Nov. 18, 1952 G. H. HEDRICK 2,618,353

MUFFLER WITH SIDE BRANCH CHAMBERS

Filed June 14, 1948

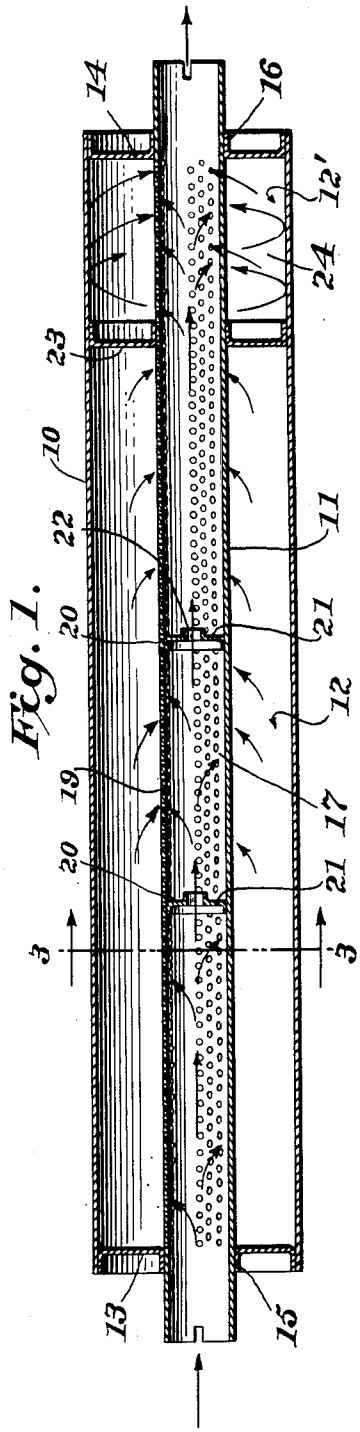


Fig. 1.

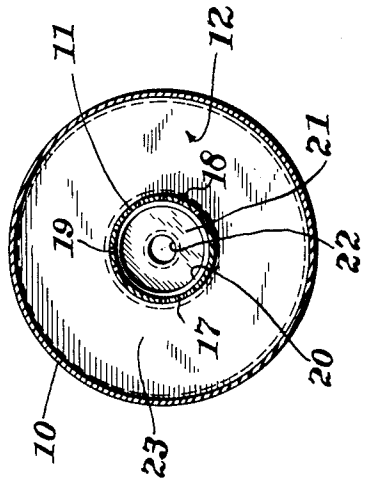


Fig. 3.

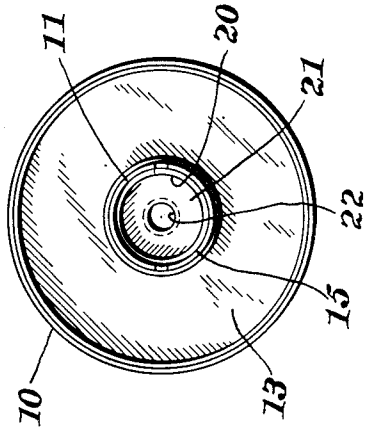


Fig. 2.

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Patented Nov. 18, 1952

2,618,353

UNITED STATES PATENT OFFICE

2,618,353

MUFFLER WITH SIDE BRANCH CHAMBERS

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Application June 14, 1948, Serial No. 32,956

1 Claim. (Cl. 181—48)

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My invention relates to mufflers for use in silencing exhaust noises created by expanding and noise producing pulsating gases such as are discharged from internal combustion engines.

The primary object of the invention is to silence sounds communicated to or generated within the muffler as well as sounds produced by emergence of the gas pulses into the atmosphere.

Another object of the invention is to provide a muffler which will suppress the pressure peaks and even the flow of the gas pulses to a point where a sound is not created.

Referring to the drawing:

Figure 1 is a longitudinal sectional view showing my improved muffler;

Figure 2 is an enlarged end view, and

Figure 3 is an enlarged section on the line 3—3 of Figure 1.

The improved muffler comprises a casing 10 in which is supported the perforate tube 11. The tube is of substantially less diameter than the casing so as to provide a concentric space or passageway 12 between the tube and the casing. The casing is provided with an end wall 13 on the inlet side and an end wall 14 on the outlet side. In the construction shown, the end walls are provided with flanged inlet and outlet openings 15 and 16, respectively, carrying the tube 11. As will be appreciated, any other structure of inlet or outlet means may be provided, the construction illustrated being preferred.

The tube 11 is perforated throughout its length, as shown, and these perforations are arranged in longitudinally spaced series, as indicated at 17, 18 and 19, the perforations of each series opening toward a diametrically opposite unperforated portion of the tube. While I have shown three spaced series 17, 18 and 19, which is preferred, the number of series of perforations may be increased or reduced, dependent upon the size and particular use of the muffler.

Disposed within the tube 11 are a plurality of spaced restricted openings 20 defined by spaced partitions 21 having central openings 22. The purpose of these restricted openings is to divert a portion of the gas stream into the surrounding space 12 which, it will be noted, is unobstructed from the end wall 13 to the partition 23, while allowing another portion of the gas stream to flow continually through the tube. The space 12 on the inlet side of the muffler with respect to the partition 23 is of considerable length, and as indicated by the arrows, the portion of the gas diverted to such space will pass along the same and return to the tube 11 through

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the perforations 17—18—19, as indicated by the arrows. The greater portion of such diverted gas will return from the passageway 12 to the tube 11 in the area of the latter between the partition 23 and the nearest partition 21.

The partition 23 with the end wall 14 defines a tuning chamber 24 at the outlet side of the muffler enclosing a relatively short portion of the perforate tube. It has been found by dissipating the energy and relieving the gas pressure in the relatively elongated portion of the tube and the space 12 on the inlet side of the muffler, that a relatively small tuning chamber will suffice to act as a resonator and tune out certain specific undesirable frequencies. The partitions 23 and 14 which define the tuning chamber 24 are not perforated, and therefore, the gas which enters the concentric space 12' of said chamber through the perforations 17—18—19 reenters the tube through the same perforations.

The openings 22 in the partitions 21 have a diameter which is considerably less than two-thirds of the diameter of the tube 11, e. g., the tube is about 1¾ inches in diameter and the openings are about ⅝ inch in diameter.

The simple construction described produces a uniformly satisfactory silencing effect in that the energy and pressure of the greater portion of the gas pulses are reduced on the inlet side in advance of the tuning chamber and enter the area of the tube defined by the chamber 24 as a smooth flowing stream at the outlet side of the muffler. The tuning chamber or resonator 24, therefore, can be made relatively short to take care of specific frequencies which were not eliminated during the relatively longer previous travel of the gases through the tube 11 and the surrounding unobstructed passageway 12 in the casing. The silencing result is considerably helped by the provision of the longitudinally extending, circumferentially spaced series of perforations 17—18—19 in that each series faces a diametrically unperforated portion of the tube, and, therefore, the pressure of the gas stream as well as its energy is considerably reduced in the tube itself by striking the imperforate opposite sections of the tube wall and by the reflection back of the gas.

It is to be observed that the construction described provides for suppressing sounds which may be generated within the muffler itself as well as noises created by the introduction of the gas stream to the atmosphere.

I claim:

A muffler comprising a casing, a perforate

tube within the casing for the passage of exhaust gases through the muffler, the perforations of said tube consisting of longitudinally extending, circumferentially spaced series, each series facing a diametrically opposite imperforated portion of the tube, and an elongated passageway about the tube, said passageway being unrestricted, a plurality of spaced restrictors disposed in a portion of said tube within said elongated passageway for diverting a portion of the gases into said passageway through said perforations, said restrictors having openings the diameter of which are less than two-thirds of the diameter of said tube, a closed chamber in the casing, of less length than said passageway and at one end of the casing, said chamber enclosing a portion of the tube, the perforate portion of the tube outside of said

chamber and within said casing being of greater length in the longitudinal direction than said chamber, said chamber being located on the outlet side of the muffler.

GALE H. HEDRICK.

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