E. SCHMITT.

MUFFLER.

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1,157,256. Patented Oct. 19, 1915

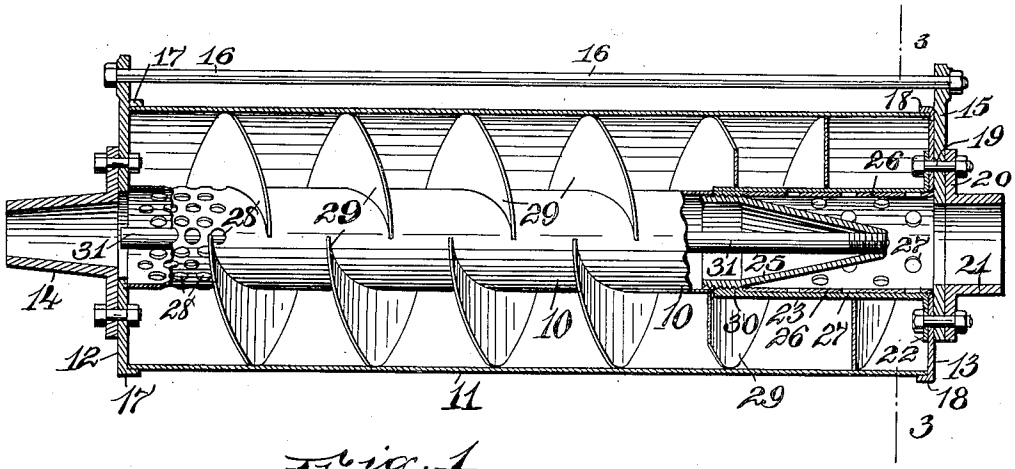


Fig. 1

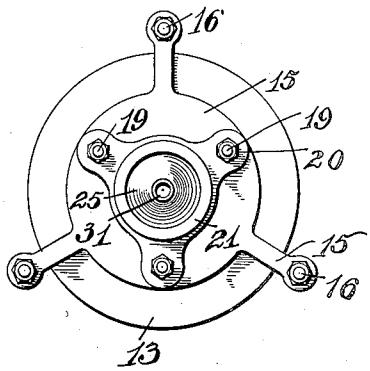


Fig. 2

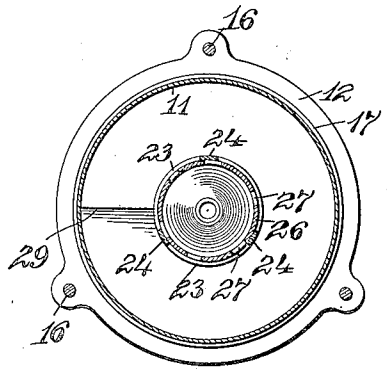


Fig. 3

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MUFFLER.

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To all whom it may concern:

Be it known that I, EDMUND SCHMITT, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Combined Mufflers and Heaters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to an improved muffler which is designed to receive the discharge gases from internal combustion engines and the like, and discharge them noiselessly, the muffler comprising a casing having an inlet and an outlet, the casing having plates arranged between the inlet and outlet to form passages that are circuitous, the passage formed by the plates not being one continuous passage, but is broken by reason of the plates not being arranged end to end.

The invention also provides a muffler of this type having an inner and outer tube, the tubes being closed at their ends except for the inlet and outlet passages for gas and having circuitous passages formed between the tubes so as to provide clearly defined passages for the circuitous travel of the gases.

The muffler also provides a sleeve adapted to be placed in the open end of the inner tube adjacent to the inlet, the sleeve being perforated, and a sleeve that is placed in the tube is provided with proper sized holes according to the engine on which the muffler is being used, so that by changing the sleeve for one with different sized holes, or removing the sleeve altogether, the same muffler can be adapted for different quantities of gas.

The invention is further designed to provide a muffler of this type having a pipe projecting through the casing toward its discharge, this pipe allowing enough gas to pass through to act as an ejector at the discharge end of the muffler, and in this way the passage of the gas through the circuitous passage of the muffler is facilitated.

The invention is further designed to provide a muffler having a baffle-plate which is preferably cone-shaped, the baffle-plate being arranged near the entrance end of the inner tube to cause a deflection from the gases passing into the muffler and directing them through a series of perforations at the entrance end of the inner tube whereby the gases are led to the circuitous passages, the inner tube at its outlet end being perforated so that the gases are well distributed and have sufficient channel or passage so as to not give any undue back pressure, as will be evident.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a sectional view of the muffler, a part of the inner tube and the helical plates being shown in elevation. Fig. 2 is an end view of Fig. 1. Fig. 3 is a section on line 3, 3, in Fig. 1.

The muffler, which is the subject-matter of this application, may be constructed in a number of ways to provide for the travel of the gases through the muffler in a circuitous manner, and different structures can be made to bring such a result about, but I show in the drawings one embodiment of my invention in which the whirling or circuitous circumferential movement of the gases is caused by a set of plates which are arranged to progress the gases toward the outlet end of the muffler, but in a manner to break up the volume of gas as it passes thus through the muffler, this being preferably brought about by arranging helical or similarly curved plates so that they do not abut and form continuous channels which, however, are irregular, and the gases are divided in their passage, and thus this division and sub-division, in passing through the muffler, is calculated to eliminate the noise of the discharge.

The muffler shown in the drawings as embodying one type of the device comprises an inner tube 10 and an outer tube 11, these tubes being held in place by end-plates 12 and 13, the end-plate 12 having a discharge nozzle 14 secured to it, the end-plate 13 having a spider 15 on its front face, the spider 15 and the end-plate 12 being connected by suitable tie-rods 16, the tie-rods drawing these end-pieces together, the end-plates 12 and 13 having flanges 17 and 18, respectively, which overlap the outside edge of the outer tube. Bolts 19 pass through the flanges 20 of the inlet nozzle 21 and on the inner side embrace the flange 22 of a thimble 23 which is open for the most part, being cut

away except for the strips 24 as shown clearly in Fig. 3. In the end of the thimble is screwed a baffle-plate 25, preferably made in the shape of a cone which receives the exhaust gases coming in through the inlet nozzle 21 and directs them out through the sides of the thimble.

If it is found that more retarding of the gas is desired, a removable sleeve 26 having perforations 27 is slid within the thimble between the cone and the end-plate, this thimble being adapted to be replaced by another of different sized openings when desired, according to the amount of gas and the force with which it is expelled into the muffler. The outlet end of the inner tube 10 is provided with perforations 28. Between the inner and outer tubes are arranged the helical plates 29, these plates being arranged to form a helical or circuitous passage around the inner tube, the plates being arranged as shown in Fig. 1, that is, they are placed so that their ends do not abut, whereby a divided or broken passage is provided which I have found causes a better dispersion of the gas and a better silencing of the discharge. The inner tube 10 rests on the back edge of the screw-threaded collar of the cone 25, this collar being screwed into the end 30 of the thimble, as will be seen from Fig. 1. A pipe 31 is fitted in the cone and extends back through the inner tube toward the discharge opening. The pipe with its outlet near the discharge end of the inner tube receives enough of the gas direct to form a suction at the outlet end of the discharge, which facilitates the passage of the exhaust gases through the muffler, but does not interfere with the silencing function of the motor in the least.

It will be understood that in this specification and in the drawing the plates have been referred to as helical, but they, of course, need not be substantially helical, but can be provided in different forms, the main object being, however, to so arrange the plate or plates that the gases do not pass through an unbroken channel but are split and sub-divided in their rotary movement in the muffler.

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

1. A muffler consisting of an inner tube, an outer tube, end-plates, the end-plates having inlet and outlet openings, and a series of helical plates between the inner and outer tubes, the plates being disposed around the inner tube so that their ends form an opening between them whereby they form a continuous irregular channel.

2. A muffler consisting of an inner tube, an outer tube, the inner tube having openings near its ends, end-plates having inlet and outlet openings to the inner tube, helical plates surrounding the inner tube and arranged so that their ends are spaced apart, and a deflecting plate at the inlet end of the inner tube.

3. A muffler consisting of an inner tube, an outer tube, the inner tube having openings near its ends, end-plates having inlet and outlet openings to the inner tube, helical plates surrounding the inner tube and arranged so that their ends are spaced apart, a deflecting plate near the inlet end of the inner tube, and an open-ended pipe passing from the plate into the inner tube.

4. A muffler consisting of an inner tube, an outer tube, the inner tube having openings near its ends, end-plates having inlet and outlet openings to the inner tube, helical plates surrounding the inner tube and arranged so that their ends are spaced apart, a cone placed within the inner tube beyond the openings at its inlet end, and a pipe extending along the inside of the inner tube to approximately the outlet end thereof.

5. A muffler consisting of an inner tube, an outer tube, end-plates, each end-plate having an opening communicating with the inner tube, the inlet end of the inner tube being cut away to form large openings, a baffle-plate in the inner tube adjacent to its cut away end, plates arranged between the inner and the outer tubes to form a circuitous passage, the outlet end of the inner tube being perforated, and a removable sleeve having perforations therein adapted to fit within the inner tube between the baffle-plate and the inlet end of the inner tube.

6. A muffler consisting of an inner tube, an outer tube, end-plates, each end-plate having an opening communicating with the inner tube, the inlet end of the inner tube being cut away to form large openings, a baffle-plate in the inner tube adjacent to its cut away end, plates arranged between the inner and the outer tubes to form a circuitous passage, the outlet end of the inner tube being perforated, a removable sleeve having perforations therein adapted to fit within the inner tube between the baffle-plate and the inlet end of the inner tube, and a pipe extending from the baffle-plate through the inner tube toward the outlet end thereof.

7. A muffler consisting of an inner tube, an outer tube, end-plates having openings in communication with the space between the outer and the inner tubes, and a series of helical plates arranged around the inner tube, the plates being arranged so that their ends form spaces between them whereby they form a broken, circuitous passage.

8. A muffler consisting of a chamber constructed with an inlet and an outlet and with an internal structure to cause a circuitous passage of gases through it, and a pipe of small diameter to conduct a small proportion of the gases direct from the inlet to the outlet.

9. A muffler comprising an inner tube, an outer tube, the inner tubes being perforated at its inlet end, and having plates on its outside to conduct gases by a circuitous route, a cone at the inlet end of the inner tube, and a pipe of comparatively small diameter extending from the cone to the outlet of the muffler.

10. A muffler comprising a casing, the casing having inlet and outlet openings in its opposite ends, the casing having plates between its ends, the plates being disposed to provide an approximately helical and continuous irregular channel for the passage of gases through the muffler.

11. A muffler comprising a casing having its ends provided with openings, and plates forming a channel extending from one opening to the other, the plates being disposed so that the channel formed by them is annular and substantially helical and is continuous but irregular so that gases passing through the channel are successively subdivided.

12. A muffler comprising a casing consisting of an outer tube, an inner tube, the ends of the casing having openings therein, the space between the inner tube and outer tube being in communication with said openings, and substantially helical plates between said tubes and so arranged as to form a non-continuous irregular channel.

13. A muffler comprising a casing consisting of an outer tube, an inner tube, the ends of the casing having openings therein, the space between the inner tube and outer tube being in communication with said openings, and substantially helical plates between said tubes and arranged so that their ends are spaced apart to form a continuous irregular channel.

In testimony, that I claim the foregoing, I have hereunto set my hand this 10th day of June 1912.

EDMUND SCHMITT.

Witnesses:
JOHN WILSON,
E. D. HAYES.