polated runs to the point of the ordinate axis which corresponds to the velocity of sound, 334 m./sec.——then increases and later gradually decreases. To the small initial velocity, in the case of initially constant energy, there corresponds a high pressure which then decreases with increasing velocity, and finally, if a further consumption of energy occurs, diminishes still more. If a Maxim silencer is now placed on the muzzle of the gun (Curve 3), then the velocity of the powder gases in the spiral turns of the silencer is appreciably reduced, and at the same time a considerable part of the energy of the powder gases is consumed. The result of this is that the pressures occurring at the muzzle of the silencer are much less than in the case of shots without the silencer. From this it is also evident that the pressure variation is not nearly so sharp as in Curve 1. As a consequence the surrounding air gets no sharp blow as in the case of shots without a silencer, which is the principal cause for the reduction of sound by the Maxim silencer. Curve 4 finally was obtained with decreased loading of 2 grams (compared with 3.2 grams in the normal cartridge), and shows a run similar to the other curves.

Along with these experiments with the silencer, we have made several others with tube attachments of greater diameter than the bore, which, however, are not yet completed. Nevertheless, several results have been obtained that seem to us worth mentioning. The waves cross inside the tube, as Prandl and his students already have observed, and have used for purposes of measurement. Furthermore, the powder gases flowing out strike against the sharply cut-off edge of the attached tube and produce Mach waves there, which, as indicated in the schematic Fig. 19, can result in intersecting compression lines in the interior of the flow pattern, similar to those mentioned earlier. These Mach waves at the edge of the attached tube are especially plain in the schlieren photograph of Fig. 20. These compression lines are so pronounced——a fact which depends particularly on the length and diameter of the attached tube——that they run far into the principal flow pattern and there strike against the outside compression lines. Since in these the outside air is strongly compressed, they suffer a reflection here, and then run back again to the inside of the flow pattern. In this way crossed waves originate within the principal flow