United States Patent [19]

Mercer

[11] **3,875,743**

[45] **Apr. 8, 1975**

[54] **EXHAUST DEVICE FOR INTERNAL COMBUSTION ENGINES**

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[22] Filed: **Aug. 10, 1973**

[21] Appl. No.: **387,468**

[52] **U.S. Cl.** **60/275;** 55/100; 55/256; 60/310

[51] **Int. Cl.** **F01n 3/04;** B03c 1/02

[58] **Field of Search** 60/275, 310, 311; 55/DIG. 30, 223, 244, 256, 89, 100

[56] **References Cited**

UNITED STATES PATENTS

3,282,047	11/1966	Wertheimer	60/310
3,485,015	12/1969	Vecchio	60/310
3,618,314	11/1971	Krebs	60/275
3,729,900	5/1973	Denning	60/310
3,762,135	10/1973	Ikebe	60/311
3,786,635	1/1974	Kates	60/310

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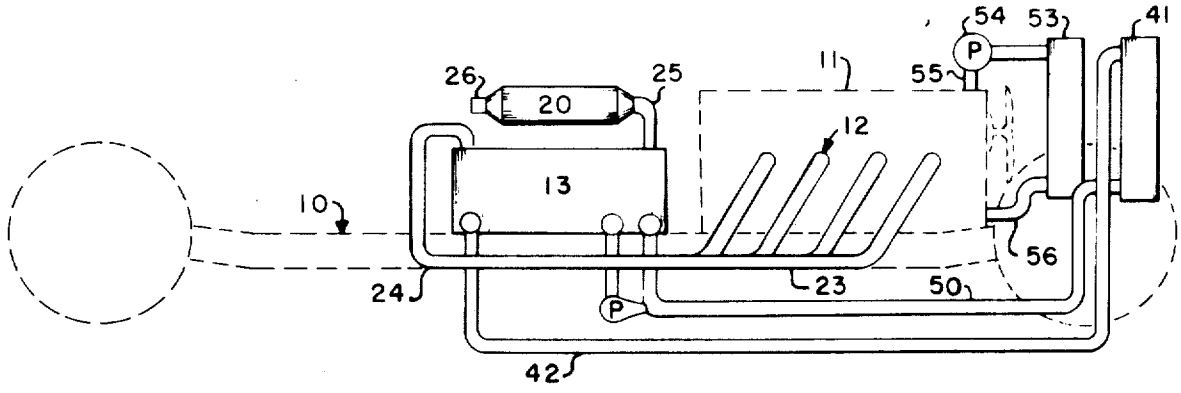
Attorney, Agent, or Firm—Willard J. Hodges, Jr.

[57] **ABSTRACT**

A combination of exhaust gas washer and fluid cooler and magnetic muffler comprising a compartmented washer connected to the exhaust system of an internal combustion engine, a system of check valves, a circulating pump and radiator for cooling the washing liquid. The gases from the washer are passed through a magnetic muffler prior to release to the atmosphere.

2 Claims, 8 Drawing Figures



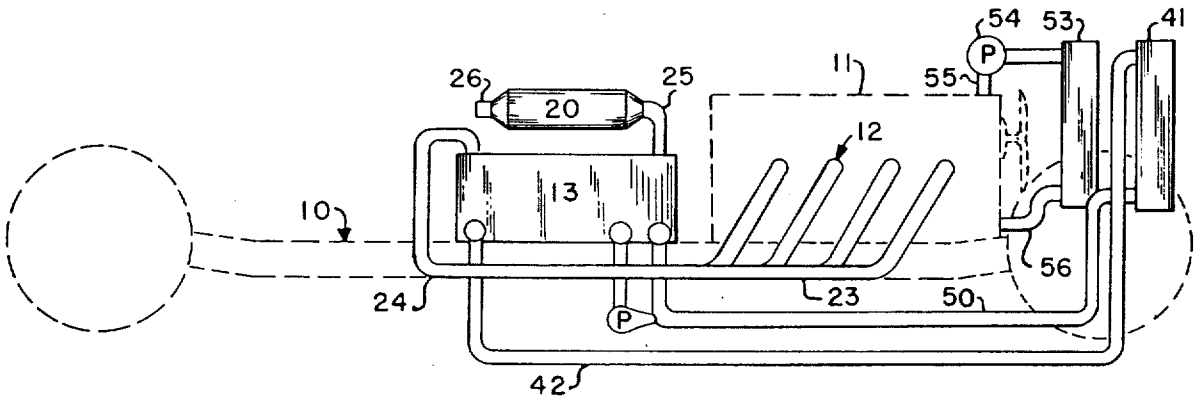


FIG. 1

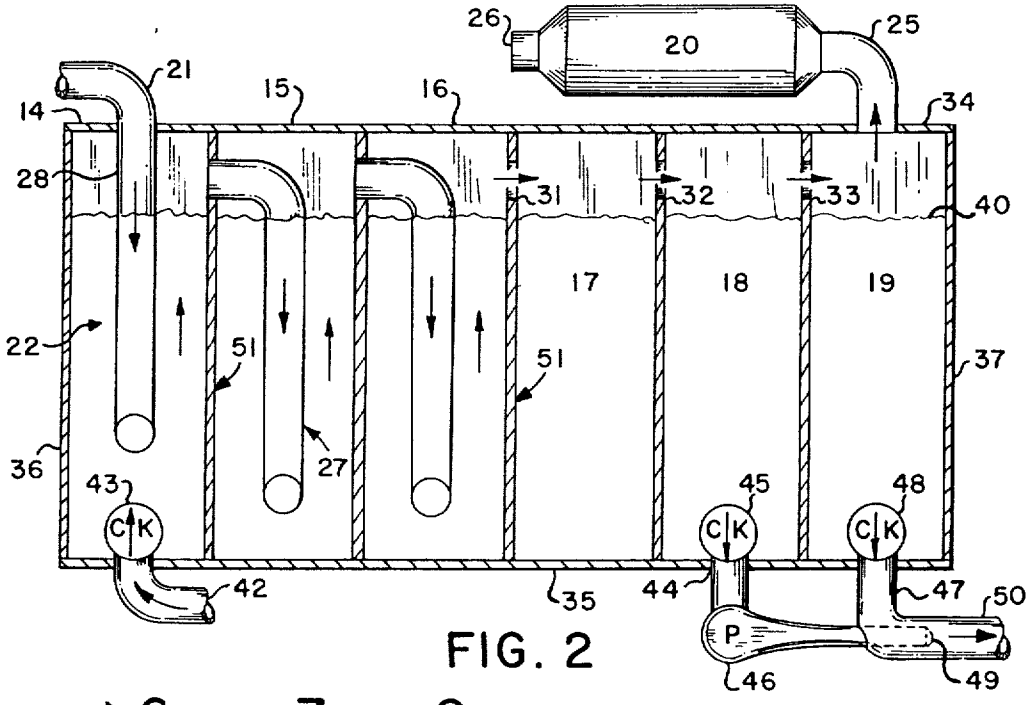


FIG. 2

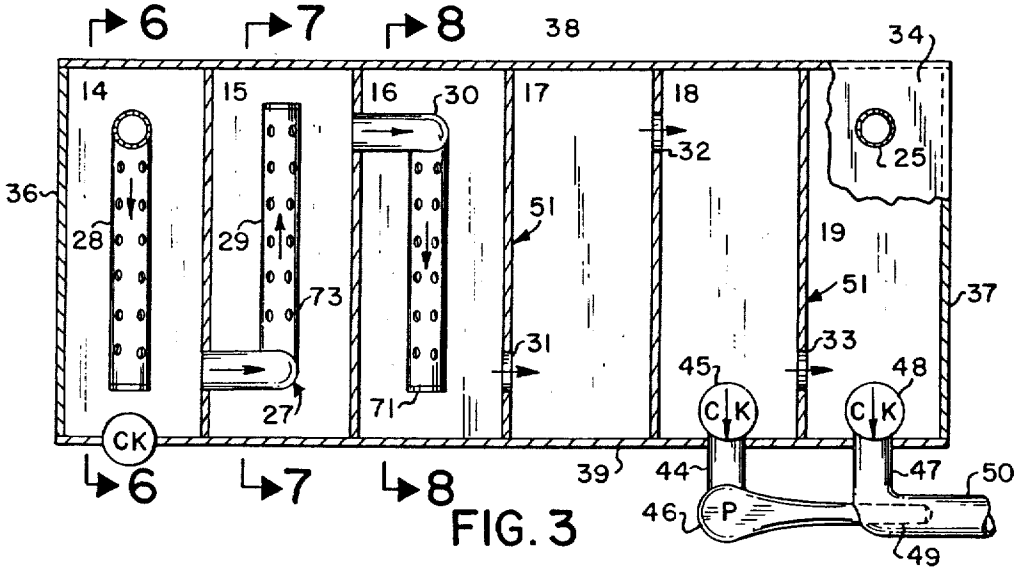


FIG. 3

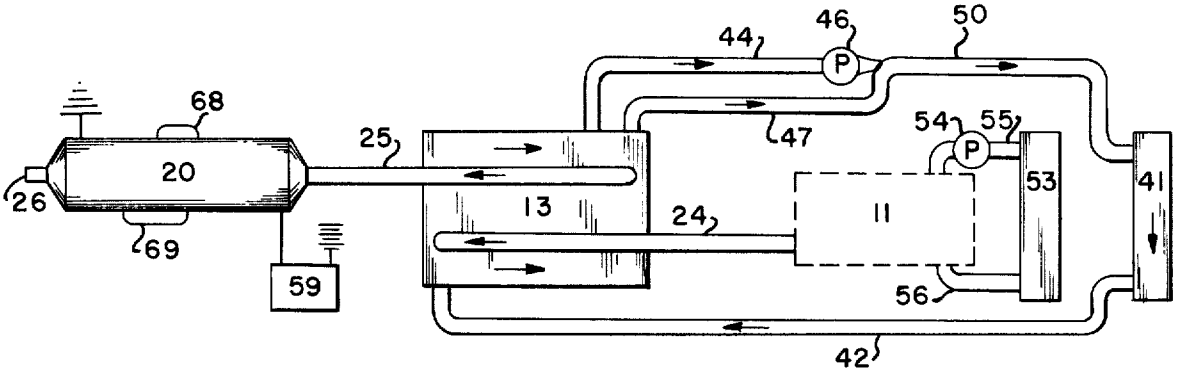


FIG. 4

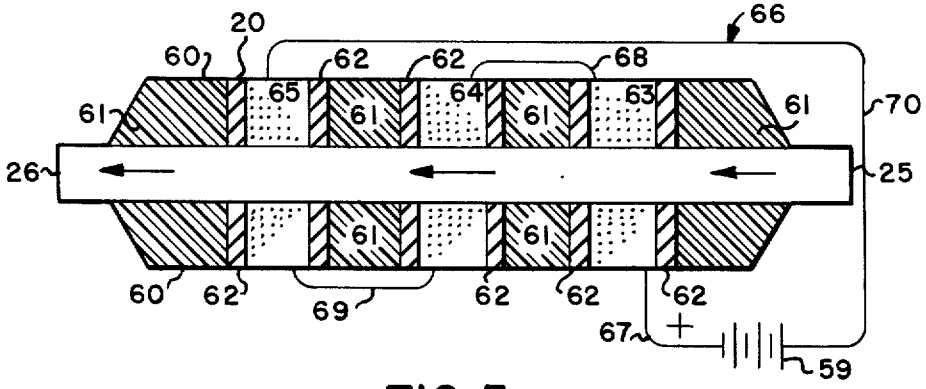


FIG. 5

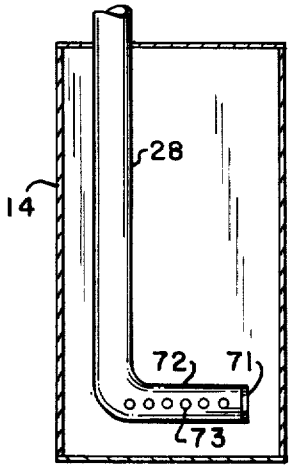


FIG. 6

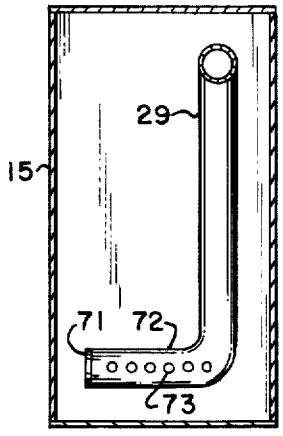


FIG. 7

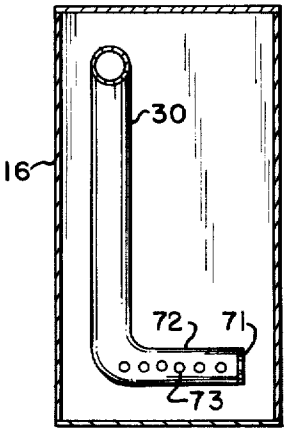


FIG. 8

EXHAUST DEVICE FOR INTERNAL COMBUSTION ENGINES

CROSS REFERENCE TO RELATED APPLICATION

This invention is related to and is an improvement to the inventor's prior application, Ser. No. 846,739, Aug. 1, 1969, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention.

This invention pertains to a device for cleaning exhaust gases of an internal combustion engine. The washer employs water mixed with a detergent and a circulating pump, a cooling radiator, and a magnetic muffler.

2. Description of Prior Art.

Washing and scrubbing towers for gases are old in the art. Various filters and exhaust cleaning devices for cleaning exhaust gases have been previously invented. Some are patented, such as Forry, U.S. Pat. No. 2,911,589, and the French patent to Bregeal, No. 607,670, filed Mar. 21, 1925. Current developments in an effort to reduce the free carbon particles, hydrocarbons, carbon monoxide, and nitrous oxides have employed various modified fueling systems in an effort to improve emission control. Current emphasis in exhaust systems appears to be stressing catalytic mufflers and regenerative systems to completely oxidize the exhaust gases.

SUMMARY OF THE INVENTION

This invention was arrived at by selective experimentation with various combinations and appears to have resulted in a device which satisfactorily controls the exhaust emissions. It is well known that a washer will tend to clean gases. The washer combined with the magnetic muffler powered by the 12 volt battery has in experimental tests indicated improved emission control.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a composite schematic illustrating a motor vehicle employing the device of this invention illustrating a preferred arrangement of the various components.

FIG. **2** is a sectionalized side elevation of the exhaust gas washer.

FIG. **3** is a top sectionalized view looking into various compartments of the washer.

FIG. **4** is a schematic flow chart for gases and washing liquids.

FIG. **5** is a sectionalized view of the magnetic muffler illustrated partially in schematic.

FIG. **6** is a sectionalized view of first compartment of the washer taken on line **6—6** of FIG. **3** looking in the direction of the arrows.

FIG. **7** is a sectionalized view of second compartment of the washer taken substantially on line **7—7** of FIG. **3** looking in the direction of the arrows.

FIG. **8** is a sectionalized view of the third compartment taken substantially on line **8—8** of FIG. **3** looking in the direction of the arrows.

For a description of the construction and operation of the preferred embodiment, reference is made to the attached several views wherein identical reference characters are utilized to refer to identical or equivalent components throughout the several views and the following detailed description.

DESCRIPTION OF THE PREFERRED EMBODIMENT

For a description of the construction and arrangement of the preferred embodiment, reference is particularly made to FIG. **1** which illustrates various components mounted on a motor vehicle and a possible arrangement for construction of the device. The device of this invention is primarily intended for mounting on a vehicle **10.** The vehicle **10** is powered by an internal combustion engine **11** having an exhaust system **12.** The exhaust gases are conducted through the exhaust system **12** into a washer **13** which from outward appearance comprises an enclosed, box-like structure constructed of a welded sheet metal. For a detailed description of the construction of the washer **13,** reference is particularly made to FIGS. **2–3** and FIGS. **6–8.** The washer **13** is constructed with a series of compartments which were formed by welding partition walls **51** in washer **13.** The exhaust system **12** of the internal combustion engine **11** leads into the first compartment **14,** in turn flows through second compartment **15,** third compartment **16,** then into a series of collecting and surge tanks characterized as a fourth compartment **17,** a fifth compartment **18,** sixth compartment **19.** Exhaust gases pass from the sixth compartment **19** through magnetic muffler **20.**

The preferred embodiment is intended for utilization in combination with internal combustion engine **11** having an exhaust manifold **23.** Exhaust manifold **23** feeds into a collector pipe **24** leading through the exhaust inlet **21** into first compartment **14** of the washer **13.** After the exhaust gases pass through the washer, they move out of the sixth compartment **19** through exhaust outlet **25** through the magnetic muffler **20** and are then exhausted through tail pipe **26.** The first three compartments of washer **13** employ a series of immersion tubes **27** for bubbling the exhaust gases through the water detergent mixture **22** contained in washer **13.** In the preferred embodiment, the water was mixed with a phosphate detergent readily available at grocery stores and supermarkets. The detergent mixture in the water prevents rust forming in the system. The solution is believed to contribute to the removal of some of the free carbon particles, carbon monoxide and nitrous oxide from the exhaust gases. The process of washing and cooling the exhaust gases employs various immersion tubes **27.** The tubes **27** are substantially "L" shaped construction and comprise first immersion tube **28** leading in through the top **34** of washer **13** and extends toward the bottom **35** of the first compartment **14.** A second immersion tube **29** leads from the first compartment **14** down into second compartment **15.** In similar fashion, a third immersion tube **30** interconnects the second compartment and the third compartment. These arrangements of immersion tubes **27** bubbles the gas through the water detergent mixture **22** cooling and washing the gases. The latter three compartments of washer **13** comprise the fourth **17,** fifth **18** and sixth **19** compartments which function primarily as collector or surge tanks. These various compartments are interconnected by passages. Constructed near the top **34** of washer **13** are passageways through the various partitions permitting the flow of gas and liquid. These passages are illustrated in FIGS. **2** and **3** as the third tank passage **31** interconnecting third compartment and the fourth compartment. The fourth tank

passage **32** interconnecting the fourth and fifth compartments and the fifth tank passage **33** interconnecting the fifth and sixth compartments. In the preferred embodiment, these tank passages were staggered as best illustrated in FIG. **3.**

As previously generally stated, the washer **13** is a box-like structure constructed of welded sheet metal comprising a washer top **34,** a bottom **35,** a first end wall **36** and a second end wall **37.** To enclose the structure a first side wall **38** and a second side wall **39** are employed to complete the box-like washer **13.** The washer system is preferably filled with the water detergent mixture to the indicated water detergent line **40.** Suitable filling and drain plugs may be provided (not illustrated) for refilling and changing the mixture. Periodic changes may be desirable after the water detergent mixture is contaminated with exhaust emissions. The heated exhaust emissions in passing from the engine **11** through collector pipe **24** tend to heat the water detergent mixture **22;** accordingly, it is necessary to employ a radiator **41** for cooling. Radiator **41** is interconnected to the washer **13** by washer inlet pipe **42** through inlet check valve **43.** Various arrangements could be employed for circulating and cooling the water detergent mixture **22** in the system; however, in the preferred embodiment, a combination of two outlets from the washer **13** were employed for returning the liquid to radiator **41.** The first washer outlet **44** from the fifth compartment **18** led to washer pump **46.** This first outlet **44** receives fluid through fifth outlet check valve **45.** A second washer outlet **47** from the sixth compartment **19** in a comparable manner utilizes a sixth compartment check valve **48.** In the particular arrangement employed in the preferred embodiment, washer outlet **44** and washer outlet **47** were interconnected adjacent washer pump **46** in such a manner as to employ an outlet suction jet **49.** The general arrangement of this structure is quite conventional in that a jet with a reduced orifice leading from washer pump **46** projects into the washer to radiator conduit **50.** This arrangement creates a suction effect on washer outlet **47** of the sixth compartment **19.** The washer to radiator conduit **50** leads into radiator **41.** This enclosed circuit could perhaps be utilized in the engine cooling radiator **53;** however, in the preferred embodiment, a separate engine cooling radiator **53** was employed for cooling the internal combustion engine **11.** This cooling system employed a conventional water pump **54** and a top radiator hose **55** and a bottom radiator hose **56.** The positioning of pump **46** and jet **49** can be varied. An electric pump **46** may be positioned adjacent washer **13** as illustrated in FIGS. **2** and **3** or an arrangement of FIG. **4** may be employed with pump **46** and jet **49** positioned adjacent and driven by engine **11.**

The exhaust gases from the sixth compartment **19** of washer **13** move through the exhaust pipe **25** into magnetic muffler **20.** For a description of the construction of the muffler **20** of the preferred embodiment, reference is particularly made to FIG. **5.** The magnetic muffler **20** employs an outer case **60** of sheet metal of somewhat conventional construction. Muffler employed a series of spacers **61** which were constructed of coils of wire mesh frequently referred to as "hardware cloth". These spacers **61** were separated by plastic insulators **62** insulating the various magnetic coils. In the preferred embodiment, the muffler **20** employed a series of magnetic coils of the type employed in the magnetic clutches of automotive air conditioner compressors. The coils are designated as first coil **63,** second coil **64,** and third coil **65.** These coils were interconnected by a wiring harness **66** to the 12 volt battery **59** of the vehicle. The wiring harness **66** comprises a battery connector **67** leading to first coil **63.** The coils were interconnected in series by a first-second interconnect **68** and second-third interconnect **69;** to complete the circuit a battery return **70** is employed. The battery return could be a separate wiring system or the chassis of the vehicle could be employed for the return circuit **70.**

Various methods of construction might be employed. As heretofore stated, the washer **13** was constructed of welded sheet metal. In the preferred embodiment, immersion tubes **27** were constructed of sections of two-inch pipe welded or threadably secured. The configuration is substantially illustrated in the drawings. The lower end of the first, second and third immersion tubes **28, 29** and **30** were enclosed at their bottom ends by immersion tube caps **71** with the lower legs **72** of the immersion tubes being constructed with a series of apertures **73** which bubble the exhaust gases through the water detergent mixture **22.**

OPERATION OF THE DEVICE

The operation of this invention has been illustrated in one concept for use in combination with an internal combustion engine for controlling emission from the vehicle. The collected exhaust gases from the internal combustion engine **11** are interconnected to washer **13.** The gases pass through the various compartments of the washer. The gases are forced through the various immersion tubes **27** and pass out through the immersion tube orifices **73** and bubble up through the water detergent mixture **22.** This process cools, washes and removes some of the undesirable exhaust components. Passing of these cooled, washed gases through the magnetic muffler appears to further reduce the amount of unburned hydrocarbons, carbon monoxide, nitrous oxide emissions released by tail pipe **26.** This inventor will not endeavor to explain how the overall combination accomplishes the desired result; however, tests conducted on his vehicle by a reputable automotive mechanic on acceptable test equipment indicate the exhaust emissions to be within acceptable levels.

Certain modifications and improvements on a device may be apparent to those skilled in the art from a study of the attached drawings and the foregoing detailed description. What is desired to be claimed is all combinations or modifications of this device encompassing equivalents of the invention as defined in the appended claims.

I claim:

1. An exhaust control system comprising:

a. an internal combustion engine having an exhaust port,

b. an exhaust manifold means connected to the exhaust port of said internal combustion engine, said exhaust manifold interconnecting and conducting exhaust gases from said engine to,

c. an exhaust gas washer connected to said exhaust manifold, said exhaust gas washer including:

1. an exhaust gas inlet adjacent a first end of said washer adapted to receive exhaust gases from said internal combustion engine, and injects gases into a first compartment of said washer,

2. an exhaust outlet adjacent a second end of said washer adapted to release exhaust gases from said exhaust gas washer,

d. a washing fluid contained in said exhaust gas washer,

e. a radiator adjacent said internal combustion engine,

f. a fluid conduit means conductively interconnecting the said radiator and the said exhaust gas washer, and

g. a fluid circulating means positioned in said fluid conduit means in such an arrangement as to circulate said washing fluid through said washer and said radiator, said fluid circulating means comprising:

1. a fluid inlet means leading through a check valve from said fluid circulating means into said first compartment,

2. a fluid outlet means leading through a check valve from a compartment adjacent the exhaust outlet, said fluid outlet leading to said radiator,

h. an outlet check valve receiving fluid from the compartment to which is connected the exhaust outlet,

i. a washer pump propelling fluid from the compartment adjacent the exhaust outlet through,

j. an outlet suction jet discharging into the,

k. washer radiator conduit, the point of discharge into said conduit being adjacent the said outlet check valve, and

l. a magnetic muffler secured to said exhaust outlet receiving and further cleaning the exhaust gases.

2. An exhaust system for an internal combustion engine comprising:

a. an exhaust gas washer having an inlet end and an exhaust end,

b. a magnetic muffler operably attached to the exhaust end of said exhaust gas washer receiving the washed gases and passing gases to a tail pipe, said magnetic muffler further comprising:

1. cylindrical outer case,

2. a series of electro-magnetic coils mounted in said case,

3. spacers retaining said coils in a uniform spaced relationship,

4. a multiplicity of insulator means insulating said coils from adjacent conductive structure,

5. conduit means interconnecting said coils, in series

6. an electric potential means for powering said coils,

7. an exhaust outlet leading into a first end of said electro-magnetic muffler,

8. a tail pipe leading from the second end of said electromagnetic muffler, and

9. a substantially straight continuous space projecting through the center of said electro-magnetic muffler surrounded by said spacers, insulators, and the multiplicity of electro-magnetic coils.

* * * * *