ABSTRACT

The inlet and outlet axis of a pinch-type chamber forming shell for a muffler tube is radially separated from the centerline of the chamber so that the width of the shell when mounted on a tube is variable and controllable with respect to a given angular position on the tube.

5 Claims, 4 Drawing Figures
OFFCENTER PINCH CAN FOR MUFFLER

BRIEF SUMMARY OF THE INVENTION

It is the purpose of the invention to provide a means to increase the design freedom in an exhaust gas muffler for internal combustion engines by providing a chamber forming shell having a variable effective width.

The invention provides a shell in which the axis of the inlet and outlet openings is spaced radially from the centerline of the shell. When the shell is mounted on a gas flow tube the angular position of the shell may be selected to suit the radial space available within the muffler.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal cross section of a typical exhaust gas muffler in which the invention may advantageously be used and shows a shell embodying the invention mounted on the outlet tube, it being understood that the shell may be used in various other locations as desired.

FIG. 2 is a cross section, enlarged, along the line 2—2 of FIG. 1.

FIG. 3 is an enlarged side elevation, broken away, of the subassembly of the tube and shell, and FIG. 4 is an end view taken from the left of FIG. 2.

DESCRIPTION OF THE INVENTION

The sheet metal exhaust gas muffler 1 for internal combustion engines has an oval shell 3 which is closed at its inlet and outlet ends by inlet and outlet headers 5 and 7, respectively, which are interlocked with the shell as indicated by heads 9.

The interior of the shell is subdivided into a series of longitudinally separated sound attenuating chambers 11, 13, 15, and 17 by transverse partitions 19, 21, and 23. The inlet header 5 and the partitions 19, 21, and 23 have aligned flanged openings in which the inlet tube 25 is supported so that it carries exhaust gas from outside the muffler 1 to the crossover chamber 17. The outlet header 7 and the partitions 21 and 23 have aligned flanged openings in which the outlet tube 27 is supported so that it carries gases from the crossover chamber 13 to the outside of the muffler. Gas in chamber 17 reaches chamber 13 by flowing through chamber 15 via the flanged openings 29 in the partitions 21 and 23.

The inlet tube 25 has perforations in the form of a louver patch 31 opening into chamber 11 and a louver patch 33 opening into a closed chamber 35 formed by a can or shell 37 that is located in chamber 15. The outlet tube 27 has perforations in the form of a louver patch 39, also located in chamber 15, opening into a closed chamber 41 formed by a can or shell 43 that is constructed in accordance with this invention.

Each of the shells 37 and 43 is preferably constructed from tubular stock of circular cross section, the shell 43 being formed in this instance of substantially larger diameter tubing than the shell 37. The shells are mounted on their respective tubes and the ends of the shells pinched into U-shaped folds which reduce the diameters of the shell ends to form collars that tightly grip the outer tube peripheries. Thus, shell 37 has four angularly spaced longitudinally extending folds or pinches 45 at each end to provide collars 47 that grip the tube 25 and one or both of which may be spotwelded to the tube. It will be observed that the collars 47 are coaxial with the shell 37 and chamber 35 and that the chamber 35 extends entirely around the tube.

In contrast, the shell 43 has three angularly separated, longitudinally extending folds or pinches 49 to form collars 51 which have an axis that is transversely or radially offset from the centerline or axis of the shell. One side of the shell 43 is tangent to the tube 27 along a longitudinal line 53 so that the chamber 41 does not extend entirely around the tube. It can be seen in FIG. 2 that on each side of the subassembly of shell 43 and tube 27 the radius of the outer periphery of the shell as measured from the axis of tube 27 (or collars 51) varies from a minimum of substantially the radius of tube 27 on the side of tangency to a maximum diametrically opposite.

The virtue of offsetting the axes of the tube 27 and shell 43 is evident in FIGS. 1 and 2. If the shell 43 were made concentric with the tube, as is shell 37, it would not fit in the transverse space available between tubes 25 and 27, even if it were of smaller diameter and smaller volume. Thus, the offset construction of shell 43 enables a materially larger diameter and larger volume chamber to be provided for louver patch 39 than would a concentric shell (such as shell 37) in the same location.

For a given spacing between tubes 25 and 27, the muffler designer has a larger range of volumes that he can use for chamber 41, giving him more design freedom, and enabling him to satisfactorily attenuate a wider spectrum of noises and frequencies. Where the spacing between two gas flow tubes, such as 25 and 27, is extremely close, use of the offsetter construction of this invention may enable attenuation chambers, such as 35 and 41, (often referred to as spit chambers) to be used where only one or even none would be possible with the concentric structure of shell 37.

In operation, gas enters the tube 25 and is subject to some sound attenuation as it flows by the louver patch 31 in chamber 11 and again to attenuation by the spit chamber 35 as it flows by the louver patch 33. Gas leaving the tube 27 is reversed in direction in chamber 17 and flows backwardly toward the front of the muffler through the chamber 15 where some sound attenuation occurs due to the change in volume and the effect of the reduced area openings 29. The gas entering a chamber 13 is again reversed in direction so that it enters the outlet tube 27 and flows through it out of the muffler with sound being removed by virtue of the spit chamber 41, provided by the shell 43 of this invention, via the louver patch 39. Modifications may be made without departing from the spirit and scope of the invention.

1. In an exhaust gas muffler having a housing including an inlet and an outlet for gas passing through the muffler, means providing a gas passage connecting the inlet and the outlet including a gas flow conduit, said conduit having a perforated area to connect the gas flowing through the conduit with space outside the conduit, a cylindrical tube mounted entirely on and enveloping the conduit and reduced in diameter at least one end to provide a collar gripping the conduit, said tube being substantially circular in cross section and of substantially uniform diameter along its length, said tube providing a chamber surrounding the perforate area of the conduit, said tube collar having a centerline, said centerline being substantially parallel to the axis of the conduit but spaced radially a substantially distance from the axis of the conduit so that the tube is materially offset with respect to the conduit and of variable radial width with respect to the axis of the conduit.

2. A muffler as set forth in claim 1 wherein said tube is reduced in diameter at both ends to provide two collars gripping the conduit and a close offset attenuation chamber surrounding said perforate area, said collars being aligned on said centerline and wherein said tube is tangent to the conduit along the length of the tube.

3. A muffler as set forth in claim 2 including structure in said housing located adjacent to said conduit and tube and spaced from the axis of the conduit by a distance less than the maximum radial width of the tube with respect to said axis whereby said tube is required to have a predetermined angular position on the conduit.

4. A muffler as set forth in claim 3 wherein said structure comprises a second gas flow tube parallel to the first having a shell mounted on it.

5. A muffler as set forth in claim 4 wherein said reduced diameter is provided by three radial U-shaped folds in the end of the tube and located on one side of the tube, the other side of the tube being longitudinally tangent to the conduit.

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