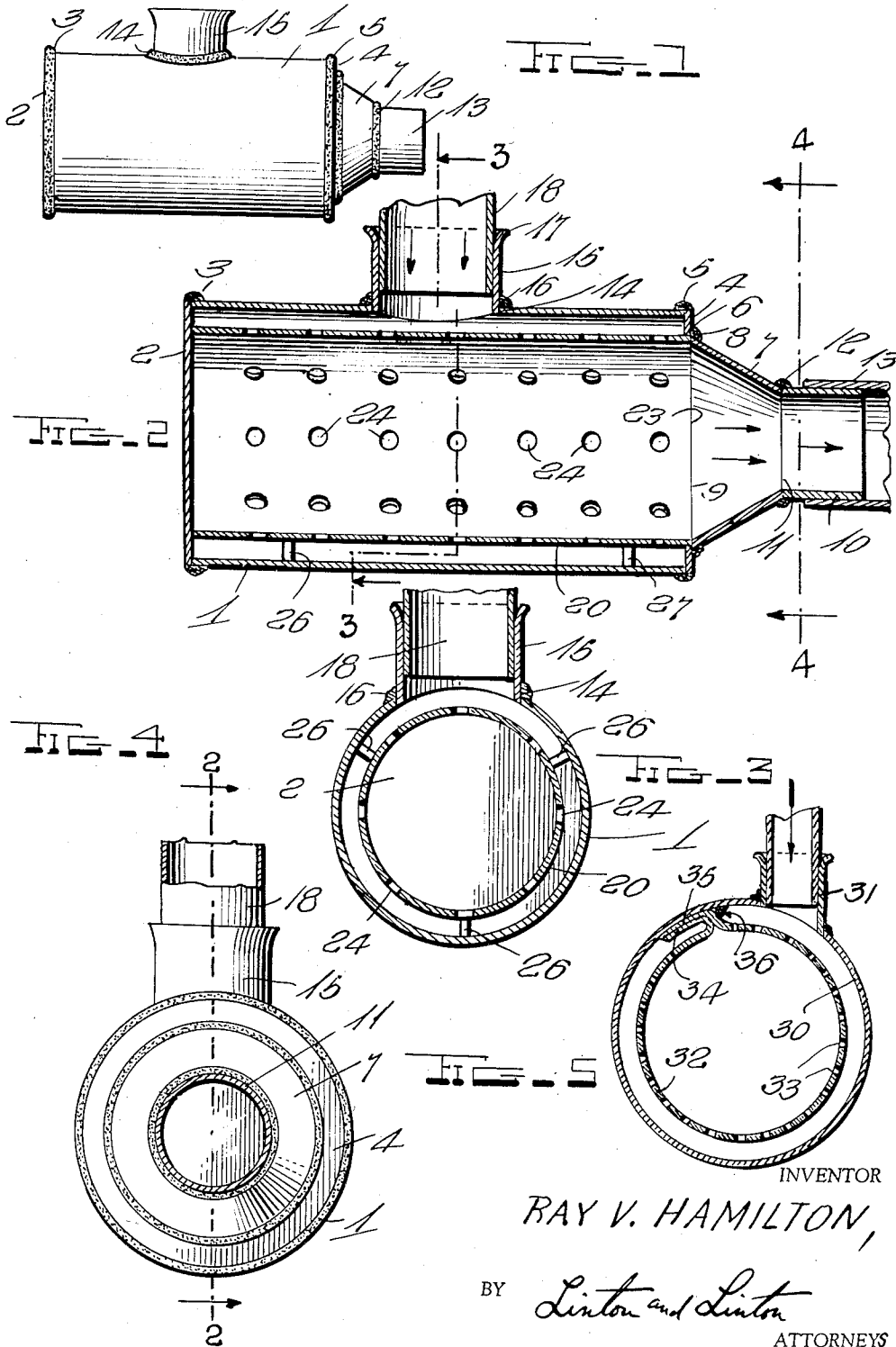


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ACOUSTICAL FILTERS FOR THE EXHAUST
OF INTERNAL COMBUSTION ENGINES
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ACOUSTICAL FILTERS FOR THE EXHAUST OF INTERNAL COMBUSTION ENGINES

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1 Claim. (Cl. 181—57)

The present invention relates to acoustical filters principally for use in muffling exhaust gases containing noise sound waves emitted from internal combustion engines without interfering with the transmission of the exhaust gases.

The principal object is to provide an improvement in noise filters such as mufflers for internal combustion engines in which the noise sound waves are essentially eliminated and which muffler permits the ready passage of the exhaust gases.

A further and also important object of the invention is to produce a muffler which is of a relatively simple construction, can be economically produced and which while deadening sound waves passing therethrough, allows for the passage of large amounts of solid particles in such gases as are discharged by internal combustion engines, particularly of the diesel type.

Further objects of the invention will be in part pointed out and in part obvious from the following description of the accompanying drawings, wherein:

Fig. 1 is a side elevation of the present acoustical filter.

Fig. 2 is an enlarged detailed cross sectional view of the present device as taken on line 2—2 of Fig. 4.

Fig. 3 is a vertical section taken on line 3—3 of Fig. 2.

Fig. 4 is a further vertical section taken on line 4—4 of Fig. 2, and

Fig. 5 is a vertical section through a modified form of acoustical filter.

Referring now more in detail to the accompanying drawings, wherein like and corresponding parts are designated by similar reference characters, numeral 1 refers to the body of the present device consisting of an elongated tubular member open at both ends. A flat plate 2 extends across one open end of tubular member 1 for closing that end thereof and is fixedly connected thereto by welding, or the like, 3. The opposite end of tube 1 has a flat plate 4 mounted thereon and also connected thereto by welding 5. Said plate 4 has a large circular central opening 6 and an inwardly tapering exhaust tube 7 is connected to plate 4 by welding 8 and the base of said tube 7 surrounds opening 6. A straight tube 10 has an edge 11 thereof abutting the outer edge of tube 7 and connected thereto by welding 12. The conventional exhaust pipe 13 can be slid over tube 10 for conveying gases therefrom. The top medial portion of tube 1 has provided an annular opening 14 into which extends a tube 15 substantially at right angles to tube 1 and fastened thereto by welding 16. The top of tube 15 is outwardly flared for the ready admittance of an exhaust pipe 18 connected to the exhaust ports of an internal combustion engine.

An elongated tube 20 open at both ends is positioned concentrically within tube 1 with one end abutting plate 2 of the outer tube 1. The opposite open end of tube 20 extends within opening 6 of plate 4 with edge 23 abutting against edge 9 of tube 7. Tube 20 has series

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of perforations 24 formed throughout the entire body thereof. Tube 20 has the periphery thereof spaced from the interior face of tube 1 by supporting legs 26 and 27 connected to and positioned between said tubes.

Upon attaching tube 15 to the exhaust pipe 18 of an internal combustion engine, the gases being exhausted from said engine as a result of the explosion of fuel therein which gases contain not only the residue from such explosions, but also the alternating flow of noise sound waves, all of which pass into said tube 15. When the gases enter within tube 1 from said tube 15 they contact tube 20 which causes them to diverge and completely envelope tube 20 and then pass through perforations 24 out through tubes 7, 10 and 13 to the atmosphere. The area within tube 1 being larger than tube 15 permits the expansion of the gases, eliminating any possible back pressure in tube 18.

The exhaust gases in travelling within the tube 1 varies the speed of travel of the gases in that those entering for example through perforations 24 at the end portions of tube 20 take a longer time to travel than those entering through the medial perforations 24 and due to the different distances of travel, the wave frequencies of the sound accompanying the gases are changed and when the several streams of gases are joined, they are out of phase whereby the noise sounds are suppressed due to the conflict thereof.

The exhaust system of an internal combustion engine provides a half wave air column at certain operating frequencies and one of the problems relative thereto is to reduce the quality of the resonant air column to the point where despite its length and operating frequency, the opposition offered is extremely low or nil. The phasing action of the present filter is, accordingly, extremely effective in dampening the resonant column so that little resonant opposition is provided, thus adding to the filtering action of the device.

An important feature of the present muffler is that the exhaust gases enter through the top medial tube 15 and not from an end as this provides for a number of streams of gases with one stream taking the longest way through perforations 24 at the left end of tube 20, a second stream taking a short path through medial perforations 24 and a third path through perforations 24 adjacent the open end of tube 20 for further dampening the sound waves of the previously intermingled path of gases as well as those provided by the intermediate perforations 24.

In Fig. 5 there is shown a modified form of the invention having an elongated cylindrical casing 30 open at one end to an exhaust pipe in the same manner as casing 1, but having an inlet tube 31 positioned off center at the top thereof for receiving the exhaust from pipe 18. Within casing 30 a tube 32 extends longitudinally of the entire length thereof in the same manner as tube 20. Tube 32 is formed from a rectangular piece of sheet metal which has perforations 33 therethrough providing a fine mesh while the ends 34 and 35 are bent over one another forming a tube. Said ends 34 and 35 are welded to the inner face of casing 30 as at 36 for attachment thereto and spacing therefrom.

The exhaust from an attached internal combustion engine enters casing 30 through tube 31 and is thoroughly broken up by the fine mesh screening provided by the perforations 33 of tube 32 creating a high degree of conflict among the sound waves in said exhaust whereby said sounds are dampened before exiting through the connected exhaust tube.

The present invention is concerned primarily with an acoustical filter or muffler for use on large vehicles such as buses, trucks and the like utilizing large horsepower engines for moving heavy loads and thus requiring an

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exhaust muffler capable of withstanding large pressures, continuous use and considerable amounts of exhaust.

The present invention is capable of being modified to meet particular requirements and such changes thereto as come within the scope of the appended claim are deemed to be a part of the present invention.

What I claim is:

An improvement in sound filters for the exhaust of internal combustion engines comprising an elongated tube, a plate fixedly mounted on and extending across an end of said tube for closing the same, a second plate having a central opening and fixedly mounted across the other end of said tube, an exhaust tube mounted on and extending from said second plate with the bore thereof in communication with said second plate opening, said first-mentioned tube having an opening provided in a medial side portion thereof, an inlet tube fixedly mounted on and extending substantially perpendicular from the side of said first-mentioned tube with the bore thereof being in communication with said tube side opening and adapted for being connected to the exhaust pipe of the internal combustion engine, a second elongated tube having a plurality of openings provided throughout the wall of the same and having one end connected to and closed by said first-mentioned plate and its opposite end extending through said second plate opening and being

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in communication with the bore of said exhaust tube, said second tube being formed from sheet material with the meeting sides thereof overlapping and extending from said second tube, and means connecting the overlapping sides of said second tube to the interior face of said first tube with said tubes positioned concentric to one another but spaced apart by said overlapping sides extending from said second tube dividing said first-mentioned casing into two longitudinal sections extending the entire length of said first-mentioned casing whereby the exhaust from said first inlet tube is caused to travel in at least two divergent directions before reaching said exhaust tube being muffled thereby.

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