SIMPLE INTERIOR ARCHES

by Paul Turpin

TRADITIONAL LAYOUT TECHNIQUES AND NEW PLASTIC DRYWALL TRIM COMBINE TO MAKE ELEGANT OPENINGS

A form built of pine boards and 2x spacers serves as the substrate for this drywall arch (above). The author finishes the edges with a bullnose trim to soften the arch's lines (right).

Interior passage arches are one of my favorite design elements. They add interest and grace to a house that's otherwise routine on the interior. They also soften the transition from one room to another and, when properly positioned, allow light to flow into formerly dark spaces. But use restraint: Unless the house is really grand, a few arches go a long way. They work best when they serve as contrast, not when they're piled one on top of the other.

Curves Ahead

Arches come in three common shapes: semicircular (Roman), segmental, and elliptical (Figure 1). In determining the shape of an arch, you must consider the height and the width of the opening. A semicircular arch can be attractive, but unless the ceilings are really high, you can't build one over a wide opening. Segmental arches, so-named because they're laid out as segments of a circle, are common in masonry construction; they allow the mason to use uniform-sized masonry units rather than tapered or angled ones. For interiors, I prefer elliptical arches; they give plenty of headroom, even on narrow openings, and still look graceful on wide openings.

Design-wise, I always look at the rest of the house before deciding what shape an arch should take. If there are curves elsewhere, perhaps an arched window or a china cabinet with a curved front, it's a good idea to match the shape of those curves.

In a recent remodel I added elliptical arches because they matched the character of the 1940s home. The owners have since been complimented for keeping the original arches! In this article, I'll focus on laying out and building elliptical arches.

Structural Preparation

If you're retrofitting an arch, as I often do, investigate the walls carefully before you decide where the arches will go. The first thing I look at is the structural question: Are the arches in bearing walls? Partition walls often carry loads from the ceiling joists and from the roof. Sometimes it's easy to tell, such as when ceiling joists from adjacent rooms break over the wall, or when braces from the roof framing land on top of the wall. But I've also seen situations where, although the ceiling joists ran unbroken over a wall, they would have been seriously undersized if I'd just yanked out a big chunk of the wall.

While I'm checking out the attic for what's bearing on the wall, I also look for electrical conduit, flues, and piping. I often wind up rerouting electrical conduit, especially for a wide opening, but this can get expensive. If the partition is a shear wall, you may be limited on how much of the wall you can take out. The same is true if you find bracing when you open up the wall. Chances are you can relocate the bracing elsewhere in that same wall, but doing so will add to your costs. In either of these cases, run your plans by an engineer before you start pulling things apart.

Preparing the opening. The first step is to strip the wall covering (drywall or plaster) up to the lower part of the double top plate. If I'm working in plaster, I'm always careful not to disturb the inside corner,

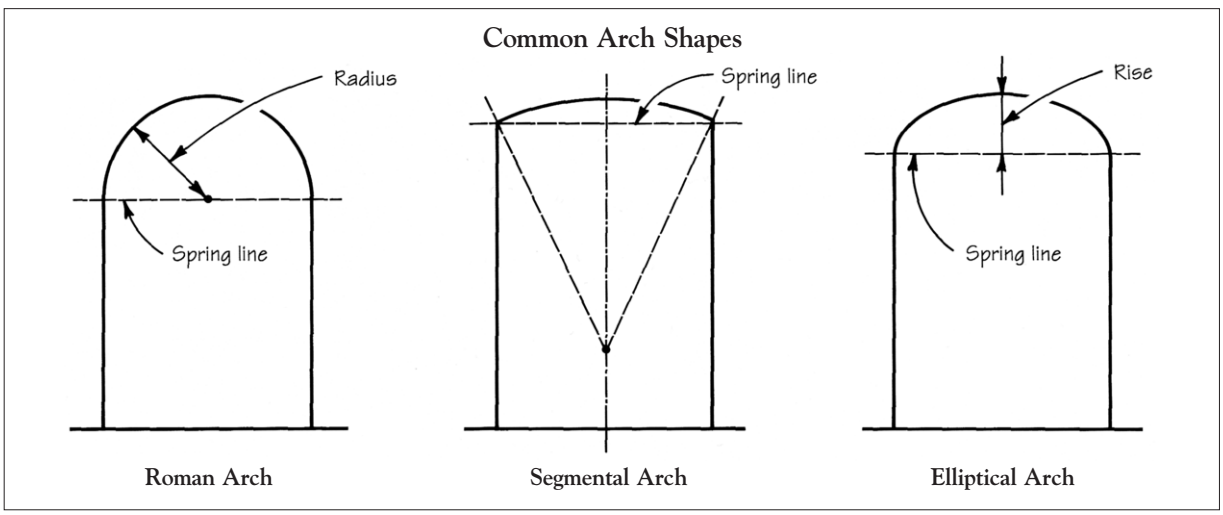

Figure 1. *Three common arch shapes:* *Roman, or semicircular, arches are graceful but require high ceilings. Segmental arches are flatter and are usually reserved for exterior masonry headers. Elliptical arches work well for interiors, having a nice shape but not requiring high ceilings.*

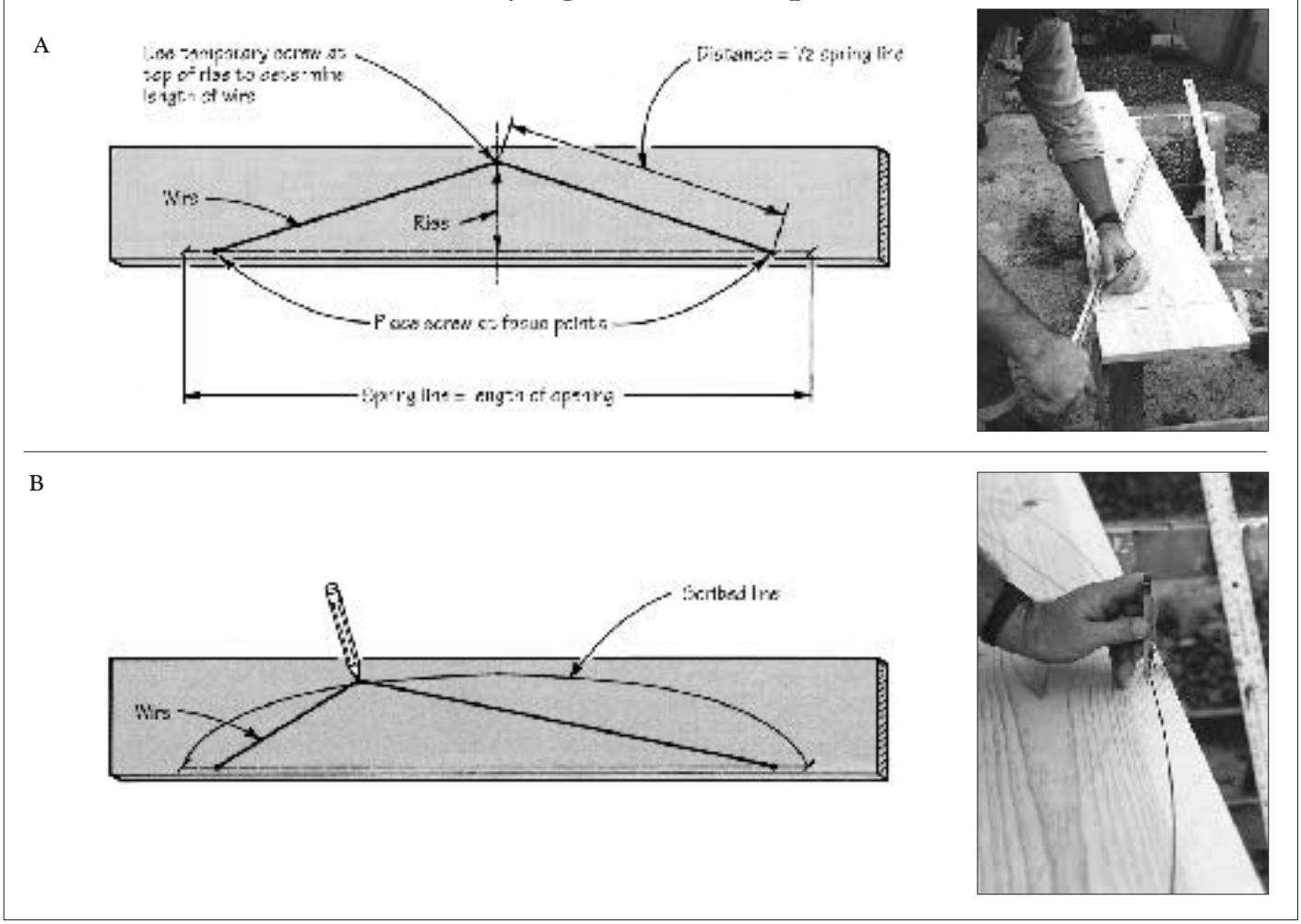

Figure 2. ***To draw an elliptical arch,*** *the author first lays out the spring line and rise of the arch. He finds the focus points by pulling a tape from the top of the rise to the spring line and measuring one-half the length of the arch opening. He then stretches picture hanging wire from focus point to focus point, passing the wire over a temporary screw at the top of the rise (A). Finally, he removes the screw from the rise and scribes the ellipse with a pencil, pressing it firmly against the wire as he moves it from focus point to focus point (B).*

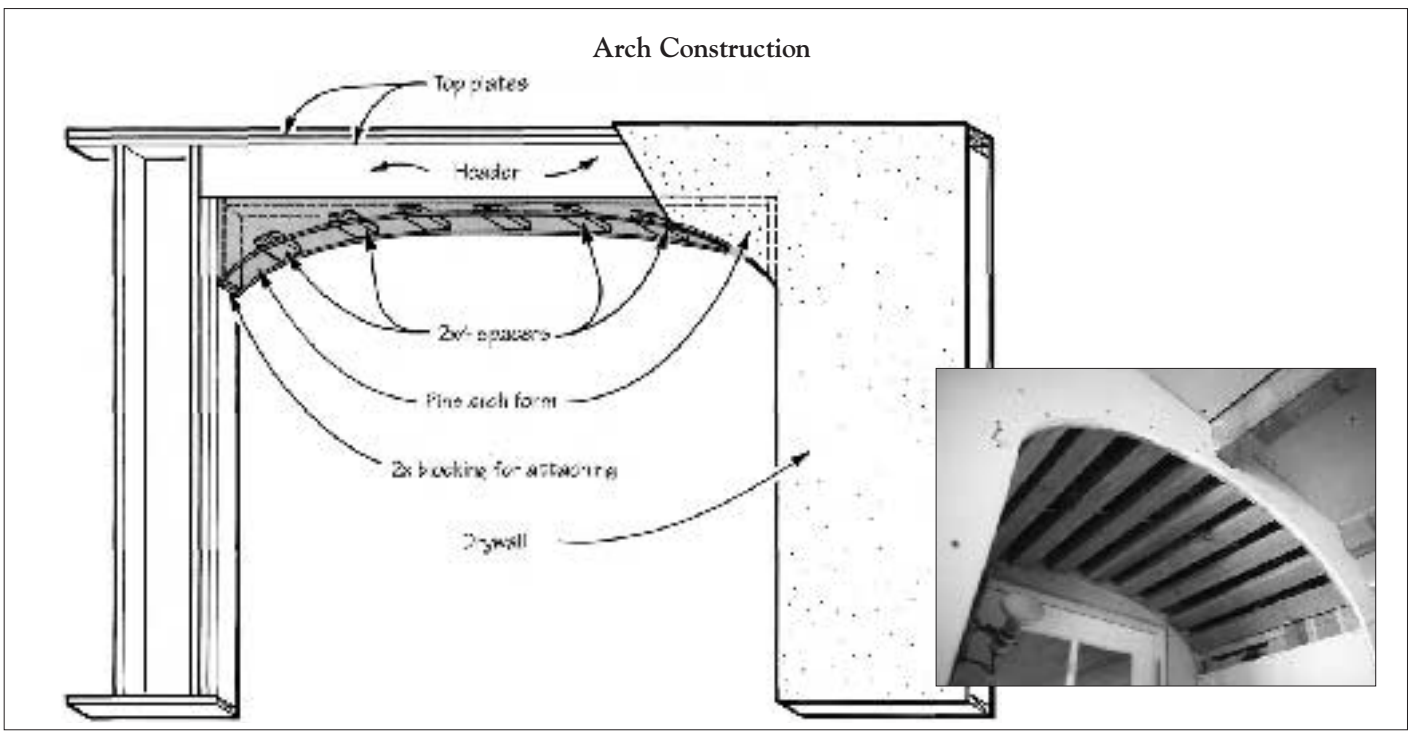

Figure 3. *The author assembles the pine arch forms with 2x spacers. He positions the arch assembly tight to the header above, attaching it to 2x blocking nailed to the jack studs. Another option is to use long spacers as joists to make a vaulted arch (inset).*

where the wall meets the ceiling. Removing the corner means you'll have to patch part of the ceiling as well as the wall.

After clearing the rubble, I erect temporary supports on both sides of the wall section to be removed to make sure nothing sags or moves during the process. When deciding where to put the temporary walls, be sure to spread the load over as many floor joists as possible. It is not a good idea to put point loads, like the bottom of a 4x4 post, directly onto unsupported subfloor. For heavier loads, as in two- or three-story houses, you'll need more support, possibly even temporary reinforcement under the house. Heavy point loads, such as roof posts or braces, always have to be handled individually.

Setting headers. Since most of the work I do here in L.A. is on one-story, single-family houses, I follow this general rule of thumb for header sizing: One inch of header width per foot of horizontal opening size (4x4 is the minimum). I always play it safe and use the next bigger beam size when I'm close to the limit. (This rule doesn't apply in two-story houses.)

Since the bottom of the header is the limiting factor on how high the top of the arch can be, I always set the header directly under the double top plate. Once the header's up, I remove my temporary support walls. This is a dramatic moment — it's the first time you and your customers get a good, unobstructed look at the new relationship between the rooms.

Plotting the Curves

Before you can lay out an elliptical arch, you need to understand the parts of an arch and how they're related. The *spring line*, or major axis, spans the width of the arch, connecting the points where the curve starts, at the top of the vertical sides of the opening. I always use a spring line height of at least 76 inches off the finish floor. Go much lower than this and tall people may bang their heads at the ends of the arch.

The rise is the vertical distance between the spring line and the highest point of the arch. The ratio of the rise to the opening width determines the roundness or flatness of the elliptical arch. The lower the proportion, the rounder the curve.

For example, the 8-foot-wide arch in the photos has an overall clear height of 88 inches. The spring line is at 76 inches, leaving a rise of 12 inches. The ratio of span to rise is 96 inches to 12 inches, or eight to one. This produced a fairly flat curve.

By comparison, in the same home I also built a hallway arch that's 42 inches wide. Again, the spring line is at 76 inches but the rise is only 10 inches (total height is 86 inches). In this case, the ratio of span to rise is about four to one. This arch is more strongly curved than the other opening but, because both are elliptical, they work well together.

Drawing the arch. I use two 3/4-inch pieces of glued-up, No. 2 pine for the sides of my arch form. I like 3/4-inch stock because it's substantial enough to hold the nails for the drywall corner bead but also light and easy to work with. For layout purposes, I always use pieces slightly longer and wider than the curved portion of the arch. For example, in building the 8-foot-wide arch with a rise of 12 inches, I used a board 16 inches wide trimmed down to just over 8 feet long.

It's actually very easy to create a smooth, symmetrical ellipse without having to dredge up all kinds of high school geometry. I use an old-time carpenter's technique called the "string method." It's simple and it works every time. I first mark a line about 1/2 inch in from one edge of the board. This serves as my spring line. From there I mark off the width of the opening and the top of the rise (see Figure 2).

The next step is to find the two focus points of the ellipse. I first put a temporary screw at the top of the rise, which is the peak of the arch. Then, I hook one end of my tape measure over the screw and pull it out to one-half of the opening width — 48 inches for the arch in the example. I swing the tape around and mark the point where the 48-inch line intersects the spring line, first on the left side, then on the right. These two intersection points are the focus points.

I put a screw into each focus point, leaving the screw heads about 1 inch proud of the surface. Then I wrap one end of a length of picture-hanging wire around one of the screws, pass it over the screw at the top of the rise, and wrap the other end around the other focus point screw. I then pull the wire taut and secure it. (Although this is called the string method, I've found that string is too elastic — you can't draw the same line twice.) Next I remove the screw from the top of the rise, leaving the wire with slack in it.

To scribe the ellipse, I hold the pencil dead-plumb and press it firmly against the wire. Starting beyond the focus point at one end of the spring line, I move the pencil past the peak of the arch and over the opposite focus point, until it meets the other end of the spring line. I trace back and forth a few times to get a good, heavy line.

Construction. After cutting both boards to size, I cut some spacer blocks from scrap 2x4s and sandwich them between my pine curves. The spacer blocks serve two functions: They hold the curved boards apart at the right distance to match the wall thickness and they provide backing for the drywall on the underside of the arch (see Figure 3). Finally, I nail additional spacer blocks to the header and the posts and slide the assembled arch up over these. The entire assembly is secured with screws.

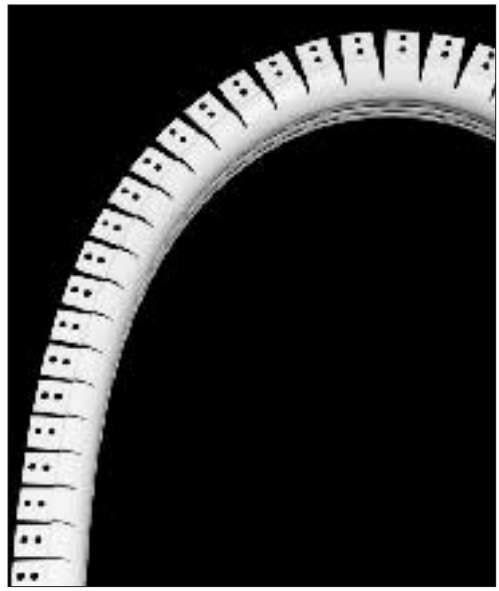

Figure 4. *The author uses a bullnose plastic corner bead, from Trim-Tex, to maintain a smooth curve.*

Drywall and Plaster

Once the arch is in place, hanging the drywall is fairly straightforward. I always use screws rather than nails for attaching the drywall to the curved form; the arch form is lightweight and it's hard to drive a nail without getting some bounce. Also, screws offer better holding power and avoid nail pops down the road.

The crucial part of the wall finish is the underside of the arch. Here I use 1/4-inch drywall for greater flexibility, but put up two layers for stability and impact resistance. I mist the two strips of drywall to soften them, then screw them in one at a time, easing the strips around the curve.

I usually use rounded corners to complement the shape of the arch. If you hire a plasterer, he'll probably use his own plaster bead along the curve and a bullnose trowel to shape the rounded edge. If you do it in drywall, use one of the new generation of rounded drywall corner beads. Trim-Tex Inc. (3700 W. Pratt Ave., Lincolnwood, IL 60645; 800/874-2333) offers a vinyl bullnose corner bead that's serrated along the edge to make it bend easily (see Figure 4).

One tip on using any type of bullnose corner bead: Drywall screws and cup-head drywall nails either stick up too high or distort the rounded corner if you drive them flush. I prefer blued lath nails, the kind normally used by plasterers. These have wide, flat heads that don't dimple the bead.

Set the corner bead carefully since this is where any little bumps in the wood arch will show up. In placing the corner bead, I always start near the center of the arch and work toward the corners, nailing as I go. I step back now and then to eyeball the arch from both sides and down the line of the curve.

The toughest part is where the curve is the tightest, at each end. To press the bead evenly into place at these spots, I use a scrap of curved stock left from cutting the pine arch form.

Since many of the houses I work on have plaster walls, I like to use drywall as a base for a skim coat of quick-setting patching plaster. This gives me a lightly troweled texture that feels hard like a real plaster wall. The quick-setting variety comes in bags and must be mixed with water. Look for the freshest bags you can find since the plaster, once it's exposed to humidity, becomes harder to work with. Gold Bond Building Products (2001 Rexford Road, Charlotte, NC 28211; 704/365-7300) makes a system called Kal-Kote that includes drywall and quick-setting veneer plaster. The drywall has an absorptive face paper on it that helps bond the board to the plaster.

I apply the plaster with a steel cement-finishing trowel. A taping knife just doesn't work since the plaster is heavier than joint compound. Be sure to mix only as much plaster as you can apply in 15 to 20 minutes (depending on weather conditions). Let the material cure for a few days before painting it.

Regular joint compound also works as a skim coat, but it won't match existing plaster. Joint compound gives a smooth finish while plaster has some texture. Also, it is slower to work with since you must build up layers gradually, sanding them back until you achieve the look you want. ■

Paul Turpin is a remodeling contractor and designer in Los Angeles, and the K&B columnist for The Journal of Light Construction.