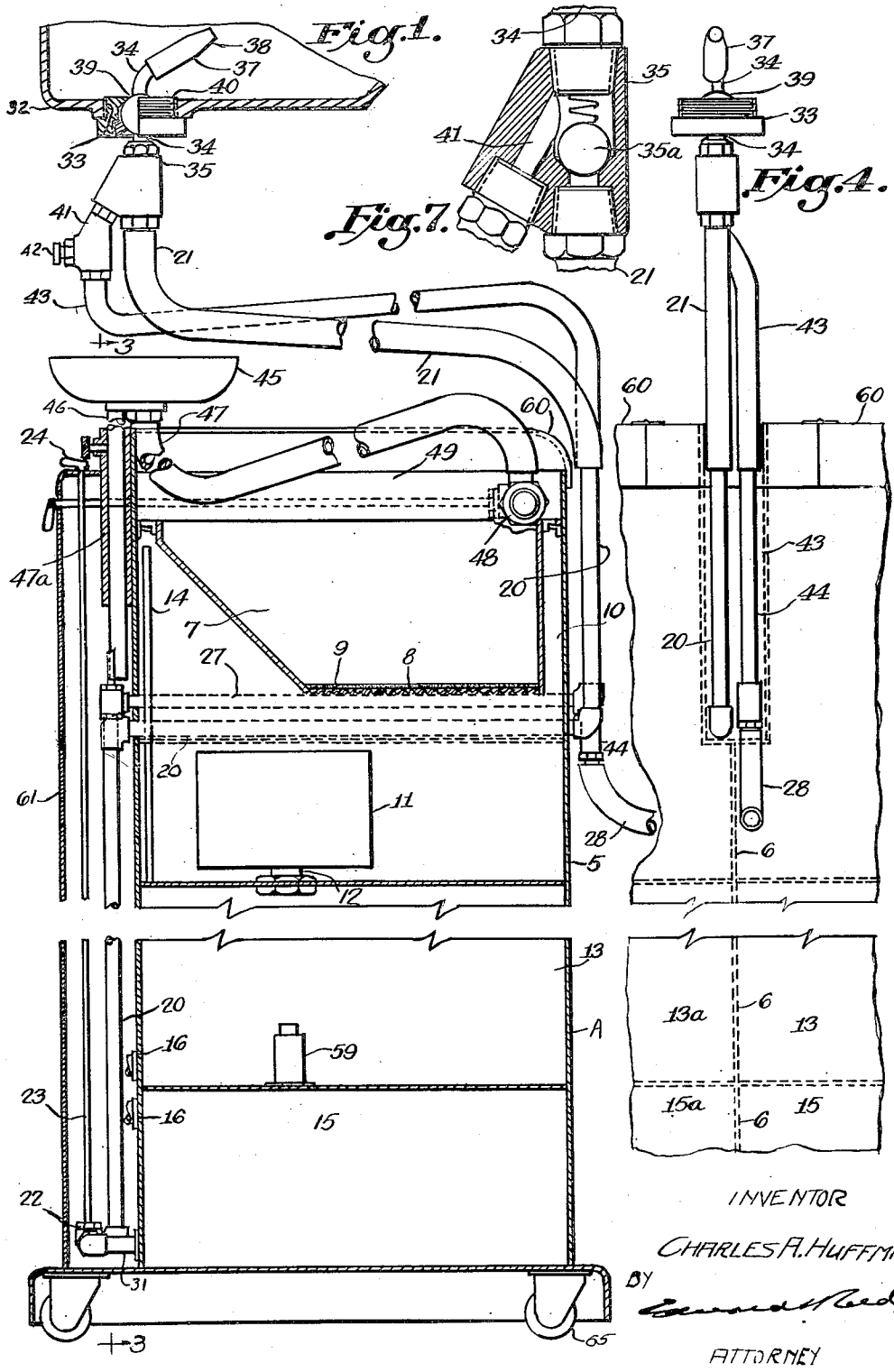
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APPARATUS FOR CLEANING AND LUBRICATING

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Fig. 5.



Fig. 6.

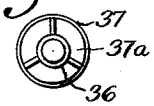


Fig. 2.

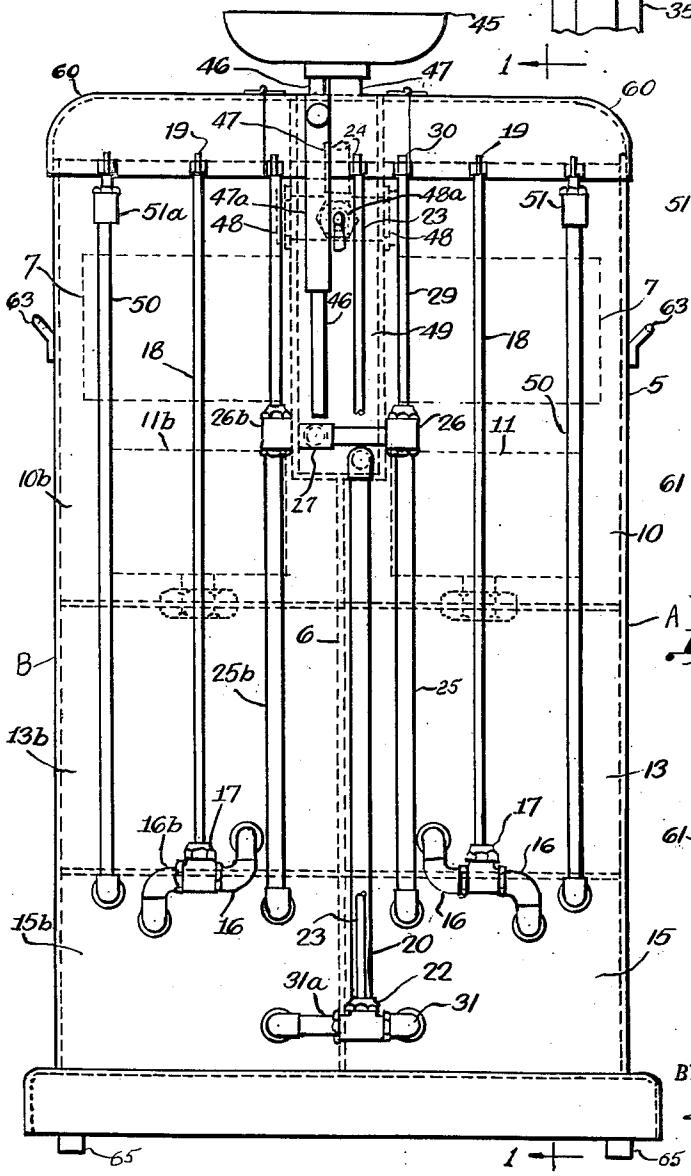


Fig. 8.

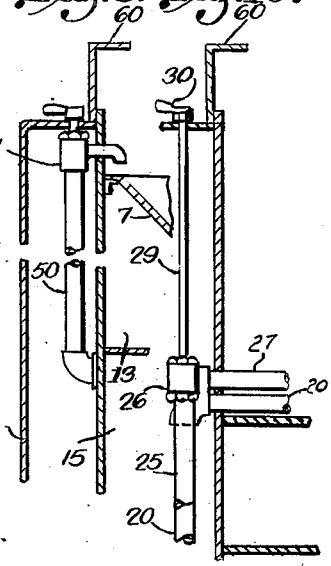
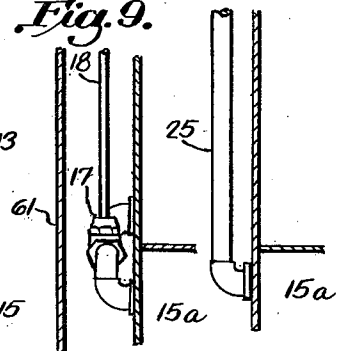


Fig. 10.

Fig. 9.



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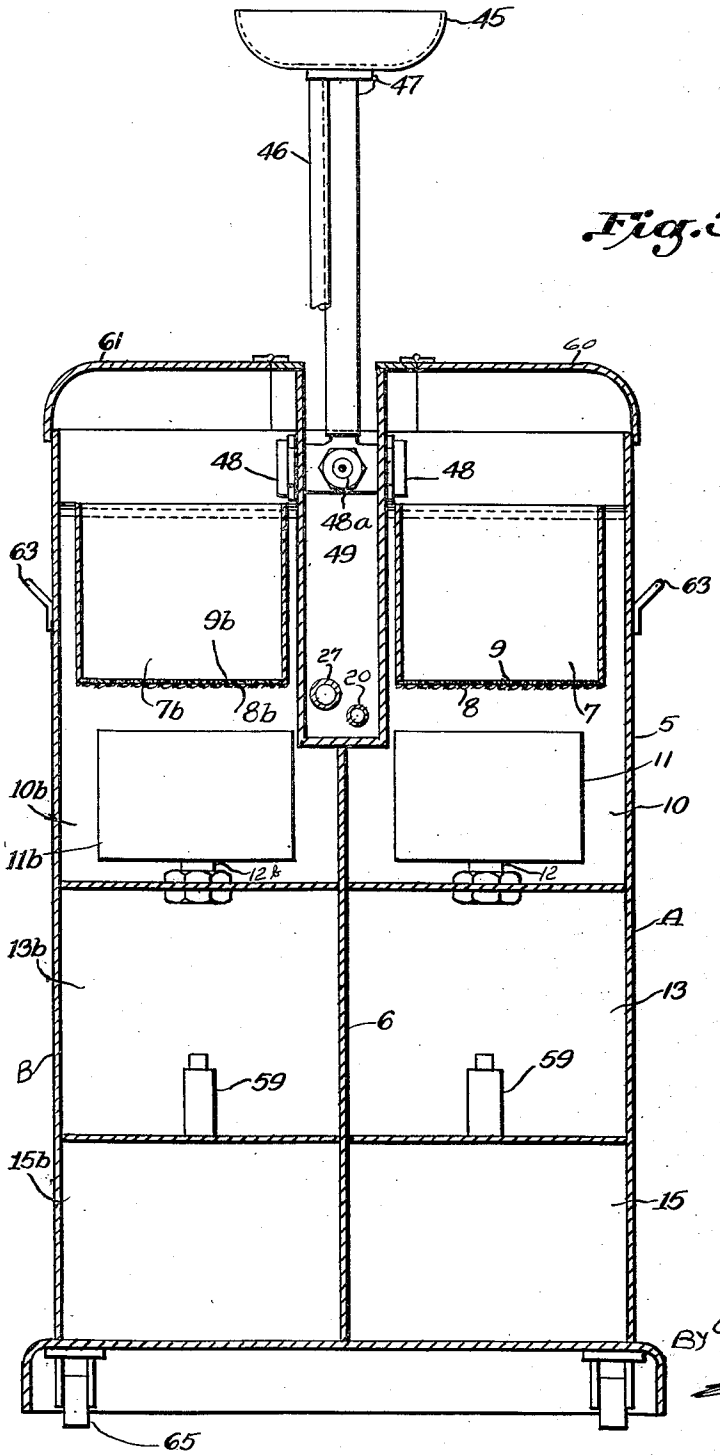


Fig. 3.

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APPARATUS FOR CLEANING AND LUBRICATING

Charles A. Huffman, Dayton, Ohio

Application December 20, 1945, Serial No. 636,138

11 Claims. (Cl. 184—1.5)

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This invention relates to an apparatus for cleaning crank cases and more particularly the crank cases of automobile engines.

One object of the invention is to provide an apparatus by which sludge and accumulations of hard and semi-hard substances may be quickly and easily removed from surfaces within the crank case.

A further object of the invention is to provide an apparatus by which a jet of solvent cleaning liquid may be discharged at high velocity against surfaces in the crank case.

A further object of the invention is to provide such an apparatus including a nozzle which can be manipulated from the exterior of the crank case to direct a jet of said liquid successively against all exposed surfaces within the crank case.

A further object of the invention is to provide such a nozzle which may be inserted in the crank case through the drain opening thereof and movably supported in said opening.

A further object of the invention is to provide such an apparatus with which the cleaning liquid may be recovered, filtered and used again.

A further object of the invention is to provide such an apparatus in which compressed air is used to deliver the liquid to the crank case and to then circulate the same through the nozzle.

A further object of the invention is to provide such an apparatus which is simple in construction, easy to operate, and relatively inexpensive.

A further object of the invention is to provide an apparatus including two similar units which function successively to clean the crank case and to then provide preliminary lubrication for the movable parts therein.

Other objects of the invention may appear as the apparatus is described in detail.

In the accompanying drawings, Fig. 1 is a vertical section through an apparatus embodying the invention, taken on the line 1—1 of Fig. 2; Fig. 2 is a front elevation of the apparatus with the front cover removed; Fig. 3 is a vertical section taken on the line 3—3 of Fig. 1; Fig. 4 is an elevation of a portion of the rear side of the apparatus showing the liquid supply and air conduits; Fig. 5 is a sectional detail view of the ejector nozzle and its mounting; Fig. 6 is a transverse section taken on the line 6—6 of Fig. 5; Fig. 7 is a sectional detail view of the fitting which connects the flexible conduits with the nozzle; Fig. 8 is a sectional detail showing the vent pipe for the supply receptacle; Fig. 9 is a sectional detail showing the connection between the reservoir and the supply receptacle; and Fig. 10 is a sectional detail view showing the liquid and air conduits and one of the controlling valves for the latter.

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In these drawings I have illustrated one embodiment of my invention and have shown the same as comprising two similar units one of which serves to supply cleaning fluid to the crank case and the other of which serves to supply a lubricant to the crank case after it has been cleaned to provide preliminary lubrication for the moving parts within the crank case. It is to be understood, however, that either unit may be used without the other and that the apparatus as a whole, as well as the various parts thereof, may take various forms without departing from the spirit of the invention.

In the particular embodiment here illustrated the apparatus comprises a cabinet or case 5 which is divided by a vertical partition 6 into two units A and B which are substantially identical and each of which includes a supply receptacle for a liquid, means for delivering the liquid from the receptacle to a crank case, means for discharging a jet of liquid against surfaces within the crank case, and means for recovering the used liquid from the crank case, filtering the same and returning it to the supply receptacle. In the arrangement illustrated the unit A is the cleaning unit and includes an upper compartment 7 which constitutes a filter chamber and is provided with a perforated bottom wall 8 over which is placed a removable layer of filtering material 9, such as a suitable paper or the like. Immediately below the filter chamber 7 and in open communication therewith is a second filter chamber 10 having therein a filter unit 11 of such a character that it will remove fine sediment or impurities which are not removed by the filtering material of the upper filtering chamber. This filter unit may be of a well known or any suitable character. The filter unit 11 communicates through an outlet 12 in the bottom wall of the chamber 10 with a storage chamber 13, which is provided with a vent pipe 14, and is adapted to receive the filtered liquid and store the same for future use. Below the storage chamber is a supply chamber 15 which is connected with the storage chamber by an exterior passage or conduit 16 controlled by a valve 17, the actuating rod 18 of which extends upwardly and is provided near the top of the apparatus with a handle 19. The supply chamber is suitably vented, as by a vent pipe 50 controlled by a valve 51. Figs. 3 and 8. The lower portion of the supply chamber 15

is connected with a discharge conduit which, in the arrangement shown, includes a pipe 20 extending upwardly along the front wall of the casing and then transversely through the casing to the back and again upwardly, the upper portion of the conduit being preferably flexible and being here shown as comprising a section of hose 21 through which liquid may be delivered from the supply chamber to a crank case which is to be cleaned, after the old oil has been drained therefrom. The liquid from the discharge conduit may be introduced into the crank case through the ordinary filling opening or in any other suitable manner but preferably it is introduced through the drain opening of the crank case as will be hereinafter described. The discharge of liquid from the supply chamber through the discharge conduit 20 is controlled by a valve 22 which is operated by a rod 23 provided near the upper end of the cabinet with a handle 24. The liquid may be forced from the supply chamber through the discharge conduit to the crank case in any suitable manner but preferably compressed air is introduced into the upper portion of the supply chamber 15 to force the liquid through the discharge conduit. For this purpose an air supply conduit is connected with the supply chamber and as here shown this conduit comprises a pipe 25 communicating with the supply chamber, extending upwardly therefrom and connected by a valve 26 with a transverse pipe 27 which extends to the back of the apparatus where it is connected with a flexible hose 28 which is adapted to be connected with a source of supply of air under pressure, such as a compressor or an air tank, not here shown. The valve 26 is actuated by a valve rod 29 extending upwardly therefrom and provided with a handle 30. Preferably the supply chamber is provided with a relief valve 59 to protect it against excessive air pressure.

As has been stated the two units are substantially identical and in Fig. 3 the unit B is shown as provided with a first filter chamber 7b, a second filter chamber 10b, a storage reservoir 13b, and a supply receptacle 15b arranged in the same manner in which the corresponding chambers are arranged in unit A. Both supply receptacles, 15 and 15b, are connected with the valve 22, by short pipes 31 and 31a, and the valve 22 is a two-way valve whereby either supply chamber may be connected with the conduit 20 and the other supply chamber disconnected therefrom. Likewise the supply chamber 15b is connected by a pipe 25b and a valve 26b with the transverse air pipe 27, the two valves being separately operable so that air may be admitted to either supply chamber at will.

In this particular embodiment of the invention the liquid from the discharge conduit 20 is introduced into the crank case 32 through the drain opening 33 thereof. For this purpose the flexible section 21 of the discharge conduit is connected with a nozzle which can extend through the filling opening. Preferably the nozzle is of the ejector type and as here shown the nozzle comprises a tube 34 which is connected with a fitting 35 which in turn is connected with the flexible section 21 of the conduit and is provided with a check valve 35a. A portion of the tube 34 which extends into the crank case is arranged at an obtuse angle to the length of the tube, as shown at 36. Arranged about the inclined portion 36 of the tube is a jacket 37 which is supported in spaced relation to the tube to provide a passage 37a between the tube and the jacket, the forward end of the jacket being tapered as shown at 38 and extending beyond the end of the tube. The nozzle is preferably so supported that it may be manipulated from the exterior of the crank case to point the same in various directions. In the present instance the tube 34 is supported by a ball and socket joint 39 in an annular member 40 which supports the nozzle in the drain opening and closes the space between the ball joint and the wall of the opening. This supporting member is screw threaded so that it can be screwed into and out of the usual drain opening.

Cleaning liquid is supplied to the crank case through the tube 34 in such quantity that the lower portion of the jacket 37 will be immersed in the liquid, and air under pressure passing through the tube will draw liquid from the crank case and project the same in the form of a high velocity jet against the surface toward which the nozzle is directed. For this purpose the nozzle is connected with a source of air supply and in the present arrangement the fitting 35 is provided with an air passage 41 which communicates with the tube 34 and is controlled by a standard push button air valve 42. This passage is connected by a flexible conduit 43 and an upright pipe 44 with the main air supply line 28.

Means are also provided for recovering the liquid from the crank case, filtering the same and returning it to the storage chamber 13 so that it is again available for use. Preferably there is mounted on the casing a bowl-like receptacle 45 which, as here shown, is supported by a rod 46 extending into a guideway 47 in the casing to enable the receptacle to be vertically adjusted and positioned under and close to the drain opening of the crank case. This bowl is connected by a flexible tube 47 with the intermediate portion of a short tube 48 the ends of which open into the respective filter chambers 7 and 7b, and which is provided with a valve 48a to control the direction of flow. It wil be noted, particularly in Fig. 3, that these two filter chambers are spaced one from the other so as to provide a space 49 into which the flexible tube may move when the receptacle 45 is lowered.

When a crank case is to be cleaned the drain plug is removed from the drain opening and the oil drained therefrom in the usual manner. The nozzle 34—37 is then inserted into the crank case through the drain opening and the supporting closure 40 screwed into place so as to close the opening. The reservoir 13 of unit A will contain a suitable cleaning fluid, preferably one including a solvent, and when the nozzle has been properly inserted the valve 17 and vent valve 51 are opened to permit the desired quantity of fluid to flow from storage chamber 13 into the supply chamber 15. The valves 17 and 51 are then closed, and the valve 22 is adjusted to connect the supply chamber 15 with the discharge conduit 20. The air valve 26 is then opened to admit air under pressure into the upper portion of the supply chamber 15 thus forcing the liquid through the conduit and nozzle into the crank case. If only the needed quantity of liquid had been drawn into the supply chamber the flow continues until that chamber is empty, otherwise the valve 22 is closed when the desired quantity of liquid has entered the crank case. The valve 42 for the air passage in the fitting 35 is then opened to permit air under pressure to flow

through the tube 34 and the discharge of this air through the tapered end of the jacket 37 creates a suction in the jacket which draws the liquid, in which the lower portion of the jacket is immersed, into the tapered end of the nozzle and a jet of liquid and air is discharged at high velocity against surfaces within the crank case. The fitting 35 is grasped in the hand and the nozzle is manipulated in its universal bearing in the supporting member 40 to direct this jet of liquid successively against the various surfaces within the crank case. When the crank case has been properly and thoroughly cleaned the air valve 42 is closed and the supporting member 40 and nozzle are removed from the drain opening, the bowl 45 having been previously moved to a position in which it will receive the liquid passing from the crank case through the drain opening. This liquid flows through the tube 47 and the valve controlled conduit 48 into the filter chamber 7. From there it passes through the second filter chamber and into the storage chamber 13 where it is stored until required for further use.

The action of the solvent cleaning fluid on the surfaces within the crank cases removes all lubrication from the exposed surfaces within the crank case and in order to provide a sufficient lubrication for the moving parts within the crank case to enable the engine to be safely started after the crank case has been refilled with lubricating oil, it is desirable to provide a preliminary lubrication of the movable parts. For this purpose the storage reservoir 13b of section B contains a light lubricating oil and after the cleaning fluid has been drained from the crank case the nozzle is again inserted therein and the valves adjusted to cause this lubricating liquid to be delivered to and projecting against the surfaces in the crank case in the same manner that the cleaning liquid was introduced in the crank case. The nozzle being manipulated to cause this oil to contact and lubricate all relatively movable contacting surfaces and this lubrication will be sufficient to prevent injury to the bearing surfaces until the operation of the engine has caused the regular lubricating oil to work its way into the bearings. When this lubricating operation has been completed, the nozzle is withdrawn and the lubricant drained through the bowl 45 to the filter chamber 7b, from which it flows into the storage chamber 13b. The drain plug is then reinserted in the crank case and the latter filled with the regular lubricating oil.

It will be understood that when fresh cleaning liquid and lubricating oil are to be supplied to the respective units this oil may be introduced into the respective storage chambers in any desired manner, but the present arrangement of the apparatus is such that the most convenient way to introduce it is to deliver the liquid or oil to the first filter chamber, by opening the movable closure 60, and permitting it to pass through the second filter chamber to the storage chamber, although, of course, this fresh cleaning liquid and oil do not require filtering. The conduits and valves on the front wall are normally enclosed in a housing 61, the valve handles projecting above the top of the housing so as to be readily accessible.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention what I claim as new and desire to secure by Letters Patent, is:

1. In an apparatus for cleaning crank cases, a jet type nozzle adapted to be inserted in a crank case through an opening in the latter, means for movably supporting said nozzle in said crank case and for normally preventing the discharge of liquid through said opening, means for supplying air under pressure to said nozzle, said nozzle having means whereby said air passing through the same will draw liquid from the lower portion of said crank case and discharge said liquid in a high velocity jet against a surface to be cleaned within said crank case, and means arranged exteriorly of said crank case for adjusting said nozzle to direct said fluid toward different portions of said surfaces to be cleaned within said crank case.

2. In an apparatus for cleaning crank cases, a nozzle adapted to be inserted in said crank case through an opening therein, means for movably supporting said nozzle in said opening and for closing the latter, said nozzle having an air passage and a liquid passage one end of which communicates with the lower portion of the interior of said crank case and the other end of which extends beyond and substantially in line with said air passage, means for connecting said air passage with a source of air under pressure to cause air to flow through said air passage, to draw liquid through said liquid passage and discharge said liquid in a high velocity jet against surfaces to be cleaned within said crank case, and means arranged exteriorly of said crank case to manipulate said nozzle.

3. In an apparatus for cleaning crank cases, two receptacles adapted to contain, respectively, a cleaning liquid and a lubricating liquid, a conduit to deliver liquid from either of said receptacles to a crank case, means for connecting said conduit with either of said receptacles to the exclusion of the other of said receptacles, an ejector type nozzle connected with said liquid conduit and having a passage for air or liquid and a separate passage for liquid only and adapted to be introduced into said crank case with the intake end of said separate liquid passage adjacent the bottom of said crank case, means for supporting said nozzle in said crank case, and for normally preventing the escape of liquid from said crank case, a conduit for air under pressure, means for connecting said air conduit with that receptacle which is connected with said liquid conduit to force liquid through said liquid conduit and the first mentioned passage of said nozzle into said crank case and immerse the intake end of said separate liquid passage of said nozzle in said liquid, and for disconnecting said conduit from said receptacle, and means for connecting the said first mentioned passage of said nozzle with said air conduit after the latter has been disconnected from said receptacle, whereby air passing through said nozzle would draw liquid from said crank case and discharge the same at high velocity against the surfaces to be cleaned within said crank case.

4. In an apparatus for cleaning crank cases, a nozzle adapted to be inserted in a crank case through the drain opening of the latter, said nozzle including a tubular member and a jacket arranged about the inner end portion of said tubular member to form a passage and having a reduced end portion extending beyond the end of said tubular member, means for supporting said nozzle in said drain opening and closing the

latter, a conduit connected with said tubular member to supply liquid to said crank case, a second conduit connected with said tubular member to supply air under pressure to said nozzle and to cause the latter to draw liquid from said crank case and discharge the same at high velocity against the surfaces within said crank case, and means for closing the connection between said air conduit and said tubular member.

5. In an apparatus for cleaning crank cases, a nozzle adapted to be inserted in said crank case through the drain opening thereof and comprising a tube extending through said opening and having a laterally extending inner end portion, and a tubular member supported about said inner end portion of said tube in spaced relation thereto to form a passage and having a reduced end portion extending beyond the end of said tube, an annular member removably supported in said drain opening to close the latter about said tube, a ball and socket connection between said tube and said annular member, a conduit to supply liquid to said tube, a second conduit to supply air under pressure to said tube and a valve for controlling the supply of air to said tube.

6. In an apparatus for cleaning crank cases, an ejector type nozzle having an air passage and a liquid passage and adapted to be inserted in a crank case through the drain opening of the latter with the intake end of said liquid passage adjacent the bottom of said crank case, means for movably supporting said nozzle in said drain opening and for closing said opening, a receptacle for liquid, a conduit leading from said receptacle to the air passage of said nozzle, means for supplying air under pressure to said receptacle to force liquid through said conduit and said nozzle to said crank case in a quantity sufficient to immerse the intake end of the liquid passage of said nozzle, a conduit to connect the air passage of said nozzle with a source of air under pressure, and a valve to control the flow of air through said air conduit.

7. In an apparatus for cleaning crank cases, a casing having within the same a filter chamber and a receptacle to receive filtered liquid from said filter chamber, a valve controlled conduit leading from said liquid receptacle and adapted to deliver liquid to a crank case, means for forcing liquid from said receptacle through said conduit, an ejector type nozzle having an air passage and a liquid passage and adapted to be inserted in said crank case through an opening therein, means for supporting said nozzle in said crank case with the intake end of said liquid passage below the level of the liquid in said crank case and for closing said opening, means for connecting the air passage of said nozzle with a source of air under pressure to cause liquid to be drawn from said crank case by said nozzle and discharged therefrom at high velocity, and means whereby said liquid may be returned from said crank case to said filter chamber.

8. In an apparatus for cleaning crank cases, a casing having within the same a filter chamber and a receptacle to receive filtered liquid from said chamber, a valve controlled discharge conduit connected with said receptacle, an ejector type nozzle having an air passage and a liquid passage connected with said discharge conduit and adapted to be inserted in a crank case through the drain opening of the latter with the intake end of said liquid passage adjacent the bottom of said crank case, means for forcing liquid from said receptacle through said discharge conduit into said crank case in a quantity sufficient to immerse the intake end of the liquid passage of said nozzle, an air conduit connected with said nozzle and adapted to be connected with a source of air under pressure, a valve to control the flow of air through said air conduit, removable means for closing said drain opening about said nozzle, and means including a conduit to receive liquid from said drain opening when said closing means has been removed and return the same to said filter chamber.

9. In an apparatus for cleaning crank cases, a nozzle adapted to be inserted in a crank case through the drain opening thereof, said nozzle including a tube extending through said opening and a jacket arranged about the inner end portion of said tube to form a liquid passage and having a tapered portion beyond the end of said tube, means for movably supporting said tube in said drain opening and for closing the latter, a receptacle for liquid, a conduit leading from said receptacle to said tube, means for forcing liquid from said receptacle through said conduit and through said tube to said crank case, and means for supplying air under pressure to said tube after the delivery of liquid to said crank case has been discontinued, whereby said nozzle is caused to draw liquid from said crank case and discharge the same at high velocity against a surface within said crank case.

10. An apparatus for cleaning crank cases comprising two units, each unit including a filter chamber and a supply chamber to receive filtered liquid from said filter chamber, a discharge conduit adapted to deliver liquid to a crank case, means for selectively connecting said supply chambers with said conduit, an air conduit adapted to be connected with a source of supply of air under pressure, means for selectively connecting said supply chambers with said air conduit, a nozzle adapted to be inserted in said crank case through the drain opening thereof, means for connecting said nozzle with a source of supply of air under pressure, a valve to control the last mentioned connection, a receptacle adapted to be positioned beneath said drain opening to receive therefrom the liquid which had been delivered to said crank case by said discharge conduit, and means for connecting said receptacle with either of said filter chambers.

11. An apparatus for cleaning crank cases comprising two units, each unit including a filter chamber and a supply chamber to receive filtered liquid from said filter chamber, a discharge conduit adapted to deliver liquid to a crank case, means including a two-way valve for connecting either of said supply chambers with said conduit, an air conduit adapted to be connected with a source of supply of air under pressure, valve means for selectively connecting said supply chambers with said air conduit, a nozzle adapted to be inserted in said crank case through the drain opening thereof, means for separately connecting said nozzle with said discharge conduit and with a source of air supply, a valve to control the supply of air to said nozzle, a vertically adjustable receptacle adapted to be positioned beneath said drain opening, a flexible conduit connected with said receptacle, and means for connecting said conduit with either of said filter chambers.

CHARLES A. HUFFMAN.

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