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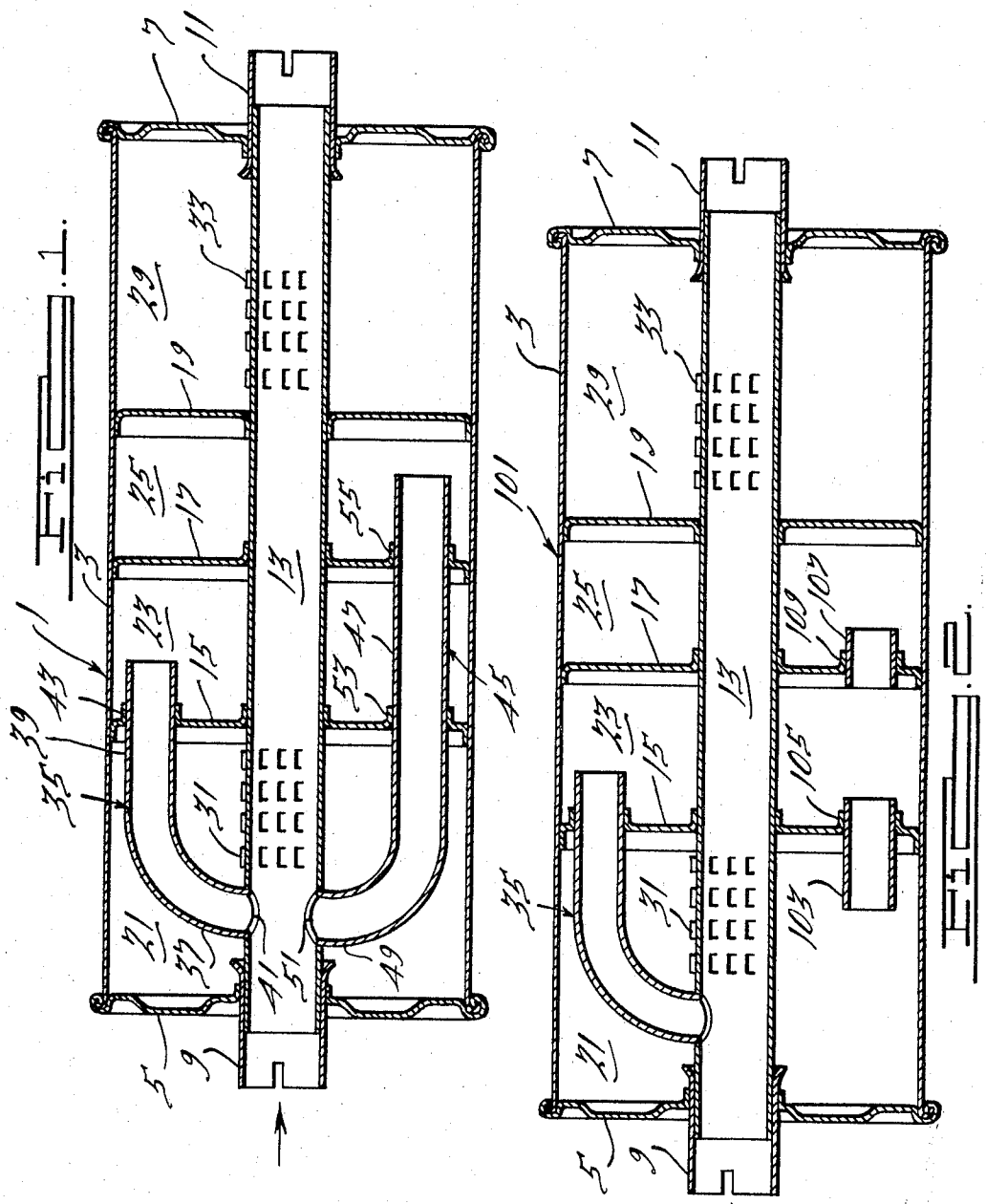
SILENCER WITH ANGLED TUNING TUBE LEADING TO HELMHOLTZ RESONATOR

Filed Dec. 21, 1967



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SILENCER WITH ANGLED TUNING TUBE LEADING TO HELMHOLTZ RESONATOR

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U.S. Cl. 181—48 1 Claim

ABSTRACT OF THE DISCLOSURE

Low frequencies are silenced in an exhaust gas muffler by means of a resonator chamber connected to the exhaust gas stream by a tuning tube which is bent at a right angle, to obtain a maximum length of tuning tube in a minimum length of muffler.

Background of the invention

In silencing the exhaust gases of an internal combustion engine by means of a muffler construction, very difficult problems are caused by relatively low frequency sound. These require tuned constructions and the lower the frequency the larger the volume and length of tuning tube required for silencing. Both these factors make for a large size muffler which is difficult to position under modern low slung automobiles.

Brief summary of the invention

It is the purpose of this invention to provide a muffler construction which includes means for silencing low frequencies that is constructed to conserve space and reduce the overall size of the muffler as compared with units now in use.

The invention accomplishes this purpose by bending the tuning tube so that the projected length of the tube is considerably less than the actual length of the tube, thus reducing the length of the space in a muffler required to accommodate the tube. Preferably the tuning tube has a right angle bend in it and the inlet end is connected to the gas flow passage and the outlet end dead ends in a resonator chamber.

Description of the drawings

FIGURE 1 is a longitudinal cross section through a muffler embodying one form of the invention; and

FIGURE 2 is a longitudinal cross section through a muffler embodying another form of the invention.

Description of the invention

The muffler **1** of FIGURE 1 has an oval outer shell **3** which is closed at one end by an inlet header **5** and at the other end by an outlet header **7**. An inlet bushing **9** is supported in the inlet header **5** and an outlet bushing **11** is supported in the outlet header **7**. A straight-through gas flow passage tube **13** is supported at opposite ends in the bushings **9** and **11** so that gas can flow straight through the shell **3**.

Transverse partitions **15**, **17**, and **19** divide the space within the shell **3** into a series of chambers **21**, **23**, **25**, and **29**. The gas flow tube **13** has a louver patch **31** opening into the chamber **21** and a second louver patch **33** opening into the chamber **29**.

In accordance with the invention, a tuning tube **35** having an upstream section **37** and a downstream section **39** which extend at right angles to each other is connected around an opening **41** in the wall of pipe **13** so that it is in full acoustic communication with gas

flowing through the pipe. The downstream section **39** is supported by an annular flange **43** formed in the partition **15** and opens into the chamber **23**, this opening comprising the only inlet and outlet for the chamber **23**. The chamber **25** is also connected to the tube **13** by means of a right angle type tuning tube **45** in accordance with the invention which includes a downstream section **47** and an upstream section **49** extending at right angles to it. The section **49** is connected around an opening **51** in the sidewall of the tube **13** and the section **47** extends through annular flanges **53** and **55** formed in the partitions **15** and **17** respectively.

In operation, gas flowing from left to right through the tube **13** is subjected to a medium to high frequency sound attenuating action by virtue of the louver patches **31** and **33** acting in conjunction with the chambers **21** and **29**. Lower frequencies of a predetermined level are silenced by the Helmholtz resonator constructions comprising the chamber **23** and the tuning tube **35** and the chamber **25** with the tuning tube **45**. Because the tuning tubes **35** and **45** are bent at right angles their effective length in the longitudinal direction is considerably less than their developed or acoustically effective length. Accordingly, lower frequencies may be attenuated by means of this construction for a given length muffler than with muffler arrangements now being used.

The muffler **101** of FIGURE 2 is almost identical in construction to the muffler **1**, hence the same parts and features are given the same reference numbers. The significant difference is the elimination of the tuning tube **45** and the substitution of a more conventional tuning tube arangement. In the muffler **101** there is a tuning tube **103** that is supported in an annular neck **105** in the partition **15** and a tuning tube **107** that is supported in an annular neck **109** in the position **17**. Tuning tubes **103** and **107** in conjunction with the chambers **23** and **25** provide a compound resonator structure while the tuning tube **103** in conjunction with the tuning tube **35** and the chamber **23** provide a double tuner enabling the chamber **23** to attenuate two different frequencies.

Modifications may be made without departing from the spirit and scope of this invention.

What is claimed is:

1. An exhaust gas muffler comprising an elongated tubular casing having an inlet at one end and an outlet at the other end, a plurality of transverse partitions extending across the width of the casing and subdividing it into a plurality of chambers, means in the casing providing a gas flow passage connecting said inlet and outlet and including a conduit extending through a pair of chambers, the wall of said conduit being inperforate in the first of said chambers and having a patch of louvers opening into the second of said chambers so that said second chamber acts to attenuate medium to high frequency sounds, a tuning tube having first and second portions extending at substantially a right angle to each other, said tuning tube first portion being secured to and opening into said conduit in said second chamber at a location upstream of said louver patch and said first portion extending at substantially a right angle to said conduit, said tuning tube second portion extending in a downstream direction and through a partition and opening into said first chamber, the part of said tuning tube in said second chamber being imperforate, said tuning tube and said first chamber being acoustically interrelated to provide a Helmholtz resonator for silencing a predetermined frequency, lower than that attenuated by said second chamber.

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U.S. Cl. X.R.

181—54, 59

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,434,565 March 25, 1969

Richard L. Fischer

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 35, "position" should read -- partition -- line 51, "inperforate" should read -- imperforate --. Column 3, line 3, "2,075,263 3/1937 Bourne" should read -- 1,954,516 4/1934 Bourne -------- 181-48 --.

Signed and sealed this 14th day of April 1970.

(SEAL)

Attest:

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