Learn from Antiques

Avoid construction mishaps by looking at mistakes from the past

BY STEVE LATTA

Let's say a future woodworker examines my furniture 100 years from now and notices a few consistent failures. Now imagine that person visits me in a time machine to tell me where I went wrong. Well, you can bet I would listen to him or her and make some changes to the way I build.

Luckily for us, we already have a time machine, thousands of them, in fact. Antiques let us see what happens to a piece during its life, and I've learned much of what I know by closely examining many of these old pieces.

For this article I scoured a number of my favorite furniture barns and museums, looking not only for cracks and breaks, but also for the most instructive failures—common problems that happen in pieces of all types and styles. I found the perfect collection at Philip H. Bradley Co., an antiques dealer in Downingtown, Pa. Bradley's pieces are iconic and beautifully preserved, and plentiful enough to contain many of the usual issues I've encountered in my decades of furniture study.

Wood movement is the creator of headaches

In most cases of furniture failure, the problem is the same: The maker did not sufficiently accommodate the seasonal shrinkage and expansion of wood parts. In a nutshell, wood barely moves along its length but moves a great deal across its width, and can do so with great force. When that movement is restricted, bad things often occur.

The most common type of restriction is cross-grain construction, where two or more pieces are joined together at opposing angles. One piece wants to expand and contract across its width, while the other piece doesn't move at all along its length. Soon cracks and splits make their debut. If a piece is veneered across the grain of solid wood below, you get buckles and bubbles.

To fix or not to fix

In each case of furniture failures that follow, we've provided an illustration of why the problem happened and how a modern maker could prevent it in their own work. However, for a reproduction woodworker the solutions are not always clear-cut. How far a builder strays from the original is a matter of compromise and choice. Some argue that we should build exactly like our forefathers did. But for me, "because they did it that way" has never been a very strong argument.

One shop in my region was determined to build veneered card tables the exact same way the originals were built. They did not cross-band the bricklaid cores, and they considered the inevitable split veneers to be part of the "charm" of working with solid wood. When I made a table that way for a friend years ago and the face veneer split, neither he nor I found the crack charming. After that, I made sure to cross-band my cores.

While I tend to stay conservative in my approach, I always give top priority to the future integrity of the piece.

Contributing editor Steve Latta teaches furniture and cabinet making at Thaddeus Stevens College of Technology in Lancaster, Pa.

Photo, opposite page: Michael Pekovich

Cracked tabletops

Like all big wood panels, a top will move across its width. If the top is attached rigidly to the aprons and legs below, as is the case on this gate-leg table, it will usually crack. There are several ways to hold a top firmly to a base while letting it expand and contract. Wood buttons—small blocks that are screwed to the top and fit into an extrawide slot cut into the apron—are one. Another method is to attach a top with cleats—often rails at the top of a desk or chest of drawers—screwing up through holes in the rails. Some of these holes will need to be oversize or elongated to allow the top to move across its grain. A round-head screw with a washer works best in these cases, as its flat bottom slides easily.

PROBLEM

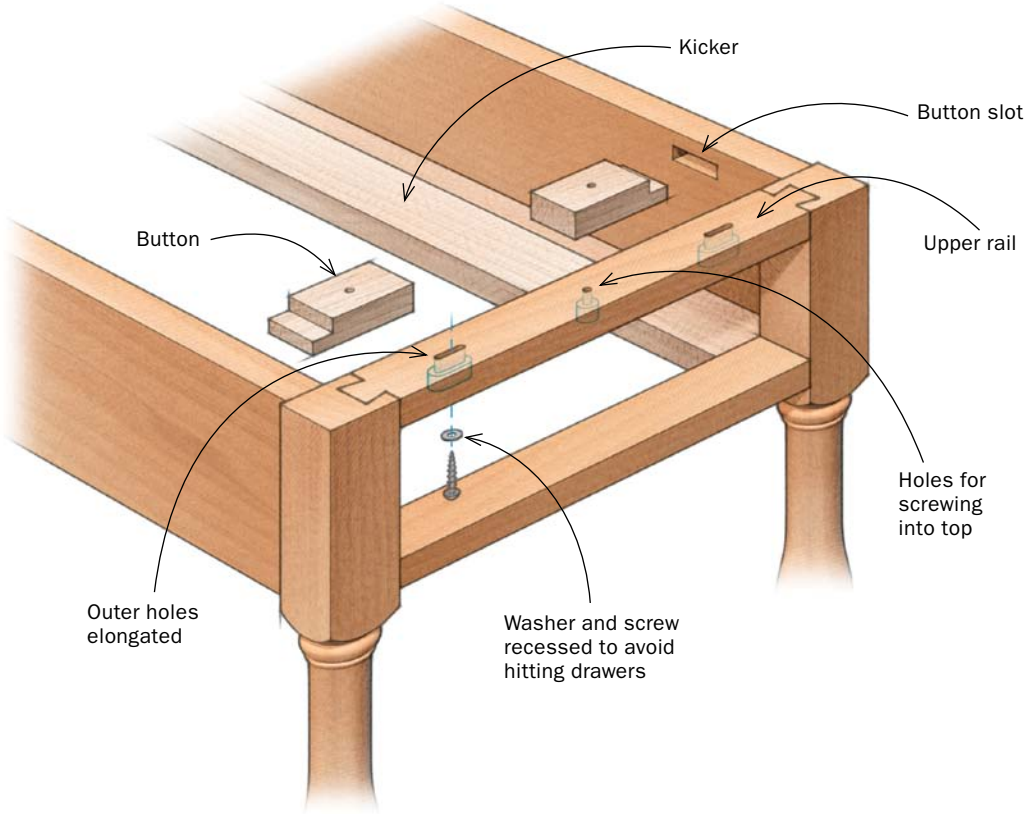
NO ROOM TO MOVE

On old pieces, tops were often screwed on from below through the inside of the apron, or worse, pegged to the aprons through the top as on this gate-leg table. With no allowance for movement, this top cracked as it moved over the years.

SOLUTION

BUTTONS AND SLOTS

On a gate-leg table like the one above, which generally would have a drawer at one end or both, I would use a hybrid approach. I'd add wood buttons along the three aprons and an upper rail dovetailed in at the ends (adding a kicker so the drawer stays level) with three mounting holes in it. The center hole is for a fixed screw, while the two outer ones are slotted to allow for movement. On other pieces, you'll want to fix the top at the front to control the overhang there, and make the center and rear holes elongated or oversize so that all the shrinkage and expansion happens at the back edge.



Photos, except where noted: Asa Christiana; drawings: Christopher Mills

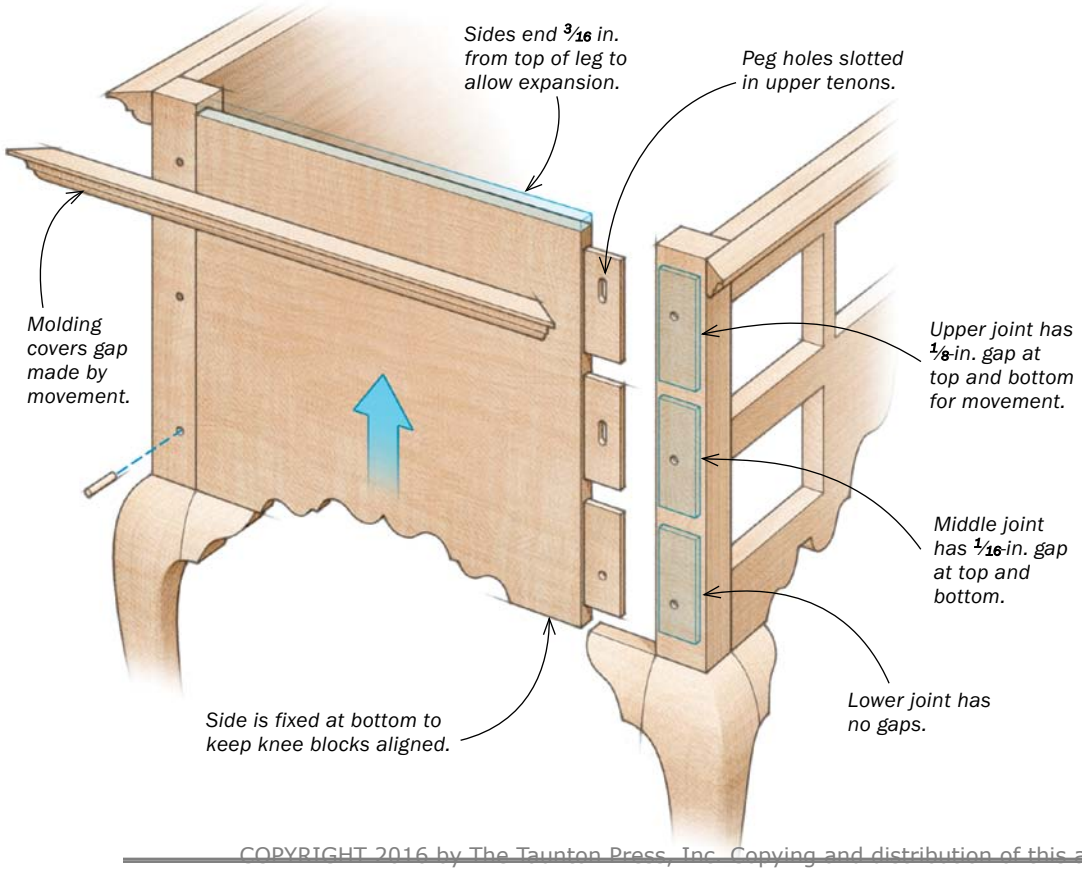
Split sides in sideboards

Splits and cracks also appear on pieces like dressing tables and sideboards where tall sides are pinned to leg posts. You could make the sides from veneered plywood and attach them with floating tenons, but the more traditional solution is to elongate one or more of the holes in the tenons. Typically the top or bottom tenon is pinned and the movement sent in the other direction by elongating the pin holes in the other tenons, and also elongating their mortises. These measures will keep a side in place and intact for generations. Some people leave the lower tenon(s) unglued, but I use white glue, which allows some movement but adds strength.

PROBLEM

JOINERY DOESN'T ALLOW MOVEMENT

Tall aprons or sides usually have multiple tenons inside, which is the right approach. Unfortunately on old pieces, these are held in place with fixed pins. So when the side shrinks across its grain and the length of the leg doesn't change, the side has no choice but to split.



SOLUTION

ALLOW EXPANSION, AND DIRECT IT

If there are cabriole legs on the piece, as on this maple dressing table, with a knee block glued to the leg and side, elongating the lower pin holes will send the movement downward and pop the block. In this case, I pin the bottom of the side, stop it a little short of the top of the leg, and elongate the upper pin holes to direct the movement toward the top. To be sure the sides don't pop the top off its fasteners, I leave a gap at the top of the sides, covered by a small molding. Glue the molding only to the leg posts, and not the side. By the way, all the pegs are drawbored to pull the tenon shoulders tight. See "Drawbore your Tenons" (*FWW* #241) for more on that technique.

Cracked sides in a chest of drawers

Another troublesome cross-grain situation happens where drawer guides and runners are attached inside the solid-wood sides. In antiques these were often glued and nailed into place, leading to split sides. There are a number of good solutions to this problem. The simplest is cutting a shallow dado in the side for the runner, gluing the runner into the dado at the front, and using elongated holes and screws the rest of the way.

My preferred solution is stronger: I create a frame-and-panel, known as a web frame, that is glued to the case only at the front. Its sides float in a shallow dado, allowing the sides of the case to move. To hold the back of the case together, I screw a frame-and-panel back into a rabbet. Be sure always to leave the runners or web frames a little short in the back. I've seen a lot of old pieces where the sides have shrunk and the back boards have been pushed or popped off by the drawer runners.

PROBLEM

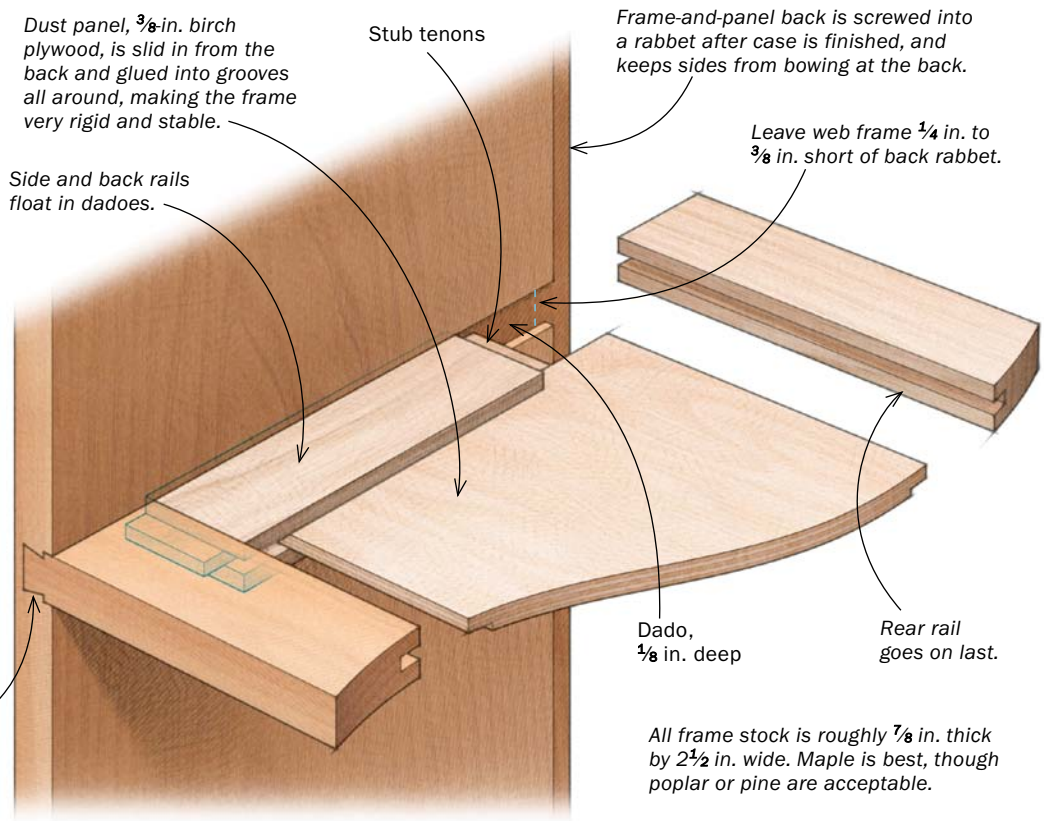
RUNNERS ARE NAILED AND GLUED FAST

When the solid-wood sides shrink and expand, they are restrained by nails and glue and eventually crack.

SOLUTION

FLOATING WEB FRAME

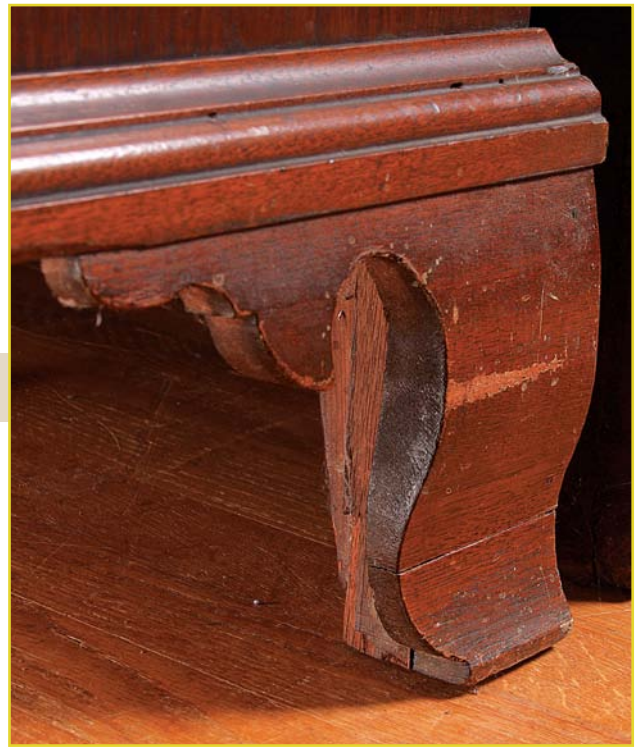
To create a rock-solid frame for drawers to ride on, I first use a dovetail and dado to join a front rail to the case. I cut a groove into the back of it and along the inside edges of the side and rear rail, and slide in ⅜-in. birch plywood as a dust panel, which is rabbeted to fit into the grooves. After the main case is assembled, I glue the stub tenons in the side rails to the front, run a bead of glue around the inside of the slots and insert the plywood panel, and then attach the rear rail. The glued-in dust panel makes the web frame extremely rigid, yet it floats in its side dadoes to accommodate movement.



Broken bracket feet

Many old pieces, usually chests of drawers, have cracked bracket feet. On most of the originals, the culprit is the internal blocks glued in to support the joints at the corners of the feet. These blocks are one piece, glued in cross-grain. When the feet shrink and expand, in effect getting shorter and taller, they want to crack. Then years of kicking and dragging finish the job.

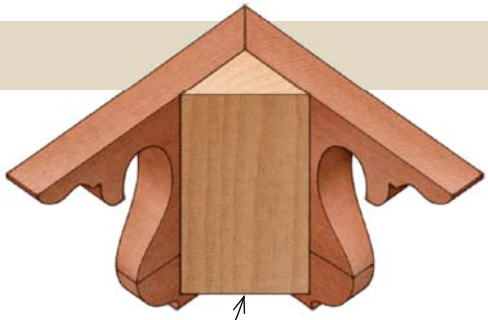
Changing the orientation of the internal glue blocks solves the problem. For our bookcase projects, my students stack and glue five big blocks of stock together with the grain running side to side, switching the direction between layers for additional stability. Then they cut these stacks into strips to make the support blocks. When they glue them into the corners of the bracket feet, the grain is sympathetic and there is more than enough face-to-face glue surface to ensure a permanent grip. It's one of my favorite solutions to wood movement.



PROBLEM

CROSS-GRAIN STRESS

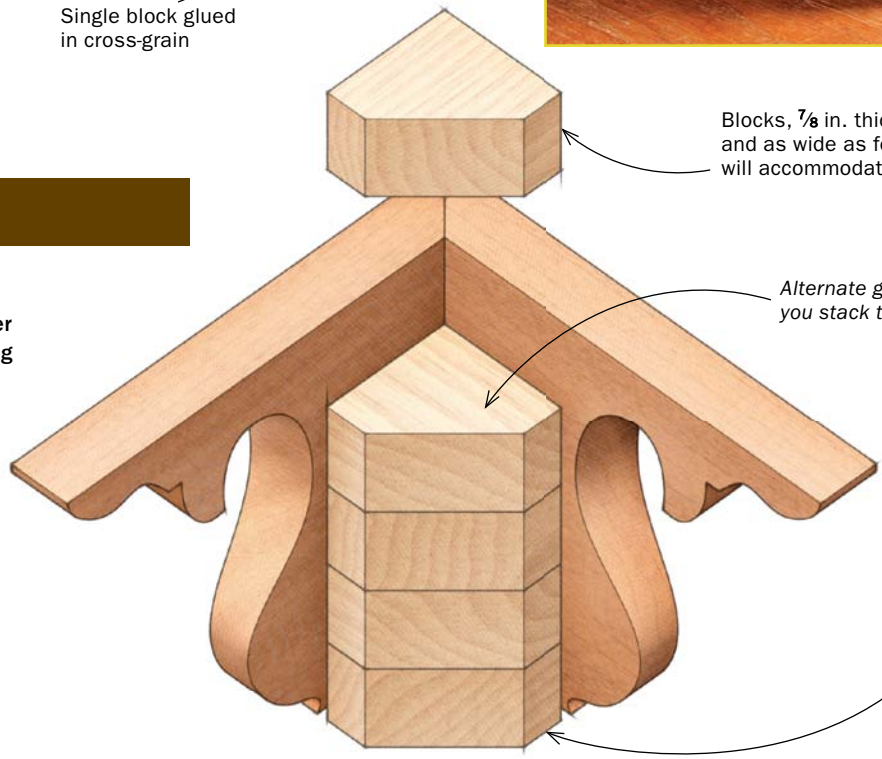
Old makers reinforced bracket feet from behind with internal blocks, glued in cross-grain. Over the seasons, when the brackets want to shrink along their height, the blocks cause them to crack.



SOLUTION

A BETTER BLOCK

For bracket feet, stack smaller blocks with their grain running horizontally like the grain in the feet, so they move in tandem. To create long-grain glue joints on both sides of the block, alternate their grain as you stack them.



Moldings that work loose

Moldings often come loose over time and sometimes pieces are lost. The front molding is usually fine, because its grain runs in the same direction as the rest of the piece, and the nails and glue usually hold. The problems tend to happen on the sides, where the grain of the molding is perpendicular to the grain in the side panels.

There are complicated ways to keep moldings attached tightly to a cabinet while letting the sides move. I prefer to keep it simple by gluing the front few inches of each side molding and nailing the rest of the way. Sometimes I insert unglued biscuits to keep the moldings from shifting up and down. I own several pieces that I made this way more than 25 years ago, and the moldings are just fine.

PROBLEM

PINNED AND GLUED CROSS-GRAIN

The moldings on this piece were attached using wooden pins, driven into the top. The molding was also glued along its entire length. The movement of the top caused it to split and the moldings to pull away.

SOLUTION

GLUE THE FRONT AND NAIL THE REST

To start with, I would attach the molding to the sides of the case and not to the top as on the original. Glue and nail the first couple of inches and then nail the rest of the way. In this situation, because the case is so narrow, I would glue the miter and the first few inches. I would also run a light bead of white glue along the inside bottom edge of the molding to hold it tight to the case. A small bead will fail and not crack the case if a lot of movement occurs. The same applies to light-duty nails. They will bend before splitting the side.