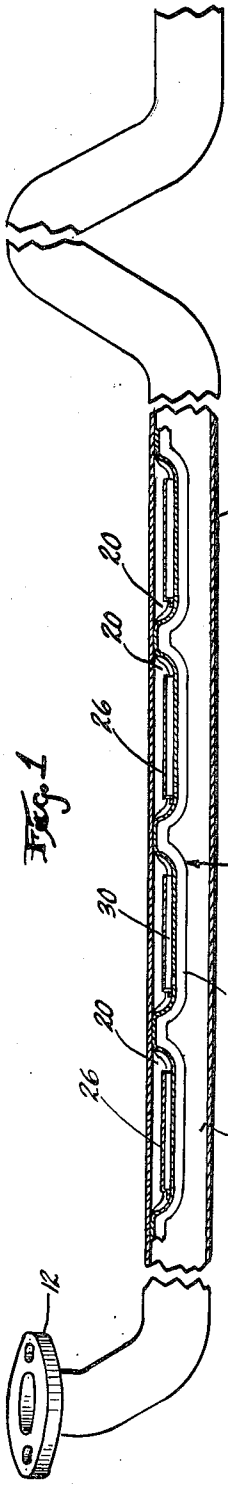
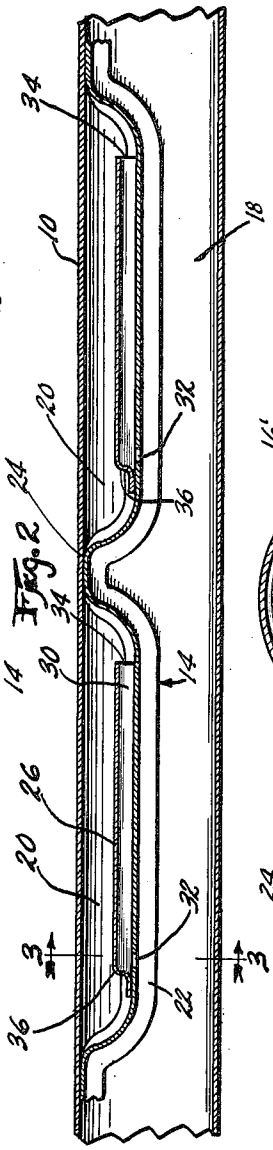
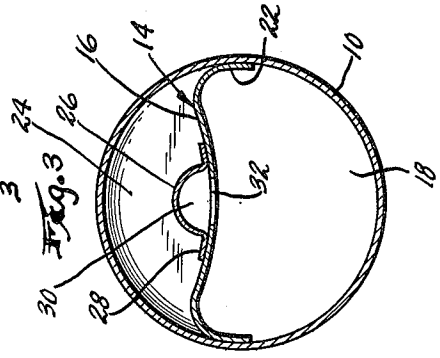
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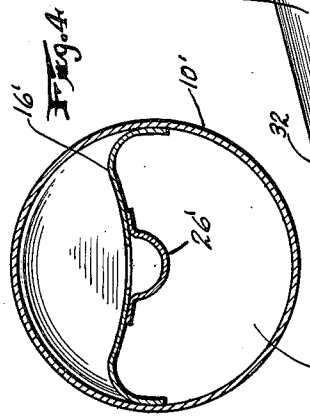
SOUND ATTENUATING GAS PIPE

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SOUND ATTENUATING GAS PIPE

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This invention relates to a sound attenuating gas pipe, and more particularly to a sound attenuating gas pipe for use in association with internal combustion engines for conveying the exhaust gases therefrom and for attenuating the noise level of said exhaust gases.

It is an object of our invention to provide a sound attenuating pipe which will convey the exhaust gases emanating from an internal combustion engine, which will attenuate the noise level of such exhaust gases, which will effect such sound attenuation over a wide range of frequencies, which can be economically manufactured from metal-tubing and sheet-metal stampings, and which will have limited space requirements.

In accordance with the preferred form of our invention, there is provided an elongated pipe having an elongated wall surface mounted within it and partitioning the pipe interior into a main gas-flow passage and a plurality of axially spaced resonator volumes, the end walls of said resonator volumes being formed by a plurality of projections formed in said wall surface and abutting the pipe inner wall. A plurality of channeled members are mounted on said wall surfaces and act in combination therewith to form a plurality of resonator volume throats opening into the resonator volumes and the main gas-flow passage to operatively interconnect said volumes and passage for silencing the gases moving through said passage.

Other objects and features of our invention will become apparent from the more detailed description which follows and from the accompanying drawings, in which:

FIG. 1 is an isometric view partially in section showing a gas pipe embodying our invention;

FIG. 2 is an enlarged fragmentary longitudinal section of the gas pipe shown in FIG. 1;

FIG. 3 is an enlarged vertical section taken on the line 3—3 of FIG. 2;

FIG. 4 is a vertical section similar to FIG. 3 but showing a modified form of our invention; and

FIG. 5 is a fragmentary isometric view of the stamping shown in FIG. 2.

Our sound attenuating gas pipe is adapted to convey the exhaust gases away from an internal combustion engine and to reduce the noise level of said gases. As shown in the drawing, our invention comprises an elongated pipe 10 adapted to be connected to the exhaust manifold of an internal combustion engine by a conventional mounting flange 12. Conveniently, the pipe 10 may have an outer diameter of about 2.25 inches, the diameter of conventional exhaust and tail pipes.

Mounted on the interior of the pipe 10 is an elongated wall surface conveniently in the form of a sheet-metal stamping 14 having a plurality of axially spaced wall stretches 16 extending across the interior of the pipe 10 to form a partitioning wall dividing the interior of the pipe 10 into a main gas-flow passage 18 and a plurality of axially spaced resonator volumes 20. The axially extending edges 22 of the wall stretches 16 are bent into an arcuate configuration and are rigidly secured to the inner wall of the pipe 10 in any convenient manner. The wall stretches 16 are interrupted by axially spaced projections 24 extending out of the plane of said stretches to abut segments of the circumference of the inner wall of the pipe 10 and thus form the end walls of the plurality of

resonator volumes 20. Preferably, a plurality of stampings 14 are employed and are disposed along only the straight sections of the pipe 14 so as to not interfere with the bending of the pipe 10 into the desired contours.

As shown in FIGS. 2 and 3, an elongated channeled member 26 is mounted on each of the wall stretches 16 between each adjacent pair of projections 24 within one of the resonator volumes 20. The axially extending edges 28 of the member 26 are rigidly secured to the wall stretch 16, such as by welding, so that with the open side of the channel presented toward said wall stretch, said channel and the underlying portion of the wall stretch 16 cooperate to form an elongated resonator volume throat 30. The ends of said throat constitute an opening 32 formed in the wall stretch 16 in radial and axial alignment with said channeled member 26 and an open end 34 of said channeled member, the opposite end of said channeled member being closed as at 36. Thus, each of the throats 30 operatively interconnects one of the resonator volumes 20 with the main gas-flow passage 18 for silencing the exhaust gases moving through said passage.

It is well established in the field of resonator design that a longer resonator throat will cause the resonator to attenuate a lower range of sound wave frequencies. Therefore, to tune the resonators so that the volumes 30 will attenuate different ranges of sound wave frequencies, it is merely necessary to adjust the axial spacing between the openings 32 and the open ends 34 of the channeled members 26. As will be obvious, when the openings 32 are spaced more closely to the open ends 34 to the channeled members 26, the resonator volume 20 in communication therewith will attenuate a higher range of sound wave frequencies than if said openings are spaced farther apart.

A modified form of our invention is illustrated in FIG. 4, and differs from the embodiment shown in FIG. 3 in that the channeled members 26' are mounted on the face of the wall stretches 16' to dispose said channeled members in the main gas-flow passage 18' to achieve a more intimate coupling between said main gas-flow passage 18' and the resonator volumes. This difference in the placement of the channeled members 26' is the only difference between the modification shown in FIG. 4 and the embodiment of our invention shown in FIG. 3, both modifications operating in the same manner.

While our invention has been described for use in an exhaust system, it is to be understood, of course, that it can also be used on the intake side of an internal combustion engine for transporting and silencing the gaseous mixture into the engine and for any other operations involving the transfer and silencing of gas streams. It may also be employed in association with other silencing means such as a conventional muffler, other types of in-line silencers, or the like, in which event it has a relatively short length, and does not extend from the engine manifold to the terminal gas discharge point.

We claim as our invention:

1. In a sound attenuating gas pipe for conveying and attenuating the noise level of a moving gas stream, an elongated pipe, an elongated stamping mounted on the inner wall of said pipe and extending thereacross to form a partitioning wall dividing the interior of said pipe into a main gas-flow passage and a plurality of axially spaced resonator volumes, said stamping having a plurality of axially spaced projections abutting circumferential segments of said pipe to form the end walls of said resonator volumes, and a plurality of elongated channeled members mounted on said stamping and forming therewith a plurality of elongated volume throats, each of said throats opening into said main gas-flow passage and one of said

volumes to operatively interconnect said volume and the main gas-flow passage for attenuating the noise level of the exhaust gases moving through said passage.

2. The invention as set forth in claim 1 in which said stamping is provided with wall stretches interposed between said projections with said main gas-flow passage and resonator volumes being disposed on opposite sides of said stretches, and said channeled members are rigidly mounted on said wall stretches.

3. In a sound attenuating gas pipe for conveying and attenuating the noise level of a moving gas stream, an elongated pipe, an elongated stamping mounted within said pipe and having a plurality of axially extending wall stretches extending across said pipe whereby the portions of the pipe interior on the opposite sides of said wall stretches form a main gas-flow passage and a plurality of axially spaced resonator volumes, a plurality of axially spaced projections formed on said stamping integrally connecting its adjacent wall stretches and abutting circumferential segments of the inner wall of said pipe to form the end walls of said resonator volumes, and an elongated channeled member mounted on each of said wall stretches and acting in combination with the portion of the wall stretch in alignment therewith to form an elongated resonator volume throat, said channeled member having an open end and the wall stretch in alignment therewith having an opening formed therein whereby said throat operatively interconnects one of the volumes with the main gas-flow passage for attenuating the noise level of the gases passing therethrough.

4. The invention as set forth in claim 3 in which said wall stretches have axially extending marginal edges rigidly secured to the inner wall of said pipe for holding the stamping in a fixed position within said pipe.

5. In a sound attenuating gas pipe for conveying and attenuating the noise level of a moving gas stream, an elongated pipe, an elongated stamping mounted within said pipe and having a plurality of axially extending wall stretches extending across said pipe whereby the portions of the pipe interior on the opposite sides of said wall stretches form a main gas-flow passage and a plurality of axially spaced resonator volumes, means interposed between the adjacent ends of adjacent wall stretches and extending between said wall stretches and the inner wall of said pipe to form the end walls of said resonator volumes, and an elongated channeled member mounted on each of said wall stretches and acting in combination with the portion of the wall stretch in alignment therewith to form an elongated resonator volume throat, said channeled member having an open end and the wall stretch in alignment therewith having an opening formed therein whereby said throat operatively interconnects one of the volumes with the main gas-flow passage for attenuating the noise level of the gases passing therethrough.

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