

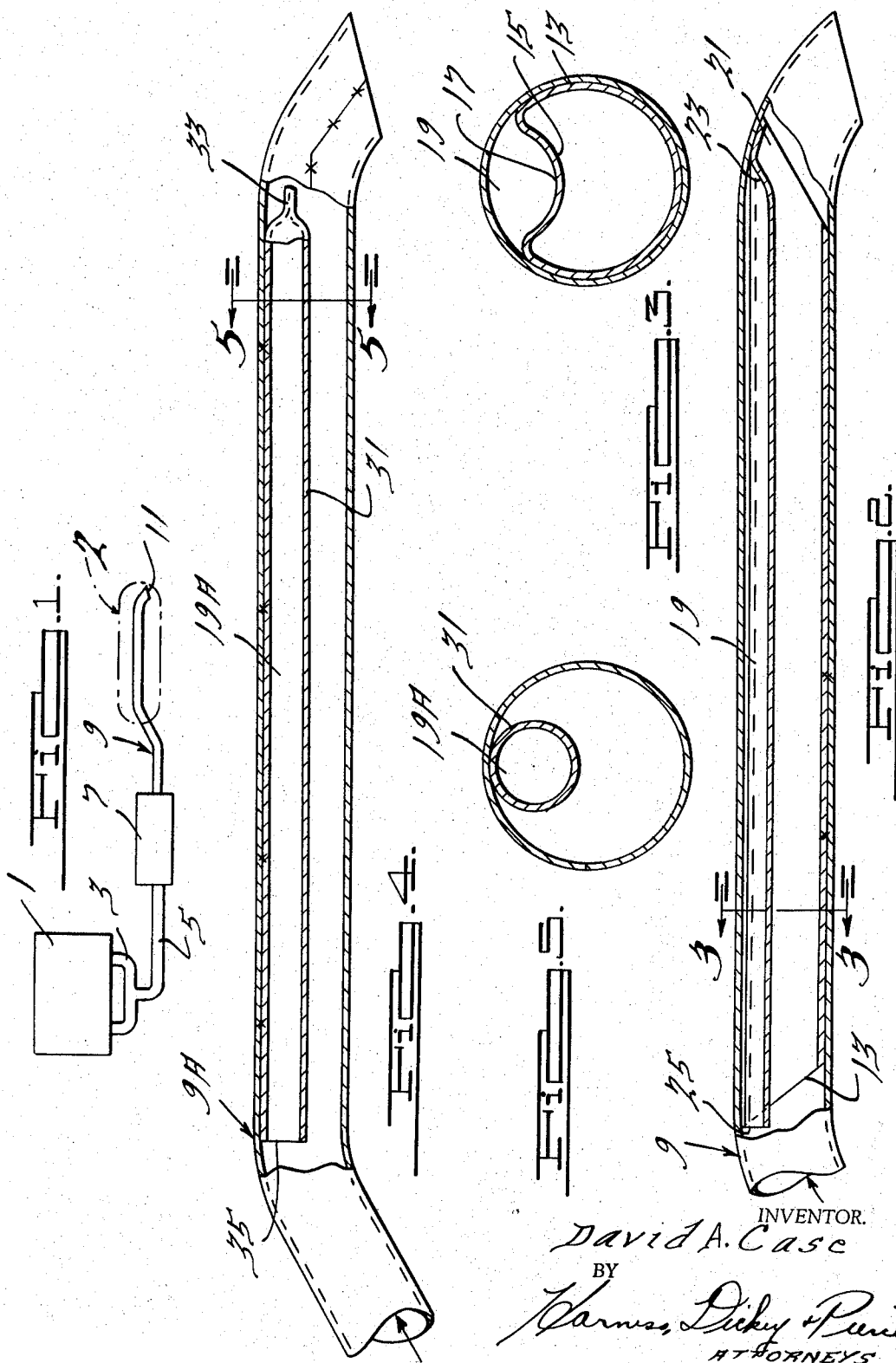
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LAMINATED CONDUIT AND ACOUSTIC SILENCER

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LAMINATED CONDUIT AND
ACOUSTIC SILENCER

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3 Claims

ABSTRACT OF THE DISCLOSURE

A tuning chamber is disposed inside of an exhaust pipe and/or tailpipe and may be in the form of a channel indented in the inner layer of a two layer pipe or a separate tube inserted in the pipe.

Brief summary of the invention

Customarily the space inside of the exhaust pipe or tailpipe of an automotive exhaust system is wasted insofar as efficient attenuation of sound is concerned. It is the purpose of this invention to provide a means consistent with the function of an exhaust pipe or tailpipe as a gas conduit to act on troublesome notes or low frequencies of sound in the exhaust gases. The invention accomplishes this by means of a longitudinal small diameter tuning chamber inside of the exhaust or tailpipe. In preferred form, this chamber is a channel formed by an indentation in the inner wall of a laminated pipe section, but it can also be provided by a separate tube attached to the inside wall of the tailpipe or exhaust pipe. One end of this chamber is closed and its other end open so that it is relatively long and narrow and, therefore, especially well adapted to act as a quarter wave length tuner acting on a particularly troublesome frequency.

Description of the drawings

FIGURE 1 is a schematic view of an exhaust system embodying the invention;

FIGURE 2 is an enlarged longitudinal section through the tailpipe section enclosed in the circle 2 of FIGURE 1;

FIGURE 3 is an enlarged cross-section along the line 3—3 of FIGURE 2;

FIGURE 4 is a section similar to FIGURE 2 showing the modified form of the invention; and

FIGURE 5 is an enlarged cross-section along the line 5—5 of FIGURE 4.

Description of the invention

The internal combustion engine 1 has an exhaust manifold 3 which is connected by an exhaust pipe 5 to a muffler 7, that includes sound attenuating devices for removing objectionable noise in the exhaust gas emanating from the engine. The exhaust gas leaving the muffler 7 passes into a tailpipe 9 and through the outlet 11 of the tailpipe to atmosphere. Normally the pipe sections 5 and 9 are simply plain conduits which do nothing more than convey the gases to and from the muffler.

In accordance with this invention one or the other or both of the pipes 5 and 7 are provided with a means that may be tuned to a particular note or frequency that may be difficult to remove by means of the usual muffler 7. This means is illustrated as applied to a downstream section of the tailpipe 9.

In preferred form, as illustrated in FIGURES 2 and 3, a sleeve 13 is slipped inside of the tailpipe 9 and spot welded to it as indicated by the small x's throughout the drawing. Prior to insertion of the tube 13, its wall is indented as indicated at 15 to form a channel 17. Thus, when the tube 13 is positioned within the tailpipe 9 there is an elongated chamber 19 between the outside of the tube 13 and the in-

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side of the tube 9. The indentation 17 terminates at the downstream end 21 of the chamber 19 in a transverse wall 23 as seen in FIGURE 2. However, the other end of the indentation runs all the way to the upstream end of the tube 13 so that there is an opening 25 that connects the chamber 19 with the interior of the pipe 9.

By selecting the length of the chamber 19 so that it is one quarter of the wave length of a note that it is desired to attenuate, the chamber can act on the Quincke principle of silencing. Conceivably, the chamber 19 may be made to operate on the Helmholtz principle in instances where it is possible to position the opening 25 adjacent an antinode of the frequency to be silenced.

In addition to functioning as a tuning chamber, the indentation 17 restricts the cross-sectional area of the tailpipe 9 and causes the gas stream passing through the pipe to contract and increase in velocity as it passes by the upstream end of the sleeve 13. The reverse action occurs as the gas passes by the end 23. Thus, the indentation 17 acts as a long length restrictor to abstract sound energy from the gas and further assist in silencing.

In FIGURES 4 and 5, the tailpipe 9a is provided with an interior tube 31 which is closed at its downstream end 33 and open at its upstream end 35. The wall of the tube is spotwelded to the tailpipe 9a and the interior of the tube provides a chamber 19a that functions in the manner described for chamber 19. However, the sleeve 13 of FIGURES 2 and 3 provides an additional sound deadening effect to that of the tube 31 since it constitutes a lamination for a substantial length of the tailpipe 9 which will deaden pipe ring, ping, and similar pipe type noises. It may also be bent with the outer tube after insertion.

Modifications may be made in the structure illustrated without departing from the spirit and scope of the invention.

I claim:

1. In an exhaust gas silencing system for an internal combustion engine having a muffler and a conduit connected to and in gas flow alignment with the muffler, said conduit comprising a length of tubing and a sleeve of substantially the same outer diameter as the inner diameter of the wall of the tubing inside the tubing and in surface contact with it around most of its outer surface to form a laminated section of conduit, a longitudinally extending portion of said sleeve extending radially inwardly of the sleeve and providing a longitudinal channel in the outer surface of the sleeve, said channel being closed along its length by the wall of the tubing to form a longitudinal chamber between the outer surface of the sleeve and the inner surface of the tubing, said chamber being open at one end and closed at the other and otherwise imperforate and having a length such that it is tuned to silence a sound frequency that is outside the efficient range of silencing of the muffler.

2. A system as set forth in claim 1 wherein said conduit forms the tailpipe portion of said system.

3. A laminated conduit and acoustic silencer for attenuating a predetermined sound frequency comprising an outer pipe and a sleeve shorter than the outer pipe and fitted inside the pipe in contact with it throughout substantially all of its outer surface to form a laminated conduit section inside the pipe, said sleeve having a radially inwardly extending portion in the wall thereof extending to one end but not to the other end of the sleeve and providing a longitudinal channel in the outer surface of the sleeve, said channel being closed along its length by the wall of the pipe to form a longitudinal chamber between the outer surface of the sleeve and the inner surface of the pipe which is open to the interior of the pipe only at said one end and having a length that is tuned to silence said predetermined sound frequency.

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