

April 13, 1965

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 DEVICE FOR REDUCING AIR POLLUTION FROM
 INTERNAL COMBUSTION ENGINES

3,177,650

Filed Nov. 27, 1962

2 Sheets-Sheet 1

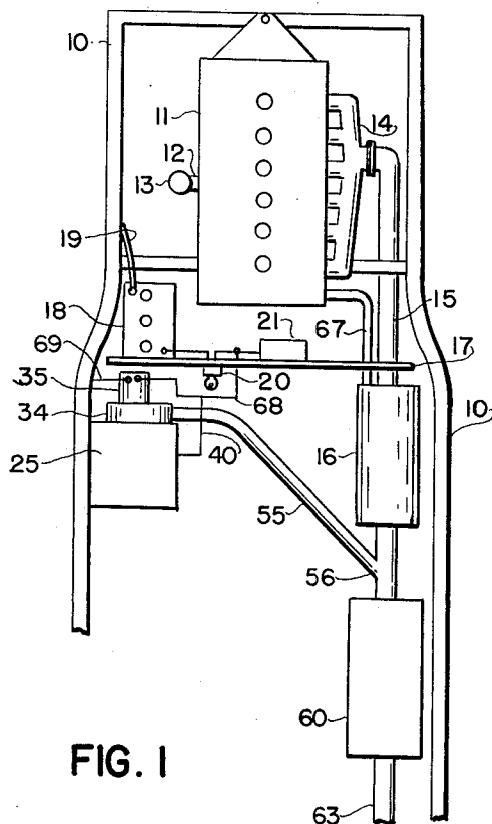


FIG. 1

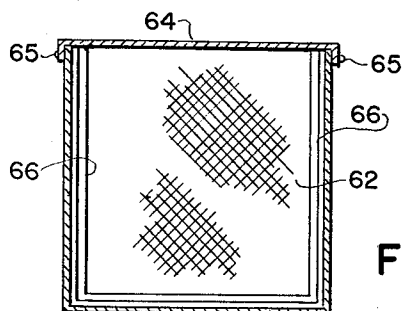


FIG. 3

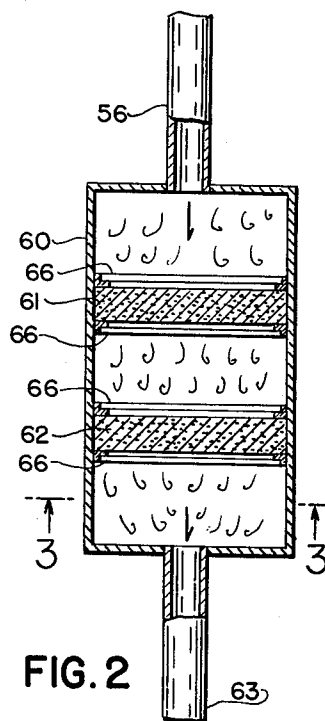


FIG. 2

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Filed Nov. 27, 1962

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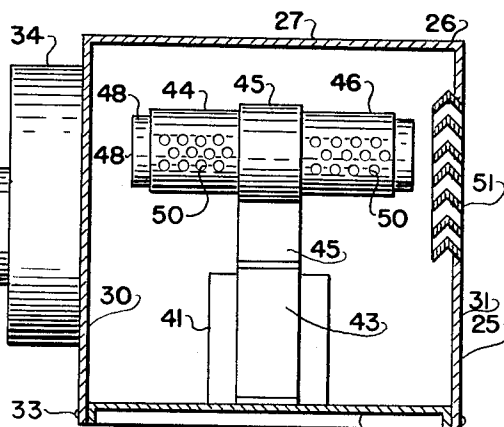
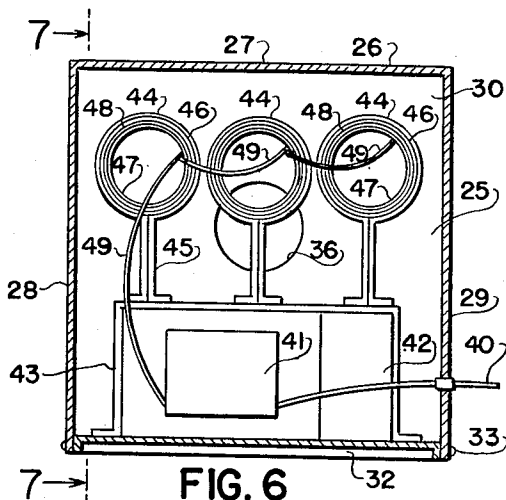
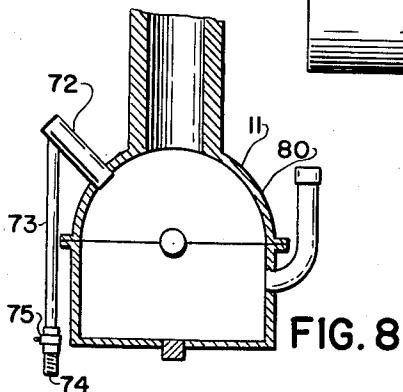
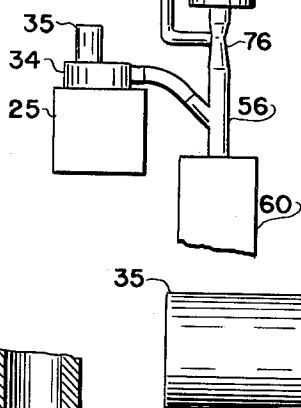
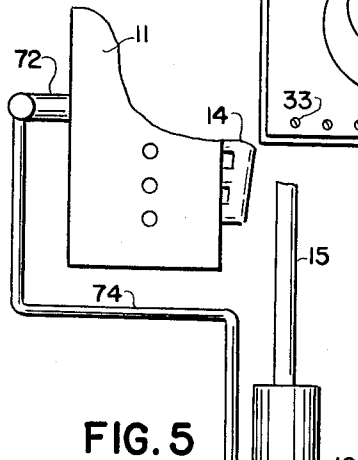
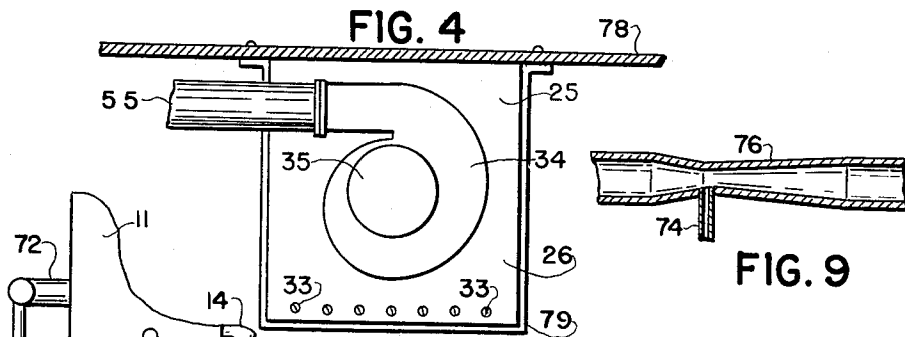


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3,177,650

DEVICE FOR REDUCING AIR POLLUTION FROM
INTERNAL COMBUSTION ENGINES

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Filed Nov. 27, 1962, Ser. No. 240,266

4 Claims. (Cl. 60—30)

This invention relates in general to devices which reduce the pollution of air by exhaust fumes and gases from internal combustion engines. More particularly, this invention mixes ions produced by the electrical decomposition of air with exhaust gases from an internal combustion engine so that the ions reduce the toxicity of the exhaust gases to a desired level.

A main object of this invention is to provide an apparatus which eliminates or reduces to a great degree the emission of poisonous fumes from the internal combustion engines of automobiles, buses, trucks, and the like.

Another object of this invention is to provide an air pollution control device which may be more inexpensively manufactured, which may be more easily installed on a vehicle, and which will function effectively for a longer period of time.

Many other objects, advantages and features of invention reside in the construction, arrangement and combination of parts involved in the embodiments of my invention and its practice as will be understood from the following description and accompanying drawing wherein:

FIGURE 1 is a top view of a motor vehicle frame with portions broken away, with an internal combustion engine mounted thereon, and with associated apparatus comprising a first embodiment of my invention shown in position;

FIGURE 2 is a longitudinal section in a horizontal plane through the mixing chamber of my invention;

FIGURE 3 is a vertical section taken on line 3—3 of FIGURE 2;

FIGURE 4 is a front elevational view of the ion generating unit of my invention shown mounted below a fragment of the body of an automobile;

FIGURE 5 is a top view of a fragment of an internal combustion engine shown connected to an ion generator and a mixing box according to a second embodiment of this invention;

FIGURE 6 is a transverse vertical section through one end of the ion generator;

FIGURE 7 is a longitudinal vertical section taken on line 7—7 of FIGURE 6 with the electrical leads removed;

FIGURE 8 is a transverse vertical section through a fragment of an internal combustion engine; and

FIGURE 9 is a longitudinal section through a venturi such as may be used in the second embodiment of my invention.

Referring to the drawing in detail, FIGURE 1 shows a conventional automobile or other motor vehicle frame 10 on which an internal combustion engine 11 is mounted. An oil filler tube 12 closed by a cap 13 extends from one side of the motor 11. An exhaust manifold 14 extends from the other side of engine 11. The hot exhaust gases containing noxious and poisonous fumes pass from the manifold 14 into an exhaust pipe 15 which leads to a muffler 16.

Mounted in front of a conventional dash panel 17 is an automobile battery 18 which is grounded to the frame 10 by means of a conventional ground lead 19. An ignition key operated switch 20 connects the battery 18 to a conventional ignition system designated by the block 21.

Referring now to FIGURES 4, 6 and 7, an ion generator 25 has a substantially rectangular container 26 with the top wall 27 and the side walls 28, 29, 30 and 31. A bottom wall 32 is fixed within the side walls by means of the screws 33.

A centrifugal exhaust blower 34 is fixed to wall 30 and

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is driven by motor 35. As may be seen in FIGURE 6, blower 34 draws through the aperture 36 in wall 30. Referring further to FIGURES 6 and 7, an electrical lead 40 extends into container 26 to be connected to a suitable transformer 41. Since current from battery 18 is direct current, a suitable alternator 42 may be provided to enable transformer 41 to function. Transformer 41 steps up the voltage to several thousand volts.

The transformer 41 and the alternator 42 are secured to the bottom wall 32 by means of a bracket 43. Mounted on top of bracket 43 are three ion generators 44. Each ion generator 44 consists of an outer bracket 45 which is welded, riveted or otherwise fixed on top of bracket 43. Within the upper loop of each bracket 45 there are disposed two tubular electrodes 46 and 47 separated by a longer tubular piece of mica 48. Each outer electrode 46 is grounded through a bracket 45 and each inner electrode 47 is connected to a high voltage lead 49 from the transformer 41. Both the inner and outer electrodes 46 and 47 contain the closely spaced perforations 50. High voltage current arcing between the electrodes 46 and 47 ionizes air in the container 26 which is withdrawn from the ion generator 25 by blower 34. As ionized air is withdrawn from container 26, fresh air may enter through the louvers 51 in wall 31.

Referring again to FIGURE 1, ionized air is expelled by blower 34 through tube 55 to merge with the exhaust gases leaving muffler 15 in the Y connection 56. Tube 55 may be of flexible conduit which is joined to blower 34 and Y connection 56 by conventional clamps.

As shown in FIGURES 1, 2 and 3, the merged stream of ion charged air and exhaust gases emerge from the Y connection 56 and pass into a mixing box 60. The generally rectangular mixing box 60 is divided into three compartments by means of the two filter elements 61 and 62. These filter elements 61 and 62 may be of fiber glass or any other inert material. The filter elements 61 and 62 serve to retain or break up any large particles in the exhaust fumes and they cause the relatively complete mixing of the exhaust fumes with the ionized air so that the ions in the air may attack, combine with, and break down harmful pollutants in the exhaust gases while they are within the filtering and mixing box 60. The then greatly purified exhaust gases pass into the atmosphere through a conventional tail pipe 63.

The top cover 64 of the filter box 60 is held in place by means of screws 65. When the top cover 64 is removed, the filter elements 61 and 62 may be withdrawn and changed by sliding them upward from between the pairs of retaining flanges 66.

FIGURE 1 further shows a tube 67 conducting fumes from the crankcase of motor 11 through the muffler 16. Whether tube 67 leads into exhaust pipe 15 or muffler 16 or leads into the exhaust gases after they leave muffler 16, a certain amount of back pressure from the exhaust system will be induced into the crankcase. This back pressure is harmless and once the pressure is established in the crankcase, fumes will pass into the exhaust system to be purified in the mixing box 60.

Referring further to FIGURE 1, it may be seen that the closing of ignition switch 20 causes current to flow through lead 68 to motor 35 which is grounded through lead 69. Lead 40, which extends to transformer 41 and is shown in FIGURE 6, is also connected to lead 68. Thus it may be seen that, as soon as the ignition is turned on, the air pollution control apparatus automatically starts to function.

Referring now to FIGURES 5 and 8, internal combustion engine 11 is shown having a conventional crankcase breather 72 extending upward from its crankcase 80. A crankcase fume vent pipe 73 extends downward from the breather 72. Flexible conduit 74 is connected to

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the lower end of tube 73 by means of a conventional clamp 75. Disposed directly behind muffler 16 is a venturi 76 as shown in FIGURE 9. As the exhaust gases flow from muffler 16 through venturi 76, their increased velocity causes a pressure drop which tends to draw crankcase fumes from engine 11 through tube 74. Beyond venturi 76 there is disposed the Y connection 56 which introduces ionized air from the ion generator 25 into the exhaust stream. The ions then decontaminate the exhaust fumes in the manner which has been described.

As shown in FIGURE 4, ion generator 25 may be secured to the bottom 78 of an automobile by means of a suitable bracket 79. FIGURE 1 shows the ion generator attached to the frame 10 of an automobile while FIGURE 5 shows the ion generator attached as in FIGURE 4 much closer to the mixing box 60.

While I have disclosed my invention in the best forms known to me, it will nevertheless be understood that these are purely exemplary and that modifications in the construction, arrangement and combination of parts may be made without departing from the spirit of the invention. For example, the ion generators 44 may have flat parallel electrodes rather than tubular electrodes. Further, the various elements of my invention may be attached to a vehicle in any suitable location as well as those shown using any conventional tubing, piping, conduit or the like with any standard fittings.

I claim:

1. An air pollution control device for use with a motor vehicle having an internal combustion engine, an exhaust manifold leading from said engine, an exhaust pipe leading from said manifold, and a muffler entered by said exhaust pipe; said air pollution control device comprising, in combination, a mixing box having at least one inert, gas permeable filter element disposed across said mixing box dividing said mixing box into at least two transverse compartments, a Y connection leading from said muffler into said mixing box, an ion generator having a container, electrodes within said container, and a high voltage current source connected to said electrodes, an electric motor, a blower driven by said electric motor forcing ionized air from said container of said ion generator to said Y connection, ionized air from said ion generator entering

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said mixing box reducing the toxicity of exhaust gases in said mixing box, and a tail pipe conducting purified exhaust gases from said mixing box.

2. The combination according to claim 1 wherein said motor vehicle has an internal combustion engine having a crankcase, and with the addition of a tube leading from the crankcase of said internal combustion engine, and a venturi disposed between said muffler and said Y connection, said tube leading to said venturi so that said venturi draws fumes from said crankcase.

3. The combination according to claim 2 wherein said motor vehicle has a battery, and an ignition switch connected to said battery, said electric motor and said high voltage current source being connected to said battery through said ignition switch.

4. The combination according to claim 3 with the addition of cylindrical insulators and brackets, and wherein said container of said ion generator is a rectangular box having louvers at one end and said blower is fixed to the other end of said box exhausting ionized air from said container, said high voltage current source being inside said container and comprising an alternator and a transformer, said electrodes being concentric inner and outer tubes separated by said cylindrical insulators, said outer tubes being supported by said brackets above said high voltage current source and being grounded by said brackets, said inner tubes being connected to said high voltage current source, said electrodes being aligned between said blower and said louvers.

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