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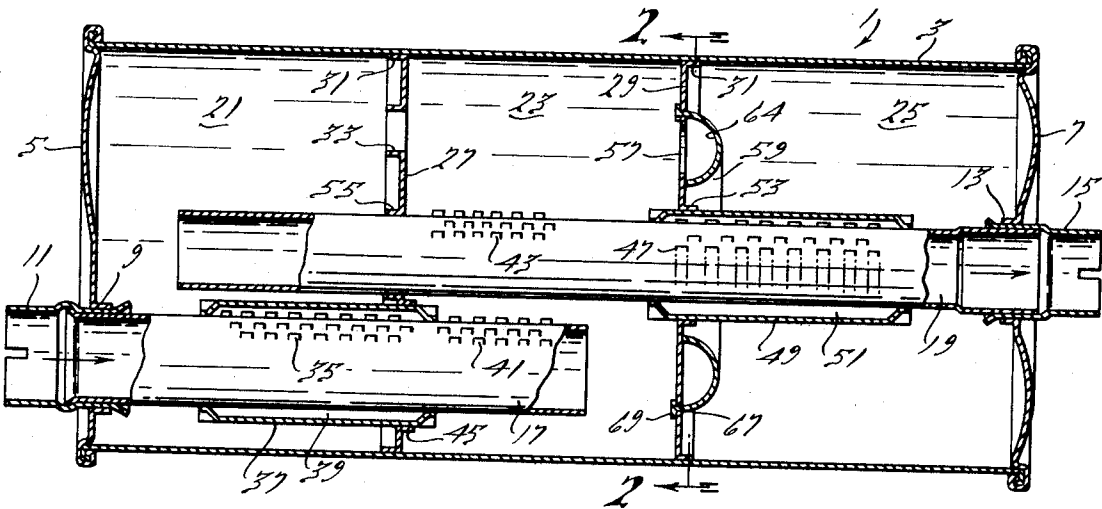
[54] **TUNING TUBE**  
**5 Claims, 2 Drawing Figs.**  
[52] U.S. Cl. .... **181/59,**  
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**54, 57-59**

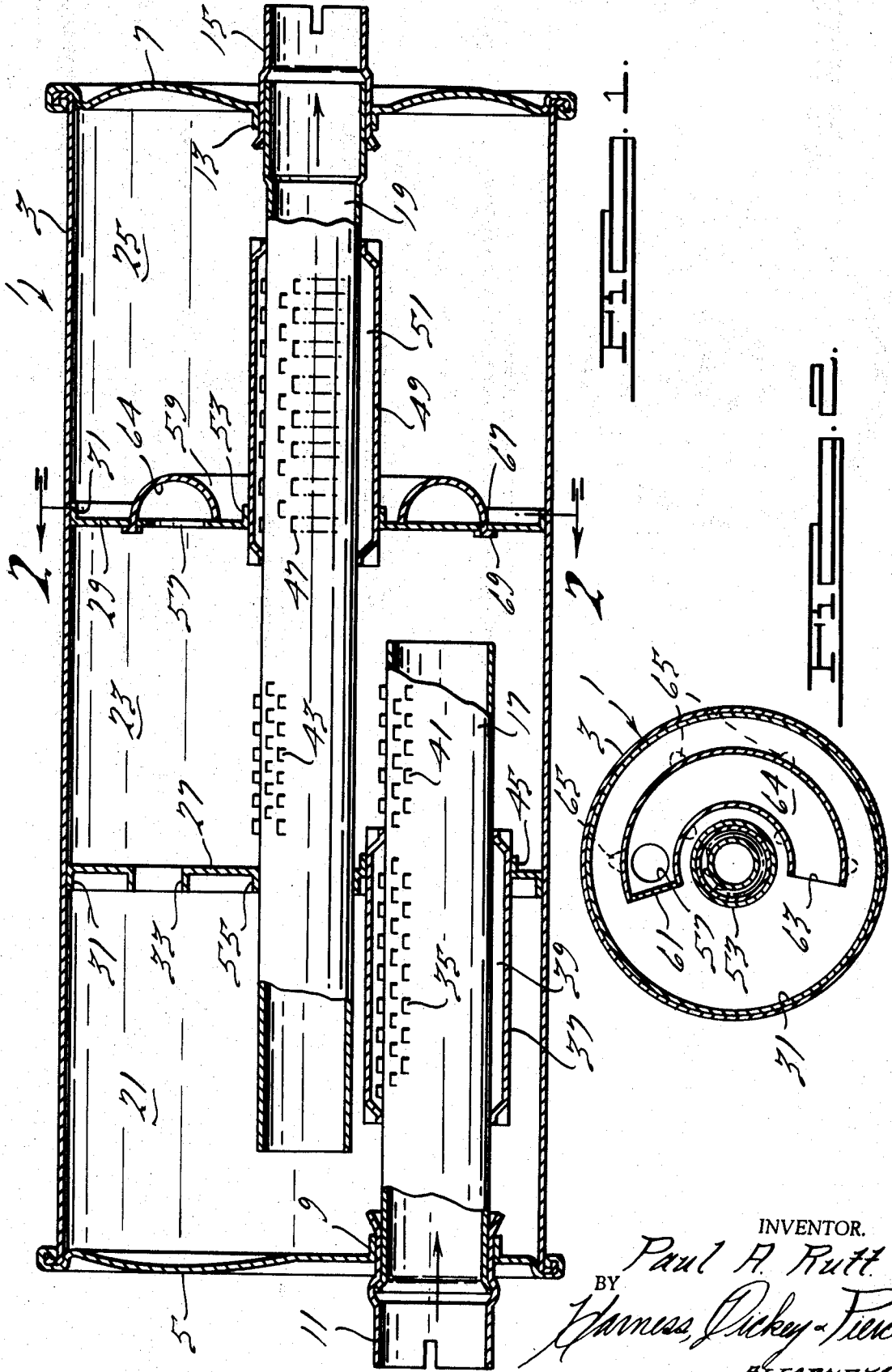
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**ABSTRACT:** A tuning tube for an exhaust gas muffler is formed by attaching a semicircular channellike member to a transverse partition.





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## TUNING TUBE

## BRIEF SUMMARY OF THE INVENTION

It is the purpose of this invention to improve the tuning tube construction of a sound attenuating muffler for flowing gases, especially exhaust gas mufflers.

The invention accomplishes this purpose by means of an assembly of partition and passage defining member in which the partition forms a lengthwise part of the passage wall. The invention simplifies and economizes the manufacture of mufflers and provides a better corrosion resistance because the passage may be located in a hotter part of the muffler.

While the invention is illustrated in connection with a combination partition-tuning tube assembly, the basic idea may be used in other locations and to incorporate other silencing techniques.

## DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal cross section through an exhaust gas muffler embodying the invention; and

FIG. 2 is a reduced size cross section along the line 2-2 of FIG. 1.

## DETAILED DESCRIPTION OF THE INVENTION

The muffler 1 has an elongated tubular shell 3 which is closed at its inlet end by a header 5 and at its outlet end by a header 7. The header 5 has an inwardly turned collar 9 in which is secured an inlet bushing 11; while the outlet header 7 has an inwardly turned collar 13 in which is secured an outlet bushing 15. An inlet gas flow tube 17 is supported in the inlet bushing 11 and an outlet gas flow tube 19 is supported in the outlet bushing 15.

The space within the shell 3 is subdivided into three longitudinally adjacent chambers 21, 23, and 25 by a pair of flat transverse walls or partitions 27 and 29 which have outer peripheral flanges 31 that are secured to the shell 3. The inlet tube 17 empties into the central chamber 23 and gas from the chamber 23 flows backwardly through an opening 33 in the partition 27 to reach the outlet chamber 21. Gas in the chamber 21 flows out of the muffler by entering the left end of the outlet tube 19. The inlet tube 17 may have a first louver patch 35 which is surrounded by a closed shell 37 to form a high frequency attenuating spit chamber 39. It may have a second louver patch 41 in the projecting end of the tube to open into the chamber 23 and permit bypassing to a louver patch 43 in that portion of outlet tube 19 which is located in the chamber 23. The tube 17 is supported on partition 27 by way of the shell 37 which is carried by a collar 45 in the partition. The outlet tube has a louver patch 47 which is surrounded by closed shell 49 to form a spit chamber 51 for attenuating high frequencies, the shell 49 being supported in a collar 53 in the partition 29 so that it along with the collar 55 in the partition 27 supply additional support for the tube 19.

In accordance with this invention, the flat wall of the partition 29 is provided with an opening 57. Secured on the chamber 25 face of the partition 29 is a semicircular, channel-like passage defining member 59 which is closed at one end 61, this end being located adjacent the opening 57. The other end 63 of the member 59 is open whereby the centerline length of the passage 64 from hole 57 to end 63 constitutes a length of tuning passage which along with its cross-sectional area, cooperates under the Helmholtz formula with the volume of chamber 25 to silence a predetermined and precalculated sound frequency. In contrast to the usual tuning passage structures wherein the passage axis is perpendicular to the partition, it will be observed that it is parallel in the present arrangement.

The member 59 may be assembled with the partition 29 by spotwelding or other suitable means but preferably has several tabs 65 formed on it which project through suitable slits 67 in the partition 29 and are then bent as seen at 69 to firmly secure the member 59 to the partition member 29.

It is apparent that an indentation could be formed in the wall 29 to cooperate with the illustrated shape of the channel-like member 59 or with other shapes, including flat, of the member 59 to form the tuning passage 64. By closing the end 63, the passage 64 will serve as a quarter wave length tuner or quince tube. Other modifications, such as the use of louvers or perforations in the member 59, may also be employed without departing from the spirit of the invention.

In operation, the bushings 11 and 15 are clamped to conduits in a gas flow system, such as an automotive exhaust system, so that gas enters the bushing 11 to flow through tube 17 to chamber 23. High frequency sound and roughness is attenuated en route in spit chamber 39. Somewhat lower frequencies are attenuated by the louvers 41. Some gas can bypass the outlet tube through louver patch 43 but most of it reverses direction and flows through hole 33 to chamber 21 where it enters outlet tube 19. In flowing to the outlet bushing 15 high frequency sounds and roughness are further attenuated in spit chamber 51. The length and cross-sectional area of tuning passage 64 and the volume of the chamber 25 are related so as to be tuned to attenuate a desired relatively low frequency.

I claim:

1. An exhaust gas muffler for internal combustion engines comprising: an elongated shell having an inlet at one end and an outlet at the other end and gas passage means connecting the inlet and outlet; a transverse partition means inside the shell subdividing it into first and second longitudinally adjacent chambers; said partition means including a wall member and a passage defining member secured to the wall member; said partition means further including a lengthy tubular passage formed in part by said wall member and in part by said passage defining member and opening only into one of the chambers whereby the passage serves as a quarter wave length tuner; the centerline of said passage being substantially parallel to the plane of the wall member.

2. A sound attenuating muffler for flowing gases comprising a housing having an inlet and an outlet, gas passage means in the housing connecting the inlet and outlet, partition means in the housing defining a resonator chamber and including a flat wall defining one side of said chamber; said wall having an opening in it; said chamber being completely closed except for said opening, a channel secured to the wall so that the wall closes the open face of the channel and the combined wall and channel define a tuning passage; one end of the channel being closed and the channel having an outlet; said channel embracing said wall opening and the closed end of the channel being located adjacent said wall opening, the outlet of the channel being located in said resonator chamber; said tuning passage being closed except for said opening and said outlet and the length and area of said passage being selected in relation to the volume of the resonator chamber so that the tuning passage and resonator chamber are tuned to attenuate a predetermined frequency of sound vibration.

3. A muffler as set forth in claim 2 wherein said channel has an open end forming said outlet.

4. An exhaust gas muffler for internal combustion engines comprising: an elongated shell having an inlet at one end and an outlet at the other end and gas passage means connecting the inlet and outlet; a transverse partition means inside the shell subdividing it into first and second longitudinally adjacent chambers; the second of said chambers comprising a closed resonator chamber isolated from said gas passage means; said partition means including a wall member separating said chambers and a passage defining member secured to the wall member; said partition means further including a lengthy tubular passage formed in part by said wall member and in part by said passage defining member; the centerline of said passage being substantially parallel to the plane of the wall member; said wall having an opening into said passage; said passage having an opening into the second of said chambers whereby said passage interconnects said chambers; the length and area of said passage and the volume of the second

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chamber being interrelated to tune them to attenuate a preselected frequency.

5. A muffler as set forth in claim 4 wherein said passage defining member comprises: a channel shaped part attached

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to said transverse partition; said channel having a closed end adjacent the wall opening and the other end of the channel being open to form the opening into the second chamber.

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