

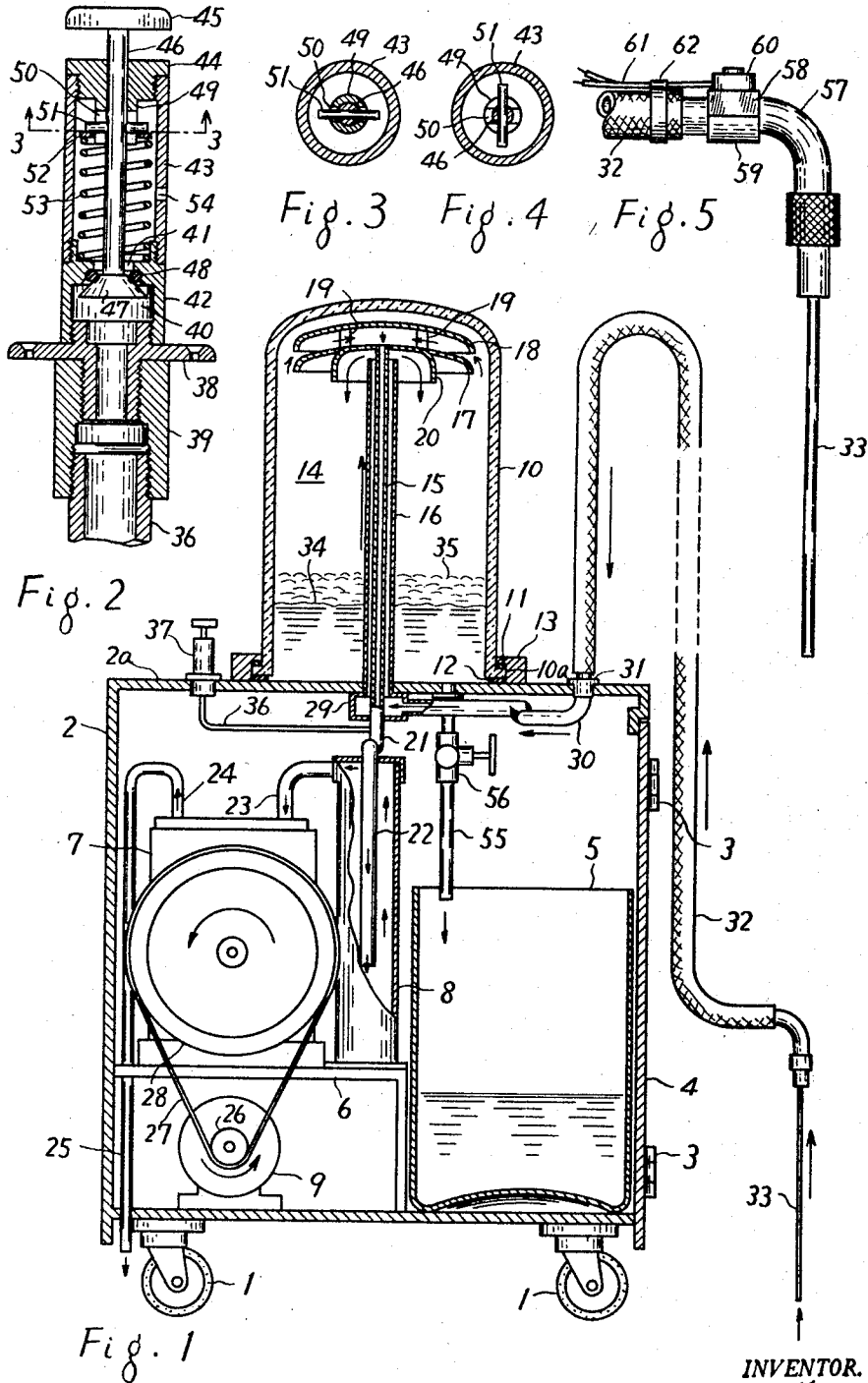
March 4, 1969

MASAICHI KITAJIMA

3,430,730

DEVICE FOR REMOVAL OF LUBRICATING OIL

Filed Jan. 25, 1966



INVENTOR.

MASAICHI KITAJIMA

BY

Eugene H. Hoffer
ATTORNEY

1

2

3,430,730

DEVICE FOR REMOVAL OF LUBRICATING OIL
Masaichi Kitajima, 9 Imazu Yamanaka-cho,
Nishinomiya-shi, Japan

Filed Jan. 25, 1966, Ser. No. 522,867

Claims priority, application Japan, Feb. 3, 1965,
40/7,984; Feb. 22, 1965, 40/13,988

U.S. Cl. 184-1.5

Int. Cl. F01m 11/04; F16n 33/00

9 Claims

ABSTRACT OF THE DISCLOSURE

A device for the removal of lubricating oil from crank cases of engines, gear boxes and the like which avoids the need for gravity drains.

This invention relates to devices for the removal of lubricating oil from crank cases of internal combustion engines, gear boxes or the like and more specifically to novel and improved apparatus greatly facilitating the removal of lubricating oil for inspection and replacement.

Generally removal of oil from the crank case from an internal combustion engine or gear box requires removal of closure means on the bottom side thereof and in many cases special tools are required for the removal of such closure. In the case of automotive engines, it is necessary to either crawl under the engine or in the alternative place the automotive vehicle on an appropriate lift both of which are necessarily time consuming. In many cases the driver of the vehicle must either be kept waiting for extended periods of time or must leave the vehicle at the service station. The service station owner must therefore have adequate space for the storage of vehicles and also additional personnel in order to render adequate service to his customers during his peak business periods.

This invention has as one of its objects the provision of a novel and improved means which both simplifies and facilitates the removal of lubricating oil from an automotive engine.

Another object of the invention resides in the provision of a novel and improved apparatus for removal of lubricating oil for inspection and replacement which apparatus is not adversely affected by the quality of the oil being removed which may include metal particles, acids or the like resulting from use and deterioration of the oil.

The utilization of known means for extraction of oil has not been found entirely satisfactory since the metal particles or fragments may be contained in the oil cause rapid deterioration of the pumping apparatus. For this reason it has been the general practice to drain crank cases by removal of the bottom closure. With this invention the rate of extraction of the oil from the crank case can be materially increased with the result that the time required for an oil change may be reduced to less than half the normal time.

Another object of the invention resides in the provision of a novel and improved apparatus for the extraction of oil which may not only include volatile substances and metallic particles but also large quantities of air bubbles. When conventional pumping devices including vacuum pumps are utilized for this purpose, the air bubbles interfere materially with the removal of the oil. With this invention the air bubbles in the oil can be removed during extraction so that they do not adversely interfere with rapid removal of the oil for inspection and replacement.

The above and other objects of the invention will become more apparent from the following description and accompanying drawings forming part of this application.

In the drawings:

FIGURE 1 is a cross sectional view of one embodiment of a device for extracting lubricating oil in accordance with the invention.

FIGURE 2 is a cross sectional view of a manually operated valve used with the apparatus as shown in FIGURE 1.

FIGURE 3 is a cross sectional view of FIGURE 2 taken along the line 3-3 thereof.

FIGURE 4 is a cross sectional view of FIGURE 2 similar to FIGURE 3 but with the valve in the open position.

FIGURE 5 is an enlarged side elevational view of the oil removal nozzle shown in FIGURE 1.

Referring now to the drawings, the numeral 2 denotes the housing provided with a plurality of wheels 1 on the bottom side thereof to facilitate removal of the apparatus. The right side of the housing 2 contains a door 4 secured to the housing by hinges 3. Immediately adjoining the door 4 is a waste oil tank 5 for reception of the oil withdrawn from a crank case, gear box or the like. Behind the tank 5 is a shelf 6 which carries on its upper surface a vacuum pump 7 including an air filter 8. Below the shelf 6 is a prime mover such as an electric motor 9 for driving the vacuum pump 7. On the top wall 2a of the housing 2 an inverted transparent glass jar is provided having a peripheral flange 10a which is hermetically sealed to the wall 2a by gaskets 11 and 12 and a cooperating ring 13. The inverted glass jar thereby forms an oil reservoir 14.

The reservoir 14 includes a pair of vertically disposed concentric tubes 15 and 16 which extend from a point within the housing 2 through the top surface 2a of the housing and into the chamber 14. The inner conduit or tube 15 carries a pair of inverted baffles 17 and 18 on the upper end thereof. The baffle 17 has a central opening registering with the opening in the tube 15 and the two baffles are supported in spaced relationship by intermediate supports 19. The opening within the tube 15 communicates with the space between the baffles 17 and 18 while the annular space between the tubes 15 and 16 terminates short of the baffle 17. As will be described, the extracted oil flows through the annular space between the conduits 15 and 16 and is deflected downwardly through a third baffle 20.

The inner conduit 15 extends downwardly through a housing 29 on the underside walls 2a of the housing 2 and is connected by piping 21 and 22 to the air filter 8. The tube 22 is surrounded by the air filter which is in turn coupled by the conduit 23 to the suction pump 7. The air outlet of the pump includes conduits 24 and 25, the latter extending through the bottom of the housing 2. The motor 9 which is preferably an electric motor is provided with a pulley 26 which drives the vacuum pump by means of an appropriate belt 27 and the pulley 28, the latter being mounted on the vacuum pump shaft.

The outer tube 16 extends through the top wall 2a of the housing 2 and is sealed to the small housing 29 as previously described. The housing 29 is coupled by means of a tube 30 and a fitting 31 to a flexible hose 32 carrying on the outer end thereof an oil extracting nozzle 33. With this arrangement, when the nozzle 33 is inserted into the crank case through the oil gaging opening, the oil in the crank case is drawn into the oil reservoir chamber 14. The oil flow is through the flexible tube 32, the conduit 30, the chamber 29, and the annular space between the concentric tubes 15 and 16 in the chamber 14. The in-flowing oil is then deflected by the cap-like baffle 20 and accumulates at the bottom of the chamber 14. The baffles 17 and 20 prevent the in-flowing oil from being drawn into the central tube 15 to

which the vacuum pump 7 is connected. This procedure also removes air from the oil entering the chamber and minimizes the boiling phenomenon of the oil caused by the production of the air bubbles contained in the oil at the time the oil entered the chamber 14 of the jar 10.

In the operation of the device in accordance with the invention, the oil is sucked into the chamber 14 and expansion of the air results in the production of bubbles 35. To prevent the large accumulation of bubbles within the chamber 14 which may cause oil to be sucked into the vacuum pump 7 through tube 15 as previously described, a valve 37 is connected to conduit 21 by means of an intervening conduit 36 and may be utilized to minimize the flow of air bubbles to the vacuum pump 7. This valve is shown more clearly in FIGURE 2. More specifically the valve 37 includes an annular flange 38 for securing the valve to the upper wall 2a of the housing 2. The flange 38 has a downwardly extending threaded tubular element which extends through the wall 2a and receives a threaded coupling 39. The bottom end of the coupling has appropriate screw threads for the attachment of the conduit 36. The upper side of the flange includes an annular threaded portion for threadably receiving the flange seat assembly 42 which forms a chamber 40 in which the valve head 47 is disposed. A second cylindrical element 43 is threadably secured to the valve seat assembly 42 and the top of this element carries a closure 44 having a central opening therein for receiving the valve stem 46. The valve stem 46 extends downwardly into the valve seat assembly 42 and carries on the lower end thereof the valve head 47. The valve seat 48 may take any desirable form as for instance an O-ring or the like. With this arrangement, when the valve stem 46 is depressed by application of pressure to the valve opening knob 45, the valve will open permitting air to flow through the opening 54 in the cylindrical member 43 down through the valve seat opening 41 and into the conduit 36.

For convenience in holding the valve 37 in the open and closed positions, the closure 44 is provided with a downwardly extending tubular member 49 having a transverse slot 50 formed therein. The valve stem 46 carries a transverse pin 51 which engages the slot when the valve is in the closed position shown in FIGURES 2 and 3. By depressing the knob 45 until the pin 51 clears the slot 50, and then rotating the knob through an angle of about 90 degrees as shown in FIGURE 4, the valve will be retained in the open position.

The valve 37 is normally maintained in the closed position when oil is withdrawn from a crank case or other receptacle. When bubbles accumulate within the bar 10, the knob 45 on the valve 37 is depressed. This procedure admits air into the tube 15 with the result that the bubbles are almost immediately removed. Normally the valve 37 need only be opened for short periods of time during the oil removal operation.

The transfer of oil from the crank case or other receptacle to the chamber 14 may be directly observed since the container or jar 10 is preferably made of a transparent material. After the oil has been transferred to the chamber 14, it may then be discharged into the tank 5 by means of a conduit 55 and a valve 66, the latter having a tube extending through the wall 2a of the housing 2 and communicating with the chamber 14. To facilitate discharge of the oil into the tank 5 it is necessary to admit air into the chamber 14. For this purpose the valve 37 is moved to the open position and held in that position until all of the oil drains into the tank 5. When the chamber 14 is completely drained, the valve 37 is operated as described above to move it to the closed position. If desired, the valve 37 may be electromagnetically operated and remote controlled. For this purpose it would be desirable to provide a switch adjoining the nozzle 33 so that an operation may control the valve more easily. One form of a switch is shown in FIGURE 5.

As will be observed in FIGURE 5, the nozzle 33 which is in fact an elongated tube is connected at one end with a curved tube portion 57. The other end of the tube 57 is secured within the end of the hose 32. A push button switch 60 is fastened to the curved tube portion 57 by clamping members 58 and 59 preferably made of insulating material. The lead wires 61 from the switch 60 may be secured to the tubing 32 by a series of clamps and connected to the electromagnetic valve and to a source of energy in the conventional manner so that depression of the switch would automatically open the valve 37.

In the description of the invention reference was made specifically to the withdrawal of oil from gasoline engines, gear boxes and the like. It is of course evident that it is equally useful for the removal of other liquids retained within cavities or wells which are normally difficult to drain.

While only certain embodiments of the invention have been illustrated and described, it is apparent that alterations, modifications and changes may be made without departing from the true scope and spirit thereof as defined by the appended claims.

What is claimed is:

1. A device for removal of oil and other liquids from reservoirs and the like comprising a vacuum pump, means for driving said pump, a liquid receiving chamber, a conduit connected at one end to said pump and terminating at the other end in the upper portion of said chamber, a flexible hose connected at one end to said chamber, a liquid removal nozzle connected to the other end of said hose, an air inlet valve, and a tube coupling said valve and the upper portion of said chamber whereby air may be admitted into said chamber and above the level of liquid in said chamber to dissipate air bubbles produced in the liquid in said chamber.

2. A device according to claim 1 wherein said liquid receiving chamber is formed of transparent material.

3. A device according to claim 1 wherein the first said conduit extends through the bottom of said chamber and terminates at the upper portion of said chamber.

4. A device according to claim 3 wherein the upper end of the first said conduit includes a baffle surrounding said conduit and wherein said chamber includes a second conduit extending from a point below said baffle downwardly through the bottom of said chamber and a connection between said second conduit and said flexible hose.

5. A device according to claim 4 wherein said chamber includes a second baffle spaced above the first said baffle and wherein said second conduit surrounds the first said conduit.

6. A device according to claim 1 wherein said tube is interconnected with the first said conduit.

7. A device according to claim 1 wherein said valve includes a valve seat, a movable valve element movable toward and away from said seat and a spring holding said valve element against said seat and against the action of said vacuum produced by said pump.

8. A device according to claim 1 wherein the upper end of the first said conduit includes a baffle surrounding said conduit and wherein said chamber includes a second conduit extending from a point below said baffle downwardly through the bottom of said chamber and a connection between said second conduit and said flexible hose.

9. A device according to claim 7 wherein said valve is operated electromagnetically.

References Cited

UNITED STATES PATENTS

1,690,470	11/1928	Bly	141—59
3,095,062	6/1963	Neely	184—1.5

HOUSTON S. BELL, JR., *Primary Examiner*.