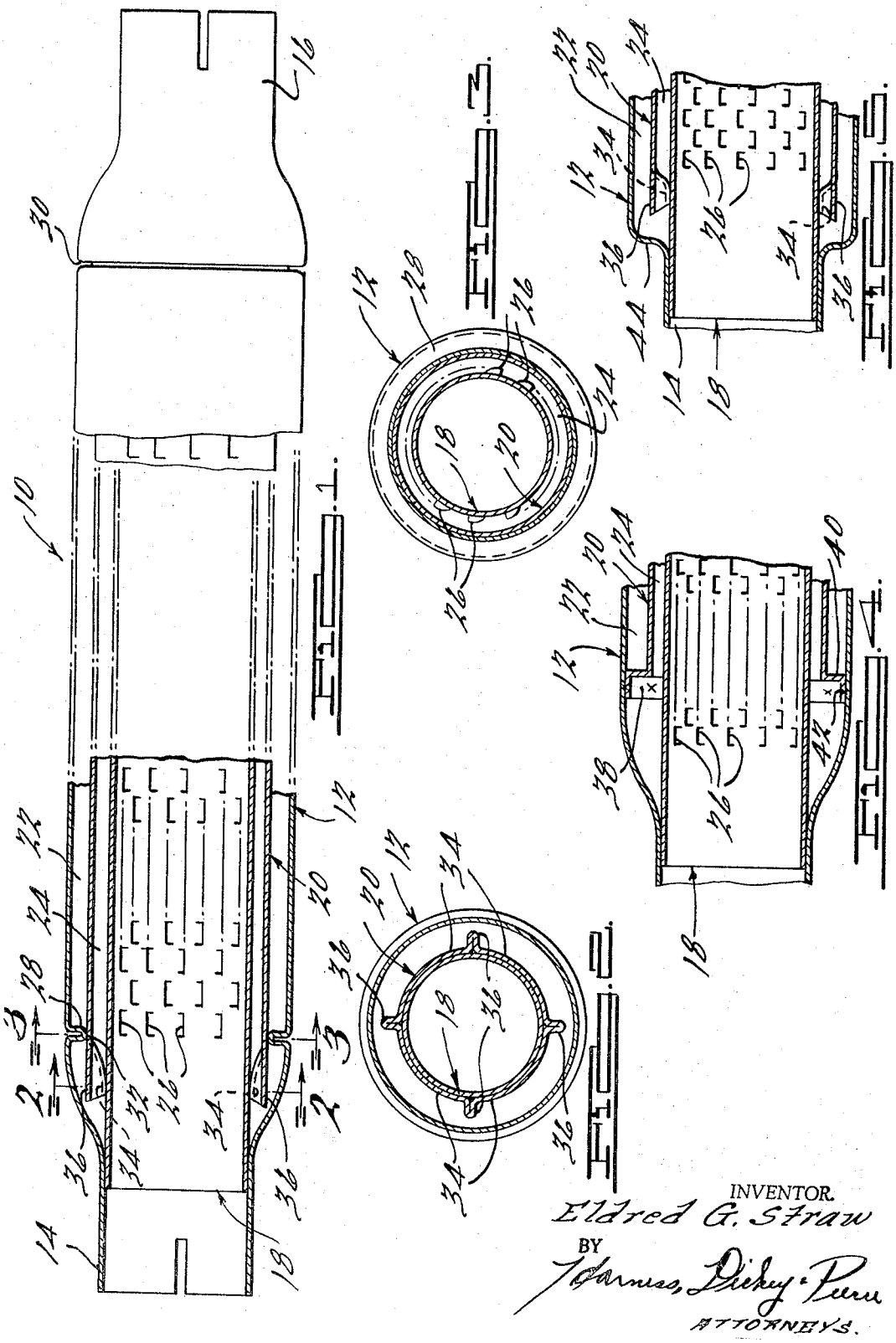
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MUFFLER WITH CHAMBERS FORMED BY THREE CONCENTRIC TUBES

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MUFFLER WITH CHAMBERS FORMED BY THREE CONCENTRIC TUBES

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This invention relates generally to exhaust systems for automotive vehicles, and more particularly, to improvements in automotive mufflers.

It is a general object of the present invention to provide an improved muffler construction of an extremely simple design.

It is a more particular object of the present invention to provide a muffler construction having improved means for partitioning various gas flow passages and chambers defined between the muffler housing and the internal exhaust gas flow tubes or conduits arranged therewithin.

It is still a more particular object of the present invention to provide an improved muffler construction of the above character wherein the partition means is integrally formed on either or both the gas flow tubes and the muffler housing.

It is yet a more particular object of the present invention to provide an improved muffler construction of the above character wherein the aforesaid partition means are formed by necking down or expanding the gas flow tubes and/or muffler housing.

Other objects and advantages of the present invention will become apparent from the following detailed description taken in conjunction with the accompanying drawing, wherein:

FIGURE 1 is a longitudinal cross-sectional view, partially broken away, of a preferred form of a muffler construction of the present invention;

FIGURE 2 is a transverse cross-sectional view taken along the line 2—2 of FIGURE 1;

FIGURE 3 is a transverse cross-sectional view taken along the line 3—3 of FIGURE 1;

FIGURE 4 is a fragmentary cross-sectional view of a muffler construction embodying an alternate form of the present invention; and

FIGURE 5 is a fragmentary cross-sectional view of a muffler construction embodying still another form of the present invention.

Referring now to FIGURES 1 through 3 of the drawing, a muffler construction **10**, in accordance with a preferred embodiment of the present invention, is shown as comprising a hollow cylindrical external shell or housing **12** which is necked down or swaged radially inwardly at its opposite ends to form reduced diameter inlet and outlet bushings **14** and **16**. Extending coaxially within the housing **12** is a hollow cylindrical gas flow tube or conduit **18** whose outer diameter is approximately equal to the inner diameter of the bushings **14** and **16**. The tube **18** is rigidly secured within the housing **12** by having its opposite ends spotwelded or similarly secured within the inner ends of the bushings **14** and **16**, as seen in FIGURE 1. A hollow cylindrical inner shell **20**, which has a diameter equal to approximately one half the difference between the diameter of the housing **12** and the diameter of the gas flow tube **18**, extends coaxially of the muffler **10** and is located approximately half way between the inner periphery of the housing **12** and the outer periphery of the tube **18**. The inner shell **20** divides the annular space between the housing **12** and the tube **18** into two concentric annular chambers **22** and **24**. A plurality or bank of fine flat louvers, generally designated **26**, are formed around the tube **18** to provide a predetermined amount of communication between the interior of the tube **18** and the annular chamber **24**.

In accordance with the principles of the present invention, a gas-tight partition is formed at each end of the annular chamber **22** through the provision of a pair of radially inwardly projecting and generally U-shaped folds or pinched down sections **28** and **30** which extend entirely around the housing **12** and engage the outer periphery of the inner shell **20** in gas-tight joints, as seen at **32** in FIGURE 1. The sections **28** and **30** may be formed in the housing **12** by employing conventional swaging or tube reducing techniques and swaging the ends of the housing **12** radially inwardly to the inner diameter of the sections **28** and **30**. Thereafter, the ends of the housing **12** may be expanded by forcing the ends of the housing **12** into engagement with a suitable expanding mandrel or die, thereby forming the U-shaped sections **28** and **30** shown in FIGURES 1 and 3.

A gas-tight partition is provided at each end of the annular chamber **24** by means of a plurality (four) of pinched down areas, generally designated **34**, that are formed at each end of the inner shell **20** and sealingly engage the outer periphery of the opposite ends of the tube **18**. The pinched down areas **34** are preferably equally circumferentially spaced around the shell **20**, the excess material adjacent each of the areas **34** being gathered into a plurality (four) of generally U-shaped outwardly projecting folds or pinches, herein designated by the numeral **36**. It will be noted that the pinched down areas **34** are adapted to contiguously and tightly engage the outer periphery of the tube **18** and therefore serve to provide the aforementioned gas-tight partitions at the ends of the chamber **24** and also to rigidly support the inner shell **20** within the muffler construction **10**.

Referring now to FIGURE 4, in a slightly modified form of the muffler construction **10** embodying the present invention, a gas-tight partition is formed at the end of the annular chamber **22** by means of a radially outwardly projecting end section, generally designated **38**, that is formed on the end of the inner shell member **20**. In particular, the end section **38** comprises a substantially flat radially outwardly extending portion **40** which terminates at its radially outer edge in an annular, longitudinally extending flange portion **42** that is contiguously engaged with the inner periphery of the muffler housing **12**. As seen in FIGURE 4, the flange portion **42** is adapted to be spotwelded or similarly secured to the inner periphery of the housing **12** such that the section **38** rigidly supports the one end of the inner shell **20** within the muffler construction **10**.

Referring now to FIGURE 5, in still another slightly modified form of the muffler construction **10** embodying the present invention, the inner shell **20** is formed with the hereinbefore described pinched down areas **34** and U-shaped folds **36** in an identical manner as was described in connection with FIGURES 1 through 3; however, the gas-tight partition formed at the end of the chamber **22** is provided in a slightly different manner than that which is illustrated in FIGURE 1. In particular, a partition is provided at the end of chamber **22** by having the end of the muffler housing **12** necked down or swaged radially inwardly into engagement with the outer periphery of the gas flow tube **18**. This is accomplished in a manner such that the housing **12** has a substantially flat end wall, as seen at **44**, which terminates at its radially inner edge at the inner (right) end of the bushing **14**. It will be seen that this modification of the muffler construction **10** of the present invention minimizes the material in the swaged portions of the housing **12** and also minimizes the outer diameter of the muffler construction **10** adjacent the opposite ends of the housing **12**.

A primary feature of each of the hereinbefore described embodiments of the present invention resides in the fact that the various partition means are provided without the use of any separate or independent partitions or header members, these members being replaced by the various swaged and expanded sections of the muffler housing and gas flow tubes and shells contained therein. This feature is of importance in that the partitions are integrally formed on the existing muffler components, thus minimizing to the extreme, the cost of producing the muffler construction, together with substantially reducing the assembly time and expense involved in the mass production thereof. Furthermore, since the partition means constitutes an integral portion of the muffler components, the possibility of any relative movement or vibration between the partition means and the muffler components on which the partition means are formed, is virtually eliminated.

While it will be apparent that the embodiments of the present invention illustrated herein are well calculated to fulfill the objects above stated, it will be appreciated that the present invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. A muffler for silencing sound in flowing gases comprising an elongated tubular housing having annular reduced diameter portions at opposite ends forming a gas inlet and a gas outlet, a perforate gas flow tube extending through said housing and having opposite ends supported in said reduced diameter portions, an intermediate tube in said housing around at least a portion of the length of the flow tube, said tubes and housing being substantially coaxial, said housing having a radially extending annular tube support and partition portion engaging the outside of said intermediate tube comprising an annular inwardly extending fold of a U-shaped cross section wherein the opposite legs of the U are substantially in contact with each other.

2. A muffler as set forth in claim 1 wherein said intermediate tube has a reduced diameter portion engaging the outside of the flow tube, said just mentioned reduced diameter portion comprising four substantially equally spaced arcuate segments embracing the flow tube and interconnected by four radially extending U-shaped folds formed in said intermediate tube.

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