Oct. 20, 1953 W. E. DRINKARD 2,656,000

CRANKCASE VENTILATION KIT

Filed Sept. 23, 1948

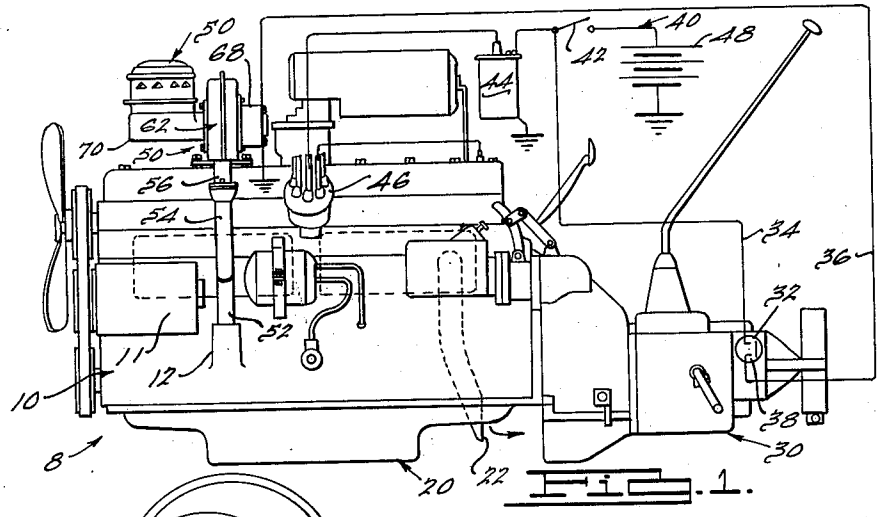


Fig. 1.

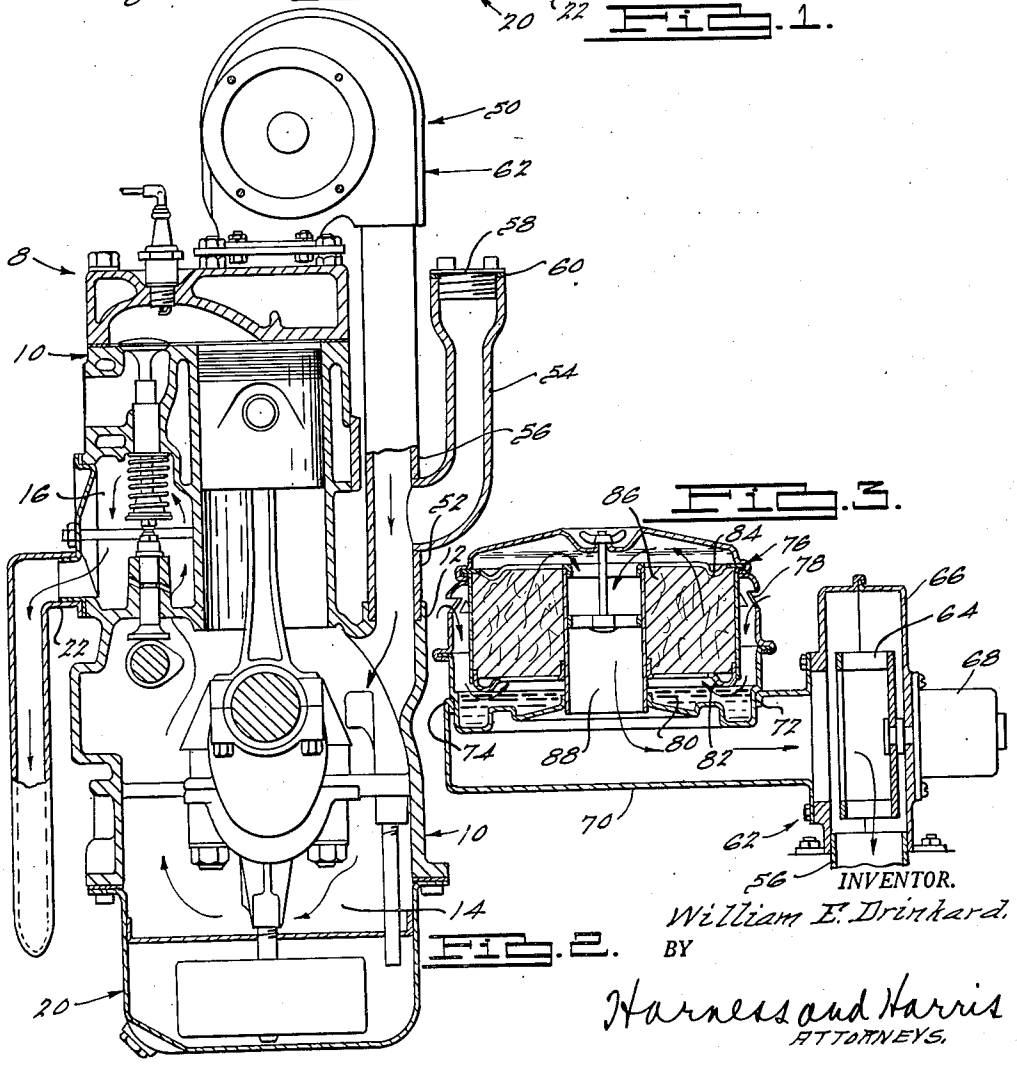


Fig. 2.

Fig. 3.

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Patented Oct. 20, 1953 2,656,000

UNITED STATES PATENT OFFICE

2,656,000

CRANKCASE VENTILATION KIT

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Application September 23, 1948, Serial No. 50,740

6 Claims. (Cl. 180—54)

1

This invention relates to a system serving as a supply for filtered outside air, and more particularly to apparatus delivering clean air to ventilate an engine crankcase.

It is an object of the present invention to provide a crankcase ventilation kit which employs a high resistance air filter and is able to furnish the large pressure differential necessary to promote operation of the filter.

Another object is to produce a device which supplements the conventional aspirator system used with engine crankcase during slow vehicle operation and which substitutes for the conventional aspirator system altogether when the latter is dormant due to lack of forward motion of the vehicle.

A further object is to provide a construction simple in parts and more efficient in use than those heretofore proposed.

Still another object is to produce a device assuring positive displacement of air in the crankcase at all times the engine is operating, continually eliminating vitiating fumes and vapors.

Yet another object is to provide means whereby only clean cool outside air is furnished to the crankcase.

A still further object is to provide means whereby during advanced operating speeds of the vehicle at which time the normal aspirator effect suffices to ventilate the crankcase amply, positive action of the forced draft system is discontinued.

Yet a further object is to produce a device so related to the engine that it will not be exposed to sludging action during its operation.

An additional object is the production of means whereby air is forcibly passed through confining passages and reliance does not have to be placed in the pressure afforded by unenclosed air currents and unshrouded fans such as would fail to insure positive displacement of the air.

Further objects and advantages are within the scope of this invention such as relates to the arrangement, operation, and functioning of the related elements of the structure, to various details and combination of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent from a consideration of the specification and drawings of a form of the invention, which may be preferred, in which:

Fig. 1 is a side elevation showing the preferred embodiment of the invention as applied to an internal combustion engine;

2

Fig. 2 is a view in enlarged transverse section of the structure of Fig. 1; and

Fig. 3 is a view showing the device in longitudinal section.

In reference now in detail to the embodiment illustrated in Figs. 1, 2, and 3, respectively, of the accompanying drawings:

Numeral 8 is used to designate a conventional vehicle engine comprising a cylinder block 10, a crankcase 20, a mechanical transmission 30, and an ignition system 40. A crankcase ventilation kit according to the present invention is indicated at 50.

The usual vehicle lubricating system includes an upstanding mouth 12 on the block through which the crankcase breathes and is supplied with oil. The lubricating oil assumes some intermediate level in the crankcase, partially filling it. Fumes over the surface of the oil, accumulating within the crankcase chamber 14, are normally led into the valve chamber 16 and supposedly conducted out through the road draft tube 22 and into the atmosphere by aspiration or induction.

These fumes and vapors, coming from various sources, are sought to be eliminated for different reasons. Water vapors, present in the crankcase due to engine blow-by and other causes, are desirably eliminated continually since, when the engine is allowed to cool off, they would otherwise condense in the chamber and into the oil. The next engine operation would cause an emulsion to result which would tend to mayonnaise up the oil filter and impede the oil filtering process. Certain other products of combustion which blow by the pistons or else are drawn down past the seal rings have a detrimental effect on the engine. If they represent oxidized oil or other sludge formers, they should be eliminated before they mingle with the lubricating oil and contaminate it. If they contain sulfur compounds and are not expelled, they may corrode the valve springs, timing chains, piston pins, and the like. These same products of combustion may well be sources of lacquer formation if allowed to accumulate. Again, there may be raw gasoline or gasoline vapors passing by the seal rings which unless expelled, will mix with the lubricating oil to cause crankcase dilution.

Ventilation of the crankcase produces air changes which eliminate these vapors and performs also the salutary service of cooling the oil supply and the engine. Many means have been devised to accomplish this function and with varying results. One system tried made

use of a circulating fan for leading the vapors away to be cooled and then reintroducing them to the crankcase. The disadvantage was that the same corrosive and otherwise objectionable vapors were merely circulated around the engine. Moreover, in time this circulating fan would sludge up. Another technique resorted to was the provision of eductors associated with the intake manifold or carburetor, which drew off the crankcase vapors. This technique was found to be unsatisfactory inasmuch as the self-same vapors reappeared again in the crankcase as blowby, having during the interim merely passed into the combustion chambers and escaped right back into crankcase.

One reason for designers shying away from using an outside source of air has been that proper cleansing of it demanded of the system provision for a high pressure differential. An inherent quality of oil bath cleaners and other high resistance cleaners suitable for the purpose is a large pressure drop for proper operation. If a road draft tube or an eductor on the exhaust system was to be used to draw a vacuum in a crankcase equipped with a high resistance filter, at low vehicle and engine speeds such a natural means, inherently not of positive action, would be grossly inadequate. Then during protracted idling conditions, particularly in the example of door to door delivery trucks, taxis, and the like, objectionable agents would tend to accumulate in the engine. The same result would be occasioned upon employing a portion of the fresh air supply delivered by the engine fan to the filter or by a forwardly facing air scoop.

The instant invention is able to surmount the foregoing difficulties at all vehicle and engine speeds. Furthermore, additional provision is made whereby at higher engine and vehicle speeds the natural ventilation created by the road draft or trailing tube may be relied on exclusively, it being equal to the task under those conditions. Hence the undesirable vapors and accumulations will be dispelled at all times.

The ventilation kit **50** includes a combination introduction tube **52** mounted on block mouth **12**, the tube branching upwardly into an oil-fill pipe branch **54** and an air duct branch **56**. The pipe branch **54** is closed by an oil filler cap **58** sealed as with an air tight washer **60**. The other branch **56** of this conduit system terminates upwardly in a casing **62**.

In Figure 3 is shown the interior of casing. In the discharge side may be flow producing means such as disk fan or centrifugal blower impeller **64**, journalled in its scroll **66** and powered as by an electric motor. The impeller expels air downwardly into duct **56** by positive or forced action, the air being drawn from shell **70**. Received by the flanges **72** and **74** of the shell may be seen an air cleaner **76**. This cleaner may be a high resistance device such as of oil bath type, and will communicate with the outside air through inlet means **78**. Inside, there may be an oil pool **80** in which may be immersed an annular embossment **82** depending from the filter cartridge **84**. The intake air may thereby be inducted through the combination oil bath and filter material **86**, down into passage **88** leading to shell **70**. This intake air, cleaned, will then have no tendency to sludge up or otherwise foul the impeller means and its blade surfaces.

In reference to Fig. 1 particularly, input power to the motor **68** may be supplied through ignition switch **42**. This switch is used primarily in conventional engines to close the circuit between the battery **48** and the induction coil **44** and distributor **46**. Thus when the ignition is turned on, the ventilation kit would be called into action. Air would then pass through the entire kit housing and into the crankcase.

Since at advanced road speeds the natural aspiration effect produced by trailing tube **22** is of the order to overcome the housing resistance to air flow, it may be found advantageous under such an eventuality to deenergize the motor **68** circuit. Speed responsive means **32** may be provided for the operation which may then be rendered automatic. Interposed in series with the lead conductors **34** and **36**, this means **32** is shown for the purposes of the schematic representation as being located in the mechanical transmission **30** so as to be sensitive to speed changes therein by governor action. The function of speed responsive means **32** is to provide impeller motor **68** with power for operation during low vehicle and engine speeds, as for example, during idling. At higher speeds, however, device **32** is desirably automatically actuated to disconnect the motor and render it inactive such as by opening the contacts **38**. Hence, device **32** lends itself equally well to response by a pressure switch interposed in the oil lines or engine coolant lines, the pressures exerted by the liquids contained therein varying with engine speeds. The generator voltage cutout relay on conventional vehicles or voltage regulator or a voltage trip could as easily be employed. Again, if the vehicle happens to be equipped with an automatic transmission, the relays or governor therein would serve as speed sensitive actuators for the contacts **38**.

Thus by referring to the foregoing detailed description there has been made a sufficient disclosure so as to enable a person skilled in the art to accomplish the objects specified at the outset as being sought after.

What is claimed is:

1. Apparatus of the character described for providing positive crankcase ventilation to an engine powered transmission driven vehicle, including: a combination introduction tube, an oil-fill pipe branch, an air-duct branch, each of said branches having an upper and a lower end, the tube being mountable on the engine in communicating relation with the crankcase and extending upwardly and terminating in the lower end of said branches, a casing with an external opening, the casing being mountable atop the engine for securing the upper end of the duct thereto, an oil bath cleaner within the casing, air handling means within the casing for drawing outside air through said external opening and cleaner and forcing the air through the tube, said transmission having speed sensitive means operatively controlled and mounted therein and remote to the engine and casing and comprising circuit means including switch contacts effective to control operation of the air handling means in a manner to drop output delivery of the latter at high engine-vehicle speed, and detachable means mounted on the upper end of the pipe for allowing oil to be admitted to the crankcase, the detachable means cooperating with the duct in confining the air travel.

2. For use with a vehicle having an engine powered transmission having speed sensitive means operatively controlled and mounted therein comprising switch contacts openable and closable in response to speed, and an engine crankcase, in

the combination with a road draft tube and an oil fill pipe communicating with the crankcase, a unitary auxiliary kit comprising a high resistance means having an exterior inlet opening to atmosphere and being connected to a location on said fill pipe so as to admit cleaned air to the crankcase through at least a portion of the fill pipe and an electrically powered impeller means associated with the high resistance means such that the latter is disposed between said exterior inlet opening and said impeller means, and said impeller means providing for positive air displacement, said electrically powered impeller means having an operating circuit therefor including said speed closable switch contacts which latter are arranged for closing to actuate said operating circuit and thereby cause said impeller means to operate under power the draft through the high resistance means being alternatively induced by the aspirator effect of the road draft tube, forced by the impeller means, or effected by the combination of the inducing and forcing agents.

3. For use with a vehicle having the engine crankcase equipped with a road draft tube and a transmission fitted with a speed device comprising switch contacts effective therein to open and close in response to speed, a high resistance means adapted to admit cleaned air to the crankcase, and electric operating means associated with the high resistance means including an energizing circuit therefor and adapted to furnish positively the draft through the high resistance means only during the vehicle speed condition when the draft induced by the road draft tube is inadequate for the crankcase ventilation desired, said switch contacts being included in said electric operating means energizing circuit.

4. In a vehicle, a propulsion power plant comprising an engine crankcase, a vehicle drive including transmission means operable to effect relatively low and relatively high vehicle drive speeds, a high resistance ventilation kit having an electrically operated blower provided with an electric driving motor, an electric power circuit connected to said electric driving motor, said kit having an exterior opening to atmosphere and comprising high resistance ventilation means constructed and arranged between said exterior opening and said electrically operated blower to provide the engine crankcase with cleaned fresh air changes therefrom, and circuit controlling means in the transmission means operable when the vehicle is being driven at relatively low and relatively high speeds for respectively controlling cut-in and cut-out of the motor thus closing the circuit to render the blower operative at relatively low vehicle speeds in providing forced draft fresh air ventilation of the crankcase.

5. In a vehicle, a propulsion power plant comprising an engine crankcase, a vehicle drive means operable to effect relatively low and relatively high vehicle drive speeds and comprising a transmission having electrical contacts incorporated therein, a high resistance ventilation kit having an electrically operated blower provided with an electric motor, a battery, and an electric circuit effective to connect said contacts between said blower motor and battery, the kit having an exterior opening to atmosphere and comprising high resistance ventilation means constructed and arranged between said exterior opening and said electrically operated blower to provide the engine crankcase with cleaned fresh air changes therefrom, and circuit controlling means in the transmission operable when the vehicle is being driven at relatively low and relatively high speeds and arranged to close the contacts to close the circuit effective between the battery and motor at relatively low vehicle speeds in providing forced draft ventilation to the crankcase.

6. In a vehicle, a propulsion power plant comprising an engine having a crankcase and a road draft tube providing for induced draft ventilation of the latter and being effective in correspondence to the natural induction proportionate to vehicle speed, vehicle drive means connected to the power plant and being operator-operable to effect relatively low and relatively high vehicle drive speeds and having electrical contacts, a ventilation kit having an electrically operated blower and a combination oil bath and filter cleaner, a battery, an electric circuit effective to connect said contacts between said blower and said battery, the electric blower and combination oil bath and filter cleaner being constructed and arranged to provide the engine crankcase with forced draft cleaned air changes, and circuit controlling means controlled by the vehicle drive means and being operated thereby at the relatively low vehicle speeds at which the natural induction draft is inadequate, to close said contacts to close said electrical circuit and render the blower operative for providing forced draft ventilation at low vehicle speeds only, the necessity for forcing of the draft being the positive action required to drive air against the high resistance offered by the combination cleaner.

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