April 20, 1943. A. G. BERGMANN 2,317,246

MUFFLER

Filed June 10, 1941

Fig. 1.

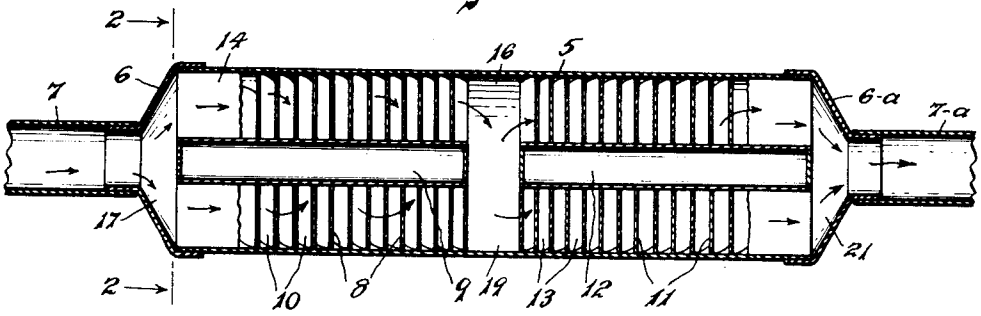


Fig. 2.

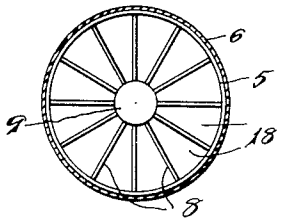
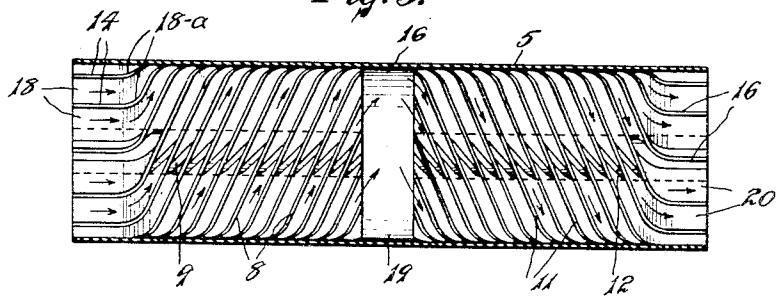


Fig. 3.



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MUFFLER

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8 Claims. (Cl. 181—66)

This invention relates to exhaust mufflers of the type commonly used for muffling the exhaust gases of internal combustion engines.

An object of the invention is to provide such a muffler which is highly efficient and which has a minimum of resistance to the passage of the exhaust gases therethrough and thereby reducing counter-pressure to a minimum as compared with mufflers heretofore produced.

A further object of this invention is to provide a muffler having spiral passages for conducting the exhaust gases through the muffler with a rotary movement and reversing the direction of said movement to diminish the velocity of the gases and thereby practically eliminate detonation as the gases reach the atmosphere.

A still further object of the invention is to provide means in such a muffler whereby the gases are guided smoothly, and without sudden obstruction, into the spiral passages to eliminate abrupt changes in the direction of their travel which would tend to create counter-pressure.

These and further objects of the invention will be more clearly understood from the following description and from the accompanying drawing in which:

Fig. 1 is a side view, in central vertical section, of an exhaust muffler embodying my invention.

Fig. 2 is an end view in vertical section in line 2—2 of Fig. 1.

Fig. 3 is a side view in central vertical section with interior parts thereof being shown in elevation.

As illustrated in the drawing, my improved muffler comprises a casing 5, which may be of tubular construction, having end members 6—6—*a* to which are connected section 7—7—*a* of an exhaust pipe.

This invention contemplates the use of a multiplicity of spiral fins 8 which surround a central core 9 so as to form spiral passages 10 leading in one direction for a portion of the distance through the tubular member 5, and similar fins 11 surrounding a core 12 and forming spiral passages 13 leading in a direction opposite to that of the passages 10.

The leading end of the fins 8 are straight for a suitable distance as indicated at 14, and the rear ends of the fins 11 are similarly straight as indicated at 15.

The said fins 8 and 11, the cores 9 and 12, and the passages 10 and 13 are separated in the central portion of the casing 5, as at 16, for the purpose to be hereinafter described.

In the operation of my improved muffler, the exhaust gases move through the muffler in the direction indicated by the arrows shown in the drawing.

As the gases enter into the chamber 17, between the front end member 6 and the fins 8, they are directed into the passages 10 through the straight passages 18 formed by the straight portions 14 of the fins. The said passages 18 are gradually blended into the passages 10, by the curved portions 18—*a* in the fins, to gently start rotation of the gases into the passages 10 without abruptly interrupting their travel with undue resistance which would cause counter-pressure.

When the said gases reach the end of the passages 10, they enter the mixing chamber 19, which is provided by the spacing 16, and then enter the spiral passages 13 whereby they are revolved in the opposite direction until they reach the straight passages 20 in which the direction of travel of said gases will be straightened out to prevent swirling motion before they enter the chamber 21, wherein they are again mixed, and from which they will pass out of the muffler through the pipe section 7—*a*.

My invention therefore provides a muffler which, in its operation, will, respectively, gently guide the exhaust gases into a spiral path, revolve them in one direction to check their speed, mix them to break up currents, revolve them in an opposite direction to further check their speed, straighten out their passage to prevent swirling, again mix them to eliminate fluttering of the gases as they pass into the atmosphere, and then eject them from the muffler in a silent uniform flow.

I have found that noise and vibration, caused by the gases passing through the muffler, may be eliminated, without the use of baffle plates or similar obstructions, by dividing the interior of the muffler into a multiplicity of passages, of not less than ten in number, so as to separate the gases into relatively fine parallel streams; I have also found that the back pressure, which is commonly caused in mufflers where baffles are used and the gases are thereby violently disrupted in their movement through the muffler, will be practically eliminated by omitting such baffle plates and providing my improved means for smoothly guiding the gas streams into the muffler in a straight direction, then gradually and gently swerving them into a spiral direction and again gently and gradually bringing them

back into a straight direction before leaving the muffler.

It may therefore be seen that my invention provides a novel and highly efficient muffler structure which will operate to exhaust engine gases silently and practically without back pressure. The said operation being rendered possible by the division of the gases into more than ten separate streams and the guiding of said streams smoothly through the muffler, which makes unnecessary the use of baffles.

I claim:

1. A muffler of the character described comprising an elongated tubular casing containing therein a plurality of fins forming spiral passages through said casing; the ends of said fins being straight for a distance to provide straight passages leading into the spiral passages.

2. An exhaust muffler of the character described comprising a casing having a plurality of fins forming passages for exhaust gases therein; said fins each having converging spiral and straight portions.

3. A muffler of the character described comprising a casing having a plurality of fins forming gas conducting fins each therein, said passages having a spirally extending portion and a straight portion leading to and gradually merging with the spiral portion to prevent abrupt changes in the direction of said passages.

4. A muffler of the character described comprising a tubular casing having fins therein providing a plurality of passages for dividing gases passing through said muffler, each of said fins each including a spirally extending portion and a contiguous straight portion.

5. A muffler of the character described comprising a tubular casing having fins therein providing a plurality of parallel passages and each including a straight portion and a spiral portion continuing from the straight portion.

6. A muffler of the character described comprising a tubular elongated casing containing at one end thereof a plurality of fins forming gas conducting passages each of said fins having a spiral portion converging with a straight portion adjacent the end of said casing, and oppositely disposed similar fins at the opposite end of said casing spaced from the first fins to provide a mixing chamber for gases passing through said casing.

7. A muffler of the character described comprising a tubular casing having means therein forming a plurality of passages for dividing gases into at least ten separate streams and guiding said streams through said muffler in spiral directions.

8. An exhaust muffler of the character described comprising a tubular casing containing therein and at one end thereof passage forming means including a core, a multiplicity of fins extending around said core for the entire length thereof, the said fins having a straight portion adjacent the end of said casing and a spiral portion continuing from said straight portion, a similar core at the opposite end of said casing spaced from the first core and having similar fins each with a spiral portion extending in an opposite direction to the spiral portion of the first core; the second fins each having a straight portion adjacent the opposite end of the casing and continuing from the spiral portion thereof.

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