

# Tame Tricky Glue-Ups

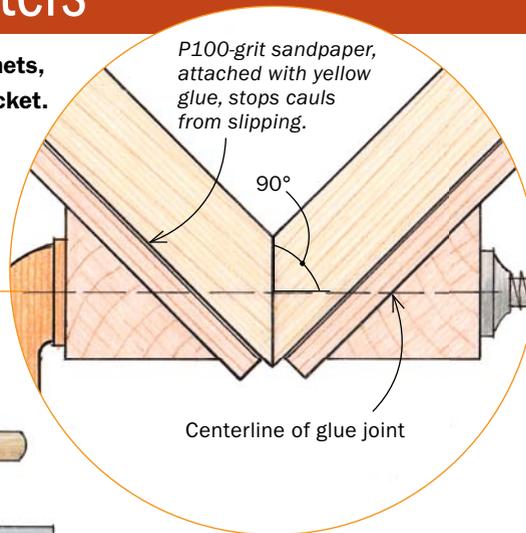
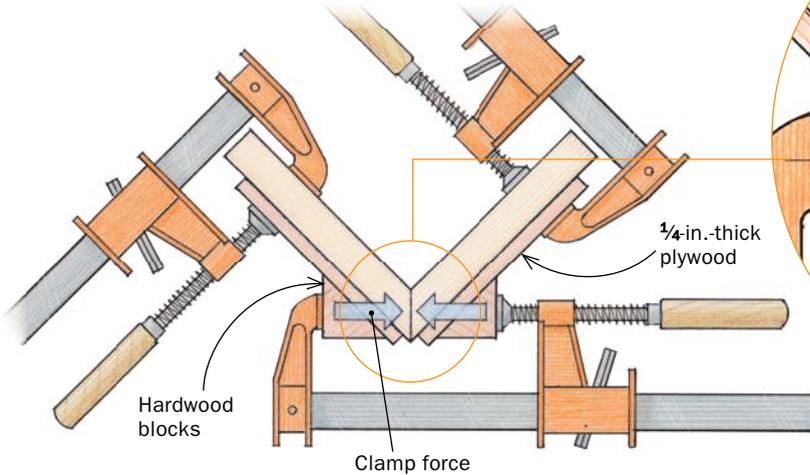
Custom cauls can handle  
every angle and curve

BY MICHAEL FORTUNE



# Nonslip cauls for tight case miters

The miter joint gives a clean, seamless look on contemporary cabinets, but only if clamped up tight and true. These simple cauls are the ticket.



## DIRECT THE FORCE

The clamps must direct the force through the joint at 90° and should be placed on the centerline of the glue surfaces. The principles are the same for any caul.



**Cauls go on first.** Clamp on the cauls (above), aligning them carefully. Then assemble one pair of sides at a time before marrying the two assemblies to form a box. Fortune alternates the direction of the clamp handles to avoid conflicts (right).



Many woodworkers stop at rectangular work, preferring to stick with flat surfaces and right-angled joints. This is a shame because curves and angles make furniture stand out, and they aren't as hard as you think. Most importantly, they are fun.

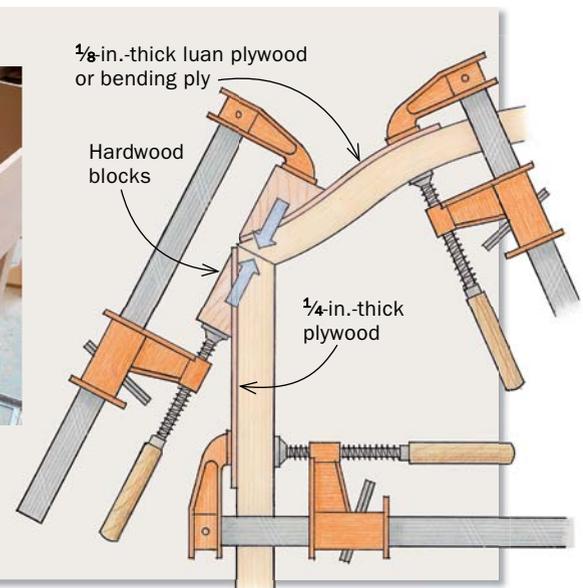
A few factors keep people in the box. Even if they know how to cut smooth curves and precise angles, there still is the problem of gluing and clamping these awkward pieces together. There is a lot of time and material invested at that point, and an open or misaligned joint can be devastating.

This is a follow-up to my two articles on basic glue-ups in *FWW* #234, which covered 90° joints and basic miters ("Great Glue-Ups Guaranteed," and Fundamentals: "Gear up for glue-ups"). As I pointed out then, while a dry run is always important for a glue-up, it doesn't tell the whole

## TIP CURVED PANELS, TOO



On a cabinet with a curved top and straight sides, Fortune attaches the normal type of miter cauls to the sides, and uses a flexible version of the caul on top.

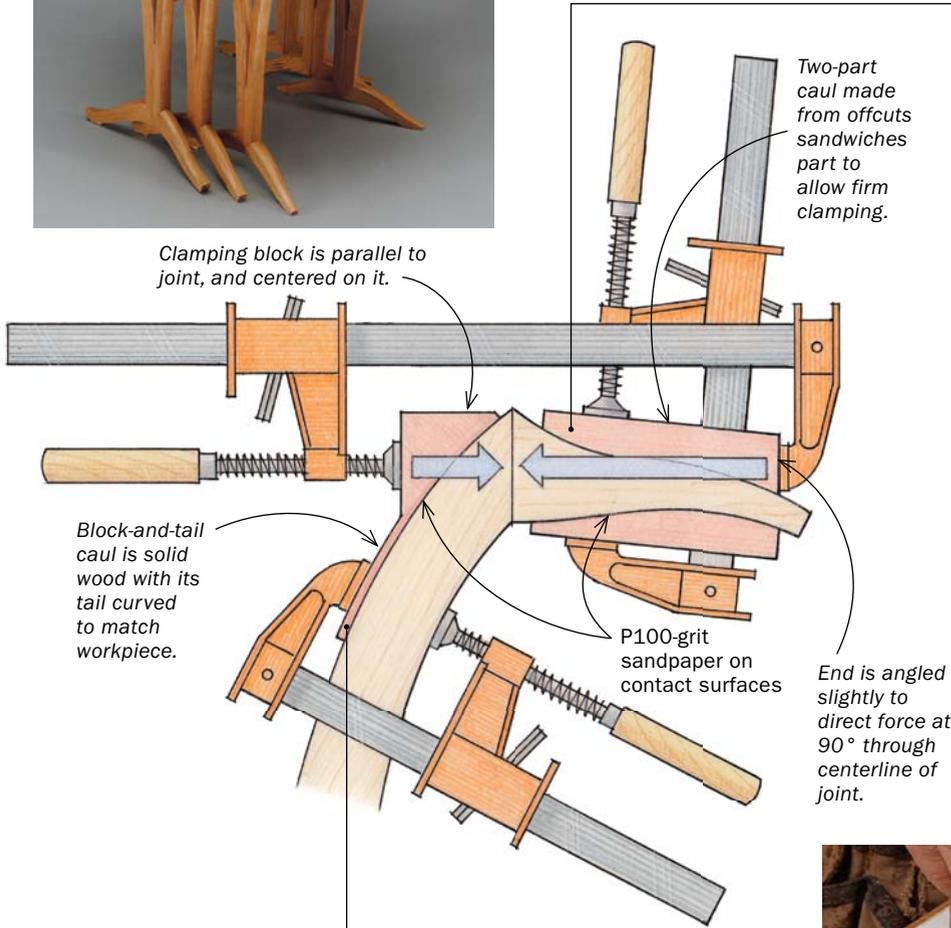


# Cauls for curved work



Each L-shaped assembly on this table base is joined with a miter. Fortune uses two different types of clamp-on cauls to ensure perfect results.

## SANDWICH STYLE



## BLOCK-AND-TAIL STYLE



**Trace and saw the foot.** The offcuts from the foot become the clamping cauls.

story. That is especially the case with curved and angled parts. Once the glue is applied, parts want to slide on the slippery film, freezing in the wrong location a few minutes later when the glue begins to set.

That's why the key to all glue-ups—especially those on irregular parts—is that the clamping pressure be at an exact right angle to the glueline, and centered on the joint. On angled and curved work, the only reliable way to direct clamping pressure



**Lay out the clamping angles.** Fortune first uses the curved table post to trace parallel lines for a long tail (far left). Then he draws the actual joint on the stock, and uses a bevel gauge to transfer that angle to the clamp block (left).



**Sandpaper adds grip.** Using the offcut as a clamping caul, he attaches P100-grit sandpaper to the underside of the caul using white or yellow glue. Don't use pressure-sensitive adhesive paper or spray adhesive—it will creep.

## ALL TOGETHER NOW



**Align the cauls carefully.** Make sure their clamping surfaces are aligned to center pressure on the miter joint.



**Carefree clamping.** With the help of a slip tenon and these custom cauls, Fortune knows the joint will come together perfectly, with firm pressure on the entire glue-line.

precisely is with specialized cauls. Designing and making these helpers may seem like a hassle at first, but not after you experience the benefits.

Sometimes I glue these custom cauls directly onto the workpieces, chipping them off later with a chisel or gouge. But most often I clamp the cauls to the workpieces, and then clamp across them to close the joint and complete the job. That's the case with the first one on my list.

By the way, I recommend using traditional F-style bar clamps whenever possible. These let you locate the clamping force precisely where it is needed.

### Clamp-on cauls for clean miters

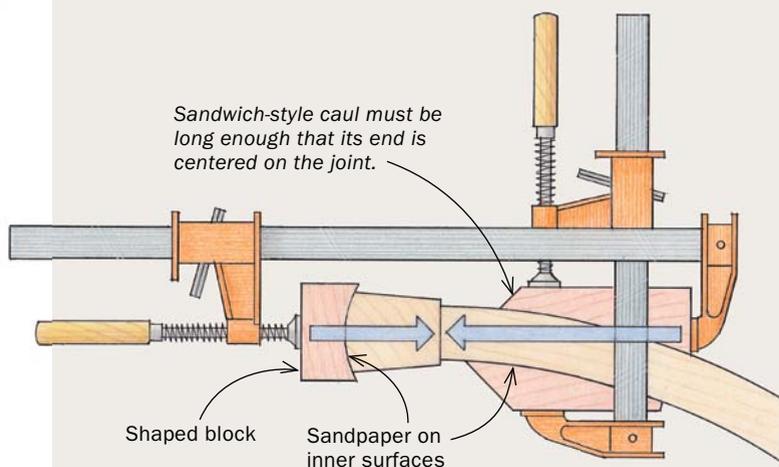
I like the seamless look of continuous grain, so I design and make many cabinets with miters at the corners. Whether the panels are ply-

wood or solid, I always reinforce the joints with biscuits or slip tenons; this also helps to keep the miters aligned during assembly. But that doesn't take care of clamping.

My simple cauls send the pressure through the center of the miter joint. And they let me deal with the joints one at a time, a bonus when using yellow glue,

## Shaped blocks tame curves, too

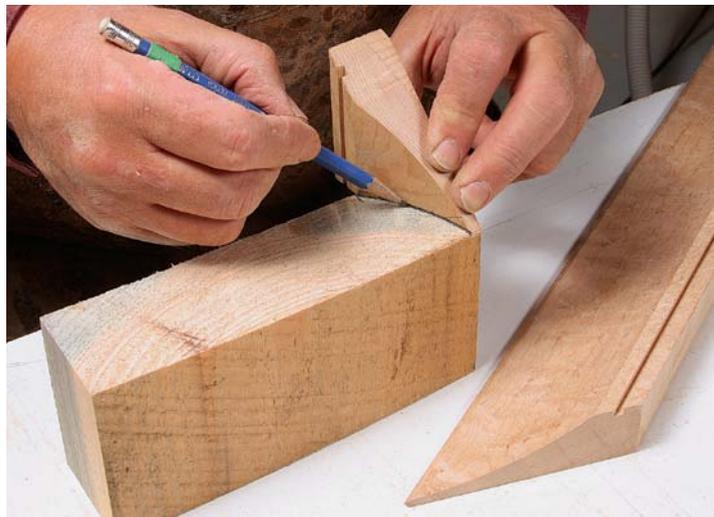
To glue the legs to this sinuous table base, Fortune used a caul arrangement similar to one he used above. This time he added a shaped block to hug the sculpted surface of the leg. In both cases, he placed the part on the caul stock and traced around it.



**Clamp with confidence.** Using the right cauls, and a slip tenon for strength and alignment, one bar clamp brings the joint together perfectly.

# Glued cauls for crown molding

Sometimes it is easier to glue on cauls, rather than clamping them. Yellow glue works fine. These blocks are simply chiseled off later, and a scraper removes the remnants. The key is a precise fit.



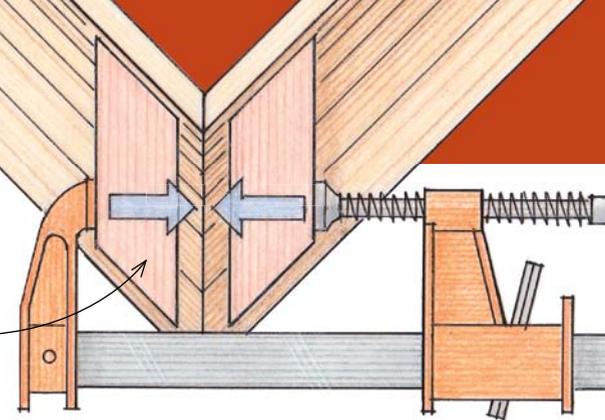
**Lay out the profile.** Chop off a section of the molding at 90° and trace the profile onto your caul stock.



**Careful bandsaw work.** Stand the stock on its end, with the grain running parallel to the curve so the caul will be easy to chip off later. Saw as close as possible to the line.



**Fine-tune the fit.** Tape 80-grit sandpaper face-up on the molding, and then rub the caul on it to match one curve to the other.



Blocks are shaped and located to direct the force squarely through the centerline of the glue joint.

which sets up pretty quickly. The results are invariably good—and stress-free. To give the cauls grip, I add cheap P80- or P100-grit sandpaper to the contact face with yellow glue, so it won't creep.

Pay attention to the lines of force. You'll need to set the angled blocks back from the tip of the miter so that the pressure passes through the centerline of the joint. This position will also allow you to see the joint come together, which is important.

## Cauls for curved work

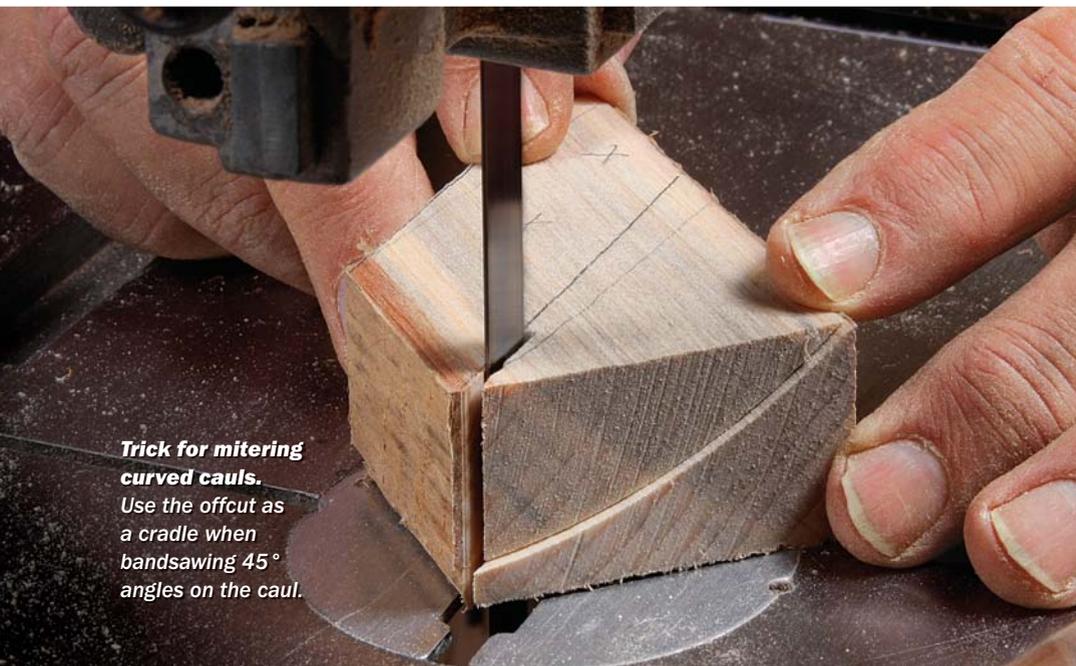
I also use long case miters to assemble curved veneered panels, made with a core of bending plywood. Clamping cauls work well here, too. These are typically the same size as the aforementioned miter cauls, but I make them from flexible 1/8-in.-thick luan plywood or bending ply.

I often make the base of these cauls long enough to reach to the far end of the workpiece, so I can either attach a block that hooks over the end, or another 45° block on the topside for clamping that miter joint at the same time (see example on p. 40).

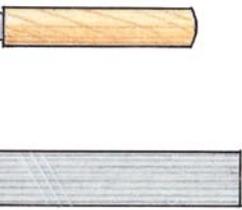
Clamped-on cauls work just as well on solid-wood parts as they do on big panels. You just need to saw the caul to fit the shape, and design it so the clamping pressure ends up at the right spot and the right angle.

On a favorite table of mine (see p. 40), each side of the base is created by a pair of L-shapes, each made up of a curvy foot joined by a miter to a tall curved upright. Once those tricky miters are assembled, joining the L-shapes to each other is easy. To clamp the miter joints effectively, I use two very helpful types of shaped cauls.

The one that goes on the upright is a narrower version of my cauls for case miters, with a long base and an angled clamping block. In this case, I cut the whole thing out of a single piece of hardwood. Again, I glued P100-grit sandpaper to the contact



**Trick for mitering curved cauls.** Use the offcut as a cradle when bandsawing 45° angles on the caul.



face to stop it from sliding. The other is a two-piece caul that sandwiches the workpiece. The far end of the outside caul is angled to create a clamping surface that directs the pressure across the joint. You simply chop off the end at the angle you need. In this case I reinforced the miters with a slip tenon, which helps keep things aligned.

**A layer of leather is best on rounded surfaces**—For chair designs that I build repeatedly, I go one step further and apply a thick layer of leather to the inside face of the cauls. It is more durable than sandpaper, better at conforming to rounded parts without damaging them, and resists slipping out of place almost as well. Like the sandpaper, the leather has to be attached with yellow glue.

### Glued-on cauls tame cove moldings

I use large cove moldings in a number of places in my work, from the tops of cases to the underside of tabletops. In this situation, it is often easier to glue on shaped cauls than to find a way to clamp them on.

To get a good glue bond, you need a perfect fit between caul and cove. I first cut the caul close to the right profile, usually on the bandsaw, and then use the part itself to fine-tune the shape of the caul. I tape a piece of P80-grit sandpaper against the part, and then rub the softwood caul



**Try a rub joint.** Apply glue and rub the caul firmly against the molding until it grips. Hold it there for a minute or so, and then leave it one hour before clamping.



**Gap-free glue-up.** Apply clamps and watch the miter come together perfectly. Hold down the far ends of the molding if necessary.

### HOT GLUE IS A THIRD HAND



Some of these cauls are hard to hold in position while you align and tighten a clamp. A hot-melt glue gun solves the problem. A mallet blow removes the cauls afterward, and the glue peels off.



**Glue and go.** Hold the caul in place and lay a bead of glue at the edges (above). Wait a few seconds and you can let go, leaving your hands free to grab a clamp (right).



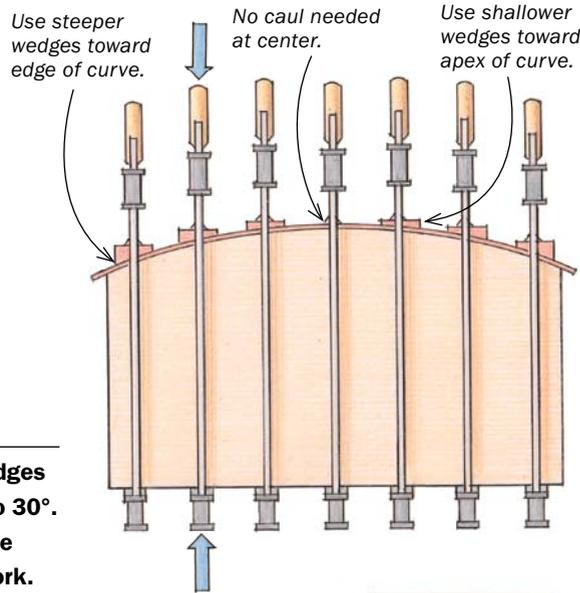
# Cauls for edge-banding curved panels

## WHEN TO BREAK THE RULES

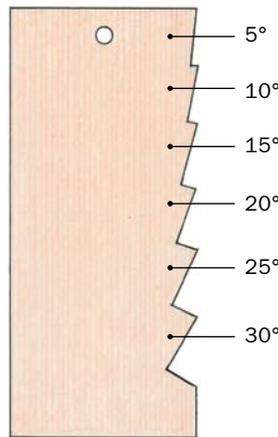
Unlike the previous examples, the clamp pressure here is not at 90° to the joint. That's OK because it is balanced out along both sides of the apex. Glued-on sandpaper keeps the wedges from slipping sideways.

## WEDGES ARE VERSATILE

Fortune keeps a bucket of wedges on hand in 5° increments up to 30°. These come in handy for a wide range of angled and curved work.



**Single jig cranks them out.** A bandsaw jig makes all six sizes that Fortune needs. To keep the grain as straight as possible, flip the stock between cuts.



WEDGE-CUTTING JIG

against it. This makes such a great fit that I can actually use a rub joint with yellow glue to attach the caul (see photo, p. 43).

Make sure the blocks are designed with the long grain in contact with the frame. This way they can be quickly pared off with a chisel or gouge, and any residue is easily removed with a card scraper.

## Use wedges for curved edge-banding

For edging along a shallow curve, like the edge of a plywood bookcase shelf, I use small, simple wedges to keep the clamps aligned. Because I do so much angled and curved work, I have a whole bucket of these wedges, sorted by angle from 5° to 30°, in 5° increments. They come in handy for all sorts of glue-ups. Each is faced on one side with P80- or P100-grit sandpaper. Some have a rare-earth magnet inset in their outer face, held in place with epoxy. The magnet is another type of third hand, holding the wedge in place against any type of clamp with metal jaws.

**Edge a whole tabletop at once**—Band clamps are designed to go around the perimeter of an object, but I use them more frequently across assemblies where conventional pipe or bar clamps would add too much weight or get in the way of each other. Tightening a strap across something



**Apply as needed.** Fortune used wedges from 5° to 25° to align the clamps along this curved edge. Start in the center and work outward to balance the pressure.



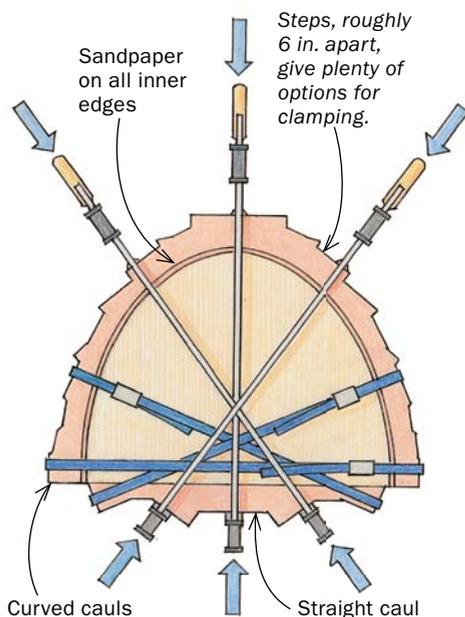
## SAWTOOTH CAULS TAME A WHOLE TABLETOP

To wrap edge-banding around an entire half of an elliptical tabletop, Fortune used a number of curved cauls, with steps cut into them to direct clamping pressure. He laminated a stack of thin banding strips and attached them to the edge in one shot. Here he is performing a dry run, a critical step before applying glue.

applies much more pressure than tightening it all the way around, and directs the pressure more precisely.

A good example is applying steam-bent or laminated edging to an oval or circular table. To make sure the straps don't slide, I use a series of sawtooth cauls. There are enough notches around the outside that I can apply direct pressure anywhere I choose. We are talking about a veneered tabletop here, so the edging is applied to a substrate like MDF. Afterward I veneer over the top of everything for a seamless look all the way to the edge. The thick laminated edging can also be molded with a router. □

*Michael Fortune has built custom furniture for more than 30 years, and teaches around the world.*



### STRATEGIC STEPS

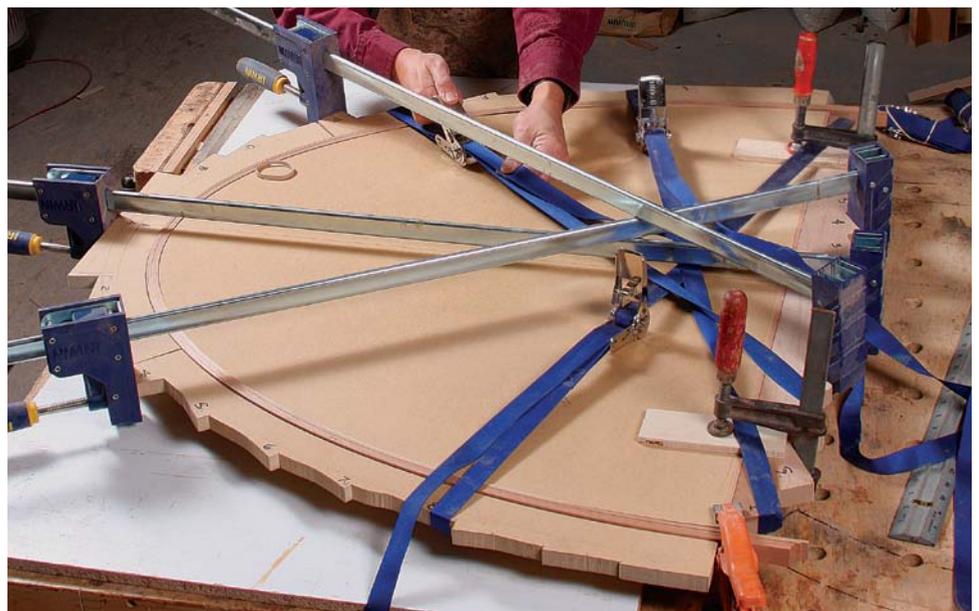
Using an array of four cauls, three curved and one straight, Fortune is able to keep all of the clamps at 90° to the banding.



**Lay out the offset.** The cauls must accommodate the thickness of the banding. So Fortune lays the table pattern on his caul stock, and uses a shopmade MDF washer to lay out the inner edge of the cauls.



**Lay out the steps.** Using a block of wood for alignment, he slides a big ruler back and forth, using its ends to mark opposing notches.



**Band clamps to the rescue.** Band clamps fit under bar clamps to apply pressure where needed. Fortune clamped at the center first, and then used most of the steps.