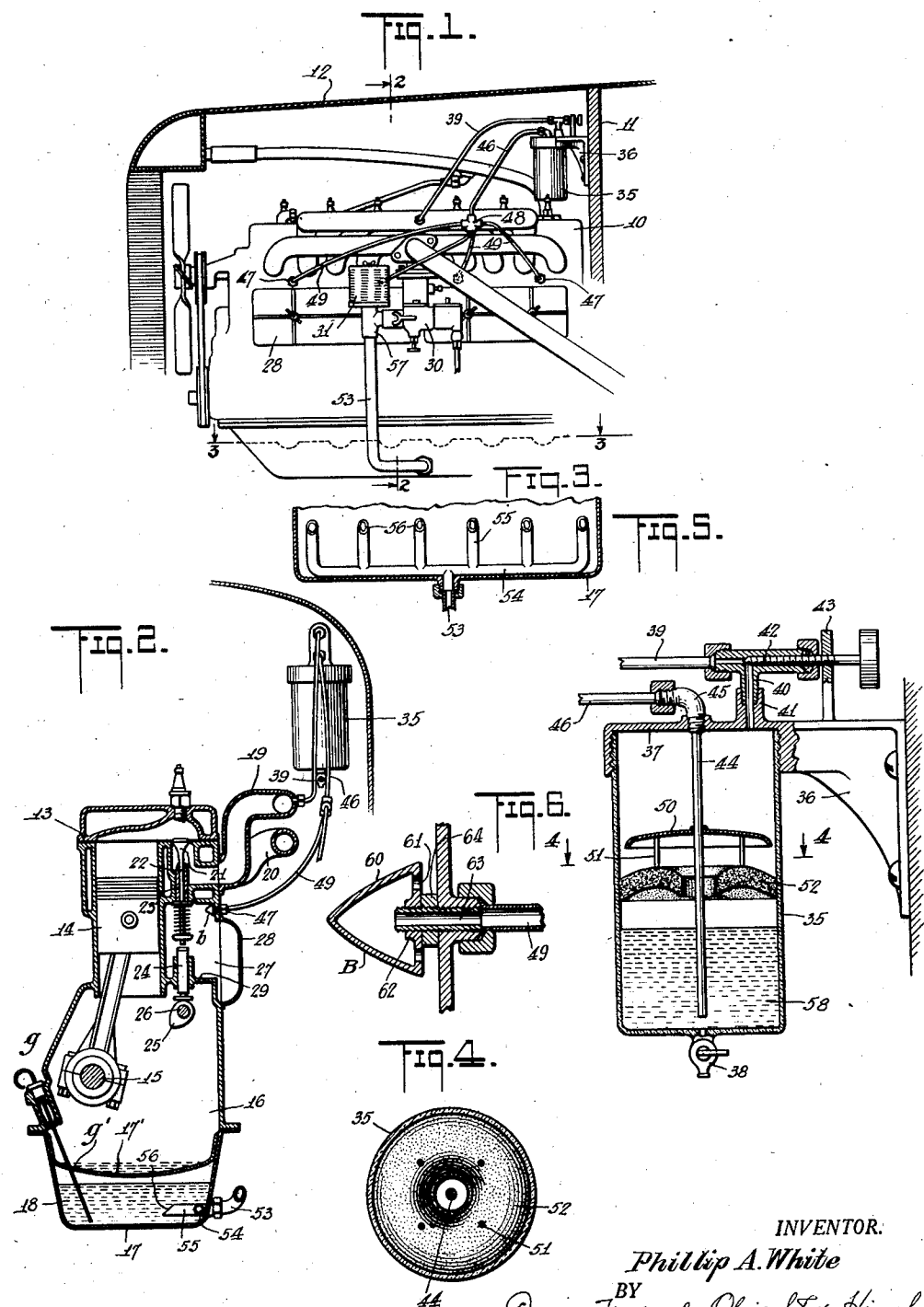


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METHOD AND APPARATUS FOR LUBRICATING AND
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METHOD AND APPARATUS FOR LUBRICATING AND OPERATING INTERNAL COMBUSTION ENGINES

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My present invention is concerned with the operation of internal combustion engines, from one aspect with the lubrication thereof, and from another aspect with the fuel supply therefor.

It is among the objects of the invention to provide methods of operation, whereby the lubricating oil in the sump of the engine is kept substantially free from solid impurities, such as carbon and from liquid impurities, such as fuel, without danger of impairing the lubricating qualities of the oil by heating or distillation, and whereby any fuel leaking past the piston rings is salvaged for useful consumption thereof.

Another object is to provide a method of operation, whereby a sufficiency, yet no excess of clean lubricant is applied, even at those bearings of the engine that are commonly neglected, such as the compression piston rings and the valve stems.

Another object is to provide apparatus of simple construction, devoid of moving mechanical parts, easily installed upon engines of various designs for reliably and automatically carrying the foregoing methods into execution.

Another object is to provide a method and an apparatus for removing carbon and volatile impurities from the engine lubricating oil, without removing the latter from the sump.

Another object is to provide an apparatus of the above character, which can be universally applied to a large number of engines of different sizes and types.

According to my method of engine operation, suction is applied to the engine case from a point above the oil in the sump, thereby to withdraw fuel vapors and the minute dust or flakes of carbon, substantially as these tend to enter the sump. Preferably a pipe communicating with the exterior, is caused to bubble air through the height of lubricant in the sump. The air is thus drawn from the exterior, preferably under the suction applied to the engine case, and serves to aerate the oil and release light, solid or volatile constituents therefrom. Preferably, the suction is applied at a part of the engine case

above the sliding valve stems, so that some of the oil vapor will be deposited there and afford effective lubrication thereof.

The suction is conveniently applied from the engine intake manifold, and in that case carbon or other solid particles are intercepted in the passage of the air and vapor toward the manifold, so that clean air enters the manifold enriched with the entrained fuel vapor.

A mist of minute particles of oil or oil vapor may be carried along from the sump, in the method of operation described, and will enter the intake manifold and be deposited at the compression piston rings to lubricate the latter.

The suction in the engine crank case being applied to the piston rings tends to draw oil away therefrom and to prevent carbon formation in the compression chamber of the cylinder.

Preferably, the suction from the intake manifold is applied in parallel to the carbureter and the engine crank case, the carbureter being adjusted so that the combustible mixture from the latter, combined with the very lean mixture that has passed through the crank case will be correct.

A single air filter may be employed, through which the air is drawn both in the flow through the carbureter and in the flow through the engine sump, although, if desired, a distinct filter may be employed for the air inlet to the sump.

For intercepting the solid impurities carried with the vapor drawn to the intake manifold from the engine crank case, I preferably employ a vessel with a washing liquid, such as castor oil through which the vapor is bubbled under the suction applied, baffle means therein preventing the entrainment of drops of oil to the manifold. The vessel is arranged for convenience in replacing from time to time the washing oil therein.

In the drawing, in which is shown one of various possible embodiments of the several features of the invention,

Fig. 1 is a side elevation of an engine equipped with my apparatus,

Fig. 2 is a view in longitudinal section taken on line 2—2 of Fig. 1,

Fig. 3 is a view of the sump taken on line 3—3 of Fig. 1,

Fig. 4 is a sectional view taken on line 4—4 of Figure 5.

Fig. 5 is a view in longitudinal cross-section on a larger scale, illustrating the construction of the oil washing, and,

Fig. 6 is a fragmentary detail of a baffle shown in section.

Referring now to the drawing, I have shown in a purely diagrammatic manner, on an automobile having a dashboard 11 and a hood 12, the outline of one of various possible types of internal combustion engine 10, to which the invention may be applied. The engine is illustratively shown of a more or less conventional type, which includes a cylinder head 13, pistons 14 therein, a crankshaft 15 operated therefrom, a crank case 16 therefor, the lower part of which constitutes the sump 17 charged with lubricating oil 18. The usual oil gage is shown at 8, passing through an aperture 8' in the usual gutters 17' of the crankcase. The intake manifold is shown at 19 and the exhaust manifold at 20. The valves 21 are shown of the puppet type, the valve stems 22 being slidable in bearings 23 and operated by tappets 24, in turn, actuated by cams 25 on the cam shaft 26. The valves are located in chambers 27, closed by the usual valve covers 28. Small holes 29 are provided for connection between the respective valve chambers and the crank case.

The carbureter 30 diagrammatically shown, may connect directly with the intake manifold or through other means which constitute no part of this invention. An air filter 31 is indicated, which may be of the usual conventional type, for excluding any dust from the air drawn into the carbureter.

I will first describe one embodiment of the simple apparatus, which I prefer to apply to the engine and will then set forth the method of operation.

In a preferred construction, the apparatus comprises the cleansing vessel 35, preferably of glass or other transparent material, which may be affixed by means of a bracket. The bracket may be in a unitary casting 36 with a cover cap 37, in which the rim of the vessel 35 is screwed to permit of ready removal of the vessel for replacement of the cleansing oil. A petcock 38 is preferably also provided. The vessel is preferably partly filled with castor oil, or a mixture of castor and mineral oil, indicated at 58.

The cover of the cleansing vessel is preferably connected by means of a suction pipe 39 with the intake manifold 19. For the purpose of adjustment, to be hereinafter more fully described, a fitting 40 screwed into a corresponding socket 41 in the cap 37 mounts

a needle valve 42, through an upstanding valve 43 on the bracket. A pipe 44 through the cover of the cleansing vessel extends centrally downward, nearly to the bottom thereof, from an elbow fitting 45 screwed into the cover. The elbow is connected to a pipe 46, the opposite end of which leads to a junction 48, from which radiate pipes 49, preferably communicating through unions 47 with the interior of the crank case.

Preferably a baffle 5 is provided over the inner end of each pipe 49 to prevent splashing of oil therethrough. As shown in Fig. 6 the baffle may comprise a cover 60 of pressed metal, having a base 61, with an axial hub 62 threaded upon a hollow screw stud 63 through the engine case, to the outer end of which the union nut for the end of pipe 49 is secured. A nut 64 upon the stud 63 spaces the baffle from the engine case.

The cleanser vessel has a baffle arrangement, which in the preferred embodiment comprises a downward dished metal disk 50 encircling the pipe 44, and soldered thereto and having depending rods 51 sustaining an annular felt washer 52, preferably downwardly dished and having a snug engagement with the wall of the vessel 35.

A pipe 53 preferably leads through the wall of the sump into a cross pipe 54 submerged therein and having horizontal branches 55 with obliquely cut open ends 56 at the bottoms of the sump. Preferably the pipe 53 draws its charge from the same air filter 31 that supplies the carbureter. For this purpose, the air filter is provided with a second outlet 57 to which the upper end of pipe 53 is connected. If desired, however, the inlet to pipe 53 may be through an air filter separate and distinct from that to the carbureter.

The operation proceeds as follows:

While the engine is running the suction in the intake manifold is applied in series to the two bodies of air, that in the crank case chamber above the sump oil and that in the cleansing vessel 35 above the oil therein. Fresh air is sucked through filter 31, pipe 53 and branch pipes 55, bubbling through the height of the oil in the engine sump, thereby cooling the oil, levitating any light solid particles therefrom and causing any volatile constituents of fuel or lubricating oil, to pass off as vapor. These impurities and other small solid particles or fuel that may pass the piston rings are then drawn from the crank case through pipes 49 during the sustained suction applied from the intake manifold. In the upward flow of the air laden with oil fumes, the oil will deposit to form a light film on the bearings of tappets 24 and valve stems 22, as the air is sucked from the upper part of the crank case into pipes 49. From pipe 46, the air and vapor bubbles through the cleansing oil 58, in which carbon

and other solid particles are intercepted, but the volatile constituents are permitted to pass on. These include fuel vapor and oil vapor which are drawn into the intake manifold. The fuel vapor is usefully consumed in the compression chamber. The oil vapor serves not only to form a light lubricating film at the compression rings, but to thereby increase the effectiveness of said rings in maintaining high compression.

The baffle construction 60 in the engine prevents drops of lubricating oil passing into pipe 49. The baffle construction of the cleansing vessel prevents any oil drops or splash from the latter being entrained to the intake manifold with the vapors bubbled through vessel 35. Any drops of oil entrained with the air or vapor are blocked or intercepted by the plate 50 and will slowly seep through the felt ring 52 back to the oil in the vessel.

In actual use of my apparatus, the oil in the sump is kept free from carbon and from fuel, so that it may be used almost indefinitely. The carbon and other solid particles are intercepted by the cleansing oil 58, which eventually turns dark and dirty. At such times, it may be readily replaced by unscrewing the vessel 35, pouring out the contents and refilling, or if so desired, the contents may be drawn off through petcock 38.

Thus, my simple apparatus effects a number of important improvements in the operation of an engine. Not only is the engine oil of the sump kept clean and cool, as above noted, but the fuel vapors escaping past the piston rings are salvaged and enter the combustible mixture to the intake manifold. Excess oil is sucked from the cylinders, but a sufficient amount is introduced by way of the compression chamber, with the combustible mixture, for adequate lubrication of the compression piston rings. Moreover, the valve stems of the engine are satisfactorily supplied with clean oil undefiled by carbon or dirt.

By regulating the valve 43, the suction or rate of air flow may be adjusted in accordance with the characteristics of the engine.

While the apparatus above described operates to produce novel methods of lubricant distribution, lubricant cleansing and fuel utilization and is preferred for this purpose, it will be understood that any or all of said methods of engine operation hereinafter claimed both singly and in combination, may be accomplished by means other than the specific apparatus disclosed.

It will thus be seen that there are herein described apparatus and methods in which the several features of this invention are embodied, and which in practice attain the various objects of the invention and are well suited to meet the requirements of use.

As many changes could be made in the above method and constructions, and many

apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description, or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. In an internal combustion engine, a crankcase, cylinders, pistons, and an intake manifold, a container partly filled with a washing oil, a pipe connected from the top of said container to the intake manifold and a second pipe extending under the surface of the washing oil and leading to the upper part of the engine crankcase.

2. In an internal combustion engine, the combination of an intake manifold, a crankcase partially filled with engine lubricating oil, a vessel partially filled with cleansing oil, and a piping arrangement connected to the intake manifold for applying suction in series to the chambers above the respective bodies of oil, part of said piping opening under the surface of the cleansing oil, to cause the vapor withdrawn from the crankcase to be bubbled therethrough.

3. In an internal combustion engine, the combination of an intake manifold, an engine crankcase partly filled with lubricating oil, a cleansing vessel partly filled with cleansing oil, a piping system connected to the intake manifold and applying suction in series to the chambers above the oil in the crankcase and in the cleansing vessel, and an inlet to said engine crankcase through which air is admitted under the suction applied at the intake manifold, said piping system being connected to bubble the air withdrawn from the crankcase through the body of cleansing oil.

4. The combination of an internal combustion engine, having an intake manifold, a crankcase partially filled with lubricating oil, a vessel partially filled with cleansing oil, a pipe communicating from the intake manifold to the top of said cleansing vessel, a pipe communicating from the top of said crankcase through the top of said vessel, said pipe extending under the surface of the cleansing liquid, and means to admit cleansed air to the engine crankcase.

5. The combination of an internal combustion engine having a crankcase, a pipe opening into the sump of said case and under the level of the lubricant therein, and communicating with the external air, a vessel partly filled with cleansing oil, a pipe communicating from above the level of lubricant in the crankcase through the top of said vessel, said pipe terminating under the surface of the cleansing oil and a pipe communicating

from the top of said vessel with the intake manifold of the engine.

6. An oil cleansing system for an internal combustion engine, comprising a vessel partially filled with a cleansing oil, a suction pipe connected from the top of said vessel to the intake manifold, a pipe connected from a part of the engine case above the sump through the top of said vessel under the surface of liquid contained therein, a pipe extending from the exterior into said sump and opening under the surface of the oil therein, and means for cleansing the air from said pipe before admission thereof to the sump.

7. In an internal combustion engine, a crank case having a sump, an intake manifold, a carbureter, an air cleaner in advance thereof, a pipe leading from said air cleaner into the sump, and opening under the level of oil therein, an oil cleansing vessel exteriorly of the engine, and piping connected from a part of the engine case above the oil in the sump to bubble through said vessel under suction applied thereto from the intake manifold.

8. An internal combustion engine having a sump, a pipe leading thereinto and having a plurality of branches opening under the surface of the oil therein, an air cleaner at the exterior part of said pipe, piping connected to the intake manifold at one end and having a plurality of branches at the other end connected to a part of the engine case above the sump, said latter piping comprising two portions, and a body of cleansing oil therebetween, through which the air and vapor are bubbled under the suction applied at the intake manifold.

9. A pipe system connected to the intake manifold at one end, and to the external air at the other, the outermost section of said pipe system extending through the engine sump under the surface of lubricant therein, an oil cleansing vessel, a pipe connected from a part of the engine case above the sump into said vessel, the innermost pipe section applying suction from the intake manifold to the top of said vessel.

10. In an internal combustion engine, a pipe connected from above the level of oil in the crank case to the intake manifold, and a baffle for preventing the splash of oil to said pipe, said baffle comprising a cone, a hollow threaded nipple through the crank case, said cone mounted upon the inner end of said nipple and having apertures for application of suction, and a union connecting said pipe to the outer end of said nipple.

11. In an internal combustion engine, a hollow nipple threaded through the engine crank case, adapted for connection of a pipe at the outer end thereof, a conical baffle structure comprising a threaded base screwed upon the inner end of said nipple, a plurality of apertures in the base of said baffle and a

spacer between the wall of the engine and the baffle base.

12. In an internal combustion engine; the combination of a crank case having a sump, mineral lubricating oil therein, a suction pipe system connected to the crank case at one end above the level of lubricant therein and connected at its opposite end to the intake manifold, and a vessel containing a cleansing fluid in the course of suction flow from the crank case to the intake manifold, said vessel having a vegetable oil therein.

Signed at New York in the county of New York and State of New York this 1st day of November, A. D. 1927.

PHILLIP A. WHITE.