INTRODUCTION

In a recent paper, Rotter and Smith[1] have reported the determination of the ultrasonic equation of state of iron. They have pointed out that this equation of state is at variance with that obtained by P. W. Bridgman in an absolute compression determination. The discrepancy is an important one because all compression measurements are made in a piezometer which is constructed of iron and hence the equation of state of other materials is relative to that of iron.

Rotter and Smith also compare the ultrasonic equation of state with the compression equation for materials other than iron and point out that there is a systematic discrepancy which is removed if the compression measurements are referred to the ultrasonic equation of state of iron. Following Bridgman, the equation of state is expressed in terms of the volume as a power series in the pressure, and the serious discrepancy occurs with the coefficient of the second degree term in the pressure. The discrepancy is important only in the case of relatively incompressible materials and unfortunately, there have not been many of such materials measured with the ultrasonic technique. Rotter and Smith were only able to make the comparison for aluminum, copper, gold, silicon and, of course, for iron itself. The purpose of this paper is to add yet another incompressible material to this list. Tantalum was chosen for the addition because of the availability of an appropriate single crystal and because it is even more incompressible than those materials previously studied. It is hoped to add other entries to the list as time goes on.