

A Door in Disguise

This bookcase masks a hidden storage closet

by Gary Katz



Hidden-door bookcases aren't easy to design or build, but they're always an intriguing undertaking. Every time I build one, I learn something new. I still haven't achieved the perfect unit, with a completely invisible door that works smooth as silk for years to come — not even the one shown on these pages.

In this article, I'll point out a few of the mistakes I've made, so that you don't repeat them.

Hinges & Wheels

I've installed bookcase doors that swing on regular butt hinges. Although I've always used 4½- or 5-inch heavy-duty ball-bearing hinges, they tend to sag a little when the bookcase is really loaded, and inevitably need adjustment down the road. They also require a lot of jamb clearance, and work only on inswinging bookcases; there's no way to hide them completely on a swing-out design.

I've also seen cabinet shops build these types of doors using Euro hinges. Trust me, those never work: No matter how many you use, they always sag. I've seen carpenters use piano hinges, too, but then it's tough to take the case off or adjust the hinge. And even a piano hinge is hard to hide in the trim on a swing-out case.

I've also tried installing wheels and rollers on the bottoms of swinging book-

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cases to deal with the sag. These work okay, as long as the floor is a smooth, hard surface and there are no throw rugs. Sometimes, though, the roller leaves a telltale track on the floor, especially over carpet.

When you use a roller, at the very least you have to leave a gap at the bottom of the case for floor clearance — and that's a dead giveaway, too. Plus it's almost

impossible to really hide the joints in the baseboard, no matter how cleverly you disguise them.

Given my past experiences, I've concluded that the best way to build a durable swing-out bookcase door — one that can be adjusted easily and is truly invisible — is to design it to swing above the baseboard and mount it on a center-hung pivot hinge.

Start With a Drawing

For this project I used SketchUp to find the correct location for the pivot point, which took some experimenting. The program allows users to draw an assembly and pivot it about a specified point.

Notice in the illustration (see facing page) how the door, when wide open, butts against the trim on the hinge side. That clearance is determined by the

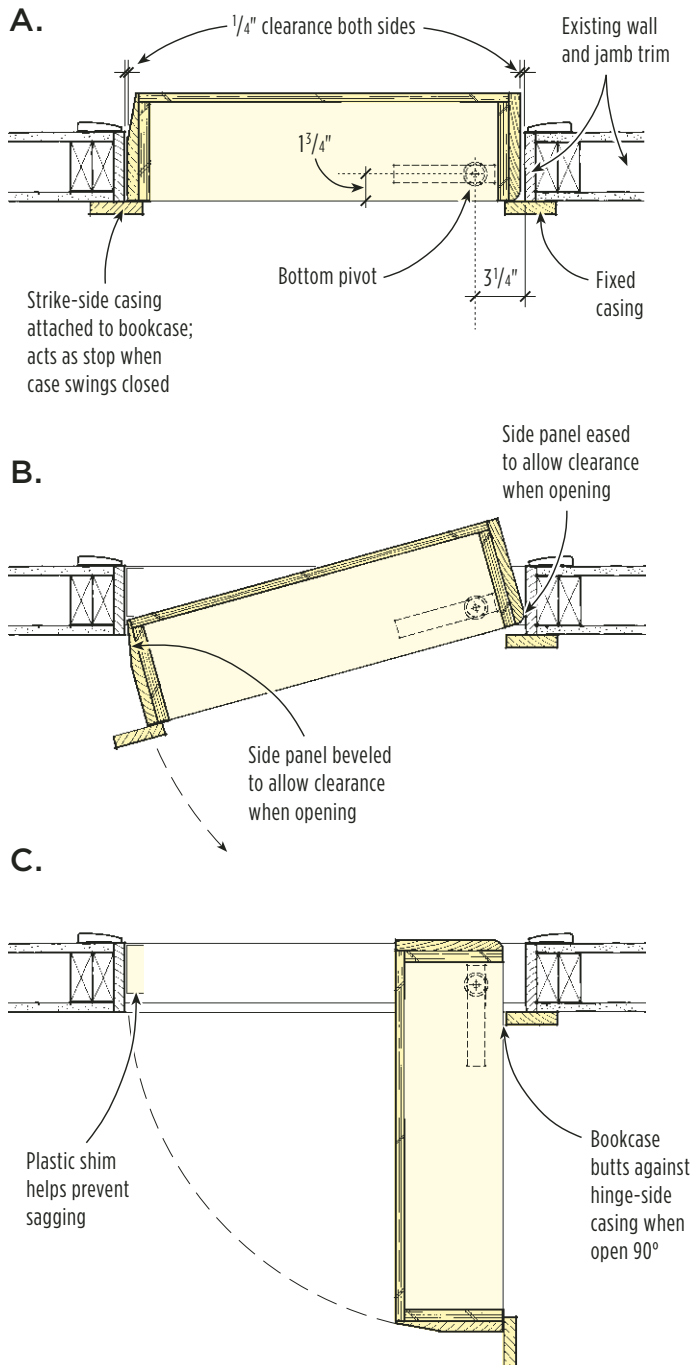


Figure 1. To strengthen the bookcase so it wouldn't sag, the author cut dados for the shelves (A). Before applying solid wood banding to the shelf edges, he ran them over a Collins Ply Prep bit (B), which helps achieve a tight glue line (C). The finished side on the strike side had to be beveled (D) to clear the jamb.

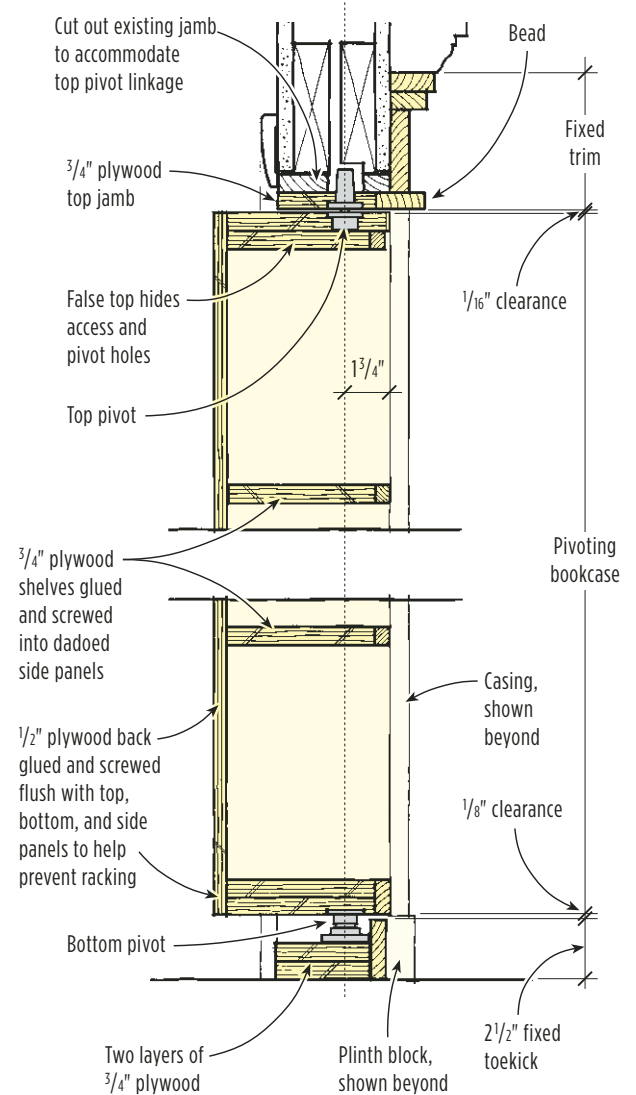


Pivoting Bookcase Details

Plan View



Section



A 500-pound-capacity Rixson pivot hinge allows the fully loaded bookcase to swing smoothly. While case construction may vary from the design shown here, it's critical that the bookcase be strong and rigid, that the swing clearance be properly planned, and that the top and bottom pivots be accurately aligned.

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depth of the bookcase and the location of the pivot measured from the hinge jamb toward the strike jamb.

I also wanted the case to have a minimal amount of clearance between the jambs, so it would just clear the trim on the hinge side and wouldn't require wide trim on the strike side. That clearance is determined by the setback of the pivot from the face of the wall.

Bottom Clearance

A big improvement in the design shown here is that the bookcase swings above the baseboard. This means it won't drag on a throw rug and can be trimmed out without any visible gaps.

I wanted the case to end up about 2¾ inches above the floor, to clear 2½-inch baseboard. My drawing confirmed that mounting the pivot base on

two layers of ¾-inch plywood would get me close to 2½ inches above the floor. Because I could install the toekick after swinging the case, the exact dimension didn't matter, which made installation a lot easier.

Bookcase Construction

To help prevent the case from sagging, I dadoed the sides to accept the shelves, something I don't always do for built-in cases (see Figure 1, page 2).

I first prepped the plywood with a Collins Ply Prep bit (\$20; 888/838-8988, www.collinstool.com), which routs a slight depression on the plywood edges, leading to a much tighter glue line. Then I banded the plywood with solid mahogany, glued and pinned it, and ran a laminate trimmer on each side to cut the surfaces flush. Before assembling the

pieces, I prefinished everything with water-based polyurethane (Figure 2). Building many bookcases has taught me that finishing all those inside corners and edges without runs and drips is just too hard.

To help ensure that the case wouldn't sag, I both glued and screwed the shelves. In this design, finished sides — added after the case was swinging — would cover the screws. I also glued and screwed the back flush with the sides, so that the case would never rack.

Pivot Hardware

I used a Rixson Model 370 bottom pivot, which can accommodate up to 500 pounds and doors up to 3'-8" x 8'-6".

The bottom pivot includes two pieces: the bottom-pivot spindle, which mounts directly to the floor; and the bottom bear-



Figure 2. After prefinishing the pieces (above), the author assembled the case with glue (top right) and screws (right).

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ing, which must be mortised into the bottom of the door (**Figure 3**).

The top pivot is a standard Model 340, consisting of a retractable jamb-mounted pivot spindle and a finished cover plate, which are mortised into the jamb head; and a top guide, which is mortised into the top of the door. The two pieces come as a set from Architectural Builders Supply (877/631-9411, ABSupply.net) for around \$150.

I learned long ago to always make templates for door hardware, especially hinges. Doing so makes it easier to position and cut the mortises perfectly — and to get their depth right. Plus, once you've used any specialty hardware, you're bound to use it again.

In this case, the bearing guides and the top jamb pivot were the same width and thickness, but because their centers var-

ied, along with their lengths, each piece of hardware required a custom template.

Making the Templates

I started by ripping stock for the center spreaders. A standard $\frac{9}{16}$ -inch door-hanging template guide and $\frac{1}{2}$ -inch router bit will cut $\frac{1}{16}$ inch short of the template bushing, so I made the template openings $\frac{1}{8}$ inch wider and longer than the hardware. I ripped the spreader stock to $1\frac{3}{8}$ inches for the $1\frac{1}{4}$ -inch plates. I centered the spreaders between two outer rails, spacing the spreaders the length of each plate plus $\frac{1}{8}$ inch apart, then fastened the templates together with pocket screws.

Laying out the template stops is critical: If you get that right, the pivots will be in exactly the right position when you set the hardware into the mortise.

For each template, I marked a centerline on both axes (parallel to the wall and perpendicular to the wall), then measured from those lines to locate the stops.

For the bookcase templates, I measured $2\frac{1}{4}$ inches from the pivot center to the back of the first side, knowing that the second finished side would add another $\frac{3}{4}$ inch, resulting in a 3-inch backset.

For the front backset, I measured $1\frac{3}{4}$ inches from the pivot to the front of the template and attached stops on that line.

So that I wouldn't have to run my router inside the house, I made a new top jamb that attached directly against the existing head jamb (more on that smart idea later). But the top template required a different layout: I measured 3 inches to the back stop and added another $\frac{1}{4}$ inch for the gap between the finished side of the case and the door jamb.

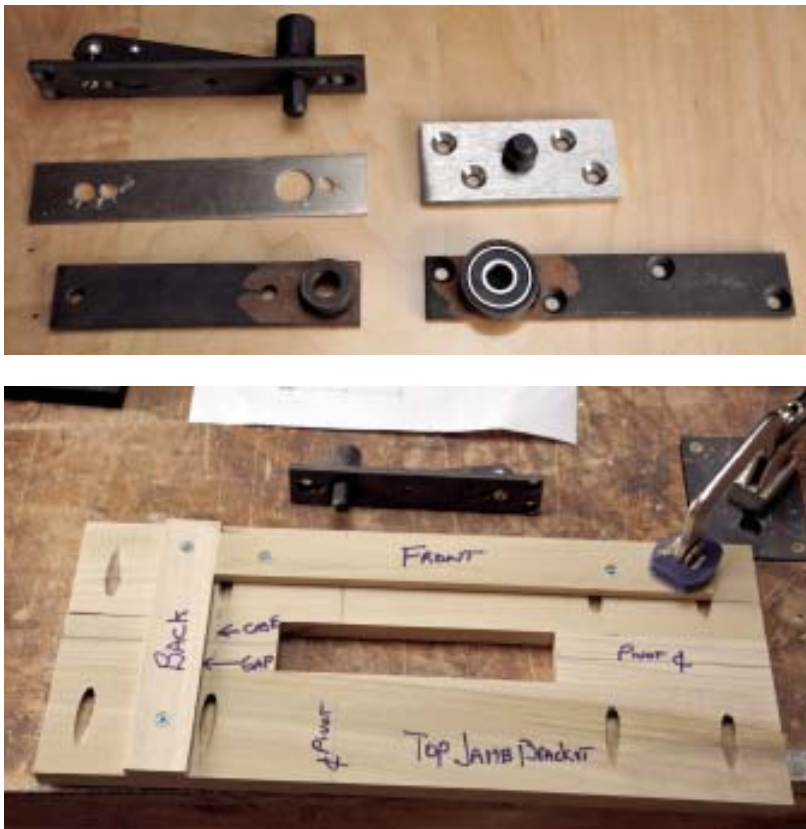


Figure 3. This Rixson pivot hinge set (top left) has a 500-pound capacity. The author made router templates (left) to guarantee that the mortises in the case and jambs would be accurate (above).

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The front backset was identical because I made the new top jamb flush with the face of the door jamb (a mistake, as I discovered later).

Making the Mortises

The rest was easy. After adjusting the depth of cut on the router bit, I attached the templates to the case. Because of the stops on the back of each template, positioning was dead on; I needed only

one clamp to secure the templates.

The top pivot guide requires a through-hole for the upper pivot spindle (Figure 4). I traced around the guide, then drilled out the hole with a paddle bit; a block of wood clamped to the inside of the case prevented tear-out. A false top shelf, installed after the case was swinging, would hide this hole.

Next, I mortised the new top jamb for the retractable jamb-mounted pivot.

A wide through-hole must be cut for the pivot linkage, which I started with paddle bits and finished with a jigsaw.

After that, I was finally ready for installation.

Installing the Case

I began by placing the new top jamb over the existing jamb, then traced the cutout for the top pivot linkage. I drilled a series of holes with paddle bits and

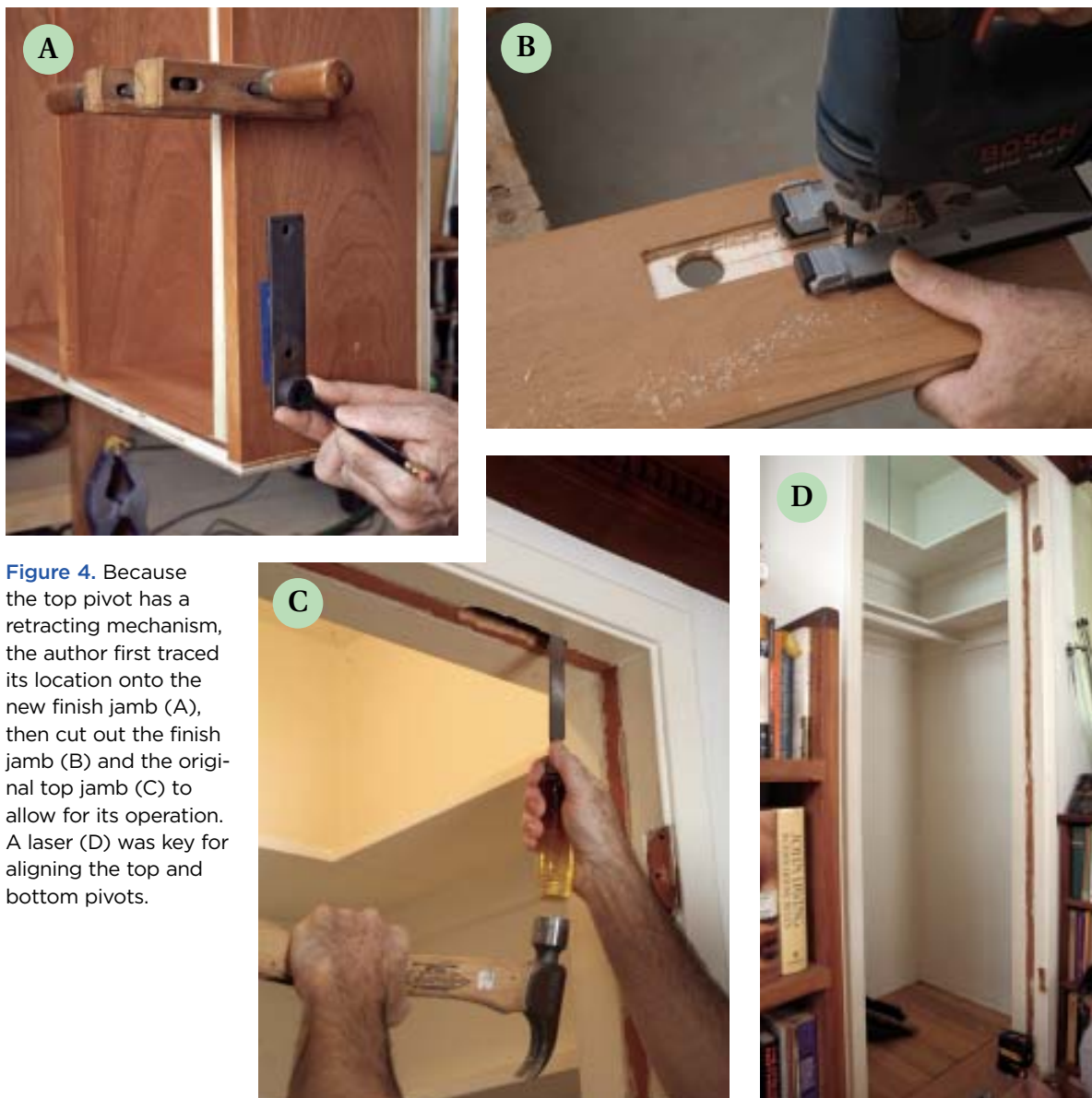


Figure 4. Because the top pivot has a retracting mechanism, the author first traced its location onto the new finish jamb (A), then cut out the finish jamb (B) and the original top jamb (C) to allow for its operation. A laser (D) was key for aligning the top and bottom pivots.

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knocked out the waste with a chisel.

With the top jamb and pivot installed, I shot a laser plumb line from the center of the pivot to the two-layer $\frac{3}{4}$ -inch-plywood base on the floor, locating the exact center of the bottom pivot. I double-checked the location with my tape measure, in case the jamb was out of plumb or twisted. Since the jamb was about $\frac{1}{8}$ inch out of plumb at the bottom, I moved the bottom plate slightly so that the case would hang as flat as possible in the plane of the wall.

Note that the plywood spacers at the

bottom are $\frac{1}{2}$ inch narrower than the jamb. I allowed $\frac{1}{2}$ inch for the toekick beneath the cabinet because a recessed toekick makes it nearly impossible to notice any gap between the top of the kick and the bottom of the case.

Hanging the case wasn't difficult. As with any pivot door, I first retracted the top pivot by backing out the set screw (Figure 5). When I'm hanging a door, I usually set it perpendicular to the jamb, place it on the bottom pivot, then lean it back against the top pivot. That way, I have comfortable control over the door

while I back out the set screw and retract the top spindle.

It's easy to position the door directly under the spindle and then run the set screw back in, pinning the door into place. But with a bookcase it's not so simple.

Fortunately, this was one problem I had anticipated, which made me feel pretty good. I had designed the case $\frac{1}{4}$ inch short of the opening, which provided just the right gap between the top of the case and the head jamb. I backed out the set screw halfway, then placed



Figure 5. To install the case, the author first retracted the top pivot (top left), then rocked the case into place (above). At this point he realized he had forgotten to provide a screw-driver access hole to drop the pivot back into place. By trial and error he was able to drill a hole from underneath (left).

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Figure 6. After swinging the case, the author attached the finish sides (A), then installed a shim made from high-density plastic to support the bookcase from beneath (B). With the case in its final closed position, he scribed and installed the bead (C) and head trim (D), leaving only a slight gap to allow the case to open.



the case on the bottom pivot and straightened it up in the opening. The top of the case barely scraped across the bottom of the set screw, while the top jamb pivot spindle dragged over the top of the case and then dropped like magic right into the pivot guide. Amazing!

It was at that moment that I realized I couldn't reach the set screw with a screwdriver: I couldn't run the screw in to secure the case completely, and I couldn't back the screw out to remove the case. Suddenly I wasn't feeling so smart anymore — and it got worse.

On my first attempt at drilling a simple

3/8-inch access hole through which I could reach the set screw with a narrow screwdriver, I couldn't seem to find a drill bit sharp enough to get through the plywood. I tried a paddle bit first, then a twist drill. On the third attempt, I realized I was drilling right into the bottom plate of the pivot hinge.

Determined to overcome my own stupidity, I thought about it, then drilled a second access hole, located on a radius layout out of the way of the bottom hinge plate. Now I could swing the case until the new hole lined up with the set screw. Luckily this strategy worked. I turned the

screw and drove the pivot spindle all the way into the top guide.

Next time, I'll lay out the access hole when I'm making the bookcase; I'll use a compass to swing an arc so I miss the hardware mortise in the top.

Trimming the Case

Attaching the finished sides after swinging the bookcase made the case easier to maneuver and gave me more wiggle room when I centered it in the opening. I painted both finished sides with glue and secured them with a few trim screws from inside the case (Figure 6).

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Figure 7. A mahogany dowel (far left) locks the closed book-case in place. A false top panel (left) completes the job.

Before starting the trim, I installed a shim made from UHMW (ultra-high molecular weight) plastic, which is pretty slippery stuff (about \$18 for a 3/4-inch-by-12-inch-by-12-inch sheet at www.smallparts.com). I ripped a 1 1/4-inch length of the material, then cut a long shim using a Festool guide and saw. I sized the shim to just touch the bottom of the case when the door is closed, which should prevent any minor settling and keep the moving joints in the trim at the top of the case tight.

Trimming the top of the case was tricky. The joint between the architrave molding (parting bead) and the top of the case must be invisibly tight, yet still provide 1/16 inch of clearance for the case to swing.

And that's where I made another mistake: I should have ripped the new top jamb down, to hold it at least 1/2 inch back from the face of the jamb, so that the architrave molding would run back inside the jamb and past the bookcase, putting the joint out of sight.

When I realized I couldn't hide the joint any other way, I swallowed hard and removed everything from the opening. After ripping down and replacing the head jamb, I hung the case back in the opening and started installing trim again.

I scribed the horns on the architrave molding to fit the wall and butt against the head jamb inside the opening. Then I installed a frieze board and finished the entablature with a two-step cap rabbeted in several passes on my table saw.

The base details went on next. With the case closed, I milled a piece of mahogany toekick and scribed it to the floor, leaving 1/8-inch clearance to the bottom of the case. Using trim head screws, I attached the plinth blocks and casings, making sure to securely attach the strike side piece that remains on the cabinet and acts as a stop when the cabinet swings closed. I also added a strip of peel-and-stick edge banding (www.fastcap.com) to the side of the case so I could hold the trim back and leave a

reveal; otherwise, as I mentioned earlier, the case wouldn't open 90 degrees.

Wrapping Up

With the case tight against the wall, I drilled a 3/4-inch hole through the side and into the jamb. A 3/4-inch by 5-inch-long dowel with a mahogany grip locks the case in the opening (**Figure 7**). (I hide the grip with a stack of books so that no one but *JLC* readers will know how to open it.)

I installed a false top to cover the access and pivot holes in the top of the case, then loaded the thing with books. As I'd expected, one slight tug slips the case free from the shim, and the door swings open with a swoosh of air. One day I might even tape and mud the joint between the jamb and the wall. But for now, no one but me and my dog will ever see it anyway, right?

Gary Katz moderates the JLC Online finish-carpentry forum and is a frequent contributor to JLC.