In all investigations concerning pressure influence on superconductivity main attention is given to the change of the critical temperature T_c and critical magnetic field H_c [3]. In [4] it was considered that $2\,\Delta/kT_c$ does not change with pressure.

One of the direct experimental methods for the study of the energy gap in superconductors is the electron tunnelling technique. Possibilities of this finest instrument allowed to find out a change of $2\,\Delta/kT_c$ with pressure at first for Pb [5] and then less for Sn [6].

This paper presents results on tunnelling investigations of the energy gap in In and Tl under pressure.

2. Experimental Technique

2.1 Samples

As is known [7] the best gaps can be obtained on superconductor–barrier–superconductor tunnel systems. This made superconducting diodes useful for investigations under pressure. Of all systems investigated the best are pairs prepared on Al base, i.e. an Al–Al_2O_3 superconductor.

Al–I–In and Al–I–Tl samples were prepared by deposition in high (1×10^{-6} Torr) vacuum on a cooled (up to 80 to 100 °K) glass slide 4×16 mm². There were three junctions on one slide, each $1_{Al}\times0.5_{In,\,Tl}$ mm² (Fig. 1). To avoid edge effects films were deposited through stencils supported by an electromagnet. Junction quality in the sense of fitness for their use in pressure measurements much depended on condensation and oxidation conditions of the Al film. Aluminium was sprayed from a tungsten U-vaporizer. During deposition the vacuum did not become worse due to preliminary long annealing (up to vacuum restoration) of the vaporizer and the hinge. Oxidation took place in the atmosphere of dry air at a pressure of 0.2 Torr for 5 min. Sample preparation was controlled by film and junction resistance measurements both during deposition and subsequent heating up to room temperatures. Junctions with resistance 50 to 100 Ω were chosen. Al–I–Tl samples were covered with Si monoxide of about 1 μm thickness. In and Tl film thickness was determined by Linnick's microinterferometer MII-4 and was equal to (1000 ± 100) Å. For Tl films $\frac{R_{300}}{R_{4.2}} = 14$ to 18.

Al films had resistivities of 4000 to 6400 Ω mm², and their initial critical temperature varied from 1.65 to 2 °K.

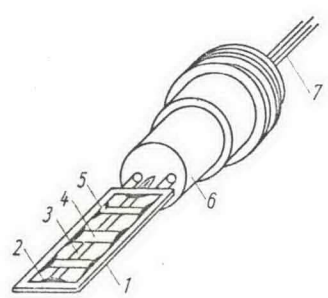

Fig. 1. Tunnel sample and obturator. 1 Sample holder made of getinax, 2 indium contacts, 3 Al film, 4 In and Tl films, 5 cover glass, 6 obturator, 7 electrical wires