Plate Joinery on the Job Site

Quick and easy insurance against joints opening up

by Kevin Ireton

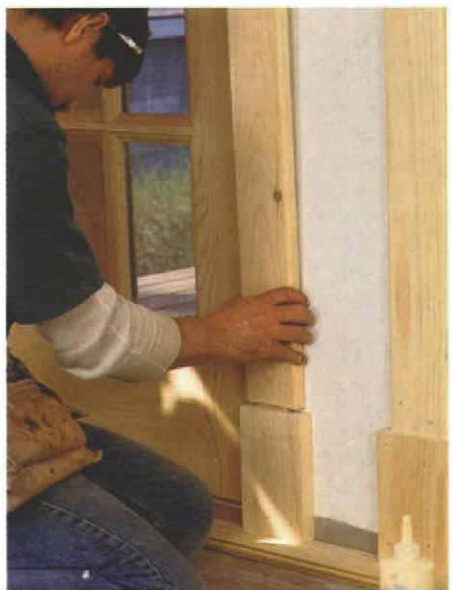
Like most people when they first buy a plate joiner, David Mader, a carpenter in Yellow Springs, Ohio, wanted to find out how strong plate joints really are. Mader crosscut a 2x4 and reassembled it with a pair of no. 20 plates (the largest size available), one over the other. After letting the glue dry, Mader tried to break the 2x4 over his knee. He couldn't do it. Convinced of plate joinery's strength, Mader proceeded to use his plate joiner to butt-join custom flooring that wasn't end-matched.

Often considered the province of shop-bound woodworkers, plate joinery, it turns out, is being used more and more by carpenters on the job site (photos at right). Plate joinery and biscuit joinery are the same thing, and in this article I'll use the terms interchangeably.

The basic idea behind plate joinery is simple: plunge a 4-in. circular sawblade into a piece of wood, and you get a crescent-shaped slot. Make a series of these slots along the edges of two boards that you want to join. Insert glue and a football-shaped wooden spline into each slot on one board. Insert more glue into each slot on the other board, then press the two boards together. Water from the glue causes the splines to swell, making a strong, tight joint.

Biscuit-joiner basics—The typical biscuit joiner is a cylindrical machine (drawing facing page), about 10 in. long, and weighs between 6 lb. and 7 lb. It has a D-shaped handle on top and a spring-loaded faceplate in front with an adjustable fence. When the tool is pressed against the workpiece, a 4-in. carbide-tipped blade extends through a slot in the faceplate and scoops out a kerf in the workpiece. You can adjust the distance between the kerf and the face of the workpiece, but any closer than 3/16 in., and the biscuit, or plate, may pucker the surface of the wood when it swells. You can also adjust the depth of the kerf to fit the size of biscuit you're using.

Biscuits come in three basic sizes (all three are arcs of same circle): #0 is about 5/8 in. wide and 1¾ in. long, #10 is ¾ in. wide and 2⅛ in. long, and #20 is 1 in. wide and 2½ in. long. Biscuits are made of beech with the grain oriented diagonally to the length, making them very strong across their width. Biscuits are also compressed so they'll fit easily in the kerf and then swell once the glue hits them. All biscuits are slightly shorter than the kerf they fit into, which not only allows room for excess glue but also provides some play for aligning a joint along its length. This gives biscuit joinery a distinct advantage over doweling as an indexing technique.



Slotting in place. **To deal safely with a small piece, this carpenter installed the plinth block first and slotted it in place (above). In the photos below, he adds a biscuit, then the casing.**

Plate joinery works in hardwood, softwood, plywood, particleboard and even in solid-stirface countertops (using Lamello's clear plastic C-20 biscuits). Plates can be used in edge-to-edge joints, butt joints and miter joints.

Joinery comes to the job site—Over the past 15 years, plate joinery has proven itself strong enough and accurate enough to earn a place in many woodworking shops, where it competes with other joinery methods such as doweling, splining or mortise-and-tenon joinery. The merits of plate joinery relative to these other methods can and have been debated. But most carpenters in the field don't enjoy the luxury of a fully equipped shop, and often their only joinery options are whether to use nails or screws. That's why plate joinery adds a valuable technique to a carpenter's repertoire. After all, a cabinetmaker can successfully argue that a biscuit-joined face frame is not as strong as one joined with mortises and tenons. But no one will argue that adding a biscuit between two pieces of mitered casing (photos, p. 52) won't strengthen the joint or greatly improve its chances of weathering changes in humidity without opening up.

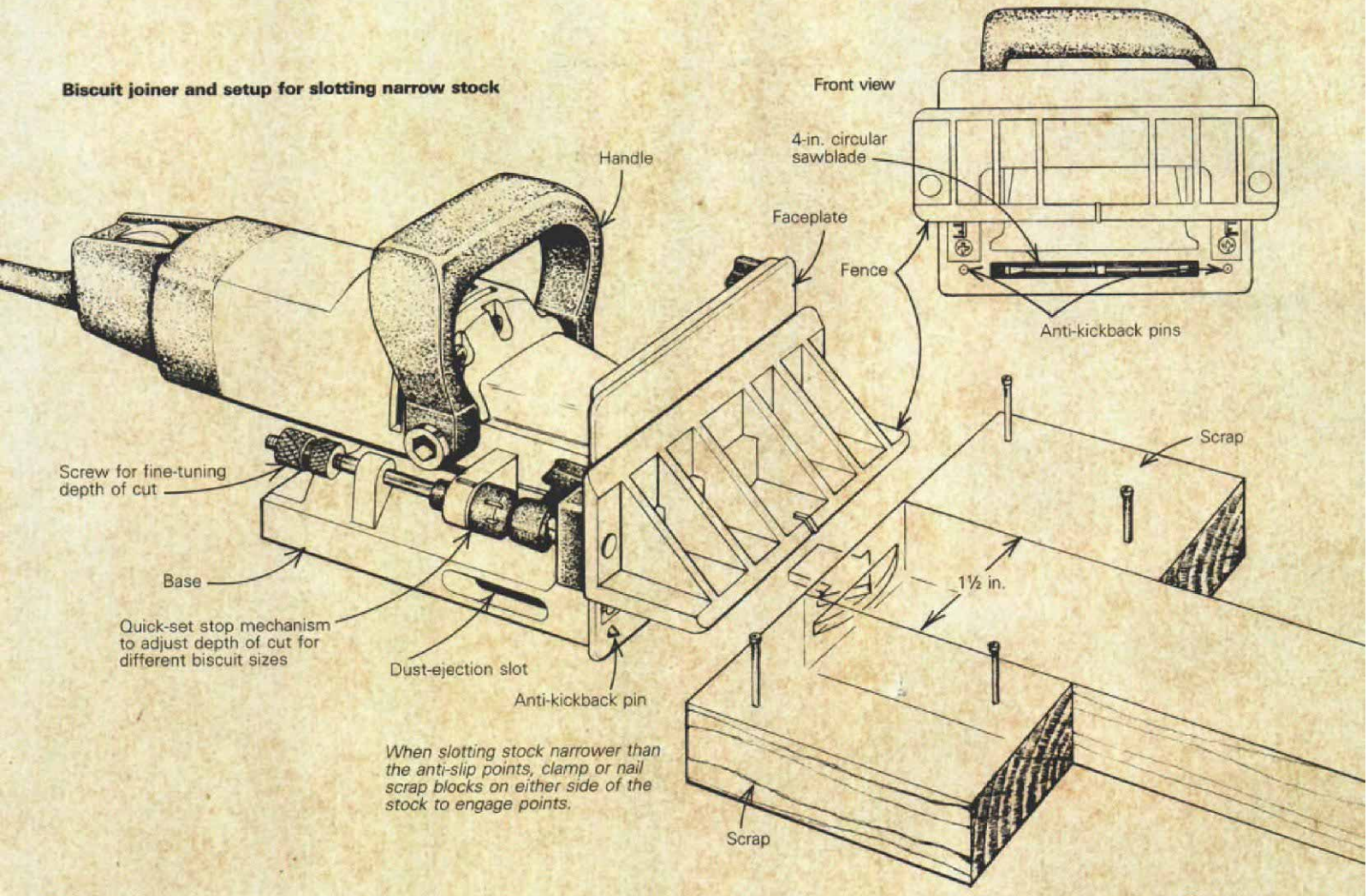
Joint strength isn't the whole story, though. A biscuit joiner is very portable, taking up less room in a toolbox than a circular saw. And it's extremely fast. Cutting slots and adding biscuits to a mitered door casing might require 30 seconds. Admittedly, even that little time can be significant when multiplied by a houseful of doors and windows. You might consider it worthwhile, though, if you've ever been disappointed when returning to a job to discover gaps in joints that fit perfectly when you nailed them up.

Who's using them where?—Stephen Sewall, a builder in Portland, Maine, feels so strongly about the advantages of biscuit-joined trim that he seldom installs trim without biscuits. On a recent job where he didn't have his biscuit joiner, Sewall nailed up the side casings, but left the head casings loose so that he could add the biscuits later.

Sewall also says that biscuit joinery has

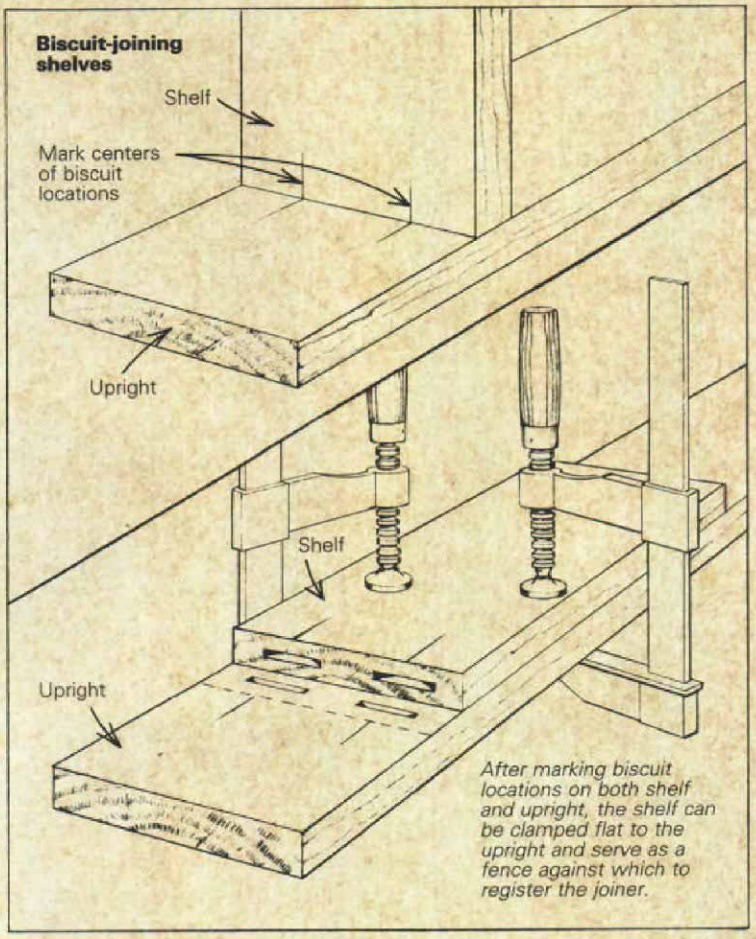
Drawings: Bob Goodfellow

Biscuit joiner and setup for slotting narrow stock



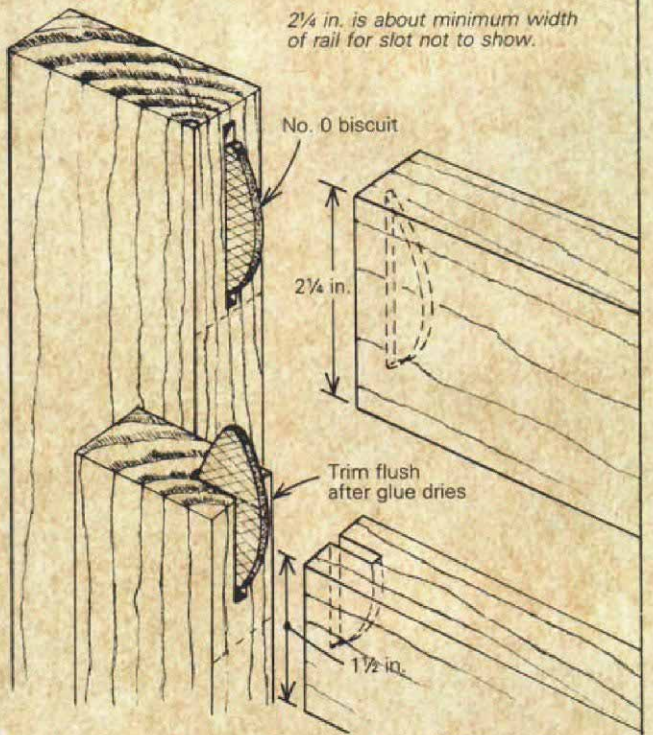
When slotting stock narrower than the anti-slip points, clamp or nail scrap blocks on either side of the stock to engage points.

Biscuit-joining shelves

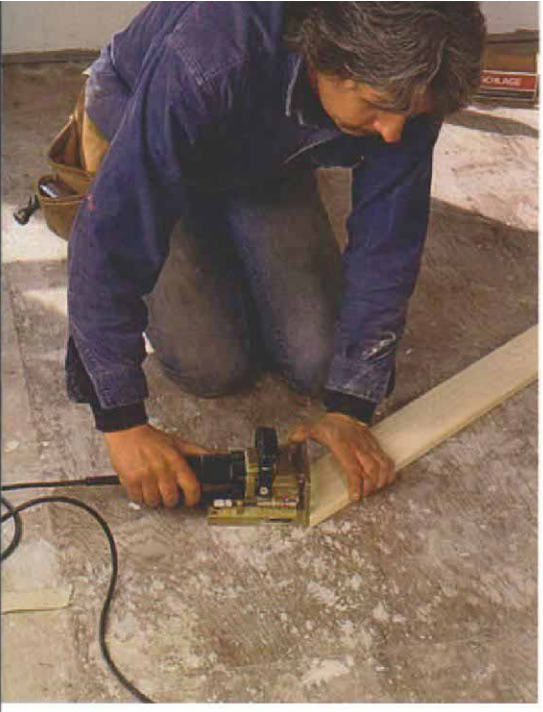


After marking biscuit locations on both shelf and upright, the shelf can be clamped flat to the upright and serve as a fence against which to register the joiner.

Offsetting slots

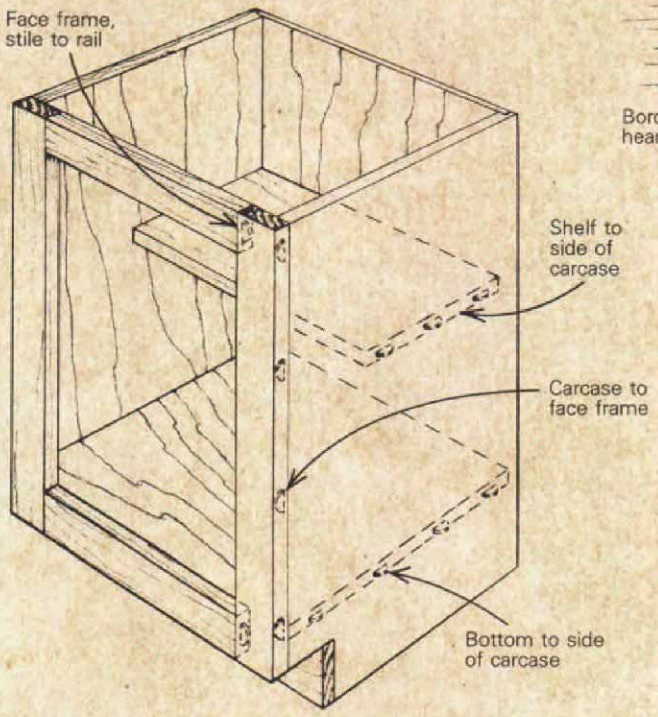


In places where the top or bottom of the face frame will be hidden, stock narrower than 2¼ in. can be used by offsetting the slot toward the hidden side and trimming the biscuit flush after glue-up.

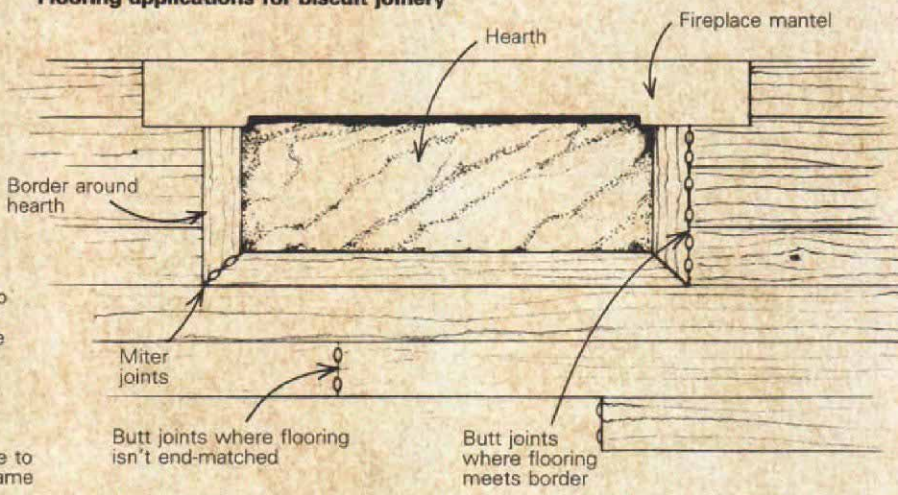


It only takes a second. **With the tool and the trim registering against the floor, this carpenter makes short work of cutting slots. By then adding a biscuit spline between two pieces of mitered casing, he prevents the joint from opening as a result of wood shrinkage.**

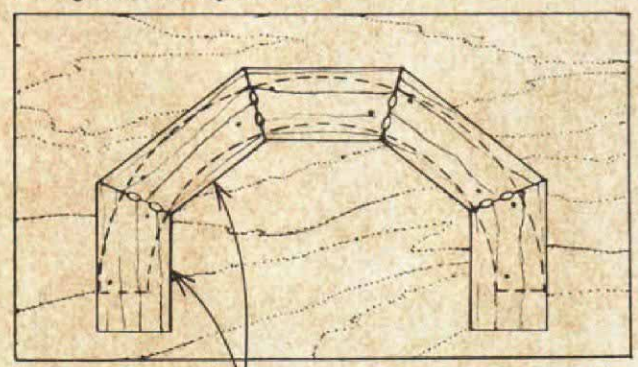
Biscuit joints in cabinetry



Flooring applications for biscuit joinery

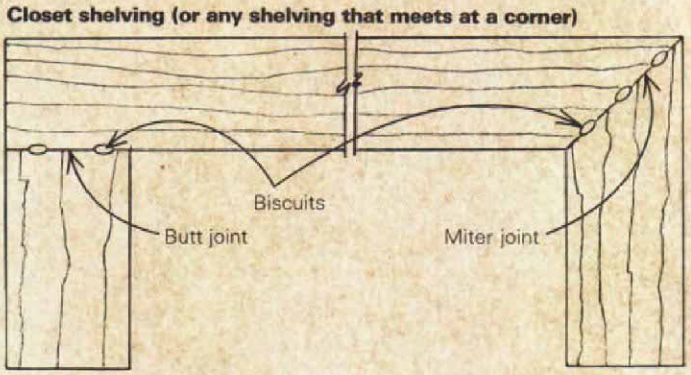


Casing for round-top windows



Position slots so biscuits won't show when radius is cut. Assemble with 5-minute epoxy. Can be worked 1 hr. after final segment is glued.

Closet shelving (or any shelving that meets at a corner)



made building cabinets on site a lot easier (drawing facing page). When installing a fixed shelf in a cabinet, which he used to do by routing dados in the sides to house the ends of the shelf, Sewall can now biscuit-join the shelf to the carcase faster than he can change bits in his router. When biscuit joining shelves, Sewall often clamps the shelf flat against the upright and registers the biscuit joiner against it as he cuts the slots (see drawing, p. 51). Biscuits will also work in ½-in. stock, like the ½-in. Baltic-birch plywood that Sewall uses to make cabinet drawers.

Foster Jones, a partner in Maine Coast Builders of York, Maine, admits that using biscuit joinery adds to the cost of a job and says his company usually decides before starting a project whether to use biscuits. If they do use them, though, they don't just use them on miter joints. They use biscuits to join inside and outside comers of baseboard, to join baseboard to door casing and to join door casing to plinth blocks (photos, p. 50).

When laying a hardwood floor, the carpenters at Maine Coast Builders use biscuits to join the picture-frame border around a fireplace hearth (drawing facing page) and to join the border to the flooring that butts into it. They even use the biscuit joiner as a trim saw to trim the bottoms of door casing so that flooring will fit beneath it.

Jones also uses biscuits when fabricating trim for round-top windows. Using biscuits and five-minute epoxy, he joins mitered segments of straight stock end to end in a rough semicircle (drawing facing page). He usually screws the segments to a piece of plywood rather than clamping them. The five-minute epoxy lets Jones work with the piece after less than an hour of drying time.

Because biscuit joinery relies in part on the biscuits' capacity to absorb water from the glue and swell up to form a tight joint, you may be wondering how well the system works with epoxy, which isn't a water-based glue. Jones and Sewall wondered, too, and broke apart joints that they had assembled with epoxy. Both found the joint to be just as strong as those made with yellow glue, which has a water base. In fact, Bob Jardinico at Colonial Saw, sole U. S. distributor for Lamello joiners (see the sidebar at right for address), recommends epoxy for biscuit joinery used outdoors. Makes you wonder if biscuits and epoxy aren't the way to keep mitered handrails on exterior decks from opening up.

Plate-joining face frames—A common complaint when assembling face frames (or cabinet doors) with biscuit joints is that the rail must be wider than the slot for the smallest biscuit. Otherwise the biscuit will show. This limits you to a rail that's at least 2¼ in. wide. Responding to this complaint, Lamello recently introduced face-frame biscuits (H-9) that are ½ in. wide by 1½ in. long. But such a short biscuit means you have to switch to a 3-in. sawblade (also available from Lamello).

A company called Woodhaven (5323 West Kimberly Rd., Davenport, Iowa 52806; 319-391-2386) makes biscuits out of particleboard that are 1-in. wide by 1⅝ in. long and for which you cut kerfs with a 6mm slot-cutting router bit (available from Woodhaven and from MLCS, Ltd, P. O. Box 4053, Rydal, Pa. 19046; 800-533-9298). With these same bits you can also use your router to perform conventional plate joinery, but the cutter is exposed and you don't have a faceplate, so you lose some of the safety and convenience of a plate joiner.

As it turns out, though, you can often get away with using a standard biscuit in a narrow rail by offsetting the slot to the outside of the frame and trimming the biscuit flush (drawing, p. 51). In most cases the exposed kerf and biscuit are either pointing down at the floor and can't be seen, or are covered by a countertop. When cutting slots in narrow stock, it's best to clamp or nail scrap blocks on either side so the steel points on the joiner's faceplate have something to grip (drawing, p. 51). These points keep the tool from slipping during a cut (some joiners employ rubber bumpers or pads rather than steel points).

But wait, there's more—It's easy to think of other job-site uses for biscuit joinery: mitered ceiling beams, jamb extensions on doors and windows, return nosings on stair treads. You could even use biscuit joinery where two closet shelves meet at a corner and avoid having to screw a cleat to the underside of one shelf to support the other (drawing facing page).

Do be careful, though, if you decide to buy a biscuit joiner. Beware the "Law of the Instrument." This is a theory in psychology that states: if you give a small boy a hammer, everything he encounters will need hammering. There may be some things that really don't need to be joined with biscuits. □

Kevin Ireton is managing editor of Fine Homebuilding. *Photos by the author.*

Biscuit-joiner manufacturers

Looking for a faster and more accurate alternative to doweling, a Swiss cabinetmaker named Henry Steiner developed plate joinery (also called biscuit joinery) back in the 1950s. Steiner founded a company to manufacture slot-cutting machines, called plate joiners, and the plates (or biscuits) to go with them. The company is called Steiner Lamello, Ltd. ("lamello" comes from the German word *lamelle,* meaning "thin plate"), and despite the fact that nine other companies now make plate joiners, the Lamello machine is still considered by many woodworkers to be the "Cadillac" of plate joiners. The following list includes all the companies that make plate joiners. Prices range from under $150 to over $600. So if you decide to buy a plate joiner, be prepared to shop around. —*K. I.*

Delta 32-100 (bench-top model)
Delta International Machinery Corp.
246 Alpha Dr.
Pittsburgh, Pa. 15238
(800) 438-2486

Elu Joiner/Spliner 3380
Black & Decker, Inc.
P. O. Box 798
Hunt Valley, Md. 21030
(800) 762-6672

Freud JS 100
Freud, Inc.
P. O. Box 7187
High Point, N. C. 27264
(919) 434-3171

Kaiser Mini 3-D
(dist. by W. S. Jenks & Son)
1933 Montana Ave. NE
Washington, D. C. 20002
(202) 329-6020

Lamello (3 models)
(dist. by Colonial Saw Co., Inc.)
P. O. Box A
Kingston, Mass. 02364
(617) 585-4364

Porter-Cable 555
Porter-Cable Corp.
P. O. Box 2468
Jackson, Tenn. 38302
(901) 668-8600

Ryobi JM100K
Ryobi America Corp.
5201 Pearman Dairy Rd.
Suite 1
Anderson, S. C. 29625
(800) 226-6511

Skil 1605:02
Skil Corp.
(subsidiary of
Emerson Electric Co.)
4300 West Peterson Ave.
Chicago, Il. 60646
(312) 286-7330

Virutex O-81
Rudolf Bass Inc.
45 Halladay St.
Jersey City, N. J. 07304
(201) 433-3800