Jan. 2, 1940. Z. WILMAN 2,185,489

MUFFLER

Filed July 18, 1935

Fig. 1.

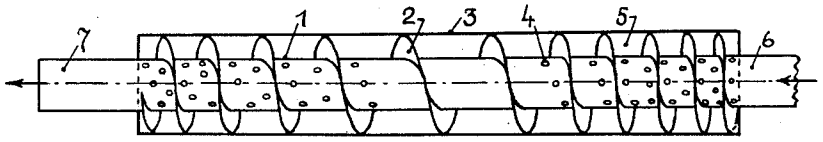


Fig. 2.

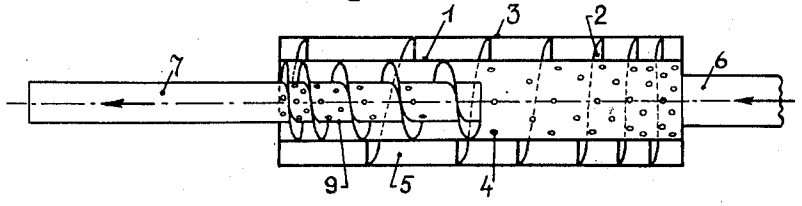
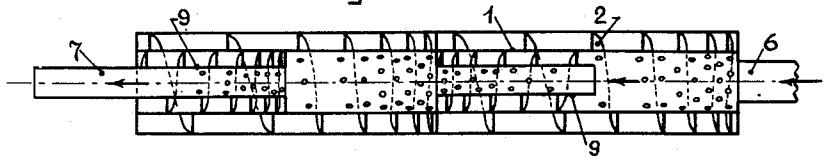


Fig. 3.



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MUFFLER

Zygmunt Wilman, Courbevoie, Seine, France

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1 Claim. (Cl. 181—48)

The present invention has for its object an improved system of mufflers for internal combustion engines or the like.

The muffler according to the invention is based upon the principle of the damping of the sound waves which are produced by the noise of the explosion of the engines and are propagated in the exhaust pipe of such engines, and for this purpose, it comprises a single chamber of special construction, or in the case of more improved apparatus, a small number of such chambers, each of which serves for the damping of a certain number of sound waves.

The present muffler avoids all obstruction of the exhaust of the gas, due to the fact that it comprises an open conduit employed for the circulation of this gas. The damping chambers surround the said conduit, and they communicate with the latter through orifices whose disposition corresponds to the acoustic characteristics of the sound waves propagated in the exhaust conduit, and whose object is to provide for the transmission of the sound waves into the corresponding chambers of resonance and of damping.

The muffler according to the invention may be constructed by mounting helical chambers of varying section around the exhaust conduit. Each of these chambers consists of a helix of varying pitch which is wound upon the exhaust conduit and with which the said chambers are placed in acoustic communication.

A single damping chamber can be constructed by the use of a sheet metal piece which is wound in spiral form around the exhaust conduit. Due to its appropriate form, the said conduit divides the spiral chamber of this construction into a certain number of spaces which communicate with the exhaust conduit through orifices so arranged as to transmit, to the said chambers, the sound waves which are to be dampened.

The damping chamber may have any suitable form, but it is so arranged that each point will possess different acoustic properties, and the damping chamber, as a whole, has a range of acoustic properties which is extensive and continuous, corresponding to the different wave lengths.

In order to attenuate the principal wave due to the operating of the engine, the invention provides for the use of acoustic interference, by the utilization of exhaust tubes whose length is adjustable at will, according to the speed of the engine.

The accompanying drawing shows various embodiments of the invention.

Fig. 1 shows a muffler comprising helical chambers surrounding the exhaust conduit.

Figs. 2 and 3 show a modification of the arrangement of the helical chambers of Fig. 1.

As shown in Fig. 1, the muffler of the simplest construction comprises an exhaust conduit 1, upon which is wound a helix 2. The whole device is inclosed in a casing 3. The exhaust gas circulates in the direction of the arrows. It is observed that the helix 2 has a variable pitch, and that it thus forms a continuous series of helical chambers of variable capacity. Orifices 4 in the conduit 1 connect this latter with helical chambers 5. The length of the muffler, as well as the length of the intake tubes 6 and the offtake tubes 7 for the gas, and also the arrangement of the orifices 4 and their dimensions, are chosen in such way as to correspond to the acoustic characteristics of the sound waves propagated in the conduit 1. The orifices 4, especially, must be located at the nodal points of two successive uneven harmonics. As will be noted, the number of such orifices increases when proceeding to the ends of the muffler, and the pitch of the helix decreases.

In order to damp the principal wave, the pipes 6 and 7 may have an adjustable length in order to obtain an optimum of silence for a given engine speed, which is the general operating speed.

As shown in Fig. 2, a modified form of the muffler disclosed in Fig. 1 has another perforated tube 9 which is also surrounded by a helix of variable pitch. This device may be considered as a complete muffler, in the case in which the partial damping of the noise is considered as sufficient. However if it is desired to obtain a complete damping of the noise, it will be necessary to mount a certain number of like devices in series.

The muffler shown in Fig. 3 relates to one of the combinations of the two devices shown in Fig. 2. The inner tubes 9 correspond to the harmonics of high frequency, and the sections of the tube 1, to the harmonics of low frequency.

I claim:

Improvement in mufflers for motors comprising an open end exhaust tube capable of being connected to the exhaust of said motor, a helix of graduated pitch wound around said exhaust tube, said exhaust tube having orifices formed therein, a second tube having said exhaust tube and helix mounted therein forming a continuous helical chamber of graduated capacity between said first and second tubes for dampening the harmonics of high frequency, orifices formed in said second tube, a helix of graduated pitch wound around said second tube and a resonant casing having said second tube and helix mounted therein forming a continuous helical chamber of graduated capacity between said second tube and said casing for dampening the harmonics of low frequency and also having said first tube passing therethrough.

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