properties of the sample up to 27 kOe with a superconducting magnet. The pressure attained with this piston-cylinder cell is lower than that with clamped anvils but the apparatus is suited for the measurement of fairly large samples.

B — Clamped-cell apparatus

In this method, pressure is applied at room temperature with a standard press, the anvils are clamped by means of three bolts, and the clamped cell is then cooled down to low temperature. The arrangement of the cell is shown in figure 1. A pyrophyllite ring ($4 \times 1.5 \times 0.15$ mm) was fixed with insulating cement to the face of the anvil. A thin strip of the sample was mounted between two discs of talc (1.5×0.15 mm) which served as a pressure transmitting medium. The talc surrounding the sample was much more plastic than the pyrophyllite ring and so generated a sufficiently uniform pressure.

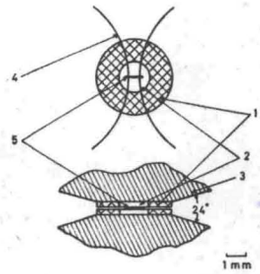

Fig. 1 — Sample assembly in the clamped cell: 1) pyrophyllite ring; 2) talc disc; 3) Bridgman anvil; 4) lead wire (Pt); 5) sample.

As shown in figure 1, the sample assembly was only 0.3-mm thick and extreme friction against the face of the anvil prevented the talc from squeezing out. The electrical resistance of the tin sample was measured by a DC method with Pt electrodes of 0.04-mm diameter. Temperature was measured by Allen-Bradley carbon resistors (91Ω, $\frac{1}{2}$ W) calibrated against a Honeywell germanium resistor.

3 — Results and discussion

A — Direct piston-displacement apparatus

Low-temperature pressure gauges can be devised from a number of superconductors whose transition temperature T_c is sufficiently sensitive to pressure change. Swenson [10] proposed a particularly useful pressure scale up to 10 kbar using a tin manometer. The relationship is given in polynomial form by

$$\Delta T_c = T_c(p) - T_c(o) = -4.7 \times 10^{-2}\, P + 3.6 \times 10^{-4}\, P^2 , \qquad (1)$$

with pressure P in kbar.

For the piston-cylinder assembly we investigated two types of sandwich structure. One consisted of a pyrophyllite disc, silver chloride disc, the sample, silver chloride disc, pyrophyllite disc, and the Cu-Be piston stacked in sequence (A-type structure). Another was made up of a pyrophyllite disc, talc disc, silver chloride disc, the sample, silver chloride disc, talc disc, pyrophyllite disc, and the Cu-Be piston (B-type structure). Silver chloride was found to extrude at an 8-ton load in the A-type structure, whereas it was fairly well contained in the B-type structure.