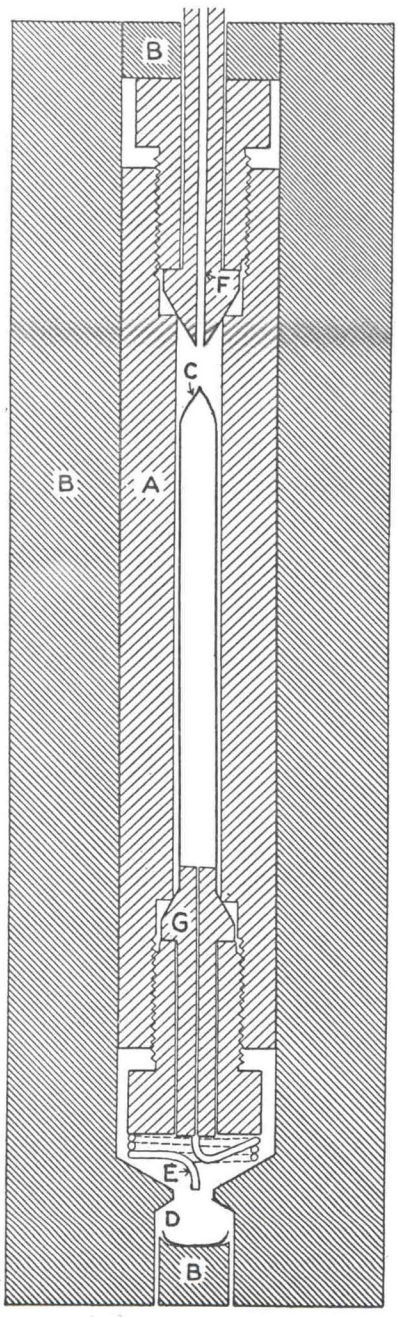

FIG. 1. Arrangement of high temperature cylinder and capillary.

in cylinder (A), but it was soon found that enough gas dissolved in the glass to produce frothing when the pressure was released, and to carry glass into the cool part of tube (F), which became plugged after a few runs. A seal of molten tin used in an effort to separate the glass from the nitrogen apparently contaminated the glass. The final arrangement, which proved convenient as well as satisfactory, was to draw the molten glass by gentle suction into a thin-walled drawn copper tube (C), silver-soldered to the plug (G) which connects the capillary to the cylinder (A). When filled, the copper tube was closed and soldered at the top, and mounted as indicated in Fig. 1. Under pressure, this tube readily collapsed upon the glass, forcing it out through the capillary, with no direct contact between glass and nitrogen. A pressure difference of less than one atmosphere was required to flatten the copper tubing.

Constancy of temperature, essential for the success of this work, was assured by a thyratron control circuit and a resistance thermometer, described by Benedict,[7] with certain improvements for which we are indebted to Mr. Dennison Bancroft. The temperature remained constant to within about 0.1°C, as measured by a chromel-alumel thermocouple inserted in the wall of the copper block near the capillary; runs were not started until the thermocouple had indicated the desired temperature for several hours.

Measurements were made successfully at two temperatures, around 500° and around 350°. The viscosity of the glass is so different at these two temperatures that very different methods of collecting samples were necessary. Near 500°, where the viscosity is about 10^4 poises, the glass issuing from the end of the capillary spread over the end of the tube until enough accumulated to form a drop; when this drop fell, it carried with it a thread, which continued to spin out from the mass on the end of the capillary until the pressure was released. After a time the thread would part somewhere in the middle. At this temperature, the glass was caught in a small platinum cup (D), placed near the end of (E), which could be removed for weighing after the flow had stopped. The amount of glass remaining on the end of the tube was somewhat variable and could not be measured; a large part of the irregularity of the results at this temperature is probably to be ascribed to this cause. All attempts to wipe or cut off the last drop were defeated by the

[7] Manson Benedict, Rev. Sci. Inst. 8, 252 (1937).