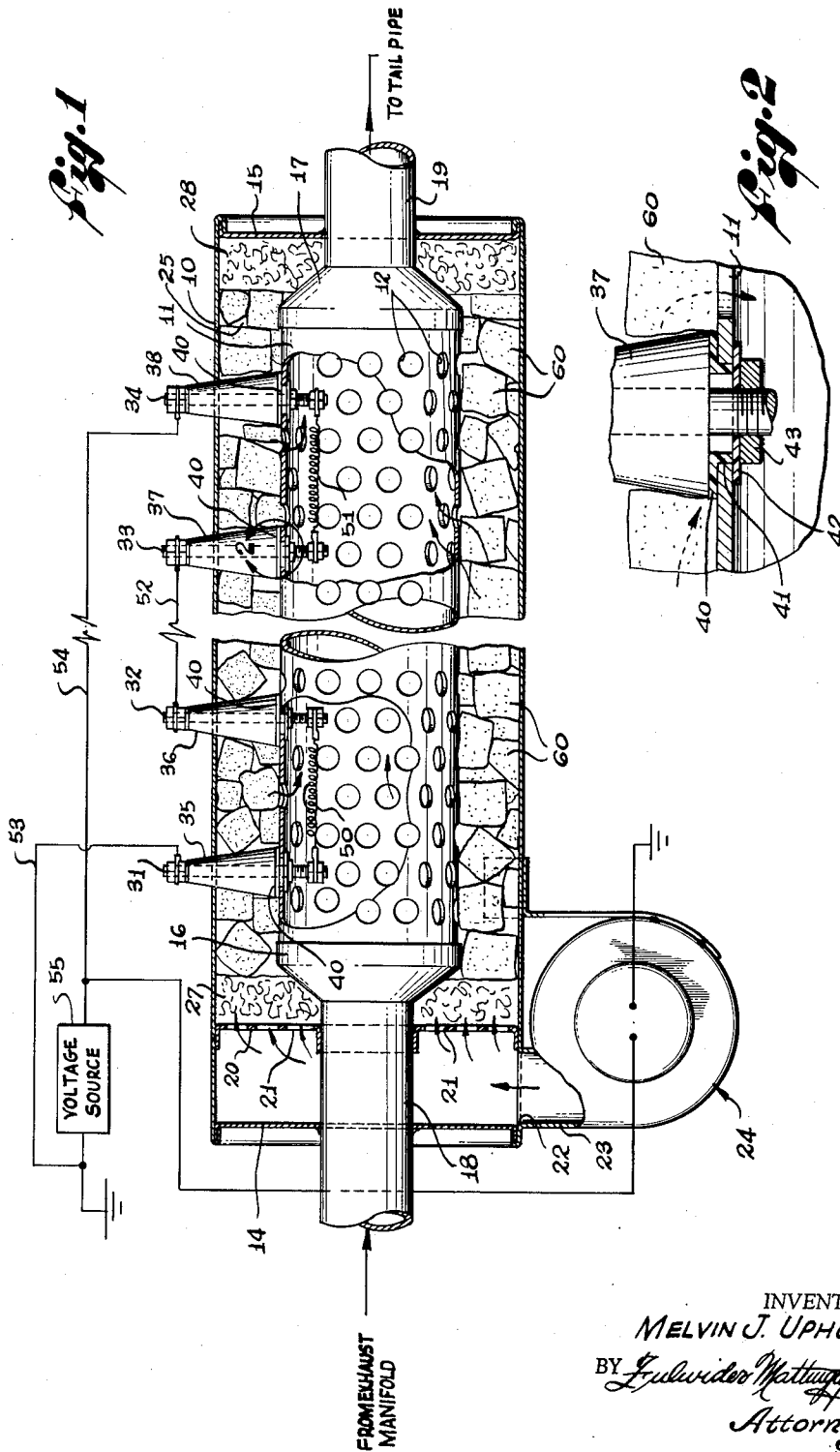


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ANTI-SMOG MUFFLER

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6 Claims. (Cl. 23-288)

This invention relates to mufflers, and more particularly to a muffler which incorporates an after-burner for substantially eliminating objectionable elements from the exhaust gases of an internal combustion engine.

Heretofore, many attempts have been made to reduce or eliminate the eye-irritating products which enter the atmosphere. It is well established that a major source of such irritants is the automobile engine. In some large metropolitan areas, atmospheric conditions are such as to permit the irritants from thousands of automobiles to accumulate and remain close to the ground. The name "smog" has been used to define this condition, which causes vexatious eye and lung irritations.

Many attempts to reduce or eliminate smog have been directed toward controlling fuel flow and combustion, as by decreasing the amount for combustion during deceleration. Such devices are generally complex and difficult to install. Not only are they ineffective to substantially reduce irritants in the exhaust gases, but they constitute expensive attachments for vehicles. They are therefore unacceptable as an item to be provided or required as standard equipment on automobiles.

It is an object of this invention to provide inexpensive means for substantially reducing irritants in the exhaust gases of automotive engines.

It is another object of this invention to provide a muffler in which smog-producing elements are burned up.

A further object of this invention is to provide a simple device to serve as a muffler and as means to burn up smog-producing elements in the exhaust of an internal combustion engine.

Yet another object of this invention is to provide a combination muffler and after-burner for substantially reducing smog-producing irritants in the exhaust of an engine.

It is still a further object of this invention to provide a device to be placed in the path of exhaust gases from an engine for substantially eliminating smog-producing elements therein.

A still further object of this invention is to provide an anti-smog muffler comprising a minimum number of component parts of simple design and rugged construction, capable of reliable operation over a long operating life.

The above and other objects and advantages of this invention will become apparent from the following description, taken in conjunction with the accompanying drawing of a preferred embodiment thereof, and in which:

FIGURE 1 is a sectional view of my muffler and after-burner construction; and

FIGURE 2 is an enlarged fragmentary sectional view of the mounting arrangement for the electrodes used in my device.

Referring to the drawing, the anti-smog muffler of my invention comprises a pair of concentric cylinders 10 and 11, wherein the inner cylinder 11 contains a plurality of apertures 12. The ends of the outer cylinder 10 are closed by end plates 14 and 15.

A pair of frusto-conical caps 16, 17 are fitted over the ends of the inner cylinder 11, and terminate in respective smaller diameter tubes 18, 19 which extend through the end plates 14, 15. As indicated, the tube 18 is adapted to be connected to the exhaust manifold of an automotive vehicle, and the tube 19 is adapted for connection to the tail pipe.

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Also encircling the tube 18 intermediate the end plate 14 and the cap 16 is a plate 20 having a plurality of apertures 21 therein. An opening 22 is provided in the outer cylinder 10 between the end plate 14 and the apertured plate 20, and the outlet pipe 23 of a blower device 24 is connected to such opening.

Thus, the plates 14, 20 and the outer cylinder 10 define a chamber surrounding the tube 18, and through this chamber air from the blower 24 is passed into the annular space 25 between the cylinders 10, 11.

Within the annular space 25 between the cylinders 10, 11, porous packing rings 27, 28 of insulation material are disposed adjacent the end plate 15 and the apertured plate 20. The material of the rings 27, 28 may be rock-wool or any suitable insulating material.

Four spaced conductive rods 31, 32, 33 and 34 extend through the cylinders 10, 11, so that one end thereof projects into the interior of the inner cylinder 11, and their upper ends are outside the outer cylinder 10. These rods are supported in respective insulators 35, 36, 37 and 38, which may be of porcelain or other heat-resistant material.

The insulators 35, 36, 37 and 38 are shown to be frusto-conical, with their larger ends abutting the inner cylinder 11 and being secured thereto. To this end, rings 40 are disposed about rods between the respective insulators 35, 36, 37, 38 and the cylinder 11, with stub bosses 41 (see FIGURE 2) extending into the cylinder 11. Abutting the inner surface of the cylinder 11 and the inner ends of the bosses 41 are respective washers 42. These washers also surround the rods, and nuts 43 are threaded on the rods and tightened against the washers so as to secure the insulators in place. The rings 40 and the washers 42 are of heat-resistant material (e.g., heat-resistant fibre or the like).

A heating element 50 is connected between the ends of the rods 31, 32, and a similar heating element 51 is connected between the rods 33, 34. These heating elements preferably are made of material (e.g., Nichrome wire) which heats rapidly to a very high temperature (e.g., 1300° F.) when connected to a low voltage source, and which will not deteriorate under constant heating.

On the exterior of the outer cylinder 10, the ends of the rods 32 and 33 are directly connected, as at 52. The outer ends of the rods 31 and 34 are connected, as at 53 and 54, to a voltage source 55, such as the generator of the vehicle. The blower 24 is also operable from the source 55.

Thus, while the engine is running, the heating elements 50, 51 glow brightly, and constitute sources of heat to effect combustion of unburned products of the exhaust gases which pass through the inner cylinder 11. If desired, a voltage boost device (not shown) may be connected between the source and the connections 53, 54 to more readily heat the elements 50, 51.

The entire annular space 25 between the insulating rings 27, 28 is filled with a heat-resistant material. Although many materials may be used for this purpose, e.g., fibre-glass, I prefer to use small elements of firebrick, as indicated at 60. Preferably, the elements 60 are small (e.g., 3/4-inch cubes) to provide a porous mass through which air from the blower 24 can pass readily to the interior of the cylinder 11, and yet is sufficiently compact to prevent the outer cylinder 10 from being unduly heated.

Air entering the interior of the cylinder 11 constitutes a source of oxygen which, in the presence of the heated elements 50, 51, results in the combustion of much of the carbon monoxide and hydrocarbons which hitherto have escaped into the atmosphere.

Preferably, the inner cylinder 11 is formed of a material capable of withstanding extremely high temperatures, e.g., stainless steel.

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It has also been found that the material within the annular space 25 is adaptable for retaining chemicals which will effect conversion of irritants in the exhaust gases into harmless elements. For example, I have impregnated the firebrick elements 60 with nickelous nitrate, and discovered that this arrangement functions over a period of months to help reduce irritants in the exhaust gases. It is thought that some chemical interaction takes place which causes smog-producing elements to be converted to harmless compounds.

Not only does my invention function to burn up irritants and unwanted gases from the exhaust of an automotive vehicle, but it also functions as an effective muffler. It is apparent that the double-cylinder construction, with apertures in the inner cylinder, is typical muffler construction. However, I have found that by forcing air into the inner cylinder through the annular space 25, and by providing the heated elements 50, 51, I achieve a muffling effect which is superior to that of prior art mufflers.

With respect to how the muffling effect is obtained, it is believed that, by virtue of the forced air feature of my invention, the annular space 25 is maintained at a lower temperature than the interior of the inner cylinder 11. Thus, the gases in the cylinder 11 have a greater tendency to rise through the apertures 12 in the cylinder. However, when the gases pass up through the apertures, they are immediately forced back by the cooler air being forced into the space 25 through the plate 20. Accordingly, more effective baffling of the gases is achieved with my invention than with prior art mufflers.

The additional heating of the gases by the heater elements 50, 51 also enhances the baffling effect, and for the same reason, i.e., the greater the differential in the temperatures within the cylinder 11 and the annular space 25, the more readily the gases tend to pass through the apertures 12. The forcing of the gases back through the apertures as above described insures better baffling.

While I have illustrated and described a preferred embodiment of my invention, it will be apparent that various changes may be made therein without departing from the spirit and scope of my invention. Therefore, I do not intend that my invention shall be limited, except as defined in the appended claims.

I claim:

1. Apparatus for eliminating air pollutants from the exhaust gases issuing from the manifold of an internal combustion engine comprising: a pair of generally concentric tubular members; the outer tubular member having end plates, one end plate, located nearer the exhaust manifold, having an aperture through which to admit exhaust gases from the manifold and the other end plate, located farther from the exhaust manifold, having an aperture to permit the escape of the exhaust gases; a perforated plate having a plurality of apertures smaller than the aperture in said end plate nearer the exhaust manifold, said perforated plate being located near to and spaced from said end plate nearer the exhaust manifold; the inner tubular member extending from said perforated plate through the aperture in said end plate located farther from the exhaust manifold, the transverse dimension of said inner tubular member being larger than that of the aperture in said end plate nearer the exhaust manifold, said inner

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tubular member having a plurality of apertures in its lateral surface; the annular space between said inner tubular member and said outer tubular member intermediate said perforated plate and said end plate farther from the exhaust manifold containing therein pieces of porous heat-insulating material, said pieces of heat-insulating material containing chemical means to aid in effecting elimination of air pollutants from the exhaust gases; at least one heating element being located within said inner tubular member; means for heating said heating element to an ignition temperature sufficient to effect combustion of air pollutants within said inner tubular member; a conduit having a diameter smaller than that of said inner tubular member extending through the aperture in said end plate nearer the exhaust manifold to direct the exhaust gases through the aperture in said end plate nearer the exhaust manifold and axially into said inner tubular member in a direction away from the end plate nearer the exhaust manifold; and means operable to force air under pressure into the space between said end plate nearer the exhaust manifold and said perforated plate, through said perforated plate and between said pieces of heat-insulating material; whereby to allow expansion of a portion of the exhaust gases adjacent said perforated plate into the annular space containing the pieces of heat-insulating material.

2. Apparatus as defined in claim 1 wherein said means for heating said heating element is operable electrically; and circuit means connected to said heating means for effecting its operation concurrently with operation of the engine.

3. Apparatus as defined in claim 1, wherein said conduit terminates in an enlarged end portion matingly engaging the adjacent end of said inner tubular element.

4. Apparatus as defined in claim 1, wherein the air forcing means includes a blower device having an outlet connection extending through the lateral surface of said outer tubular member into the space between said end plate nearer the exhaust manifold and said perforated plate.

5. Apparatus as defined in claim 4, wherein said blower device is operable electrically; and circuit means connected to said blower device for effecting its operation concurrently with operation of the engine.

6. Apparatus as defined in claim 1, wherein said pieces of porous heat-insulating material are pieces of fire brick, and wherein said chemical means in said fire brick pieces is nickelous nitrate.

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