July 21, 1931. E. J. SWEETLAND 1,815,221

METHOD AND APPARATUS FOR RAPIDLY DRAINING CRANK CASE OIL

Filed June 2, 1924 3 Sheets-Sheet 1

Fig. 1.

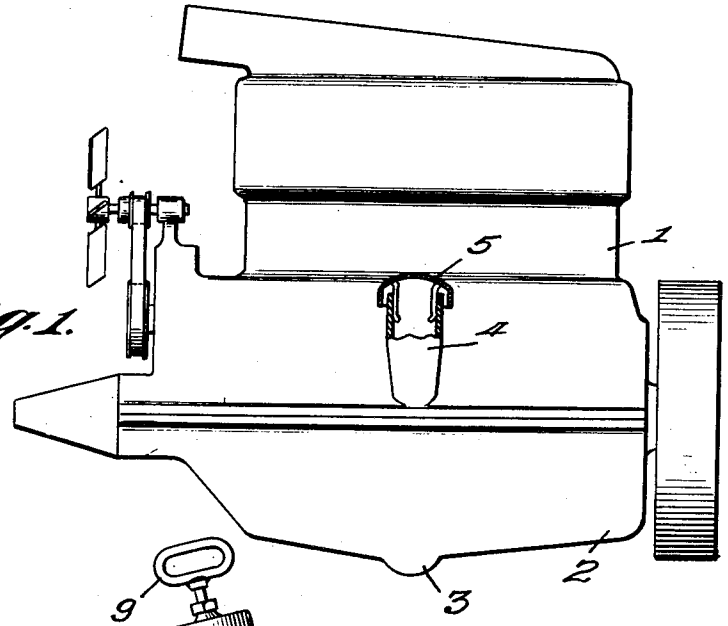

Fig. 2.

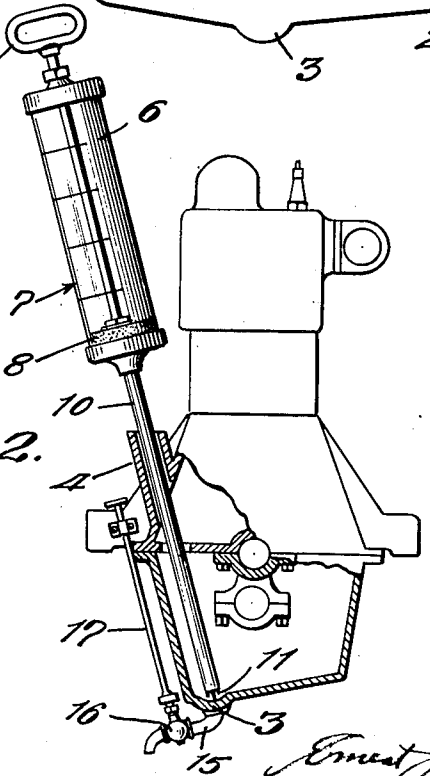

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Fig. 4.

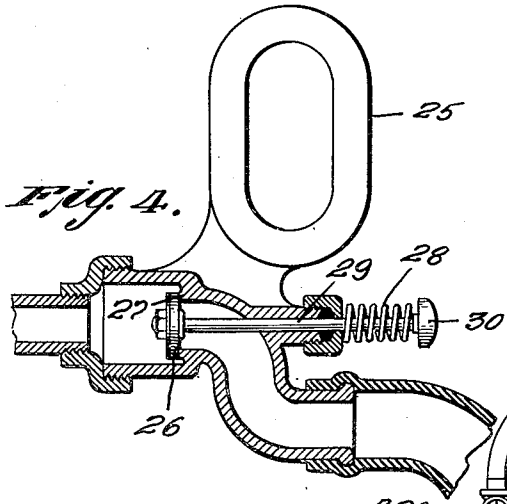

Fig. 9.

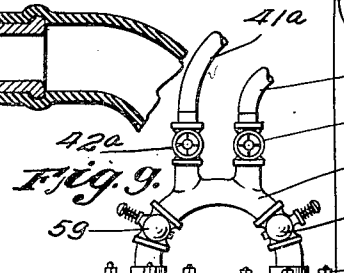

Fig. 10.

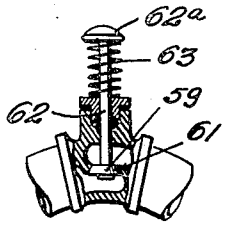

Fig. 3.

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METHOD AND APPARATUS FOR RAPIDLY DRAINING CRANK CASE OIL

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Fig. 5.

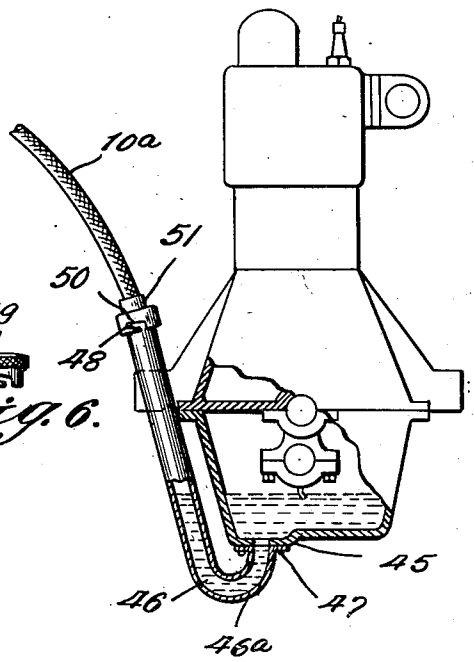


Fig. 6.

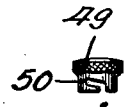
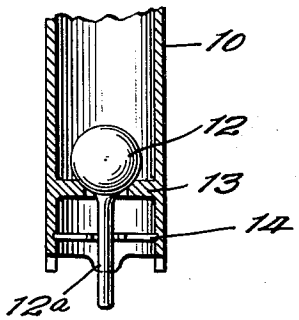


Fig. 7.



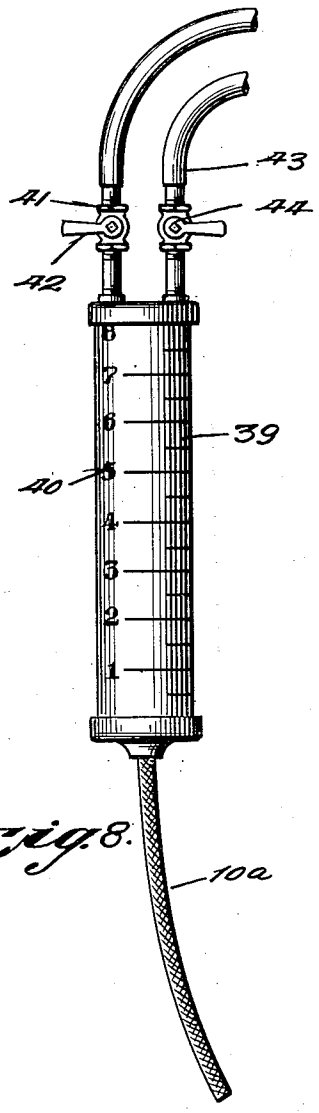


Fig. 8.

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Patented July 21, 1931 1,815,221

UNITED STATES PATENT OFFICE

ERNEST J. SWEETLAND, OF HAZLETON, PENNSYLVANIA

METHOD AND APPARATUS FOR RAPIDLY DRAINING CRANK CASE OIL

Application filed June 2, 1924. Serial No. 717,389.

This invention relates to an improved method and apparatus for draining the lubricating oil from the crank case of an internal combustion engine.

It is an object of the invention to provide a method and apparatus for this purpose whereby the lubricating oil in the crank case of an internal combustion engine may be quickly and completely withdrawn from the crank case without the necessity for crawling under the car and removing the drain plug which is at present used to close the bottom of the crank case and without the dirty work which is incidental to the present draining and refilling of the crank case of an automobile.

Another object of the invention is to provide a method and apparatus whereby the contents of the crank case can be withdrawn and the crank case refilled with clean oil in much less time than is taken for the withdrawal or drainage of the dirty crank case oil by gravity as under the present procedure.

A further object of the invention is to provide an internal combustion engine crank case constructed and arranged so that the emptying, or draining, and refilling of the same may be expeditiously accomplished.

The invention involves broadly the step of withdrawing the oil from the crank case of an internal combustion engine by suction and of an apparatus adapted to be inserted into the lowest portion of the crank case from above for the purpose of effecting said withdrawal. In order to facilitate the insertion of the apparatus into the lowest portion of the crank case I have designed a crank case for automotive internal combustion engines which locates the oil sump below and in line with the breaking tube or some other convenient opening into the crank case from above. It will be obvious however to persons skilled in the art that various forms of apparatus may be used for accomplishing this broad purpose and that certain modifications in the method described herein may be resorted to without departing from the general spirit of the invention or the scope of the claims thereto.

In compliance with the patent statutes, I have shown in the accompanying drawings, the present preferred embodiment of an apparatus suitable for carrying out the method under the various conditions described herein but it is to be understood that the invention is not limited to the particular apparatus shown and described.

In the accompanying drawings, Figure 1 is a side view of an automotive internal combustion engine showing certain modifications in the construction thereof to adapt the same for use with my method.

Figure 2 is a part sectional view thru the crank case of the engine showing one form of apparatus for withdrawing oil from the crank case.

Figure 3 is a side elevation of a large scale apparatus for carrying out my method, suitable for use in garages, service stations, etc.

Figure 4 is a part sectional view of one form of valve to be used in connection with the apparatus shown in Figure 3.

Figure 5 is a part sectional view of an ordinary internal combustion engine with a suitable drainage pipe attached thereto to adapt the same for use with my method of draining and refilling the crank case with lubricating oil.

Figure 6 is a detailed view of a cap for closing the top of the drainage pipe shown in Figure 5.

Figure 7 is a detailed view of the valve which may be provided in the lower end of the suction tube.

Figure 8 is a side view of still another form of apparatus suitable for the carrying out of my method.

Figure 9 is a side view of a still further modified form of apparatus.

Figure 10 is a sectional view of one form of valve for use with the apparatus of the invention.

In the embodiment of the invention illustrated in Figures 1 and 2, the crank case 2 of the internal combustion engine 1 is provided with a depression or sump 3 located in line with the breather tube or inlet 4 to the crank case. A suitable spring retained cap 5 fits upon the breather tube to normally

close the opening to the crank case and prevent the entrance of dust therein. In Figure 2, 6 illustrates one form of apparatus for quickly withdrawing the lubricating oil from the crank case of an engine constructed in accordance with the drawings shown in Figure 1, in the use of which it is unnecessary to go thru the laborious and dirty process of crawling underneath the engine, removing the drain plug from the crank case and waiting for the oil to drain out by gravity then replacing the drain plug and refilling the crank case with oil or perhaps with kerosene or some other flushing out fluid and repeating the process to remove the kerosene after which the new lubricating oil is put into the crank case.

The apparatus illustrated in Figure 2 comprises a graduated pump cylinder 7 which is preferably constructed of glass or some other transparent material so that the amount of oil therein may be observed, and is provided with a piston 8 which is moved in the cylinder 7 by means of a handle 9 to draw the oil thru the nozzle 10 into the cylinder or to eject same from the cylinder. The lower end of the nozzle 10 is provided with a valve portion 11 which projects downward below the end of the nozzle portion so that the valve 12 is lifted from its seat 13 when the nozzle 10 is placed at the bottom of the crank case, to permit the oil to be sucked into the nozzle 10 and cylinder 7. When the nozzle 10 is removed from the bottom of the crank case, the valve 12 falls back upon its seat and prevents any of the oil from draining back into the crank case. A suitable guide 14 keeps the stem 12*a* of the valve 12 in proper alignment with the nozzle 10. By placing the sump 3 at the one side of the crank case adjacent the side while thereof the nozzle 10 can be inserted therein while the cylinder 7 is held in substantial vertical alignment therein.

In the use of this device, the breather cap 5 is removed from the crank case and the nozzle 10 inserted thru the opening 4 and is pushed into the sump 3 at the lowest portion of the crank case. The valve stem 12*a* resting upon the bottom of the sump 3 is lifted and when the piston 8 is pulled upward in the cylinder 7, the suction in the cylinder draws the oil from the crank case through the nozzle 10 and into the cylinder 7. When all of the oil has been sucked out of the crank case, which is a matter of only a very short time, the nozzle 10 is lifted out of the opening 4 and the apparatus 6 is removed to any suitable place for discharging the dirty oil. It will the obvious to any one familiar with the internal combustion engine are that all these operations will take a very short time as compared to the time necessary to drain the oil from the crank case by gravity and that same can be carried out with much more comfort to the operator and with much more cleanliness than accompanies the present method of draining the crank case. After the oil has been removed in the manner indicated new oil may be added either by drawing the same into the cylinder 7 and forcibly ejecting it into the crank case or by pouring the same into the crank case thru the breather opening 4 as is the usual practice. If it is desired to flush out the crank case and oil conduits with kerosene or some other cleaning compound, the kerosene is introduced into the crank case in any suitable manner and after the engine has been run for a short period of time it may be withdrawn by the use of the apparatus and method described in the same way that the dirty lubricating oil is withdrawn.

To permit drainage of the crank case without the use of the suction apparatus just described the sump 3 may be provided with a tap 15 normally closed by valve 16 which is operable thru the rod 17 to permit the oil to drain from the sump 3. The apparatus just described is designed for the use of the owner of a car or for the man who does his own service work. For garages, service stations etc., where crank cases are drained on a large scale, an apparatus similar to that illustrated in Figures 3 and 4 can be utilized. This apparatus comprises a suction tank 18 provided with a vacuum pump 19 driven by a suitable motor 20 which may be automatically or hand controlled to maintain the proper degree of vacuum in the tank 18. The gage 21 indicates the degree of vacuum in the tank. Extending from the tank 18 is a vacuum line 22 provided with flexible hose connections 23 which permits movement of the nozzle 24 to various positions for the purpose of withdrawing the oil from the crank case of the automobile. This nozzle 24 is provided with a handle portion 25 and a hand controlled valve 26 for opening and closing the communication between the nozzle 24 and the vacuum line 22. The valve 26 is seated upon a suitable seat 27 and is normally held in closed position by a spring 28 which surrounds the valve stem 29.

A trigger or thumb piece 30 is provided adjacent the handle 25 so that the valve may be conveniently opened by pressing downward upon the trigger 30 to communicate the suction from the vacuum line 22 to the nozzle 24. A valve 22*a* is provided near the tank 18 to permit the suction in the line 22 to be cut off for repairing the hose 23 or at other times when the apparatus is not to be used.

In the use of this apparatus, the nozzle 24 is free to be moved to the automobile by means of the flexible hose 23 and is inserted into the crank case as in the manner similar to the way the nozzle 10 is inserted in Figure 2. The valve 26 is then open and the

suction in the tank 18 quickly withdraws the oil from the crank case into the tank. A suitable sight glass 31 may be provided in the tank 18 for indicating the height of the oil therein and a discharge valve 32 and conduit 33 may be used for conveying the oil from the tank 18 to any suitable storage or tank receptacle. To prevent kinking of the hose 23 and to keep the same off the floor, the hose may be passed over a pulley 34 suspended from a suitable cable 35 which runs over the pulleys 36 located adjacent the top of the room and having attached thereto a suitably proportioned counterweight 37 which will normally hold the hose 23 off the floor but will permit ready extension of the hose to any desired position when it is necessary to move the nozzle 24 to a distant automobile.

It is obvious in this connection that duplicate apparatus of this type could be designed, the one for rapid withdrawal of the oil from the crank case and the second utilizing a pressure tank similar to the suction tank 18, a hose 23 and a nozzle 24, etc., could be utilized for injecting the oil under pressure into the empty crank cases after they had been drained.

Figure 8 illustrates a form of apparatus which might also be used for this purpose, comprising a cylindrical body portion 39, preferably constructed of glass or other transparent material and provided with a scale 40 by which the amount of oil in the cylinder can be gauged or measured. This cylinder is provided with a flexible nozzle 10*a* adapted to be inserted into the crank case and being flexible may be used with crank cases where the lowest portion of the crank case is not directly in line with the pressure cap as illustrated in Figure 1. A vacuum line 41 controlled by a suitable valve 42 communicates with the cylinder 39 and a pressure line 43 controlled by a suitable valve 44 also communicates with the cylinder at the top thereof.

In the use of this device, the nozzle 10*a* is inserted into the crank case and the valve 42 opened to suck the oil in the crank case into the cylinder 39. When all of the oil has been withdrawn, the valve 42 is closed and the apparatus removed to any suitable place for discharging the dirty oil, there the nozzle 10*a* is inserted into the storage receptacle and the valve 44 opened to permit the air under pressure in the line 43 to enter the cylinder 39 and quickly eject the dirty oil from the cylinder. For refilling the crank case, the cylinder 39 may be sucked full or partially full of clean lubricating oil by means of the valve 42 and the vacuum line 41 and the nozzle 10*a* reinserted into the crank case and the clean oil ejected from the cylinder by air pressure from the line 43.

A modified form of apparatus is illustrated in Figure 9 in which two storage cylinders 39*a* and 39*b* are provided, one for receiving the dirty oil from the crank case and the other for containing a supply of clean oil to be injected into the crank case.

The cylinders 39*a* and 39*b* are preferably connected together by manifolds 52 and 53 at the upper and lower ends thereof, and each may consist of a graduated glass cylinder, closed at the ends thereof by the cap portions 54 and 55. A plurality of adjustable bolts or rods 56 extend between the cap portions and serve to bring the gaskets in the caps into fluid tight engagement with the ends of the cylinders, and to protect the glass of the cylinders from breakage.

From the lower manifold 53 a nozzle 57 is extended outward in position to be projected into the crank case, and a suitable three-way valve 58 is provided to open or close communication between the nozzle 57 and the cylinders 39*a* or 39*b*. At the top of the cylinders 39*a* and 39*b* the manifold 52 is provided with vacuum and air pressure connections 41*a* and 43*a* respectively provided with suitable control valves 42*a* and 44*a*, a pair of push valves 59 and 60 are also provided in the manifold 52 adjacent the cylinders 39*a* and 39*b* to control the communication between the cylinders and the manifold 52. A part sectional view of one of the push valves is illustrated in Figure 10, and comprises a valve seat 61 valve 59 and stem 62 provided with a pusher head 62*a*, a coil spring 63 normally keeps the valve in closed position.

To fill the cylinder 39*b* for example with new oil the nozzle 57 is inserted into the oil, valve 58 is turned to open communication between the nozzle and cylinder 39*b* and suction is communicated to this cylinder by opening valves 60 and 42*a*, to draw the oil into the cylinder, the valve 58 is now turned to connect the nozzle 57 with the cylinder 39*a* and when the nozzle 57 is inserted into the crank case the valve 59 is opened to establish the vacuum in the cylinder 39*a* and draw the oil from the crank case into this cylinder. When the crank case has been drained the valve 59 is released, valve 42*a* is closed and valve 44*a* is opened, the valve 58 is turned to open the communication between the cylinder 39*b* and the nozzle 57 and the valve 60 is opened to force the clean oil under pressure into the crank case. The graduations on the cylinder 39*b* permit a measured quantity of oil to be injected into the crank case before closing the valve 58.

In the use of this device the cylinder 39*b* is filled with clean oil, the nozzle 57 is inserted into the crank case and the dirty oil drawn into the cylinder 39*a*, the valve 58 is then turned to open communication to the cylinder 39*b* and the clean oil discharged under pressure into the crank case.

The apparatus may then be removed from the engine, the dirty oil discharged from the cylinder 39*a* and the cylinder 39*b* refilled in readiness for the next crank case in which the oil is to be changed.

By the use of this form of apparatus it is possible to very quickly drain and refill the crank case, without removing the apparatus from position on the engine.

In Figure 5, I have illustrated a means whereby an ordinary crank case may be modified so as to permit it to be used in carrying out the present method of draining the oil. To permit this change by suction a hole 45 may be drilled into the lowest portion of the crank case and a drain pipe 46 connected to the crank case at this point by means of the flange 47 which may be bolted or riveted to the crank case around the hole 45. The drainage pipe 46 is provided with an elbow 46*a* which permits it to be turned upward so as to project above the top of the crank case to an accessible position preferably under the hood of the automobile approximately near the position occupied by the breather tube of an ordinary crank case. The top of this pipe may be provided with suitable bayonet pins 48 and be normally closed by the cap 49 with slots 50 which cooperate with the bayonet pins to retain the cap in position. When it is desired to withdraw the lubricating oil from the crank case of an engine equipped with a drainage pipe 46, the nozzle portion 10 or 10*a* is provided with a cap 51 also having slots 50 for cooperation with the bayonet pins 48 so that a fluid tight seal may be formed between the top of the pipe 46 and the cap 51. When the suction is opened in the nozzle 10*a*, the oil is withdrawn from the pipe 46 into the cylinder 7 or 39 or tank 18 as the case may be. The new oil may be introduced thru pipe 46 or may be introduced thru the breather opening of the crank case in the usual manner.

It is to be understood, of course, that the process lends itself quickly to the drainage of the oil and the immediate refilling of the crank case with new oil or to the drainage of the oil and the flushing out of the crank case with kerosene or the like before the new oil is added. In either case the saving of time and trouble over the method heretofore prevailing for the drainage and flushing out of the crank case is very great and the draining of the crank case by my new method is obviously a much cleaner operation than the drainage of the crank case as heretofore practiced.

As stated heretofore, the invention contemplates broadly the method of rapidly draining the crank case by suction either with or without the rapid filling of the crank case and is not limited to any particular form of apparatus unless so limited in the claims.

I claim:

1. In an apparatus for removing used lubricating oil from the crank case of an internal combustion engine of the type described a vacuum tank, a vacuum line, leading therefrom a nozzle adapted to be extended into the breather opening of the crank case above the normal oil level and means for controlling the vacuum to said nozzle, including a push valve adjacent the top of said nozzle.

2. In an apparatus of the type described, a pair of transparent cylinders, manifolds connecting the cylinder at each end thereof, a nozzle extending from the lower manifold and adapted to extend into the crank case of an internal combustion engine, means to control communication between the nozzle and each cylinder, pressure and vacuum connections for the upper manifold, and means to control the communications of pressure or vacuum to each cylinder.

3. In an apparatus of the type described, a pair of transparent cylinders, manifolds connecting the cylinder at each end thereof, a nozzle, extending from the lower manifold and adapted to extend into the crank case of an internal combustion engine, means to control communication between the nozzle and each cylinder pressure and vacuum connections for the upper manifold, means to control the communication of pressure or vacuum to each cylinder, and means extending between the manifolds to connect the same and protect the cylinders from breakage.

4. In a system for discharging used lubricant from vehicle motors, the combination with the lubricant holding case of the vehicle motor provided with an opening above the normal oil level therein and in line with a sump at the bottom of the holding case of a vacuum discharge nozzle adapted to extend through said opening and into said sump and connected with a lubricant eduction tube and means to produce a partial vacuum in said eduction tube whereby the used lubricant may be quickly withdrawn from the vehicle motor through said nozzle.

5. In a system for discharging lubricant from the crank case of vehicle motors, an opening in the crank case above the normal oil level and in line with the low point of the crank case and accessible from above the crank case upon raising the motor hood and a lubricant eduction hose, including an eduction nozzle, adapted to extend through said opening and into the low point of the crank case, a lubricant receiver with which said hose communicates and means to create a differential pressure within and without the crank case to cause the lubricant to discharge from the crank case through said hose and nozzle to the lubricant receiver.

6. In a system for discharging lubricant from the lubricant holding cases of vehicle motors, a crank case shaped to provide a low-

ermost portion to which the lubricant in the crank case will drain and provided with a discharge port above the lubricant level and in operative alignment with the said lowermost portion of the crank case, a lubricant eduction tube provided at one end with a portion adapted to be readily inserted through the said discharge port into the lowermost portion of the crank case, and means to create a reduced pressure in the eduction tube to cause the lubricant to discharge from the crank case through the eduction tube.

7. In a system for discharging lubricant from the lubricant holding cases of vehicle motors, a crank case shaped to provide a lowermost portion to which the lubricant in the crank case will drain and provided with a discharge port above the lubricant level and in operative alignment with the lowermost portion of the crank case, a lubricant eduction tube connected at one end to a lubricant receiver and adapted at its opposite end to be inserted through the said discharge port into the lowermost portion of the crank case, and means to create a reduced pressure in the lubricant receiver to cause the lubricant to discharge from the crank case to the lubricant receiver through the eduction tube.

8. In a system for discharging lubricant from the lubricant holding cases of vehicle motors, a crank case shaped to provide a lowermost portion to which the lubricant in the crank case will drain and provided with a discharge port above the lubricant level and in operative alignment with the said lowermost portion of the crank case, a flexible hose connected at one end to a lubricant receiver and provided at its opposite end with a nozzle adapted to be readily inserted through the said discharge port into the lowermost portion of the crank case, and means to create a reduced pressure in the lubricant receiver to cause the lubricant to discharge from the crank case to the lubricant receiver through the flexible hose.

9. In a system for discharging lubricant from the lubricant holding cases of vehicle motors, a crank case having a sump to which the lubricant in the case will drain and a discharge port above the lubricant level and in operative alignment with the sump, a flexible hose connected at one end to a lubricant receiver and provided at its opposite end with a nozzle adapted to be readily inserted through said discharge port into the sump of the crank case, and means to create a reduced pressure in the lubricant receiver to cause the lubricant to discharge from the crank case to the lubricant receiver through the flexible hose.

10. In a system for discharging lubricant from the lubricant holding cases of vehicle motors, a crank case shaped to provide a lowermost portion to which the lubricant in the crank case will drain and provided with a discharge port in operative alignment with the lowermost portion of the crank case and above the lubricant level and readily accessible upon raising the motor hood, a lubricant eduction tube provided at one end with a portion adapted to be readily inserted through the said discharge port into the lowermost portion of the crank case, and means to create a reduced pressure in the eduction tube to cause the lubricant to discharge from the crank case through the eduction tube.

11. In a system for discharging lubricant from the lubricant holding cases of vehicle motors, a crank case having a sump to which the lubricant in the case will drain and a discharge port in operative alignment with the sump and above the lubricant level of the crank case and readily accessible upon raising the motor hood, a flexible hose connected at one end to a lubricant receiver and provided at its opposite end with a nozzle adapted to be readily inserted through said discharge port into the sump of the crank case, and means to create a reduced pressure in the lubricant receiver to cause the lubricant to discharge from the crank case to the lubricant receiver through the flexible hose.

12. In a system for discharging lubricant from vehicle motors, a crank case shaped to provide a lowermost portion to which the lubricant in the crank case will drain and having a discharge port above the lubricant level and in operative alignment with the said lowermost portion of the crank case, a lubricant eduction tube located at a suitable service station and adapted at one end to be readily inserted through the said discharge port into the lowermost portion of the crank case, and means to create a reduced pressure in the eduction tube to cause the lubricant to discharge from the crank case through the eduction tube, whereby lubricant may be quickly discharged from a vehicle motor brought to the service station.

13. In a system for discharging used lubricant from vehicle motors, the combination with the lubricant holding case of the vehicle motor provided with an opening above the normal oil level therein and in line with a sump at the bottom of the holding case, of a discharge nozzle adapted to extend through said opening and into said sump and connected with a lubricant eduction tube, and means to create a differential in pressure between the lubricant in said lubricant holding case and said eduction tube whereby the lubricant in said case may be caused to flow from said case outwardly through said eduction tube.

14. In a system for discharging lubricant from vehicle motors, a crank case shaped to provide a lowermost portion to which the lubricant in the crank case will drain and having a discharge port above the lubricant level and in operative alignment with the said

lowermost portion of the crank case, a lubricant eduction tube located at a suitable service station and adapted at one end to be readily inserted through the said discharge port into the lowermost portion of the crank case, and means to create a differential of pressure between the lubricant in said case and said eduction tube to cause the lubricant to discharge from the crank case through the eduction tube, whereby lubricant may be quickly discharged from a vehicle motor brought to the service station.

15. In a system for discharging used lubricant from vehicle motors, the combination with the lubricant holding case of the vehicle motor provided with an opening above the normal oil level therein a sump or low point at the bottom of the holding case in position to be reached by a nozzle extended through said opening and a vacuum discharge nozzle adapted to extend through said opening and into said sump and connected with a lubricant eduction tube and means to produce a partial vacuum in said eduction tube whereby the used lubricant may be quickly withdrawn from the vehicle motor through said nozzle.

In testimony whereof I have affixed my signature to this specification.

ERNEST J. SWEETLAND.