May 8, 1962 J. A. EDGAR ETAL 3,033,311

OIL REMOVAL AND GAUGING APPARATUS

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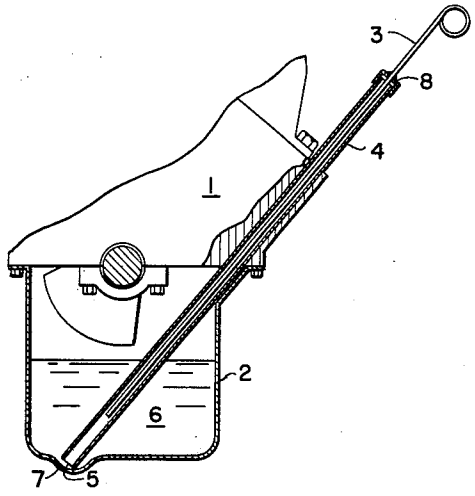


FIG. I

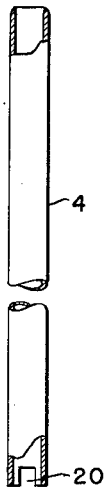


FIG. III

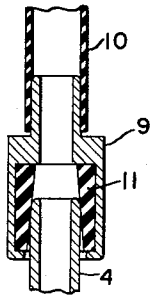


FIG. IV

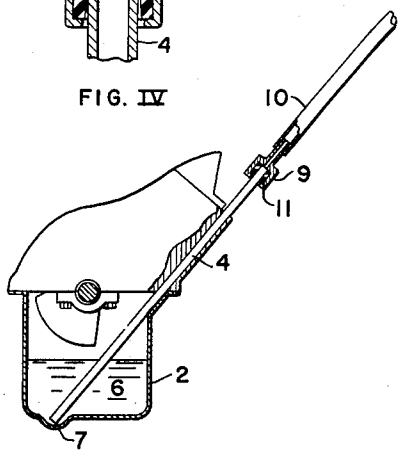
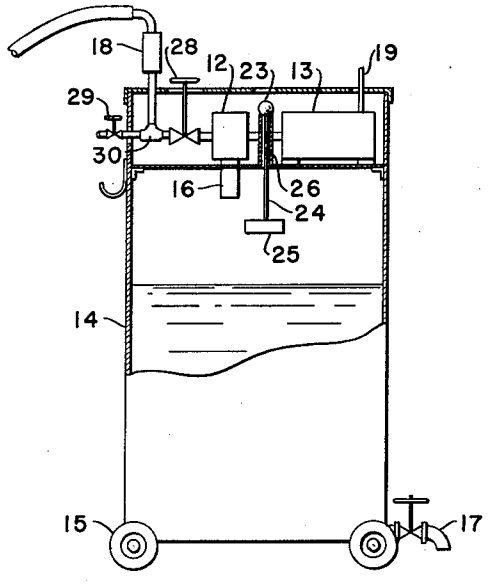


FIG. II



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OIL REMOVAL AND GAUGING APPARATUS

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This invention relates to internal combustion engines and is particularly directed to the provision of means for effecting a rapid and efficient draining of the lubricating oil from the crankcase of an engine.

Heretofore it has been the practice in changing the oil in the crankcase of automobile engines to elevate the automobile by means of a hoist or to run it over a pit and remove a drain plug from the bottom of the crankcase so that the oil may flow by gravity into a suitable container. After replacement of the drain plug, fresh oil is poured into the crankcase through a filler pipe situated on the upper part of the crankcase or situated on the valve cover.

As will be apparent, the above system of changing the oil in a crankcase is both time-consuming and inconvenient.

Another approach to the problem of removing the oil from the crankcase has been to insert a small diameter tube through the dipstick opening in the top of the crankcase and by means of a suitable pump withdraw the oil to a container for disposal. Such an arrangement has an advantage that the necessity of putting the car on a hoist or over a pit and removing the drain plug is avoided. However, the employment of such an insert tube is not in many cases possible as the dip stick opening is either of too small a diameter or is inaccessible. A further disadvantage in the use of such a withdrawal tube is that there is in some cases no assurance to the operator or owner of the automobile that the tube has been inserted to the bottom of the crankcase and substantially all the oil withdrawn.

It is an object of our invention to devise a rapid oil removal system.

A further object is to devise an oil change means for withdrawing the oil without the insertion of a temporary withdrawal tube into the crankcase.

A further object is to provide a combined dip stick casing and oil withdrawal tube on the crankcase of an engine.

The further objects of our invention will be apparent from the following description.

In brief, our invention comprises the provision of a tube of sufficient diameter to form a sheath or guide tube for the dip stick on an internal combustion engine and to extend this tube inside the crankcase to the bottom thereof. The external upper end of the tube is provided with means for connecting the inlet of a pump for withdrawal of the crankcase oil.

The further details of our invention will be understood from the detailed description of an embodiment thereof throughout which reference is made to the accompanying drawing wherein:

FIG. I is a fragmentary sectional view of an internal combustion engine showing a dip stick in place.

FIG. II is a similar view of the engine shown in FIG. I with dip stick removed and connection made to an oil withdrawal mechanism.

FIG. III is a longitudinal section of an alternative form dip stick casing.

FIG. IV is an enlarged sectional view of the coupling means shown in FIG. II.

The internal combustion engine, only part of which is shown, generally indicated by numeral 1, is provided with a crankcase 2. Into this a removable oil dip stick

or rod 3 extends part way. Surrounding the rod 3 is a casing or sheath 4 which is attached to and forms part of the engine construction. The sheath in the form shown in FIGS. I and II, extends into the crankcase at an angle and is provided with a lower open end 5 which is normal to the longitudinal axis of the sheath. By such construction, oil 6 in the crankcase can readily seek its own level inside the sheath, there being an ample opening provided from the interior of the crankcase to the interior of the sheath in view of the sheath meeting the bottom face of the crankcase at an angle less than 90 degrees. An oil drainage sump 7 may be formed below the lower end of the sheath. The upper end of the sheath 4 extends beyond the exterior surface of the engine 1 so that attachment of external piping can readily be made. The upper end of the dip stick 3 can be provided with a flange 8 so as to cover the upper end of the sheath and prevent the ingress of dirt and to prevent crankcase fumes from escaping at this point.

FIG. II shows an engine 1 being serviced by having the oil of its crankcase 2 removed by means of our invention. As will be seen by reference to this figure and to FIG. IV, the dip stick 3 has been removed and a coupling member 9 on the end of a flexible pipe and having a suitable tapered sleeve 11 attached by push-fit to the sheath 4 so as to provide an airtight joint. The sleeve 11 is preferably made of oil resistant rubber or other suitable elastomer. The flexible pipe or hose 10 is connected at its other end to rigid piping leading to the inlet of a suitable pump such as a gear pump 12 driven by an airmotor 13. The gear pump 12 and airmotor 13 can be mounted on the top of a container or drum 14 having casters 15. The outlet of the pump 12 can be arranged to discharge into the drum through pipe 16. A faucet 17 at the bottom of the drum permits the removal of accumulated used oil for ultimate disposal.

A transparent section 18 can be installed near the inlet to the pump 12. The airmotor 13 is provided with a chuck or other connection 19 so that an air line connected to a source of air pressure can be used to operate the motor.

An indicator knob 23 attached by a shaft 24, to a float 25 is located in the top of the container 14. The shaft 24 passes through a loose fitting sleeve 26 in the top sheet of the container 14. As will be apparent upon the level of used oil rising sufficiently, the indicator knob will become elevated thus warning the service station attendant that the container 14 requires emptying.

In utilizing our invention to change the oil in the crankcase of an engine, such as that of an automobile, an operator removes the dip stick 3 from the engine and connects the flexible pipe 10 leading to the pump 12. On starting up the airmotor 13, the pump will draw oil from the crankcase 2 and discharge it into the drum 14. By observing the flow past the transparent section 18 it can be determined when the oil has been withdrawn and air is being sucked into the end 5 of the sheath 4. The pumping is then stopped, the hose disconnected from the sheath, and the drum 14 moved away by means of the casters. Fresh oil is then poured into the crankcase through the usual filler pipe and the dip stick 3 replaced in the sheath.

Instead of providing the lower end of the sheath 4 with an opening as shown in FIGS. I and II, the lower end may be provided with deep serrations or indentations 20 such as shown in FIG. III. This type of opening for the oil will be desirable in engines where the dip stick and sheath are mounted vertically in the crankcase. With a vertically mounted dip stick sheath the lower end thereof could, if desired, be cut off diagonally to ensure free entry of oil into the sheath.

We have found that very satisfactory results are ob-

tained when employing a withdrawal pipe of 5/16" internal diameter and having a wall thickness of 1/32".

As shown in FIG. II, a shut-off valve 28 is preferably mounted at the pump inlet and a valved inlet 29 connected by means of a pipe T piece 30, the inlet 29 being provided with a suitable connection for a source of air under pressure. The purpose of the above is as follows: Under some operating conditions sludge forms in the crankcase of internal combustion engines. This sludge is in some cases of a viscous nature and in other cases substantially solid. With the use of our sheath-oil withdrawal pipe it is possible that amounts of sludge could remain in the sheath at the end of the oil removal or could block or partially block the opening 5 in the bottom of the sheath. Accordingly, to ensure that sludge does not remain so lodged and thereby effect subsequent readings of oil levels on the dip stick, the valve 22 is preferably closed after all oil is removed from the crankcase. An air hose then can be connected to the valved inlet 29 and air under pressure forced into the sheath and associated piping. By this procedure any sludge in the sheath 4 will be blown back into the crankcase and away from the lower end 5 of the sheath.

While we prefer to use an airmotor to drive the pump, in view of the readily availability of air under pressure at most oil service stations, it will be realized that other motive power such as an electric motor or a hand-cranked pump could be used in place of an air motor.

Instead of providing air blow-back system as above to clean out the withdrawal pipe, we may provide that the pump 12 is reversible and that pipe 16 extend to the bottom of container 14. By a back pumping of fluid into the crankcase 2 for short periods, a scouring of the crankcase and withdrawal pipe can be obtained to remove solid deposits such as sludge therein.

While we have shown in FIG. II a drum 14 for receiving the oil withdrawn from the crankcase, in some cases we may provide that the discharge pipe 16 terminate in a pail or other open container. By the above arrangement, the customer can readily see the quantity of the oil and the condition thereof as it is withdrawn from the crankcase of his car.

In the embodiment of the invention a straight dip stick sheath is shown, we can, however, where desired, employ a dip stick sheath of curved shape. Such a curved dip stick sheath and a somewhat flexible dip stick would be particularly adapted for use in internal combustion engines having sump sections of their crankcases relatively inaccessible.

While we have shown a dip stick sheath having a smooth exterior upper end whereby connection to an oil removal pump by a push-fit type coupling can be made, it will be realized that we may provide threads, lugs or other common pipe coupling elements thereon whereby a quick air-tight joint may be made with the oil withdrawal means.

Besides incorporating our dip stick sheath as part of the crankcase construction of an automotive or other engine, we also contemplate the adaption of our invention to automotive transmissions, gear boxes, and the like, which have a supply of fluid lubricant contained therein. Good maintenance practice requires that the level of fluid therein be periodically checked, the contents drained and replenished with fresh fluid. This requirement is especially necessary with transmissions of the automatic type. The application to other machinery having an oil bath case, such as industrial transmissions, marine engines and transmissions, farm equipment, et cetera, is contemplated.

While preferred embodiments of the invention have been described and illustrated by way of example, it will be obvious that changes may be made therein within the spirit and scope of the invention as set forth in the appended claim.

We claim as our invention:

In an internal combustion engine: a crankcase, a dip stick extending into said crankcase, a thin walled, uniform diameter tubular sheath in said crankcase surrounding said dip stick and extending to the bottom of the crankcase, an opening in the lower end of said sheath for the admission of oil thereto, the wall of said sheath being imperforate throughout its length, the upper end of said sheath protruding externally beyond the wall of the crankcase and adapted for connection to external suction piping by push-fit connection, the highest point of said opening in the lower end of said sheath being substantially at the bottom of said crankcase whereby the crankcase can be emptied through said tubular sheath upon the application of suction thereto.

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