

pattern, which can be repeated, under these circumstances, many times within the gas stream. If the length of the attached tube is changed, or if the shot is observed at different times, then since the angle of incidence of the flow lines to the edge of the attached tube is thereby changed, the crossed waves proceed from the muzzle with different angles, occasionally with such angles that a crossing no longer occurs, as is the case, for example, in Fig. 21. These crossed waves described here also can occur with automatic guns, in which the barrel slips back in the barrel-casing after the shot. In this case the extended barrel-casing plays the role of the attached tube. Crossed waves of this kind in the flow pattern have previously been observed in this connection, without, however, the cause of them being explained.

While the preceding results concerning the outflow of powder gases refer for the most part to relatively late time intervals at which the bullet has already left the barrel, we shall consider in Part II of this work chiefly the phenomena which pertain to the outflow of those gases which leave the barrel before the bullet. Since these investigations, however, are more of a ballistic nature, and also require special new arrangements for triggering the spark, we have separated them from the preceding published Part I.

The investigations were carried out in the ballistic laboratory of the Military Academy at Charlottenburg.

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