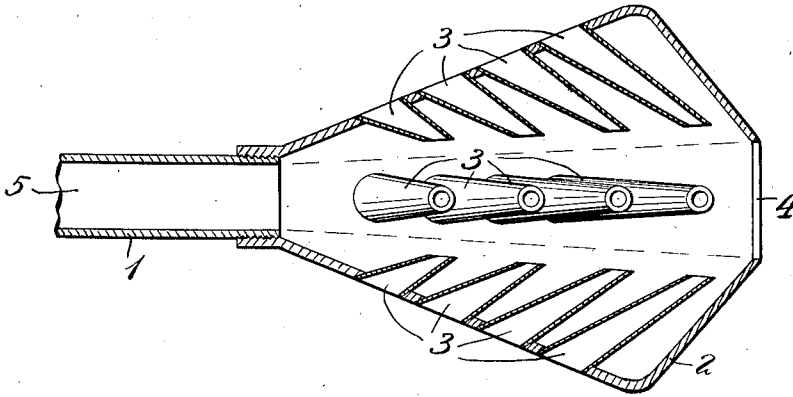


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APPARATUS FOR SILENCING AND EXHAUSTING GASES AND METHOD THEREFOR.
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1,382,690.

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INVENTOR

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To all whom it may concern:

Be it known that I, CHARLES LAWRENCE STOKES, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for Silencing and Exhausting Gases and Methods Therefor, of which the following is a specification.

This invention relates to mufflers for internal combustion engines and can also be applied as a silencer for guns. It is well known that the passage of gases under pressure through a confined space induces a vacuum following the path of these gases and this fact is used in this invention to utilize this vacuum to induce currents of air to flow from the external portion of the apparatus to the internal portion through which the gases are forced.

It is an object of this invention to provide a simplified and cheap means of bringing the air in so that it will mingle under vacuum or pressure with the gases and so break up the sound waves as to silence them and also under certain conditions to exhaust the gases by induced vacuum.

The invention is particularly applicable to internal combustion engines used in aeroplanes. It is well known that an aeroplane, to sustain itself in the air must move at a high rate of speed and the speed of the aeroplane moving through the air will give a high pressure and large volume of air which can be used in the apparatus in addition to the vacuum induced by the engine gases themselves to aid exhaust. One of the principal objections to using well known types of mufflers on aeroplanes has been that the ordinary type of muffler causes what is known as back pressure on the engine cylinders and consequently loss of power. It will be readily understood that a muffler, which in addition to being an effective silencer can do away with this back pressure by using the ejector action of air caused by the high speed at which the aeroplane is traveling, will be highly desirable.

Referring to the drawing, 1 is the exhaust pipe of an internal combustion engine or it may be a gun or rifle barrel. To the end of this is secured or fastened in a suitable manner a casing 2. This casing is preferably of a conical form and has projecting through it at different portions, conical shaped tubes. These tubes may be arranged symmetrically

or staggered. Casing 2 has an outlet 4 which is of preferably larger diameter than that of the interior 5 of pipe 1. This is in order that the volume of gases passing through 1 together with the air drawn in through tubes 3 shall have room to freely pass out at the mouth 4 thus eliminating any back pressure whatsoever.

The operation is as follows: Exhaust gases or rifle bullets passing through pipe 5 into the interior of casing 2 and passing out of mouth 4 to the atmosphere induce a certain amount of vacuum on the interior of casing 2. This vacuum acts upon the interior mouths of tubes 3 and causes a certain volume of air to rush in through the exterior mouths of tubes 3, to the interior of casing 2. This body of air rushing in at a plurality of points approximately concentric with the passage-way of the gases, mingles with the exhaust gases thus causing sound waves created by the explosion of the motor or the rifle to be broken up and passed quietly to atmosphere.

In an aeroplane which is moving at high velocity, the volume of air passing through from the exterior to the interior of casing 2 will be very much larger and under comparatively high pressure. It will therefore be seen that the velocity of this air will cause an ejector action on the gases passing through passage 5 and will eliminate back pressure in passage 5 as well as silencing the gases before passing to atmosphere.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The combination with a pipe for exhaust gases, of a casing communicating with said pipe, said casing having at least one face thereof inclined to the longitudinal axis of said pipe and casing, and a plurality of air inlet tubes extending into said casing from the inclined face thereof at an acute angle to said longitudinal axis.

2. The combination as claimed in claim 1, wherein the said casing is of conical form, and said pipe communicates with the smaller end of the casing, the air inlet tubes extending into said casing from all parts of the conical wall thereof.

3. The combination as claimed in claim 1, wherein the said casing is of conical form and said pipe communicates with the smaller end of the casing, the air inlet tubes extending into said casing from all parts of

the conical wall thereof, the wall of the casing remote from said pipe being conical and provided with an aperture which is of at least the same size as the interior diameter of said pipe.

4. The method of exhausting gases, which consists in introducing said gases into a chamber of increasing cross-sectional area, and introducing cool air into said chamber through a plurality of separate and independent passages extending into said chamber from the exterior thereof at an acute angle to the longitudinal axis thereof.

5. The method of exhausting gases, which consists in introducing said gases into a chamber of increasing cross-sectional area, and introducing a plurality of separate and independent streams of cool air into said chamber from the exterior thereof at an acute angle to the longitudinal axis thereof.

6. The method of exhausting gases, which consists in introducing said gases into a chamber of increasing cross-sectional area, and introducing a plurality of circular series of converging streams of cool air into said gases from the exterior of said chamber, the streams of the several series converging toward points spaced from each other along the axis of the chamber in the direction of flow of the gases.

7. The combination as claimed in claim 1, wherein a plurality of circular series of air inlet tubes are provided, the series being located one in advance of another in the direction of flow of the gases, the tubes of each series converging toward a point on the axis of the chamber.

8. The combination as claimed in claim 1, wherein each air inlet tube is of gradually decreasing cross-sectional area in the direction of flow of the air therethrough.

9. Apparatus for exhausting gases, comprising a chamber through which the gases flow, and a plurality of air passages tapering in the direction of movement of the air therethrough and communicating at the portions of least cross-sectional area with said chamber.

10. Apparatus for exhausting gases, comprising a chamber connected to the source of supply of said gases, and a plurality of air passages through which air is forced, said passages communicating with the interior of said chamber, said passages being of greatest cross-sectional area at their inlet ends and being of least cross-sectional area at their points of communication with said chamber.

11. Apparatus for exhausting gases, comprising a circular series of tubes through which air is forced, and a main passage through which said gases are caused to travel, said air passages being in communication with said main passage and being of greatest cross-sectional area at their inlet ends and of least cross-sectional area at their points of communication with said main passage.

12. The method of exhausting gases, which consists in forcing air through a plurality of air passages of gradually decreasing cross-sectional area in the direction of movement of the air, and which are in communication with a main gas passage at their points of least cross-sectional area.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES LAWRENCE STOKES.

Witnesses:

GEO. L. ERTZ,
G. G. QUINN.