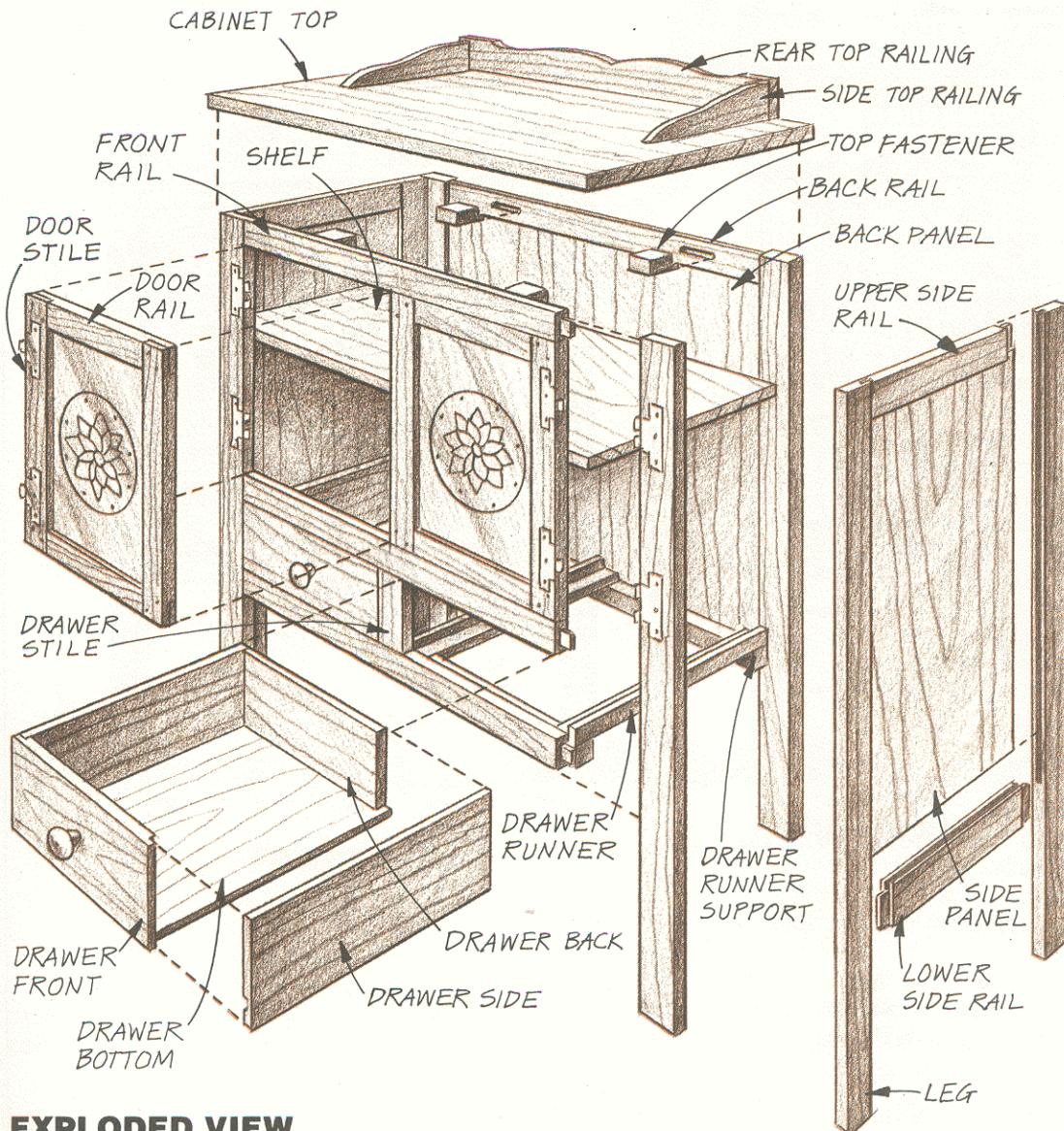


PIE SAFE

The pie safe was once a common furnishing in American homes. It kept baked goods and other foodstuffs safe from pests. This miniature version is not an antique but does capture the flavor of early pie safes. It was designed and built by Butch Roller of Richmond, Virginia, for his apartment. He puts his TV set on top and his VCR on the shelf.

1 Select the stock. Butch made the side and back panels of $\frac{1}{4}$ -inch plywood and framed them with solid wood of the same species. Most original pie safes were constructed of softwoods such as pine or poplar, but examples in cherry and other hardwoods are also common. Choose a wood and finish to suit your own taste, then select the



**EXPLODED VIEW**

CUTTING LIST

Part

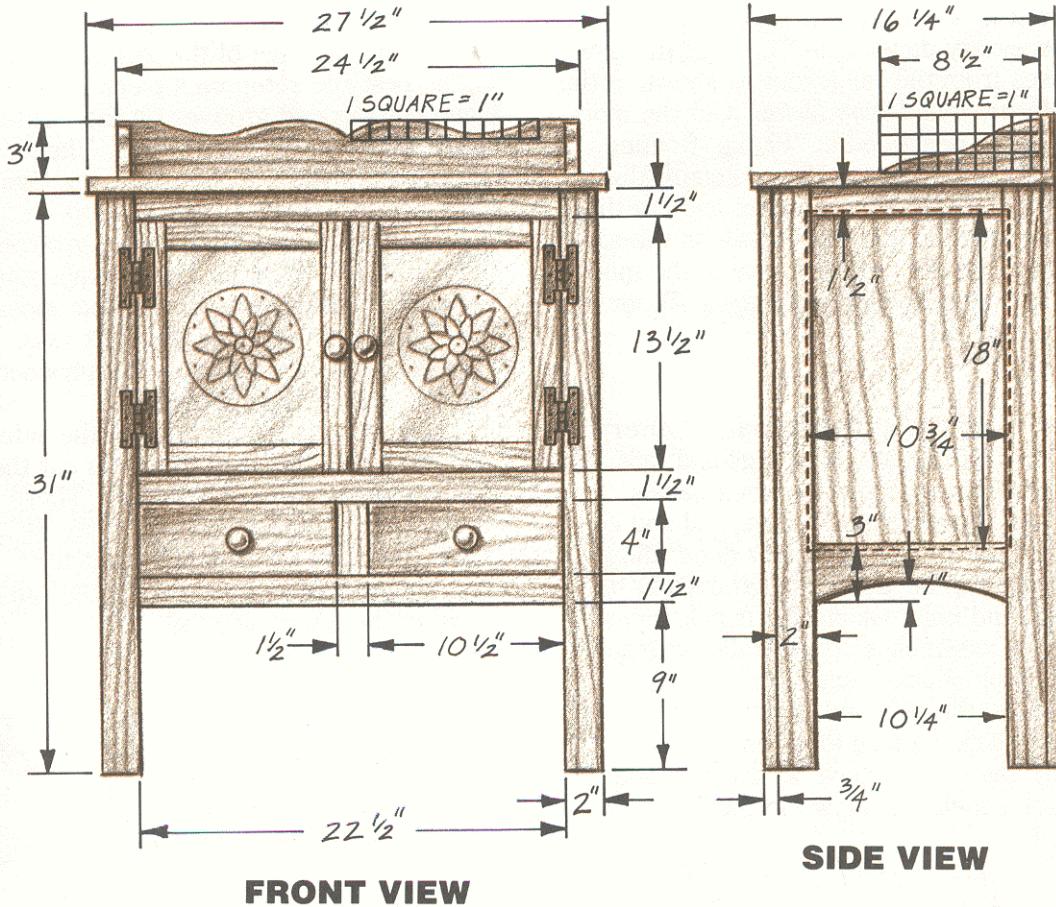
Part	Dimensions
Legs (8)	$\frac{3}{4}'' \times 2'' \times 31''$
Front rails (3)	$\frac{3}{4}'' \times 1\frac{1}{2}'' \times 23\frac{1}{2}''$
Drawer stile	$\frac{3}{4}'' \times 1\frac{1}{2}'' \times 5''$
Lower side rails (2)	$\frac{3}{4}'' \times 3'' \times 10\frac{3}{4}''$
Upper side rails (2)	$\frac{3}{4}'' \times 1\frac{1}{2}'' \times 10\frac{3}{4}''$
Back rails (2)	$\frac{3}{4}'' \times 1\frac{1}{2}'' \times 23''$
Top fasteners (4)	$\frac{3}{4}'' \times 1\frac{1}{4}'' \times 2''$
Side panels* (2)	$\frac{1}{4}'' \times 10\frac{3}{4}'' \times 18''$
Back panel*	$\frac{1}{4}'' \times 23'' \times 19\frac{1}{2}''$
Drawer runner supports (2)	$\frac{3}{4}'' \times 1'' \times 25''$
Shelves (2)	$\frac{3}{4}'' \times 14\frac{1}{8}'' \times 24\frac{7}{8}''$
Drawer runners (4)	$\frac{3}{4}'' \times \frac{3}{4}'' \times 14\frac{1}{4}''$
Drawer fronts (2)	$\frac{3}{4}'' \times 3\frac{15}{16}'' \times 10\frac{3}{8}''$
Drawer backs (2)	$\frac{3}{4}'' \times 3\frac{7}{16}'' \times 9\frac{7}{8}''$
Drawer sides (4)	$\frac{3}{4}'' \times 3\frac{15}{16}'' \times 14\frac{7}{8}''$
Drawer bottoms* (2)	$\frac{1}{4}'' \times 9\frac{5}{16}'' \times 14\frac{3}{4}''$
Door stiles (4)	$\frac{3}{4}'' \times 1\frac{1}{2}'' \times 13\frac{3}{8}''$
Door rails (4)	$\frac{3}{4}'' \times 1\frac{1}{2}'' \times 11\frac{3}{16}''$
Pane retainers† (8)	$\frac{1}{4}'' \times \frac{1}{4}'' \times 12''$
Side top railings (2)	$\frac{3}{4}'' \times 2\frac{3}{4}'' \times 8\frac{1}{2}''$
Rear top railing	$\frac{3}{4}'' \times 3'' \times 24\frac{1}{2}''$
Cabinet top	$\frac{3}{4}'' \times 16\frac{1}{4}'' \times 27\frac{1}{2}''$

Hardware

- 6d finish nails
- 8 flathead wood screws, #6 × 1¼"
- 4d box nails
- 16 dowels, ¼" × 1"
- 2 pieces aluminum flashing, 10⅞" × 8¹¹/₁₆"
- 5/8" brads
- 2 pair H hinges, 1¾" wide
- 7 flathead wood screws, #6 × 1½"
- 4 porcelain knobs, 1¼" dia.

*Make from plywood.

†Cut to length at assembly.



most attractive boards for the visible parts.

2 Cut the carcase parts to size. Cut the main carcase parts to size, leaving the plywood panels, shelves, drawer parts, and door parts until later. The top is made up of edge-glued narrow boards. See "Edge-Gluing" on page 6 for step-by-step instructions.

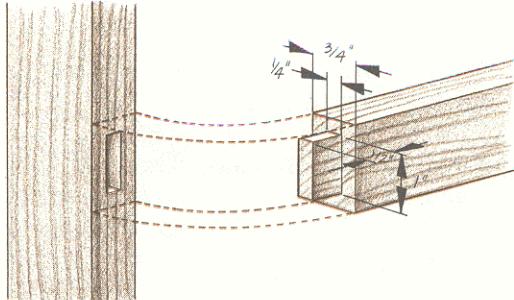
3 Cut the front-frame mortise-and-tenon joints. The front frame of the carcase is joined together with mortise-and-tenon joints. These all have $\frac{1}{4}$ -inch shoulders. Since the tenon pieces are all $\frac{3}{4}$ inch \times $1\frac{1}{2}$ inches, the tenons are all $\frac{1}{4}$ inch thick and 1 inch wide. The tenons are $\frac{1}{2}$ inch long so the mortises should be just a bit deeper, say $\frac{9}{16}$ inch. Lay out the position of the front rails on the two legs that you intend to be the

front legs. The *Front View* gives the necessary dimensions. Lay out the mortises from the rail layout as shown in the *Mortise-and-Tenon Detail*. Cut the mortises as described in "Plunge-Routing Mortises" on page 18 and square the ends with a chisel. Lay out and cut the mortises for the drawer stile in the same way. Cut the tenons to match the mortises, as described in "Cutting Tenons" on page 60.

4 Cut the side and back joinery.

The side and back legs and rails form frames around plywood panels. Since plywood does not expand and contract the way solid lumber does, these panels can be glued into grooves in the legs and rails. Gluing the panels gives these assemblies considerable strength allowing smaller tenons on the rails. Hence, the side and back rails have $\frac{1}{4}$ -inch-thick, $\frac{1}{4}$ -inch-long tenons that fit into the same groove as the side and back panels, as shown in the *Panel Detail*.

Chuck a $\frac{1}{4}$ -inch straight bit in a table-mounted router and adjust it to cut



MORTISE-AND-TENON DETAIL

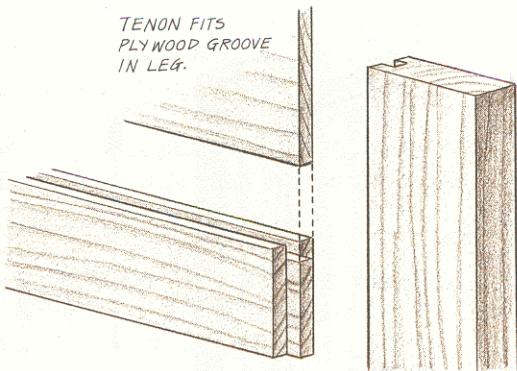
$\frac{1}{4}$ inch deep. Adjust the fence to center the cut in the edge of the $\frac{3}{4}$ -inch-thick legs. Test the setup on a piece of scrap, then cut stopped grooves on the inside edge of the six remaining legs. These grooves are open at the top of the legs and stop $21\frac{3}{4}$ inches from the top. Square the stopped ends of the grooves with a chisel. With the same setup, rout grooves in the inner edges of the upper and lower side rails and the back rails. These grooves, which hold the plywood panels, are open on both ends.

Cut tenons on the ends of the side and back rails the same way you cut the tenons for the front framework. These tenons are only $\frac{1}{4}$ inch long. They all have shoulders on both sides but the only edge shoulders are on the bottom edge of the lower side rails.

5 Rout grooves for attaching the top.

The pie-safe top will swell and shrink as the humidity changes. To accommodate these changes, the top is fastened down with four small tongued blocks that engage grooves in the side rails. Keep the bit and depth adjustment

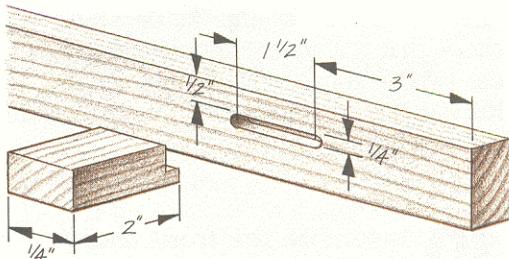
SHOP TIP: When making stopped cuts on the router table, you can't watch the cut being made. To tell where you're cutting, mark the location of the bit onto the fence. Lay out the ends of the cut on the side of the stock opposite where the cut will be. You can now begin and end the cut in the correct places by lining up the layout marks with the bit location marks.

**PANEL DETAIL**

that you used for the panel grooves, but move the fence to $\frac{1}{2}$ inch from the bit. Rout two $1\frac{1}{2}$ -inch-long grooves in the upper front rail and two in the upper back rail as shown in the *Top Fastener Detail*.

6 Make the top fastener blocks. Select a scrap of $\frac{3}{4}$ -inch-thick stock that is 2 inches in the direction of the grain and $5\frac{1}{2}$ inches across the grain. With the $\frac{1}{4}$ -inch straight bit still in the router, cut a rabbet $\frac{1}{2}$ inch high and $\frac{1}{4}$ inch wide along a 5-inch edge of the stock. Crosscut the piece into four $1\frac{1}{4}$ -inch-wide blocks with $\frac{1}{4}$ -inch tongues on the end. Set these aside until you're ready to install the top.

7 Cut arches in the lower side rails. The lower side rails are relieved with a 1-inch-high arc as shown in the *Side View*. (The radius is $13\frac{5}{8}$ inches.) Lay out the arc on a piece of paper, cut it out, and trace it onto the rails. Saw to the traced line with a coping saw, then remove the saw marks

**TOP FASTENER DETAIL**

with a file and sandpaper. Round the edges slightly.

8 Saw the plywood side and back panels to size. Assemble the side and back frames without glue. Measure the insides of the frames and add $\frac{1}{2}$ inch to the length and width. The resulting dimensions should be the same as the dimensions given in the Cutting List for the side and back panels. If they differ slightly, use your own dimensions rather than the Cutting List dimensions. Saw the panels to size making sure you will have the grain running vertically in the assembled project. Double-check that the widths of the panels do not exceed the overall lengths of the corresponding rails and trim the panels if necessary.

9 Assemble the side and back frames. Sand all of the parts. Chamfer the edges of the tenons and panels very slightly with a block plane. Starting with one of the sides, apply glue to the grooves in the rails and install them on the panel. Apply glue to the grooves in the legs and to the tenon shoulders, then assemble the legs to the

rails and panels. Clamp the assembly and check that it's square by checking that the two diagonals are of equal length. Repeat this procedure for the other side and the back.

10 Assemble the front frame.

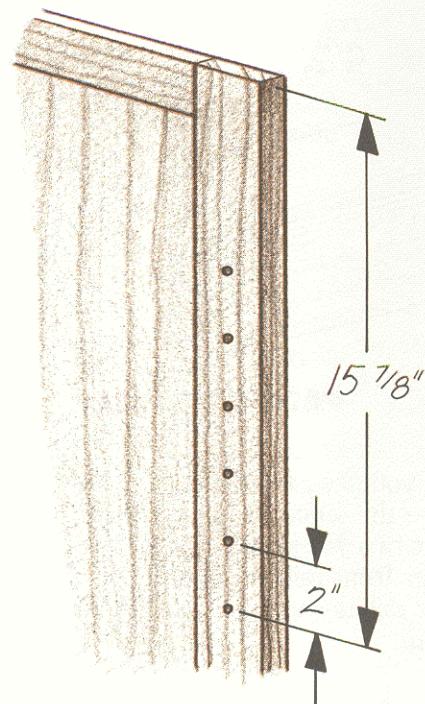
Glue the drawer stile to the two lower rails, then glue this assembly to one of the legs. Glue the top rail to this leg, then glue the second leg in place. Clamp the assembly and check that it's square.

11 Mount the drawer runner supports.

The drawer runners rest on two supports screwed to the front and back lower frame rails as shown in the *Drawer Runner Detail*. Glue and clamp them to the assembled front and back flush with the bottom edge of the lower rails.

12 Drill the shelf support pin holes.

Lay out the shelf support pin holes in the side legs as shown in the *Shelf Pin Layout*. Wrap masking tape around the drill bit $\frac{1}{2}$ inch from the tip

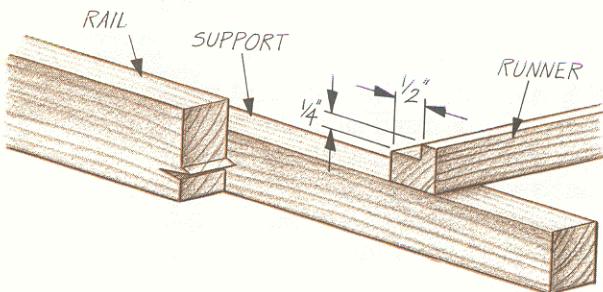


SHELF PIN LAYOUT

to act as a depth gauge, then drill all the holes.

13 Assemble the carcase.

Assemble the front and back assemblies to the side assemblies without glue, holding them in place with clamps. Make sure the assembly is square, then drill holes for the 6d finish nails that will hold the carcase together. Use a drill bit slightly smaller than the nail diameter. Unclamp one side frame and carefully slip it out of the assembly. A stick of scrap $14\frac{5}{16}$ inches long may be handy to hold the front and back slightly apart for the time being. Apply glue to the edges



DRAWER RUNNER DETAIL

of the side, then replace the frame in the assembly and nail it. Check again that the assembly is square, then glue and nail the other side frame in the same manner. Reclamp the assembly, check that it is square, and let the glue dry.

14 Make the shelves. Measure the inside of the cabinet to check that the shelves will fit with $\frac{1}{8}$ -inch clearance. Edge-glue boards to create the necessary width if necessary, then saw the shelves to size and plane off the saw marks.

15 Make the drawer runners. Saw four drawer runners to the dimensions given in the Cutting List, then rout a $\frac{1}{2}$ -inch \times $\frac{1}{4}$ -inch rabbet along an edge of each. Position the runners on the supports as shown in the *Drawer Runner Detail* and check that they are flush with the bottom and sides of the drawer openings, parallel, and perpendicular to the front frame. Drill shank and pilot holes for #6 \times $1\frac{1}{4}$ -inch flathead wood screws and screw the drawer runners in place.

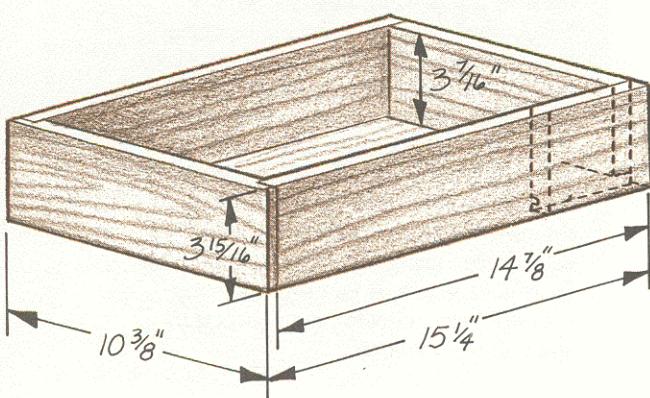
16 Make the pie safe drawers. Measure the drawer openings in the front framework of the pie safe. If your dimensions differ from those shown in the *Front View*, adjust the dimensions of the drawer parts to compensate. The drawers should have $\frac{1}{16}$ inch of clearance on both sides and at the top.

The drawer sides fit into $\frac{3}{4}$ -inch \times $\frac{3}{8}$ -inch rabbets in the drawer fronts as shown in the *Drawer Detail*. The drawer

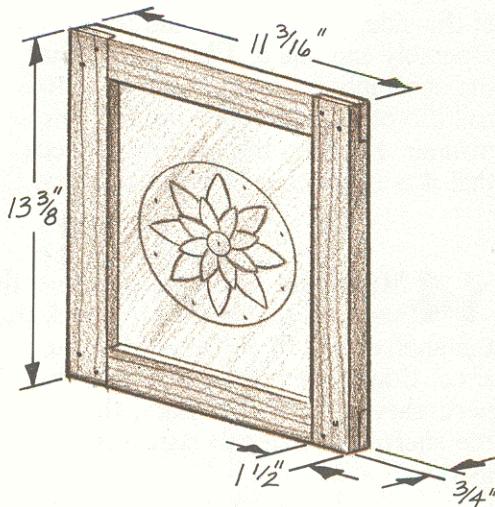
SHOP TIP: When you need to drill several identical sets of holes, shelf support holes for example, tape a piece of poster board to the stock in the area requiring one set of holes. Lay out the holes on the poster board instead of directly on the stock. Drill the holes right through the poster board into the stock. Then tape the poster board to the next piece of stock and drill the new set of holes using the holes in the poster board as a guide. If you require many sets of identical holes, use plywood instead of poster board.

backs simply butt against the sides where they are glued and nailed. The drawer bottom fits in a $\frac{1}{4}$ -inch \times $\frac{1}{4}$ -inch groove in the sides and front. Cut the fronts, backs, and sides to length and width, then rabbet the fronts with a $\frac{3}{4}$ -inch straight bit in a table-mounted router. Change to a $\frac{1}{4}$ -inch straight bit and groove the sides and front for the bottom. Saw the bottoms out of $\frac{1}{4}$ -inch plywood. They should slide easily into the grooves in an assembled drawer.

Sand all of the drawer parts, then clamp the drawers together without glue. Check that they're square and drill pilot holes for 6d finish nails to hold the sides to the fronts and backs. Remove the clamps, apply glue to the joints, and nail the sides in place. Slide the bottoms into their grooves, check that the drawers are square, and nail the bottoms to the backs with a couple of 4d box nails. Do not glue the bottoms. Drill a drawer-knob screw hole in the center of each drawer front.



DRAWER DETAIL



DOOR DETAIL

17 Make the door frames. Measure the door openings in the pie safe and adjust the Cutting List dimensions as you did for the drawer parts. The doors should have $\frac{1}{16}$ -inch clearance on all four sides. Cut the parts to your dimensions.

The corners of the door framework have glued and pinned lap joints as shown in the *Door Detail*. Cut each half of a lap joint as though you were cutting one cheek of a tenon. Refer again to "Cutting Tenons" on page 60 if you need to.

Clamp the door frames together without glue to check the fit of the joints and make sure they are square, then sand the pieces. Glue and clamp the doors together and again check that they are square. Set them aside and let the glue dry.

Drill $\frac{1}{4}$ -inch-diameter holes for pins as shown in the *Door Detail* and glue in short lengths of dowel. When the glue is

dry, trim the dowels flush with the frame with a sharp chisel and sandpaper.

Rout $\frac{1}{4}$ -inch-deep by $\frac{1}{4}$ -inch-wide rabbets for the tin inserts in the inner edges of the door frames. This will be easiest with a piloted rabbeting bit in a table-mounted router. Square up the corners with a sharp chisel.

18 Make the tin inserts. Decoratively punched "panels" were traditionally made out of tin-plated sheet steel known as "tinplate." Tinplate is no longer commonly available but easily found aluminum flashing as used in roofing is a very close look-alike. Cut the metal to fit in the back rabbet.

The *Punch Pattern* is printed actual size. Trace or photocopy the pattern. Make a complete circular pattern on paper by pricking through the tracing at each mark, then pivoting the tracing about the center and pricking through at

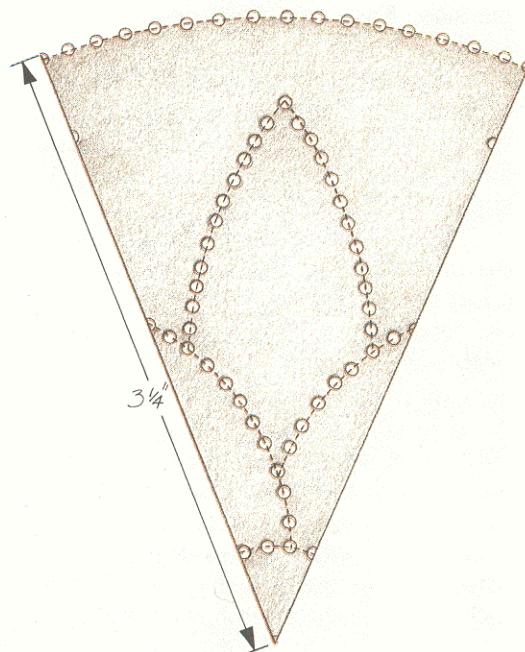
each mark again. Seven repeats make a full circle.

Center the pattern on one of the pieces of metal, tape it in place, and tape the metal to a piece of plywood. Punch through the pattern and the metal at each mark with a nail or awl. Repeat the procedure for the second piece of metal but don't use the same plywood surface; the dimples in the surface will misguide the nail or awl.

To install the metal, place it in the rabbets in a door frame and hold it with $\frac{1}{4}$ -inch-square panel retainers tacked to the frame with $\frac{5}{8}$ -inch brads. Miter the retainers at the corners for a neat job.

19 Hang the doors. Place the hinges on the doors as shown in the *Front View*. Mark the center of each screw hole and drill pilot holes for the screws. Screw the hinges to the doors, then place the doors in the opening. Shim the doors so they have uniform clearance all the way around. If either the doors or the opening are a bit off, you won't be able to shim them to get nice uniform clearances. In this case, carefully plane the door edges as needed. When you have the fit right, drill pilot holes for the hinge screws that go in the cabinet and screw the hinges in place.

20 Install the top railing. The railing on the top is decorative but also keeps things from sliding off. Saw the side and rear railings to the shapes shown in the *Front View* and *Side View*. If you don't have a scroll or band saw, a coping saw will do just fine. Re-



PUNCH PATTERN

move the saw marks with a fine rasp and sandpaper and round the edges just a bit with the sandpaper. Position the railings on the top as shown in the drawings and lightly trace their position onto the top. Drill shank holes for #6 \times 1½-inch flat-head wood screws through the top, inside the tracings. Drill two evenly spaced holes for each side and three for the back. Countersink the holes on the underside of the top. Clamp the railings in position and drill pilot holes up through the shank holes into the railings. Sand the top, removing the traced lines, then glue and screw the railings in place.

21 Apply your finish. Remove the hinges and finish sand the entire

pie safe. Ease any sharp edges as you sand.

Both painted and natural finishes are appropriate. Boiled linseed oil and paste wax provide an attractive and economical finish in keeping with the traditional design of the project.

If you choose the oil finish, apply the oil with a rag. Allow it to soak in for a half hour, then wipe off as much as you can. Hang the rags out like laundry on a clothesline to keep them from spontaneously combusting. Allow the oil in the wood to cure for a day, then rub it with 0000 steel wool. Apply a second and third coat in the same manner. Allow the third coat to cure for several days. Apply a paste wax with an ultra-fine Scotch-Brite pad, let the wax dry, then buff it with a soft cloth or lambswool buff.

If you prefer a painted finish, consider milk paint as described on page 100.

22 **Attach the top.** Put a towel or blanket over your workbench as a protective pad, then put the pie-safe top upside down on the bench. Put the pie-safe carcase upside down on the top. Position the carcase as shown in the *Front View* and *Side View*. Put the top blocks in place and drill shank and pilot holes for the top block screws. Be especially careful not to drill through the top. Screw the blocks to the top.

Reinstall the door hinges and install the door and drawer knobs.