March 17, 1936. H. V. SHEBAT 2,034,119

MUFFLER

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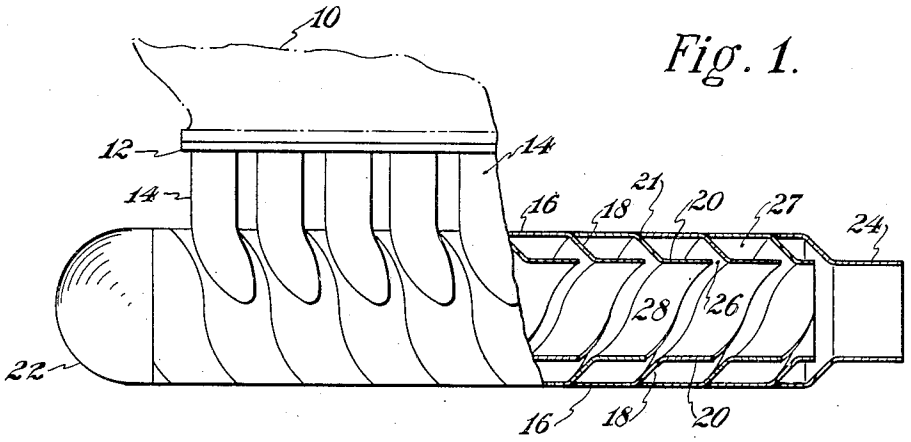


Fig. 1.

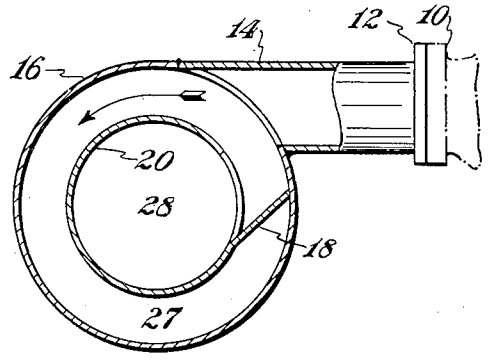


Fig. 2.

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MUFFLER

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6 Claims. (Cl. 137—160)

This invention relates to mufflers for silencing the exhaust of engines and the specific showing of the drawing represents a muffler suited to an in-line aircraft engine.

Objects of the invention are to provide a muffler of large capacity which shall have minimum bulk and weight and which shall serve as a manifold for a plurality of cylinders. Other objects are to provide a muffler which will efficiently silence the exhaust noise without introducing excessive back pressure. Further objects are to provide a construction which is easy to fabricate and one employing a minimum number of separate pieces.

In the drawing:

Fig. 1 is a plan view in partial axial section; and

Fig. 2 is an end view partially in section.

In the drawing the broken lines 10 indicate a portion of the cylinder block to which the muffler is attached by the flange 12 and suitable bolts (not shown). Aligned with the multiple exhaust ports of the cylinder block are the exhaust pipes 14, secured as by welding to the flange 12. These pipes enter the body of the muffler tangentially as shown in Fig. 2.

The body of the muffler is fabricated by coiling in helical form, a strip of metal, which is preformed to approximately Z section, as shown in Fig. 1. The section comprises the outer leg 16, the intermediate portion 18 and the inner leg 20, and when wound to helical form the edges of the outer portion 16 touch each other so that the joint may be welded as at 21, giving a helical seam uniting the outer casing into one cylindrical member. The inner legs 20 are shorter than the outer legs 16 whereby a narrow helical slot 26 communicating from the outer helical passage 27 to the interior 28 of the muffler is provided.

The pitch of the helix is preferably the same as the spacing of the exhaust pipes 14 so that each pipe joins one convolution of the helix. A suitable cap 22 is welded on the front end of the muffler while a connection piece 24 is similarly attached at the rear end to receive the usual tail pipe. A plurality of strips may be used to form a series of helical passages, the pitch of each helix then becoming a multiple of the exhaust pipe center distances.

It will now be seen that all exhaust connections deliver tangentially into the helical passage wherein a continuous high velocity of flow will be established along the outer cooler surface 16 of the muffler. The high velocity gases are held close to the outer wall by centrifugal force, so that they do not flow inwardly through the slot 26 until they have lost velocity and have been cooled to some extent, thus improving the muffling effect. It should likewise be noted that the device of this invention combines the functions of a manifold and muffler.

Experience has shown that a very long and narrow slot is an efficient silencing device, but the required length for engines of the large power used in aircraft gives a device of prohibitive overall dimensions where the old, so-called "bayonet" type of slotted stack is used. It will be seen that, by the spiral construction of this invention, a very great length of slot is provided in a muffler of convenient form for attachment to the engine, and that the spiral conformation lends itself to easy and rapid production and results in a rigid muffler body of virtually one-piece construction.

While I have described my invention in detail in its present preferred embodiment, it will be obvious to those skilled in the art, after understanding my invention, that various changes and modifications may be made therein without departing from the spirit or scope thereof. I aim in the appended claims to cover all such modifications and changes.

What is claimed is:

1. A muffler comprising a plurality of substantially equally spaced exhaust connectors, a helically wound member of pitch equal to said spacing, one said connector registering with each convolution of said member, said member comprising a continuous outer shell and helically slotted inner shell having a helical passage therebetween into which said connectors deliver.

2. A muffler comprising a helically formed strip of Z cross section, the outer flange of said strip forming a continuous outer cylinder, the web of said strip forming a helical baffle, and the inner flange of said strip forming a cylindrical inner duct, said inner flange being narrower than the outer flange whereby a helical slot is formed in the inner duct adjacent the helical baffle formed by the strip web, and an inlet pipe for said muffler entering tangentially into said outer cylinder in each convolution of said strip, whereby gases entering said outer cylinder pass through the helical passage formed by said helical baffle between said inner and outer cylinders, and through said helical slot to said inner cylinders.

3. A combined manifold and muffler comprising a Z-section helically wound strip, the outer strip flange having its edges adjacent through successive convolutions, and the said flange width being substantially equal to the distance between adjacent exhaust ports, said flange thereby

forming a continuous cylinder, the latter having openings in said flange in each strip convolution for communication with respective exhaust ports, the inner flange of said Z-section strip being of less width than said outer flange whereby a helical slot is formed between the successive edges of said inner flange during successive convolutions thereof, the web of said strip forming a helical baffle and a helical passage between successive convolutions of said strip, said helical passage being in communication, through said helical slot, with the cylindrical passage defined by the inner strip flange, by which exhaust gases entering said helical passage from said ports, pass through said helical passage and likewise pass through said helical slot into said inner cylindrical passage.

4. A combined manifold and muffler as claimed in claim 3, further characterized by the formation of said helical slot with a width substantially less than the diameter of any one exhaust port.

5. A combined manifold and muffler as claimed in claim 3, further characterized by the formation of said strip in a helix wherein the diameter of the inner cylinder, former by said inner strip flange, is greater than half the diameter of the outer cylinder formed by said outer strip flange.

6. A combined manifold and muffler as claimed in claim 3, further characterized by the fact that the exhaust ports enter said outer continuous cylinder, at said openings, tangentially to said cylinder.

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