A CABINET FOR SCHMIDT BOXES

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Storage of insect collections in tight cabinets is generally recognized as a superior method and has become standard for large collections. Deterioration due to pests, dusts, and mold is considerably reduced, and naphthalene fumigant lasts perhaps five times as long when insect boxes are stored in tight cabinets as when kept on open shelves. An advantage of tight cabinets not always realized is that they tend to compensate for poor boxes. In fact, it seems more practical and economical to emphasize tight cabinets rather than tight boxes or drawers. Good quality in both places is of course desirable, but in a tight fumigated cabinet any sort of box gives relatively safe storage. It is unfortunate that the commercially available cabinets for insect collections are so expensive, costing about $3.00 for storage of each Schmidt box and perhaps $7.50 for storage of each drawer. These prices are often out of reach for the private collector and are a real strain on museum budgets.

For about four years we have been using a home-made cabinet with a lift-off type of door designed for Schmidt boxes. It is as tight as any insect cabinet we have seen and has proven generally satisfactory in service. Superiority is not claimed over the steel covered insect cabinets or cases used at the Washington or the San Francisco museums nor over the masonite cabinet sold by Wards Natural Science Establishment; rather that our cabinet gives as good protection and is adapted to inexpensive and easy manufacture. We have made forty of them at a cost of about $13.00 in cash and five hours in labor for each. Drawings and directions are presented for the consideration of anyone who may wish to make this same type of cabinet. The dimensions given provide space for 30 Schmidt boxes stored on edge. They accommodate any box up to 10 inches high and 13¾ inches long. If other box sizes are used, appropriate changes can be made in dimensions, or if storage for drawers is wanted, in addition to dimension changes, the shelves will need to be omitted and wood or metal drawer runners installed. It would,

however, not seem wise to make a cabinet requiring a door substantially larger than 3 feet by 2½ feet. A large door is awkward and is hard to fit tightly. Drawings are presented in figure 1 and a list of parts is given below.

Parts for one Cabinet

White pine, ¾-inch stock, clear.

Piece A, ½" x 1½" x 26". 1 piece for top door stop.

Piece B, ¾" x 1½" x 26". 1 piece for front support of bottom shelf.

Piece C, ¾" x ½" x 26". 1 piece for back support of bottom shelf.

Piece D, ¾" x 2½" x 25". 2 pieces for top and bottom of door. Groove and tenon as in drawing.

Piece E, ¾" x 2½" x 34". 2 pieces for sides of door. Groove and mortise as in drawing.

White or Ponderosa pine, ¾ inch stock, knotty.

Piece F, ¾" x 11½" x 26½". 2 pieces for middle and top shelf.

Douglas fir plywood, ¼ inch thick, good on one side.

Piece G, ¼" x 13¾" x 26". 1 piece for bottom shelf.

Piece H, ¼" x 27½" x 34½". 1 piece for back of cabinet.

Gum (*Nyssa*) plywood, ¼ inch thick, good on one side.

Piece I, ¼" x 22⅞" x 28⅞". 1 piece for door panel.

Douglas fir plywood, ¾ inch thick, good on one side.

Piece J, ¾" x 14⅝" x 27". 2 pieces for top and bottom of cabinet.

Piece K, ¾" x 14⅝" x 34½". 1 piece for left side of cabinet. Dado as in drawing.

Piece L, ¾" x 14⅝" x 34½". 1 piece for right side of cabinet. Dado to be a mirror image of piece K (make the ⅞" wide dado on the edge opposite to that in piece K).

Hardware

2 crescent sash locks and screws for attaching.

2 steel mending plates 1/16" x ⅝" x 2", drilled with 2 holes for screws.

2 steel angle plates ⅛" x ⅝", with each leg 2½" long and drilled with two holes for screws in one or both legs.

8 flat-headed wood screws ⅝" long, for attaching mending plates and angle irons.

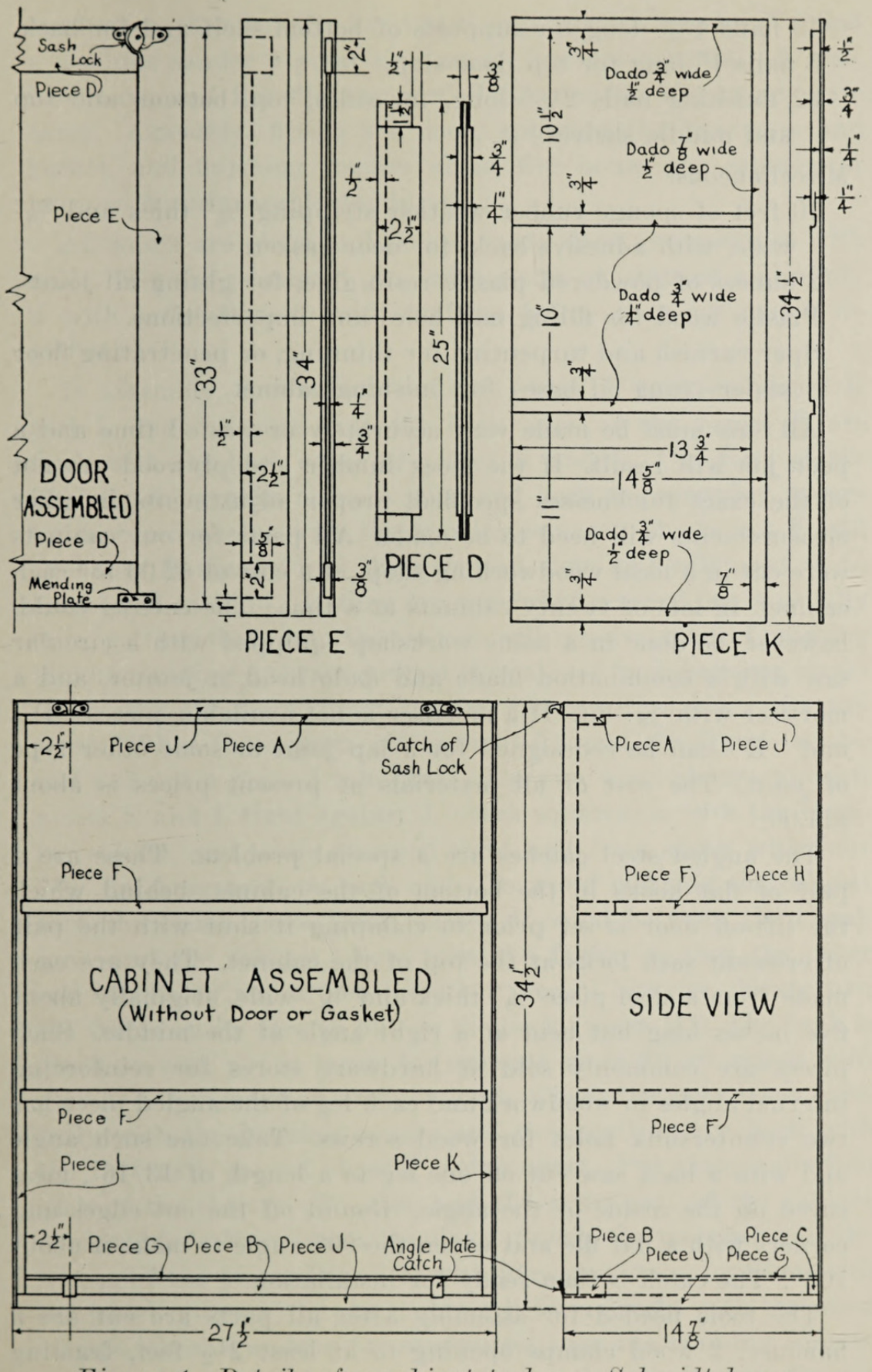

Figure 1. Details of a cabinet to house Schmidt boxes.

40 nails 1¼" long for supports of bottom shelf and for back.
5 nails 1" long for top door stop.
32 finishing nails 2½" long, for sides, top, bottom, and top and middle shelves.

Miscellaneous.

10 feet of sponge rubber weather stripping ¼" thick and ⅜" wide, with adhesive back, for door gasket.
2 ounces of powdered plastic resin glue, for gluing all joints.
Plastic wood for filling nail holes and imperfections.
Spar varnish and turpentine for thinning, or penetrating floor sealer (tung oil base) for finishing cabinet.

All cuts must be made very accurately or wasted time and a poor job will result. If the stock lumber and plywood are not of the exact thicknesses specified, proper adjustments in other measurements will need to be made. All parts for our cabinets were cut in a local woodworking shop, at a cost of $2.00 for each cabinet, in lots of twenty cabinets at a time. The cutting could, however, be done in a home workshop equipped with a circular saw with a combination blade and dado head, a jointer, and a mortiser with ⅜" bit. If a mortiser is not available, pieces "D" and "E" can be redesigned for a lap joint or some other type of joint. The cost of all materials at present prices is about $11.00.

The angled steel catches are a special problem. These are a pair of flat hooks in the bottom of the cabinet, behind which the lift-off door is set prior to clamping it shut with the pair of crescent sash locks at the top of the cabinet. They are each made from a steel piece ⅛" thick and ⅝" wide, originally about five inches long but bent at a right angle at the middle. Such pieces are commonly sold at hardware stores for reinforcing internal angles in woodwork and each leg of the angled piece has two countersunk holes for wood screws. Take one such angle and with a hack saw cut off one leg to a length of 13/16", measured on the inside of the angle. Round off the cut edges and corners with a flat file and widen the 90° angle to make it about 100°. The catch is then ready for installation.

The tools needed for assembly after all parts are cut are a hammer, 2 wood clamps opening to at least 2½ feet, framing square, block plane, hand drill, nail set, ½" chisel, screw driver,

sandpaper (number 0), hand saw, and varnish brush. We find a machine sander a great time saver, but not essential. A vise, hack saw, and flat file are needed for making the angle plate catch. Assembly, fitting the door, applying the hardware and gasket, and finishing require about five hours per cabinet, or more with unfavorable conditions.

All joints are glued and except in the door are held also with nails. Mix the powdered glue with water as directed and apply it with a flat stick to both surfaces before they are nailed together.

In assembly, first attach the two pieces F between pieces K and L, making sure that the back edge of the pieces F are flush with the back edges of pieces K and L. Use four of the 2½" finishing nails at each joint and keep the assembly square by repeated checks with the framing square. The pieces F will probably fit snugly into their dadoed slots and will need to be hammered in tight. If they are somewhat warped, as is usually true, getting them into the dadoes will require a lot of pushing and hammering. Always protect the cabinet from hammer marks by shielding it from direct hammer blows with a piece of scrap wood. When these parts are assembled stand the frame on one end and put a piece J into place. Use two wood clamps to draw pieces K and L tight against J, check squareness with the framing square, and while clamped tight nail from above with four 2½" finishing nails on each end. To avoid marring the cabinet with the clamp jaws, insert pieces of wood between the clamp jaws and the cabinet. Now turn the frame so that the other end will be up and attach the other piece J likewise. Next, turn the frame on its face to put on the back (piece H). The back is glued on also, not so much for strength as to fill all cracks with glue and thus make an airtight joint. Check the squareness carefully with the framing square and then nail on the back with the 1¼" nails spaced about 4 inches apart. Put three nails into each of the shelves (F) also, and the main part of the cabinet is assembled. Next comes the door. Smear the mortises and the tenons of the pieces D and E with glue, put them together with the panel (piece I) in place, clamp them up tight with the wood clamps, check the door for squareness with the framing square, and leave it in the clamps overnight for the glue to set. Do not

glue in the panel. It must be free to expand and contract in its slots as the humidity changes.

The larger pieces are now assembled and the smaller more tedious work comes. Put one angle plate catch in its proper position, mark around it with a pencil, and chisel out the marked area just deep enough to set the plate in flush with the wood. Attach the plate with two screws and put in the second plate similarly. Next glue and nail pieces A, B, and C in place. With a block plane now round all outside edges slightly and smooth up the dado cut for the door (the 7/8" cut). Sink the nails in pieces K and L with a nail set and fill these holes and any others that will be conspicuous with plastic wood. With number 0 sandpaper smooth all outside corners, smooth up the dado cut for the door, and take off any dirt or other blemishes. Brush and wipe out all chips and sandpaper dust and apply the finish. For a finish we have used two coats of spar varnish (three might be better), the first coat thinned with turpentine for priming. The inside is given only the first coat and the shelves are left unvarnished to avoid the possibility of having the Schmidt boxes stick to the shelves. At this time give piece G a single coat. Sandpaper lightly between coats to get a smooth finish. The penetrating wood finishes with a tung-oil base are also good finishes and some may prefer them to varnish. Use at least two coats.

After the main part of the cabinet is varnished, attach the sponge rubber gasket. This type of material is sold for weather stripping, or in automobile supply stores for cushioning or weather stripping. It comes with a backing which is moistened with gasoline to make it sticky. Glue the gasket flat against the top and side door stops, but at the bottom of the door opening, glue it flat against the part of piece J where the door will rest. The door will thus rest on the bottom strip of gasket and shut against the side and top pieces. Fitting the door is next. The door has been made exactly the size of the door opening (without the bottom gasket) and will need to be trimmed for a loose fit that permits it to be taken in and out with no or very little scrape. Allow about 1/16 inch clearance at top and sides. After the door is fitted, round the corners slightly with a block plane and sandpaper smooth and clean with number zero sandpaper.

Next attach the two mending plates, one on each side, each flush with the bottom edge and centered over the joint between pieces D and E as shown in the drawing. Chisel out beds for the plates so that they lie flush with the wood surface and attach them with screws. These plates are in a position to prevent the angle plate catches from wearing into the door.

Finish the door with two or more coats of varnish or a penetrating finish as for the cabinet. Next put on the crescent sash locks and their catches, put in the bottom shelf piece G (nail it in or leave it loose), and the cabinet is finished. However, unless all measurements were perfect, the door is either too tight or too loose against its gasket in one or more places. Make adjustments to get an even pressure against the gasket by bending the angle plate catches with hammer taps and by putting washers under the sash locks or their catches as needed.

In use we stack these cabinets two high, with the bottom cabinet resting on a 1¾ inch wooden base (made from 1¾" x 3¾" stock) to raise it a little above the floor. Living in the humid southeast, we have several times encountered problems of moisture and the resulting mold, both before and after this type of cabinet was adopted. The cabinets give substantial protection against moisture if it is present in dangerous amounts for less than a few weeks at a time. When moisture problems were acute and prolonged we have used a small calcium chloride dryer in each cabinet. This consists of a hardware cloth container suspended in a jelly glass. The hardware cloth container is filled with calcium chloride which absorbs moisture from the air in the cabinet and gradually deliquesces and drips into the jelly glass. About every six weeks the jelly glasses need emptying and the hardware cloth containers a refill of calcium chloride. These dryers have given satisfactory service, but it seems that silica gel or a two watt electric light in each cabinet may be a better answer to the problem. The kind of building and the place in the building where the collection is stored are important factors in moisture control. It is well to avoid rooms that are cooler than the rest of the house in summer, or in winter unless the heat is by circulating hot air, and to avoid storage against outside walls during cold weather.