The general inadequacy of theory in predicting correctly the volume dependence of electrical resistivity leads us also to the second purpose of these experiments. Theories which give incorrect predictions for the volume coefficient may, nevertheless, give correctly the temperature dependence of a quantity. To compare experimental results with such theories, however, it is necessary to be able to measure, or to be able to estimate from experimental data, the temperature dependence of the quantity at constant density. In the present work, therefore, we have made resistance-temperature measurements at effectively zero pressure between 2 and 300 °K from which, together with our high-pressure measurements, we have been able to deduce how the resistivities of lithium, sodium and potassium vary with temperature when their density stays constant; in such a highly compressible metal as potassium, for example, the differences between the temperature dependence at constant pressure and at constant density can be quite large (see figures 1 and 3).

Experiments comparable in scope with this work have already been made on copper (Dugdale & Gugan 1957). Less detailed studies have been made on rubidium (Dugdale & Hulbert 1957) and on a number of other metals (cf. Lawson 1956). Preliminary results of some of the present experiments have already been published (Gugan & Dugdale 1958*a*, *b*).

2. Experimental

We have described in detail elsewhere the methods by which we have made these measurements (references are given below). We shall therefore give here only a brief description of our methods.

2·1. *The specimens*

The specimens were made in the form of bare wires about 100 cm long and 0·5 mm in diameter. These were mounted on an insulating former and measured in either a high-pressure or a low-pressure apparatus. The resistance measurements were made by the potentiometer method. Further details of the preparation and mounting of specimens are given by Dudgale & Gugan (1960).

2·2. *The low-pressure apparatus*

This was designed after the principle of an adiabatic calorimeter so that accurate resistance–temperature curves could be obtained between about 2 and 300 °K at effectively zero pressure. Further details are given by Dugdale & Gugan (1960).

2·3. *The high-pressure apparatus*

This was an apparatus with which hydrostatic pressures of up to about 3000 atm could be applied to specimens using helium as the transmitting fluid. Below about 30 °K helium solidifies within the range of pressures that we could generate and in some cases we used solid helium as the pressure transmitting medium. The apparatus was designed so that the temperature of the specimen could be varied at fixed pressure. However, because of the long time needed to reach thermal equilibrium in the high-pressure bomb, we have made all our experiments under almost isothermal conditions, only a small correction being then necessary to allow for the change