

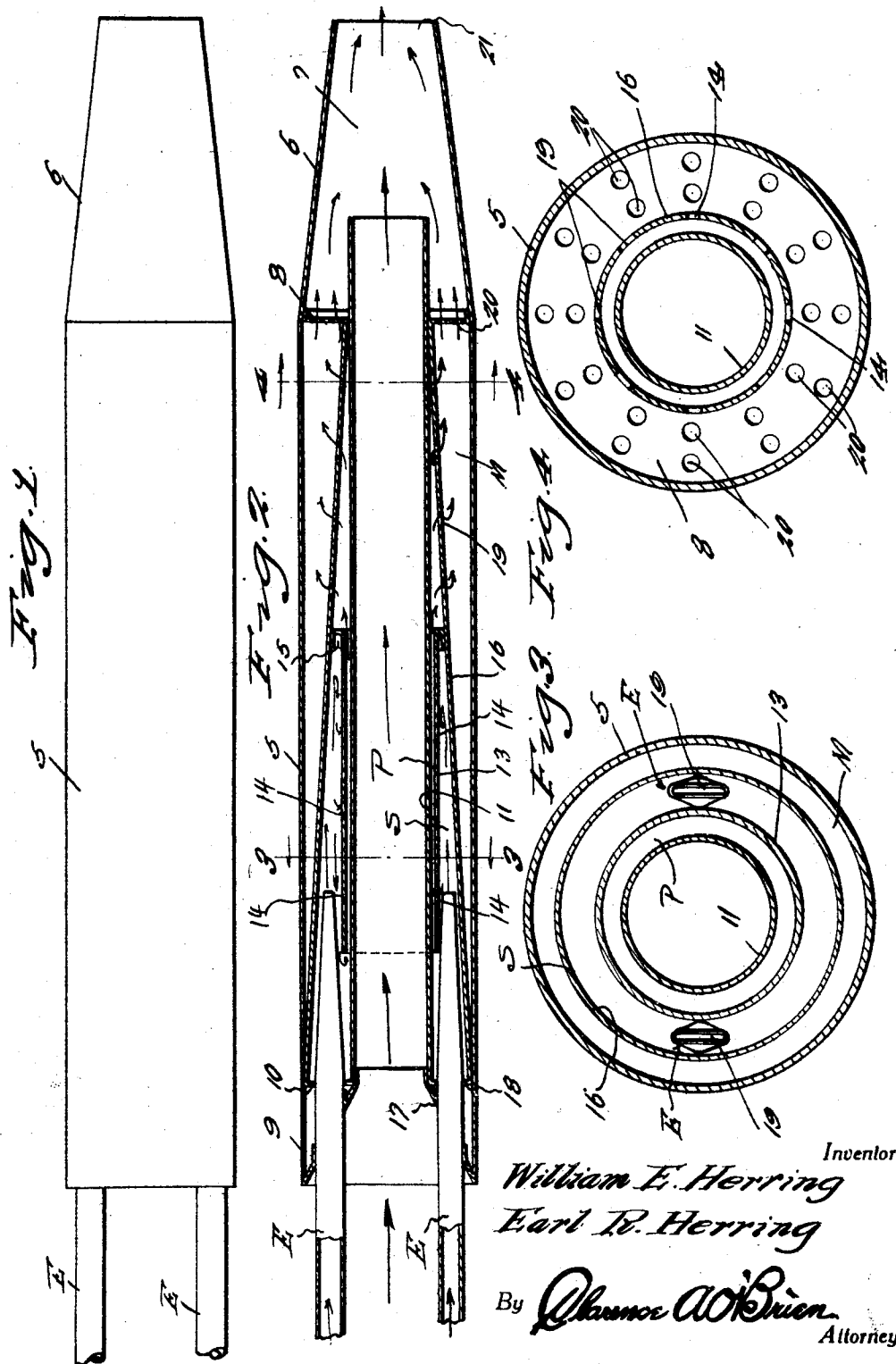
Dec. 29, 1931.

W. E. HERRING ET AL

1,838,550

EXHAUST SILENCER

Filed May 20, 1930



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EXHAUST SILENCER

Application filed May 20, 1930. Serial No. 454,084.

This invention relates to exhaust mufflers or silencers of the kind commonly used in connection with internal combustion engines to reduce or eliminate the noise caused by the engine exhaust.

A primary object of this invention is to provide a silencer or muffler of the character above mentioned especially adapted for internal combustion engines used with aeroplanes and the like, a still further and very important object of the invention being to provide an exhaust muffler especially designed for reducing back pressure and heat caused therefrom, and further to reduce fuel consumption which is increased due to back pressure in an exhaust muffler.

Other objects and advantages of the invention will become apparent during a study of the following description, taken in connection with the accompanying drawings wherein:

Figure 1 is a side elevational view of our improved muffler,

Figure 2 is a longitudinal sectional view therethrough,

Figure 3 is a transverse section taken substantially on the line 3—3 of Figure 2,

Figure 4 is a similar view taken substantially on the line 4—4 of Figure 2.

With reference more in detail to the drawings it will be seen that our improved silencer or muffler comprises an outer shell or casing 5 tapering toward one end as at 6 to provide a vacuum chamber 7. At said one end, inwardly of the chamber 7 there is secured within the casing 5 an end plate or head 8.

Arranged within the other end of the casing 5 is a conical mouth 9 constituting an air intake, and at its apex said conical mouth 9 extends through a central opening arranged in an end plate or head 10. At said apex, said mouth 9 is telescopically received within one end of a cylindrical shell or tube 11 which extends longitudinally through the casing 5 and at its forward end projects through a suitable opening formed in the end or head 8 to terminate inwardly of the vacuum chamber 7.

Circumjacent and intermediate the end portions of the tubular shell 11 is a relatively

short tubular shell 13 which shell 13 is provided on its periphery with a plurality of openings 14. That end of the shell remote from the air intake mouth 9 is provided with an outstanding annular flange so shaped as to provide an internal groove 15. Arranged between the casing 5 and the tube 11 is an elongated conical shell 16, which shell 16 has its largest end integral with the end plate 10, the shell gradually tapering to have its apex integral with the end plate or head 8.

The conical shell 16 forms with the cylindrical shell 13 a substantially conical sound deadening chamber S into which the exhaust gases from the internal combustion engine pass from exhaust pipes E which pipes lead from the internal combustion engine and are passed through suitable openings 17 in the conical mouth 9 and openings 18 in the head or end plate 10.

At their discharge ends, the exhaust pipes E are flattened or fan shaped as at 19, the flattening of the discharge end of said pipes E being such as not to decrease the end area of the pipes.

From the sound deadening chamber S the exhaust gases escape through a passage P formed by the tube 11 and cylinder 13 to pass through apertures or perforations 19 formed in the wall of the conical shell 16 forwardly of the cylinder 13 into the main chamber M. From the main chamber M, the gases pass through perforations 20 in the end plate or head 8 into the vacuum chamber 7 to exhaust from the silencer through the exhaust opening 21 at the smallest end of the chamber 7.

Air or wind passing into the air intake mouth 9 and flowing in the direction of the arrows in Figure 2, through the air tube 11 and vacuum chamber 7 in said vacuum chamber creates a vacuum in the lower part of the vacuum chamber 7 thereby drawing the exhaust gases out of the said sound deadening chamber S, through passage P into main chamber M and finally into the vacuum chamber 7 to exhaust through the opening 21 in the end of the silencer or muffler.

The vacuum created in the chamber 7 has a tendency to pull at all times all exhaust gases

entered in the exhaust pipe E thereby decreasing and eliminating back pressure.

Of course, it is to be understood that the wind or air entering into the air tube 11 through the conical mouth 9 is either by natural or mechanical causes depending on whether the muffler is to be used on internal combustion engines in the air or on the ground or in other words for example on an automobile or on an aeroplane.

From the foregoing then it will be seen that the hottest gases will pass through the silencer between the outer casing 5 and the conical member or shell 16, that is in the main chamber M and consequently the hot gases in said chamber are cooled by the surrounding atmosphere.

The gases in the sound deadening chamber S will also be cooled by the air passing through the air tube 11 so that a muffler embodying the features of the present invention will extract heat from the burned gases from the time the burned gases enter until they exhaust from the muffler, the volume of the burned gases being decreased by the cooling above referred to.

It will be further noted that there are two inlet pipes E for the burned gases from the engine, so that the gases from the cylinders on each side of a vertical line drawn through the center of the engine are collected and carried down through and under the fuselage when the invention is used in conjunction with aeroplanes, in two separate pipes. This position of the muffler is best for decreasing accidents in the event the muffler should work loose from the aeroplane at such time it being obvious that the muffler will drop away from the plane and the only possible resulting damage being the possibility of a bent tail skid.

Thus it will be seen that we have produced a type of muffler that will keep the engine from overheating caused by back pressure and secondly will destroy sound caused by the exhaust of the internal combustion engine. Such result will permit of a reduction in the expense of the sound proof construction on aeroplanes.

Even though we have herein shown and described the preferred embodiment of our invention, it is to be understood that the same is susceptible to changes fully comprehended by the spirit of the invention as herein described and the scope of the appended claims.

Having thus described our invention, what we claim as new is:

1. A muffler comprising an outer casing, end plates arranged in said casing, a tube extending between end plates, a conical shell circumjacent said tube and having its smallest end terminating adjacent one of said end plates, a relatively short cylinder interposed between said tube and said conical shell and

spaced respectively therefrom, and provided at one end with an annular flange bridging the space between said cylinder and conical shell, said cylinder, said conical shell intermediate said flange and said one end plate, and said one end plate respectively being perforate.

2. A muffler for internal combustion engines comprising an outer casing provided with an inlet at one end, and an outlet at its opposite end, spaced end plates mounted in said casing, an open ended tube extending between said end plates, a conical shell disposed about said tube and having its widest end contacting with one end plate, and its smallest end contacting with the other of said end plates, a relatively short cylinder arranged concentrically of the tube and provided with a flange at one end for bridging the space between said cylinder and said conical shell, said cylinder providing with a corresponding portion of said conical shell a sound deadening chamber, said cylinder being apertured, and spaced from said tube to provide therewith a passage affording communication between said sound deadening chamber and the space between said tube and conical shell provided between said flange and said one of said end plates, said conical shell intermediate said flange and said other end plate, and said other end plate, respectively, being perforated whereby the exhaust gases from said sound deadening chamber may pass from said chamber into the space between said conical shell and said outer casing to subsequently pass outwardly of said casing at said outlet of said casing.

In testimony whereof we affix our signatures.

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