

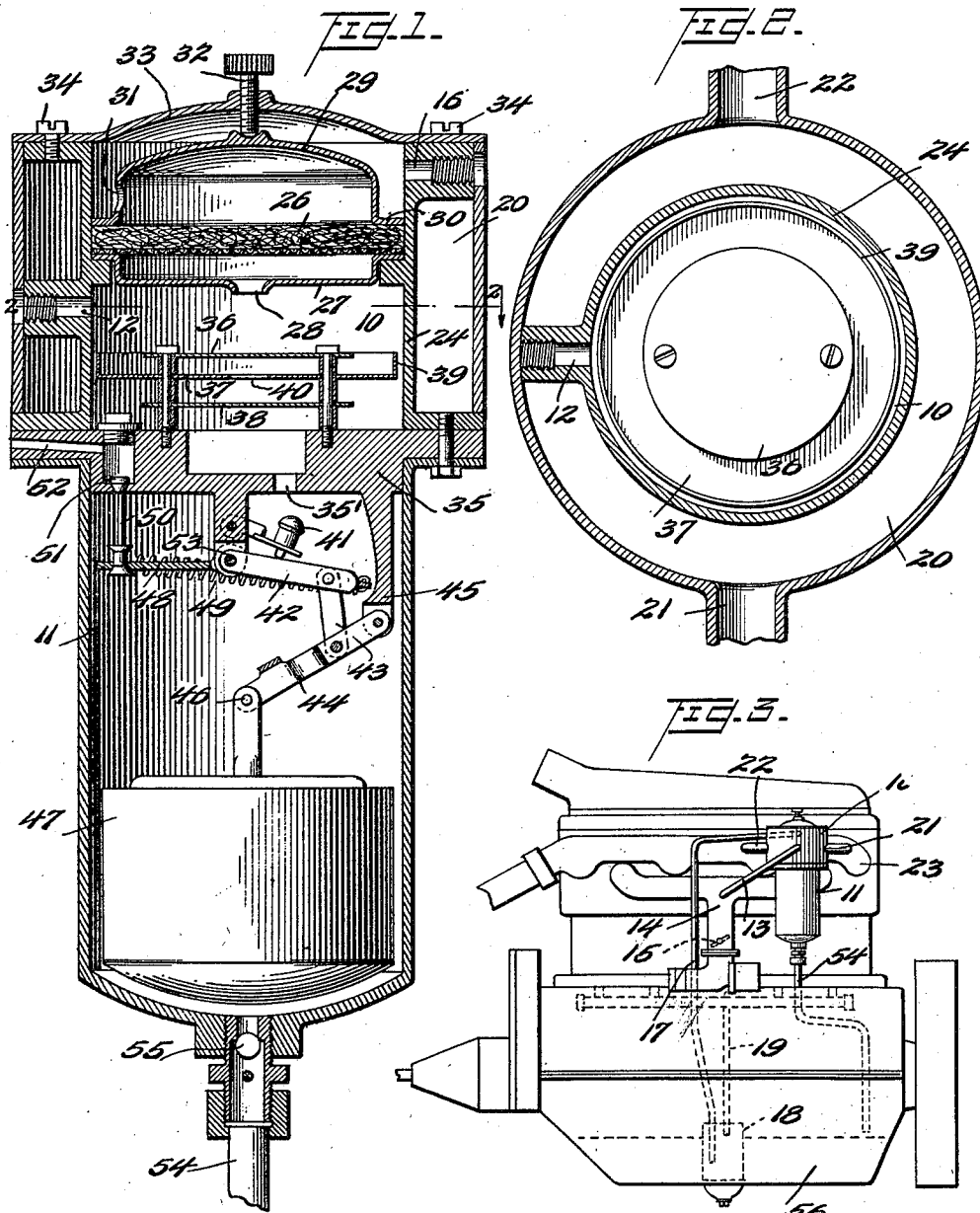
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OIL PURIFYING APPARATUS FOR INTERNAL COMBUSTION ENGINES

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OIL-PURIFYING APPARATUS FOR INTERNAL-COMBUSTION ENGINES.

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This invention relates to oil purifying devices of the type described in my Patent No. 1,359,453, November 16, 1920, and in Patent No. 1,435,561 to R. L. Skinner, and the object of the invention is to simplify the apparatus and provide for thoroughly removing all solid particles from the lubricating oil of an engine as well as volatile impurities, such as gasoline and water.

Referring to the accompanying drawing: Figure 1 is a vertical sectional view of a combined refiner and filter;

Figure 2 is a section on the line 2—2 of Figure 1, and

Figure 3 is a diagram of an internal combustion engine with the oil refiner or rectifier applied.

Referring to the drawing, 10 indicates a refining chamber and 11 a float chamber, both normally closed to the atmosphere and in communication with means to maintain a subatmospheric pressure therein.

As shown, the sub-atmospheric pressure is maintained in the two chambers 10 and 11, when the connecting port is open, by connecting a port 12 in the chamber 10 by means of pipe 13 with the intake manifold 14 of the engine above the throttle valve 15.

Due to the difference in pressure oil flows into the upper part of the refining chamber through a port 16, being conveyed to this port by a pipe 17 which communicates with the crank case or other receptacle for the engine lubricating oil. As shown, the pipe 17 draws oil from a compartment 18 in the crank case into which the contaminated oil from the pistons drains through a pipe 19, as described in my pending application, Serial No. 22,791, filed April 13, 1925.

It will be understood that so far as the present application is concerned it is immaterial from what particular point in the engine lubricating system the impure oil is withdrawn through the pipe 17.

Between the suction port 12 and the oil inlet port 16 I arrange a filter for removing from the oil any particles of metal, carbon, or other solid matter. The purpose of locating the filter at this particular point is to utilize the suction to draw the oil through the filter and in order that this may be done most effectively the filtering medium should be horizontal so that the oil will cover it and be subject to equal pressure over its surface. It is also essential that the filter

should be in the nature of a complete partition across the refining chamber so that all of the oil must pass through it. Before describing the filter in detail it is to be noted that the refining chamber has a hollow wall providing a surrounding space 20 through which a portion of the exhaust gases pass to heat the oil in the refining chamber and assist in evaporating the volatile impurities.

Referring to Figure 3, 21, 22 indicate a by-pass through which a part of the gases in the exhaust manifold 23 are directed through the hollow wall 20.

As shown in Figure 1, the inner wall 24 of the refining chamber is formed with a ledge 25 which supports the filtering medium 26. Beneath the filtering medium and resting on the ledge 25 is a pan 27 which catches the oil from the filter and directs it downward thru a central opening 28, for a purpose to be presently explained. Above the filtering diaphragm 26 is an inverted cup-shaped clamping member 29, having a marginal flange 30 arranged to rest on and clamp the outer edge of the filter diaphragm 26. The cup 29 is provided with an opening 31 which should be arranged on the opposite side from the oil inlet 16. This will cause the oil entering at 16 to flow around the cup and in contact with the heated wall 24 before passing on to the filtering diaphragm through the opening 31. The inverted cup 29 is clamped tightly upon the margin of the filter diaphragm by means of a screw 32 centrally threaded in a cover plate 33 which is removably attached to the upper end of the wall of the refining chamber by suitable screws 34.

It will be understood that the filtering diaphragm is arranged substantially horizontal, as shown, for the purpose previously stated. It will be noted that by removing the screws 34, the cover 33 and the cup 29, the filter diaphragm can be quickly removed for the purpose of cleaning the filter or inserting a new diaphragm. This is an important feature as it is essential to keep the filter relatively free from dirt to promote efficient cleaning and purifying of the oil.

Between the walls of the chambers 10 and 11 there is clamped a casting 35 having an opening 35' through which the oil drains into the float chamber 11. It is preferable to break up the oil in the refining chamber into drops or thin films in order to expose as large a surface as possible to the action

of the heat and the vacuum, and for this purpose there is shown supported on the casting 35 a series of plates 36, 37, 38. The oil from the opening 28 in the pan 27 flows on to the center of the plate 36 and runs over its margin on to the plate 37. This plate is provided with a side flange 39 and hence the oil is compelled to flow toward a central opening 40 and thence on to the center of a plate 38. From the margin of plate 38 the oil flows on to the casting 35 and drops through the opening 35' and into the float chamber.

In the float chamber the same sub-atmospheric pressure exists as in the refining chamber when the port 36 is open. This port is, however, periodically closed by a valve 41 carried on a pivoted arm and resting on a toggle lever 42. This toggle lever is connected by a link 43 with a lever 44 which is pivoted to a hanger 45 on the casting 35 and the free end of which is connected by pivot 46 with a float 47. The free end of the toggle lever 42 is connected with the free end of another toggle lever 48 by means of a spring or springs 49. The toggle lever 48 has a sliding connection with a valve stem 50 which carries a valve 51 adapted to open connection between the float chamber 11 and an air port 52. A pipe 54 at the bottom of the float chamber conducts the refined or purified oil back to the crank case 56, or to some suitable part of the lubricating system. At the entrance to the pipe 54 there is a ball-check valve 55 for a purpose to be presently explained.

The operation of the toggle levers, the oil valve 41 and the air valve 51 is substantially the same as in the Skinner patent above mentioned and quite similar to the operation of the like devices in the well known gasoline vacuum tanks used on automobiles.

Briefly stated, the operation of the apparatus is as follows. A partial vacuum is maintained in the apparatus by reason of the suction in the intake pipe of the engine which is quite strong when the engine is idling or running with the throttle only moderately open. The oil is drawn or sucked from its source of supply due to the vacuum and enters through the port 16, being heated as it passes around to the port 31 where it enters the filter chamber. Raising the temperature of the oil reduces its viscosity and causes it to pass more readily through the filter. The filter diaphragm, which may be of felt or any other suitable material, is securely held at its edges so that the oil has no escape from passing through it. The oil is forced quite rapidly through the filter by atmospheric pressure due to the partial vacuum below and it passes in more or less thin films over the plates 36, 37 and 38, which plates are also located in a chamber heated by the exhaust.

Due to the heat and the vacuum and the large surface of the oil exposed thereto volatile impurities, such as gasoline and water, will be vaporized and drawn through the port 12 and discharged into the intake to be burned in the engine. As the purified oil fills the float chamber 11 the float rises until the lever 42 passes a dead center with respect to its pivot 53 when the spring 49 will cause the toggle levers 42 and 48 to snap upwardly, closing the oil valve 41 and opening the air valve 51. Air is thus permitted to enter the chamber 11, the check valve 55 drops, and the accumulated oil is quickly discharged through the pipe 54. As soon as the oil is discharged the float descends, the toggle levers and valves resume the positions shown in Figure 1, the air in the float chamber 11 is quickly exhausted, the check valve 55 then closes the outlet to the chamber 11 by reason of the vacuum therein, and the operation proceeds as before.

It will be understood that the float chamber empties very quickly and that hence the oil in the float chamber, as well as the oil passing through the refining chamber, is almost continuously under a vacuum.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. The combination with an internal combustion engine having a lubricating oiling system and means for separating volatile impurities from the oil comprising a refining chamber, an oil inlet to said chamber and means for conducting oil from the oiling system to said inlet, an exhaust outlet from said chamber and means connected thereto for withdrawing air and volatile impurities from the chamber, and means for discharging purified oil from the chamber and returning the same to the oiling system, of means for separating solid impurities such as carbon and metal particles from the oil comprising a filtering element arranged in said chamber intermediate the oil inlet and the exhaust outlet.

2. The combination with an internal combustion engine having a lubricating oiling system and means for separating volatile impurities from the oil comprising a refining chamber, an oil inlet to said chamber and means for conducting oil from the oiling system to said inlet, an exhaust outlet from said chamber and means connected thereto for withdrawing air and volatile impurities from the chamber, and means for discharging purified oil from the chamber and returning the same to the oiling system, of means for separating solid impurities such as carbon and metal particles from the oil comprising a filtering element arranged in said chamber intermediate the oil inlet and the exhaust outlet, said filtering element be-

ing flat and horizontal whereby the depth of oil thereon will be substantially uniform.

3. The combination with an internal combustion engine having a lubricating oiling system and means for separating volatile impurities from the oil comprising a refining chamber, an oil inlet to said chamber and means for conducting oil from the oiling system to said inlet, an exhaust outlet from said chamber and means connected thereto for withdrawing air and volatile impurities from the chamber, and means for discharging purified oil from the chamber and returning the same to the oiling system, of means for separating solid impurities such as carbon and metal particles from the oil comprising a filtering element arranged in said chamber intermediate the oil inlet and the exhaust outlet, said filtering element forming a porous partition within said chamber completely separating the portion thereof having the oil inlet from the portion having the exhaust outlet.

4. The combination with an internal combustion engine having a lubricating oiling system and means for separating volatile impurities from the oil comprising a refining chamber, an oil inlet to said chamber and means for conducting oil from the oiling system to said inlet, an exhaust outlet from said chamber and means connected thereto for withdrawing air and volatile impurities from the chamber, and means for discharging purified oil from the chamber and returning the same to the oiling system, of means for separating solid impurities such as carbon and metal particles from the oil comprising a filtering element arranged in said chamber intermediate the oil inlet and the exhaust outlet, said filtering element being horizontally arranged, the oil inlet being arranged to deliver oil on top of said element and the exhaust outlet being arranged to create subatmospheric pressure below said element.

5. The combination with an internal combustion engine having a lubricating oiling system and means for separating volatile impurities from the oil comprising a refining chamber, an oil inlet to said chamber and means for conducting oil from the oiling system to said inlet, an exhaust outlet from said chamber and means connected thereto

for withdrawing air and volatile impurities from the chamber, and means for discharging purified oil from the chamber and returning the same to the oiling system, of means for separating solid impurities such as carbon and metal particles from the oil comprising a filtering element arranged in said chamber intermediate the oil inlet and the exhaust outlet, a portion of the wall of said chamber being removable and said filtering element being removable for cleaning and renewal.

6. The combination with an internal combustion engine having a lubricating oiling system and means for separating volatile impurities from the oil comprising a refining chamber, an oil inlet to said chamber and means for conducting oil from the oiling system to said inlet, an exhaust outlet from said chamber and means connected thereto for withdrawing air and volatile impurities from the chamber, and means for discharging purified oil from the chamber and returning the same to the oiling system, of means for separating solid impurities such as carbon and metal particles from the oil comprising a filtering element arranged in said chamber intermediate the oil inlet and the exhaust outlet, and means for heating the oil prior to its passage through the filtering element.

7. The combination with an internal combustion engine having a lubricating oiling system and means for separating volatile impurities from the oil comprising a refining chamber, an oil inlet to said chamber and means for conducting oil from the oiling system to said inlet, an exhaust outlet from said chamber and means connected thereto for withdrawing air and volatile impurities from the chamber, and means for discharging purified oil from the chamber and returning the same to the oiling system, of means for separating solid impurities such as carbon and metal particles from the oil comprising a filtering element arranged in said chamber intermediate the oil inlet and the exhaust outlet, said filtering element being horizontally arranged in said chamber and means for heating the oil in said chamber above the filtering element.

In testimony whereof I hereunto affix my signature.

JAMES A. WATSON.