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Jatcko

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[54] **EXHAUST SILENCER**

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[52] **U.S. Cl.** ..... **181/60;** 181/36 A; 181/49

[51] **Int. Cl.²** **F01N 1/08**

[58] **Field of Search** ..... 181/36 A, 57, 60, 40, 72, 181/46, 47 R, 55, 41, 49

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[57] **ABSTRACT**

An exhaust silencer for gases has a hollow cylindrical body with a uniform bore. An inlet at one end of the body is adapted to receive an exhaust pipe. A cap is anchored across the other end of the body. A plurality of spaced rows of outlet holes are formed through the body, said holes inclined at an acute angle to the body axis. The holes of one row extend forwardly and outwardly and the holes of an adjacent row extend rearwardly and outwardly, said rows of holes alternating in direction and extending around the body.

8 Claims, 4 Drawing Figures

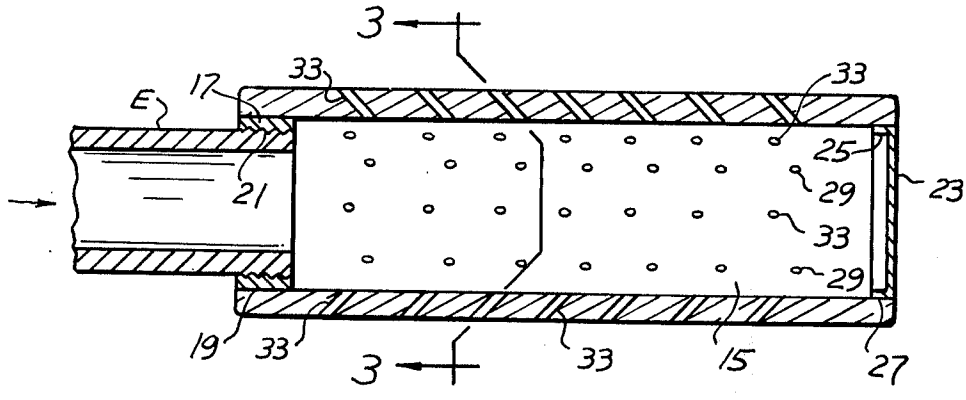


FIG. 1

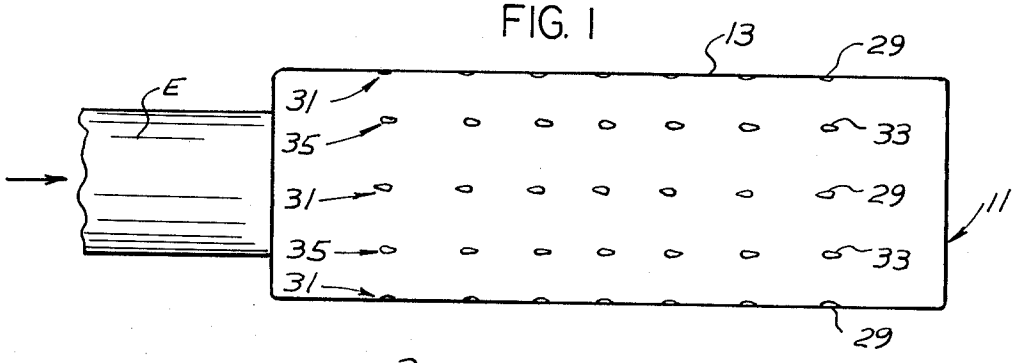
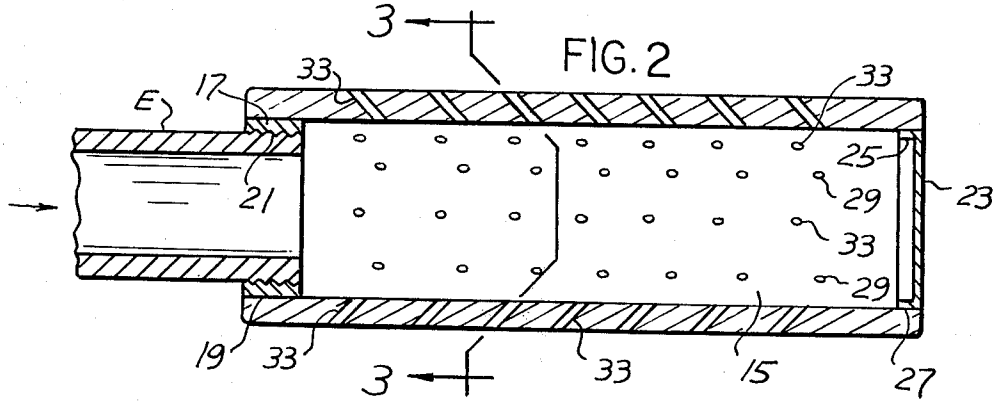


FIG. 2



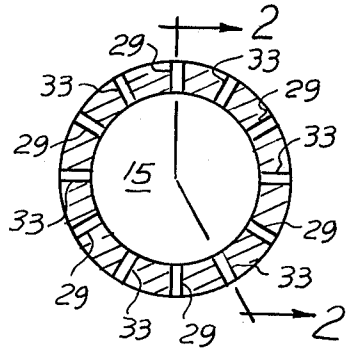


FIG. 3

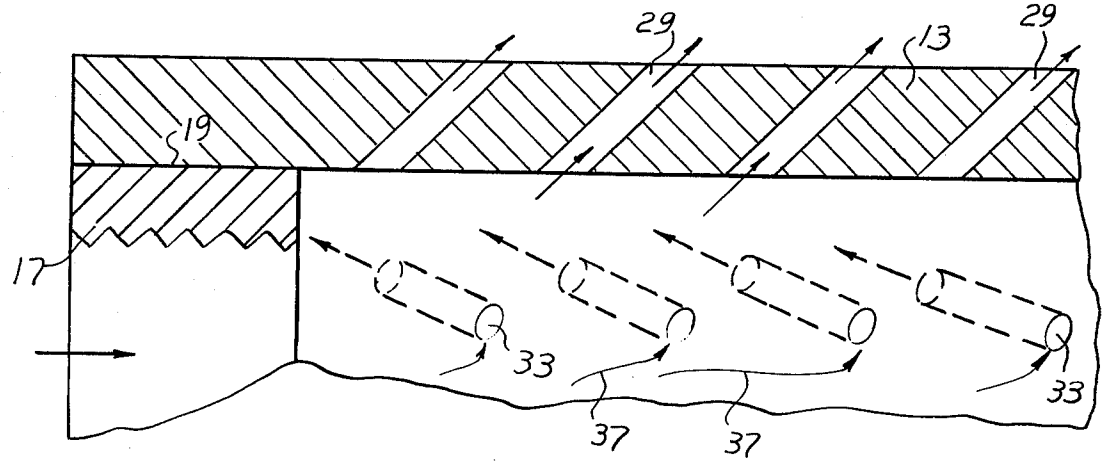


FIG. 4

EXHAUST SILENCER

BACKGROUND OF THE INVENTION

There has long existed the need for an efficient muffler or silencer for internal combustion engines including automobile, motorcycle, diesel, compressed air engines, air valves and air-operated equipment. Various efforts have been made to reduce the level of noise as much as possible. The difficulty with some exhaust silencers is in view of the internal construction thereof, considerable back pressure is developed against the free escape of the exhaust.

BRIEF DESCRIPTION OF THE INVENTION

It is an object of the present invention to provide an improved and simplified exhaust silencer which is simple in construction and provides an efficient means for silencing exhaust gases including gases from internal combustion engines, motorcycles, diesel engines, air engines, air valves and air-operated equipment, without creating back pressure.

Other objects will be seen from the following specification and claims in conjunction with the appended drawing.

THE DRAWING

In the drawing:

FIG. **1** is a side elevational view of the present exhaust silencer.

FIG. **2** is a longitudinal section thereof as connected to the outlet of an exhaust pipe, fragmentarily shown.

FIG. **3** is a section taken in the direction of arrows **3—3** of FIG. **2.**

FIG. **4** is a fragmentary view corresponding to FIG. **2,** on an increased scale illustrating the direction of flow of exhaust gases within and from the silencer body.

It will be understood that the above drawing illustrates merely a preferred embodiment of the invention, and that other embodiments are contemplated within the scope of the claims hereafter set forth.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawing, the present exhaust silencer, shown at **11,** FIG. **1,** is adapted to substantially reduce the noise level of exhausting gases from internal combustion engines including automobiles, motorcycles, diesel engines or exhausting air from compressed air engines, air valves and air-operated equipment and the like. The present silencer includes a hollow, elongated cylindrical body **13** having a uniform bore **15** throughout its length.

An inlet for said body includes, for example, an intake fitting **17** which is press-fitted into one end of the body as at **19** and has a threaded bore **21.** Said inlet or inlet fitting is adapted to threadedly receive the outer end of the exhaust pipe E which is delivering exhaust gases from an internal combustion engine or the like or is delivering air exhaust from an air engine or other air-operated equipment. Exhaust pipe E is fragmentarily shown. While a separate fitting **17** is shown in FIG. **2,** it is contemplated that the exhaust pipe E could merely be threaded into the interior bore of the body or otherwise fitted thereinto and secured with respect to said body so that the exhaust gases pass through the inlet to the interior of said body. Pipe E may be replaced by a threaded fitting for an exhaust outlet.

Cap **23** is anchored at and across the other end of the body as a closure therefore. In the illustrative embodiment, said cap has an annular flange **25** which is press-fitted or otherwise secured into the bore **15.** Said cap may be made of a high-density polyethelene, for example, which is frangible. In other words, should there be a pressure build up upon the interior of the body due to a clogging of the outlets, the end cap is adapted to fracture to permit the escape of the exhaust gases. If the silencer were used for internal combustion engines, where the exhaust gases are hot, a thin, metallic frangible cap may be employed instead.

As shown in FIG. **1,** there are a plurality of spaced rows of outlet holes **29** which are formed through the body. Said holes are inclined at an acute angle to the body axis. In the illustrative embodiment, that angle is **45°.** It is contemplated that the angle may range between **30°** and **60°** approximately.

The holes **29** are longitudinally spaced uniformly throughout substantially the length of the body and are in a series of rows **31.** The holes **29** extend forwardly and outwardly of the body, as shown in FIG. **4.**

The series of rows **31** of said outlet holes are alternated by an additional series of rows **35** having uniformly spaced angularly disposed outlet holes **33.** These holes extend rearwardly and outwardly, as shown in FIG. **4.**

The respective rows **31** and **35** alternate around the entire circumferance of the body, thus, providing for the escape to atmosphere of the exhausting gases delivered to the body.

The flow of the exhaust gases is schematically shown in FIG. **4** with the direction of flow of said gases altered, as shown by the arrows, in such a manner as to intersect eachother and to result in an efficent silencing of said exhaust gases.

In the illustrative embodiment, the body wall is three-sixteenths of an inch thick and the diameter of the holes **29** and **33** is one-sixteenth of an inch. Thus, it appears that the diameter of said holes is one-third of the wall thickness. The wall thickness may be up to one-half inch, with the hole diameter one-third or less the wall thickness.

By this construction, the total cross-sectional area of the exhaust holes **29** and **33** is always greater than the cross-sectional area of the inlet aperture with the result that no back pressure is developed within the silencer.

The angularity of the holes **33** in the illustrative embodiment is **45°** to the longitudinal axis. It is contemplated, however, that this angularly can be modified within the range of **30°** to **60°** approximately.

In the handling of compressed air exhaust, the entire body may be constructed of a suitable plastic material, such as polystyrene, for example, though other plastic materials may be employed.

For internal combustion engines or with heated exhausts, it is contemplated that the body and associated parts will be of metal, such as aluminum or steel.

In normal operation, the exhaust gases will outlet through their respective sets of exhaust holes **29** and **33.** It is contemplated that should these holes become clogged in some manner, that as pressure builds up upon the interior of the body, the frangible end cap **23** will collapse or fracture to permit the escape of exhaust gases and to avoid a dangerous build up of pressure.

In the construction of the holes **29** and **33**, their size with respect to the wall thickness is such that there is no build up of back pressure within the silencer.

It has been found that the present silencer will reduce noise level to an area of below **60** decibles, approximately.

Depending upon the silencing problem involved and as an illustration, the diameter of the silencer may range between one and 2⅝ inches with the diameter of the air inlet varying in the range between one-fourth and **1** inch and with the number of holes per row varying, between **5** and **15**. The larger the body, the greater the number of rows of holes are provided. The diameter of the silencer may be up to **6** or more inches, depending upon the size of the inlet.

Having described my invention, reference should now be had to the following claims.

I claim:

1. An exhaust silencer for gases comprising a hollow elongated cylindrical body with a uniform bore;

an inlet at one end of the body adapted to receive an exhaust pipe;

a cap anchored at and across the other end of the body;

a plurality of spaced rows of outlet holes formed through the body;

said holes inclined at an acute angle to the body axis;

the holes of one row extending forwardly and outwardly, and the holes of an adjacent rows extending rearwardly and outwardly;

said rows of holes alternating in direction and extending around the body and substantially throughout its length, whereby exhaust gases passing said inlet move along the length of the body and escape through the rows of holes therein.

2. In the exhaust silencer of claim **1**, the diameter of the holes being such with respect to the body wall thickness and said inlet that no back pressure is developed within the body.

3. In the exhaust silencer of claim **1**, the angle of said holes relative to said axis being in the range of **30°** to **60°** approximately.

4. In the exhaust silencer of claim **1**, said holes extending at a **45°** angle approximately.

5. In the exhaust silencer of claim **1**, said holes having a diameter of approximately one-third of the wall thickness.

6. In the exhaust silencer of claim **1**, said cap being frangible and fracturable upon a build up of pressure in said body due to clogging of the holes.

7. In the exhaust silencer of claim **1**, the decibel level of exhaust noise being in the area of **60** decibels approximately.

8. In the exhaust silencer of claim **1**, said inlet including an internally threaded pipe fitting secured into said body.

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