is several times greater than for that which has not been transformed. Thickness of the plastic II shock front has been estimated by some workers from post shock hardness measurements in which the plastic II wave is quenched by reflection of elastic precursor and plastic I wave from a free surface.[24,25]

Shock width can be related to the hardness transition zone thickness measured in such experiments in the following way: Assume the interaction between the oncoming plastic II wave and reflected plastic I wave to be as shown in Fig. 6.3. Then

$$\frac{h_2-h_3}{U_2'} = (h_1-h_2)(1/R_2' - 1/R_1') + (h_2-h_5)(1/U_2' + 1/R_2') \;, \qquad (6.11)$$

where velocities are Lagrangian, $h_2 - h_3$ is shock width, $h_1 - h_2$ is distance from the free surface, $h_2 - h_5$ is width of the transition band, U_2' is plastic II wave velocity, R_2' is velocity associated with the relief wave that brings the stress behind the plastic II shock to 130 kbar, and R_1' is the leading elastic relief wave velocity. In deriving this expression the following assumptions were made: (1) wave velocities are constant through the region of wave interactions; (2) the plastic II shock is steady and can be represented as two parallel lines in the h-t diagram; and (3) the first term on the right hand side of Eq. (6.11) is smaller than the second term. Slopes of the various lines are indicated in the h-t diagram as the reciprocal of their wave speeds.

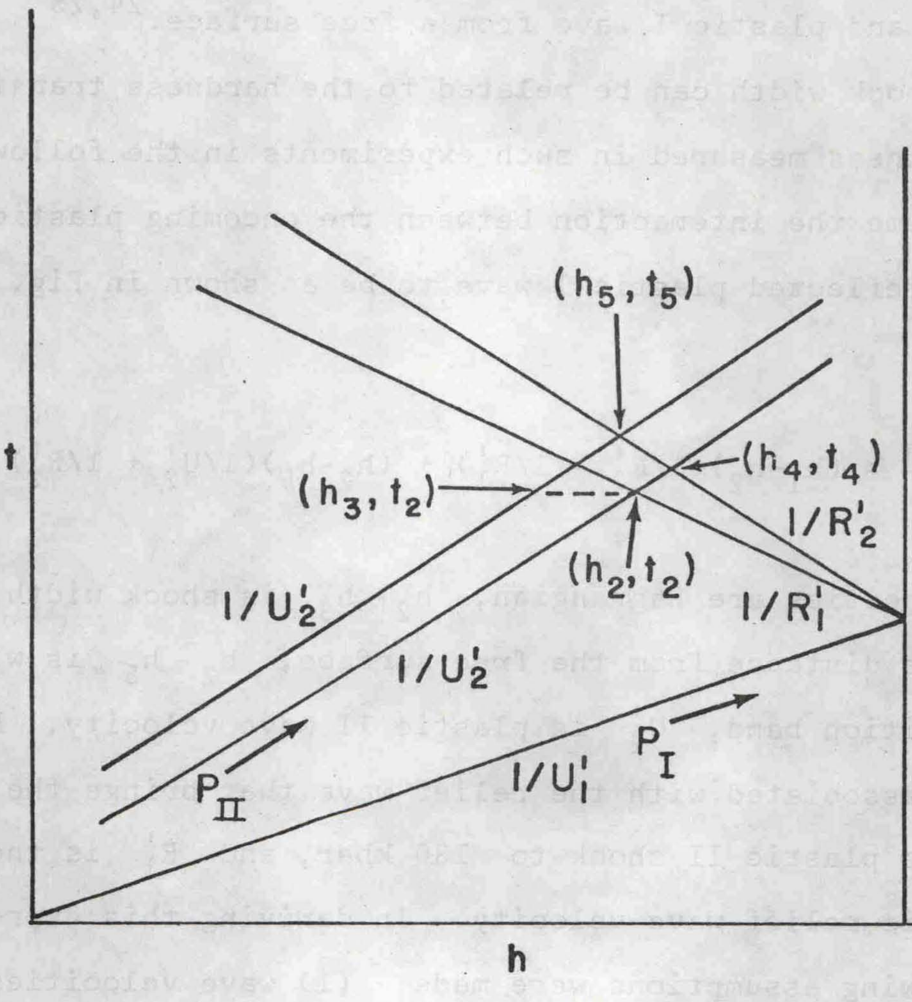

Fig. 6.3.--Reflected plastic I wave reduces the stress in and behind the plastic II shock front to a value below the transformation stress. This process leaves a zone, h_5-h_3, in iron of varying hardness.