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SMOG CONTROL DEVICE

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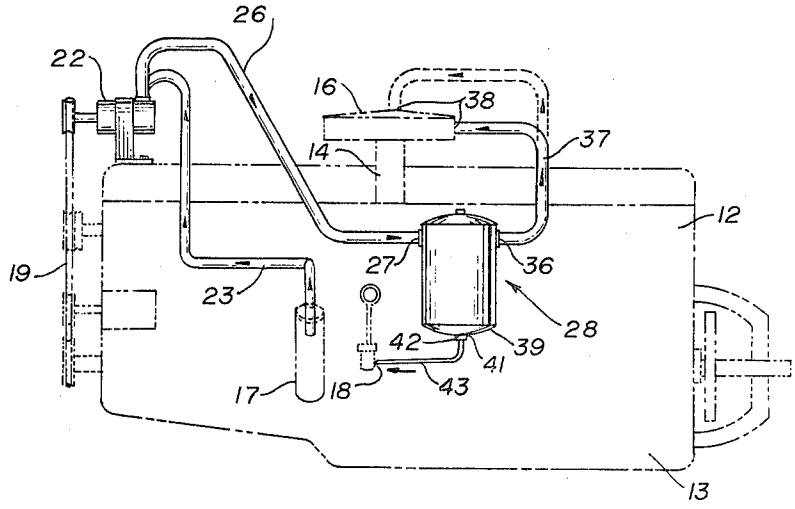


FIG. 1

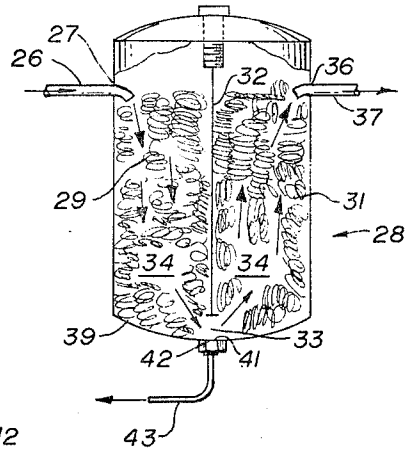


FIG. 2

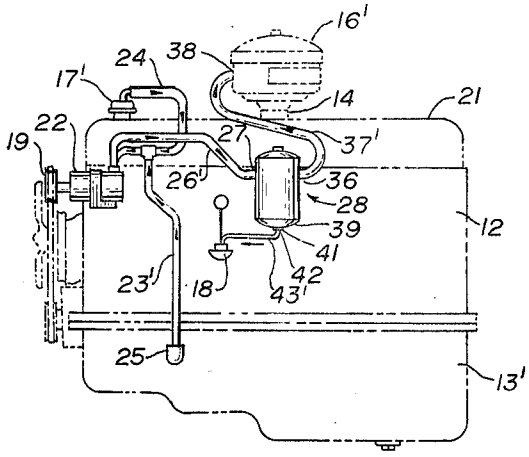


FIG. 3

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SMOG CONTROL DEVICE

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This invention relates to engine crankcase ventilating devices and more particularly to devices for removing the vapors and solids which collect in the crankcase and under the valve cover of an internal combustion engine and for filtering and recirculating the vapors back into the engine's combustion chambers.

Generally the invention provides a vacuum pump, driven by the engine, which takes a suction on the crankcase and on the chamber under the valve cover in the case of overhead valve type engines. The fluids and solids drawn through the vacuum pump are then forced through a combination filter-condenser which both filters out the solids and condenses the oil vapor drawn from the crankcase by the pump. The condensed oil is then fed back into the crankcase while the filter fluid is drawn into the carburator air filter for refiltering and then combustion after passing through the carburator.

The prior art discloses several devices for ventilating crankcases all of which are subject to various disadvantages not found in the present invention. Some of these devices, for example, depend for their operation on the vacuum created by the carburator and are thereby limited by the capacity of the carburator to provide a partial vacuum in the crankcase. This device, on the other hand, provides for a separate vacuum pump operated directly or indirectly by the engine, which vacuum pump may be adjusted to provide exactly the vacuum found to be most efficient.

Some of the devices shown in the prior art exhaust the vapors and solids which are drawn from the crankcase directly into the carburator or intake manifold and thereby subject the carburator and cylinders to fouling. These systems also burn off the oil carried in liquid or vapor form from the crankcase into the carburator or intake manifold. The present invention overcomes these disadvantages by directing the vapors and solids through both an oil vapor condenser and filter or trap, and the carburator air filter thereby assuring a supply of clean gases to the carburator. In this way this device also recovers for recirculation any gases which failed to explode and passed by the piston rings after initial introduction into the engine.

Additionally the present device provides for the return of the condensed oil to the crankcase and thereby prevents oil loss due to operation of the device

A further advantage of this invention is that the crankcase is completely sealed at all times, there being no vent leading from the crankcase to the atmosphere which is the customary method for ventilating the crankcase. Still another advantage of the device is that by maintaining a substantial vacuum in the crankcase oil is prevented from leaking around the crankcase seals, and, still further, solids such as carbon particles which contribute to the formation of sludge in the crankcase are drawn off and filtered out of the engine system. The substantial vacuum maintained by the device also increases the rate of oil flow through the engine oil filter.

Other objects and advantages of the present invention will become apparent upon further study of the following specification where similar characters of reference designate similar structure in each of the several views.

In the accompanying drawings:

FIG. 1 is an elevational view of the present invention as it is mounted on a standard L-head engine.

FIG. 2 is a cut-away view of the oil vapor condensor shown in FIG. 1.

FIG. 3 is an elevational view of a second embodiment of the present invention as it is mounted on a standard overhead valve type engine.

As shown in FIG. 1, the device of the present invention may be mounted on a typical L-head type engine having a block 12, crankcase 13, carburator 14, carburator air filter 16, oil spout 17, oil dip stick tube 18 and fan belt 19. FIG. 3 shows an embodiment of my invention which may be used with a typical overhead valve type engine with the valve cover shown at 21.

As shown in FIG. 1, a vaccum pump 22 which may be one of many types well known in the art is mounted, preferably, on engine block 12, although it is understood that the pump may be mounted anywhere on the vehicle at a point in effectively close proximity to the engine. Pump 22 is driven either directly or indirectly by the engine. As shown in FIG. 1 it may be driven directly by fan belt 19 or it may be electrically driven by the electrical supply generated by the engine. Pump 22 may be of any desired capacity although it is preferably that it have the capacity such to enable it to maintain a partial vacuum measuring at least four inches of mercury, and preferably up to ten inches of mercury in the crankcase. It is recognized that if pump 22 is driven directly by fan belt 19 its capacity will increase as the engine speed increases.

Vacuum pump 22 has communication with crankcase 13 through a first conduit 23, preferably a hose, connected to the interior of the crankcase above the oil level, preferably through oil spout 17.

The vapors and solids which collect above the oil level in crankcase 13 due to the operation of the engine and the agitation of the oil in the crankcase, are drawn into pump 22 from crankcase 13, and are ejected from pump 22 into a second conduit 26, preferably a hose. Conduit 26 is connected at its other end to the intake port 27 of an oil vapor filter and condenser, or trap, 28 which is best shown at FIG. 2. The trap 28 is preferably a container divided into two compartments 29 and 31 by a partition 32, extending from the top to the bottom of the condenser 28 but provided adjacent its base with an aperture 33 permitting fluid communication between compartments 29 and 31. Compartments 29 and 31 are filled with a material 34 suitable for filtering solids out of the vapors passing therethrough and which also is suitable for inducing the oil vapor to condense into a liquid state. A suitable filter material 34 for this purpose is aluminum shavings. The vapor and other matter exhausted from pump 22 through conduit 26 enter intake port 27 which is located at or near the top of compartment 29 and are then forced toward the bottom of compartment 29, through aperture 33 and upward toward the top of compartment 31. In making this passage much of the solid state matter is trapped by filter and condensing material 34. In addition filtering and condensing material 34 induces the oil vapor to condense so that liquid state oil collects at the bottom 39 of trap 28. The vapor which passes to the top of compartment 31 passes out port 36 which is located at or near the top of compartment 31.

Port 36 is connected by a third conduit 37, preferably a hose, to an intake port 38 in carburator air filter 16. The vapor in compartment 31 is drawn by the vacuum created in the carburator system during normal engine operation through conduit 37 and engine carburator air filter 16 where the vapor is further filtered in the same manner as the engine's normal air supply.

The bottom 39 of trap 28 is appropriately shaped, such as in the form of a dish, to allow the liquid oil to collect in one relatively small preselected portion 41 of bottom 39, which portion 41 is preferably centrally disposed beneath partition 32. The preselected portion

41 defines an aperture 42 in the condenser bottom 39. Aperture 42 has a relatively small diameter, preferably measuring approximately 1/32 of an inch. A fourth conduit 43, preferably a copper tube, is fitted at one end over aperture 42 in an appropriate airtight fitting over an aperture opening into the interior of crankcase 13. This aperture is preferably located in oil dip stick tube 18. From the foregoing it is obvious that the oil collected by oil condenser 28 drips into tube 43 and is funneled back into crankcase 13 by gravity and by the vacuum therein created by vacuum pump 22. It has been found that the small size of aperture 42 and the liquid oil passing therethrough prevent the vapor from passing into conduit 43 and allow the vapor to be drawn instead into conduit 37.

As used with an overhead valve type engine, as shown in FIG. 3, the invention is only slightly modified from the embodiment shown in FIG. 1. Because the oil spout 17' is usually located on the valve cover 21, a fifth conduit 24 may be used to connect oil spout 17' to vacuum pump 22. First conduit 23' may be connected to the interior of crankcase 13' by means of a special fitting 25 in crankcase 13'. In this embodiment pump 22 draws fluid from crankcase 13' as well as from under valve cover 21. The fluids are ejected from pump 22 through second conduit 26' and into trap 28 where the fluid is filtered and the oil vapor condensed as above described. The filtered fluid is drawn through third conduit 37' and into carburator 16' while the liquid oil is returned to crankcase 13' through fourth conduit 23'.

A number of modifications may be made without departing from the spirit of my invention and I do not intend to limit myself except as set forth in the claims which follow.

What I claim is:

1. In combination with an internal combustion engine having a crankcase, a carburator, and a carburator air filter, a crankcase ventilating, fluid filtering and recirculating device comprising a vacuum pump mounted in close proximity to said engine and driven by said engine; first conduit means connecting the intake port of said vacuum pump to the interior of said crankcase to permit said vacuum pump to maintain a partial vacuum in said crankcase; a trap adapted for filtering fluid and condensing vapor mounted in close proximity to said engine; second conduit means connecting the exhaust port of said vacuum pump to the interior of said trap; third conduit means connecting the interior of said trap to the interior of said carburator air filter; fourth conduit means connecting the interior of said trap to the interior of said crankcase to permit the passage of liquid oil from said trap to said crankcase.

2. A crankcase ventilating and fluid filtering and recirculating device according to claim 1 wherein said trap comprises a closed container, said container having an interior partition dividing said container into a first and a second compartment, said partition defining an aperture adjacent the bottom of said container to permit the passage of fluid between said first compartment and said second compartment, said container defining a first port adjacent the top of said first compartment adapted to receive one end of said second conduit means, and defining a second port adjacent the top of said second compartment adapted to receive one end of said third conduit means, said container having a bottom shaped to direct liquid to a preselected portion of said bottom, said preselected portion defining an aperture adapted to receive one end of said fourth conduit means; and filtering and condensing means packed in at least one of said first and said second compartments and adapted to filter out solids carried by fluids passing therethrough and to cause oil vapor carried in fluids passing therethrough to condense into a liquid state.

3. A crankcase ventilating and fluid filtering and recirculating device according to claim 1 wherein said vacuum pump is adapted to provide a partial vacuum of at least four inches of mercury in said crankcase.

4. A crankcase ventilating and fluid filtering and recirculating device according to claim 2 wherein said filtering and condensing means comprises aluminum shavings.

5. A crankcase ventilating and fluid filtering and recirculating device according to claim 2 wherein the aperture defined by said preselected portion is approximately 1/32 of one inch in diameter.

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