

[54] **TOTAL VENTILATING AND SCAVENGING SYSTEM FOR AN INTERNAL COMBUSTION ENGINE**

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[58] Field of Search **123/119 B, 198 E, 195 C,
123/90.38**

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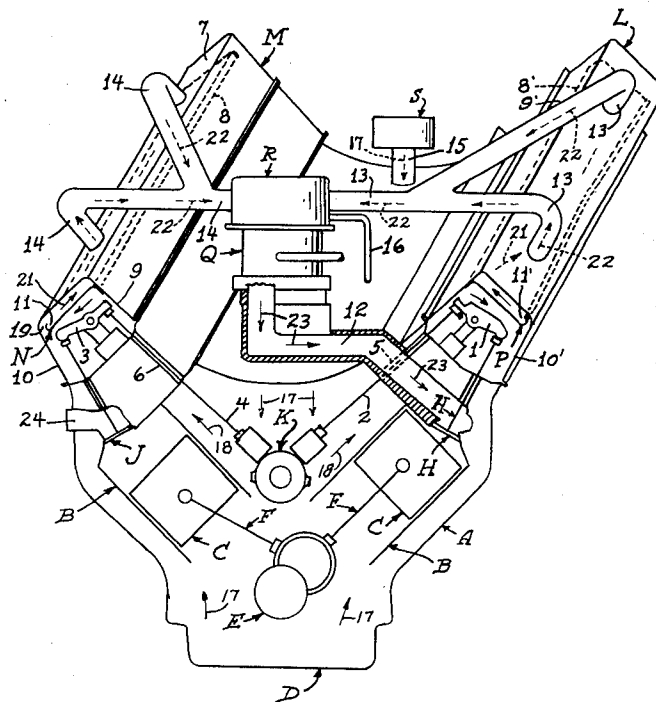
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[57]

ABSTRACT

A total ventilating and scavenging system for an internal combustion engine in which filtered fresh air is initially drawn into the interior of the engine, such as the cam shaft and crankcase areas, where the air will mingle with, absorb, and pick up any gaseous vapors and then this air is conveyed into such space as within the cover that houses the rocker arms and valves and will pick up any additional gaseous vapors, including oil vapors. Then this vapor laden heated air is delivered to a combined oil/air filter where any condensed vapors will be trapped. The heated and filtered air will be led into the carburetor where it will become part of an explosive mixture to be delivered to the cylinders for combustion. The carburetor receives only this vapor laden air as just described and in this way I provide a total ventilating and scavenging system for the engine. An oil return pipe leads from the oil/air filter to the interior of the engine for draining any excess oil from the filter. An oil return pipe is so positioned in the oil/air filter as to maintain a proper operating level for the air/oil separation in the filter.

4 Claims, 3 Drawing Figures



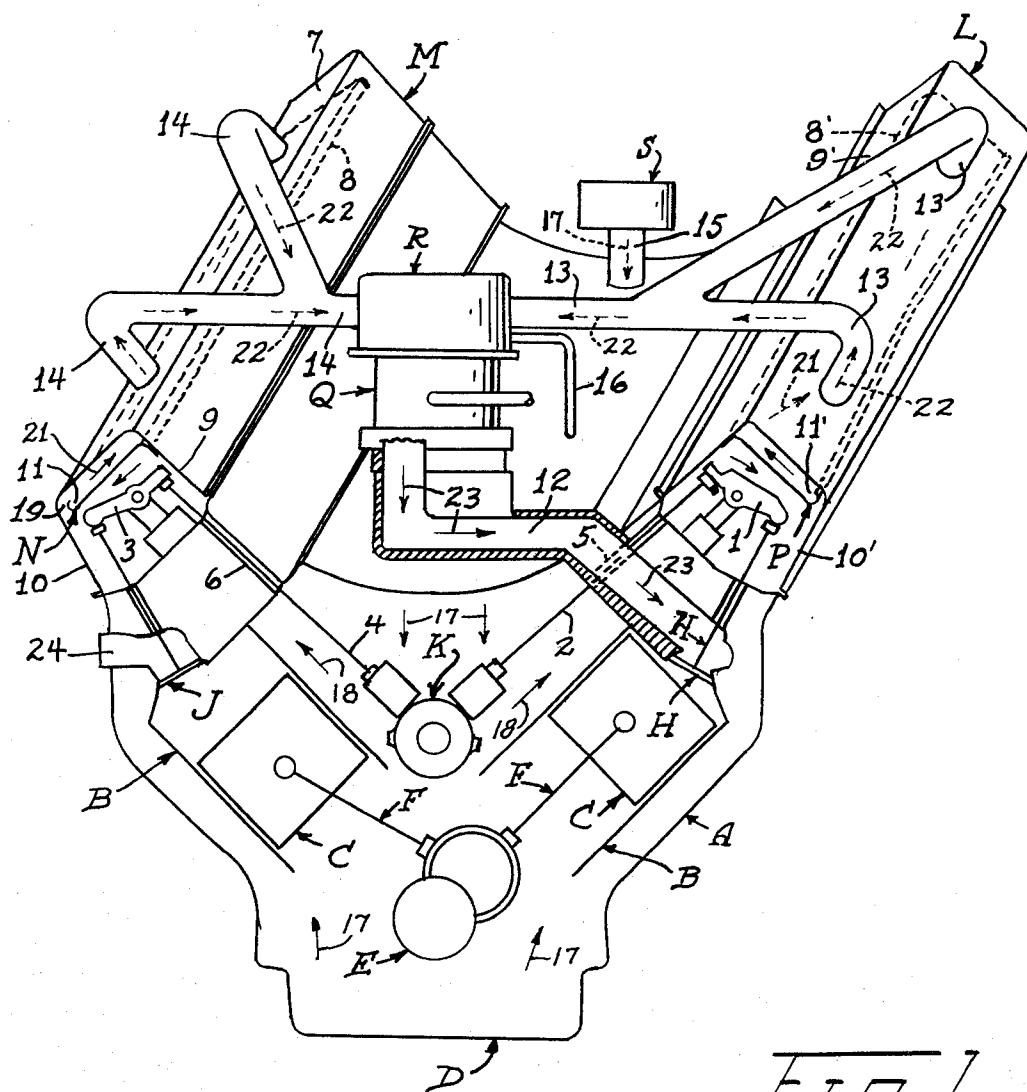


FIG. 1

TOTAL VENTILATING AND SCAVENGING SYSTEM FOR AN INTERNAL COMBUSTION ENGINE

BACKGROUND OF THE INVENTION

1. Field of the Invention:

One of the main problems faced by engineers when designing an internal combustion engine is to prevent the accumulation of gaseous vapors within the engine where they will collect and condense on cold surfaces to form sludge. Sludge contaminates oil and hinders its lubricating qualities as well as hindering its heat transfer. I have provided novel means whereby the air that is fed to the carburetor must first be moved through the interior of the engine and the valve covers and this air will mingle with and pick up gaseous vapors, carrying them to the oil/air filter which is connected to the carburetor. The interior of the engine will be continuously scavenged and thus prevent the formation of sludge. A pre-enriched mixture will be delivered to the carburetor because the air will already be mixed with a gaseous vapor that at times collects within the interior of the engine.

2. Description of the Prior Art.

The patent to Jacob Cornell on an engine crankcase ventilation system, U.S. Pat. No. 3,111,120, issued Nov. 19, 1963, discloses an air filter communicating with a carburetor. A conduit leads from the air filter to the interior of the valve cover that houses the rocker arms and valves. In my invention I do not provide a conduit for conveying filtered fresh air directly into the interior of the valve cover. Instead, the filtered fresh air must first flow through the interior of the engine to mingle with and pick up blowby gases as well as any oil vapors. Before this mixed air is conveyed to the carburetor it must pass through the interior of the valve cover where the majority of the oil is separated and remains within the engine interior enclosures.

SUMMARY OF THE INVENTION

An object of my invention is to provide novel means for thoroughly scavenging the interior of an internal combustion engine, to remove any undesirable gases and vapors from the engine and valve cover. The scavenging of the engine interior is accomplished by flowing filtered fresh air through the engine to mingle with and pick up gaseous vapors and carry these to and oil/air separator where condensed oil vapor is removed, and the remaining heated vapor laden air is delivered to the carburetor. The intake vacuum created in the manifold creates sufficient suction to cause the filtered fresh air to flow through the interior of the engine for scavenging before this air reaches the carburetor. The engine interior is not only scavenged of any gaseous vapors but the resulting vapor laden air aids the carburetor in forming a better combustible mixture for the engine cylinders.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric schematic view of an internal combustion engine with parts being shown in section. The pistons, cylinders, valve rods, valves, engine block, etc., are indicated by single lines rather than by double lines to denote thickness of material. This four cycle engine is shown as one example of how my invention may be applied to any type of internal combustion engine.

FIG. 2 is a top plan view of FIG. 1.

FIG. 3 is an enlarged sectional view of a valve cover, rocker arm and associate mechanism, and in the present illustration shows a baffle mounted within and secured to the valve cover.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In carrying out my invention I make use of a standard internal combustion engine which is shown in an isometric schematic view in FIG. 1. The engine block A is shown in phantom by a single line and the cylinders B and pistons C are also schematically shown by single lines. I have indicated a V8 engine, although my invention can be applied to any type of internal combustion engine, such as one having a single row of cylinders. The oil pan D is disposed under the crank shaft E and piston rods F interconnect the crank shaft E with the pistons C in the customary manner.

The overhead intake valve is schematically shown at H and a rocker arm 1 actuates the valve in a properly timed sequence by a push rod 2 being operated by a cam on a cam shaft K, see FIG. 1. I further illustrate an overhead exhaust valve J and its rocker arm 3 actuates the exhaust valve in a properly timed sequence by its push rod 4 being operated by a cam on the common cam shaft K. It should be understood that the engine shown in FIG. 1 is given by way of example since my invention can be used on any type of internal combustion engine. In the present illustration, the valve cover L encloses the rocker arm 1, see FIG. 1, and the other rocker arms, not shown, are arranged above the cylinders in the right hand bank of cylinders.

Another valve cover M, see also FIG. 3, encloses the rocker arm 3 and the other rocker arms, not shown, are arranged above the cylinders in the left hand bank of cylinders shown in the same Figure. It will also be noted that there are passages 5 between the interior of the engine and the interior of the valve cover L, and there are passages 6 between the engine interior and the interior of the valve cover M.

In FIG. 3, I show an enlarged transverse sectional view of the valve cover M that houses the rocker arm 3 and the upper ends of the push rod 4 and the exhaust valve K. I mount a baffle N within the valve cover M and above the rocker arm 3. The baffle N is separated from the top 7 of the valve cover M and it has one edge 8 welded or otherwise secured to a side wall 9 of the valve cover. The opposite edge of the baffle N is spaced from the adjacent side wall 10 of the valve cover M, and this edge is curved back on itself to form a trough 11 that will catch and carry oil that condenses or drops as "fall out" on the upper inclined surface of the baffle and flows downwardly by gravity into the trough 11. The length of the baffle N is less than the length of the valve cover M and the ends or portions of the baffle are spaced from the adjacent ends of the valve cover as shown by dotted lines in FIG. 1. The trough 11 for the baffle N may have its high point midway between the ends of the trough portions may incline downwardly at a slight angle from this higher midpoint portion so that any condensed oil and gaseous vapors, which are caught in the trough, will flow by gravity to the ends of the trough and flow back into the interior of the engine.

The special design features which I have explained for the baffle N are also true for the baffle P that is positioned within the valve cover L, see FIG. 1. Rather than

describe the baffle P in detail, I have applied the same reference numerals to the different parts of the baffle P, as has been applied to the baffle N, but have primed the numbers referring to the baffle P, see FIGS. 1 and 2. The engine has a standard carburetor Q that communicates with an intake passage 12, see FIG. 1.

I will now describe the apparatus that causes the interior of the engine and the interiors of the two valve covers L and M to be continually scavenged of gaseous vapors during the operation of the engine, thereby greatly reducing the formation of sludge and the dilution of the oil within the engine. I mount on oil/air separator R on the top of the carburetor Q, see FIG. 1 and provide one or more conduits 13 of sufficient air capacity that lead from the top of the valve cover L to the oil/air separator R. I further provide one or more conduits 14 that lead from the top of the other valve cover M to the oil/air filter R. No other air can enter the oil/air separator than that is conveyed to it by the conduits 13 and 14, as shown in FIGS. 1 and 2. An air filter S has a conduit 15, see FIG. 1, that conveys atmospheric air from the filter S to the interior of the engine. An oil return passage, such as the pipe 16, leads from the oil/air separator R to the interior of the engine for conveying trapped oil in excess of or above the normal operating level in the oil/air separator R, back to the engine oil supply.

OPERATION

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. In the normal operation of the internal combustion engine using my invention, the air enters in a manner such as through the air filter S, see FIG. 1, and flows into the interior of the engine through the pipe 15 as indicated by the dotted arrow 17 in the pipe 15 and the arrows 17, shown in the interior of the engine block. The air will pick up, absorb and collect gaseous vapors from the engine interior and then will pass up through the push rod area into the rocker arm area, as shown by the arrows 18, see also FIG. 3. At this point the air, which is carrying gaseous vapors collected from the engine interior, will flow along the under surfaces of both the baffle N in the valve cover M and the baffle P in the valve cover L. FIG. 2 illustrates how the lengths of the baffles N and P are of less length than the lengths of the valve covers M and L, and therefore spaces are provided between the ends of the baffles and the adjacent ends of their respective valve covers. It is possible for the air with its gaseous vapors to pass through these spaces and to flow through the area lying between the upper surfaces of the baffles N and P and the undersurfaces of the valve covers; M and L, respectively.

In addition, I have already described how the baffle N has its longitudinal edge 8 welded or otherwise secured to the adjacent inner surface of the valve cover M, see FIG. 3, and how the baffle P has its longitudinal edge 8', see FIG. 1, welded or otherwise secured to the adjacent inner surface of the valve cover L. The opposite longitudinal edge of the baffle N has the trough 11 formed therein that extends throughout the length of the baffle and is spaced away from the adjacent inner surface of the valve cover M, as is shown in FIG. 3. The width of this space 19 will cause the gaseous laden air to speed up its flow through this space and then there will be a sudden slow down of the flow as the gaseous

air enters the enlarged space above the baffle N. This sudden slow down of the gaseous air in the area above the baffle N will permit some of the heavier gaseous products to precipitate or condense, as a fall out from the air and to drop upon the upper surface of the baffle N where they will flow into the trough 11 and then along the inclined portions of the trough to the ends of the baffle N, at which points the products, consisting mostly of condensed gases vapors, will drop from the ends of the trough and flow back into the engine interior. What I have described for the gaseous flow of air around the baffle N holds true for the gaseous air flowing around the baffle P shown in FIG. 1.

One or more passageways, such as the conduits 13 and 14, communicate with the interiors of the valve covers L and M, respectively, at points above the baffles P and N, respectively, so as to receive the gaseous vapors from the interiors of the valve covers and convey them to the oil/air filter R, see FIG. 1. The oil/air filter R will filter any oil particles from the gaseous vapors and then the air and remaining gaseous vapors will flow into the carburetor Q where it will be mixed with fuel to form a desired combustible mixture that is conveyed to the cylinders B by the intake passage 12. This completes the flow of the air from the air filter S to the flow of gaseous vapor laden air into the intake passage 12. I have shown the direction of flow of the air with its gaseous vapors into the space between the baffles N and P and their respective valve covers M and L by the arrows 21. Also, dotted arrows 22 indicate the flow of the air with its gaseous vapors through the conduits 13 and 14. Finally, arrows 23 show the flow of air with its gaseous vapors in the intake passage 12 leading from this down draft carburetor Q. The oil return pipe 16 in FIG. 1 will carry trapped oil in the oil/air filter R that is in excess of or above the operating level in the oil/air filter back to the engine oil supply.

My invention discloses an arrangement of parts in any type of internal combustion engine that will provide total ventilation and scavenging for the engine interior. Moreover, the gaseous vapors picked up and absorbed by the filtered air passing through the engine interior during the scavenging process will provide air that is already enriched with combustible materials and hydrocarbons and these are fed into the carburetor or air metering control, such as diesel or fuel injected engine. It is understood where the word carburetor is mentioned throughout the specification, the term carburetor includes other possible fuel and air mixing devices for automatically or manually providing a prearranged mixture for combustion.

I claim:

1. The combination with an internal combustion engine having a carburetor for feeding and metering a combustible mixture to the engine cylinders and a cover enclosing the rocker arms that actuate the intake and exhaust valves;

- a. a first sole air feeding means for said carburetor and including a conduit communicating with the top interior of said cover and with said carburetor;
- b. a second sole atmospheric air feeding means for delivering air to the interior of the engine adjacent to one end of the engine crankcase, said engine having passages leading from the crankcase to the interior of said cover so that the air passing through the crankcase will pick up any gaseous vapors therein for scavenging the crankcase;

- c. a baffle spaced below the top interior of said cover and disposed above the rocker arms, the plane of said baffle being downwardly inclined from a horizontal plane and extending from one side wall of said cover and having a lip forming a trough, spaced a measured distance from the other side wall so as to provide a space between the trough and the wall of less area than the space between said baffle and the top of said cover, whereby the air and any gaseous vapor carried therewith will be caused to pass more rapidly through the space between the trough and the adjacent wall and will slow down immediately upon entering the larger space above the baffle so that the slowing down of the air with its vapors will cause the heavier vapors to precipitate out from the air and drop onto said baffle, the remaining lighter vapors in the air being conveyed by said first conduit to the carburetor, this conduit being the only source of air and any vapor supply to the carburetor.
2. The combination as set forth in claim 1 and in which
- a. the trough for the baffle has its central portion at a higher elevation than the trough ends so that the condensation from the vapor in the trough will flow by gravity to the ends of the trough; and
- b. the trough ends being spaced from the adjacent ends of the valve cover for permitting the condensation to return to the interior of the engine.
3. The combination as set forth in claim 1: and in which
- a. the internal combustion engine is of the V-type with two banks of cylinders and pistons with a cover enclosing each set of rocker arms that cooperate with intake and exhaust valves for each bank of cylinders;
- b. the first sole air feeding means for said carburetor having a conduit communicating with each of the ends of the top interior of each cover and with said carburetor;
- c. the engine passages that lead from the crankcase

- to the interior of the cover communicating with the interiors of both covers; and
- d. there being a baffle spaced below the top interior of each cover and disposed above the rocker arms enclosed by each cover, the planes of both baffles extending downwardly from a horizontal plane and extending from the higher side wall of the cover and having a trough spaced a measured distance from the other side wall so as to provide a restricted space between the upper lip of the trough of each baffle and its adjacent side wall of less area than the space between each baffle and the top of the cover enclosing the baffle, whereby the air and any gaseous vapor carried therewith and picked up by the air flowing through the crankcase and along the passages to the covers, will pass more rapidly through the said restricted spaces and then suddenly more slowly as the air with its vapor enters the larger spaces provided between the baffles and the tops of their covers;
- c. whereby the slowing down of the air with its lighter vapors will cause the heavier vapors to precipitate out from the air and drop upon the baffles, the remaining air with its vapors being conveyed by said first conduits to the carburetor, these conduits being the only source of air and vapor supply to the carburetor.
4. The combination as set forth in claim 2: and in which
- a. the conduits extending from said covers to said carburetor have an oil/air filter forming a part of the passage between the conduits and carburetor, said oil/air filter separating any oil from the vapor laden air and returning this oil to the engine interior; and
- b. said second sole atmospheric air feeding means for delivering air to the interior of the engine including an air filter for filtering the atmospheric air entering the engine interior.

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