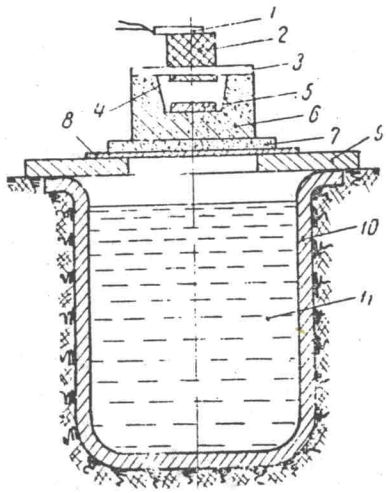

FIG. 1. Diagram of experimental apparatus: *1* - detonator; *2* - HE; *3* - asbestos cover; *4* - percussion plate; *5* - specimen; *6* - warm container; *7* - sand bed; *8* - plywood sheet; *9* - plate; *10* - steel vessel; *11* - water.

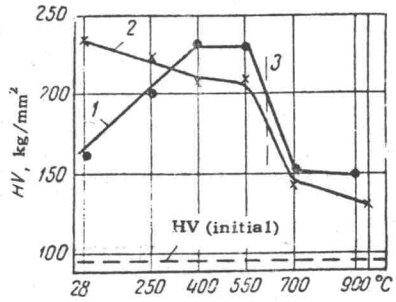

FIG. 2. Temperature dependence of the hardness of iron during shock loading: (*1*) 115 kbar; (*2*) 210 kbar; (*3*) approximate transition point from twinning (left) to granulated uniaxed structure (right).

calculation of the pressures.

The hot container with specimen was loaded into an electric muffle furnace and heated. The temperature in the furnace was checked on a thermocouple. After holding in the furnace at the required temperature the specimen was withdrawn and immediately covered with the asbestos lid. The temperature of each specimen was taken during the shock tests. They reached the explosion position with a temperature 30-40° higher than that required during the explosion. The time taken to cool them ot the temperature necessary for the explosion was determined from a calibration curve. Before the tests the hot asbestos cover was replaced by a cold one with the percussion plate attached to it. There was practically no heat loss.

In the case of high-temperature shock loading (900° or above) the hot container with the specimen was heated in the furnace together with a special refractory cover which had an opening for the thermocouple. After withdrawing from the furnace the temperature inside the container under the lid remained constant for 5 min. The other operations were the same.

RESULTS AND DISCUSSION

From the specimens microsections were made and used for measuring the hardness and analyzing the microstructure. The Vickers hardness was measured across the section of these specimens from the shock surface to the centre where the shock wave can be treated as two-dimensional [3, 8]. In the places where the hardness was measured the deformation of the Armco specimens was not more than 6%, and that of the copper specimens was 8-10%. No measures were taken to prevent plastic deformation in these experiments.

Figure 2 shows the temperature dependence of the hardness of Armco iron specimens under load. The hardness figures were taken at a distance of 0.6 mm from the shock surface.