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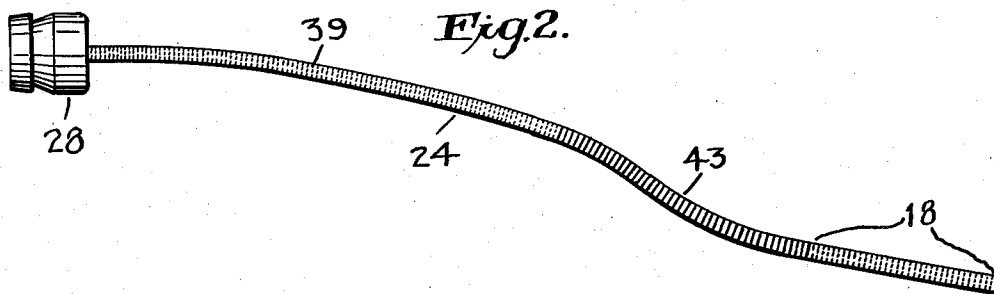
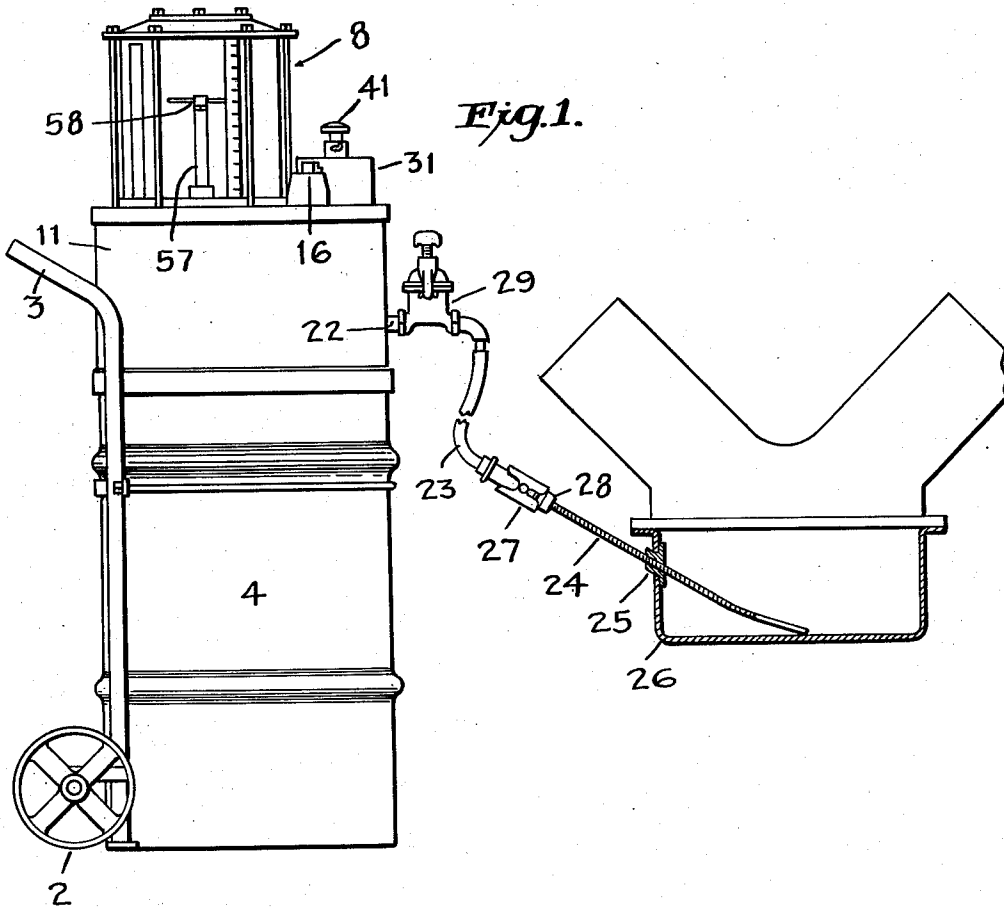
C. F. BERTSCHINGER

2,020,350

CRANK CASE EMPTYING AND FLUSHING APPARATUS

Filed Aug. 12, 1933

5 Sheets-Sheet 1



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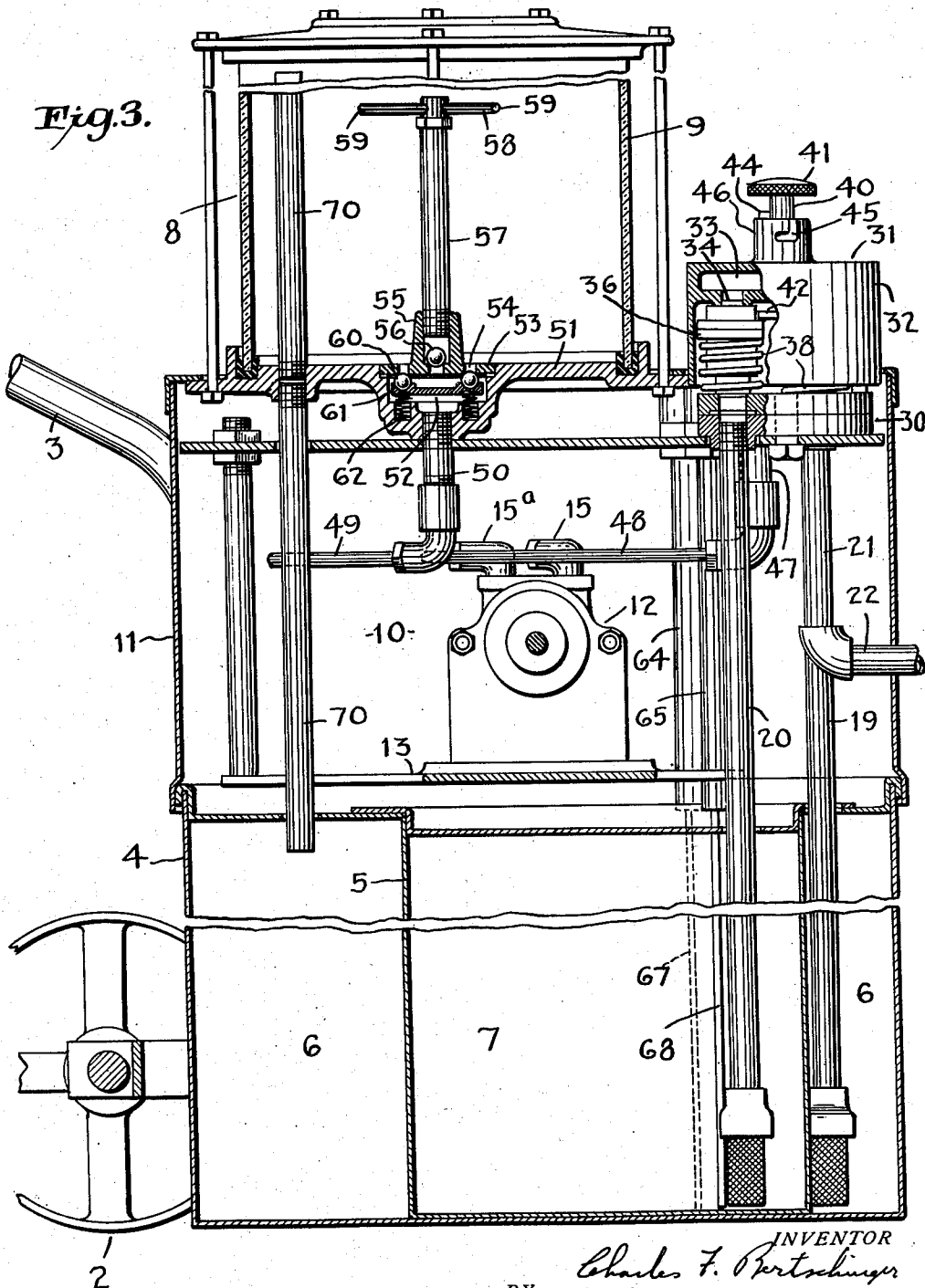
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CRANK CASE EMPTYING AND FLUSHING APPARATUS

Filed Aug. 12, 1933

5 Sheets-Sheet 2



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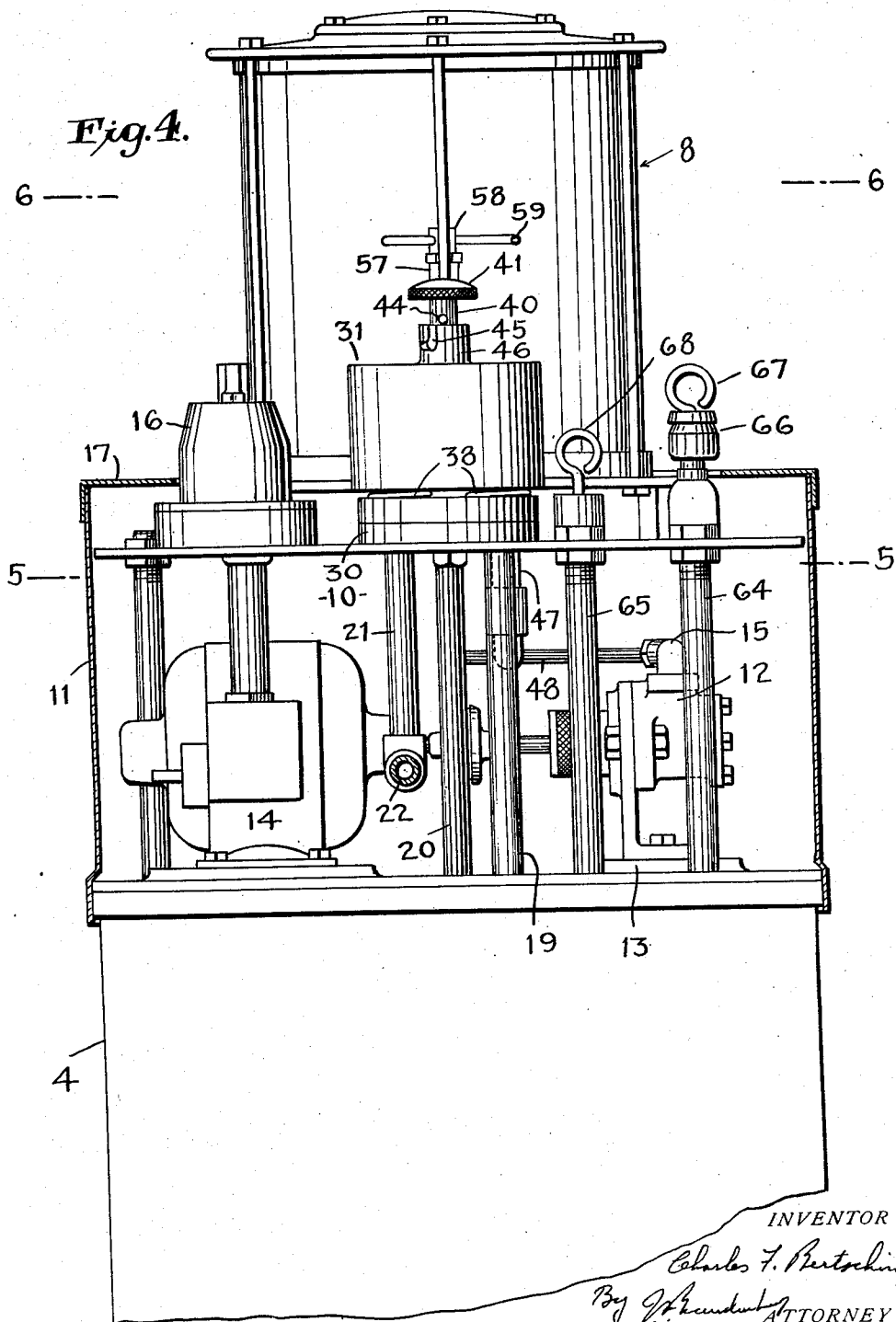
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CRANK CASE EMPTYING AND FLUSHING APPARATUS

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5 Sheets-Sheet 3



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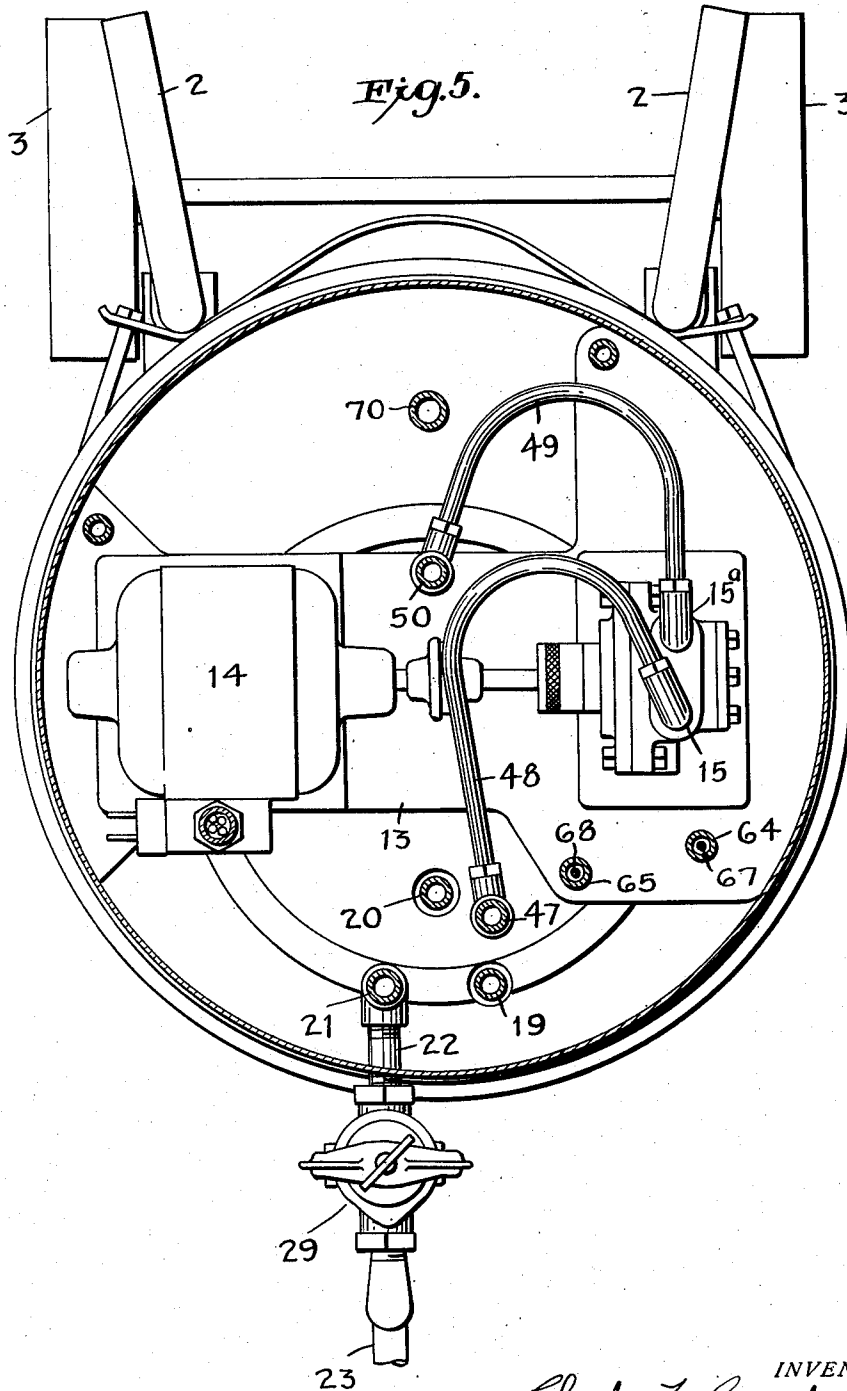
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CRANK CASE EMPTYING AND FLUSHING APPARATUS

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5 Sheets-Sheet 4



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2,020,350

CRANK CASE EMPTYING AND FLUSHING APPARATUS

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5 Sheets-Sheet 5

Fig. 6.

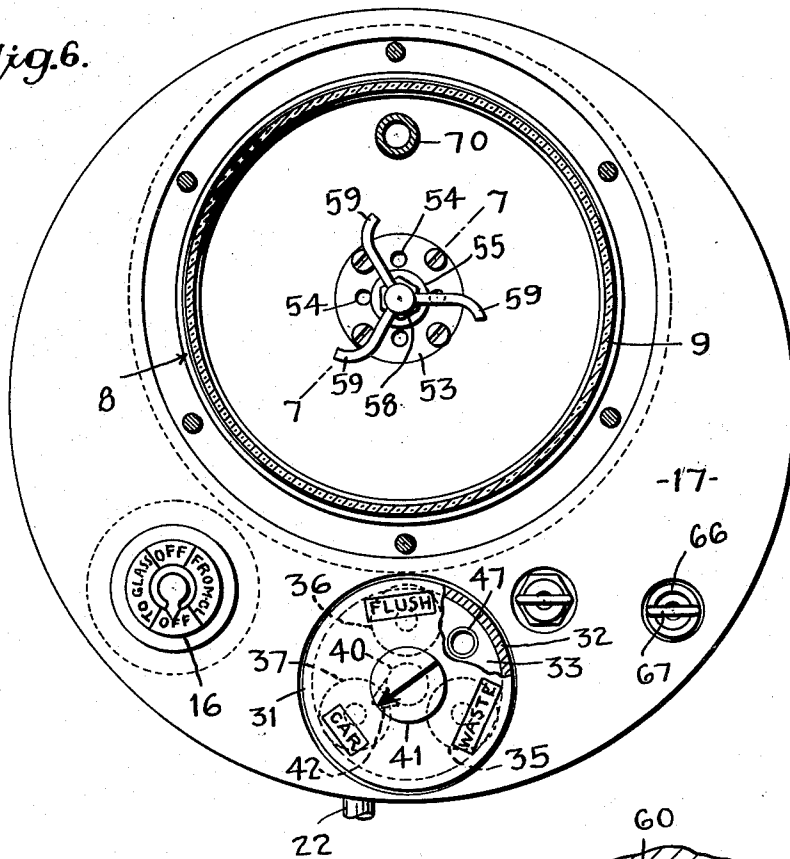


Fig. 7.

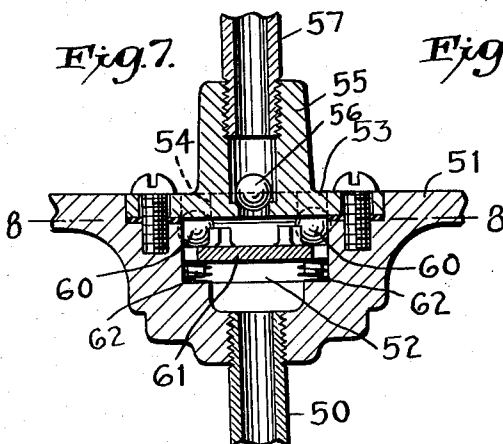
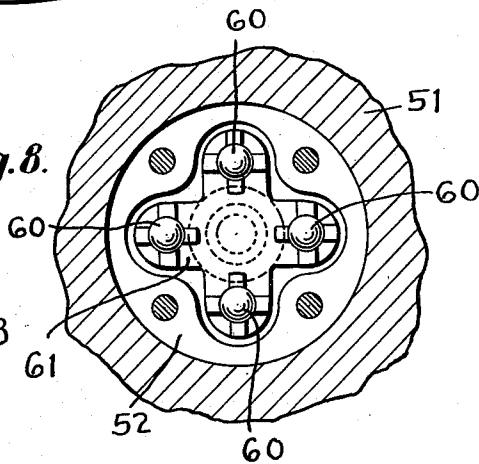


Fig. 8.



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UNITED STATES PATENT OFFICE

2,020,350

CRANK-CASE EMPTYING AND FLUSHING
APPARATUS

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Application August 12, 1933, Serial No. 684,805

7 Claims. (Cl. 184—1.5)

In my Patent No. 1,955,169, dated April 17, 1934, I have disclosed an apparatus for removing used oil from the crank-cases of automobile engines and for flushing the crank-cases with a relatively light flushing oil. The embodiment illustrated in said patent has a hose and nozzle to communicate with the crank-case, a waste receptacle, a receptacle for flushing oil, a sight jar constituting a transfer chamber, piping and selective valve mechanism, and means for causing the oil to flow in the path selected, the organization being such that oil withdrawn from the crank-case is delivered into the transfer chamber before being discharged to waste, and likewise a charge of flushing oil withdrawn from the flushing oil receptacle is delivered into the transfer chamber before being passed to the crank-case.

The object of the present invention, which embodies the general features of my earlier disclosure, is to provide a simpler, more positive, more serviceable and more rapid apparatus.

Other objects are to show the condition of the old oil more plainly by delivering it against the inside of the transparent wall of the transfer chamber so that it flows down the wall in a film or sheet, and by delivering the flushing oil in the same manner to wash the glass.

Still another object is to remove coarse solids from the oil drawn out of the crank-case before it enters the sight jar and to provide for the disposal of material thus caught.

Other objects and advantages will be apparent to those skilled in the art. The features and combinations comprising the present invention can best be described in the body of the specification.

In the accompanying drawings, forming part hereof:

Fig. 1 is a side elevation of the apparatus, with its nozzle inserted into the dip-stick opening of the crank-case of an engine, the engine and crank-case being shown somewhat schematically, and an intermediate portion of the hose being broken out;

Fig. 2 is a view on a large scale of a nozzle constituting one of the features of the invention;

Fig. 3 is a side section taken substantially in a central vertical plane, intermediate portions of the transparent transfer chamber and of the tank part being broken out;

Fig. 4 is a front elevation, with the lower portion of the tank part broken away and a casing in section;

Fig. 5 is a sectional plan taken on the line 5—5 of Fig. 4;

Fig. 6 is a sectional plan taken on the line 6—6 of Fig. 4, with a portion broken away;

Fig. 7 is a fragmentary section taken on the line 7—7 of Fig. 6; and

Fig. 8 is a fragmentary section taken on the line 8—8 of Fig. 7.

The drawings illustrate a portable apparatus which can be readily moved about and brought to the automobile to be serviced. It is preferably of upright drum-form and provided with trundling wheels 2 and handles 3.

The lower part of the unit is a tank 4, in which is fixed a smaller tank 5, these two tanks forming an outer receptacle 6 to receive waste oil and an inner receptacle 7 to hold a supply of flushing oil.

Supported by and above the tank part of the apparatus, by means of suitable structural arrangements which are illustrated but which need not be particularly described, is a transfer vessel 8 having a transparent side wall 9 permitting the oil that is introduced into this chamber to be viewed. In some instances an opaque-walled chamber having a sight glass might be used.

The space 10 between the tank part and the transfer chamber is enclosed by a housing 11, and in this space there is a reversible pump 12, preferably of a rotary or gear type, which is mounted on a platform 13, on which there is also a reversible electric motor 14 coupled to the pump. The pump has two fittings 15, 15^a, each of which will serve for intake while the other serves for discharge, and vice-versa. It will be convenient to speak of the pump as having two "sides", meaning the passages and spaces in which, interchangeably, suction or pressure will exist, depending upon the direction in which the pump is driven. The motor is controlled by a reversing and shut-off switch 16 projecting above a cover plate 17, this switch having suitable legends, such as "Off", "To glass" and "From glass".

A group of three vertical pipes or conduits 19, 20 and 21 is disposed inside the unit near the front. The pipe 19 extends down to near the bottom of the waste oil receptacle 6, for delivery of waste oil into this chamber. The pipe 20 extends down to near the bottom of the flushing oil receptacle 7, for uptake of oil from this chamber. The pipe 21 has a lateral continuation 22 which extends outside the unit and receives a hose 23 constituting a flexible part of this conduit. On the end of the hose there is a nozzle 24 which is adapted to be inserted through the dip-stick opening 25 of a crank-case 26, to the bottom of the crank-case. The end of the hose

is provided with a coupling device 27 which engages a coupling head 28 on the rear end of the nozzle, permitting the nozzle to be readily detached from the hose and also permitting different styles and sizes of nozzles to be applied to the hose.

Not all crank-cases are free of obstructions which would prevent a rigid nozzle reaching the bottom of the crank-case. With a flexible nozzle such obstructions may be passed, but an unexpected difficulty was encountered with flexible nozzles, which was that it was practically impossible to tell when the end of the nozzle had struck bottom, in consequence of which the nozzle was apt to be pushed in too far, causing its end to curl up. When that happened, a considerable part of the old oil would not be pumped out of the crank-case, and when the flushing oil was forced into the crank-case it would be delivered in an upwardly directed jet, without creating the turbulence that results when the stream is delivered below a body of oil collecting in the crank-case, and sometimes causing oil to be driven out through the breather opening.

This difficulty has been overcome by devising a flexible nozzle that has a relatively stiff end portion. The nozzle illustrated in Figs. 1 and 2 is preferably made of flexible metal tubing having a helically formed wall. A short length 18 of this nozzle at the outer end is given an application of solder, which stiffens the convolutions. A longer, rear portion 39 of the nozzle is preferably treated in the same way, to give it stiffness for pushing, the stiffness not being so great, however, that the portion of the nozzle outside the crank-case can not be curved or bent to avoid obstacles on the outside of the engine. The intermediate portion 43 of the nozzle, which goes into the crank-case, is left substantially flexible. This nozzle can be readily inserted all the way to the bottom of a crank-case, notwithstanding the presence of obstructions in line with the dip-stick opening, and it is possible to know when the stiff forward portion 18 touches bottom. Furthermore, there is no danger that this end will turn upward.

A filter or screening device 29 is inserted in the outer portion of the conduit 21, 22, to keep coarse solids and grit drawn from the crank-case from passing through the pump 12 and valves and to the transfer chamber 8.

The upper ends of the pipes 19, 20 and 21 are connected to openings in the base plate portion 30 of a selective valve device 31, which projects above the cover plate 17. In the upper part of the fixed body 32 of this valve device there is a header chamber 33. The passage openings in the base 30 are connected with passage openings in the bottom of this header chamber by tubes 34, one of which is shown in Fig. 3. On the outside of these tubes there are three slidable valves 35, 36 and 37. The valves are indicated in Fig. 6, and the valve 36 is seen in elevation in Fig. 3. These valves are of a known kind and need not be specially illustrated. Suffice it to say that the tube 34 of such a valve does not have a through bore, but is walled across intermediate its ends and has ports through its wall at opposite sides of the septum, and that the slidable valve element is internally constructed so as to open and close communication between the ports. The valves are normally held up in closed positions by springs, one of which is shown in Fig. 3, and marked 38. These valves are illustrative of selective valve means for opening the passageway

through any one of the three conduits represented by the pipes 19, 20 and 21, while the other conduits are closed. Suitable valves designed for direct manual operation might be employed, but convenience and certainty of operation are better served by the provision of a selector. The selector preferably employed has a rotatable and depressible shaft 40 passing through the top of the body 32, the top of this shaft having an operating button 41 and its lower portion carrying a radial arm 42. By turning the button, this arm can be swung to engage any one of the valves 35, 36 and 37, without engaging the other two, whereupon downward pressure of the button will open the selected valve. In order to hold any one of the valves open, the shaft 40 is provided with a lateral pin 44 to engage any one of three bayonet slots 45 in a boss 46.

The knob 41 bears an index, and the top of the body 33 has properly positioned indications, such as "Car", "Flush" and "Waste".

A common pipe or connection 47 opens into the header chamber 33 (see Fig. 6), and this pipe is connected by a tube 48 with one side (fitting 15) of the pump 12.

The other side of the pump (fitting 15^a) is connected with the transparent transfer chamber 8 by a tube 49, this tube being connected to a pipe 50 screwed into an opening in the bottom 51 of the transfer chamber.

The pipe 50 opens into a pocket 52 formed in said bottom. A plate 53 having outlet openings 54 is seated in the top of this pocket. A hollow boss 55 on this plate has a port in communication with the pocket, and a ball check valve 56 inside the boss rests on the edges of the port. An uptake pipe 57 is screwed at its lower end into the boss, and on its upper end is a reaction spinner 58. Oil delivered through the nozzles 59 of this spinner is thrown against and distributed over the inside of the transparent wall 9, and as it flows down this wall in a sheet its condition can be observed to advantage.

When oil is being pumped into the transfer chamber or sight vessel through the uptake pipe 57, the check valve 56 is automatically lifted off its seat. Admission of oil to the transfer chamber through the outlet openings 54 is prevented, during this operation, by check valve balls 60, which seat against the bottom edges of the outlet openings 54, these balls being carried by a plate 61 disposed in the pocket 52 and pressed upward by springs 62. When a body of oil is withdrawn from the transfer chamber, these check valves open automatically, while the check valve 56 prevents loss of suction and drawing in of air through the uptake pipe 57.

Two additional pipes 64 and 65 extend down from the region of the cover plate 17. The lower end of the pipe 64 passes through an opening in the top wall of the waste receptacle 6, and its upper end is provided with a connection head 66 to which the coupling device 27 on the end of the hose 23 can be applied. This pipe also serves as a guide through which to pass a gauge rod 67 to the bottom of the waste oil receptacle.

The pipe 65 is merely a guide for a gauge rod 68 to gauge the contents of the flushing oil receptacle 7.

The mode of operation in the use of the apparatus is as follows: The nozzle 24 is inserted through the opening of the crank-case of a car. The valve device 31 is set to the "Car" position. This opens the valve 37 of the conduit 21, to which the hose 23 is connected, the valves 35 75

and 36 being closed. The motor switch 16 is then turned to "To glass" position. This drives the pump in the direction which causes the old oil in the crank-case to be drawn in through the conduit 24, 23, 22, 21 to the header chamber and thence through the connections 47, 48 to the fitting 15 of the pump. From the fitting 15 of the pump, this oil is forced through the connections 49, 50 to the pocket 52 in the base of the sight jar or transfer chamber 8. The check valve 56 opens, and the check valves 50 being closed, the oil passes up through the uptake pipe 57 and out through the spinner 58 against the inside of the glass wall of the jar, and collects in the jar. When all the oil in the crank-case has been transferred to the jar, the pump motor is stopped and the valve device is set to the "Waste" position. This opens the valve 35 of the waste conduit 19, the valves 36 and 37 being closed. The switch is then turned to the "From glass" position. This causes the pump to be driven in the direction reverse to that of the preceding operation. The body of old oil in the sight jar is then drawn through the outlet openings 54 past the check valves 50, the check valve 56 being closed, and through the pocket 52 and the connections 50, 49 to the fitting 15 of the pump. From the other pump fitting 15 the oil is forced through the connections 48, 47 to the header chamber 33, and thence down through the pipe 19 into the waste receptacle.

When all the oil in the transfer chamber 9 has been delivered to waste, the motor is again stopped, and the valve device is set to the "Flush" position. This opens the valve 36, the valves 35 and 37 being closed. Then the switch is turned to the "To glass" position. Flushing oil is then drawn from the flushing oil receptacle 7, through the pipe 20 to the header chamber 33, and thence through the connections 47 and 48 to the pump, and from the pump it is forced through the connections 49 and 50 to the uptake pipe 57 of the transfer chamber 8. This enables the customer to see the charge of flushing oil that is to be introduced into the crank-case. When a sufficient charge of flushing oil has been taken into the sight jar, the motor is stopped, and the valve device 31 is set to the "Car" position. The motor is again reversed and the charge of flushing oil is drawn from the transfer chamber and forced through the hose and nozzle into the lower part of the crank-case. The turbulence created in the crank-case dislodges and holds in suspension solid matter, and an effective cleaning is accomplished. Next, the motor and pump are reversed and the dirty flushing oil is returned to the transfer chamber. Finally, the valve device is set to the "Waste" position, the motor and pump are reversed again, and the dirty flushing oil is discharged into the waste receptacle.

This operation may be modified in the following manner: When old oil is withdrawn from the crank-case, a certain amount of solids is caught and held by the filter or screen device 29 and prevented from passing to and through the pump and the valves. The filter is accessible and can be readily opened and cleaned, but if the solids are allowed to remain in the filter they will be carried back into the crank-case by the flushing oil. However, after the old oil has been removed from the crank case into the transfer chamber, instead of discharging this oil from the transfer chamber to the waste receptacle in the manner that has been described, the nozzle may be pulled out of the crank-case and disconnected

from the hose. The coupling device 27 may then be applied to the head 66 of the pipe 64, the gauge rod 67 having been removed, and, without changing the setting of the valve device 31, but by setting the switch 16 so that the pump is operated in the reverse direction, the old oil may be pumped from the transfer chamber out through the filter and hose, carrying the solids out of the filter, and thence through the pipe 64 to waste.

If desired, the dirty flushing oil may also be pumped from the transfer chamber to the waste receptacle in this same manner. It follows that the conduit 19 and the valve 35 need not necessarily be used and might even be omitted.

If the transfer chamber 8 should be pumped over-full at any time, the excess oil will pass to the waste receptacle through an overflow conduit 70.

The apparatus is charged with flushing oil by inserting the nozzle in a container, setting the valve device to the "Car" position, and operating the pump in the "To glass" direction, after which the valve device is set to the "Flush" position, and the pump is operated in the "From glass" direction, thereby delivering this flushing oil into the flushing oil receptacle. These operations may be repeated as necessary in order to put the desired amount of flushing oil into the apparatus.

In order to empty the waste receptacle, the valve device is set in the "Waste" position, and the pump is operated in the "To glass" direction, thereby raising waste oil into the sight-glass, whereupon the valve device is set in the "To car" position and the pump is operated in the "From glass" direction, so as to empty the sight-jar and discharge the oil through the hose. These operations may be repeated until the waste receptacle is empty.

Advantages of the apparatus and the combinations of parts which have been described are the quickness with which the operations of draining and flushing crankcases can be performed, freedom from leakage, the simplicity and convenience of the controls, and the simplicity and economy of the construction, which requires but little and inexpensive piping and few valves and a single motor and a single pump, which pump handles both the old oil and the flushing oil, moving them to and from the crank-case and the transfer chamber, from the transfer chamber to the waste receptacle, and from the flushing oil receptacle to the transfer chamber.

I claim:

1. Apparatus for removing oil from crank-cases and for flushing the same, having three conduits, namely, a conduit adapted to be placed in communication with a crank-case, a conduit for delivering oil to waste, and a conduit for intake of flushing oil, a reversible pump, a connection between said three conduits and one side of said pump, valve means for selectively placing any one of said three conduits in communication with said connection to one side of said pump, and a transfer chamber connected with the other side of said pump.

2. Apparatus for removing oil from crank-cases and for flushing the same, having a waste receptacle, a receptacle for flushing oil, three conduits, namely a conduit adapted to be placed in communication with a crank-case, a conduit for delivering oil to said waste receptacle, and a conduit for withdrawing flushing oil from said flushing oil receptacle, a reversible pump, a connection be-

tween said three conduits and one side of said pump, valve means for selectively placing any one of said three conduits in communication with said connection to one side of said pump, a transfer chamber connected to the other side of said pump, a hose connected to the first-named conduit, and an entrance to said waste receptacle by means of which oil can be delivered from said transfer chamber through said pump, conduit and hose to the waste receptacle.

3. Apparatus for removing oil from crank-cases and for flushing the same, having a waste receptacle, a receptacle for flushing oil, three conduits, namely, a conduit adapted to be placed in communication with a crank-case, a conduit for delivering oil to said waste receptacle, and a conduit for withdrawing flushing oil from said flushing oil receptacle, a reversible pump, a connection between said three conduits and one side of said pump, valve means for selectively placing any one of said three conduits in communication with said connection to one side of said pump, a transfer chamber connected to the other side of said pump, a hose connected to the first-named conduit, a filter in said conduit, and an entrance to said waste receptacle by means of which oil can be delivered from said transfer chamber through said pump, conduit and hose to the waste receptacle.

4. Apparatus for removing oil from crank-cases and for flushing the same, having a waste receptacle, a receptacle for flushing oil, three conduits, namely, a conduit adapted to be placed in communication with a crank-case, a conduit for delivering oil to said waste receptacle, and a conduit for withdrawing flushing oil from said flushing oil receptacle, a reversible pump, a connection between said three conduits and one side of said pump, valve means for selectively placing any one of said three conduits in communication with said

connection to one side of said pump, a transfer chamber connected to the other side of said pump, a hose connected to the first-named conduit, and provided with a detachable nozzle, and an extra pipe extending down to said waste receptacle, to the upper end of which pipe said hose can be applied when said nozzle is detached.

5. Apparatus for removing oil from crank-cases and for flushing the same, having a waste receptacle, a receptacle for flushing oil, two conduits, namely, a conduit adapted to be placed in communication with a crank-case and a conduit for withdrawing flushing oil from said flushing oil receptacle, a reversible pump, a connection between said two conduits and one side of said pump, a transfer chamber connected to the other side of said pump, a hose connected to the first-named conduit, and an entrance to said waste receptacle by means of which oil can be delivered from said transfer chamber through said pump, conduit and hose.

6. An apparatus of the character described, including a sight vessel having an uptake pipe and an outlet, a reversible pump, one side of which is connected with said uptake pipe and said outlet, and automatic valve means for permitting flow through said uptake pipe while preventing flow through said outlet, and vice-versa.

7. An apparatus of the character described, including a transparent transfer chamber, an uptake pipe in said chamber having means for throwing oil against the inside of the transparent wall of said chamber, means for withdrawing oil from a crank-case and delivering it through said uptake pipe against said wall, and means for thereafter delivering a charge of oil for flushing the crank-case through said uptake pipe and against said wall, whereby the wall is washed.

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