W. R., H. J., AND E. M. WOOCK.

UNIT PUMP AND MOTOR FOR SUBMERGED SERVICE.

APPLICATION FILED MAY 24, 1921.

1,425,308. Patented Aug. 8, 1922.

Fig. 1

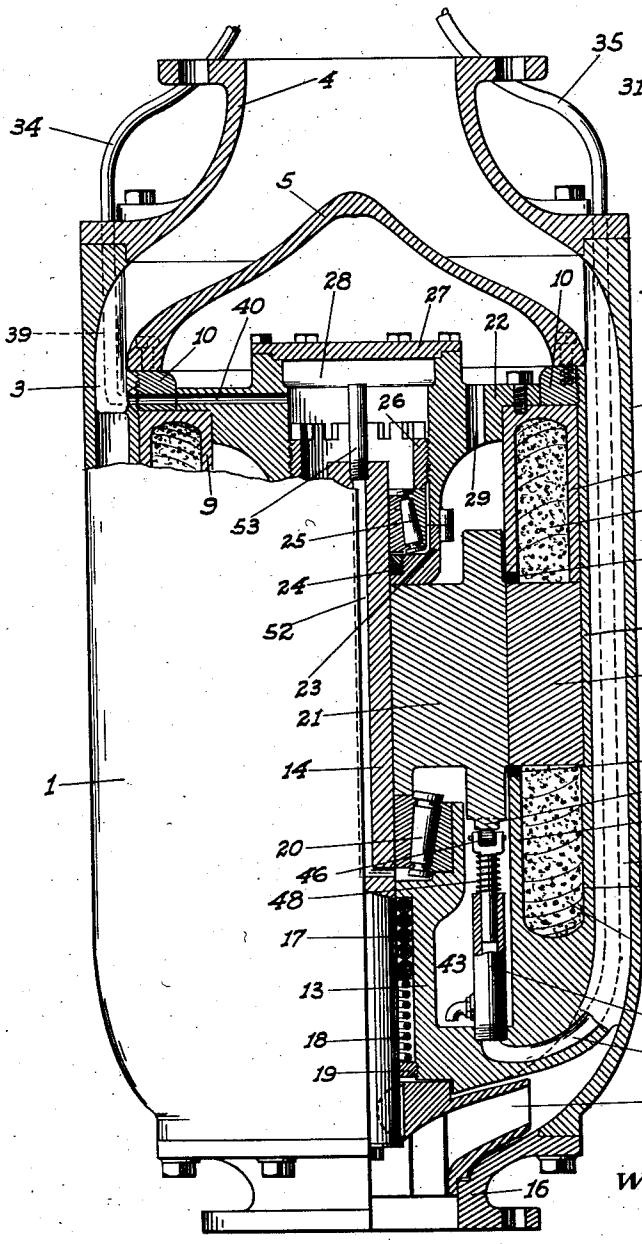


Fig. 2

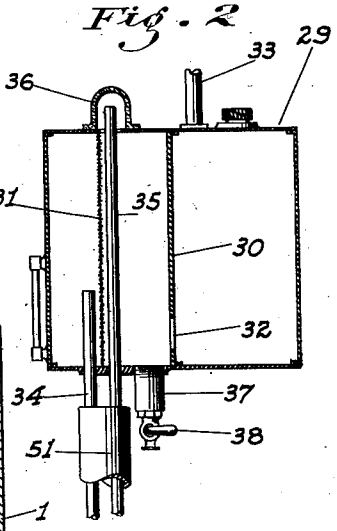


Fig. 3

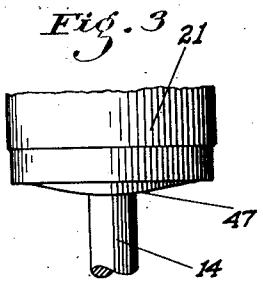
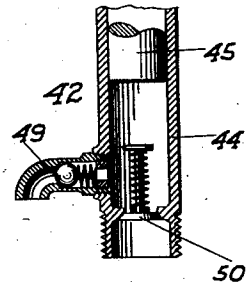


Fig. 4



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UNITED STATES PATENT OFFICE.

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UNIT PUMP AND MOTOR FOR SUBMERGED SERVICE.

1,425,308. Specification of Letters Patent. Patented Aug. 8, 1922.

Application filed May 24, 1921. Serial No. 472,281.

To all whom it may concern:

Be it known that we, WALTER R. WOOCK, HERBERT J. WOOCK, and ERIC M. WOOCK, citizens of the United States, residing at Lodi, county of San Joaquin, State of California, have invented certain new and useful Improvements in Unit Pumps and Motors for Submerged Service; and we do declare the following to be a full, clear and exact description of the same, reference being had to the accompanying drawings and to the characters of reference marked thereon, which form a part of this application.

This invention relates to improvements in water pumps and especially to one of a type combining in a single compact unit a pump and an electric driving motor, and adapted to be lowered into the well and to operate under water.

Such a unit is also shown in our copending application for patent, Serial No. 427,347, filed November 3rd, 1920, the present invention being an improvement over the construction shown in said application.

The principal object of this invention is to provide a means for positively lubricating the bearings of the rotatable members of the unit at all times and regardless of the depth of submergence, and at the same time providing means for counteracting the pressure of the water, which is enormous beyond certain depths, and which exerts a tendency to force its way past any packing which might be adequate under ordinary conditions.

Another object is to construct certain parts of the pump of non-magnetic metals, so that there will be no dissipation of the strength of the motor-magnets.

A further object is to construct and arrange the pump so that the motor will be maintained in a cool condition regardless of any continuous running thereof.

A fourth object of the invention is to provide for adjustment of the motor-shaft bearings without disturbing the permanently mounted magnet and coils of the motor.

These objects we accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views.

Fig. 1 is a side view, mainly in section, of our improved pump and motor unit.

Fig. 2 is a sectional view, on a smaller scale, of an oil supply tank.

Fig. 3 is a fragmentary view, detached, of the motor-rotor, showing an oil-pump operating cam.

Fig. 4 is a sectional detached view, enlarged, of an oil pump.

Referring now more particularly to the characters of reference on the drawings, the numerals 1 and 2 denote a pair of cylindrical and concentrically spaced casings, connected by webs 3 at certain intervals thereby forming a single unit member. The casings however will be referred to in the description hereinafter as individual members, 1 denoting the outer and 2 the inner casing, these being made of bronze or some similar non-magnetic metal.

An orificed cap 4 designed to be connected onto a discharge pipe is removably fitted on top of the casing 1, while a solid cap 5 is removably secured on top of the casing 2, the latter terminating below the casing 1, so that a space of ample size for the water discharge is left between the caps 4 and 5.

A stationary ring-magnet 6 is fitted in the casing 2 substantially central of the length of the latter, the lower ends of the coils of said magnet seating in a pocket 7 provided with the casing 2 by means of an upwardly projecting wall 8 spaced from said casing inwardly thereof.

The upper ends of the coils seat in a member 9 channel-shaped in cross section, this member being press-fitted into the casing 2 and positively held in place by a ring 10 threaded into the upper end of the casing, inside of the cap 5.

The wall 8 and the inner wall of the member 9 terminate short of the magnet 6 and are fitted at such terminations with gaskets

11 of lead or some material having similar properties to break the magnetic path from the magnet to the members 8 and 9, no matter of what metal these may be constructed.

The pockets into which the coils project are filled with a solid insulating and heat resisting composition as at 12, preferably that described in our copending application for an insulation composition, filed May 18th, 1921, Serial No. 470,656, this material being liquid in its original state, but becoming very hard when applied and treated by heat, as specified in said application.

Formed with the casing 2 is a sleeve 13, projecting upwardly from the lower end thereof, through which projects a shaft 14, on the lower end of which is fixed a runner 15, adapted to take the water from an intake cap 16 fitted onto the lower end of the casing 1 and force it upwards between the casings 1 and 2. Above the runner and fitted into the sleeve 13 about the shaft is a packing member 17, forcibly held snug by means of a spring 18 about the shaft, the spring being capable of tension-adjustment by means of a nut 19 threaded into the sleeve 13. This form of packing is very efficient to resist leakage of water under pressure therepast, and is of the same type as that shown in our Patent No. 1,340,472, dated May 18th, 1920, for "Deep well pumps".

Above the packing member is an anti-friction bearing 20, preferably of a certain well-known roller type, which is cooperatively mounted with the shaft 14 and sleeve 13, which terminates at said bearing. Secured onto said shaft and also supported by the cone member of the bearing 20 is the motor-rotor 21, positioned of course in horizontal alinement with the magnet 6.

Removably fitted onto the member 9 inwardly of the ring 10 is a flange 22 having a central hollow and downwardly projecting boss 23 extending to the rotor, being fitted adjacent its lower end with a packing ring 24 bearing against the shaft 14. Above this ring is another roller bearing 25, cooperatively mounted with the shaft and boss, and being held in position and adjustable by means of a sleeve-nut 26 threaded into the boss 23.

A removable cap 27 fits over the flange 22, so that a certain enclosed area 28 is had inside the boss, the shaft 14 terminating inside the latter just above the bearing 25. It will also be noted that an enclosed area, independent of the area inside the boss 23, is had between the flange 22 and the cap 5, there being a hole or port 29 leading through the flange 22 to the space between the latter and the rotor. By reason of the construction just described, the heat from the rotor can rise into the chamber formed inside the cap 5, where it comes into immediate contact with the constantly cooled walls of the latter, since the water being pumped flows against and past said walls.

The bearings 20 and 25 are positively lubricated in the following manner:—

We employ an air tight oil tank 29 provided with a partition 30 and a screen 31, both vertically positioned.

The fresh oil is adapted to be placed into the portion of the tank beyond the screen and partition, the latter however having a hole 32 cut therethrough near the bottom. The tank is arranged to be kept under air pressure to whatever extent is made necessary, and depending on the depth of submergence of the pump, by any suitable means, the compressed air being fed to the tank through a pipe 33.

Two pipes 34 and 35 lead into the tank from the bottom, one on each side of the screen, the pipe 34 terminating a short distance from the bottom of the tank but the pipe 35 leading above the top and discharging into a cap sight-glass 36. A small sump 37 is fitted onto the bottom of the tank adjacent said pipes, and is provided with a draw-off cock 38.

The pipe 34 leads to the top of the pump unit, and is connected to a duct 39 formed in one of the casing-webs 3. A hole 40 communicating with said duct and with the enclosure 28 is bored through the flange 22 and ring 10.

The pipe 35 leads to the pump unit also, and is connected to a duct 41 cored in another one of the webs 3, this duct extending down and communicating with the lower end of an oil pump 42 mounted in what may be termed a sump 43 formed between the sleeve 13 and wall 8. This pump is preferably of the plunger type and comprises a vertical cylinder 44 rigidly secured in the sump, and a plunger 45 slidable therein and provided with a roller 46 on its upper end adapted to bear against the lower edge of the rotor 21 and also ride on an easy-motion cam 47 projecting downwardly from the rotor. A spring 48 about the plunger acts to force the roller constantly upward.

Below the plunger a check intake valve 49 in the cylinder communicates with the sump, and another spring pressed valve 50, opening toward the duct 41, is positioned in the lower end of the cylinder above said duct.

From the oil tank to a point adjacent the pump unit, the pipes 34 and 35 are preferably enclosed in a conduit 51.

In operation, the air pressure in the tank, aided by gravity, forces the oil down the pipe 34 and into the chamber 28. To permit the oil to reach the lower bearings and sump, while maintaining a supply in the said chamber, the said shaft 14 is provided with an orifice 52 leading from its upper end to the bearing 20, while a tube 53 is secured in and projects above the upper end of the

shaft in alinement with the orifice therein.

Some of the oil then flows, or is forced, down to the lower bearings, overflowing therefrom into the sump, where it is picked up by the pump with the operation of the latter had with the rotation of the rotor and forced upwardly and back into the tank 29 through pipe 35. The oil discharges out of said pipe into the sight-glass 36, enabling the operator to see the amount and condition of the oil coming from the pump.

This same returned oil is then fed back to the pump, after passing through the screen 31, which holds back all solid matter. The fact that the oil may be maintained in the pump under considerable pressure positively prevents any water from passing the packing 17, which, it will be noted, is the only point in the entire structure at which the water might possibly gain access to the interior mechanism of the pump.

From the foregoing description it will be readily seen that we have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described our invention, what we claim as new and useful and desire to secure by Letters Patent, is:—

1. A pump comprising a casing structure, a driven shaft turnably mounted therein and provided with an impeller member, upper and lower bearings for the shaft, an oil reservoir, a pipe leading therefrom to the upper bearing of the shaft and another pipe leading thereto from the casing below the lower shaft-bearing, and means for maintaining a constant circulation of oil through said pipes.

2. A pump comprising a casing structure, a driven shaft turnably mounted therein and provided with an impeller member, upper and lower bearings for the shaft, an oil reservoir, a pipe leading therefrom to the upper bearing of the shaft and another pipe leading thereto from the casing below the lower shaft-bearing, and an oil pump mounted in the casing and operatively connected with the return oil pipe to force the oil upwardly therethrough.

3. A pump comprising a casing structure, a driven shaft turnably mounted therein and provided with an impeller member, upper and lower bearings for the shaft, an oil reservoir, a pipe leading therefrom to the upper bearing of the shaft and another pipe leading thereto from the casing below the lower shaft bearing, an oil pump mounted in the casing and operatively connected with the return oil pipe, and means for driving said pump with the rotation of the shaft.

4. A pump comprising a casing structure, a driven shaft turnably mounted therein and provided with an impeller member, upper and lower bearings for the shaft, an oil reservoir, a pipe leading therefrom to the upper bearing of the shaft, the shaft being provided with a duct leading from the upper to the lower bearing, an oil sump in the casing below the lower bearing and into which the oil from the latter overflows, a driven oil pump mounted in the sump and adapted to take oil therefrom, and a pipe connected to the discharge of said pump leading back to the oil reservoir.

5. A pump comprising a casing structure, a driven shaft turnably mounted therein and provided with an impeller member, upper and lower bearings for the shaft, an oil reservoir, a pipe leading therefrom to the upper bearing of the shaft and another pipe leading thereto from the casing below the lower shaft-bearing, an oil pump mounted in the casing and operatively connected with the return oil pipe, an electric motor structure cooperatively mounted with the shaft and casing, a spring-pressed plunger for the pump, a roller on the outer end thereof, and a cam projecting from the lower edge of the rotor member of the motor, the roller riding alternately on the cam and on the lower edge of the rotor beyond said cam.

6. In a pump, a casing, a driven shaft turnably mounted therein, an oil reservoir, continuous oil passage means between the bearings of the shaft and said reservoir, an oil pump interposed in said passage means, an electric motor structure operatively mounted with the shaft, a plunger for the pump, and means between the motor and plunger for operating the latter.

7. In a pump, a driven shaft, an oil reservoir, continuous oil passage means between the bearings of said shaft and said reservoir, a plunger-type oil pump interposed in said passage means, said pump being parallel to the shaft, a roller on the pump plunger, and an annular flange member mounted with the shaft and provided with a cam surface against which the roller bears.

In testimony whereof we affix our signatures.

WALTER R. WOOCK.
HERBERT J. WOOCK.
ERIC M. WOOCK.