Open Rack for Hand Tools

Build it by hand and enjoy the benefits

BY DAN FAIA

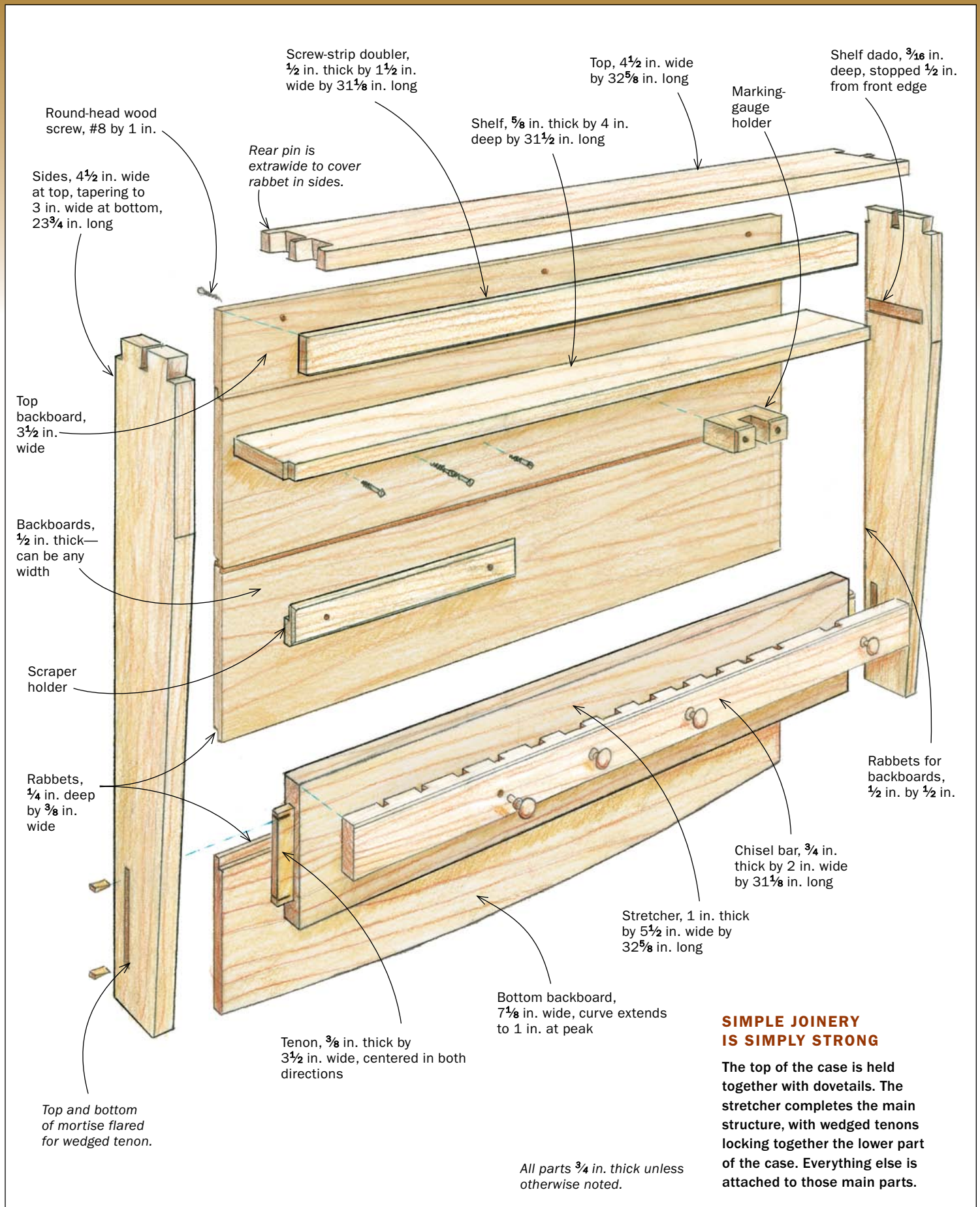
For the first few years in my new shop, I worked out of a tool chest. Or at least I tried. A pile of tools took over my workbench, battling with workpieces and wood shavings. I wasted a lot of time working around the clutter. That's when I decided to hang my most-used hand tools on the wall behind the bench. At first I used whatever hooks and holders I could come up with, but this new approach had an instant impact. Making my tools easier to access not only made work easier but also encouraged me to put tools away. The clutter dissipated and the workbench became a pleasant area to work.

To take my wall-hung tool storage to the next level, I designed the rack you see here. Although compact, it will hold and display all of the essential hand tools for a modern furniture maker. (For my personal list of essential hand tools, and why each one deserves its place in the rack, see Handwork on p. 78.) Your list may not match mine, so I made the rack design versatile enough to adapt to almost any collection.

I figured out the dimensions and layout by spreading out the tools on the bench and arranging them as they might go in the rack. I wanted my two bench planes on top, so I simply lined up my No. 4 and No. 7 nose to nose to get the overall width. I took the depth from the widest tool, adding a little extra space plus the thickness of the case back. To get the overall height, I arranged the entire set of tools as they would go on the shelf, in the chisel rack, and on the various hangers.

You can build the rack from almost any wood, but I chose Eastern white pine, mostly because of its light weight. The tools themselves are quite heavy, so I wanted to keep the rack on the lighter side.

I went with traditional joinery that is both strong and straightforward. These classic joints are also a good hand-tool exercise, and I'll show you how to execute most of them. Through-dovetails join the case sides to the top, with the tails located on the sides to resist the weight pulling downward. The lower stretcher ties the case sides together with wedged through-tenons. The wedging action has a mechanical effect similar to the dovetails, completing a rock-solid case. The shelf can then sit in simple stopped dadoes, and the back can be made of shiplapped boards. I ran the backboards side to side so that I could



SIMPLE JOINERY IS SIMPLY STRONG

The top of the case is held together with dovetails. The stretcher completes the main structure, with wedged tenons locking together the lower part of the case. Everything else is attached to those main parts.

Photos: Asa Christiana; drawings: Kelly J. Dunton

Pins first. *Faia cuts his dovetails pins first, sawing right to his pencil lines. He uses a coping saw to remove most of the waste, and pares to the baseline with a wide chisel as shown, working in from both sides.*

Dovetails at the top

The tails go on the side boards, carrying the weight of the rack hanging below.

Transfer carefully. *Hold the pins board against the tails board, lining it up carefully. Use a hard, sharp pencil to transfer the location of the pins, and then carry the layout around the end of the tails board.*

glue in the topmost one, which holds the long screws that attach the rack to the wall.

Start with the dovetails

Mill the sides, top, and stretcher to thickness and cut them to length. The stretcher should be left ⅛ in. to ¼ in. longer than the top to allow some extra material for its tenons to be wedged. (Afterward the tenons are planed flush to the sides.) This is a good time to rabbet the sides to accommodate the backboards later.

Construction starts at the top. I cut the dovetails pins first and used hand tools throughout. I set a marking gauge to the thickness of the stock and scribed the dovetail shoulders on both the top and sides. I used a pencil to lay out the pins on the end grain and then squared them to the shoulders.

After sawing the pins, coping out the waste, and paring the shoulders, check that the cheeks and shoulders are flat and square to the face of the board, and pare them if they're not. Next, transfer the pin locations on the top board to the case sides using a sharp pencil with hard lead (No. 3). Continue the square pencil lines across the end grain. Now saw, chop, and pare the tails to fit.

Now the mortise-and-tenons

It's always easier to cut mortises first and then make tenons to fit.

Pine is forgiving. *After sawing the tails right to the layout lines, you shouldn't have to pare them. But if you do, pare sparingly with a wide chisel.*

So lay out the two through-mortises now, on both the inside and outside faces of the sides. Use a marking gauge and marking knife (vs. a pencil) for accuracy and to prevent chipout on that all-important outside face where the tenons will come through. It will also be cleaner to cut these mortises from the outside face in, regardless of whether you use power or hand tools.

After cutting the mortises, lay out the tenons. To ensure that the rack sides end up parallel, with square joints, start by marking a light centerline on both the top and stretcher, and clamp the two together, using a marking knife to transfer the shoulders of the dovetails to the stretcher board. Finally, square the shoulder marks around the stretcher. Next, lay out the tenon cheeks. Start by determining the width of the back shoulder (or the distance

SOURCES OF SUPPLY

HARDWARE FOR HANGING TOOLS
LeeValley.com

Cast steel classic knobs, ¾ in.

Single coat hooks, oiled bronze finish

Pyramid-head screws, #8 by 1 in., and #8 by 1¼ in.

Square-cut nails, assorted

Mortise-and-tenons lock in the stretcher

Cut the stretcher extralong, so the tenons will stick out a bit at each end. You'll level those later, after driving in the wedges.

START WITH THE MORTISES

Scribed layout makes for cleaner cuts. *Use a marking gauge to scribe the sides of the mortise. Scribe the corresponding line on each case side before changing the setting on the gauge.*

to the back cheek). I set dividers to the distance from the rabbet to the rear mortise, and transferred that to both ends of the stretcher, which ensures that the stretcher meets the back of the case evenly. After sawing the tenons, plane or pare the back cheek right to its scribe line, to be sure the back of the stretcher ends up flush against the backboards. Use the front cheek to fit the tenon to the mortise.

After milling the shelf to thickness, leave it a bit extralong and extrawide. Then dry-assemble the four main pieces of the rack to locate the shelf dadoes. To avoid weakening the sides, the dadoes are shallow, about 3⁄16 in. You can mark the depth with pencil on the front edge; the router plane will ensure uniform depth.

Fit your tools to the chisel bar

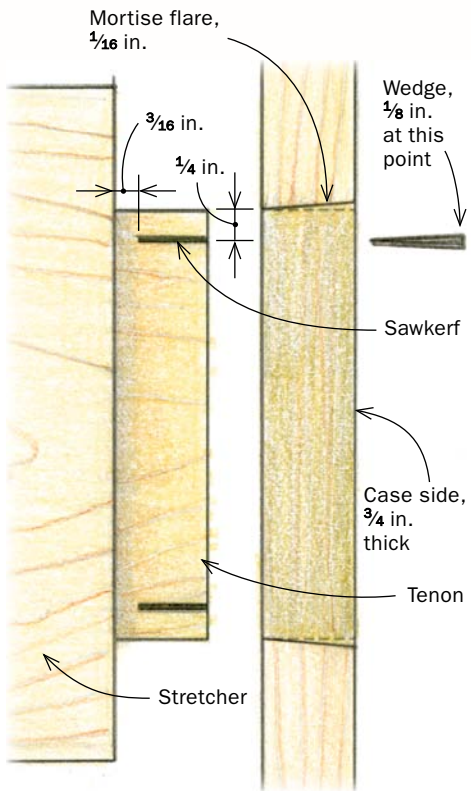
The chisel bar is simply a dadoed stick that is glued or screwed to the stretcher. Cut the chisel bar to length, matching it to the shoulder length of the stretcher. You might be tempted to assemble the whole rack before gluing in the bar, but the overall assembly will go easier with the bar already glued to the stretcher, providing a larger surface for the sides to register against. Before committing to these dadoes, mock up the tool layout a few ways. Then cut these short dadoes the same way you did the shelf dadoes. Before attaching the bar to the stretcher, dry-clamp them together to check how the tools fit. Adjust as necessary. If you are committed to your tool set, as I am, you can glue on the bar permanently. If you are still assembling the perfect collection, use

Drill and chop. *After drilling out the waste, do most of the chisel work from the outside face, which is the most important. Work slowly back to your scribe lines.*

Flare the mortises. *Mark both ends of each little taper. One mark goes on the outside face, and the other goes inside the mortise. Connect the marks with chisel cuts.*

FLARE MATCHES FLARE

For best results, flare the ends of the mortise to accommodate the depth of the sawkerfs in the tenon and the thickness of the wedge.



Scribe and saw. *For both the shoulders and cheeks, use a knife to mark the layout and then keep the sawcuts on the waste side. To make the long cheek cuts, saw first into one corner as shown, come from the other side and saw into the other corner, and then finish the job with the saw level and the first two cuts guiding you.*

screws to attach the bar, so you can change it out later. When locating each screw, be aware of where other hardware will be attached to the front of the bar.

Prep the mortises for wedging, and glue up the case

For wedging to work well, you must flare the top and bottom of the mortise. This prevents splitting and ensures that the parts won't pull apart. The tenons are not split all the way down to the shoulder, so the mortises aren't flared all the way down either. Now prepare some wedge stock to match the thickness of the tenon. I laid out the same flare angle on the wedge stock, and used a dovetail saw to cut the wedges. Then, using a chisel and simple notched guide block, I trued each wedge surface. The last step before assembly is to taper the sides of the case.

One of the great things about traditional joinery is how easy it makes assembly. Be sure the case glues up square. Do not add the shelf yet. While the glue is still wet and the clamps are still on, put a little glue on each wedge and drive it in. Since there is one at each end of the tenon, you'll need to go back and forth, driving each wedge a little at a time. Stop when there are no gaps in the mortise and the tone of the hammer blows changes to a harder knock, indicating that the wedge is seated. Once the glue has cured, the excess tenon and wedge material can be planed flush.

You know the shelf thickness is right because you made the dadoes to fit it. Start by cutting it to precise length, leaving it a bit wide. Now lay out and cut notches at the front end for the stopped dadoes. Then, with the shelf in place, flush with the front edge of the rack, mark the location of the rabbets on the back edge of the sides. Rip the shelf to this mark, but don't glue it in just yet.

Add the shiplapped back

Determine the layout for the shiplapped back, depending on the width of your lumber. Screw and glue in the top and bottom boards, but to allow seasonal wood movement, leave gaps around the middle boards and use only screws to attach them. The ½-in.-thick boards will accommodate most hardware, pegs,

CUT AND FIT THE TENONS

Pare the shoulders. *Use a wide chisel to work your way across the shoulders, setting the tip of the chisel in the knife line each time.*

Use a shoulder plane to fit the cheeks. *Do most of the planing on the front cheek, so you don't change the distance at the back. Then notch the ends to cut the tenon to width.*

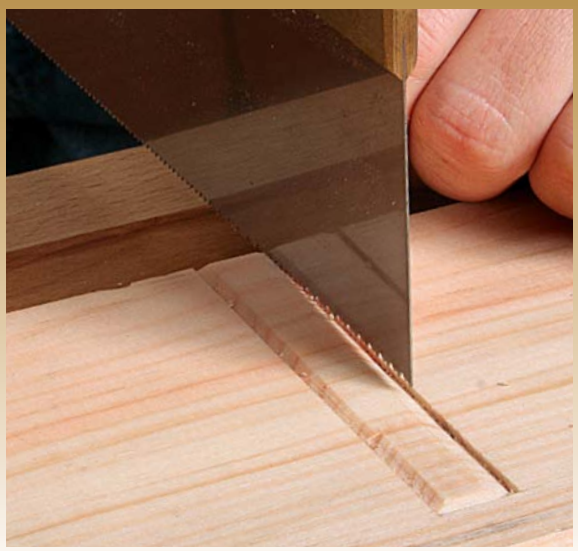
Kerf the tenons. *Saw ¼ in. from the ends and stop 3⁄16 in. short of the shoulder.*

Tricks for clean stopped dadoes

The shelf slides into shallow, stopped dadoes, which are easy to cut with hand tools.

Scribe the edges. *Dry-fit the case and measure from the top to mark the first edge. Use the actual shelf to position the square for scribing the second line.*

Ramp the scribe lines. *Take an angled chip along the inside edge of each line. Do the same at the stopped end.*



Small shoulder guides the saw. *Rest a backsaw against the shoulder. Pull it backward to start the cut, and then tilt it to cut down to depth at the front edge before leveling the saw and finishing the stopped cut with short strokes.*

Rough out the waste. *Use a bench chisel to pare out the waste between the sawcuts, stopping a little short of the bottom. Don't push too hard at the stopped end or you could chip the wood past the stopping point.*

Router plane finishes the job. *Lower the blade bit by bit to clean up the bottom of the dado. Use a chisel to chop the edges deeper if necessary.*

and screws for hanging tools. For easiest clamping, attack the rest of the assembly in the following order. Glue and screw in the top backboard. Then, while you have easy clamp access to the area, glue the screw-strip doubler into the top corner of the case. This ½ in. of extra wood helps to support the screws that attach this heavy case to the wall. Now glue in the shelf, and then screw on the rest of the backboards with small expansion gaps between them.

Before attaching the hooks, knobs, nails, and custom hangers, double-check the positions of all the tools and add a simple shellac finish. To hang the rack, drive screws through the back and into wall studs. Now stow your hand tools and start working. □

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Mark the shelf notches. *After milling the shelf to thickness and length, slip it into its dadoes as far as possible and make a knife mark at the shoulder. Then remove the shelf and cut the notches at the front edge.*

Assembly is easy

It shouldn't take much pressure to glue up the case. Check diagonals to make sure it comes together square.

Wedge the tenons. *Grooved clamping blocks accommodate the extra tenon length. Keep the clamps on while you drive the wedges.*

Glue in the top backboard and the shelf. *Screw it into place at the ends, but also clamp across it to strengthen the glueline at the top edge (above). Now glue and clamp on the screw-strip doubler while it is easy to access, and then rip the shelf to width and glue it in (right).*

The rest of the backboards. *Note the screwing pattern, designed to hold down the backboards while letting them shrink and expand. The bottom board is fully screwed and glued, like the top one.*