May 16, 1939. J. H. RINEHART 2,158,914

OIL CASE DRAINING AND CLEANING APPARATUS

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Fig. 1.

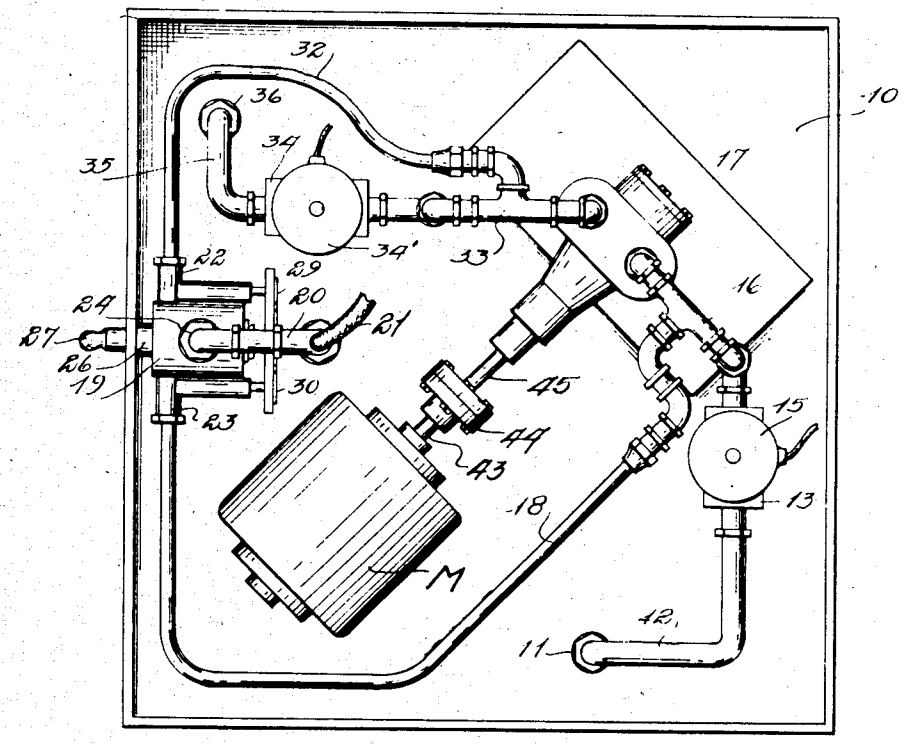


Fig. 2.

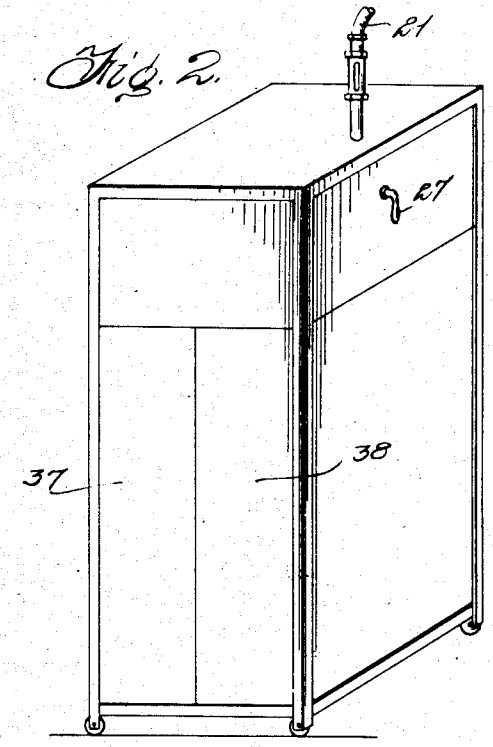
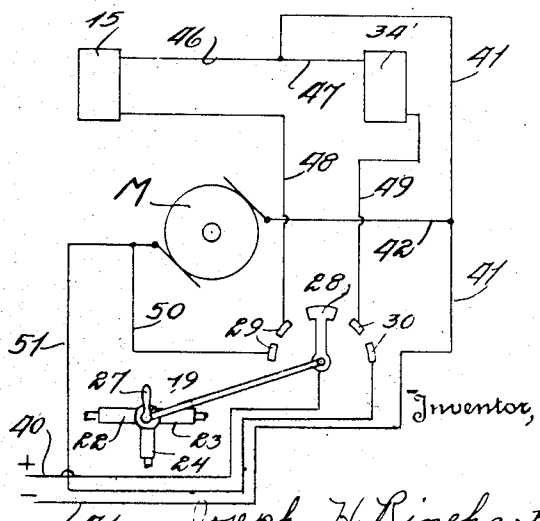


Fig. 4.



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Fig. 3.

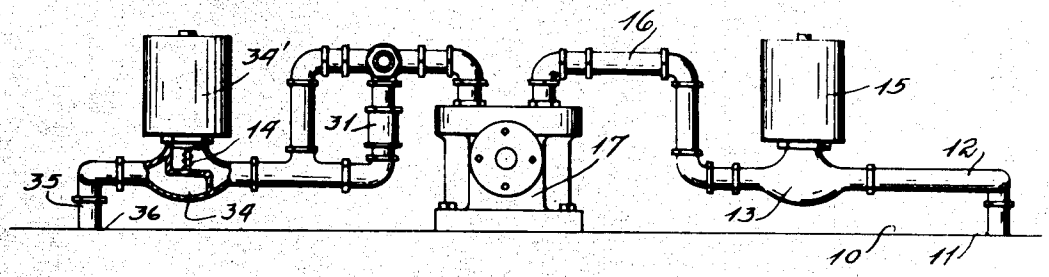


Fig. 5

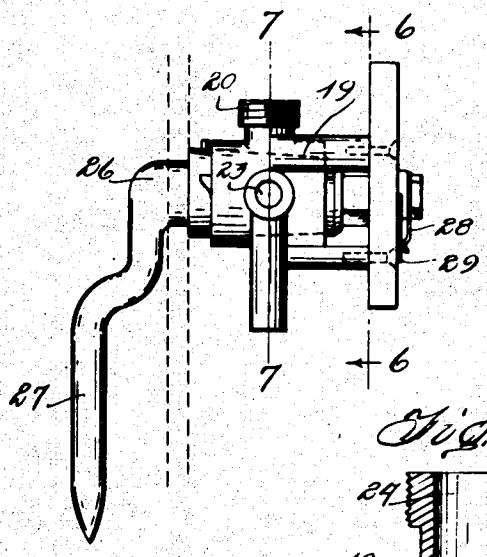


Fig. 6.

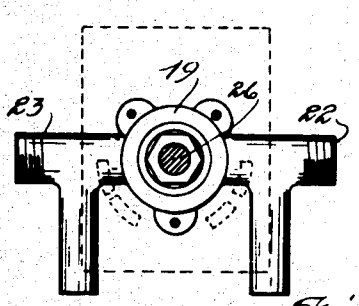


Fig. 8.

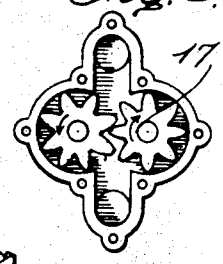
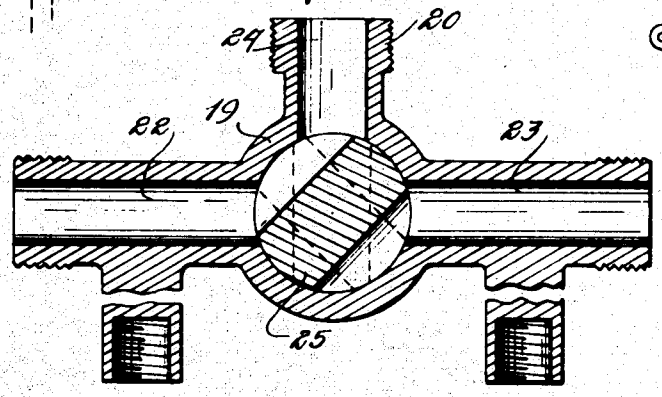


Fig. 7.



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UNITED STATES PATENT OFFICE

2,158,914

OIL CASE DRAINING AND CLEANING APPARATUS

Joseph H. Rinehart, Fort Lee, N. J.

Application December 2, 1938, Serial No. 243,631

6 Claims. (Cl. 184—1.5)

This invention relates to cleaners and flushers for treating containers of lubricant, and it may be employed in connection with crank or gear cases, although it is especially adapted for use in flushing and cleaning crank cases of automobiles, whereby such operation may be conducted without moving the automobile to some particular location, such as pits now commonly employed in service stations, or without the use of hoists or elevators which are now also commonly employed in service stations.

It is an object of this invention to provide a transportable apparatus which can be moved near an automobile, the said apparatus having a pipe which can be inserted in the usual oil delivery pipe of an automobile crank case; the said apparatus being then operative to draw or suck oil from the crank case until it is emptied, and then by a sequence of operations, deliver cleaning or flushing fluid or oil to the crank case for the purpose of dislodging sediment and thick oil from the walls of the crank case, and thereafter actuate the mechanism which will draw the flushing fluid from the crank case, leaving it in condition for a fresh charge of lubricating oil.

It is a further object of this invention to provide a plurality of pipes and connections, one of which delivers the spent oil and the cleaning fluid to a tank or tanks constituting a part of the transportable mechanism, and other pipes and connections for delivering the flushing fluid after the spent oil has been drawn off and, in this connection, novel means are provided whereby a pump arranged to be driven only in one direction is directly connected to an irreversible motor which effects the suction for removing spent oil, the pressure for supplying the flushing oil and the suction for removing the latter.

It is also a most important object of the invention to provide a single means for controlling the supply of current to the motor and the flow of fluid through the pump selectively to produce extraction of spent oil and supply of flushing or fresh oil.

It is furthermore an object of the invention to provide valves, each of which is under the influence of a spring which holds the valve closed and furthermore, under the influence of a solenoid which, when energized, overcomes the force of the spring and dislodges the valve from its seat to permit the circulation of fluid therethrough, according to the position of the master valve which also controls the circuit. In other words, when the master valve is set to permit fluid to pass through the valve actuated by the solenoid, that solenoid is energized at the time or substantially at the time when current is delivered to the motor to rotate it for driving the pump which forces the fluid through the master valve and the valve actuated by the solenoid which is energized to move the valve from its seat.

It is a still further object of this invention to provide a motor driven pump of suitable construction, which pump, as stated, will be operated through the several connections for drawing fluid from the crank case and successively forcing fluid into the crank case.

It is a still further object of this invention to provide a frame or truck-like structure having wheels to facilitate the movement of the apparatus into positions in proximity to the automobile to be treated, or to be moved to remote places where it can be stored; and it is furthermore an object to provide the said truck with containers for the flushing fluid and for the spent oil and flushing fluid during the operations heretofore stated.

An apparatus embodying the invention has been found to be successful in use and comparatively inexpensive to produce and maintain.

With the foregoing and other objects in view, the invention consists in the details of construction, and in the arrangement and combination of parts to be hereinafter more fully set forth and claimed.

In describing the invention in detail, reference will be had to the accompanying drawings forming part of this application, wherein like characters denote corresponding parts in the several views, and in which—

Figure 1 illustrates a plan view of the operating parts of the apparatus, showing the connections with the master valve and with the pump;

Figure 2 illustrates a perspective view of the truck-like structure encasing the operating parts of the apparatus and containers for fluid, to which the circulating system of the apparatus is connected;

Figure 3 illustrates a detail planar view in elevation of the circulating system;

Figure 4 illustrates a diagram of the circuits for the motor and solenoids controlled by the master valve;

Figure 5 illustrates an enlarged detail view of the master valve and the switch, a contact of which is carried by an extension of the plug of the master valve;

Figure 6 illustrates a sectional view on the line 6—6 of Fig. 5;

Figure 7 illustrates a sectional view on the line 7—7 of Fig. 5; and

Figure 8 illustrates a detail view of the suction and forcing pump.

In these drawings 10 denotes a base or platform on which the operating parts of the mechanism are located, the said platform being provided with an aperture 11, through which a circulating pipe 12 extends, for delivering fluid from or to a container on the truck, to be presently described. The pipe 12 is connected to a valve 13 and the said valve is under the control of a spring 14 which holds the valve closed and a solenoid 15 which, when energized, as will be presently explained, opens the valve. There are two solenoid controlled valves in the system and the illustration of one of them as it appears in Fig. 3 will suffice as a detail disclosure of each of these parts of the apparatus. The valve 13 has suitable couplings, generally identified by the numeral 16, by which it is connected to the pump 17, it being shown also that these couplings 16 are connected through the pipe 18 with a master valve 19, the said master valve having a branch or coupling 20, to which a pipe, such as a hose 21, is connected, which is of such length as to enter the oil filling tube of a crank case and descend therein to the bottom of the crank case. The master valve has two ports 22 and 23 in addition to the port 24 leading to the coupling 20, and these ports are controlled by a valve 25 which is carried by the valve stem 26, the said valve stem projecting from the valve and terminating in a handle 27. The pipe 21 has a section through which the condition of the circulating fluid can be observed.

An electrical switch member 28 is mounted on the inner end of the valve stem and it coacts with sets of contact terminals 29 and 30 to bridge the gap between each pair of contacts for establishing electric circuits for energizing the pump and the solenoids. The valve 25 is movable to positions to permit fluid to pass through the port 22 into the port 24, or from the port 24 to the port 23, and when moved to these positions, communication between the several ports is controlled, that is to say circulation may be established or interrupted. The system may be provided with one or more relief valves 31 of known construction, so that when fluid is passing through the pipes of the system, the relief valve will operate to control one set of pipes of the system. This being a well known mechanical feature, it need not, it is thought, be illustrated in detail.

The piping system from the pump opposite the piping system comprising the connections 12, 13 and 16 may include a pipe 32, connected with the port 22 of the master valve, a pipe 33 under control of the valve 34 controlled by the solenoid 34', it being shown that the pipe 32 connects with the coupling 33 which communicates with the pump and that the valve 34 has a pipe extension 35 which descends through an opening 36 in the base, so that it communicates with one of the containers or tanks in the truck. Two such tanks 37 and 38 are conventionally shown in Fig. 2 and this figure also illustrates the handle 27 of the master valve and the hose or pipe 21 which leads to the crank case.

As shown in Figure 4, there is provided a pair of supply wires or leads 40 and 41. The lead 40 is connected to the movable contact 28. From the lead 41 extends a conductor 42 which connects with one brush of the motor M, the latter being connected by a shaft 43 and coupling 44 with the pump shaft 45. Branch conductors 46 and 47 connect the lead 41 with one terminal of each of the solenoids 15 and 34' respectively. The remaining terminal of the solenoid 15 is connected by a conductor 48 with one of the contacts 29 and the remaining terminal of the solenoid 34' is connected by a conductor 49 with one of the contacts 30. Conductors 50 and 51 connect the remaining contacts 29 and 30 in multiple with the remaining brush of the motor M.

In the operation of the device, we may consider Fig. 4. When the handle 27 is in the position there shown, the contact 28 is in neutral position and the device is idle. If the handle 27 be swung to the right, then the contact 28 bridges the contacts 30 and current will flow from lead 40 to contact 28, one contact 30, conductor 49, solenoid 34', conductor 47 and back to lead 41. Also, current will flow from the other contact 30 through conductor 51 and motor M back to lead 41. Solenoid 34' and motor M are thus connected in multiple under these conditions. If, on the contrary, handle 27 be swung to the left, contact 28 will engage both contacts 29 and current will flow from lead 40 to contact 28, one contact 29, conductor 48, solenoid 15 and conductor 46 back to lead 41. At the same time, current flows from the other contact 29 through conductor 50 and motor M back to lead 41 through conductor 42. Under the last conditions, solenoid 15 and motor M are connected in multiple. Now, when solenoid 34' is energized, valve 34 is opened and valve 13 is held closed by its spring. Assuming that tank 37 is for the reception of spent oil and that pipe 35 is connected thereto, what now happens is that the port 24 is placed, by movement of the master valve, in communication with port 23 and, the pump being in action, fluid will flow from the pipe 21 through port 24, port 23, pipe 18, pump 17, pipe 33, valve 34 and pipe 35 to tank 37. Under the opposite position of handle 27, solenoid 15 will be energized and valve 13 opened while valve 34 will remain closed. Now fluid will flow from tank 38 through pipe 12, pump 17, pipe 33, pipe 32, port 22, port 24 and down through pipe 21 to supply flushing oil to the crank case.

While it is the intention of the inventor to circulate oil and cleaning fluid for draining the oil case or supplying cleaning fluid thereto and again draining it, reference is made to the circulation of fluid by the operation of the pump, and it is to be understood by this term "fluid" that either oil or cleaning fluid is comprehended within the said term.

I claim:

1. In a cleaning and flushing apparatus, a pump, a motor connected to said pump, pipes each leading from one side of said pump and each provided with a normally closed valve, a master valve, pipes connected to the respective first mentioned pipes between the valves and pump and leading to said master valve, a suction and delivery pipe connected to the master valve and adapted by movement of the master valve for selective connection to the last mentioned pipes, and electrical means for simultaneously energizing said motor and selectively opening said normally closed valves.

2. In a cleaning and flushing apparatus, a pump, a motor connected to said pump, pipes each leading from one side of said pump and each provided with a normally closed valve, a master valve, pipes connected to the respective first mentioned pipes between the valves and pump and leading to said master valve, a suction and delivery pipe connected to the master valve and

adapted by movement of the master valve for selective connection to the last mentioned pipes, electro-magnetic means associated with each normally closed valve and operating to open the valve when energized, and switch means for simultaneously energizing said motor and a selected electro-magnetic means.

3. In a cleaning and flushing apparatus, a pump, a motor connected to said pump, pipes each leading from one side of said pump and each provided with a normally closed valve, a master valve, pipes connected to the respective first mentioned pipes between the valves and pump and leading to said master valve, a suction and delivery pipe connected to the master valve and adapted by movement of the master valve for selective connection to the last mentioned pipes, and electrical means for simultaneously energizing said motor and selectively opening said normally closed valves, said electrical means including switch means connected to and operated with said master valve.

4. In a cleaning and flushing apparatus, a pump, a motor connected to said pump, pipes each leading from one side of said pump and each provided with a normally closed valve, a master valve, pipes connected to the respective first mentioned pipes between the valves and pump and leading to said master valve, a suction and delivery pipe connected to the master valve and adapted by movement of the master valve for selective connection to the last mentioned pipes, electro-magnetic means associated with each normally closed valve and operating to open the valve when energized, and switch means for simultaneously energizing said motor and a selected electro-magnetic means, said switch means being directly connected with the master valve to move therewith.

5. In an oil case draining and cleaning apparatus, a movable frame member having containers, an electrically driven suction and forcing pump, a pipe communicating with the suction side of the pump and with one of the containers, a pipe communicating with the pump at its forcing side and with another container, a valve held normally closed in each pipe, a solenoid for each valve operative when energized to open the valve, a pipe adapted to enter an oil case to be cleaned, a master valve having a port with which said last mentioned pipe communicates, and other ports with which the pipes from the pump communicate between the pump and the valves of the first mentioned pipes, means in the master valve for directing a flow of fluid through either pipe from the pump to the oil case pipe, electric circuits for the motor and solenoids including switch elements for the circuits to the solenoids and motor, and a switch operated by the operation of the master valve for coacting with the said switch elements for energizing the solenoids selectively and for energizing the motor.

6. In an oil case draining and cleaning apparatus, a movable frame having containers one of which receives fluid drawn from the case and the other of which contains a flushing fluid, an electrically driven suction and forcing pump, a pipe communicating with the suction side of the pump and with the container for receiving fluid, a pipe communicating with the pipe at its forcing side and with the container of the flushing fluid, a valve held normally closed in each pipe, a solenoid for each valve operative when energized to open the valve, a pipe adapted to enter the oil case to be drained, a master valve having a port with which the last mentioned pipe communicates, and other ports with which pipes communicate between the pump and the valves of the first mentioned pipes, means in the master valve for directing a flow of fluid through either pipe from the pump to the oil case pipe, electric circuits for the motor and solenoids including spaced switch elements for the circuits to the solenoids and motor, and a switch operated by the movement of the master valve for coacting with the switch elements in bridging the spaces therebetween for energizing the solenoids selectively and for energizing the motor.

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