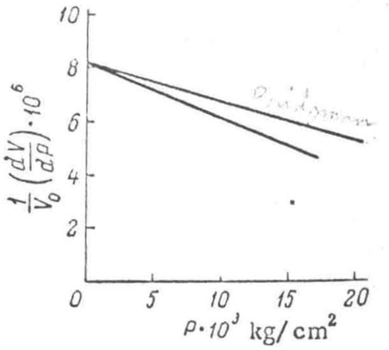

Fig. 7. Compressibility of strontium as a function of pressure. The upper curve was obtained by Bridgman.

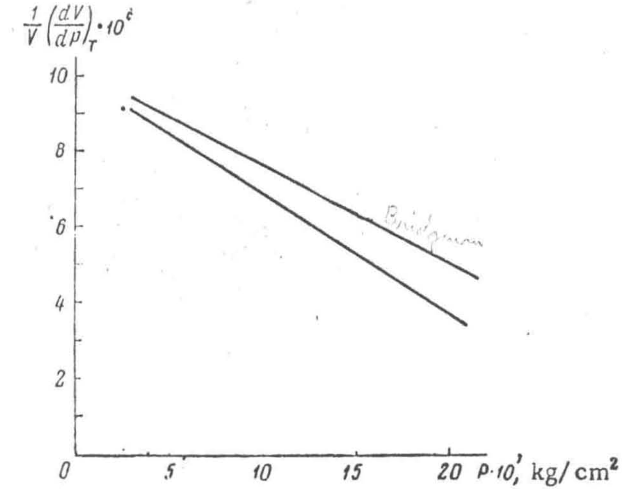

Fig. 8. Compressibility of barium as a function of pressure. The upper curve was obtained by Bridgman.

For strontium, Bridgman gives the following value:

$$-\frac{\Delta V}{V_0}=81.84\cdot 10^{-7}P-70.92\cdot 10^{-12}P^2.$$

For barium we found, by the x-ray diffraction method, the following values:

$$a=100\cdot 10^{-7}\pm 4.4;\ b=-155.5\cdot 10^{-12}\pm 9.0.$$

By the method of linear compressibility, one finds for barium the following expression:

$$-\frac{\Delta V}{V_0}=101.87\cdot 10^{-7}P-127.42\cdot 10^{-12}P^2.$$

The compressibility can be expressed by the following relationship:

$$\frac{1}{V_0}\frac{dV}{dP}=a+2b.$$

The large difference in the values of the constant b in the two cases leads to a considerable divergence of the compressibility curves drawn on the basis of data obtained by us and by Bridgman, as shown in Figs. 7 and 8. The difference in the values of compressibility obtained by the two different methods exceeds the experimental error, which is about 3%.

Jacobs [5] has previously obtained an analogous result for copper and aluminum. The difference in the values of compressibility exceeding the experimental error is explained by Jacobs as follows: when the "movable piston" or linear-compressibility method is used, an unavoidable error is introduced in the results due to the fact that the microspaces and the intercrystalline substance are not taken into account; this error is not eliminated even when the sample is compressed previous to the experiment.

The pressure at which this fact ceases to affect the compressibility is not known, and it would be logical to assume that the higher the compressibility, the smaller this pressure will be. For barium, however, which is one of the most compressible metals, the effect of microspaces is still noticeable at a pressure of 15,000 kg/cm^2. On the other hand, the increase of the divergence of the curves in Figs. 7 and 8 with pressure can be explained by the fact that the corrections introduced in the results in the case of the method of linear compressibility, which are usually either calculated with the formulas of the theory of elasticity, or determined experimentally, are insufficient to some degree in this case.