the variety of values observed for $d \ln \varrho_0 / d \ln V$ that the details of the scattering potential might be very important. It is one of the purposes of this work to study the concentration dependence of $d \ln \varrho_0 / d \ln V$ in a simple binary alloy system in which both constituents have similar electronic structure. If $d \ln \varrho_0 / d \ln V$ is concentration dependent, then this could be a reflection of subtle changes in the scattering potential. The $Ag_{1-c}Au_c$ alloy system was chosen for this study because: 1. Ag and Au have similar electronic structures, 2. Ag and Au form a continuous series of solid solutions, and 3. there are no complicating magnetic (s–d) types of scattering processes.

In this work the effect of pressure (0 to 4 kbar) on the resistivity of five $Ag_{1-c}Au_c$ alloys ranging in concentration from $c = 0.1$ to 0.9 has also been measured from 4 to 273 °K. The high temperature measurements were made to determine the relative influence of phonon scattering and disorder scattering on the pressure derivative of the total resistivity in a concentrated alloy system, and to determine the magnitude of the deviations from Matthiessen's rule.

2. Experimental Procedure

The alloys were prepared from high purity (99.999%) Ag and Au by melting in a quartz tube. The ingots were homogenized at 1000 °C for one week and then extruded into wires with a diameter of 0.040 in. and a length of 2 in. Internal strains were removed by annealing at 900 °C for 3 h. The resistivity of these alloys was measured at ice, liquid nitrogen, and liquid helium temperatures and plotted as a function of concentration. These plots exhibited the typical parabolic behavior characteristic of a disordered alloy system; it was concluded from this that the nominal concentrations were correct.

Since these experiments were conducted mainly at low temperatures, solid and fluid helium were used as the pressure transmitting media to obtain the best possible hydrostatic pressures. The isobaric freezing technique and the system used to compress the helium up to 4 kbar are described in detail by Schirber [4]. Details of the sample chamber and high pressure bomb are shown in Fig. 1. The current and voltage leads are coiled around the sample for support and electrical insulation. The resistance was measured by the standard four probe technique using a Honeywell model 2768 microvolt potentiometer

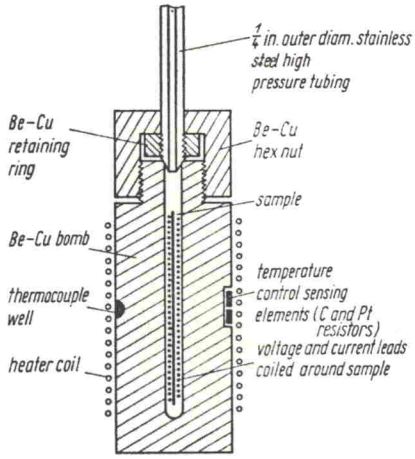

Fig. 1. Sample chamber and high pressure bomb details