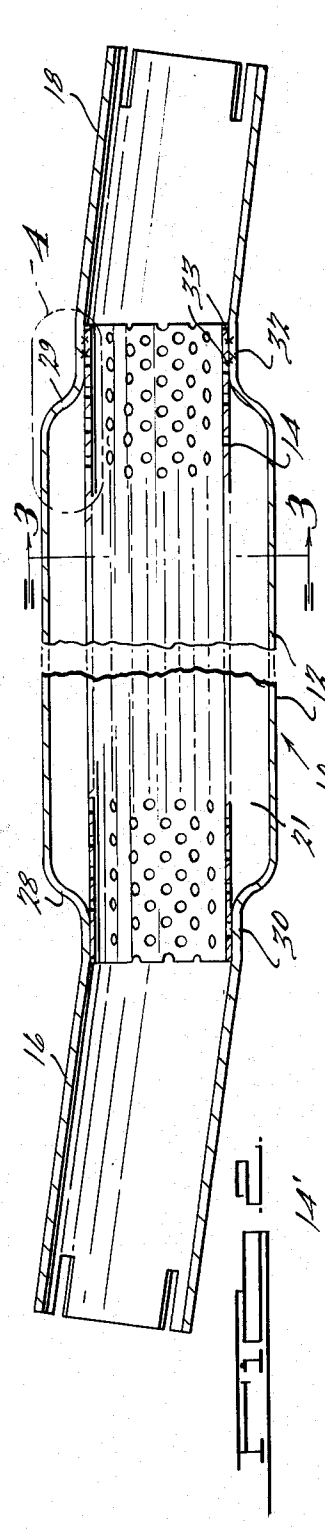
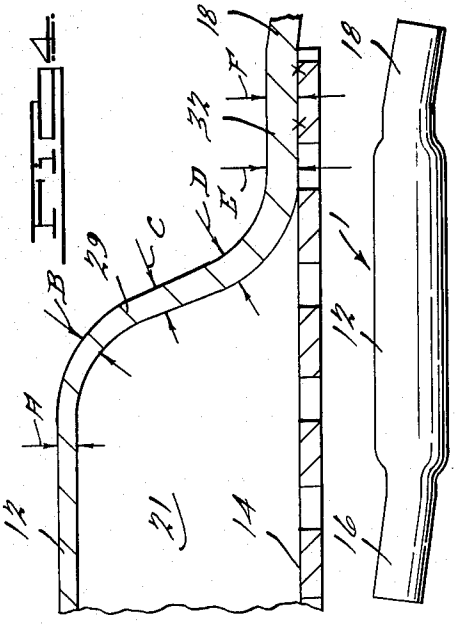
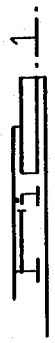
Feb. 8, 1966 W. H. POWERS 3,233,698

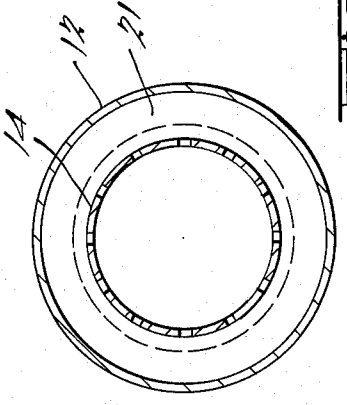
MUFFLER WITH ONE-PIECE OUTER HOUSING

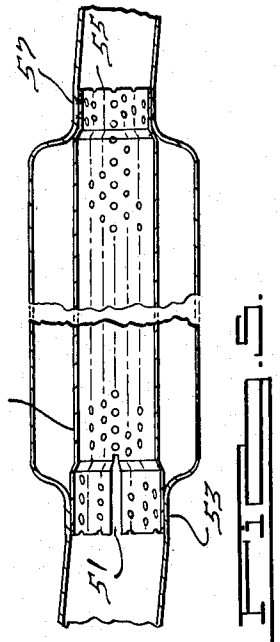
Filed Nov. 28, 1960











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# MUFFLER WITH ONE-PIECE OUTER HOUSING

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This invention relates generally to mufflers or silencers and is particularly, but not exclusively, concerned with mufflers for attenuating sound in the inlet air or exhaust gases of an internal combustion engine.

It is an object of my invention to simplify and improve the construction of mufflers from the manufacturing, acoustic, and structural standpoints.

I accomplish this object by means of a muffler construction wherein the outer housing is formed of only one piece—in contrast to commercial mufflers now available wherein the outer housing consists of five pieces, viz, a shell, two headers, and two bushings.

The manner in which my one-piece housing accomplishes the object will become evident upon consideration of the accompanying drawings which show one embodiment of the invention and in which:

FIGURE 1 is a side elevation of an exhaust muffler embodying the invention, the muffler shown being of the well-known "hot rod" or "Hollywood" type;

FIG. 2 is a cross-sectional view of the muffler of FIG. 1, enlarged for clarity;

FIG. 3 is a cross-sectional view taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is a fragmentary cross-sectional view of an end portion of the outer shell of the muffler, enlarged for clarity; and,

FIG. 5 is a view similar to FIG. 2 showing a modified form of inner tube.

Referring to the drawings, the sound attenuating structure or muffler **10** comprises an outer shell **12** surrounding an inner, straight through perforated gas passage tube **14**. The outer shell **2** has slotted inlet and outlet extensions **16** and **18** at opposite ends which are reduced in diameter for fluid sealed connection with suitable exhaust and tailpipe conduits (not shown). The tube **14** may be of various construction but is preferably formed by rolling a perforated sheet into a tube thus providing a conduit with a plurality of apertures **20** extending from end to end to acoustically connect with an annular chamber **21** defined by the shell **12** and the tube **14**. If desired, the chamber **21** may be filled with a suitable sound attenuating substance such as glass wool (not shown).

In accordance with the present invention, the opposite end portions of the outer shell **12** are formed to define integral, generally arcuate, radially inwardly and axially extending end walls or headers **28** and **29** terminating in the integral end bushings **30** and **32**, and the extensions **16** and **18**, respectively. The bushings **30** and **32** are of suitable diameter and position to accept and support the tube **14**, which is tightly secured thereto as by spot-welding. This is preferably done at only one end, as shown at **33** in FIG. 2, if desired, to facilitate manufacture, the other end having a slip fit in the associated bushing.

The end walls **28** and **29** progressively increase in thickness radially inwardly of the shell **12**, to a maximum thickness at the bushings **30** and **32**. For example, as in an exemplary constructed embodiment, the outer shell **12** has an initial thickness of .048" at Section A (FIG. 4) then progressively increases in thickness to .055" at Section B. The end header **29** progressively increases in thickness radially inwardly of the shell **12** to .061" at Section C, then to a thickness of .071" at Section D. The integral axially extending bushing **32** is .072" thick at



Sections E and F and through the length of extensions **16** and **18**. Thus, there is substantially a 50% increase in thickness.

By forming the entire outer shell from one piece of steel tubing the two end headers and two busings previously used, and their seams and joints, are eliminated along with the need for manufacturing and assembling them. Because the joints between these parts are eliminated, the opportunity for corrosion to occur is minimized. The integral construction minimizes vibration and improves appearance. Because the end headers are integral with the shell there is a relatively gradual change in cross-section, tending to promote better sound and flow patterns and less back pressure. Since the end portions of a muffler are relatively highly stressed, the progressive change in thickness provides increased strength where it is needed most. Thus, the new construction provides many practical advantages in functioning, use, handling, and design of the muffler and associated parts.

In FIGURE 5 is illustrated an expedient to increase standardization and reduce the number of different parts that must be produced to make mufflers for a variety of different makes and models of automobiles requiring a variety of different sizes of inlet or outlet ends **16** and **18**. This expedient comprises formation of preferably four slots **51** in one end of the tube **14**. These slots will permit the tube to be radially expanded into contact with a larger bushing **53** without cracking of the metal, the slots preferably being about the same length as the expanded end of the tube. The unslotted end **55** can be reduced in diameter by swaging to fit small bushing **57** since the perforations at the end of the tube will absorb the stress by closing up somewhat to prevent fracture.

It is to be understood that the specific construction of the improved muffler herein disclosed and described is presented for the purpose of explanation and illustration and is not intended to indicate the limits of the invention, the scope of which is defined by the following claims.

I claim:

**1.** A muffler comprising an outer casing having a central portion of enlarged diameter and integral end portions of reduced diameter, the diameter of the integral end portions being unequal with one end portion having a relatively large diameter and the other end portion having a relatively small diameter, a tubular member fixed within said outer casing and connecting said integral end portions, one end of said tubular member having a reduced diameter approximately equal to the diameter of the smaller of said integral end portions, a shoulder portion connecting said one end of reduced diameter to said tubular member, said one end of reduced diameter being entirely received in the smaller of said integral end portions, said shoulder being located in abutting engagement with said casing, the other end of said tubular member having an enlarged diameter approximately equal to the diameter of the larger of the integral end portions, and said other end being received and supported in the larger of the integral end portions.

**2.** The invention as defined in claim **1** and wherein the ends of said tubular member are spaced inwardly of the ends of the integral end portions.

**3.** The invention as defined in claim **1** and wherein said tubular member is secured to said casing only at one end thereof, and said tubular member being secured to said casing in said integral end portion of smaller diameter.

**4.** The invention as defined in claim **1** and having means at both ends of said tubular member permitting radial inward displacement of the ends without fracture to accommodate insertion in and supporting engagement with the integral end portions.

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