

(see Fig. 8), that this reduction of the transverse velocity component, because of the lower inclination of the flow lines, not only balances but even requires an increase of the transverse velocity component. As a result, the transverse deviation which the air particles experience is likewise increased toward the center. This transverse deviation reaches its maximum about at B (Fig. 11), and then quite rapidly decreases because of the action of the compression CPC_1 . The behavior of this transverse deviation results in the formation of curved compression lines in the same way as in the case of CPC_1 . Also, these lines are wave crests, that is, geometrical positions of relative pressure maxima, originating through the compression of the outside air by the expelled powder gases. Since it is a question here of relative maxima, there is nothing to prevent the occurring of additional wave crests simultaneously in succession or into each other (see Fig. 21). It may be seen, therefore that, in the case of the flowing out of the powder gas, the outside air because of its inertia and elasticity plays a role similar to a piece of rubber tubing, which is fixed to the end of a pipe, and squeezed out at the other, as an elastic elongation of greater cross-section. At the places at which the side compressions ABC and $A_1B_1C_1$ and the transverse compression CPC_1 occur, the transverse velocity is relatively small. As a result, the compression here is not so great, as may also be seen from the lesser darkening of the compression lines in Fig. 2. The flow lines thus go through these compression places with considerably higher velocity, and then produce the appendages CD and C_1D_1 , which, therefore, likewise represent compressions.

In the case of all these considerations, the conceptions "Flow Lines" and "Compression Lines" must be carefully distinguished. The flow lines go through the compression lines, in exactly the same way as in the case of the water flow. The two quantities correspond in a certain sense with the conceptions of current and voltage in electricity. The measuring or the visibility of the compression lines results from schlieren observations, that of the flow lines from the above-described probe-method with the aid of Mach waves. Nothing, of course, prevents the appearance of these compression waves in the midst of a turbulent motion, for example, in a mixture of air and turbulent powder gas like that produced in the case of a shot.