HgI_2--13,500 atm, AgBr--83,000 atm, AgCl--87,000 atm. (The optical effects due to light scattering at a phase transition are quite dramatic, and, in fact, form the basis for a current study of kinetics and mechanism of phase transitions.) These transitions gave certain fixed points as a function of applied force and center thickness. We then measured the shift of numerous peaks and absorption edges with pressure for various applied pressures and pellet thicknesses. By curve fitting it was possible, for each substance, to predict extrapolated pressures as a function of thickness and applied force. Since the various substances extrapolated to the same pressures ($\pm$ 5000 atm at 200,000 atm pressure) there is a consistency to the calibration. Every substance studied in the cell is run at several pellet thicknesses, and the consistency from thickness to thickness gives a check on the calibration. In its final form, the calibration can be written[3]

$$p_c = p_a \left[1 + \frac{10.8}{p_a^{0.14}} \exp(-0.174\, t_c)\right]$$

where

p_c = center pressure, thousands of atmospheres

p_a = applied pressure, thousands of atmospheres

t_c = center thickness, thousandths of an inch.

Numerous runs have been made as high as 175,000 atm, and a few runs over 200,000 atm, although the accuracy of pressures above about 160,000 to 180,000 atm is much in doubt due to flowing of the carboloy. There is sufficient deformation of the carboloy to require regrinding for every run over about 160,000 to 180,000 atm.

There exists the possibility of significant nonhydrostatic optical effects because of the medium used. We were able to check several shifts obtained in a liquid cell to 10,000 atm. Apparently the strains and dislocations introduced in the sample, which would certainly have measurable effects in an electrical conductivity experiment, introduce optical absorption at too low a level to affect the spectra observed. There are theoretical calculations[4] which indicate that it would take a very high concentration of dislocations to give a large optical absorption.

3. The High-Temperature Optical Cell. The optical cell has been modified to extend to high temperature and pressure.[5] One piston is ground 0.008 inch undersize and insulated from the insert with mica. Salt and pipestone are extruded in the gap to hold the mica in place. The piston is also backed with a sheet of mica. The heater arrangement is shown in Fig. 3. Four holes are drilled, carefully spaced, around the center flat. Graphite is fused in the holes. A wattage-temperature calibration was obtained by observing optically the melting points of a number of substances near atmospheric pressure. The observation of phase transitions at high pressure indicates that the

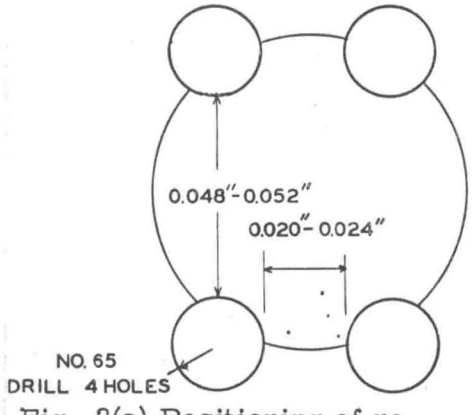

Fig. 3(a) Positioning of resistors in center of pellet.

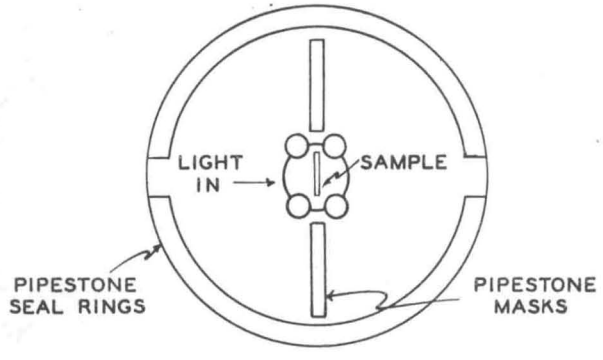

Fig. 3(b) Salt pellets with slots cut for sample and pipestone masks.