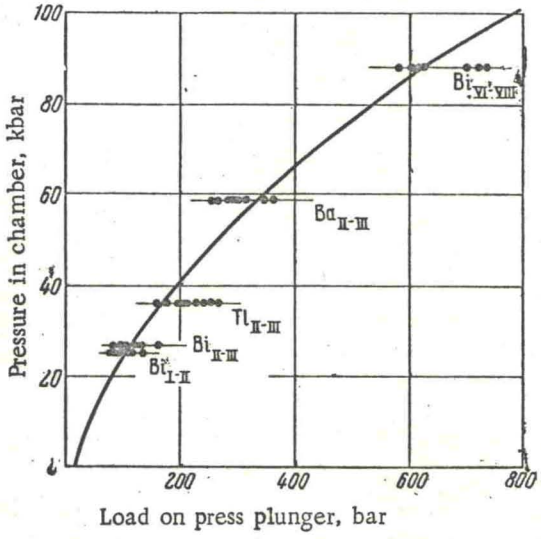

Fig. 2. Calibration curve in pressures, for chamber built to take 100 kbar.

tapered plunger 2 was fitted, at its high-pressure end, with a cylindrical termination 3 which protrudes into the cylindrical portion of the insert liner 4 of the chamber 6. A 0.5-mm clearance was left between the cylindrical portion of the plunger 3 and the cylindrical hole in the liner 4, with the diameter of the inner hole in the liner 5.0 mm. This clearance becomes filled with the pressure-transmitting medium NaCl 5 as the pressure mounts, since the NaCl is partially forced out of the chamber by leakage, and this acts to lower slightly the pressure generated by the motion of the plungers, but the electrical insulation of the plungers is reliably maintained in the process. Excess outleakage of salt 5 is hindered by the talc seal 1, which acts as an excellent insulating material, and which reliably blocks the clearance between the chamber walls and the tapered portion of the plungers, while simultaneously sealing the interior of the chamber, i.e., the liner 4. In that case, it is best to make the liner not in tapered form, but cylindrically, with subsequent fitting into the chamber. This was found to simplify the operation of replacing linears, and hence lengthened the service life of the chamber.

The chamber 6 depicted in Fig. 1 was made of U-8 grade steel, tempered to Rc = 48 to 50. The liner 4 was made of U-10 grade steel, tempered to Rc = 60 to 62. The plungers were made of U-10 grade steel, tempered to Rc = 58 to 60. The outer support 7 of the chamber 6, as well as the supports of the pistons 8, were made of 45KhNMFA steel, with subsequent tempering to Rc = 45 to 48.

As the investigations showed, the chamber is capable of withstanding pressures to 100 kbar, and can be used repeatedly, with no changes of any consequence in the accuracy of the pressure measurements.

Pressure calibration of the chamber, i.e., correlation of the pressures within the chamber to the loads on the press plunger, was carried out in terms of the polymorphic transitions in Bi, Tl, and Ba, corresponding to 25.4, 27.0, 36.7, 59.6, and 89.0 kbar. Results of the calibrations (Fig. 2) as processed by the method of least squares showed that the rms error in pressure measurements did not exceed ±6% up to pressures of 100 kbar. All of the chambers are intended for optical investigations, and were provided with side cylindrical viewing ports, steps widening out from the center to the periphery ϕ 0.8, 1.5, 3.0, 5.0, and 12.0 mm at the respective heights 4.5, 5.0, 5.0, 5.0, 5.0, and 10 mm. The ports were filled with crystalline NaCl. This chamber, like its precursors, can be used for investigations of other processes occurring at high pressures and high temperatures.

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