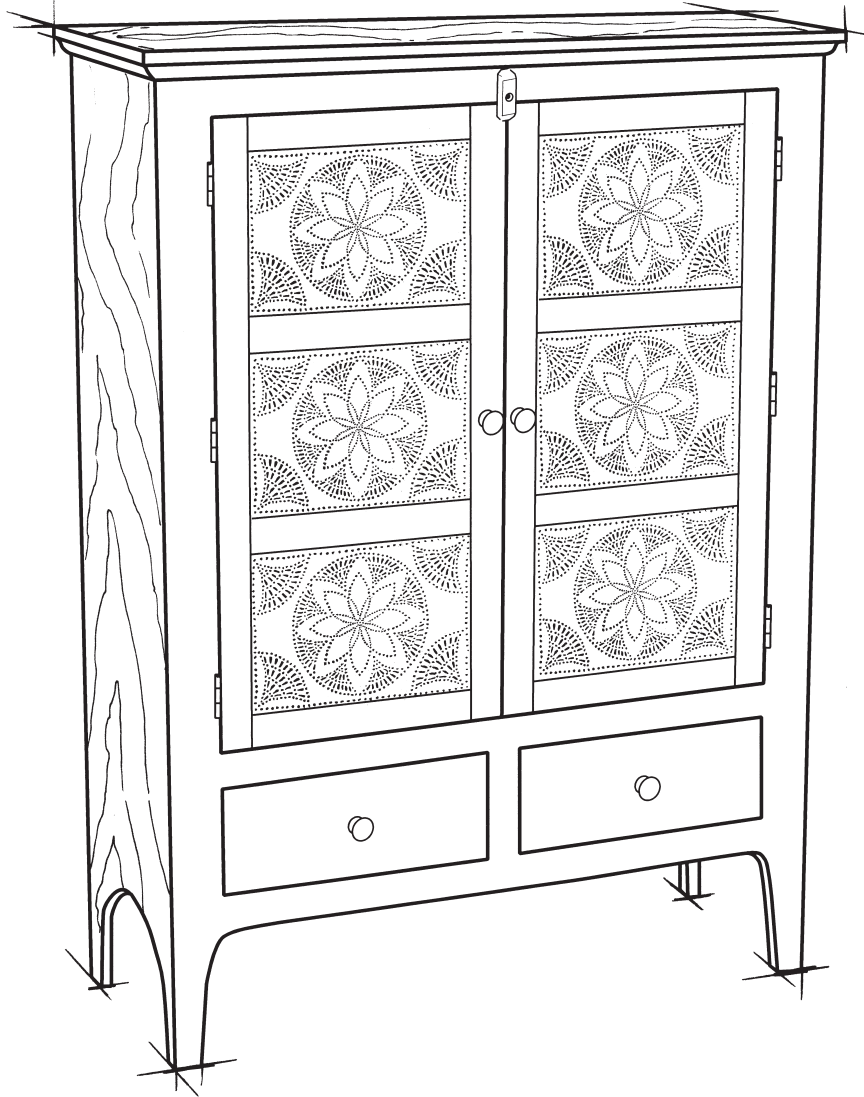


**WOODWORKS: ADVANCED PROJECT 2001-2002**  
**OAK PIE SAFE**



Build a brand-new antique! This versatile classic goes together fast with biscuit joinery.

- Built of solid oak in a simple, modified-Shaker style, this pie safe blends easily into most any décor. Adjustable shelves and a pair of drawers make it a versatile storage cabinet for more than just cooling off fresh-baked pies. The pierced-tin panels can also provide ventilation for a modern sound system. Or, you can use this cabinet to store clothing and take some of the pressure off an overstuffed closet or bureau.
- Biscuits make the joinery on this project as easy as pie. If you've never made a project of this scale before, or are new to biscuit joinery, this is the perfect place to start. You'll need to know how to make stopped rabbets for the back and dados for the drawers, but hanging the flush-fit doors is a breeze with no-mortise hinges.

This pie safe gives advanced woodworking students the opportunity to employ a number of their skills, including biscuit joinery for edges and corners, making templates, measuring, cutting, marking, gluing, clamping and mitering. And after you build the pie safe, you'll learn how to apply stains and finishes to protect the wood and keep it looking beautiful.

## TOOLS REQUIRED

### Hand tools

- Hold-down clamps
- Pipe or bar clamps at least 4' long
- Combination square
- Carpenter's square
- Hole punch
- Lampmaker's chisel

### Power Tools

- Biscuit joiner
- Table saw
- Router with a 3/8" rabbeting bit
- Jigsaw

### Miscellaneous

- Pencil
- Carpenter's glue
- Safety glasses

## SHOPPING LIST

Item	Quantity
4/4 oak	100 board feet
1/4" oak plywood	1 4'x8' sheet
1/4" diameter brass shelf supports	16
1-1/4" diameter wood knobs	4
Tin for pierced panels	4 pcs., 10"x14"
#20 biscuits	150
Brads, 3/4", 1", 1-1/4" long	1 box each size
#10 x 1-1/4" pan head screw w/ flat washer	8
#4 x 5/8" flat head screw	50
#10 x 1-1/4" flat head screw	10
No-mortise hinges	6

## WOOD FINISHING PRODUCTS

(Choose the recommended stain/finish or create your own combination)

### Recommended finish

Stain: Minwax® Wood Finish™ Cherry (or any color you prefer)

Finish: Minwax® Fast-Drying Polyurethane Satin

### Alternate Finishes

Stain: Minwax® Gel Stain in Cherrywood (or any color you prefer)

Finish: Minwax® Fast-Drying Polyurethane Satin

### Miscellaneous

- Sandpaper
- Gloves for finishing
- Clean, lint-free rags for wiping
- Mineral spirits
- Minwax® Wood Putty
- Minwax® Finishing Brushes
- Water-filled metal container with tight-fitting lid

## CUTTING LIST

### OAK PIE SAFE 57-3/4" H x 42-1/2" W x 16" D

Part	Name	Qty.	Dimensions
<b>CARCASS Oak hardwood</b>			
A	top	1	3/4 x 17 x 42-1/2
B	sides	2	3/4 x 15-1/4 x 57
C	shelves	5	3/4 x 15 x 39
D	back rail	1	3/4 x 4 x 39
E	drawer kickers	2	3/4 x 2 x 15
F	drawer runners	4	3/4 x 1-1/2 x 15
G	doorstop	1	3/4 x 1-1/2 x 3
H	drawer runner cleats	2	3/4 x 1-5/16 x 39
J	drawer kicker cleats	2	3/4 x 1-1/16 x 39
K	molding	1	3/4 x 3/4 x 42
L	molding	2	3/4 x 3/4 x 16-3/4
M	drawer runners	4	3/4 x 3/4 x 15
N	door latch	1	1/2 x 7/8 x 2-1/2

### FACE FRAME Oak hardwood

P	face stiles	2	3/4 x 3 x 57
Q	top rail	1	3/4 x 2-3/4 x 34-1/2
R	lower rails	2	3/4 x 2 x 34-1/2
S	drawer divider mullion	1	3/4 x 2 x 6-1/2

### DOORS Oak hardwood

T	door stiles	4	3/4 x 2 x 35-3/4
U	door rails	8	3/4 x 2 x 13-1/4
V	tin panel stops	24	3/8 x 3/8 x 15

### DRAWERS Oak hardwood

W	drawer fronts	2	3/4 x 6-3/8 x 16-1/8
X	drawer sides	4	1/2 x 6-3/8 x 15-1/2
Y	drawer backs	2	1/2 x 5-7/8 x 15-5/8

### OAK PLYWOOD

Z	back	1	1/4 x 39-3/4 x 48-3/16
AA	drawer bottoms	2	1/4 x 14-3/4 x 15-5/8

## BEFORE YOU BEGIN

Good craftsmanship begins and ends with good work habits, so make the following steps part of your routine workshop practice. If you have any doubts or questions about how to proceed with a project, always discuss them with your shop instructor.

- Carefully and fully review plans and instructions before putting a tool to the project lumber.
- Work sensibly and safely. Wear safety goggles when doing work that creates flying chips and sawdust; wear the appropriate mask or respirator whenever making sawdust or working with thinners or other solvents.
- At the end of every work session, clean up your shop area and put away all portable tools.

## CUTTING AND ASSEMBLY PROCEDURE

Refer to the project illustrations shown on pages 7, 8 and 9.

**Woodworker's Tip:** Sort your wood for grain and color. Select flat, straight-grained wood for the doors and face frame. This is one place you can't afford any warping. Cut the drawer fronts (W) from a single board so the grain flows from one drawer to the next. Choose boards with compatible figure and color for the sides (B) and top (A). Use the less desirable pieces for shelving.

**Woodworker's Tips:** There are three common sizes of biscuits: #20, #10 and #0. Number 20 biscuits offer the greatest gluing surface and are, therefore, the strongest. Use these whenever possible even if it results in the biscuit "breaking out" of the joint. In this project, breakouts occur on the face frame and door frames where narrow rails join the stile. But they won't be a problem if you offset the center mark for the biscuits so the breakout won't be seen. We did this on the face frame so the biscuits break out where the drawers and top cover them (see Fig. D). Breakouts on the door frames are covered by the stops for the tin panels. The top-rail biscuits on the door frames are also offset to keep the top edge of the door clean (Fig. B). Use the following tips to get better results with your biscuit joinery.

- Take the time to dry-fit each assembly using all the biscuits and clamps you'll need for the real thing. You'll be able to rehearse your glue-up and red-flag any misaligned biscuits.
- Assembly with biscuits needs to go smoothly because the biscuits swell quickly once glue is applied. For a more-relaxed assembly, use an extended-open-time glue.
- Getting glue in the biscuit slots can be a bit messy. Just squirt a bead into the groove and spread it along both side walls of the slot with a small glue brush.
- If you accidentally cut a biscuit slot where none belonged, and it's on an exposed edge, you can make a nearly invisible repair. Use a compass to mark a 4" - diameter circle in some oak that's 5/32" thick. Cut it out on the bandsaw and then glue the circle into the bad slot, cleaning up any excess glue. After the glue dries, flush-cut the repair and sand the edge smooth.

## THE CARCASS

1. Lay out and cut the biscuit slots for the top (A), sides (B) and shelves (C).

**Woodworker's Tip:** Cut the biscuit slots about 6" apart for edge joining. The biscuits align the surface of the boards and produce flush joints that will require little sanding. You don't want to expose a biscuit joint when making your final cuts, so keep your biscuits at least 3" away from the ends of the top (A) and the leg cutout area on the sides (B).

2. Dry-fit then glue-up and clamp the top (A), sides (B) and shelves (C); after the glue has dried, cut these pieces to length.
3. Use the leg patterns (shown in Fig. A) to lay out the shapes on the bottoms of the sides (B). Cut them out with a jigsaw.
4. Use a table saw to cut the rabbet on the back rail (D) for the back (Z). Use a router with a 3/8" rabbeting bit to cut the stop rabbet on the sides for the back.
5. Lay out the fixed shelf locations on the cabinet sides, then cut the biscuit slots for the shelves and the back rail.

**Woodworker's Tip:** Cut the slots in the end of a shelf (C) with the base of the plate joiner on the cabinet side (B). Clamp the shelf on the side so the top edge of the shelf lines up with the top edge of the layout mark on the side. Mark for biscuits in the middle of the shelf and 3 inches in from each end. Cut the slots in the side (B) with the plate joiner held vertical, using the markings on the shelf.

6. Drill holes for adjustable shelf pins.

**Woodworker's Tip:** An accurate way to drill for adjustable shelf pins is to use a perf-board template. Mark the bottom and back edge to correctly register the template on the other side of the cabinet. Mark the holes to be drilled (every other hole gives a 2" spacing) and use a sharp brad-point bit. Fasten a metal depth-stop ring to the bit or use your own depth stop made from 3/4" x 3/4" stock that's drilled down the center and cut to length.

7. Finish-sand all the pieces starting with 120-grit paper and working your way to 220-grit.
8. Dry-fit and glue the carcass. Use four clamps and some cauls for the shelves and a fifth clamp for the back rail. Be sure the carcass is glued-up square.

**Woodworker's Tip:** When doing the above assembly, make a few clamping cauls to ensure that the sides and top will be flat (see Fig. E). A caul is used to distribute clamping pressure across a wide joint. Make your cauls from 2x4s cut to the width of the cabinet. The wood should be well dried and square on all four sides. Choose one of the edges and plane or sand a 1/16" crown into it, marking the crown with an arrow.

9. Glue the drawer kicker cleats (J) to the bottom of the lower shelf. If you have a pneumatic brad nailer, tack the cleat in place first so it won't slide around when you apply the clamps.

**THE FACE FRAME**

10. Lay out the face frame, as shown in Fig. D.

**Woodworker's Tip:** Labeling your project parts with letters and numbers works fine when you're dealing with a few pieces. But if your pile of parts gets mixed up, it can take a while to sort things out again. The cabinetmaker's triangle allows you to instantly identify the location and orientation of each individual piece. Here's how it works: Group your frame members face-side up in the same orientation they will have when assembled (stiles are vertical, rails are horizontal, etc.). Mark each group with a triangle that points up toward the top of the cabinet. (With parts like the top and shelves, the triangle will point to the back of the cabinet.) The triangle leaves two lines on each piece, making identification a snap (See Figs. B and D). If two or more assemblies are identical, like our pair of doors, add an extra line along the triangle's side for the rails and along the bottom for the stiles.

**Woodworker's Tip:** Group the face-frame stiles and rails together and orient them as they will be on the cabinet. Use the combination square to mark the precise position of each rail on the stiles. Make these lines light and long to distinguish them from your biscuit marks. Now, decide where an offset is needed to disguise any biscuit breakout. To figure out how much to offset the bottom rail, for example, subtract the width of the rail (2") from the width of the slot made by the joiner (2-3/4"). If you centered the biscuit on the rail, the slot would break out 3/8" on each side. To keep the biscuit inside the drawer opening, you'll need to offset the cut 3/8" toward the opening. Add 1/8" for insurance and you have an offset of 1/2".

11. Cut the biscuit slots and dry-fit the face frame.

**Woodworker's Tip:** Cut slots in the ends of narrow parts, like this face frame rail, using a simple jig to steady the work and provide a wider surface for the plate joiner fence. We used a 12" x 30" piece of melamine with a 3" x 18" piece of hardwood centered along the edge. Add a couple of hold-down clamps. Note in Fig. D how the cabinetmaker's triangle identifies the piece being cut as the top rail.

12. If you are mortising in your hinges, now's the time to lay out and cut the hinge mortises on the inside edges of the face stiles.

13. Lay out and cut the leg profiles on the bottom of each stile (see Fig. A).

14. Begin the glue-up with the drawer divider mullion (S) and the lower rails (R). Then glue the rest of the face frame together.

15. Trim any protruding biscuits and finish sand.

**FINAL ASSEMBLY**

16. Glue the face frame assembly to the carcass. Tack the face frame in position with brads before applying clamps. Trim the face frame overhang with a flush-trim bit in a router.

17. Center the drawer kickers (E) in the drawer openings and attach them to the kicker cleats with a #6 x 1-1/2" screw.

18. Attach the drawer runner cleats (H, see Fig. C) with a brad, glue and clamp.

19. Assemble the drawer runners (F and M) and position them on the cleats so they set 1/16" into the drawer openings (see Fig. C). Attach the runners to the front cleat only (see Fig. C). You'll attach the back of the runners later.

20. Attach the top (see Fig. A).

21. Make the oak quarter-round molding (K and L) from a 3"-wide piece of oak. Round over the two long edges with a router and a 3/4" round-over bit. Rip the moldings off the piece and cut to fit. Glue and nail the front molding in place. Nail the side moldings in place but only glue the miter joint and the first couple of inches at the front of the case. This will keep the miter joint tight but still allow the carcass to move with the seasons.

**THE DOORS**

22. Use a table saw to cut the rabbets on the back edges of the door rails (U).

23. Cut biscuit slots, dry-fit, glue and clamp the door frames.

**Woodworker's Tip:** Assemble your door frames on a perfectly flat surface using identical clamps. This helps ensure a flat door and saves all kinds of headaches later. Spacer sticks hold the frame up off the clamps (so it won't get stained by the metal) and in line with the clamp screw pressure (so it won't get twisted).

24. Finish the rabbets on the doors with a router fitted with a 3/8" rabbeting bit; this will also trim the protruding biscuits. Square the corners with a sharp chisel.

25. Fit the doors into the face-frame opening.

26. Make the door latch (N) and the door stop (G); mount only the door stop at this time (see Fig. A).

27. Make the tin panel stops (V) and miter them so they fit in place, but don't attach them yet.

**THE DRAWERS**

28. Cut the dadoes and rabbets in the drawer fronts (W) and sides (X).

29. Finish-sand the insides of the drawer pieces, then glue and nail the drawers together making sure they are square.

30. Finish-sand the outside of the drawers.

31. Attach the drawer runners to the drawer runner cleat.

**Woodworker's Tip:** Mark the position of the drawer runners on the lower back support cleat. Have the drawer in place with even margins around the opening and enough room between the slides and drawer sides for smooth operation. Remove the drawer and fasten the runners with screws.

32. Drill holes for the door and drawer knobs.

33. Attach the back with screws. Screws allow you to easily remove the back for finishing and you won't be accidentally driving nails through the side of the cabinet.



### THE TIN PANELS

The pattern used in this project is a Lacework stencil, which is available from Country Accents (pattern #1004P, phone: 570 478-4127), or visit [www.piercedtin.com](http://www.piercedtin.com). Country Accents can also supply the 10" x 14" tin blanks and the hole punch and lampmaker's chisel. If you'd rather develop your own pattern, look through books about American quilts, where you'll find ideas for all sorts of geometric and floral designs. As was done with the Lacework pattern, the hole punch makes round holes, which should be spaced at roughly 1/4" intervals, and the lampmaker's chisel makes the elongated perforations.

Expect to spend 30 to 40 minutes punching each panel. Don't try to do all six in a row or you'll feel like punching more than tin. Take it easy and spread the job over a few sessions. Wear gloves when handling the tin to keep from etching in your fingerprints. The stencil kit comes with complete directions, but you basically just secure the tin to a piece of particleboard, tape the pattern to the tin with masking tape and have at it with the punch and chisel.

### STAINING AND FINISHING

**Woodworker's Tip:** *Though you may be tempted to cut short your sanding and wiping time, don't do it. Both of these tasks are very important steps in obtaining a high-quality finish. Remember, it is the finish, just as much as the fit and smoothness of the parts, that will have great bearing on how people judge your craftsmanship. To ensure an excellent result, follow the steps listed below and also the instructions the finish manufacturer puts on its products.*

#### FINISHING TIPS

- Use scraps of wood to test the stains and finishes you are planning to use. On the back of the scrap, mark the stain/finish combination and the type of wood. Allow all samples to dry thoroughly before making your final finish selection. Save your samples for quick reference on future projects.
- All stains and finishes must be allowed to dry thoroughly between coats. Remember that drying times can vary due to humidity and other climate conditions.
- If you have some leftover stain or finish, wipe the can rim so that stain or finish in the rim won't dry out and prevent the lid from forming a tight seal.
- Brushes used for oil-based finishes must be cleaned with mineral spirits; for water-based products such as Minwax® Polycrylic® Protective Finish, clean brushes with warm water and soap.

**34.** Finish-sand the outside surfaces and ease all the edges. Vacuum the inside and wipe the entire piece down with a cloth dampened with mineral spirits.

**NOTE:** Whichever stain you choose, do the staining in two steps, starting on the interior surfaces and then moving to the exterior surfaces. Apply the Minwax® Wood Finish or Gel Stain you've chosen to the interior surfaces using a clean, lint-free rag. Allow the stain to set for about 10 to 15 minutes then wipe off any excess. Repeat for the exterior surfaces. Allow the stain to dry for 24 hours before applying the finish.

**Woodworker's Tip:** *When wiping off stain, make certain that your last wipe with the cloth goes with the grain of the wood. This way, any stain you might miss during wipe-off will be visually minimized by the wood grain.*

**35.** Apply Minwax® Fast-Drying Polyurethane following the directions on the can. Use a brush intended for use with Polyurethane. Allow the first coat to dry overnight.

**36.** The next day, sand all surfaces lightly with 220-grit paper using with-the-grain strokes. Dust off and wipe all surfaces with a cloth dampened with mineral spirits. Apply a second coat of Polyurethane and set the piece aside to cure overnight.

**37.** The next day, sand all surfaces lightly with 220-grit paper. Dust off and wipe the piece with a cloth dampened with mineral spirits and apply the third and final coat of Polyurethane.

**38.** Follow these same steps for finishing the knobs, the door latch (N) and the back (Z) separately, after first removing the back from the cabinet. Allow the cabinet and these pieces to cure for several days before doing the next steps.

**39.** Mount the tin panels in the doors, hang the doors and attach the knobs and the latch.

**40.** Attach the back and stand back to admire your work. Just think, food safes like this used to hold biscuits; now they're held together by them!

### PRODUCT SAFETY

For your safety and the safety of those you work with, always read the safety warnings, which manufacturers print on their labels, and follow them to the letter. Typical safety advice and instructions will contain information such as the following:

#### **DANGER! MINERAL-BASED PRODUCTS ARE HARMFUL OR FATAL IF SWALLOWED. SKIN IRRITANT. COMBUSTIBLE. KEEP OUT OF REACH OF CHILDREN. DANGER:**

Contains mineral spirits. Harmful or fatal if swallowed. Do not take internally. Skin irritant. Avoid contact with skin and eyes. Wear rubber gloves and safety glasses when handling. Combustible. Do not use or store near heat, sparks, flame or other source of ignition. Close container after each use. Avoid inhalation and use only with adequate ventilation. If using indoors, open all windows and doors to make sure there is fresh air movement. If you experience light-headedness, dizziness or headaches, increase fresh air movement or leave the area. Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.

**FIRST AID:** If swallowed: Do not induce vomiting. Call physician immediately.

**FOR SKIN CONTACT:** Wash thoroughly with soap and water. If irritation persists, get medical attention.

**FOR EYE CONTACT:** IMMEDIATELY flush eyes thoroughly with water, then remove any contact lenses. Continue to flush eyes with water for at least 15 minutes. If irritation persists, get medical attention.

**IF AFFECTED BY INHALATION:** Immediately remove to fresh air. If symptoms persist, call physician.

#### **DELAYED EFFECTS FROM LONG-TERM OCCUPATIONAL OVEREXPOSURE.**

Contains solvents that can cause permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.

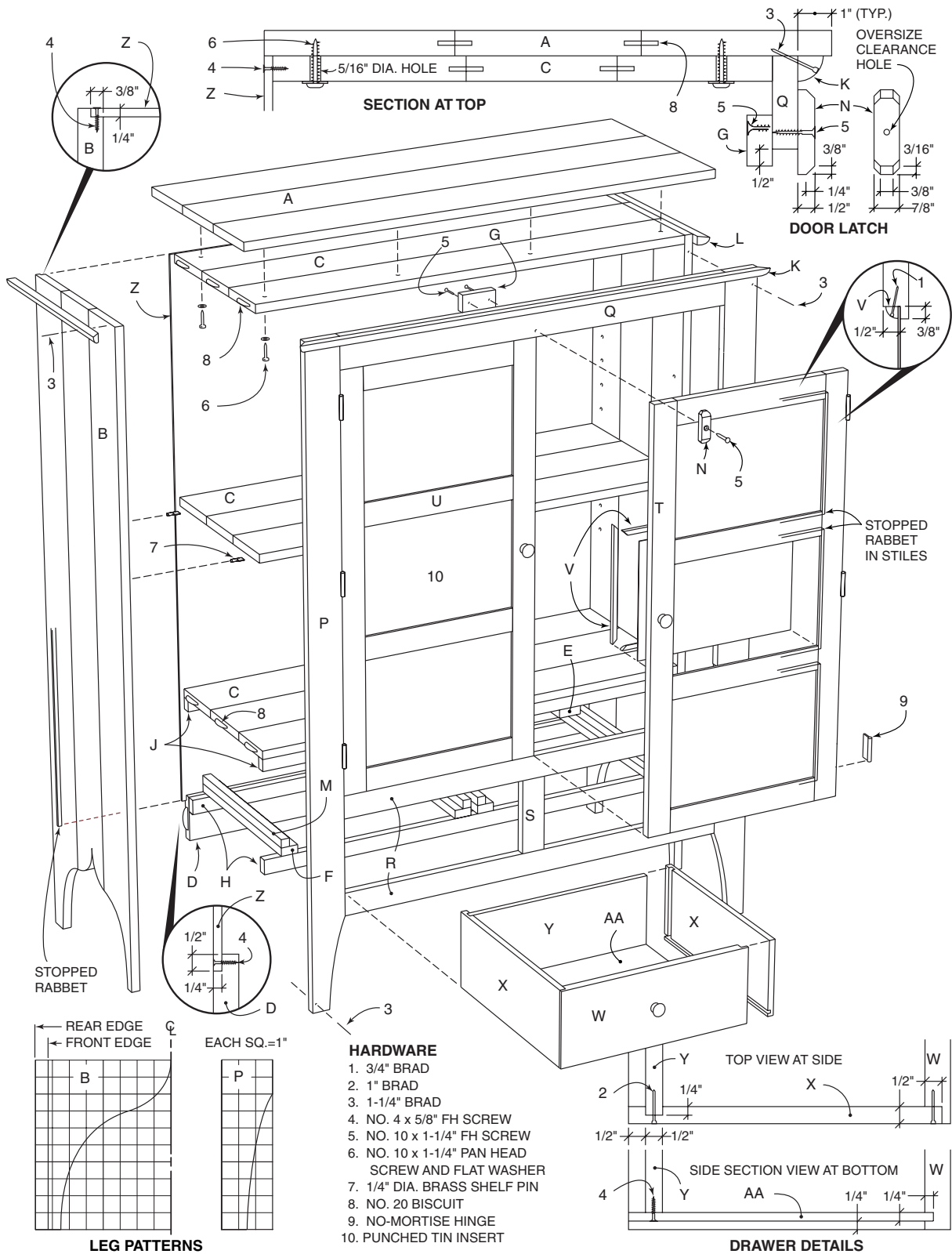
#### **SAFE DISPOSAL OF RAGS AND WASTE.**

Please be mindful of the safe way to dispose of rags and other waste. Rags, steel wool and other waste products soaked with oil finishes or solvents may spontaneously catch fire if improperly discarded. Place rags, steel wool and other waste immediately after use in a water-filled metal container. Tightly seal and dispose of the waste materials in accordance with local trash removal regulations. Be sure to keep the waste out of reach of children.

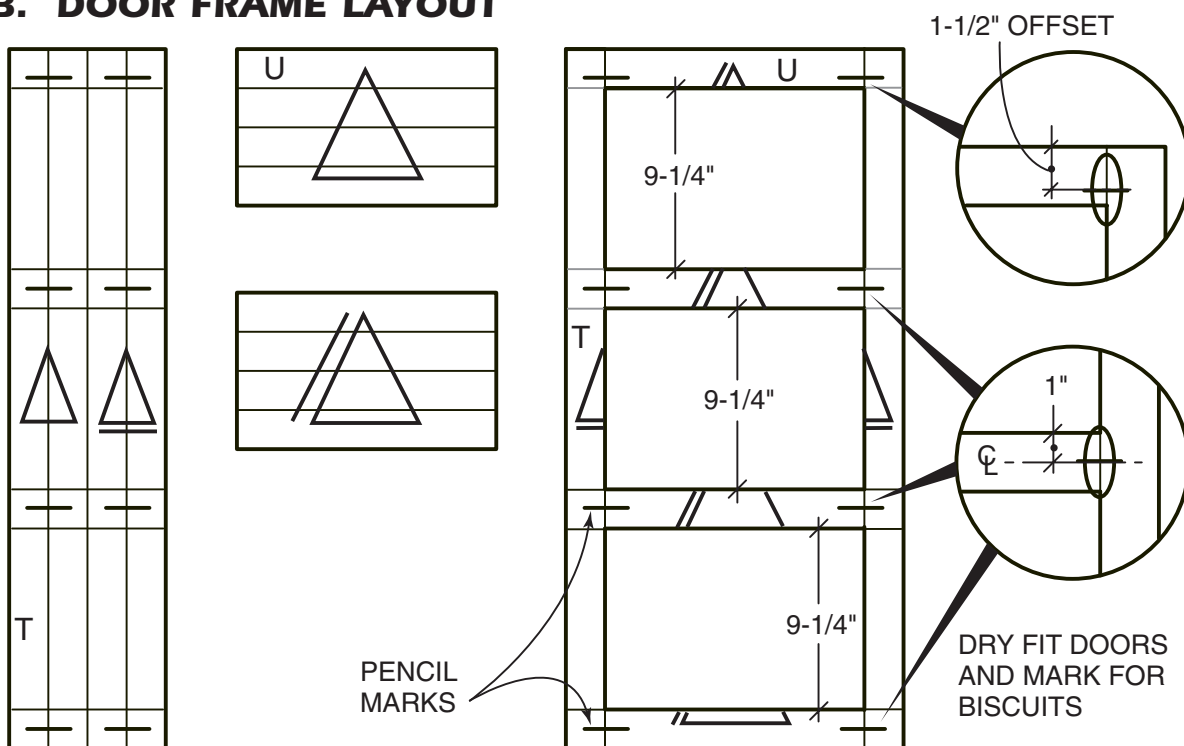
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**AMERICAN  
WOODWORKER**

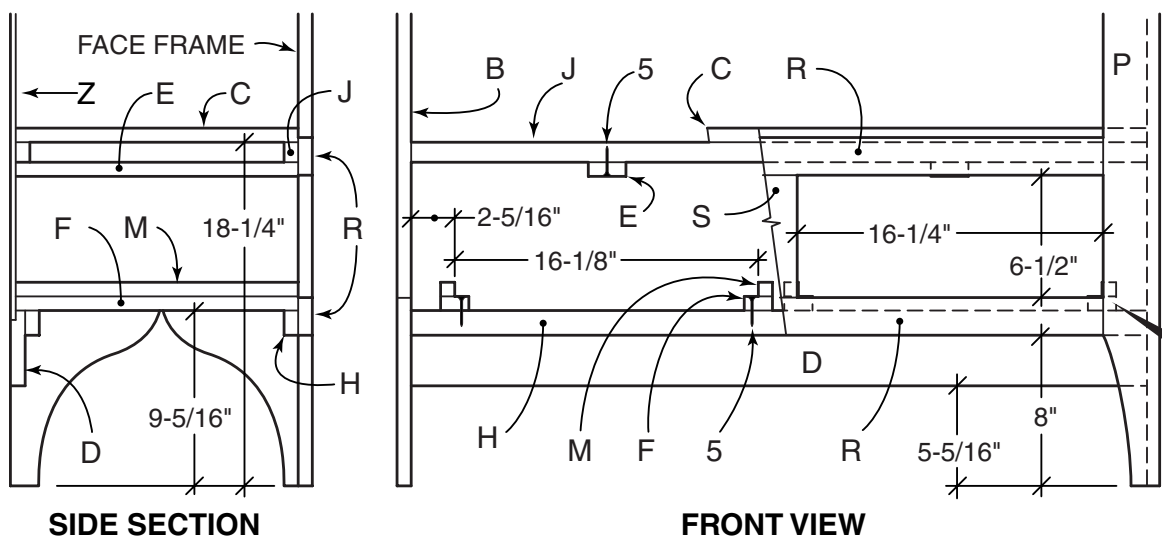
**FIG A. OAK PIE SAFE ASSEMBLY**



**FIG B. DOOR FRAME LAYOUT**

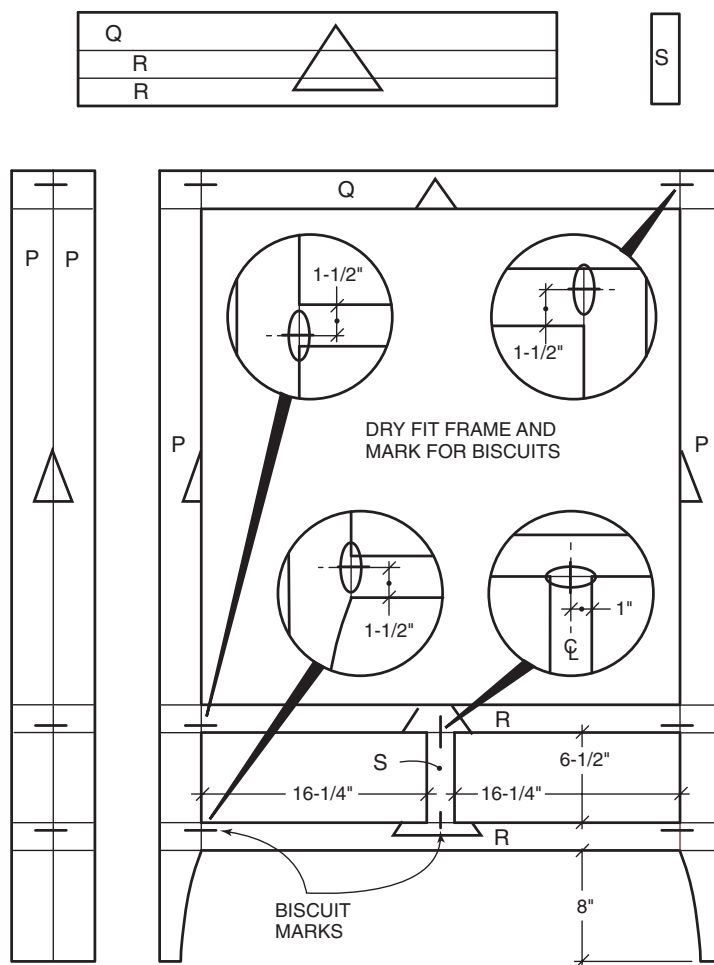


**FIG C. INTERIOR CONSTRUCTION**





**FIG D. FACE FRAME LAYOUT**



**FIG E. CAUL DESIGN AND USAGE**

