March 2, 1943. M. E. ZIMMERER 2,312,514

PUMP

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Fig. 1.

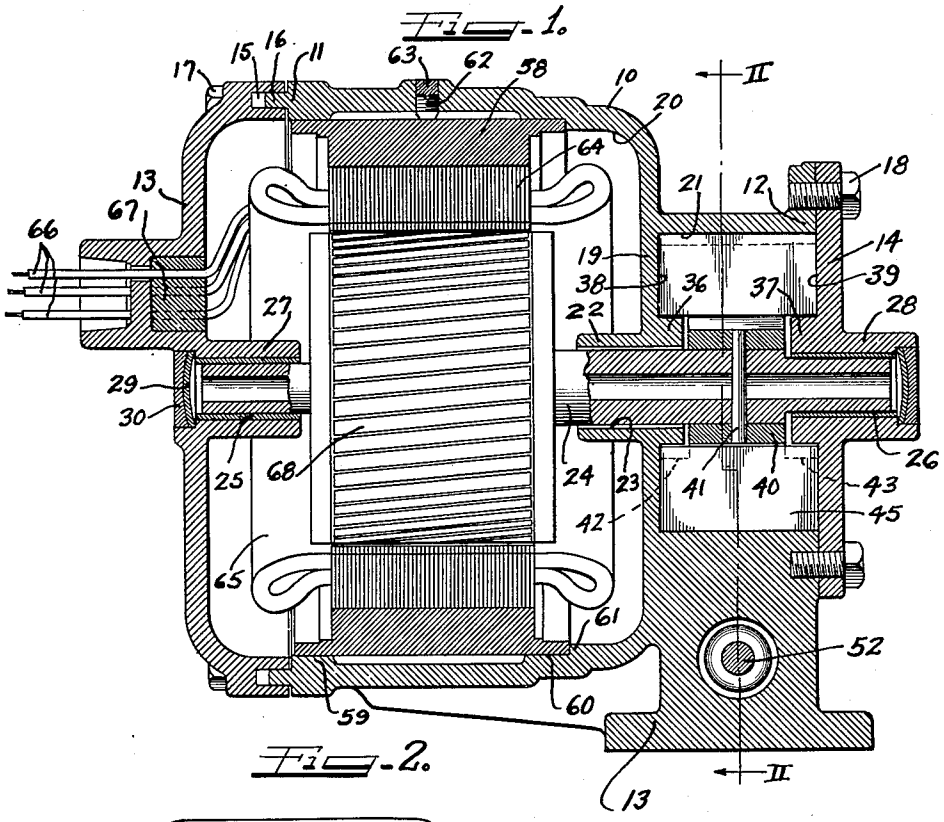


Fig. 2.

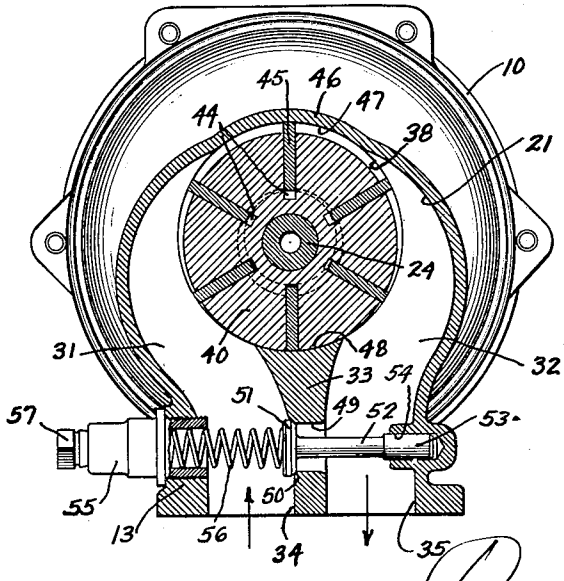


Fig. 3.



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PUMP

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1 Claim. (Cl. 103—118)

The present invention relates in general to pumps and is more particularly concerned with improvements in a pumping unit which is particularly advantageous for use in the pumping of hydrocarbon liquids such as gasoline and the like.

Heretofore, it has been the general practice in the construction of motor driven pumping units for the pumping of gasoline in gasoline dispensing apparatus to suitably connect a driving motor of the usual construction with a separate pump in which the pump shaft was supported in bearings separate and apart from the motor bearings.

Considerable difficulty has been experienced with such constructions in that the pump bearings soon become leaky. This not only caused considerable inconvenience to the operator of the equipment, but also, due to the leaking of gasoline, presented a constant hazard as long as the bearings were left in a leaky condition.

In order to overcome the above as well as other objections to the equipment as now manufactured, the present invention contemplates an improved pumping unit wherein the pump housing and motor housing are integrally formed with fluid communication between the pumping parts and the motor parts so that these parts may operate immersed in the fluid being pumped. By this improved arrangement, there is no shaft extending outwardly from the casing as in previous arrangements, so that the casing may be entirely sealed except for the inlet and outlet for the liquid to the pumping parts and the interior of the housing. It is to be noted that in my improved construction, the motor parts and wiring are immersed in the liquid being pumped, and the wiring is insulated so that it will not be damaged by the liquid.

It is therefore a primary object of the present invention to provide an improved pumping unit, including a novel arrangement of pumping parts and driving mechanism therefor.

A further object of the invention is to provide a pumping unit wherein the pumping parts and driving motor parts are contained in a single housing, and in which fluid being pumped may immerse the motor parts as well as the pumping parts.

A still further object is to provide a pump unit including improved means for sealing the same and guarding against leakage of the fluid being pumped.

Other objects and features of the invention will more fully appear from the following detailed description taken in connection with the accompanying drawing, which illustrates a single embodiment thereof, and in which:

Figure 1 is a longitudinal section taken through the housing of the unit and showing the cooperative relationship of the pumping and motor parts embodying the features of the present invention;

Figure 2 is a transverse section taken through the portion of the housing containing the pumping parts, taken substantially on line II—II of Figure 1; and

Figure 3 is a detail fragmentary view of a section of the motor winding, showing portions of the insulation cut away.

As shown on the drawing:

For purposes of illustration, there is shown in Figure 1 a pumping unit embodying the features of the present invention.

This unit comprises a tubular casing or housing 10 having open ends 11 and 12. The casing also has integrally formed therewith on one side a pedestal 13 which serves to support the unit on any suitable surface.

The open ends of the casing are respectively closed by end members 13 and 14. The end member 13 is provided with a circumferentially extending groove 15 which is adapted to receive therein a circumferentially extending tongue 16 on the casing to form a sealed joint, when the end member is secured to the casing as by suitable circumferentially spaced bolts 17.

The end member 14 closes the open end 12 of the casing and is likewise secured by circumferentially spaced bolts 18. The joint between the end member 14 and the associated end of the casing may be sealed with a suitable gasket or simply by providing polished contact surfaces.

The interior of the casing is provided with an integrally formed inner wall or partition 19 which extends across the interior of the casing and separates the interior into adjacently disposed compartments or chambers 20 and 21, the former providing space for the motor parts and the latter for the pumping parts, as will hereafter be more fully explained.

At its center, the partition 19 is provided with a hub 22 defining an opening 23 for loosely receiving therethrough a shaft 24.

The shaft 24 extends longitudinally of the casing and has its ends supported in suitable bearing sleeves 25 and 26 in bearing housings 27 and 28 integrally formed with the end members 13 and 14, respectively.

It will be noted that the bearing housings are

of tubular construction and have their outer open ends covered with a disk insert 29 which is held in position and sealed by means of a suitable sealing material, as shown at 30.

Referring to Figure 2, it will be noted that the chamber 21 is transversely divided into an intake passageway 31 and an outlet passageway 32 by an integrally formed baffle or partition 33, the passageways 31 and 32 communicating with openings 34 and 35, respectively, in the base of pedestal 13.

As shown in Figure 1, the partition 19 and end cover member 14 are provided on their confronting faces with eccentric collar portions 36 and 37, which cooperate with the interior wall of chamber 21 to define eccentric annular grooves 38 and 39 at the ends of the chamber.

A pump rotor element 40 is secured to the shaft as by means of a pin 41 for rotation with the shaft. This rotor is of generally circular cross section and is provided at its ends with annular end flanges 42 and 43 which extend into the eccentric grooves 38 and 39, respectively.

The rotor element is provided with longitudinally extending slots 44 which extend outwardly in a radial direction from the shaft 24 and are circumferentially spaced around the rotor. Each of these slots slidably carries therein a plate 45. These plates are of such length as to extend into the grooves 38 and 39 and have their ends in sliding engagement with the partition and inner surface of the end cover 14, as well as their inner and outer edges at their ends in sliding engagement with the outer and inner walls of the grooves.

It will therefore be apparent that since the grooves 38 and 39 are of eccentric construction surrounding the shaft, the plates will be moved outwardly and inwardly in their slots when the rotor element is rotated.

The eccentric grooves 38 and 39 are similarly positioned with reference to the shaft so that they will be spaced at the top a greater distance from the shaft than at the bottom. With such arrangement, the plates as they reach their position at the bottom of the rotation of the rotor element, when they are adjacent the baffle 33, will be retracted into their slots. On the other hand, when the plates are at the top of the rotor, they will be pushed outwardly or in extended position in their slots.

At the top wall portion of chamber 21, the wall is deflected, as shown at 46, so that its inner surface 47 forms a bridging connection between the top part of groove 38 and the top part of groove 39, the surface 47 transversely conforming to the curve of the outer wall of the groove.

At the bottom of the grooves 38 and 39, the outer walls of the grooves are bridged by the surface 48 formed at the upper end of baffle 33. It will be noted that the surface 48 is more closely disposed to the rotor surface than the surface 47.

The inlet passage 31 communicates with the rotor surface on one side of the baffle 33 between surfaces 47 and 48, and the outlet passage 32 similarly communicates with the rotor surface on the opposite side of baffle 33 and extends between the surfaces 47 and 48. It will therefore be apparent that the inlet passage and outlet passage are separated by the baffle 33 in cooperation with the rotor 40. Pumping action takes place during the time that the outer edges of the blades are in contact with surface 47.

The eccentric grooves 38 and 39 positively move the blades outwardly and inwardly during rotation of the motor so that they will always be positively positioned to suitably engage surfaces 47 and 48 when the blades come to these surfaces.

In order to provide for relieving of excessive pressures which might be built up in the outlet passage 32 of the pumping mechanism, the baffle 33 is provided with a transverse opening 49 which terminates on its end in communication with the inlet passage in a bevelled seat 50. This seat is adapted to have seated thereon a valve 51 having a stem 52 which extends across the outlet passage and is provided with a piston portion 53 reciprocatingly supported in a suitable socket 54 formed in the casing.

On the side of the casing in which the inlet passage 31 is disposed, the casing is fitted with a hollow plug 55 for receiving one end of an expansion spring 56, the other end of this spring bearing against the valve 51. The pressure of the spring 56 is arranged to be adjusted by means of an adjusting screw 57 threaded into the outer end of the plug 55 and arranged to engage at its innermost end the associated end of the spring 56. Thus, the valve is held closed by the spring 56 but will open whenever the pressure in the outlet passage becomes sufficiently high to unseat the valve and permit relief of the pressure into the inlet passage of the pump.

The driving or motor mechanism is contained within the chamber 20 and comprises a cylindrical ring 58 having its outer surface adjacent its ends in close fitting engagement with axially spaced ribs 59 and 60 formed on the interior of the casing. The ring 58 is arranged to be axially pressed into the casing until its innermost end abuts an abutting flange 61 which prevents further movement of the ring into the casing. This ring and the parts supported thereby is held in position within the casing by means of a suitable set screw 62 which may be sealed at its outer end by suitable sealing material, as shown at 63.

The ring 58 forms a support for a plurality of laminations 64 having a stator winding 65 associated therewith in the usual manner, this winding being connectable to an electric circuit by means of conductors 66 which are carried to the exterior of the casing through a sealed connection generally indicated at 67.

Cooperatively associated with the stator winding is a rotor 68 which may be of squirrel cage construction and is secured to the shaft in suitable manner for rotation therewith.

As previously explained, the hub 22 provides an opening 23 through which the shaft extends, and this opening provides a passageway for fluid to pass from chamber 21 into chamber 20. Thus, the pumping elements as well as the parts of the motor mechanism will be immersed in the fluid which is being pumped.

Motors as usually constructed are not provided with windings which would permit immersion in the fluid, particularly where such fluid is a hydrocarbon liquid. In order to adapt the motor parts for immersion in such fluid, the stator windings are provided with a suitable insulation 69 which totally encloses the winding wire 70 and prevents the wire from being attacked by the liquid.

From the foregoing description, it will be apparent that the present invention provides an improved pumping unit particularly adapted for the pumping of hydrocarbon liquids such as gasoline, in which the pumping and driving mech-

anisms are arranged and associated in a novel manner; a pumping unit in which the pumping parts and driving motor parts are contained in a single housing, and in which the fluid being pumped may immerse the motor parts as well as the pumping parts; and in which a novel construction is embodied for sealing the pumping unit and guarding against leakage of the fluid being pumped.

The invention has been described herein more or less precisely as to details, yet it is to be understood that the invention is not to be limited thereby, as changes may be made in the arrangement and proportion of parts, and equivalents may be substituted, without departing from the spirit and scope of the invention.

I claim as my invention:

A pumping unit for hydrocarbon liquid comprising a tubular casing having open ends, end covers respectively secured over said ends to close and seal the same, said covers including aligned bearings sealed at their outer ends to the exterior of the casing, an interior wall separating the inside of the casing into chambers, said wall having an opening therein, a shaft extending through said opening and having its ends extending partly through and supported in said bearings, driving motor parts in one of said chambers associated with said shaft, pumping parts in the other of said chambers associated with said shaft, inlet and outlet connections with said latter chamber for the liquid to be pumped, said shaft having a bore therethrough connecting the outer ends of said bearings whereby the pressure of leakage fluid in the outer ends of said bearings and against the ends of said shaft will be equalized.

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