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UNITED STATES DEPARTMENT OF AGRICULTURE
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CONSTRUCTION DETAILS OF THE ISOLATION CABINET SYSTEM FOR AVIAN
DISEASE RESEARCH AT THE SOUTHEAST POULTRY RESEARCH LABORATORY

L. N. Drury, C. W. Beard, and S. R. Hopkins^{1/}

Isolation facilities are essential for infectious disease research with animals. In another report,^{2/} we gave a general description of an isolation cabinet system that is being used in chicken disease research at the Southeast Poultry Research Laboratory. This publication contains supplementary details to facilitate construction and use of similar cabinets and accessories.

DESCRIPTION

General.--This publication, the drawings, and the report published in Avian Diseases are complementary and should be considered together. When several cabinets and sets of accessories are built, the parts should be interchangeable. We suggest that one cabinet and its accessories be completed and tested before others are built. Materials and workmanship should be of high quality to assure durability and performance of the system. A graph (fig. 1) for estimating the cabinet ventilation rates is included.

Cabinet.--The cabinet (fig. 2) is made of 24-gage hot-dip galvanized steel ^{3/} with 1.5 ounces of zinc per square foot remaining intact through the fabrication process. Openings are reinforced to prevent warping of the gasket seats. Seams, rivets, and screws are soldered to prevent leaks; and residual flux is removed to prevent corrosion. The interior and exterior of the cabinet are easy to clean, having a minimum of projections and crevices that could injure the birds or hold dirt. Windows are double-strength window glass. Gaskets of 1/2-inch half-round closed-cell foam neoprene are fitted and cemented securely without gaps. They are compressed approximately 1/16 inch when the

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^{2/} Drury, L. N., Beard, C. W., and Hopkins, S. R. An isolation cabinet system for avian disease research. Avian Diseases. Vol. 13, No. 2, May 1969, pp. 400-412.

^{3/} For increased durability and corrosion resistance, stainless steel may be substituted wherever other metals are named in this report.

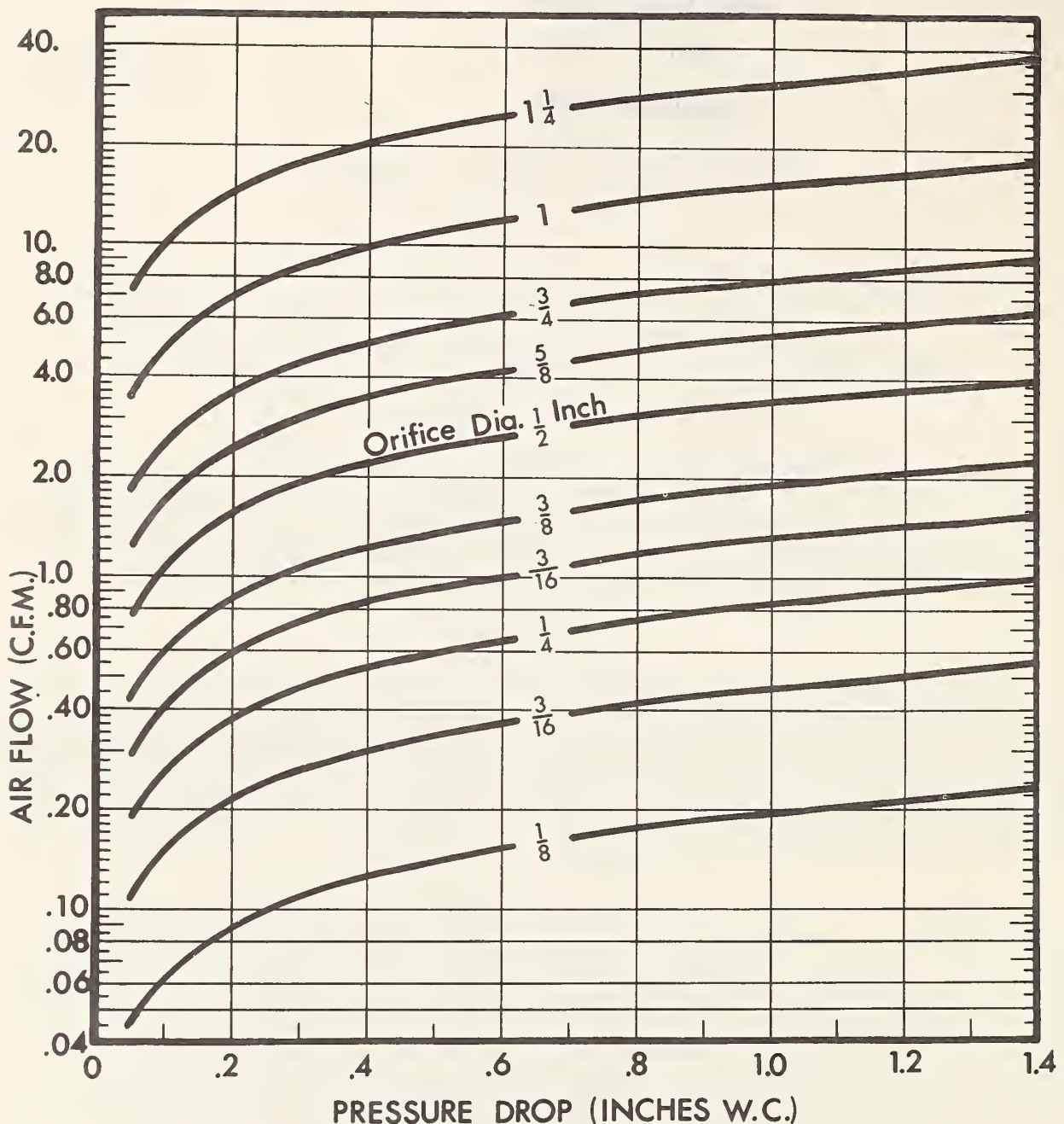


Figure 1.--Graph for estimating rates of airflow through a sharp-edged circular orifice in a 1-7/16-inch-ID pipe. Pressure drop across orifice measured in inches water column (WC), using "corner" taps.

cabinet is closed. Hinges, latches, screws, and rivets are corrosion-resistant metal. Holes required for accessories are accurately punched and finished free of burrs or sharp edges. A 1/2-inch length of 1-3/4-inch-OD copper tubing, beveled at the top inside, is soldered to the air inlet and outlet ports to protect the cone washers that are used in making the connections. (The hole locations shown are to fit the components named in Appendix 1 and may not fit other components.) The inside dimensions of the cabinet are 24 x 24 x 24 inches, with \pm 1/8-inch tolerance. Outside dimensions do not exceed 25 inches

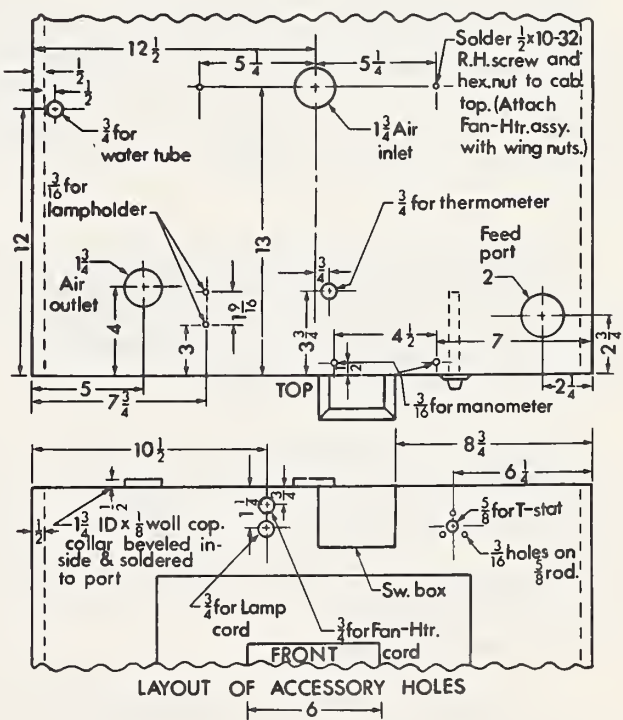
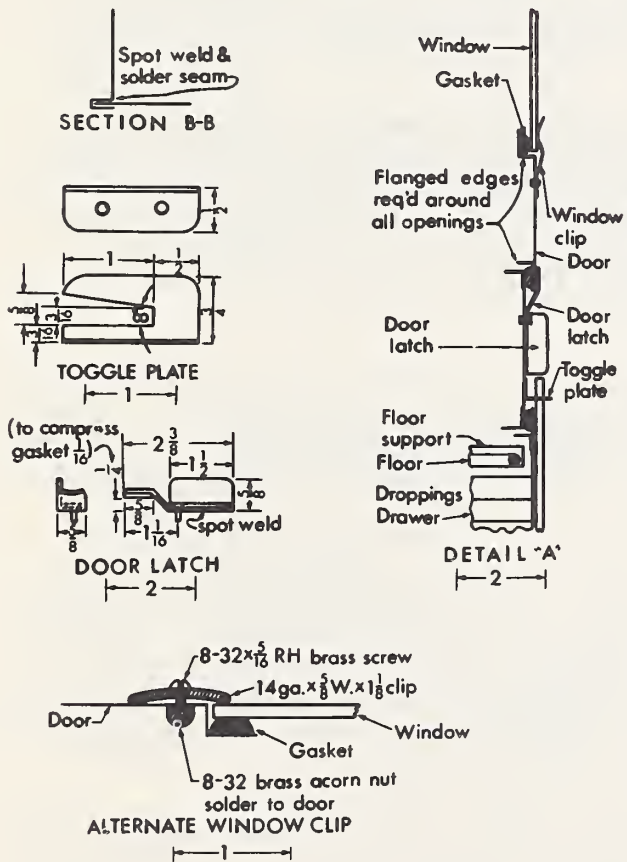
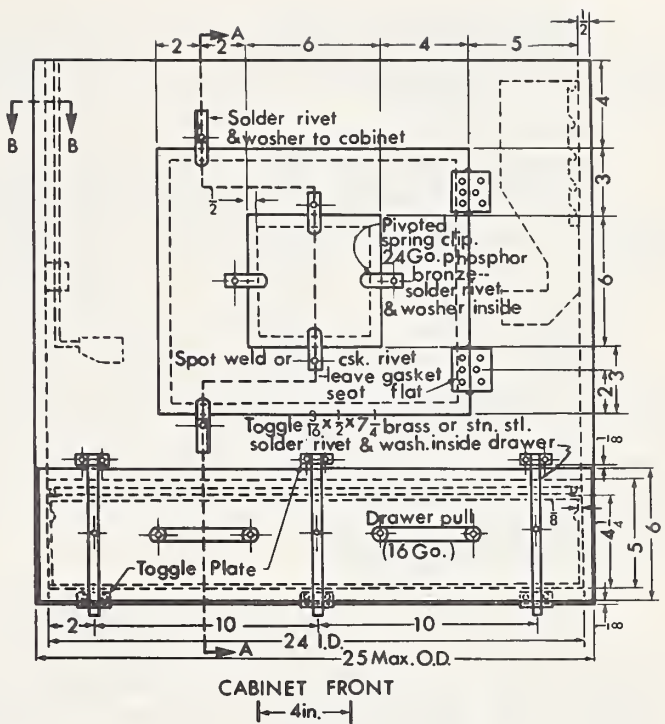
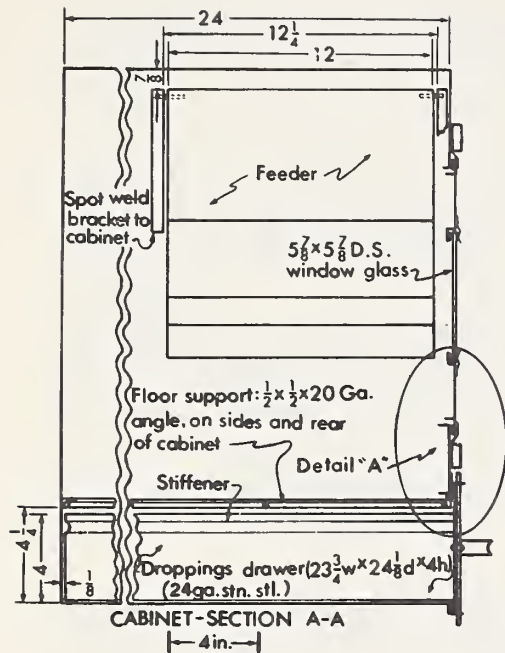


Figure 2.--Drawings of the cabinet and droppings drawer.

wide, 27-1/2 inches high, and 27 inches deep, including the manometer and switchbox. The completed cabinets are leak tested^{4/} and repairs or adjustments are made as needed.

Droppings drawer.--The droppings drawer (fig. 2) is made of 24-gage stainless steel with watertight seams. The edges are reinforced to resist warping when the drawers are handled full of droppings. Clearance between the closed drawer and the sides and back of the cabinet is 1/16 to 3/16 inch.

Floors.--Floors (fig. 3) are made of crimp-woven 12-gage steel wire mesh welded to a 5/16-inch-diameter frame, finished free of loose ends and sharp corners, and electroplated with zinc after fabrication. The floor for young chicks has 5/8-inch-square mesh, and the floor for older chickens has 1-inch-square mesh. Alternatively, the chick floor can be made of 14-gage 1/2- x 1-inch mesh, as shown on the drawing (fig. 3); and the floor for older chickens can be made of 20-gage 3/4- x 2-inch flattened diamond-mesh stainless steel on a stainless steel frame.

Feeder.--The feeder (fig. 4) is made of 24-gage galvanized steel with a 1/8-inch-thick clear acrylic plastic window. The lip on the trough (to prevent "billng out" of feed) extends completely around the front and sides of the trough. The feeder hangs on notched brackets, which permit easy adjustment of height.

Waterer.--The waterer (fig. 2) is a plastic trigger cup that screws into a 1/8-inch pipe thread x 3/8-inch-OD copper tubing adapter. The street ell connecting the adapter to the 3/8-inch-OD x 20-inch supply pipe is bent to tilt the cup downward approximately 10 degrees. The pipe goes through a neoprene stopper in the top of the cabinet, and it is supported by the spring clip shown (fig. 4). Cup height is adjusted by sliding the pipe up or down in the stopper and clip.

Filters.--The filters (fig. 3) are made of 24-gage galvanized steel with medium-weight (0.03-inch wall) 1.5-inch-OD brass sink-drain fittings. Mating surfaces of the exhaust filter sections and of the intake filters and retainers are flat and smooth, and the corners are rounded to assure airtightness when the filter media are fastened in place.

Manometer.--The manometer (fig. 4) has a 24-gage galvanized-steel body, with glass and vinyl tubing to hold the oil. It is connected to the orifice assembly with 5/32-inch-ID gum rubber tubing. The inclination of 17.9 degrees from the horizontal is suitable for use with 0.826-specific gravity gage oil, giving a sensitivity of 0.01 inch water column (WC) and a range of 0 to 1 inch WC. A satisfactory commercial manometer having comparable sensitivity and range is also available.

Orifice plate and valve assembly.--The exhaust pipe (fig. 3) is made from 1.5-inch-OD medium-weight preformed brass sink-drain tubing. It is soldered flush into the 16-gage galvanized-steel orifice-plate flanges. Pressure taps are soldered to the flanges, flush with the inside of the pipe; and 1/16-inch-

^{4/} See footnote 2.

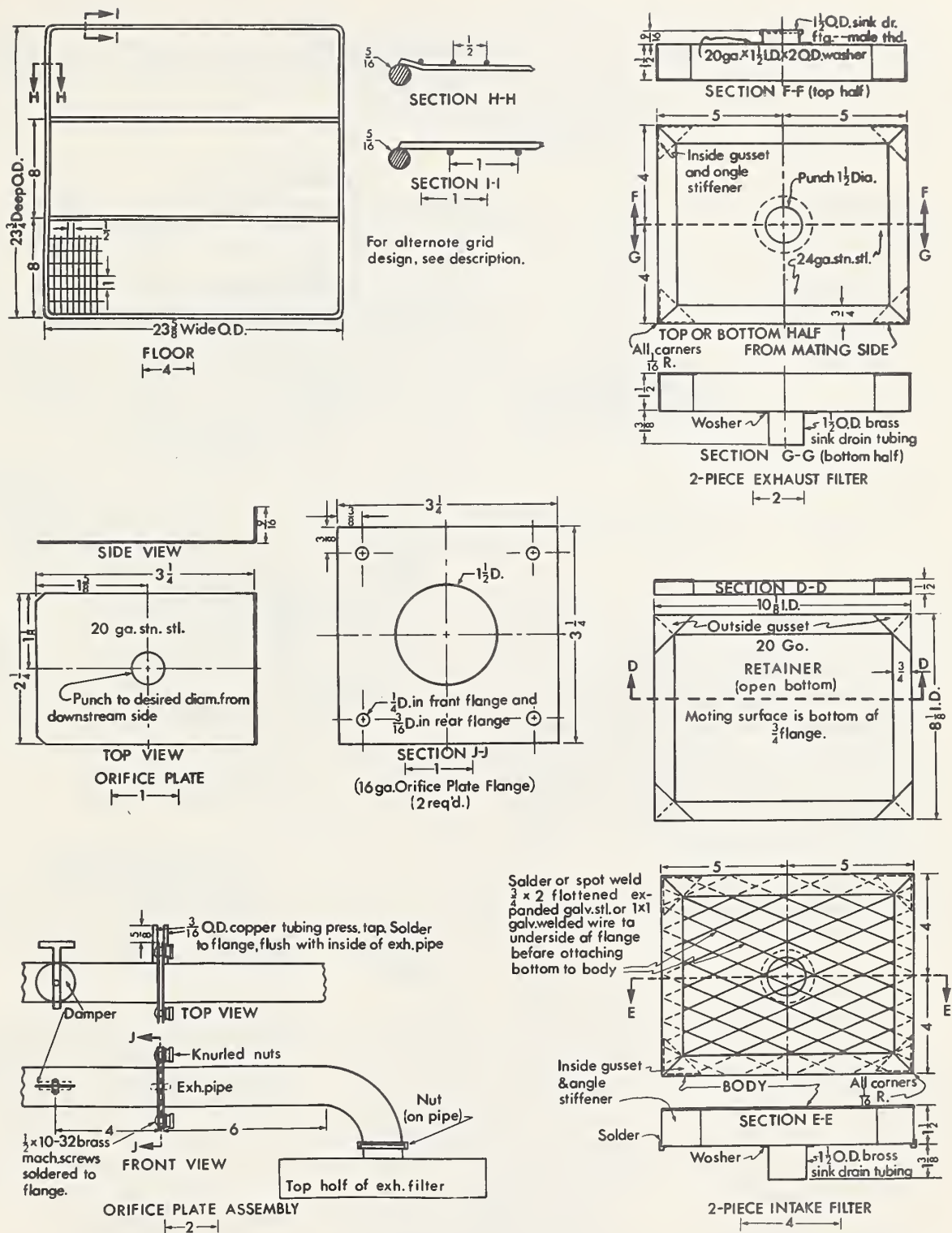


Figure 3.--Drawings of floor, filters, and orifice-plate assembly.

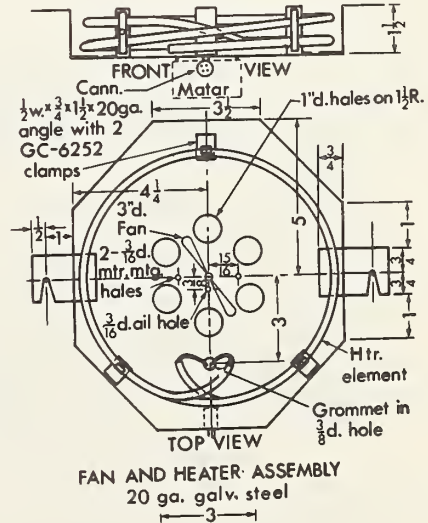
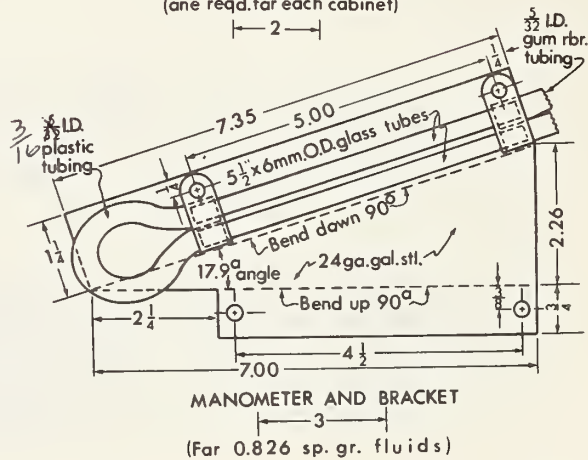
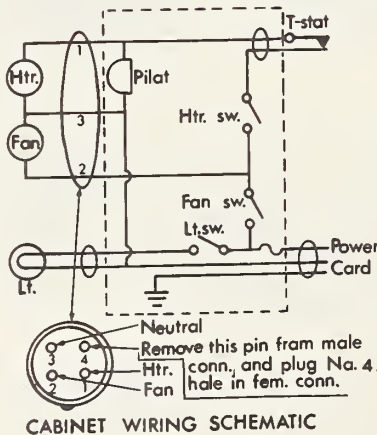
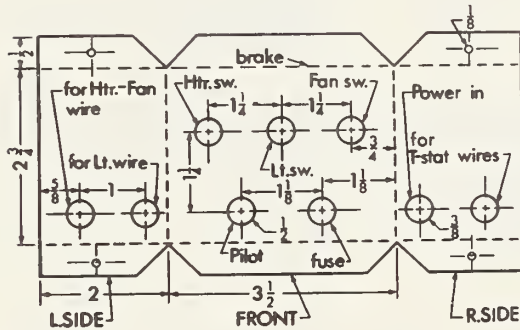
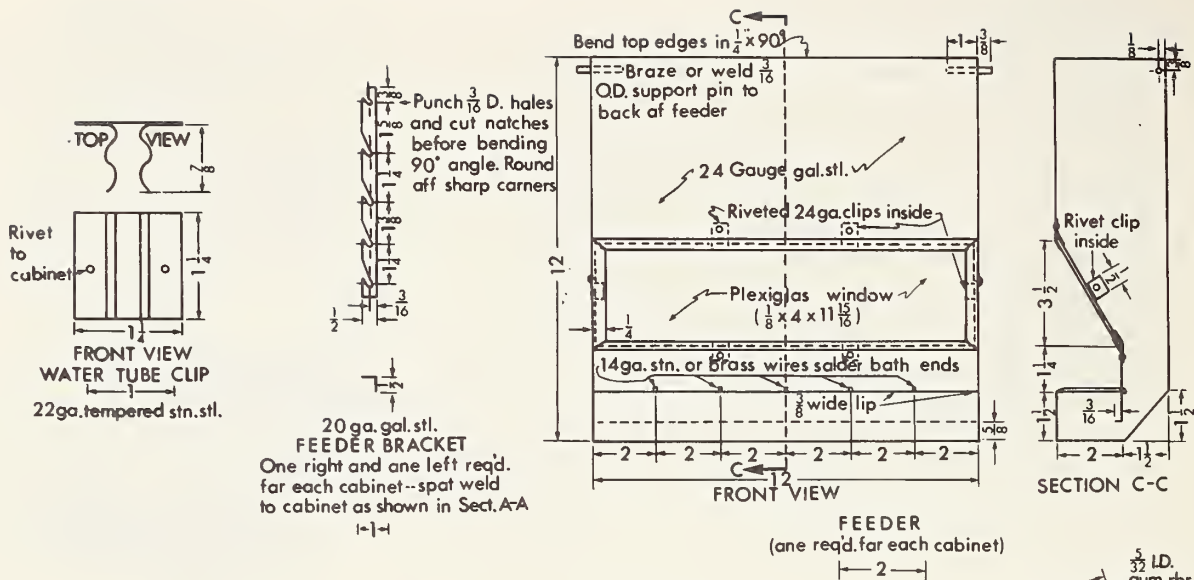


Figure 4.--Drawings of feeder, manometer, fan and heater assembly, and other cabinet accessories.

thick closed-cell foam neoprene gaskets are cemented to the flanges. Orifice plates are made of 20-gage stainless steel cleanly punched to exact diameter and honed flat and free of burrs, leaving a sharp, 90-degree edge on the up-stream side of the orifice. The valve disk and shaft are brass. A good fit is necessary to permit fine adjustment of ventilation rate when a small orifice is used.

Fan and heater assembly.--The base plate and brackets (fig. 4) are made of 20-gage galvanized steel. The heater element, made of a standard electric-range browning unit, is carefully straightened and formed into a 7-5/8-inch-ID coil. Sharp bends, which might damage the interior of the element, are avoided. Stranded wires with heat-resistant insulation (type THW) are soldered to the terminals of the heater element (after clipping off the lugs), and the junction is insulated with silicone rubber. The stirring fan (100 c.f.m. free-air delivery) is mounted on the base plate using lock washers and rust-resistant screws. The three wires from the fan and heater terminate in a miniature four-pin connector with the unused pin removed. The unused hole of the mating connector is plugged to prevent improper connection. (Three-wire connectors of the same type can be connected improperly.) The assembly is attached to the cabinet top with 10-32 x 3/4 roundhead screws and wing nuts. The screws are locked in place with a hex nut and soldered to the cabinet.

Other electrical accessories.--The thermostat is mounted through the front of the cabinet using a gasket. This places the metal-encased sensor in the airstream of the stirring fan, for fast response. The requirements of + 1 degree F sensitivity, 40 to 120 degrees F range, 2 amperes at 125 volts AC current rating, and contacts that break on temperature rise are adequately met. The porcelain lampholder ("sign receptacle") is attached to the underside of the cabinet top with brass screws that are soldered to the cabinet. Switches are rated single pole single throw 3 ampere 125 volt. The pilot lamp is a press-fit neon assembly with built-in resistor. Cords leading to the switchbox and into the cabinet are 0.25-inch-OD 18-gage plastic-covered type SVT. Rubber grommets are used where cords enter the switchbox, and prepunched No. 3 neoprene stoppers are used where cords enter the cabinet. The stoppers fit snugly on the SVT cord. The three-wire power cord terminates in a grounding-type plug; and the grounding conductor is soldered to the switchbox, which is fastened to the cabinet with sheet-metal screws.

Water handling equipment.--The water manifold (fig. 5) and the supply pipes to the watering cups are made of 3/8-inch-OD hard copper tubing with soldered fittings. Flexible connections on the low-pressure lines are 5/16-inch-ID vinyl tubing without clamps, while those on the high-pressure lines are 3/8-inch-ID fabric-reinforced butyl-lined hose (rated 150 p.s.i.) with aviation-type clamps. A drain cock for flushing the lines is installed near each pressure regulator. The regulator has an inlet pressure rating of 100 p.s.i., and the outlet pressure is adjustable over the range 3 to 10 feet of head, with an allowable variation of + 1 foot of head.

Exhaust-air handling equipment.--The exhaust manifold (fig. 5) is made of 4-inch-OD 28-gage galvanized-steel downspout. The 1-3/4-inch-diameter ports for the exhaust pipes are reinforced with cleanly punched 16-gage galvanized-steel plates that protect the exhaust-pipe connectors. Manifold sections are connected to each other and to the exhaust blower with 4-inch-ID metal-

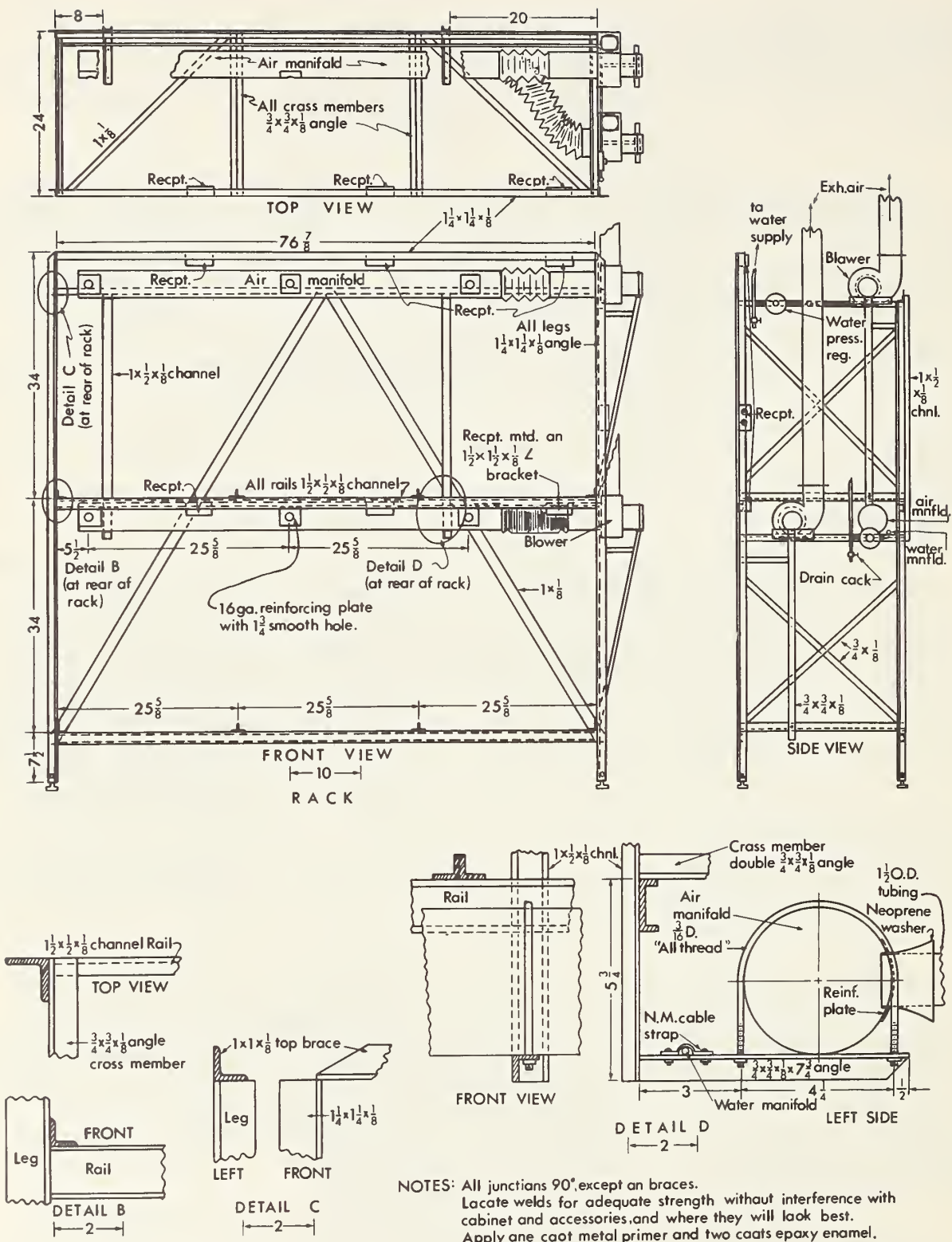


Figure 5.--Drawings of the rack with water- and air-handling accessories.

reinforced neoprene-coated cotton fabric hose, using standard clothes-dryer hose clamps. The blower is rated 80 c.f.m. at 1 inch WC, with cutoff at 1.5 inches WC. Neoprene cone washers ("filter adapters") are used to connect the intake and exhaust filters to the cabinet, as well as to connect the exhaust pipe to the manifold.

Racks.--The racks (fig. 5) are made of structural steel with welded joints. They have adjustable feet for leveling. After assembly, including the receptacles but not the wiring, the rack is cleaned, primed, and given two coats of tractor enamel or epoxy paint. The racks are tilted forward slightly so the wash water will drain out when the cabinets are cleaned. This tilt does not significantly affect the accuracy of the manometer.

Appendix 1
 Partial List of Commercially Available Components^{5/}

<u>Item</u>	<u>Description</u>	<u>Vendor</u>
Connector, cable (male)----	Amphenol 91MPM4L -----	Allied Electronics 100 N. Western Ave. Chicago, Ill. 60680
Connector, cable (female) -	Amphenol 91MPF4L -----	Allied Electronics
Cup, water -----	Hart Kleen-flo plastic trigger cup H8-P or H9-P.	H. W. Hart Mfg. Co. P. O. Box 3456 Glendale, Calif. 91201
Element, heater -----	Chromalox RTB 500w 230v	Edwin L. Wiegand Co. Pittsburgh, Pa. 15208 & repair shops for electric ranges
Fan, exh. booster -----	Dayton 4C006 -----	W. W. Grainger, Inc. Chicago & other principal cities
Fan, stirring -----	Dayton 7C724 -----	W. W. Grainger, Inc.
Fuseholder -----	Buss HJM -----	Allied Electronics
Fluid, manometer -----	0.826 sp. gr. red gauge oil.	F. W. Dwyer Mfg. Co. P. O. Box 373-T Michigan City, Ind. 46360
Gasket, 1/2-round -----	Rubatex R-1412-N -----	Rubatex Corp. Railroad Avenue Bedford, Va. 24523

^{5/} Mention of trade and company names does not constitute a guarantee or warranty of the product by the U.S. Department of Agriculture or an endorsement by the Department over other products not mentioned.

Gasket, flat -----	Rubatex G-207-N-1/16 ---	Rubatex Corp.
Hose, exh. air -----	Amazon Type 86 -----	Amazon Hose and Rubber Co. 132 N. Jefferson Chicago, Ill. 60606
Lamp, pilot -----	Leecraft 3200 -----	Allied Electronics
Lampholder, med. base -----	Knox 50716 -----	Knox Porcelain Corp. 2700 Mynders Ave. Knoxville, Tenn. 37921
Medium, coarse filter -----	1-inch thick roll-type furnace filter.	Any Sears, Roebuck & Co.
Medium, high efficiency filter.	1/2-inch thick FG-50 ---	American Air Filter Co. 200 Central Ave. Louisville, Ky. 40208
Manometer (purchased option).	Dwyer Series 25 Flextube, 0-3 in. WC.	F. W. Dwyer Mfg. Co.
Regulator, water pressure -	Helco Model 11 -----	Alberts Mfg. & Supply Co. 16115 Vanowen St. Van Nuys, Calif. 91406
Switch -----	Cutler-Hammer 8280K14 --	Allied Electronics
Thermostat -----	Fenwal 17300-0 with small dial and knob	Fenwal, Inc. 251 Main St. Ashland, Mass. 01721
Washer, cone -----	Thomas 5115-v, size 5 Filter Adapter.	Arthur H. Thomas Co. Vine St. at Third Philadelphia, Pa. 19105

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