

- [54] **ANTI-POLLUTION DEVICE FOR AND METHOD OF REMOVING OIL FROM AIR VENTED FROM THE CRANKCASE OF AN INTERNAL COMBUSTION ENGINE AND RETURNING THE OIL TO THE CRANKCASE**
- [76] Inventor: **Frank B. Ottofy**, 2036 McCausland Avenue, St. Louis, Mo. 63143
- [22] Filed: **June 16, 1971**
- [21] Appl. No.: **153,525**
- [52] U.S. Cl. **123/119 B, 123/41.86**
- [51] Int. Cl. **F02f 9/04**
- [58] Field of Search **123/41.86, 119 B**

[56] **References Cited**
UNITED STATES PATENTS

3,246,639	4/1966	Oliver.....	123/119 B
3,550,570	12/1970	Watson	123/119 B
2,652,819	9/1953	Nusbaum	123/41.86
2,686,504	8/1954	Hill	123/41.86
3,166,062	1/1965	Yerman.....	123/119 B

Primary Examiner—Laurence M. Goodridge
Assistant Examiner—Cort Flint
Attorney—Edmund C. Rogers et al.

[57] **ABSTRACT**

An anti-pollution device for and a method of removing oil from air vented from the crankcase of an internal combustion engine and returning the oil to the crankcase. The present device includes an elongated casing packed with wire mesh. At one end is an inlet connectible to the PCV valve on the crankcase or valve cover of an internal combustion engine and at the other end is an outlet connectible to the intake manifold of the engine. An oil detection and final filter is provided near or at the outlet end of the casing. A drain outlet for oil removed from oil laden air drawn through the wire mesh is provided including a check valve which is closed during operation of the engine and which is open for oil drainage purposes when the engine is shut off. The use of the present device and method substantially decreases carbon monoxide and other exhaust pipe emissions and lowers fouling of spark plugs to the extent of the oil removed.

9 Claims, 5 Drawing Figures

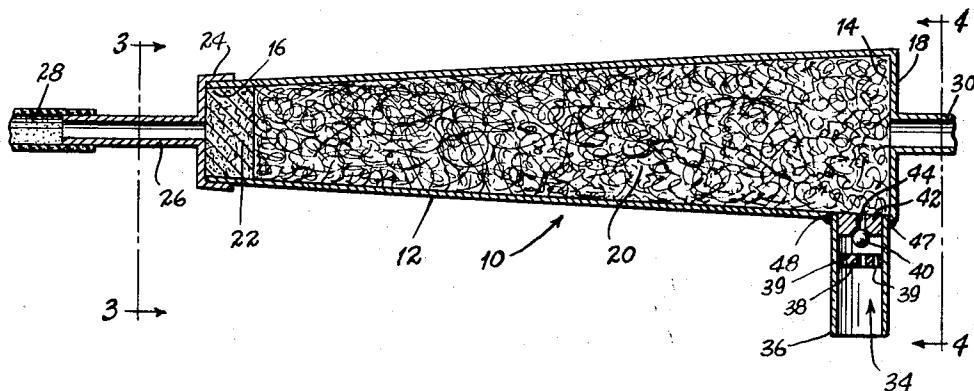


Fig. 1.

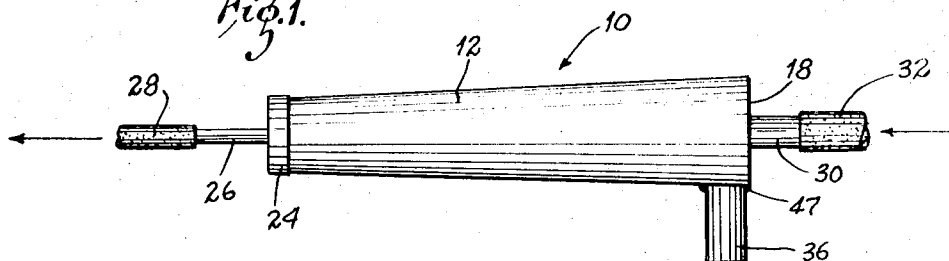


Fig. 2.

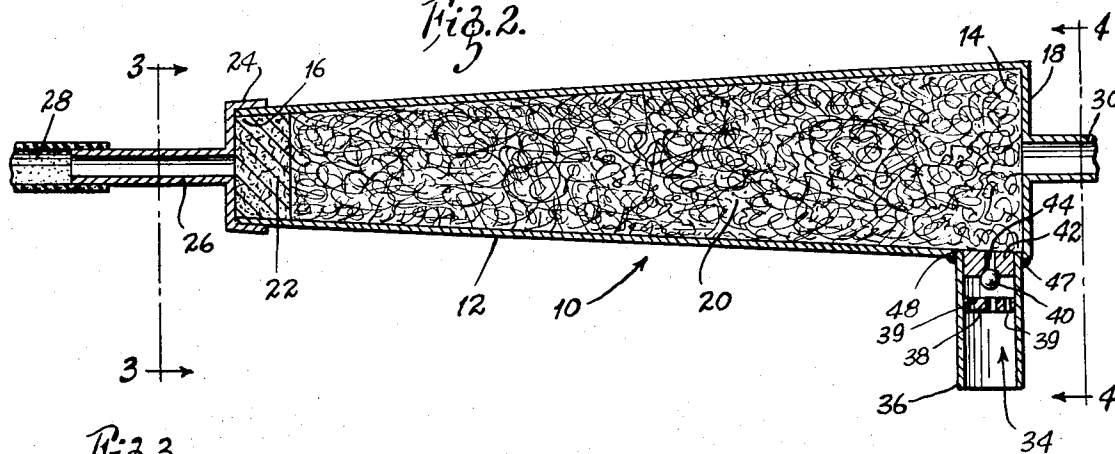


Fig. 3.

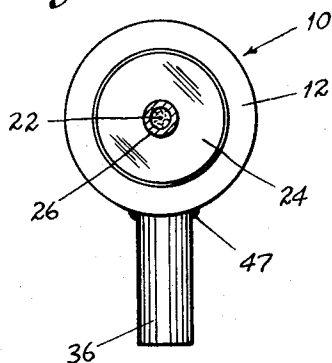


Fig. 4.

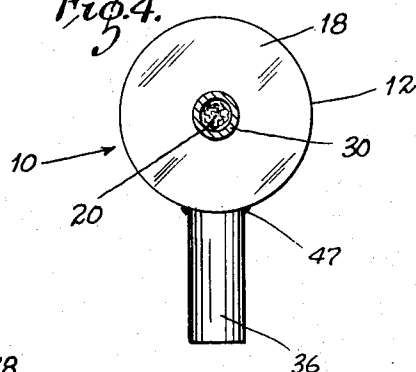
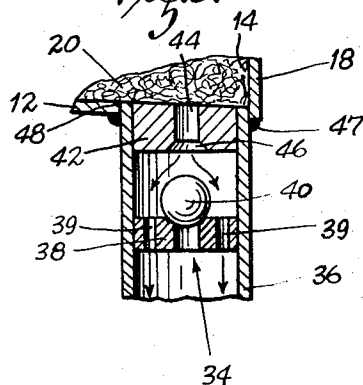


Fig. 5.



INVENTOR:
FRANK B. OTTOFY,
BY Rogers, Ezell, Eilers & Robbins
ATTORNEYS

ANTI-POLLUTION DEVICE FOR AND METHOD OF REMOVING OIL FROM AIR VENTED FROM THE CRANKCASE OF AN INTERNAL COMBUSTION ENGINE AND RETURNING THE OIL TO THE CRANKCASE

BACKGROUND OF THE INVENTION

1. Field of The Invention

The present invention relates generally to the automobile and internal combustion engine art, and more particularly to reducing pollution of the air and fouling of spark plug points caused by crankcase oil vapors exhausted from the crankcase and other areas of internal combustion engines and trained into the intake manifold, such as those of gasoline automobiles.

2. Description Of The Prior Art

In relatively recent years there has developed an international effort to reduce pollution of the natural resources, including air. One fact is the attempt to eliminate air pollution caused by venting the crankcase and other areas of internal combustion machines, particularly those in automobiles, to the atmosphere. The oil vapors in some automobiles are being conducted from the crankcase and other areas into the intake manifold, thence into the firing chambers of the engine. However, this results in a material increase in the carbon monoxide and other exhaust pipe emissions and in increased fouling of the spark plug points, resulting in air pollution and poor engine operation, particularly at idling speeds. The increase in exhausted carbon monoxide has been demonstrated to be 4 percent and higher with the oil vapors burned in the firing chambers. The applicant is not aware of activity other than his to solve the aforesaid problem.

SUMMARY OF THE INVENTION

In brief, the present novel device includes a casing including an inlet opening at one end and an exit opening at the other end. Within the casing is a mass of metal mesh and the like which mechanically removes oil from oil vapor or oil laden air passed therethrough. Near or at the outlet end is an oil detection filter for quickly determining whether oil has reached the outlet end of the casing and which also serves as a final filter. A drain outlet is provided including a ball check valve which permits oil to drain from the casing when the engine is stopped and which closes against a valve seat when the engine is running effected by a vacuum established by passage of the air through the container. The casing is operatively mountable under the front or rear deck of a car adjacent the engine so that the inlet is connectible by suitable hose to the PCV valve of the engine, the outlet is connectible by suitable hose to the inlet manifold of the engine, and the oil drain is connectible by suitable hose back into the crankcase.

An object of the present invention is to provide a novel anti-pollution device for and a method of effectively removing oil from the oil laden air exhausted from the engine crankcase enroute to the intake manifold of the engine so that clean air will be delivered into the intake manifold, thence to the firing chambers, to eliminate increasing the carbon monoxide and other exhaust emissions and fouling of spark plugs caused by the oil vapors presently being fed into the firing chambers of the engine.

Further objects are to provide such novel anti-pollution device and method which are adapted to function for long periods of time with minimum maintenance, which can be applied to new or used engines, which can be efficiently employed and installed by the user with minimum instructions, which require minimum maintenance to keep effectively performing the desired removal of oil, and which otherwise fulfill the objects and advantages sought therefor.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of an oil removing device incorporating the principles of the present invention;

FIG. 2 is an enlarged vertical longitudinal cross-sectional view through the device of FIG. 1;

FIGS. 3 and 4 are vertical transverse cross-sectional views taken on substantially the lines 3-3 and 4-4 of FIG. 2, respectively; and

FIG. 5 is a further enlarged fragmentary view of the oil release valve portion of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawings by reference numerals, 10 indicates generally an oil removing device constructed in accordance with the teachings of the present invention. The device 10 includes a tubular main body or casing 12, preferably, as shown, of decreasing cross-section from an inlet end 14 to an outlet end 16, but the casing 12 may take other shapes. Packed in the casing 12 from an integral end plate 18 closing the inlet end 14 to near the outlet end 16 is wire mesh 20, or the like, which mechanically removes oil from oil laden air passed through the casing 12. Near, as about an inch from, the outlet end 16 is a filter 22 of cotton or other suitable material to register or detect any oil remaining in the air to this point and serving as a final filter, which is retained in the casing 12 by an end cap 24 frictionally or otherwise maintained on the casing 12 and against the outlet end 16. Formed integral with, as illustrated, or attached to the end cap 24 is a tube segment 26 of small diameter, the free end of which is removably secured in one end of a hose segment 28 adapted to be connected to the intake manifold of a combustion engine. To avoid affecting operation of the modulator in the automatic transmission, at least the tube segment 26 must be and preferably the hose 28 is substantially of the same internal diameter as the size of the opening in the PCV valve. A large diameter segment 26 and hose 28 into the intake manifold would introduce too much free air and reduce the vacuum which affects the operation of the modulator. The end plate 18 has a tube segment 30 opening therethrough formed integral with, as shown, or secured to the end plate 18. A hose segment 32 is connected to said tube segment 30 at one end and is connectible to a PCV valve of an engine.

Depending from the casing 12, preferably at the lowest point with the casing 12 horizontal, is a one-way convention ball valve unit 34 including a cylindrical casing 36, a ball supporting plate 38 having apertures 39 therethrough, a ball valve 40, and an upper plate 42 having an opening 44 therethrough and including a seat 46 for the ball valve 40. The valve unit 34 is shown welded at 47 in an opening 48 in the casing 12, but may

be threaded into said opening 48 or otherwise secured in operative position.

The device 10 is mounted in generally horizontal position beneath the hood or rear deck of a car, depending on location of the engine, by suitable brackets or otherwise. The hose 28 is connected to the intake manifold of the car and the hose 32 to the engine PCV valve which may be fitted into the crankcase or the valve cover. With the engine of the car running, oil laden air is drawn from the crankcase and other areas into the mass of wire mesh 20 in the casing 12, which mechanically removes the oil from the air. Normally, the air is free of oil before it reaches the filter 22, hence, clean air is drawn into the intake manifold. Fouling of plugs and increase in exhaust carbon monoxide and other emissions caused by oil vapors from the crankcase and other areas of the engine are thus eliminated by the present novel anti-pollution device and method.

It is apparent that there have been provided a novel device for and method of harmlessly disposing of oil vapors from combustion engines.

It is to be understood that the foregoing description and the accompanying drawings have been given by way of illustration and example. It is also to be understood that changes in form of the several parts, substitution of equivalent elements or steps, and rearrangement of parts or steps, which will be readily apparent to one skilled in the art, are contemplated as within the scope of the present invention, which is limited only by the claims which follow.

What is claimed is:

1. A device for removing oil from oil laden air vented from the crankcase of an internal combustion engine and returning collected oil to the crankcase, said device being adapted for mounting between the PCV valve, intake manifold, and crankcase of the engine, said device comprising a casing having an inlet, an outlet, and an oil drain, means connecting the inlet of the device to the outlet of the PCV valve, means connecting the outlet of the device to the intake manifold of the engine, means for connecting the oil drain to the crankcase of the engine, filter means within the casing between the inlet and outlet through which the oil laden air from the PCV valve must pass for removing oil from the air as it passes therethrough, and valve means in the oil drain which valve means is operated to close the drain in response to the passage of the air through the device, and open the drain when there is no such passage of air as when the engine is not running, whereby oil is removed from the oil laden air by the filter means and clean air is directed to the intake manifold when the engine is running, and the removed oil is returned to the crankcase when the engine is not running.

2. The device of claim 1 wherein the valve means further comprises a lower ball support plate having an aperture therethrough, an upper plate spaced from the lower plate and closer to the path of moving air through the casing, a ball valve between the plates, the upper plate having an aperture therethrough with a valve seat for the ball valve at the opening of its aperture, whereby the passage of air through the casing pulls the ball valve into the valve seat to close the oil drain, and when there is no such passage of air the ball valve is allowed to drop from the seat to open the drain.

3. The device of claim 1 wherein the casing is generally tubular in shape and of decreasing cross section from one of its ends to the other, the inlet being at one

end and the outlet at the other, said casing being adapted for mounting generally horizontally in the engine compartment, said oil drain being mounted to depend from the casing near its end of greater cross section, whereby as air moves generally horizontally through the filter medium from the inlet to the outlet, the oil removed by the filter means drains downwardly in a direction normal to the flow of air and ultimately to the oil drain such that the upper portion of the filter means remains relatively oil free as the air passes there-through for greater filtering efficiency.

4. The device of claim 1 including a second filter adjacent the outlet end of said casing means through which the air must pass for determining presence of oil in the air at the exhaust end of the casing means.

5. The device of claim 1 wherein the filter means comprises metal mesh packed in said casing means.

6. A device for removing oil from oil laden air vented from the crankcase of an internal combustion engine and returning collected oil to the crankcase, said device comprising a casing having an inlet, an outlet, and an oil drain, means for conducting oil laden air from the crankcase of the engine to the input, means for conducting the filtered air from the output of the device to the intake manifold of the engine, means for connecting the oil drain to the crankcase of the engine, filter means within the casing between the inlet and outlet through which the oil laden air from the crankcase must pass for removing oil from the air as it passes therethrough, and valve means in the oil drain which valve means is operated to close the drain in response to the passage of the air through the device, and open the drain when there is no such passage of air as when the engine is not running, whereby oil is removed from the oil laden air by the filter means and clean air is directed to the intake manifold when the engine is running, and the removed oil is returned to the crankcase when the engine is not running.

7. A device for removing oil from oil laden air vented from the crankcase of an internal combustion engine and returning collected oil to the crankcase, said device comprising a casing of generally tubular shape and of decreasing cross section from one of its ends to the other, and having an inlet at one end, an outlet at the other end, and an oil drain depending from the casing near its end of greater cross section, said casing being adapted for mounting generally horizontally in the engine compartment, means conducting the oil laden air from the crankcase of the engine to the input of the device, means conducting the filtered air from the output of the device to the intake manifold of the engine, means for connecting the oil drain to the crankcase of the engine, filter means within the casing between the inlet and outlet through which the oil laden air from the crankcase must pass for removing oil from the air as it passes therethrough, whereby as air moves generally horizontally through the filter media from the inlet to the outlet, the oil removed by the filter means drains downwardly in a direction normal to the flow of air and ultimately to the oil drain such that the upper portion of the filter means remains relatively oil free as the air passes therethrough for greater filtering efficiency.

8. The device of claim 7 further comprising valve means in the oil drain which valve means is operated to close the drain in response to the passage of air through the device and open the drain when there is no such passage of air as when the engine is not running.

9. The device of claim 7 including a second filter adjacent the outlet end of said casing through which the air must pass for determining presence of oil in the air at the exhaust end of the casing.

* * * * *