to form a continuous piece of material, there is less possibility of leaks developing than in a glass-metal water bath. The plastic is sufficiently nonconducting to make other insulation unnecessary. The cover helps to maintain the temperature equilibrium and also aids in keeping the water in the bath clean.

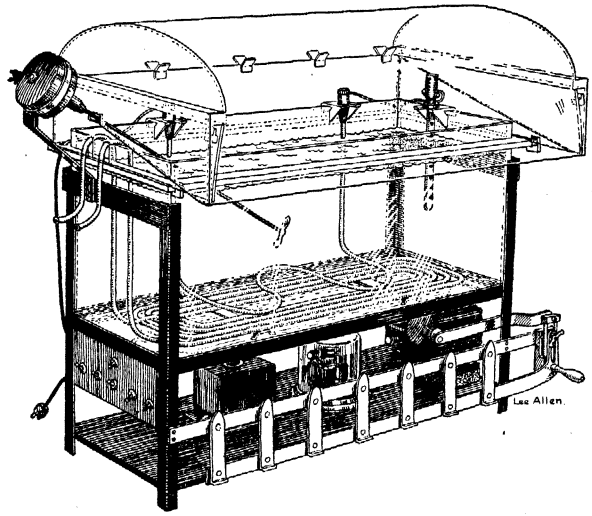

FIG. 1. Assembled transparent plastic tank and cover for Warburg manometric apparatus.

The tank now in use measures $9 \times 11\frac{1}{2} \times 26$ in. and is made of $\frac{3}{8}$-in. plastic sheets, with the corners both cemented and pegged with $\frac{1}{8}$-in. plastic dowels, as shown in Fig. 2, *e* and *f*. Very small holes were drilled the length of the dowels to allow escape of air and excess cement while they were inserted. The cover is constructed of $\frac{1}{8}$-in. material. A cement made by dissolving plastic scraps in chloroform was used for all seals where great strength was necessary. Other surfaces were joined by flowing chloroform from a pipette between the adjacent surfaces. The shelf around the top of the tank serves both as a brace and as a platform for the sidewalls of the cover. To accommodate the sidewalls a groove is cut around the back and two end pieces of this shelf (Fig. 2, *d, e,* and *f*). The upper, curved portion of the cover rests on the sidewalls, which have "Y"-shaped receptacle hinges (Fig. 2, *b*) along the top of the back edge. The $\frac{1}{8}$-in.-thick curved portion of the cover was bent by clamping the long edges between wooden 1×2's and playing a lazy gas flame under the sheet until it sagged nearly into shape. Final shaping was done by force, and the 1×2's were clamped in proper position with the curved sheet suspended between two tables of equal height. The "Y" hinges, and the hooked portion of the movable accessory brackets (Fig. 2, *g*) were softened by slowly heating the plastic over a Bunsen burner. When it could be bent

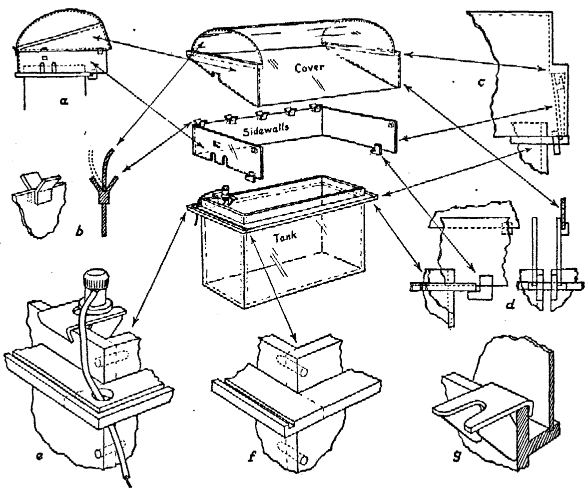

FIG. 2. "Exploded" view of "Plexiglas" tank, cover, and cover sidewalls with accompanying detail sketches: *a*, end view of assembled unit with cover lifted and resting on sidewall brackets; *b*, "Y"-shaped receptacle hinges; *c*, front view of closed cover showing how offset in cover rests on slightly displaced sidewall; *d*, solid hooks on sidewalls locking under shelf and locking device for supporting end of cover when lifted; *e*, construction of top rear corner with electrical accessory in its movable plastic bracket; *f*, construction of top front corner; *g*, view of accessory bracket on a cross-section of the top edge of tank.

with slight pressure, it was shaped over a form and held until cool.

In order to avoid strains and bubbles in the cemented joints of the tank it is advisable to allow 3 to 5 weeks for thorough drying.

A Simple Automatic Pressure-regulating Device for Use With Vacuum Lines

WALTER S. CLARK
Duke University

A reliable pressure-regulating valve for use with vacuum lines can easily be constructed from an ordinary drying tube and some glass tubing. The valve is designed to even off small variations in a vacuum line, rendering the partial vacuum very nearly constant. It is based on a regulator described by Asprey (*1*).

The valve (Figs. 1 and 2) consists essentially of a drying tube (b) with a side arm (a) blown into the body immediately below the bulb, a glass rod (r), and a sealed glass float (f) which is buoyed up by the mercury in the reservoir (m). The end of a glass rod which fits loosely in the tip (t) is heated in a Bunsen flame until a small, solid bead is formed with a diameter somewhat greater than that of the tip. Removed from the flame, the bead is carefully flattened and again revolved in the flame until it assumes an ellipsoidal form as shown (g). After grinding off the tip of the drying tube evenly, the rod (r) is inserted and the bead seated in the tip by grinding with emery powder. This operation is accomplished by covering the bead with oiled emery and rotating the

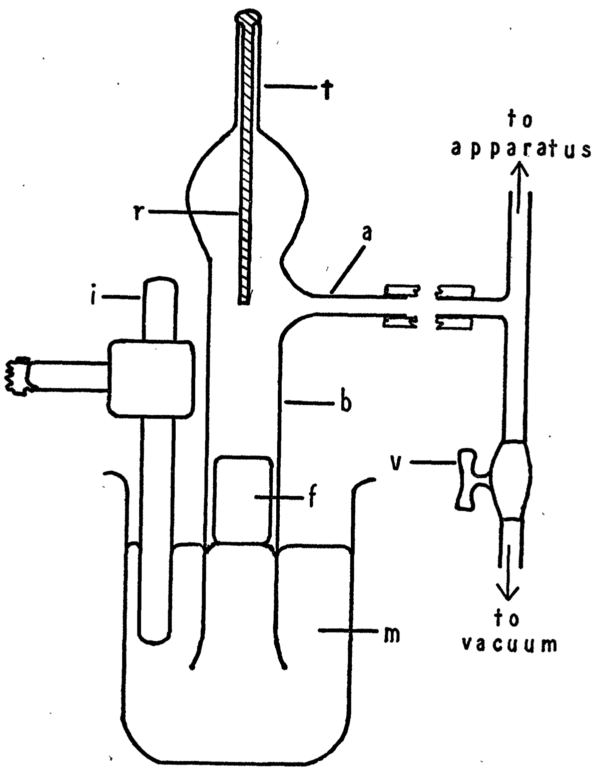

FIG. 1. Schematic view of the apparatus.

rod with the fingers from the opposite end. For best performance, the valve seat (s) should be given a second polishing with fine emery. The rod (r) is then cut off about the level of the side arm. A float (f) can be fashioned from an ordinary glass vial which is of such dimensions as to slip freely inside the body of the drying tube (b). To operate at low-pressure differential, the valve is set into a mercury reservoir (m) and connected by means of a "T" tube into the vacuum line.

In operation, the pressure differential between the inside of the valve and the atmosphere causes the mercury to rise in the absorption tube. The float rises on the mercury column until it contacts the lower end of the valve stem (r) and causes the valve to open, permitting an influx of air. The float immediately ceases to rise, because the air entering the valve tends to lower the pressure differential and causes the mercury to fall. A balance is set up between the line vacuum and the rate of entry of air around the valve seat (s), maintaining a practically constant pressure difference. In this way minor fluctuations in the vacuum source are compensated for by a corresponding change in the rate of air intake through the valve.

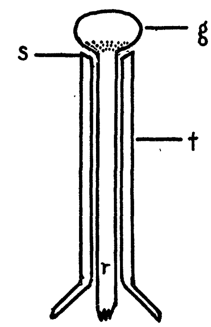

FIG. 2. Detail of the valve.

The valve operates best when connected into the vacuum line between two resistances. If, for example, the valve is used for controlling the rate of air flow through a flowmeter, operation is most efficient when connected into the vacuum line between the vacuum source and the flowmeter. The adjustable valve (v) for controlling the amount of vacuum acts as one resistance while the flowmeter acts as the second. In operation, the control valve (v) is adjusted so that the vacuum applied to the flowmeter is slightly greater than is to be used. The automatic valve then prevents any decrease in pressure below a fixed limit. When connected with a high-resistance apparatus where a strong vacuum is required, the length of the mercury column may be increased by inserting a piece of tubing through a stopper at the bottom of the drying tube and setting this into the reservoir. Any desired rate of flow can be maintained by adjusting the height of the valve above the mercury reservoir, and, where fine adjustment is required, a piece of solid glass rod (i) may be raised or lowered in the reservoir to produce slight changes in the level of the mercury. When used in connection with liquid flowmeters, no significant fluctuations were observed even after several hours of continuous operation.

Reference

1. ASPREY, G. F. *Ann. Bot.*, 1937, **1**, 566–568.

Scanning Science—

Contracts have been awarded for the construction of the Schemmerhorn Hall of Natural Sciences and the Hall of Physics for Columbia College. The proposed new building is to be erected at the Boulevard and 119th street.

—24 January 1896