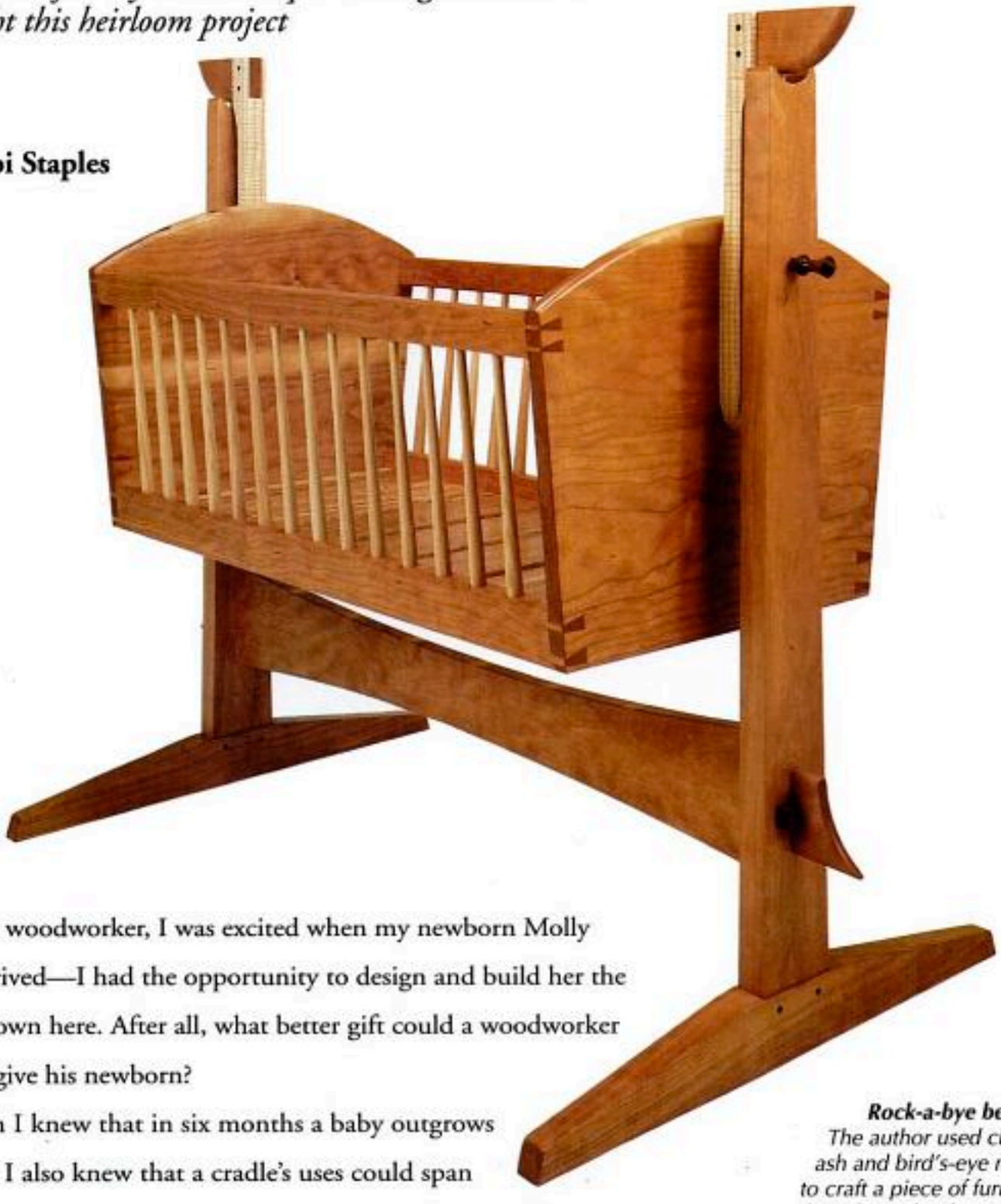
molly's cradle

Traditional joinery and a unique rocking mechanism highlight this heirloom project

by Robbi Staples



Rock-a-bye beauty. *The author used cherry, ash and bird's-eye maple to craft a piece of furniture that's bound to be enjoyed by many generations.*

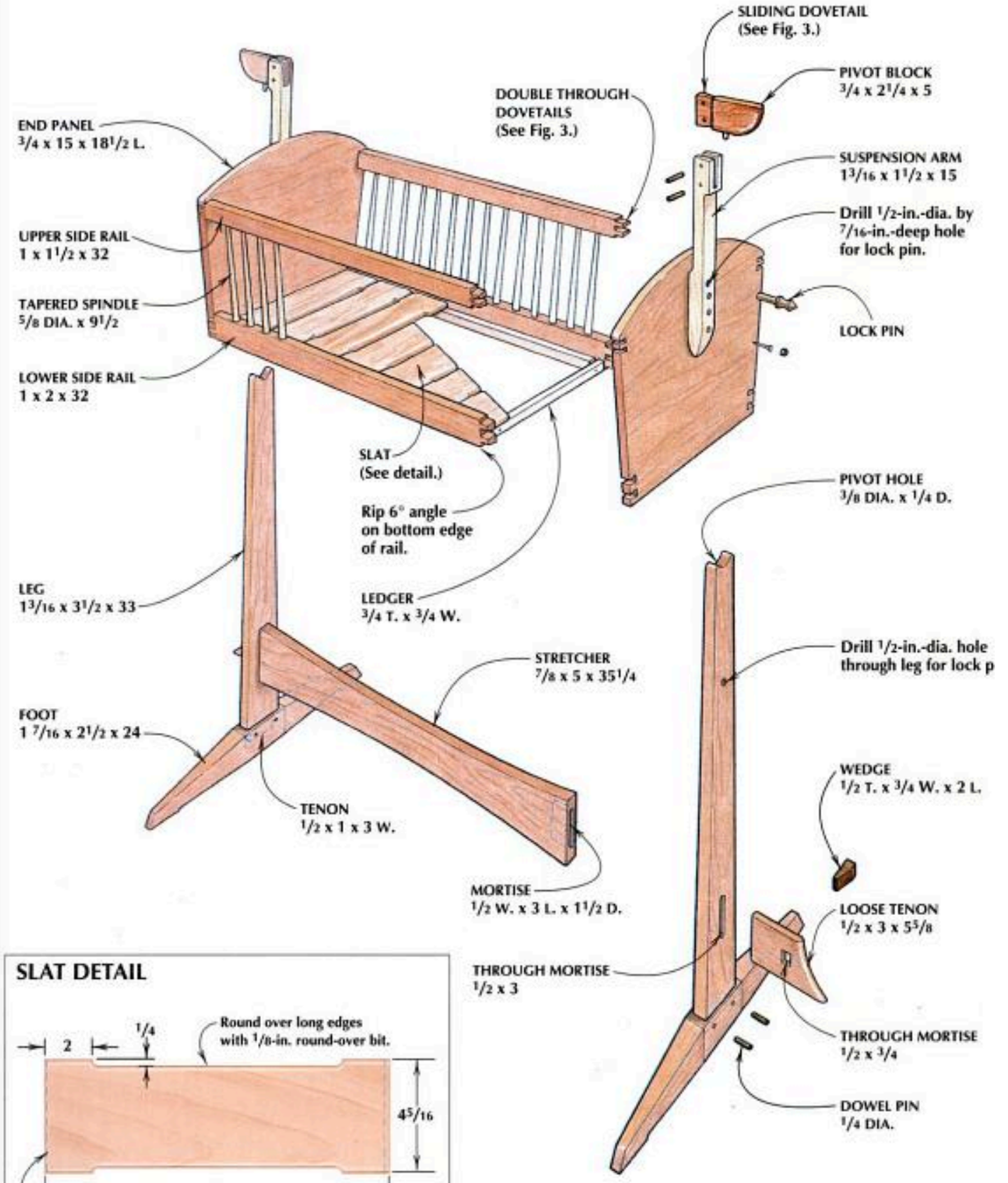
PHOTO BY JOHN HAWKS THORNTON

As a woodworker, I was excited when my newborn Molly arrived—I had the opportunity to design and build her the cradle shown here. After all, what better gift could a woodworker and dad give his newborn?

Though I knew that in six months a baby outgrows a cradle, I also knew that a cradle's uses could span generations. First, what was once your infant's sleepy habitat can hold toys, dolls—you name it. Later, visiting grandchildren will appreciate a comfortable bed. And eventually your child can pass the cradle down to his or her own children.

FIG. 1: HANGING CRADLE

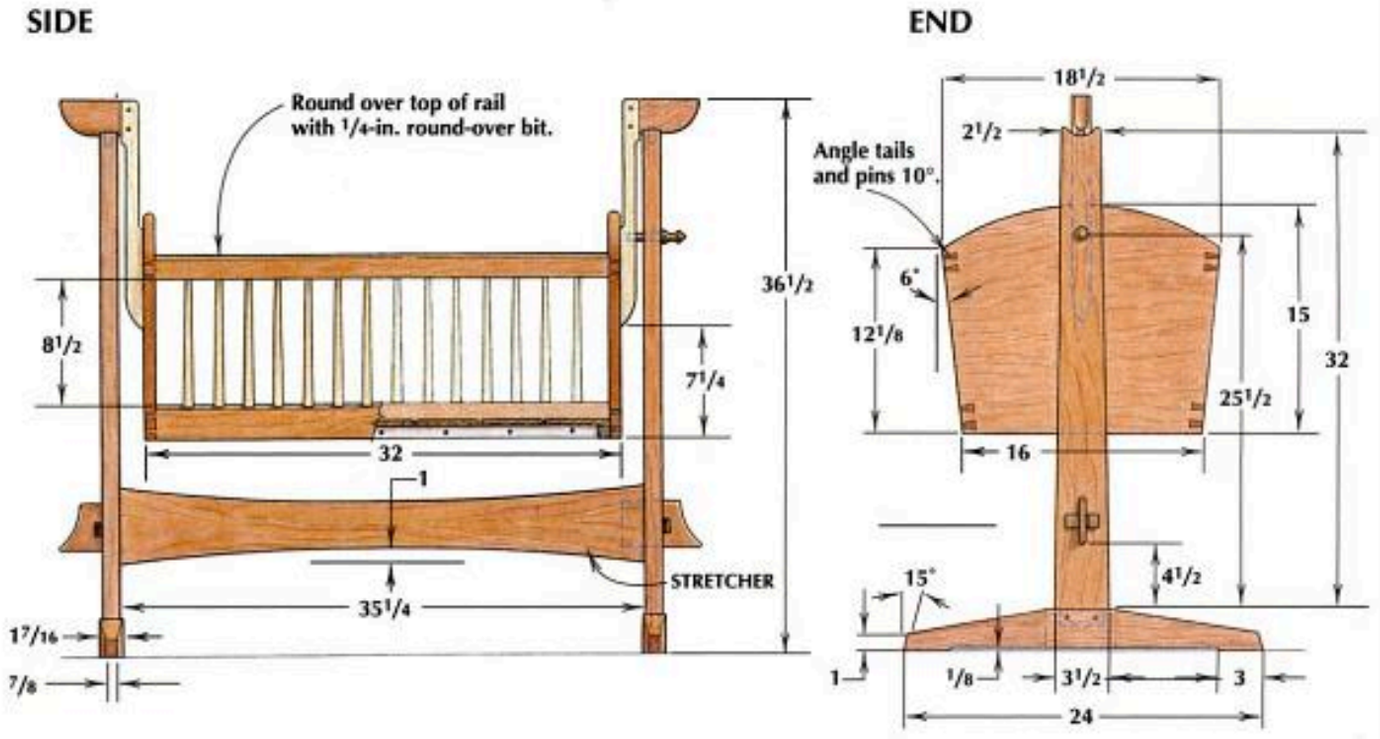
This cradle consists of a basket designed to swing or lock safely on a stand that can be disassembled easily. Major dimensions a shown in Fig. 2. Suspension system details are shown in Fig. 3.



SLAT DETAIL

FIG. 2: ELEVATIONS

Make the basket, suspension arm and leg assemblies first, then use these to determine the exact shoulder-to-shoulder dimension of the stretcher.



Cradle Design

At six months, babies are usually 23 in. to 27 in. long. To keep the cradle on an intimate scale, I designed it to hold the smallest standard baby mattress I could find, which measures 14 in. by 30 in.

I chose open sides with spindles instead of an enclosed basket for several reasons. Spindles allow the baby to see out, and parents to see in. It's also more comfortable during hot weather. And the spindle design makes the cradle as light and portable as possible.

I designed the basket to rest on a knock-down stand. Dowel pins attached to the basket register in holes at the top of the stand, allowing the basket to be rocked gently or lifted off at a moment's notice. (See Fig. 1, previous page.) It's easy to make the cradle stationary: Just push a lock pin through the stand and into a hole drilled in the suspension arm at one end of the basket.

Safety Considerations

When designing the cradle, I wanted to make sure it would be safe for our baby. The Consumer Products Safety Commission stipulates that cradles and cribs should have spindles or slats spaced no more than 2 3/8 in. apart. Corner posts shouldn't extend more than 1/16 in. above rails, and all exposed edges should be smooth. These safety aspects ensure that active babies won't get themselves or a piece of clothing caught. Also, there should be no loose parts (screws or bolts) for babies to get their hands on.

The design I settled on incorporates traditional mortise-and-tenon and dovetail joinery. I used cherry for the main parts—the basket and stand; ash for the spindles and the suspension arm; and bird's-eye maple for the slats. Feel free to use any hardwood or combination of hardwoods that suits your tastes.

Making the Basket

It's important to make the basket first, since any variation in its finished length can be compensated for when making the stand.

Dovetailing the side rails. I lay out the dovetail pins on the ends of the rails, using a 1:6 ratio, or about 10°, for the slope of the pins. (See Fig. 2.) I make the pins about 1/32 in. longer than necessary so they protrude slightly through the ends of the cradle when they're assembled. This saves time later when sanding or planing the pins flush to the tails. When laying out the pins on the lower rails, make sure you allow room for a 6° rip cut, which you'll make later. (See Fig. 1.)

I cut the pins on the tablesaw, using a 5-in.-high fence screwed to my miter gauge to support the stock vertically on the saw table. I adjust the miter gauge to 10° and mark a series of vertical lines on the fence as a guide to help me keep the workpiece square to the table. Later in the process, I use the same technique to saw the socket in the suspension arms. (See right photo, page 48.) If you prefer, you can cut the pins by hand with a fine-tooth handsaw.

Spindle work. Once the pins are cut in the rails, I lay out the centers for the spindle holes. (See Fig. 3.) I drill all the holes on the drill press, clamping a fence to the table as shown in the top left photo on the opposite page. An alignment mark on the fence ensures accurate spacing of holes. Drill all the 5/8-in.-dia. holes in the lower rails. Then with the same fence setup, switch to a 3/8-in.-dia. bit and drill the holes in the upper rails.

MAKING THE SIDES

Fenced for a straight line of holes. *Clamp a fence to the drill-press table when drilling the multiple holes for the spindles, lining up marks on the work with a mark on the fence.*

Glue up square and without twist. *Clamp each side assembly against two 90° fences to keep it square. Use a flat surface such as the tablesaw to ensure the panel glues up flat.*

Bevel the lower rail. *After the glue has dried, rip a 6° bevel on the lower rail on the tablesaw to match the splay on the ends of the cradle.*

Next, I turn the spindles on the lathe, tapering each spindle from 5/8 in. to 3/8 in. with a small gouge. Once the spindles are turned, I bandsaw a 1/8-in.-deep "X" in each spindle end to eliminate glue squeeze-out when clamping up. If you don't have access to a lathe, you can buy 5/8-in. dowel stock and make the taper with a block plane or spokeshave.

Gluing up the side assemblies. Gluing the spindles to the rails can be troublesome if you're not careful to keep the assembly flat and square. I made a simple glue-up jig to deal with this. (See top right photo, above.) The jig consists of a flat piece of plywood with two fences screwed to it to form a 90° angle. By placing the jig on a flat surface such as a bench or a tablesaw, you avoid introducing any twist in the assembly. Since I also use this jig later when gluing the rails to the end panels, I cut 1/8-in.-deep notches spaced 14 in. apart in the shorter fence where the pins protrude.

With 14 spindles to glue into 14 holes in each side assembly, it's wise to use a glue with a long open time. Polyurethane glue is the perfect choice. Since it is moisture activated, I use a small sponge to dampen all the spindle holes prior to spreading any glue. An eye-shadow applicator, available wherever cosmetics are sold, works great. Be careful not to apply too much, since polyurethane glue expands as it cures.

After the glue has dried, I rip a 6° angle on the bottom rail to match the angle on the cradle ends. (See lower right photo, above.) Then I round over the top edges of the upper rails with a 1/4-in. round-over bit. (See photo, below.) Stop the round-over 1/2 in. from the rails' shoulders so you don't accidentally rout into the dovetail pins. You'll round these stopped areas later by hand.

Making the End Panels

The tops of the end panels have a gentle arc that reflects the design of more traditional cradles. I prepare my blanks slightly oversize and lay out the 6° slope on the ends of the panels. Then I lay out the arcs directly on the wood by tracing along a 1/8-in.-thick wooden strip bent to the desired curve. Two small blocks, held with hot glue, hold the ends of the strip while I bend the center with my free hand. (See top left photo, page 47.)

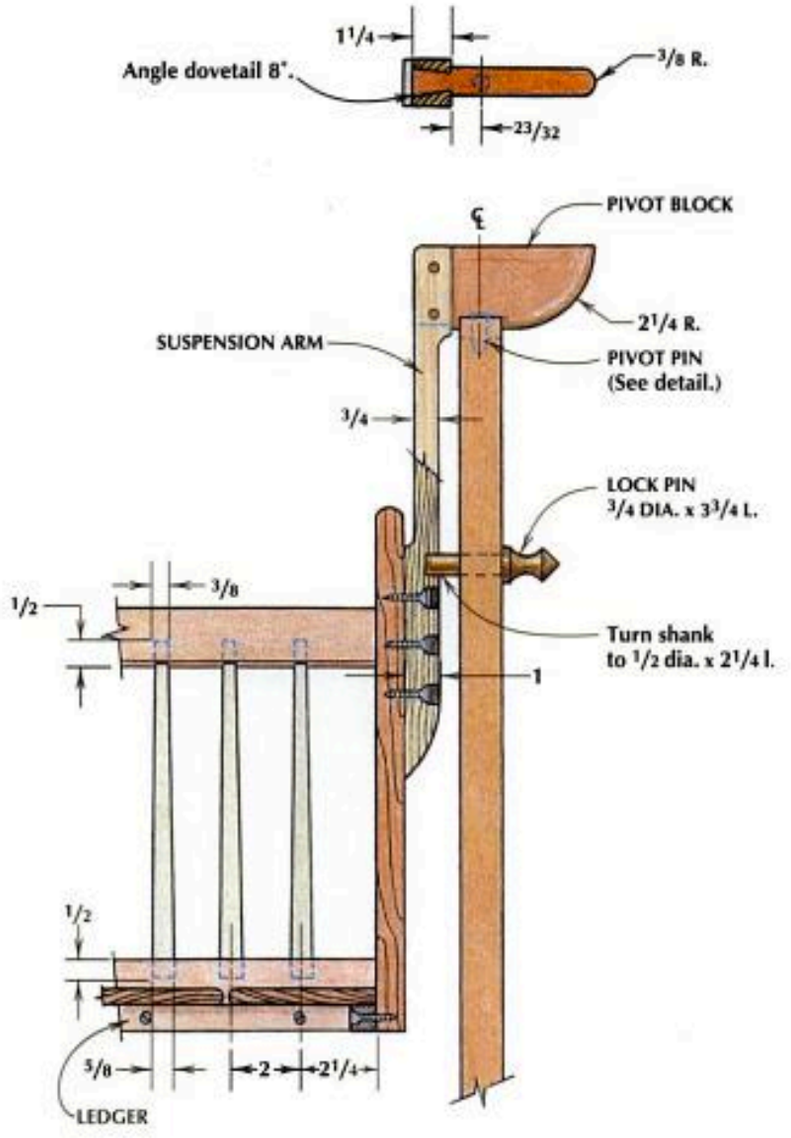
Once I've drawn the arc, I cut the angled ends with a crosscut jig on the tablesaw. (See *Shop Solutions*, AW #60.) Alternatively, you can rough out the angle on the bandsaw and sand to your line with a disc sander. After the ends are angled, bandsaw the top arc and round it over slightly with a spokeshave, working from the center toward the ends. (See Fig. 2.)

Marking and cutting the tails. I use a sharp #3 pencil to trace around the dovetail pins when marking out the tails, as shown in the top middle photo,

Round over the upper rail. *Rout a stopped round-over on the top of the upper rail with a piloted 1/4-in. round-over bit.*

FIG. 3: SUSPENSION SYSTEM ELEVATION

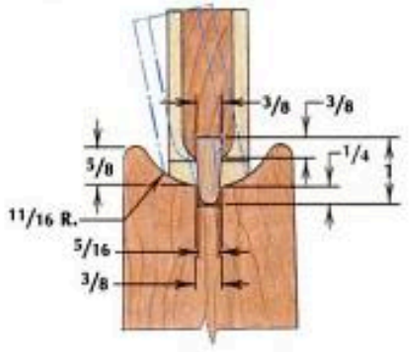
The cradle rocks by pivoting on two wooden dowel pins. Each pin is glued to a pivot block and rests in a hole drilled in the top of the legs.



Balancing act. *Wooden dowel pins in the suspension assemblies pivot in shallow holes in the stand.*

PIVOT PIN DETAIL

Taper dowel from 3/8 in. to 5/16 in. on the drill press with a sanding drum.



opposite page. If you're new to sawing dovetails by hand, it's a good idea to mark the waste. I cut the tails with a Japanese *dozuki* saw, removing the waste with sharp chisels and a mallet. (See top right photo, opposite page.) Check the fit to the side assemblies and make any necessary adjustments with a chisel.

Now you can glue up the basket. I use the same glue-up jig as before to ensure that the basket goes together square. (See bottom photo, opposite page.) Once the glue has dried, finish rounding the tops of the side rails with a rasp.

Attaching the Bottom Slats

The seven bottom slats, made of bird's-eye maple, rest on ledger strips screwed to the insides of the basket. (See Fig. 3.) I cut the slats to the dimensions shown in the detail in Fig. 1, sawing out the scooped center sections on the bandsaw. Don't scoop the outside edges of the end slats. I rout the edges of the slats with a 1/8-in. round-over bit.

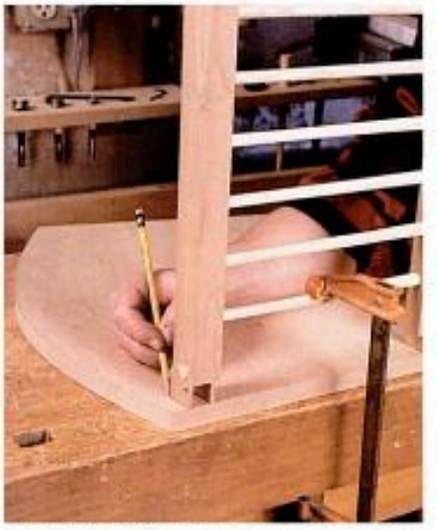
Next, I glue the slats to the ledgers, centering a 1 1/2-in.-long bead of glue on each slat end. I also spread glue on the sides of the two end slats and on the end panels. I butt the two end slats against the end panels. Then I position the remaining slats by inserting playing cards between them, creating equal gaps to allow for wood movement. To clamp the slats to the ledgers, I lay a board over the tops of the slats and place a 50-lb. bag of sand on top of the board.

Making the Suspension System

Now that the basket is made, you can turn your attention to the suspension system, which consists of two pivot

MAKING THE END PANELS

Simple arc. *Draw the curve on the panel with a thin, straight-grained strip of wood flexed between two wood blocks. Hot glue holds the blocks on the stock.*



Mark the tails. *Trace around the pins in the side assembly with a sharp pencil to lay out the tails on the end panel. Then square your lines across the ends of the panel.*

Saw to the mark. *Cut to the baseline of the tails with a dovetail saw, keeping the blade on the waste side of the marks. Clean out the waste with a sharp chisel.*

blocks, each dovetailed into a suspension arm. (See Fig. 3.)

I cut the tails on the pivot blocks on the tablesaw. It's much safer to cut both tails in a single piece of stock, then cut the two individual blocks from that piece. I start by making 1/8-in.-deep shoulder cuts in both ends of the stock with a miter gauge, riding the end of the piece against the fence at the correct distance from the blade. Then I tilt the blade to 8° and use a tenoning jig to rip the cheeks. (See photo, next page.) After ripping the cheeks, cut a 1/4-in. shoulder on each tail with a fine-tooth handsaw.

Drill the 3/8-in.-dia. holes in the bottom of the block for the pivot pins with a brad-point bit. Then cut out the individual blocks on the bandsaw and round over the edges on the router table with a 3/8-in. round-over bit.

For the pivot pins, I use tapered wooden table-alignment pins (available from The Woodworkers' Store, 800-279-4441). You can make your own pins from 3/8-in.-dia. dowel stock if you prefer. Taper one end of each dowel to 5/16-in. dia. with a sanding drum or a stationary belt sander, then glue the 3/8-in.-dia. end into the pivot block. (See detail, Fig. 3.)

Cutting the dovetail sockets in the suspension arms is next. I cut the sockets on the tablesaw, using the same fence and miter-gauge setup I used before. I adjust the miter gauge to 8° and raise the saw blade height to 2 in. (See left photo, next page.) If you're uncomfortable holding the workpiece with your hands alone, you can clamp the arm to the fence. Rip one side in each piece, then readjust the miter gauge to cut the opposite side. Clean out the waste by making successive passes over the blade with the miter gauge set at 90°. Then use a sharp chisel to remove any remaining waste, being careful to keep the shoulder flat. Once you've cut the joint, cut the arms to final shape on the bandsaw.

Now you can glue the dovetailed pivot block to the suspension arm. Once the glue has dried, finish-sand the assemblies and pin the joints with 1/4-in.-dia. walnut dowels. Then mount the arms to the end panels with three screws apiece, centering the arms on the panels and applying a 2-in.-long bead of glue at the center screw holes.

Making the Stand

The cradle stand is composed of two leg-and-foot assemblies joined by a stretcher with wedged through tenons. (See Fig. 1.)

Glue up the basket. *Use the same squaring jig as before to glue up the basket flat and square. Paired clamps pull the dovetails home.*

Tails first. *The author angles the blade to 8° and clamps the pivot-block stock in a Delta tenoning jig to saw the sliding dovetails.*

Pins second. *With the miter gauge angled at 8°, Staples saws the dovetail socket in the suspension arm by holding the work against a high fence attached to the miter gauge.*

The legs and feet are assembled with mortise-and-tenon joints, which I cut while the stock is still square. I use a plunge router to rout the mortises in the feet as well as the through mortises in the legs and the end mortises in the stretcher. I equip my router with a 1/2-in.-dia. upcut spiral bit and a commercial mortising guide that attaches to the baseplate of my router. (See lower photo, opposite page.) The guide consists of two fences that center the bit over the stock (available from Woodhaven, 800-344-6657; for more info see *Toolbox,* AW #44). To cut the tenons in the ends of the legs, I use the same tablesaw tenoning jig as before.

A doweling jig lets me accurately bore the 3/8-in.-dia. by 7/8-in.-deep hole for the pivot pin at the top of each leg. Then I bandsaw the radius at the top of each leg and taper the legs and feet. Clean up the tapers on the jointer and sand the radius cuts smooth. Be sure not to remove too much material when sawing and sanding the curves at the tops of the legs. Removing 5/8 in. of material in this area should give you a 1/4-in.-deep hole for the pivot pin. (See Fig. 3.)

Before gluing the legs to the feet, remove 1/8 in. of material from the center of the bottom of each foot to ensure that the stand won't rock on an uneven floor. I use a commercial edge sander for this operation, but a hand-held belt sander will also work fine. Assemble the legs and the feet, and pin the joints with 1/4-in. walnut dowels. Finally, lay out and drill a 1/2-in.-dia. hole in one of the legs for the lock pin. (See Figs. 1 and 2.)

With the suspension arms glued to the basket, now is the time to calculate the length of the stretcher for the stand. To do this, measure from the centerline of the two pivot pins, then subtract half the thickness of each leg.

Making the wedged through-tenon joints is next. Since the protruding tenons are a visual part of the design, it's important that they fit accurately in the through mortises cut in the legs. Rather than try to cut perfect tenons on the ends of the stretcher, I make separate loose tenons that fit perfectly into mortises. (See sidebar, opposite page.)

With all the joinery complete, the next step is to assemble the stand and drill the 1/2-in.-dia. hole in the suspension arm for the lock pin. Make sure that the basket is centered on the stand, and temporarily clamp the two assemblies together. Drill through the lock pin hole and 7/16 in. deep into the suspension arm.

The last step is to turn the lock pin on the lathe. (See Fig. 3.) Alternatively, you can carve or whittle the pin from 3/4-in.-dia. dowel stock. Turn the shank of the pin so it slides easily but without slop through the hole in the leg.

Finishing Up

Choosing a finish was important for me. I knew babies can make a mess, so I wanted a finish that could take the worst that ours could think up. Since I prefer the look of a hand-rubbed finish, I chose Sutherland Welles low-luster wiping varnish (available from Garrett Wade, 800-221-2942). Four coats wiped on, then wiped off with a clean rag, provide the protection of a varnish—and it's easy to maintain the finish by wiping on another coat when the wood starts to look dull. A rubdown with a soft cloth dampened with a mixture of beeswax and lemon oil completed Molly's dreamy abode. ▲

ROBBI STAPLES
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WEDGED THROUGH TENONS—THE EASY WAY

The wedged through tenon is a knock-down joint that goes way back in woodworking history. Strong, attractive and easy to put together or take apart, this joint can be used on all kinds of furniture, including tables, chests, armoires, cradles and even bookcases.

Cutting the wedge and its through mortise are the easy parts of this joinery exercise. The tough job is cutting the broad, long tenon accurately so that it will fit snugly in its mortise. But this isn't a problem if you follow my technique. Instead of forming the tenon from the stretcher, I cut a piece from each stretcher end and use it to make a loose tenon, as shown below. It's easy to plane the loose tenons to the exact thickness for their mortises. Then each tenon can be joined back to the stretcher. If you stick to the original grain orientation, no one will suspect that your tenons were made the easy way. —*R.S.*

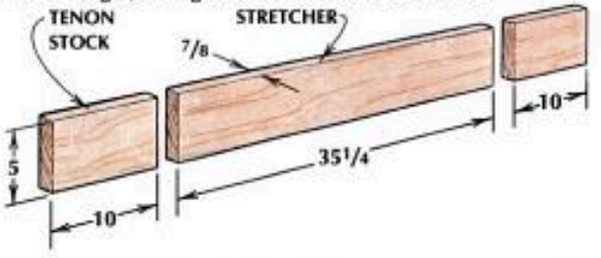
Locked with a wedge. *This sturdy knock-down joint is held together with a wedge that slips through a mortise in the tenon.*

FIG. 4: MAKING A WEDGED THROUGH TENON

This beautiful knock-down joint is sturdy and simple to make by following the steps below:

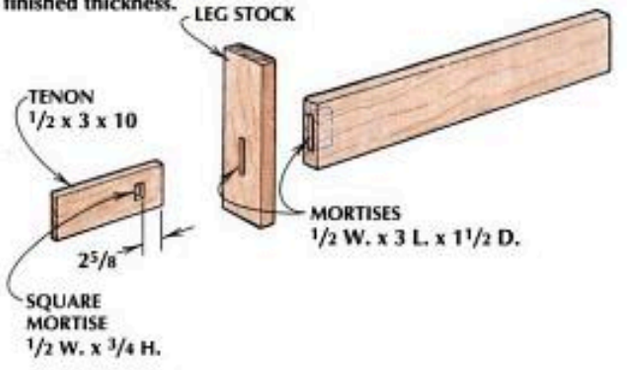
STEP 1

Crosscut stock. **Mill the stretcher stock to 7/8 in. x 5 in. x 55 1/4 in. long. Crosscut the stretcher to finished length, saving the two offcuts for the tenons.**



STEP 2

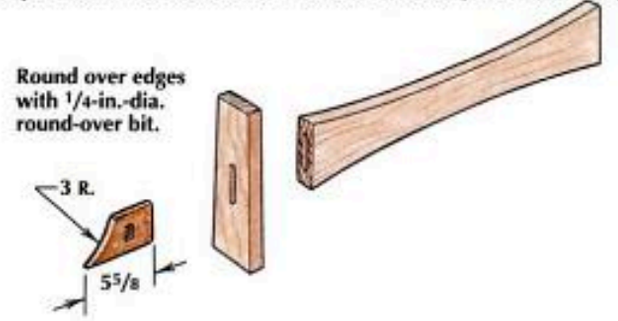
Rout mortises; rip and plane tenons to fit. **Drill and chop the mortise in each tenon after planing it to finished thickness.**



Plunge rout the mortise. *Staples uses a 1/2-in. upcut spiral bit and a pair of fences attached to the router baseplate to rout the mortise in the end of the stretcher.*

STEP 3

Bandsaw stretcher, leg and tenon. **Shape the parts on the bandsaw, and round over the tenon to fit the curved ends of the mortises. Glue the tenon into the stretcher, making sure the tenon is perpendicular to the stretcher shoulder. Lock the joint with a wedge.**



ASSEMBLED JOINT DETAIL