

March 18, 1958

G. WOODBURY

2,827,124

DUAL PASSAGE MUFFLER

Filed Nov. 4, 1953

Fig. 1

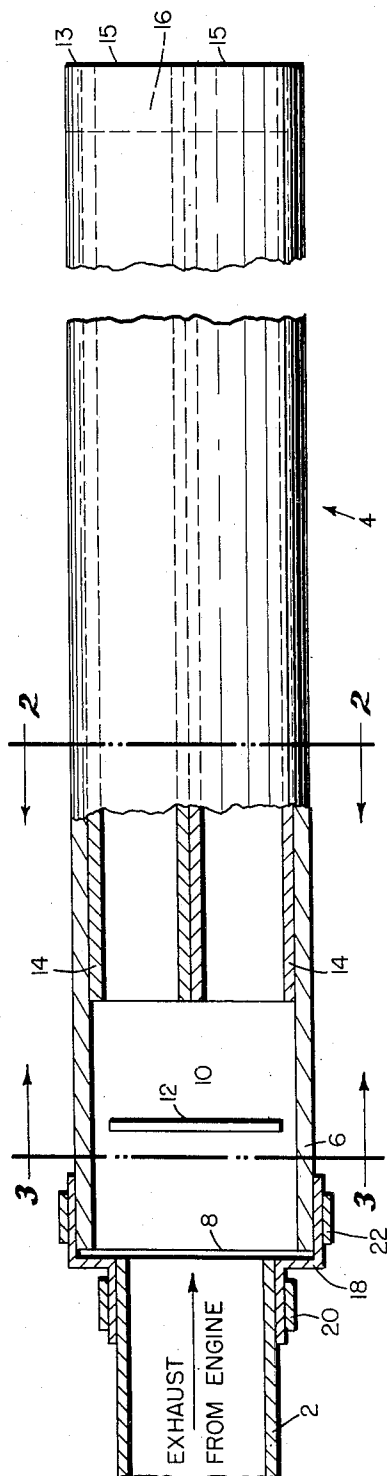
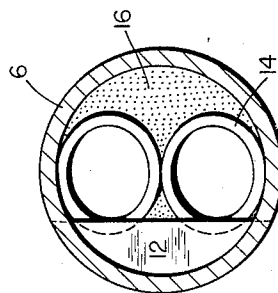


Fig. 3

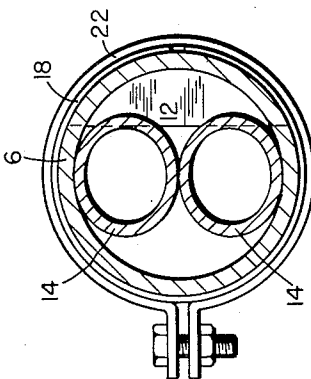


Fig. 2

George Woodbury
Inventor
by William W. Rymer, Jr.
Attorney

1

2,827,124

DUAL PASSAGE MUFFLER

George Woodbury, Bedford, N. H.

Application November 4, 1953, Serial No. 390,202

5 Claims. (Cl. 181—46)

This application relates to a method for muffling noises produced as for example by the exhausts of engines, and to novel mufflers for practicing the same. More particularly, it provides a method and mufflers which effectively muffle such exhausts simply, inexpensively, and with substantially no interference with free flow of exhaust gases to the atmosphere.

In mufflers heretofore known and used, reliance has been placed on passing such exhaust gases through a tortuous arrangement of chambers and passages, or through a chamber filled with some loosely packed sound deadening material such as glass wool. Such mufflers have been characterized by frictional resistance to the passage of gases therethrough with resulting back pressures and decrease of engine efficiency.

I have discovered that surprisingly good muffling may be obtained by giving to separate streams of free-flowing exhaust gases different sound wave characteristics such that, when said streams are discharged at adjacent outlets, substantial sound wave cancellation thereupon results, giving a surprisingly quiet exhaust. I have found that particularly good muffling occurs if exhaust gases are discharged through a muffler comprising a chamber having emerging therefrom, for passage of gases to the atmosphere, two conduits with their discharge ends next to each other and having cross-sectional areas large relative to the cross-sectional area of the chamber.

One advantage of my new method and muffler is that it offers very little friction to the exhaust gases passing through it, and thus greatly cuts down engine back pressure, and correspondingly increases engine efficiency.

A further advantage of the muffler of my invention is its simplicity and durability of construction. It may be inexpensively constructed of materials having a longer life than the average car.

As an additional feature of my new muffler there preferably is a small baffle extending from one side of the above-referred to chamber a short distance interiorly thereof. An advantage of said baffle is that during initial starting and warm-up of the engine improved muffling effects are produced thereby.

Other advantages and features of my invention will be apparent from the following description of a preferred embodiment thereof, shown in the attached drawings, in which:

Fig. 1 shows a side elevation, partially in section; Fig. 2 is a sectional view on lines 2—2 of Fig. 1; and Fig. 3 is a section view on lines 3—3 of Fig. 1.

Referring now to the drawings, there is shown in Fig. 1 an engine exhaust pipe 2 (broken away). Connected to the exhaust end thereof is a preferred embodiment of my new muffler, indicated generally at 4.

I show and describe an embodiment which has operated with complete satisfaction as the muffler for a small automobile of the character popularly referred to as a "Jeep." There is provided a fourteen inch length of 1½" iron pipe 6. Extending two inches from the inlet 8 of said pipe 6 is a chamber 10, into which a baffle 12 extends from the

2

inner wall of said pipe a short distance interiorly thereof. Said baffle may suitably be a piece of sheet metal inserted in a force fit through a slit provided therefor in the wall of the pipe 6.

Extending from said chamber 10 to the outlet end 13 of the pipe 6 are two tubes 14 in side-by-side relation. In the embodiment shown, said tubes are ¾" copper tubing, flattened somewhat to permit forced introduction in the pipe 6. Said tubes thus have the same cross-sectional area, said area being substantial with respect to the cross-sectional area of the chamber 10. Said tubes are 12 inches in length, and in the embodiment shown are secured further in the pipe 6 by means of retort cement 16, which also forms in effect a washer that serves to seal the annular space between pipe 6 and tubes 14 against passage of gas therethrough. The outlet, or discharge, ends 15 of said tubes terminate adjacent to each other and adjacent to the outlet end 13 of the pipe 6.

The exhaust pipe 2 may of course be connected to the muffler 4 by any suitable means, as by a split, offset ring 18 secured to exhaust pipe 2 and muffler 4 by clamp rings 20 and 22 respectively.

In operation, exhaust gases, as from an engine, enter chamber 10, through exhaust pipe 2. Said gases then pass through tubes 14 to the atmosphere, exhaust noise being most satisfactorily muffled. A free and unobstructed path is thus provided for flow of the gas, so that back pressures with consequent lowered engine efficiency are practically eliminated. The baffle 12, I have discovered, makes for still more effective muffling, particularly during engine starting and warming up. The baffle, while preferred, is not essential and may be omitted.

In my new method and muffler, sound waves coming from one pipe interact with sound waves coming from another so that the fundamental tones are almost completely canceled out and neutralized. I have observed that if the outlet of either of the adjacent tubes 14 is experimentally sealed off, the gases emerge from the single tube left open with sounds like a firing shotgun. When both tubes are free, however, as in actual operation, there is simply a low bubbling sound at lower engine speeds, and a buzz at higher engine speeds. When two tubes or conduits of the same length and cross-sectional area are used, said area being large relative to the cross-sectional area of the chamber 4, it may be that oscillation of the gases in the chamber is what causes the tubes to sound in opposite phases, thus resulting in cancellation between the sound waves emerging from the conduits adjacent each other.

I have found that with two tubes of diameter large with respect to the diameter of the chamber, such for example that said chamber is not large enough to accommodate a third tube of the same size, a much better result is achieved than by using more than two tubes of smaller diameter. I have also found it preferable, though not essential, to use conduits having a free space therearound.

I have also been able to achieve satisfactory results using two tubes of certain different lengths (for example, two ¾ inch tubes, one ¾" longer than the other); and in other cases, using two tubes of particular different diameters (for example, ½ inch and ¾ inch). In these cases, apparently, the differences between the tubes used produce or contribute to producing differences in phase resulting in the desired canceling-out effect.

I have been able to achieve satisfactory results using, instead of two tubes, a divider separating the pipe 6 into two compartments (half-moon shaped in cross-section) between the chamber and the outlet end of the pipe, to form a pair of conduits of the same cross-sectional area and length.

I have also found that the exhaust pipe itself may suitably

bly serve as the chamber, if two conduits of cross-sectional area large with respect to the area thereof are led therefrom, apparently producing with efficiency suitable differences in phase in the sound waves emerging from the two conduits.

It is preferable, though not necessary, to enclose the conduits in a pipe as in the preferred embodiment. The muffler works satisfactorily if the two conduits are simply joined to the chamber in air-tight manner and extend therefrom without enclosure of any kind.

It will be apparent that I have provided the art with a new and efficient muffler which combines the virtues of lower cost and greater durability with the advantage of increased engine efficiency, owing to there being no substantial production of back pressures.

It will also be apparent that modifications within the spirit of the invention and the scope of the appended claims will readily occur to those skilled in the art. And of course muffler dimensions may be varied for use in connection with engines of different sizes.

I claim:

1. A muffler for quiet discharge of exhaust gases without substantial production of back pressure which includes a pipe and, mounted therein, two tubes, a baffle, and a sealing washer, said tubes having the inlet ends thereof spaced from the inlet end of said pipe to form a chamber within said pipe, said tubes being of the same cross-sectional area, said area being substantial with respect to the cross-sectional area of said pipe, and said tubes being of the same length and having the outlet ends thereof adjacent to each other and to the outlet end of said pipe, said washer being positioned around said tubes and within said pipe to prevent passage of gas therebetween, and said baffle extending from the inner wall of said pipe generally radially a short distance into said chamber.

2. A muffler for quiet discharge of exhaust gases without substantial production of back pressure which includes a pipe and, mounted therein, two tubes and a baffle, said tubes having the inlet ends thereof spaced from the inlet end of said pipe to form a chamber within said pipe, said tubes being of cross-section area substantial with respect to the cross-sectional area of said

pipe, said tubes having the outlet ends thereof adjacent to each other, and said baffle extending from the inner wall of said pipe generally radially a short distance into said chamber.

3. A muffler for quiet discharge of exhaust gases without substantial production of back pressure which comprises a conduit for accepting exhaust gas from an engine and a pair of tubes of smaller diameter than said conduit and connected therewith to lead gases therefrom, said tubes each being of the same diameter and length, imperforate, low-friction, and substantially free of absorptiveness or curves that would cause any substantial energy loss in a stream of exhaust gas passing there-through, said tubes terminating in an adjacent side-by-side relation with a pair of orifices adapted to discharge exhaust gas freely in the atmosphere in generally parallel correspondingly directed streams.

4. The muffler of claim 3 in which said tubes have cross sectional areas large relative to the cross sectional area of said conduit.

5. A muffler for quiet discharge of exhaust gases without substantial production of back pressure which includes a pipe and, mounted therein, two tubes, said tubes having the inlet ends thereof spaced from the inlet end of said pipe to form a chamber within said pipe, said tubes being of cross sectional area substantial with respect to the cross sectional area of said pipe and having the outlet ends thereof adjacent to each other.

References Cited in the file of this patent

UNITED STATES PATENTS

702,031	Ronan	June 10, 1902
1,038,931	Michaelson	Sept. 17, 1912
1,351,122	Paulson	Aug. 31, 1920
1,591,088	Holmes	July 6, 1926
1,821,688	Bourne	Sept. 1, 1931

FOREIGN PATENTS

178,815	Germany	Nov. 23, 1906
428,695	Germany	May 10, 1926
116,512	Austria	Feb. 25, 1930