OREGON STATE BOARD OF FORESTRY

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AN INEXPENSIVE RAIN GAUGE

by

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During the summer of 1954, the need developed for a large number of rain gauges for use in a weather study being conducted by the research division of the Oregon State Board of Forestry. Because of the large number needed, the use of the more permanent conventional rain gauges of either the U. S. Weather Bureau or the U. S. Forest Service would have proven too expensive. The gauges were to be in the field during the fall hunting season and experience had shown that the mortality of weather instruments during this period, either through theft or target practice, was excessive.

A satisfactory inexpensive rain gauge was designed by using a number 10 canning can, a funnel top constructed of aluminum foil, and a plastic cylinder graduated to measure rainfall directly in tenths and hundredths of inches. Cost of material and construction amounted to a few cents per gauge as compared to several dollars per gauge for the U. S. Forest Service type. The cans, although smaller than conventional gauges, were sufficient for summer rains and for locations where rainfall was measured frequently. With the low cost, the gauges were distributed in quantity and abandoned in place at the end of the study.

Number 10 canning cans are purchased by canneries in lots of 1000 for 10 cents per can. However, used cans can usually be obtained from canneries at no cost. These are more serviceable because of the rounded edge left by the removal of the top. The cans are 6 inches in diameter and nearly 7 inches deep.

Aluminum foil, 0.002 of an inch thick, was purchased in a roll 24 inches by 100 feet for $3.85. As many as 240 funnels can be fashioned from a roll, at a cost for

materials of less than 2 cents per funnel. The funnel is formed by cutting a disc 10 inches in diameter, punching a one-half inch hole in the center, overlapping the disc 90 degrees, and stapling in place. The funnel is then shaped to the top of the can allowing a splash apron of one-half inch by crimping one-half inch on the outside of the can and one-half inch on the inside. The distance from the opening of the funnel to the bottom of the can is approximately four inches. To measure the rainfall the funnel lip is raised and the water poured into the graduated plastic cylinder. The lip can then be easily molded back into place.

The graduated cylinder is of commercial lucite. It is 13 inches tall, with a two inch outside diameter and a .125 inch sidewall. The bottom is sealed with a 1.750 x .250 inch disc cemented outside the cylinder. The tubing costs approximately $2.20 per foot. The sheet material costs about $.01½ per square inch.

The cylinder is so graduated that the depth of rain entering the can may be read directly. Graduation is accomplished by:

(1) Calculating the height of water column in the tube necessary to represent one inch in the can,

(2) Dividing this distance into 100 equal parts.

The height of the water column can be computed by the formula $h = \frac{D^2}{d^2}$ where "h" is height in the lucite cylinder, "D" is diameter of top of can, and "d" is diameter of lucite cylinder.

Substituting, $h = \frac{(6)^2}{(1.75)^2} = \frac{36}{3.0625} = 11.7551$ inches.

This distance may be divided graphically into 100 equal parts. The cylinder can be placed in a lathe for scribing.[1] The graduations on a strip of drafting paper or other firm material placed inside the tube will serve as a guide for marking. The distance may also be laid off directly on the lathe.

[1] Hamilton, E. L., Reimann, L. F., and Andrews, L. A. Shock Resistant Lucite Graduate. Cal. Forest & Range Experiment Station, Berkeley, Cal. Misc. Paper No. 6, September, 1952.

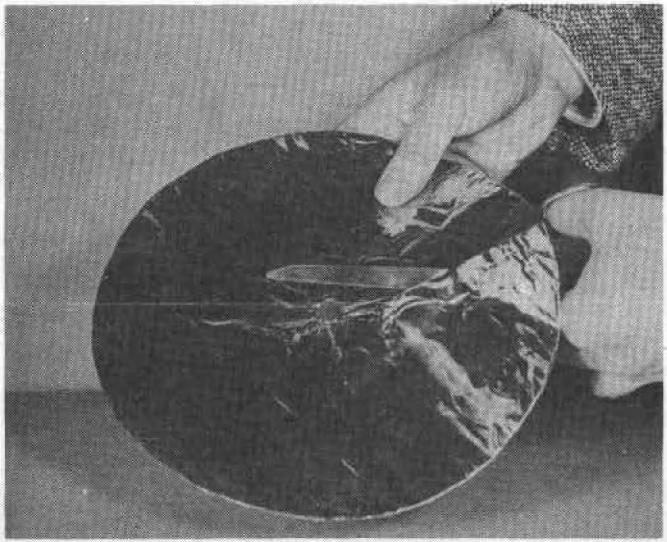

FIGURE 1.
Cutting the 10-inch diameter aluminum foil disc in preparation to forming the funnel. Notice the 1/2 inch hole in the disc center.

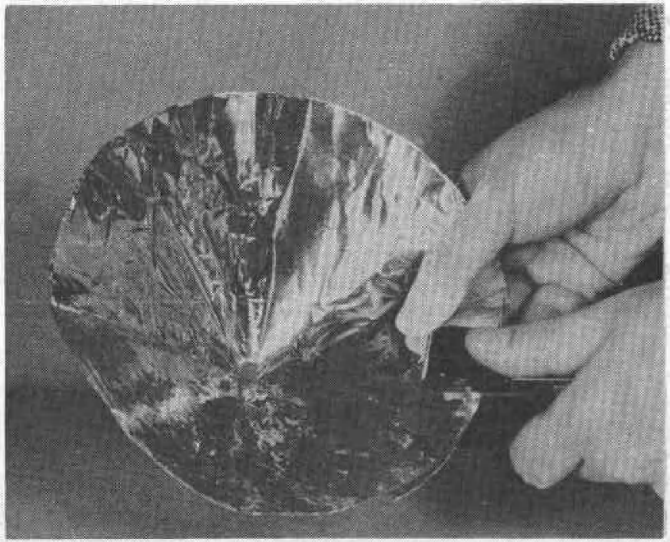

FIGURE 2.
Forming the funnel by overlapping the disc by 90 degrees and stapling.

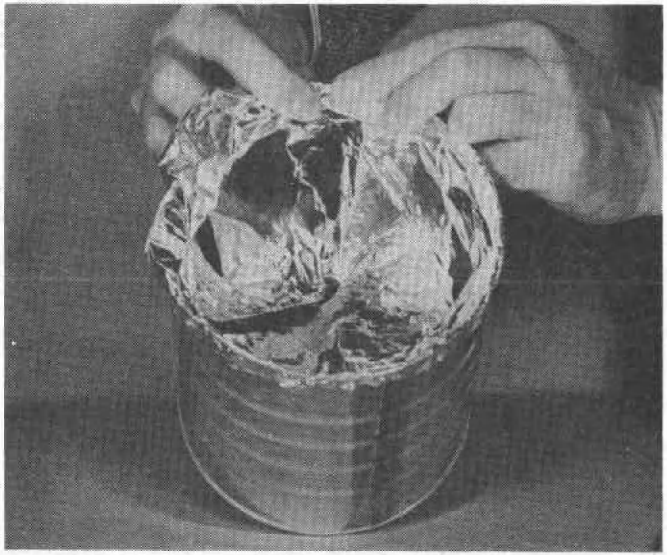

FIGURE 3.
Shaping the funnel to the can. One-half inch of the disc is crimped on the outside of the can and one-half inch on the inside to form a splash apron.

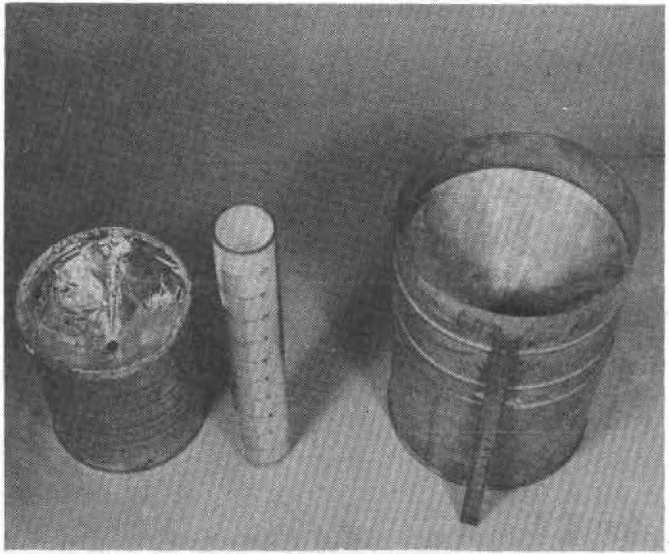

FIGURE 4.
The completed rain gauge and graduated cylinder alongside a standard U.S.F.S. rain gauge and measuring stick. Numbers on the cylinder represent tenths of inches.