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ACOUSTIC AND PURIFYING EXHAUST MUFFLER

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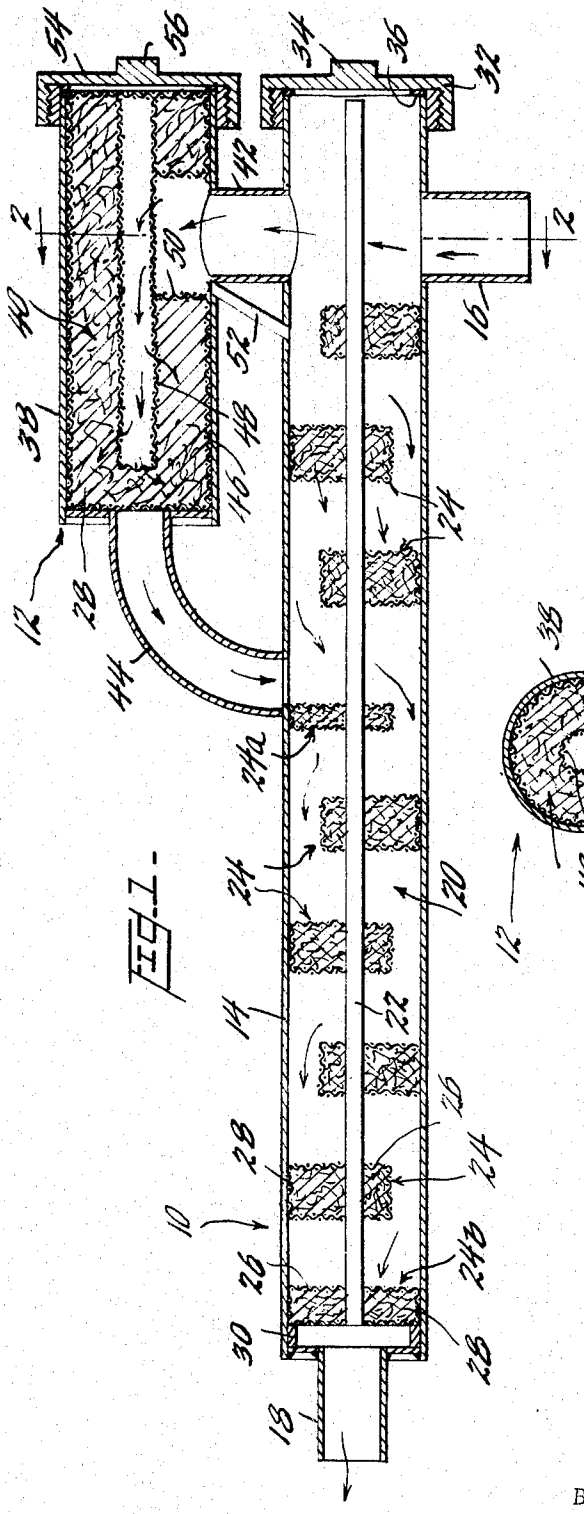


FIG. 1

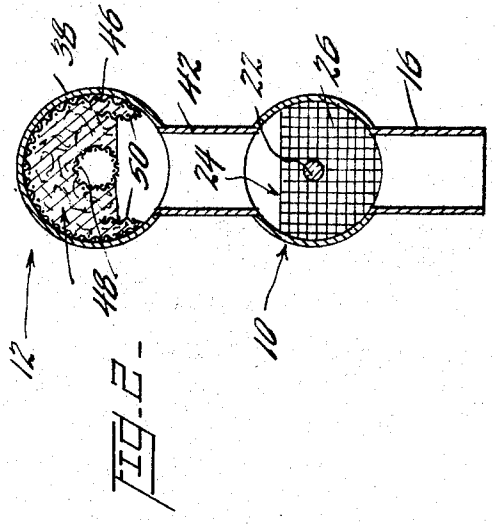


FIG. 2

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ACOUSTIC AND PURIFYING EXHAUST MUFFLER

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ABSTRACT OF THE DISCLOSURE

The invention disclosed is an acoustic and purifying engine exhaust muffler comprising a primary, side entry exhaust chamber with a plurality of removable filter elements mounted on a core, and a secondary chamber, having entry and exhaust ports communicating with the primary chamber, and packing therein, to absorb exhaust impurities. A relief line vent may be provided between the chambers to prevent creation of back pressure in the muffler assembly.

This invention relates to exhaust mufflers for internal combustion engines or the like in general, and, more particularly, to an improved acoustic and purifying muffler assembly.

The prior art devices are innumerable, none yet having attained the maximum of optimum performance, and the minimum of cost and maintenance. The problem of the automobile's contribution to air pollution is acute, yet no one or number of exhaust control devices is available that is inexpensive and trouble-free so as to gain popularity, yet effective to reduce the amount of air pollutants generated into the atmosphere.

The prior art devices range from the sublime to the exotic, but generally include a chamber, and an arrangement of filter elements therein to entrap the exhaust particles and gasses. These devices have two significant shortcomings. First, the filters must be replaced frequently, as they quickly become clogged with exhaust particles. Secondly, these filters cannot block the passage of exhaust fumes too effectively, as this would create back pressure in the engine exhaust system, thus causing the engine to stall.

The present invention overcomes these two serious disadvantages by providing a muffler assembly whose filters need only be changed every 4,000 to 6,000 miles of vehicle operation, or about every time an oil change is required, said filters requiring only a matter of a few moments for changing, the muffler assembly being of the side entry type and including an auxiliary chamber for removing most of the objectionable particles from the exhaust, and a back pressure relief system for preventing the reentry of exhaust fumes and particles into the engine.

Basically, the invention comprises a primary, acoustic muffler chamber, including an elongated shell with intake and exhaust ports and a removable, central core with a plurality of filter elements thereon, which also serve as baffles to abate engine noise. A secondary, auxiliary muffler chamber is mounted on one side of the primary chamber, parallel thereto, and includes an entry port communicating with the primary chamber, an exhaust outlet, also communicating with the primary chamber, medially thereof, and an internal filter packing for absorbing exhaust gasses and materials. A relief line is mounted adjacent the entry port of the auxiliary chamber, and also communicates with the primary chamber to vent the exhaust line of the engine and thus prevent back pressure from forming therein.

Specific details of construction and further objects and

advantages of the invention may be had by reference to the following specification and drawings in which:

FIGURE 1 is a side, elevational view of the invention, and

FIGURE 2 is a sectional view, taken along lines 2—2 of FIG. 1.

Referring now to the drawings by reference character, there is shown the invention comprising a primary, acoustic and filtering muffler assembly **10** and a secondary, filtering assembly **12**. Assembly **10** includes an elongated shell **14**, an inlet port **16**, for receiving hot exhaust gasses from an internal combustion engine or the like (not shown), an exhaust port **18**, for releasing the treated exhaust fumes into the atmosphere, and an internal filter and baffle assembly **20**. Assembly **20** comprises a central support rod **22**, and a plurality of spaced, baffle and filter elements **24**. Each element **24** is constructed with an external wire mesh skeleton **26** which is packed with hydrocarbon absorbing material **28**. One element **24***a* is of reduced thickness for purposes to be explained below, and an end element of disc configuration **24***b* is provided near exhaust port **18**. A spacer ring **30** separates element **24***b* and exhaust port **18**. Each element **24** and element **24***a* are in the form of a circle minus a segment, as shown in FIG. 2, so as to impart a swirling motion to the exhaust gasses interiorly of primary muffler **10**, thus causing exhaust noise to be diminished and the exhaust fumes to pass around and through filter elements **24**, **24***a*, and **24***b*, so that the objectionable constituents therein may be removed. The elements **24**, **24***a*, and **24***b* which comprise the first filter assembly, occupy, preferably, a total volume less than 50% of the volume of shell **14**, so that the possibility of back pressure is minimized.

Packing material **28** may be of various materials which have been proven successful in treating internal combustion engine exhaust fumes, by removing objectionable hydrocarbon compounds and carbon monoxide. Preferably, asbestos will be used. Alternatively, alumina, or aluminosilicates could be employed, with or without the addition of minor amounts of metal oxides having catalytic properties.

The forward end of shell **14** is threaded to receive a removable cap **32** having a raised, wrench-engaging portion **34** thereon. A washer **36** is located between cap **32** and the threaded end of shell **14** to seal the end and prevent escape of exhaust fumes.

Secondary muffler assembly **12** includes a second shell **38** of reduced length, an internal filter structure **40**, an entry port **42**, and an exhaust line **44**. As may be seen in FIG. 1, shell **38** is mounted in parallel relationship to shell **14**. Entry port **42** communicates with shell **14** and is placed co-axially with respect to inlet port **16** so that the direct blast of exhaust fumes from the internal combustion engine is received first by secondary muffler assembly **12**. Therefore, filter structure **40** fills a greater portion of shell **38** than filter assembly **20** fills shell **14**.

The forward end of shell **38** is also threaded to receive a removable cap **54** having a raised, wrench engaging portion **56** thereon. A washer **58** is placed between cap **54** and the threaded end of shell **38** to seal the end and thus prevent any escape of exhaust fumes therethrough.

Filter structure **40** includes an external skeleton **46** and an internal skeleton **48** defining a central core in muffler **12** so that exhaust fumes may be spread evenly throughout filter **40**. A bore **50** is formed in a portion of filter **40**, adjacent entry port **42** for the introduction of exhaust fumes to the internal core of filter **40**. Filter **40** is also packed with material **28**. Filter **40**, which comprises the second filter assembly, occupies, preferably, a volume greater than 60% of the total volume of shell **38**, so as to provide high heat retention in the secondary

muffler assembly thereby assuring optimum exhaust purification.

Exhaust line **44** conducts the partially cleaned exhaust fumes from muffler **12** to primary muffler **10** where the fumes are filtered again and exhaust noise is further reduced before the gasses are released into the atmosphere through exhaust port **18**. It can be seen in FIG. 1 that filter element **24***a* is of reduced thickness in order to provide a clear and unobstructed entry area for exhaust line **44**.

It is apparent that any back pressure that might form in the invention will be mostly dissipated by the dual muffler assemblies as discussed above. In particular, at least a portion of the exhaust fumes entering through inlet port **16** will pass into primary muffler **10**, while the direct exhaust will be received by secondary muffler **12**. It is possible that pressures might increase within secondary muffler **12** so as to cause the exhaust gasses to escape through bore **50** into entry port **42** and eventually to inlet port **16**, thus possibly causing the internal combustion engine to suffocate. A back pressure relief line **52** mounted adjacent the junction of entry port **42** and bore **50** and communicating with shell **14** allows any pressure formed within secondary muffler **12** to escape into primary muffler **10** before back pressure in the invention rises to critical levels.

As discussed above, filter assemblies **20** and **40** should be replaced at periodical intervals, such as every 4,000 to 6,000 miles of vehicle operation, provided the engine is in good working condition. Of course, if the engine "burns oil" or otherwise emits a larger quantity of objectionable exhause fumes than normal, the filters will have to be replaced more frequently. Replacing the filter assemblies requires only a few moments, as this is accomplished by merely removing caps **32** and **54** with the aid of a convenient wrench and withdrawing the soiled filter assemblies. New filters may then be inserted and the caps replaced.

The invention may be used with or in place of the muffler or mufflers already installed on the vehicle. The location of the invention in the exhaust line of the vehicle may be at the rear of the vehicle, or in any suitable place under the vehicle, provided that the caps **32** and **54** are accessible.

It is apparent from the foregoing that we have invented a new and highly useful device in the art of acoustic and purifying mufflers, and that various modifications of the invention may be employed without departing from the scope of the invention. Therefore, we are not to be limited to the exact construction as hereinbefore provided, except as may be deemed to be within the scope of the following claims.

We claim:

1. An acoustic and purifying exhaust muffler for an internal combustion engine or the like comprising a first muffler assembly and an auxiliary muffler assembly, said first muffler assembly comprising an elongated, tubular shell, an inlet port for exhaust fumes emitted from said engine, at the forward end of said shell, on a side thereof, an exhaust port on the remote end thereof, a removable filter assembly within said elongated shell, said auxiliary muffler assembly comprising a second tubular shell of reduced length, mounted in parallel relationship with said elongated shell, an entry port formed in a side wall of said second shell, and extending to and communicating with said elongated shell, on a side opposite said inlet port, an exhaust line from said second shell to said elongated shell, a second, removable filter assembly within said second shell, first closure means for removal of said first filter from said elongated shell and second closure means for removal of said second filter from said second shell.

2. The device of claim **1** wherein said first removable filter assembly comprises a central support rod, extending approximately the length of said elongated cylinder, and a plurality of filter elements, each of said elements in the form of a circle minus a segment in cross section.

3. The device of claim **2** wherein one of said plurality of filter elements is in the form of a complete circle, in cross section and is located at the end of said rod, adjacent said exhaust port.

4. The device of claim **2** wherein said each of said filter elements comprises an external wire mesh skeleton and a plurality of loose catalytic particles within said skeleton, the total volume of said first filter assembly being less than fifty percent of the total volume of said first shell.

5. The device of claim **1** wherein said second, removable filter assembly comprises an external wire mesh skeleton, an internal wire mesh skeleton, a plurality of loose catalytic particles between said internal and external skeletons, and additional wire mesh means defining a bore from said internal skeleton to said external skeleton, said bore being located approximately co-axially with said entry port.

6. The device of claim **5** wherein said internal skeleton forms a central core in said second filter assembly, said core located approximately along the axis of said second shell, and said second filter assembly having a total volume greater than sixty percent of the total volume of said second shell.

7. The device of claim **1** wherein each of said means for removal of said filters from said shells comprises a cap, threadably received on the forward end of said shell, said cap sealingly engageable with said forward end to prevent escape of said exhaust fumes therethrough, and removable from said forward end to permit withdrawal of a filter assembly therefrom.

8. The device of claim **1** wherein said second muffler assembly includes a back pressure relief line, mounted adjacent the junction of said entry port and said second shell, and communicating with said elongated shell.

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55—276, 387; 181—36, 44