G. W. MOORES.

MUFFLER.

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1,338,520. Patented Apr. 27, 1920.

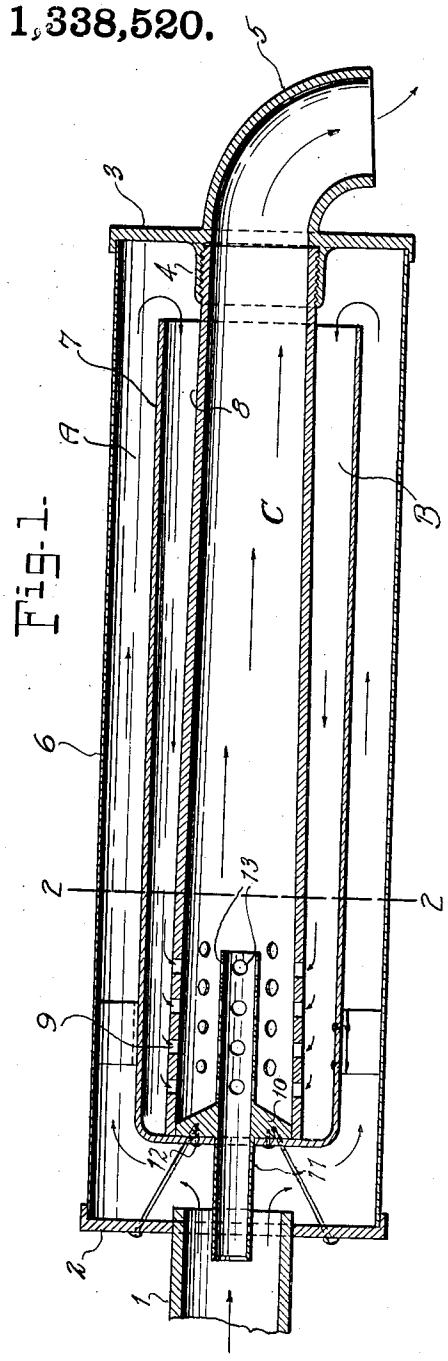


Fig. 1.

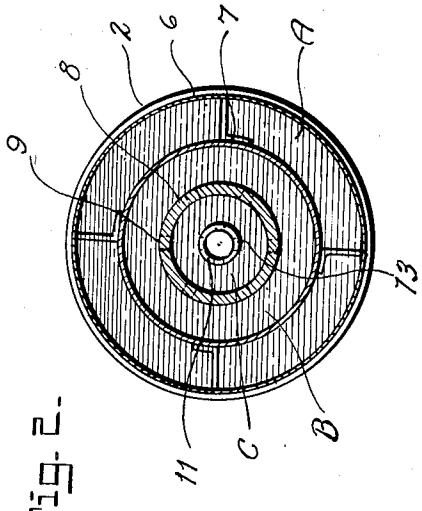


Fig. 2.

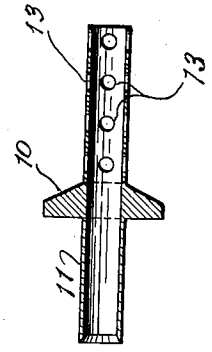


Fig. 3.

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MUFFLER.

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To all whom it may concern:

Be it known that I, GEORGE W. MOORES, a citizen of the United States, residing at Sun City, in the county of Barber and State of Kansas, have invented certain new and useful Improvements in Mufflers, of which the following is a specification.

This invention has to do with improvements in muffling devices for internal combustion engines and has for its primary object to provide means of this type which, by virtue of the construction and arrangement of its elements, will most effectively muffle the exhaust. One of the important features of my invention lies in the arrangement of the interior chambers or passages such that a relatively small portion of the exhaust discharges substantially direct into the exit passage and tends to produce a vacuum in an intermediate passage or chamber thereby inducing the main stream of exhaust gases to move from the larger outer expansion chamber into the intermediate chamber, through which it passes to the exit passage in expanded condition and issues without noise from the muffler.

For a full understanding of the invention reference is to be had to the following description and accompanying drawing, in which:

Figure 1 is a longitudinal sectional view of the device constructed in accordance with my invention.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1; and

Fig. 3 is a detail sectional view of the connector passage or throat used in this device.

Throughout the following detail description and on the several figures of the drawings, similar parts are referred to by like reference characters.

Referring to the drawing, 1 indicates the extremity of the exhaust pipe from the engine upon which is fixed the muffler head 2. The opposite end of the muffler comprises an integral casting 3 having a short, internally threaded neck 4 projecting inwardly of the body, and preferably a downwardly curving outlet or tailpiece 5. Between the two heads is secured the shell of the muffler, denoted 6, of suitable size and length to afford ample capacity for expansion of the exhaust gases of the particular engine. Arranged within this shell is a substantially smaller shell 7 which is closed at its forward end and open at the other to connect with the outer chamber. Within this second shell is the innermost conduit or core 8 of substantially smaller size than the shell 7. This tubular core is preferably smaller at one end and at the smaller end is threaded so as to be screwed into the neck 4 of the muffler head 3. At the larger end the core is formed with a plurality of holes 9 and snugly fits upon the central collar 10 of what I term for the purposes of this description the connector piece or throat 11 to which the intermediate shell 7 is attached, as by means of the screws 12, thus forming a closure and support for the inner end of said core and intermediate shell. The throat passage is of a relatively small diameter, for instance about one-third of that of the exhaust pipe 1, into which one end thereof extends, while its opposite end extends part way into the core as indicated at 13. This construction and arrangement thus provides, in addition to the outer chamber A, an intermediate vacuum chamber B, so called, and a central exit passage C leading to the outlet 5. Bolts 1^a support the shells against longitudinal movement and flanges 1^b against lateral.

A description of the movement of the gases will make clear the muffling action of this device. These gases when they reach the end of the exhaust pipe 1 are divided, a relative small portion passing into the throat 11 direct, while the main portion passes around the entrance of the throat into the outer expansion chamber A. Owing to the force with which the gases pass through the throat they produce a heavy suction at the inner end of the core C tending to produce a vacuum in the intermediate passage B through the openings 9 which induces the main stream of the gases to move the full length of the chamber A into the intermediate chamber B through the open end thereof, from which chamber they pass by the openings 9 into the core and out of the outlet substantially completely muffled or expanded. Owing to the proximity of the openings 9 and 13 an intermingling of the two streams of gases occurs, the said gases being broken up into little streams by reason of the provision of the series of openings, one counteracting another and tending to retard the speed of flow sufficiently to give ample time for the necessary expansion of the gases to take place. As

a further retarding means, especially as affecting the issue of the direct gases through the throat, the core 8 tapers toward the outlet as herein above mentioned. The result of this arrangement, as has also been above premised, is a most effective muffling of the sound of the exhaust of the engine.

Having thus described my invention, what I claim as new is:—

1. A muffler for internal combustion engines comprising an outer shell having an inlet at one end for exhaust gases and an inner shell having an outlet to atmosphere at the opposite end of said outer shell, said inner shell being provided with an opening at its opposite end and a tubular passage extending into the mouth of the exhaust inlet to shunt a portion of the exhaust gases directly into the inner shell past the opening therein aforesaid whereby the major portion of the gases will be caused to travel the complete length of the outer shell in one direction and substantially back to the inlet end in the opposite direction before entering the inner shell for final exhaustion from the muffler.

2. A muffler for internal combustion engines comprising an outer shell, an intermediate shell and a central shell providing outer, intermediate and inner chambers, the outer chamber having an inlet opening at one end for the exhaust gases, the intermediate chamber being closed at the inlet end and open to the outer chamber at the opposite end, the innermost chamber being closed to the outer chamber at the outlet end but open to the intermediate chamber adjacent to the inlet end, and a short tubular passage extending from the inlet into the innermost chamber, whereby the exhaust gases will be caused to travel the full length of the muffler in the outermost chamber in one direction and back to the inlet end of the intermediate chamber under the ejection action of the gases shunted through the tubular passage into the innermost chamber.

3. A muffler for internal combustion engines comprising an outer shell having an inlet for the exhaust gases at one end, an intermediate shell therein and an inner exhaust passage within the intermediate shell, the latter passage having an outlet at the opposite end of the muffler from the inlet aforesaid and communicating with the innermost shell at the inlet end through lateral openings, the intermediate shell being open to the outermost chamber at the outlet end only, and a short tubular passage arranged at the mouth of the inlet to receive a portion of the gases therefrom and extending into the innermost exhaust passage, said short tubular passage having lateral openings whereby said exhaust gases passing therethrough will meet with the gases entering through the openings of the innermost passage aforesaid in opposing directions.

4. A muffler comprising an outer shell chamber closed at the outlet end of the muffler, an intermediate inner shell chamber closed at the entrance end of the shell but open at its other end to outer shell chamber, a central shell chamber open to the intermediate shell chamber at said exhaust end and leading to atmosphere at its other, and a short tubular passage projecting into the engine exhaust at one end but of relatively smaller diameter to receive only a small portion of the exhaust gases, and projecting at its other end into the central shell.

5. A muffler for gas engines, comprising spaced heads, one of which connects with the engine exhaust, an outer shell between the heads, an inner shell dividing the muffler into outer and inner chambers, the inner chamber being open to the outer at the end opposite the exhaust entrance, an outlet passage within the inner shell having openings into the latter at the end near the exhaust entrance and connected with the other of said muffler heads, and a short and relatively small tube connecting the inner shell and outlet passage together, the entrance of said tube extending into the exhaust pipe of the engine and the outlet extending into the outlet passage, the outlet end having opening associated with the openings in the outlet passage to produce a breaking up of the exhaust gases into intermingling or counteracting streams.

In testimony whereof I affix my signature.

GEORGE W. MOORES.