

June 2, 1942.

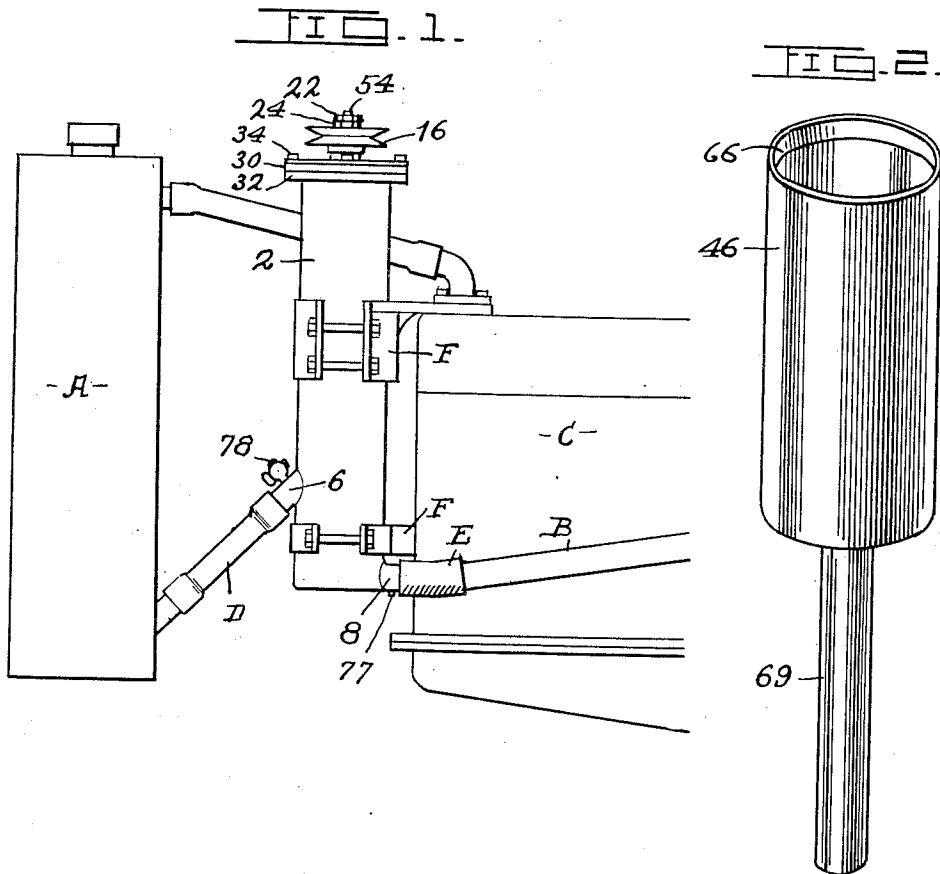
C. A. COMBS

2,284,948

ROTARY PUMP

Filed Sept. 15, 1941

2 Sheets-Sheet 1



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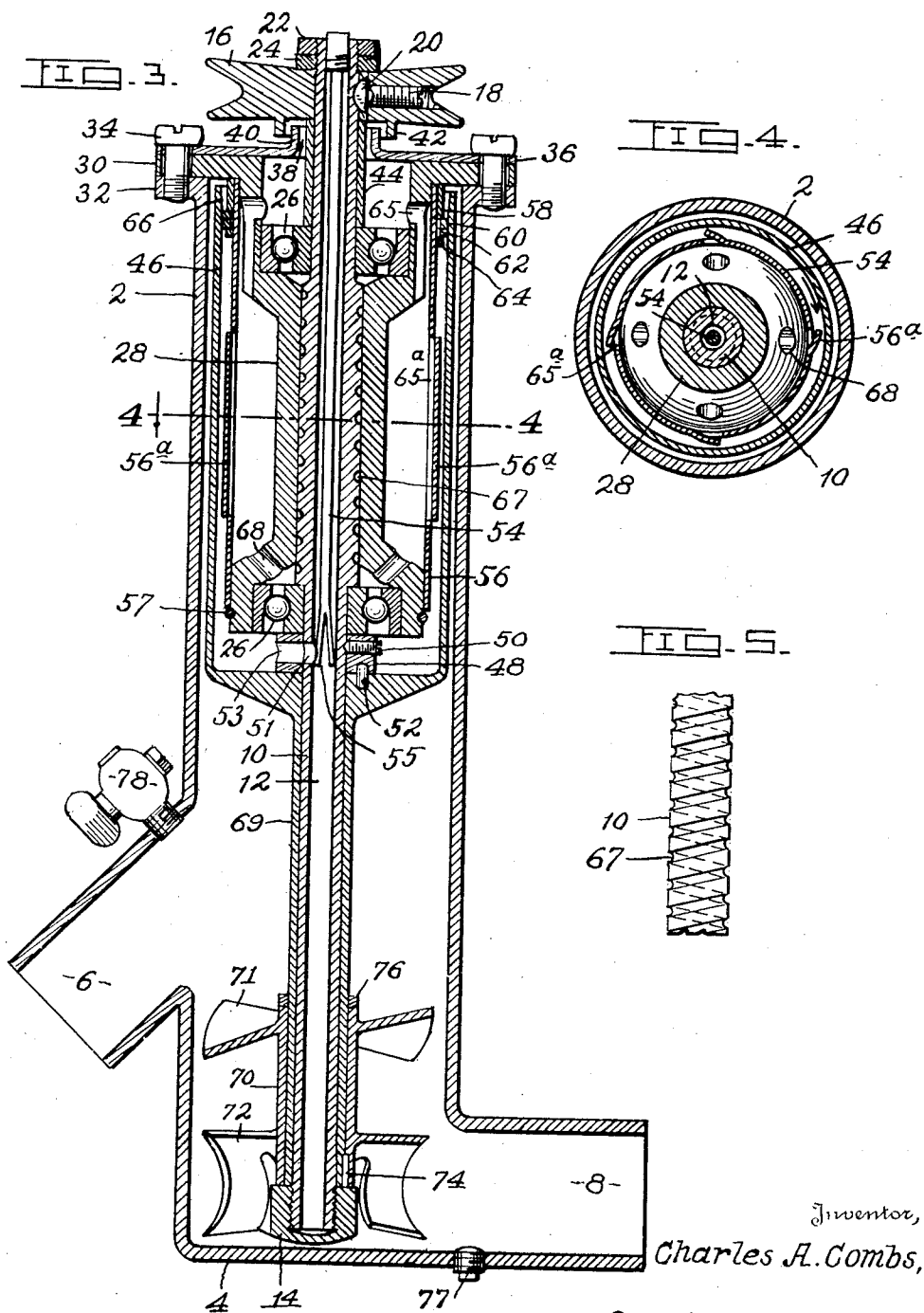
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UNITED STATES PATENT OFFICE

2,284,948

ROTARY PUMP

Charles A. Combs, Kansas City, Mo.

Application September 15, 1941, Serial No. 416,915

8 Claims. (Cl. 103—89)

My invention relates to rotary pumps which are intended more particularly for circulating water or other liquid through the cooling systems of both stationary and automotive internal combustion engines, and an important object of the invention is the provision of a leakless pump in which the use of all kinds of packing for preventing leakage are dispensed with.

Another object is the provision of a pump having a self-contained internal lubricating system for maintaining a free flow of lubricant to the bearings of the drive shaft that operates the pump impeller.

A further object is the provision of a vertically disposed bearing and drive shaft assembly having means for forcing a proper supply of lubricating oil to the uppermost bearing surface.

Another object is the provision of a pump in which all of the internal parts are so assembled that they can be simultaneously removed for inspection and repairs without draining the pump or disconnecting it from the cooling system, thereby saving time and avoiding wastage of any antifreeze solution that is mixed with the cooling water.

Another object is the provision of a self-contained pump which is relatively simple and of durable construction and can be readily assembled or disassembled without the use of special tools.

Other objects will hereinafter appear and in order that the invention may be fully understood reference will now be had to the accompanying drawings, in which:

Fig. 1 is a diagrammatic view showing the pump connected to the cooling system of an internal combustion engine.

Fig. 2 is a detail perspective view of a lubricant container.

Fig. 3 is a vertical sectional view of the pump.

Fig. 4 is a cross section on line 4—4 of Fig. 3.

Fig. 5 is a fragmentary elevation of part of the impeller drive shaft.

Referring in detail to the different parts of the pump, 2 designates an upright housing open at its upper end and closed at its lower end with an integral bottom 4 to provide a leak-proof pump when the same is installed in the cooling system of an internal combustion engine. The housing 2 has an inlet 6 spaced a short distance above the bottom 4 and an outlet 8 arranged adjacent to said bottom. Inlet 6 and outlet 8 are connected to the lower portion of a radiator A and the inlet pipe B of the water jacket of an internal combustion engine C by suitable means

such, for instance as hose D and E, respectively, and the pump is secured to the forward portion of the engine by suitable brackets F.

Arranged concentrically within and extending vertically from the lower portion to a short distance above the housing 2 is a drive shaft 10 having a central bore 12 extending vertically therethrough and closed at its lower threaded end by a cap-nut 14. The upper end of shaft 10 is provided with a grooved pulley 16 adapted to be driven through a belt, not shown, from any suitable working part of the engine C, such, for instance, as the crank shaft, the fan shaft, or the generator shaft. The pulley 16 may be firmly secured to the shaft 10 by any appropriate means, such, for instance, as a set-screw 18, a key 20, and nuts 22 and 24, which latter are threaded upon the upper end of the shaft to engage the upper surface of the pulley 16.

The shaft 10 is mounted in antifriction bearings 26 located in the enlarged upper and lower ends of a stationary tubular bearing member 28, provided at its upper end with a peripheral flange 30 which rests upon the flanged upper end 32 of the housing 2. A dust-cap 36, having a central opening 38, cooperates with the flange 30 in closing most of the upper end of the housing 2, to the flange 32 of which they are removably secured by screws 34. The central opening 38 is surrounded by an upturned flange 40 which extends into an annular flange 42 depending from the under portion of the pulley 16. A spacer sleeve 44, mounted on the upper portion of shaft 10, extends from the upper bearing 26 to the under part of the pulley 16 to support the latter and the shaft.

Referring now more particularly to the lubricating system of the pump, 46 designates a cylindrical lubricant container located in the upper portion of the housing 2 and secured to shaft 10 to rotate therewith through the medium of a collar 48 interposed between the lower bearing 26 and the bottom of the container, a set-screw 50 which secures said collar to the shaft, and a lock-pin 52 connecting the container and the collar 48. The shaft 10 and collar 48 have registering ports 51 and 53, respectively, so that the lubricant container 46 may be supplied with a measured quantity of oil introduced through the upper end of bore 12. The level of the oil in the container 46 may be readily ascertained at any time by a removable measuring rod 54 threaded at its upper end in the upper end of bore 12. The measuring rod 54 is prevented from vibrating

by its lower split and 55 which engages the surrounding wall of the bore.

The oil container 46 is provided internally with a stationary annular baffle 56 mounted upon the enlarged ends of the bearing member 28 and resting at its lower end upon a lock-ring 57 embracing the lower part of the bearing member 28. The baffle 56 has peripheral blades 55a which extend close to the inner surface of the oil container 46 to check any oil that might otherwise be carried to the top of the container by capillary attraction and centrifugal force when the pump is in operation. Any oil which may escape above the blades 55a is prevented from overflowing from the container by a series of rings 58, 60, 62 and 64, closing the upper end of the space between the container 46 and the baffle 56. The rings 60 and 62 are preferably split rings which fit friction tight in the upper portion of the oil container and are interposed between the rings 58 and 64, which fit friction tight around the external upper portion of the baffle 56. The upper internal surface of the oil container 46 is slightly beveled as indicated at 66 to facilitate placement of the rings 60 and 62, and also to eject by centrifugal force any moisture which might arise from water in housing 2, thereby preventing dilution of the oil in the container.

The container 46 is preferably supplied with lubricating oil to about one-fourth or one-fifth of its capacity to completely submerge the lower bearing 26 and when the pump is in operation a portion of the oil is carried to the upper bearing 26 by a spiral groove 67 formed in the periphery of shaft 10 and extending from the lower to the upper bearing 26. The oil passes through the upper bearing 26 and returns to the container 46 through ports 65 in the upper part of the bearing member 28 and slots 65a in the baffle 56. A portion of the oil also freely enters the lower bearing 26 through ports 68 in the enlarged lower part of the bearing member 28.

The lower end of the oil container 46 has an integral tubular shaft 69 which fits snugly upon the drive shaft 10 and extends down to the cap-nut 14. The lower portion of the shaft 69 is equipped with an impeller comprising a hub 70 and upper and lower blades 71 and 72, respectively, which are located between the inlet 6 and the outlet 8 and adapted to circulate water through the cooling system. The hub 70 fits snugly upon shaft 69 and is driven thereby through an intervening key 74. The hub 70 is also clamped between the cap-nut 14 and a ring 76 fixed to the shaft 69.

In practice, the pump is installed in the cooling system with the upper end of the lubricant container 46 arranged a short distance above the water line in the core of the radiator A, so that when the pump is idle water will not rise high enough in the housing 2 to overflow into the lubricant container. When installed the only exterior opening in the pump will be the opening 38 in the dust-cap and since said opening is above the water line no leakage can occur. When the pump is in operation the impeller blades 71 and 72 draw the water downward from the inlet 6 and expel it through the outlet 8, thereby keeping the water in circulation throughout the cooling system.

When desired all of the water may be drained from the pump on removal of a plug 77 threaded in the bottom of the housing 2. Preparatory to filling the cooling system with a fresh supply of water an air cock 78, threaded in the housing

2, is opened to permit the air to escape, so that inflow of water to the housing will not be retarded.

Wornout oil may be sucked from the container 46 by inserting the nozzle of a grease gun, not shown, in the upper end of bore 12 and pulling the plunger of the gun upward. Gasoline may then be alternately pumped into the container and sucked therefrom to cleanse the container 46 and the bearings 26, after which fresh oil may be pumped into the container.

Although I have shown the pump connected to the cooling system of an internal combustion engine, it is apparent that it may be employed to advantage in mixing chemical solutions and for various other purposes.

From the foregoing description, taken in connection with the accompanying drawings, it is apparent that I have provided a pump having the advantages above pointed out and while I have shown a preferred form of the pump I reserve all rights to such other forms and modifications thereof as properly fall within the spirit and scope of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. A pump comprising an upright housing closed at its lower end and open at its upper end, said housing having an inlet and an outlet at its lower portion and a peripheral flange surrounding its upper end, a rotary impeller located in the lower portion of said housing, driving means for the impeller extending above the housing and including a pulley provided at its under portion with an annular flange, bearing means for the upper portion of said driving means provided with a peripheral flange which rests upon the housing flange and partially closes the open end of the housing, a dust cap resting upon the flange of the bearing means and provided with a central opening through which the upper portion of the driving means extends, said central opening being surrounded by an upturned flange which projects into the depending flange of the pulley, and threaded means for removably holding the dust cap and the flange of the bearing means in assembly with the flange of the housing.

2. A pump comprising an upright housing having an inlet and an outlet, a drive shaft arranged axially in the housing, means for driving the shaft, bearing means in the housing in which the drive shaft is mounted, a rotary lubricant container surrounding said bearing means and provided with a tubular shaft mounted on the drive shaft, an impeller secured upon said tubular shaft, and means through which the drive shaft drives the lubricant container.

3. In a pump, an upright housing, a lubricant container in said housing, a tubular bearing member in the lubricant container provided at its upper end with a peripheral flange whereby it is suspended from the housing, antifriction bearings in the upper and lower ends of said tubular bearing member, and a drive shaft extending through the tubular bearing member, and journaled in said antifriction bearings, said shaft having a spiral groove for forcing lubricant from the container through the upper antifriction bearing.

4. In a pump, an upright housing, a lubricant container in said housing, a tubular bearing member in the lubricant container provided at its upper end with a peripheral flange whereby it is suspended from the housing, said tubular bearing member having enlarged ends with ports ex-

tending therethrough for the passage of a lubricant, bearings in the upper and lower ends of said tubular bearing member, a drive shaft extending through the tubular bearing member and journaled in said bearings, said shaft having a spiral groove for forcing lubricant from the container through the upper bearing, and the ports in the upper end of the tubular bearing member.

5. In a pump, an upright housing, a rotary cylindrical oil container in the housing having an upper open end, a drive shaft connected to said lubricant container to actuate the same, bearing means for said drive shaft connected to the housing and extending down into the lubricant container, an annular baffle in the oil container secured to the bearing means and provided with peripheral elements for preventing oil from being carried to the upper end of the lubricant container by capillary attraction or centrifugal force, ring means secured in the upper portion of the oil container, and rings on the baffle one of which contacts the under surface and the other the upper surface of the ring means.

6. In a pump, an upright housing, a rotary lubricant container in the housing, a drive shaft extending axially through the lubricant container and the upper portion of the housing, said

drive shaft having an axial bore and a transverse port through which latter lubricant may flow from said axial bore into the lubricant container, bearing means for the drive shaft, and a removable measuring rod adapted to close the upper end of the axial bore and extend down into the latter to measure the depth of the lubricant in the lubricant container.

7. In a pump, an upright oil container comprising a lubricant chamber with a depending tubular shaft, a drive shaft extending through the lubricant chamber and the tubular shaft, means through which the drive shaft rotates the oil container, and an impeller secured upon the tubular shaft to rotate therewith.

8. In a pump, an upright oil container comprising a lubricant chamber with a depending tubular shaft, a drive shaft extending through the lubricant chamber and the tubular shaft provided with an axial bore communicating with the lubricant chamber, means through which the drive shaft rotates the oil container, an impeller having a hub mounted upon the tubular shaft, a ring secured to the tubular shaft, and a cap nut threaded upon the lower end of the drive shaft to close the axial bore and force the upper end of the impeller hub firmly against said ring.

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