nature that the compression lines are repeated several times within the stream, a formula has been advanced by Emden and then by Prandl which permits the calculation from the wave length——the distance between two successive compression lines or of the first one from the muzzle——of the pressure produced in the exit nozzle, in good agreement with the results of measurement; however, as was mentioned in the beginning, the basic underlying assumptions of the calculation in the case of our experimental arrangement are so little fulfilled that there is not much use to apply the formula in the present case. We have, therefore, limited ourselves for the present to the determination of only the relative run of the pressure change, measured for the time being by the distance of the compression line from the muzzle. The result of the measures is graphically represented in Fig. 18, for a shot with S-bullet and normal loading in Curve 1. It is seen from this that the distance of the compression line in front of the muzzle, and therefore the pressure in the muzzle, or, more exactly expressed, the ratio of the gas pressure in the tube in front of the muzzle to the gas pressure outside the muzzle, at first increases and then decreases relatively rapidly.

Associated with this phenomenon is the question of under which circumstances the velocity of the bullet after leaving the muzzle is still further accelerated a distance by the pressure of the outflowing powder gases. For cannon, C. Crehore and O. Squier, for guns W. Wolf, M. Rodakovic, and especially recently M. Okochi, have concerned themselves with this question. We intend to return to this in Part 2 of the work[1].

Earlier velocity measurements by the probe method lead to the same result: that the pressure ratio, and hence the ratio of the flow velocity to the velocity of sound, at first increases and then decreases; in this case, the experiment was carried out in such a way that the probe was placed at a fixed distance from the muzzle, and at different time intervals after the shot the instantaneous velocity was obtained from the Mach waves that formed. Curve 2 in Fig. 18 shows the run of the velocity variation. The velocity is at first small——the curve when extra-

1) More exact references to the liter...