WESTVACO CONE KILN

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To fill a definite need for a low-cost cone kiln to cure small lots of cones, the Westvaco Experimental Forest designed and constructed a kiln that has a capacity of 12 bushels of loblolly pine. Inquiries prompted publication of the design and effectiveness of the kiln.

The kiln is 72 inches high, 50 inches wide, and 96 inches long. The gas heater and air duct add 40 inches to operating length. The kiln cabinet, made of 1/2-inch Westvaco Flakeboard, has two compartments with three sections each. Each section holds two trays (fig. 1); therefore, there are a total of 12 trays.

The accompanying diagrams and list of materials provide sufficient information for construction (figs. 2-5). All materials, Reznor Heater [1] ductwork, and labor should cost $500 to $600. The heater operates on bottled gas. To increase heat efficiency, all interior surfaces were painted with two coats of aluminum paint. The exterior was shellacked.

In operation, it was necessary to close off part of the right hot air intake port to assure equal circulation in both compartments. To send more air through the top trays, it was necessary to add two more baffle strips in each compartment between the cabinet end and the top drawer slides, just below the exhaust ports. A dial gage thermometer[2] is located in the hot air duct just outside the cabinet. Except for pond pine that cures best at 140° F., temperature of entering hot air should not exceed 110° F. for all species of southern pine. The thermostat for the heater flame should be set at 92° F. during heating of the kiln, then reset at 86° F. after temperature is at operating level. Doors of exhaust ports should be half open while bringing the kiln up to operating temperature and completely open during operation. Some adjusting of the heater flame via the valve on the gas line is necessary to prevent overheating intake air.

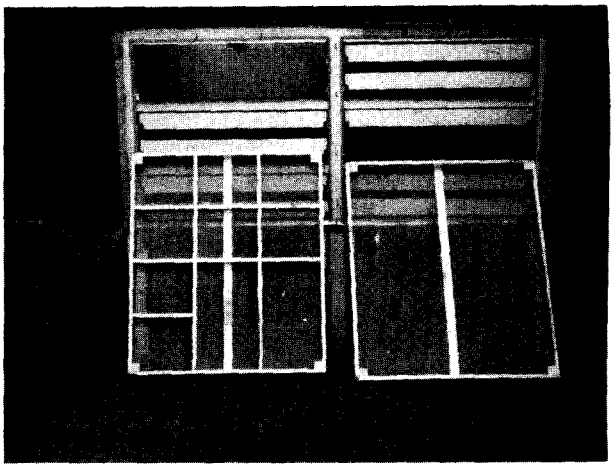

Figure 1.--Tray on right holds one bushel; tray on left has partitions for 10 small lots.

Eight lots of cones of six species of southern pine were run to test kiln efficiency. Of great importance to successful kiln operation is to predry cones in burlap bags for 3 to 4 weeks outdoors on a rack off the ground. Predried loblolly, slash, and longleaf cones were processed in 24 hours in the kiln. Using only the four bottom trays of each section of the kiln, predried pond pine cones were processed in 43 hours. Use 1 bushel of cones per tray for all pine species except longleaf (three-fourths bushel).

To assure uniform curing, check trays halfway through a drying cycle. Transferring the slower drying top trays to the bottom will bring them closer to heated entering air. This is necessary because air that is 110° F. at entry drops to 86° F. at exit ports. Movement of air is through the bottom section to the outside of the cabinet, up to the second section around the end of the baffle, up to the top section, and across the ports at the end of the cabinet.

[1] Model FM 25, 25,000-BTU capacity with two-speed fan, Reznor Manufacturing Co., Mercer, Pa.

2 Catalog. 9543-G Weston, Range 0° -180° F., Arthur H. Thomas Co., Box 779, Philadelphia 5, Pa.

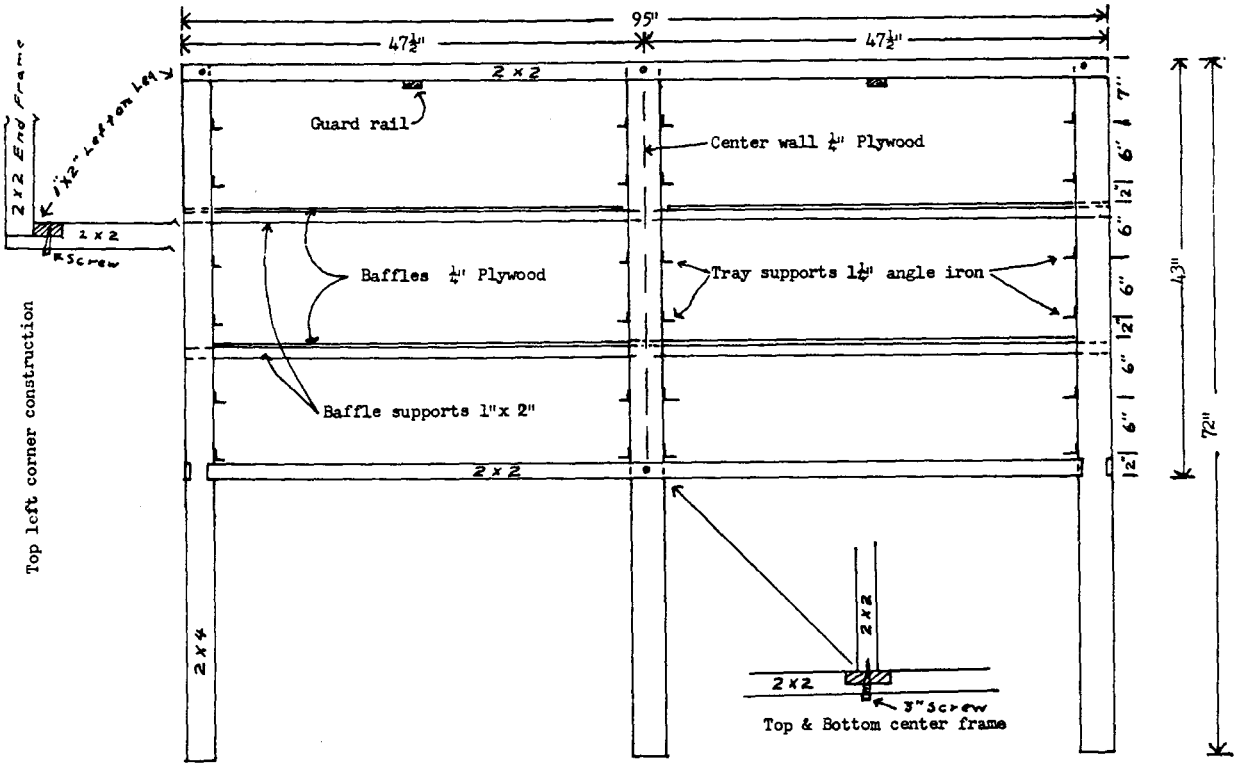

Figure 2.--Westvaco cone kiln front and rear frame.

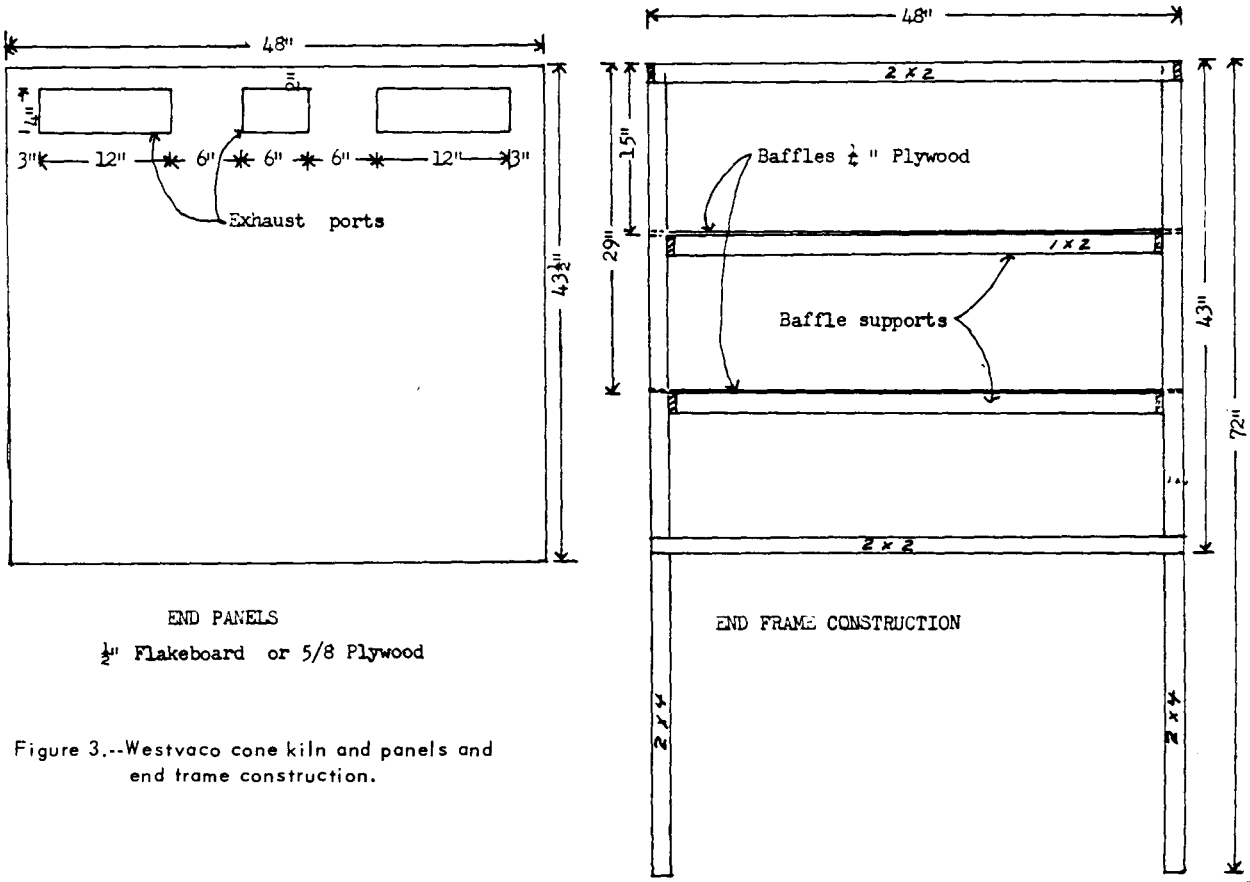

Figure 3.--Westvaco cone kiln and panels and end frame construction.

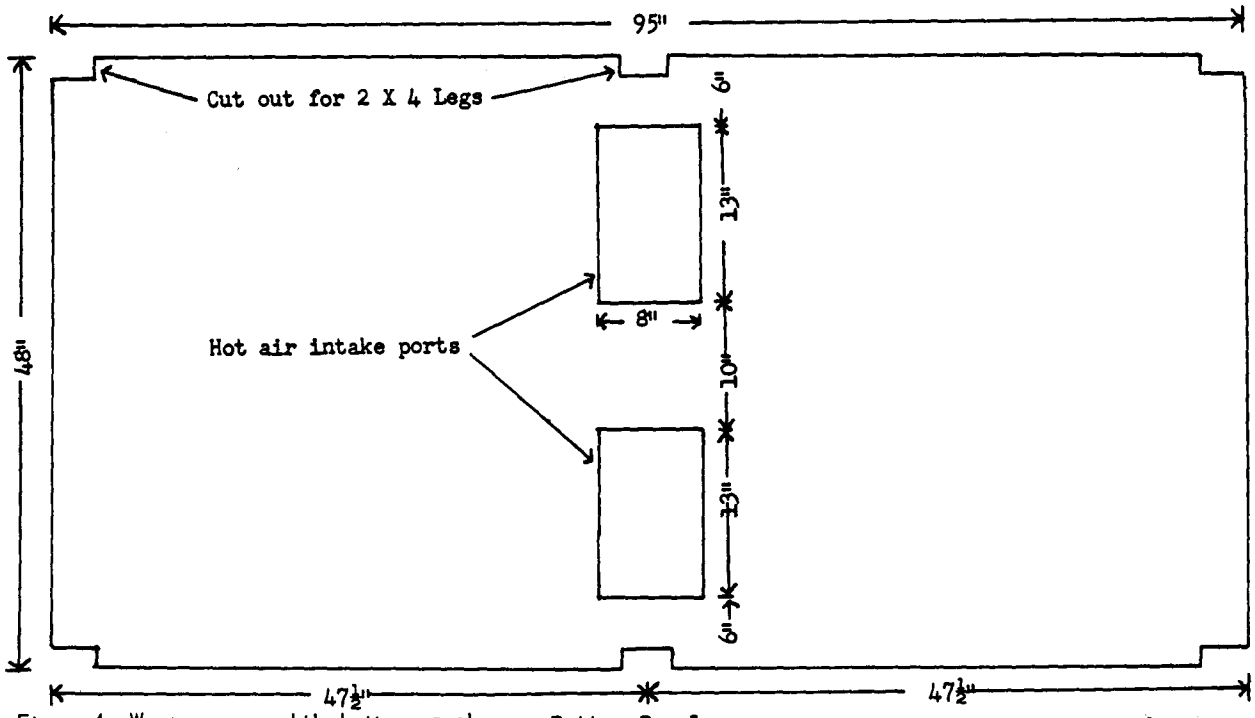

Figure 4.--Westvaco cone kiln bottom panel.

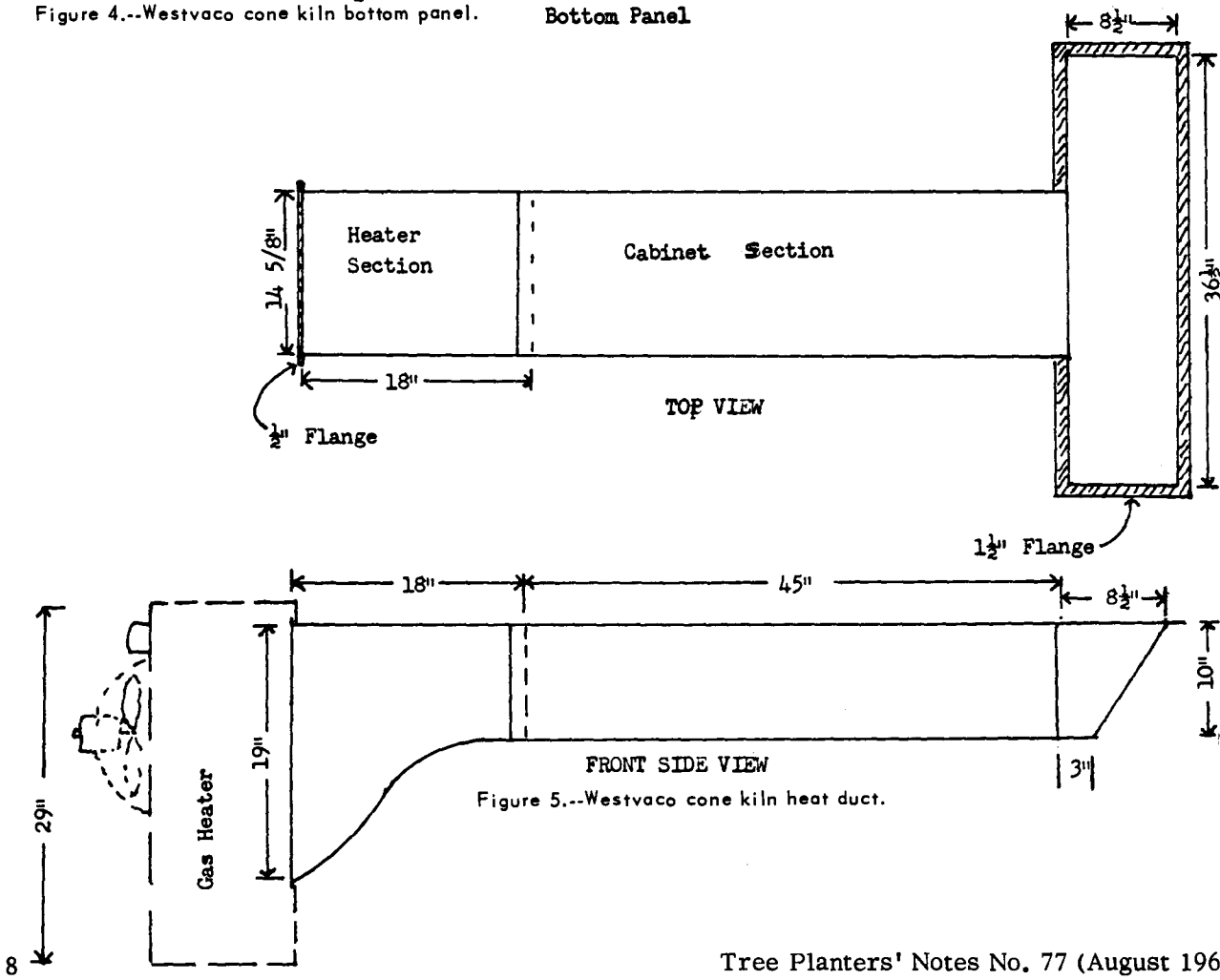

Figure 5.--Westvaco cone kiln heat duct.

Materials for Construction

6 pieces 2 x 4 in. 6 ft. long (legs)
60 linear ft. 2 x 2 in.
152 linear ft. 1 x 2 in.
192 linear ft. 1 x 4 in. (tray sides)
32 linear ft. 1 x 1 in. (to hold center partition in place)
60 #12 screws 1-1/2 in. long
144 #10 screws 1-1/2 in. long
7 3 in. screws
24 58 in. metal screws
4 lbs. #6 and #10 galvanized finishing nails
2 lbs. #3 shingle nails
2 lbs. 1 in. wire staples
42 ft. 48 in. aluminum or galvanized screen wire
42 ft. 48 in. wide, 1 in. mesh chicken wire, or 1/2-in, mesh hardware cloth
8 ft. metal weather stripping for bottom of door
40 ft. vinyl weather strips
160 linear ft. 1-1/2 in,-wide x 5/8 in.-thick fiberglass insulation
24 pieces 1-1/4-in, angle iron 47-3/4 in. long for drawer slides
5 pieces 4 x 8 ft. 1/2-in. flakeboard or 5/8-in, plywood
2-1/2 pieces 4 x 6 ft. 1/4-in, plywood
12 eye bolts 3/4-in, eye, 2-1/2 in. long
4 eye screws 3/4-in, eye, 2-1/2 in. long (for center leg)
16 wedge 6 in. long, 1/2 in. thick, 1 in. deep on heavy end

Duct work (see fig. 5)

1 25,000 BTU Reznor heater
3 yds, 48 in. paperback fiberglass insulation for duct
2 gal, aluminum paint 2
qts. clear shellac
Supply of 5/16-in. swing line staples
NOTE: All lumber should be bought in multiples of 4 ft. (all wood was local pine).