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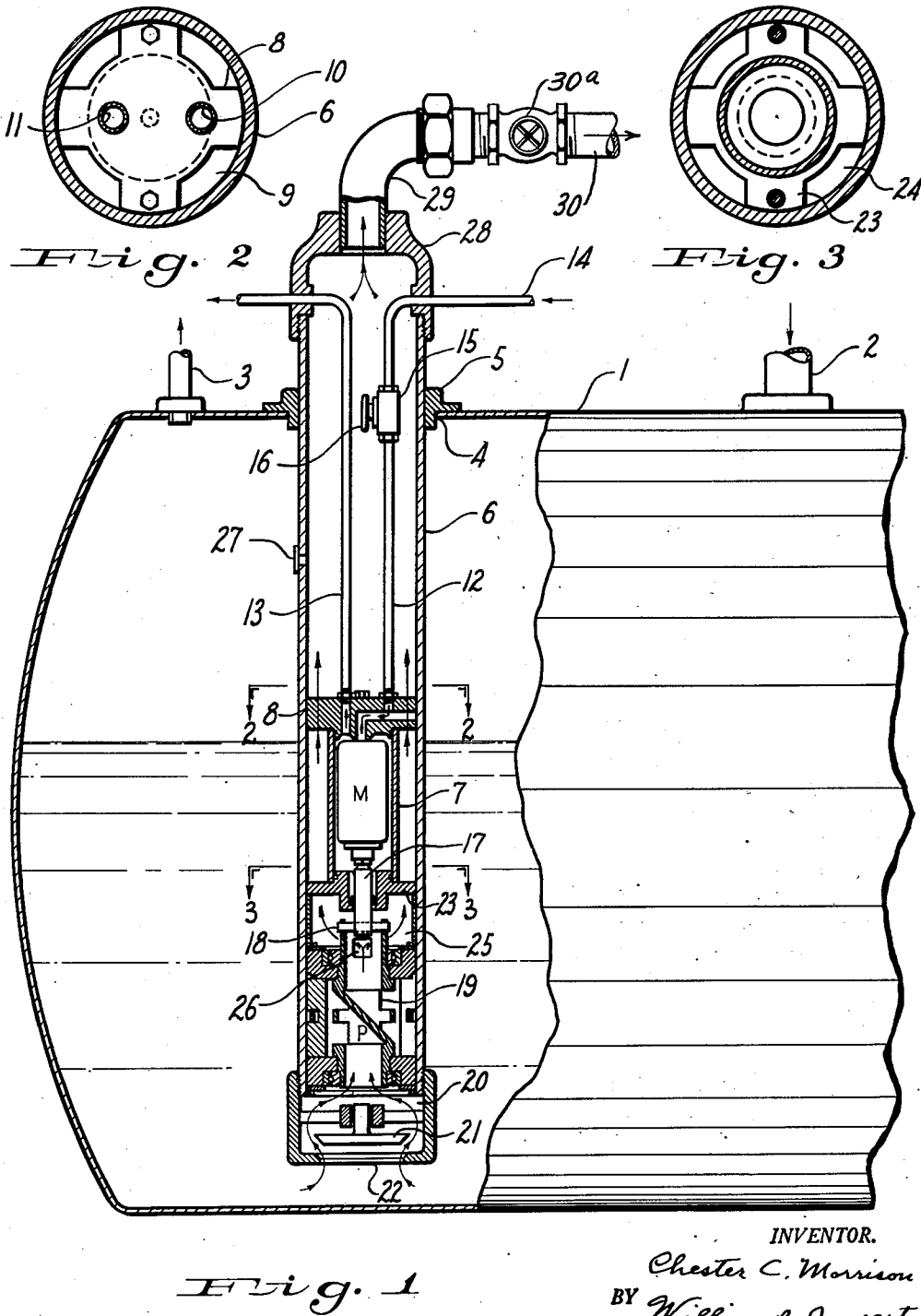
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2,611,320

GASOLINE OR OTHER LIQUID DISPENSING MEANS

Filed Aug. 30, 1947

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2

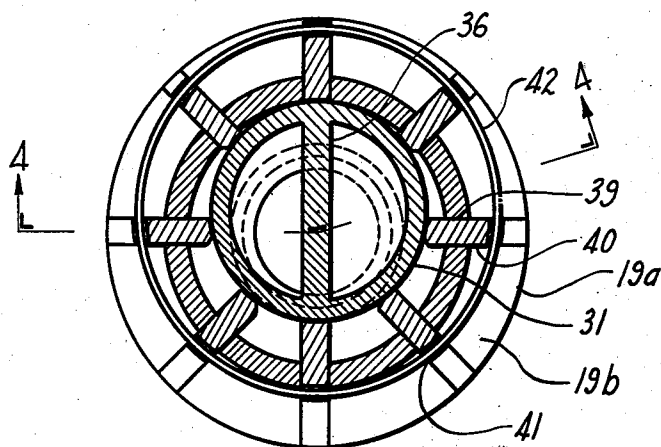


Fig. 3

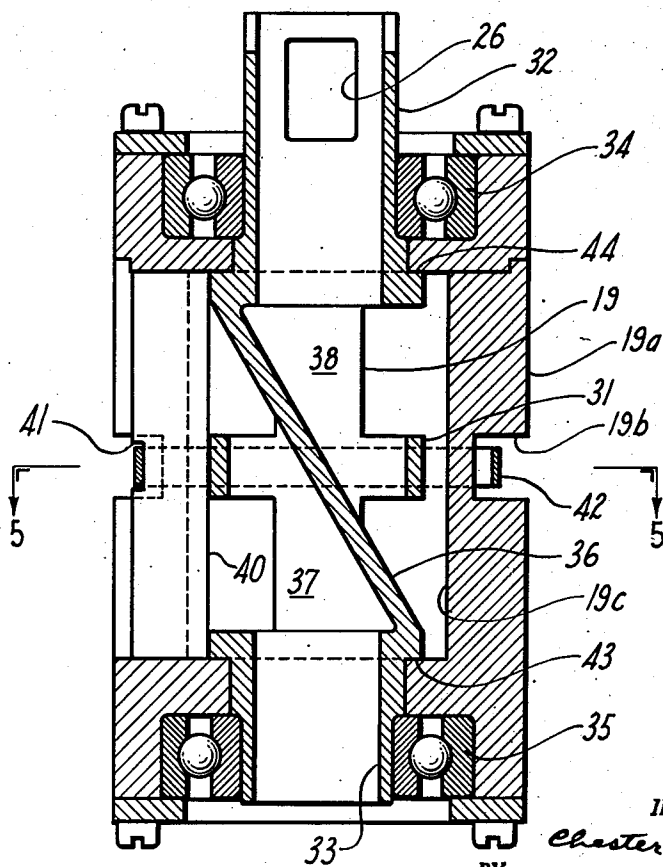


Fig. 4

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GASOLINE OR OTHER LIQUID DISPENSING MEANS

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This invention relates to new and useful improvements in gasoline or other liquid dispensing means, and it is among the objects thereof to provide a combined motor and pump unit which may be inserted in the opening of a storage tank and connected to one or more dispensing units to provide a constant supply of the liquid to be dispensed under pressure.

It is a further object of the invention to provide a motor pump unit which shall be operated by air or other fluid means controllable to be operative only in response to a demand for the liquid at the dispensing end and which eliminates the fire hazards from sparking incidental to the use of electric motor or control systems.

It is a further object of the invention to provide a motor pump unit to be submerged in a gasoline storage tank for supplying gasoline under pressure free of air or vapors, thereby eliminating the need for separators.

It is a further object of the invention to provide a motor pump unit which shall maintain a constant pressure in a delivery chamber, which pressure regulates the operation of a fluid motor and which is maintained by a foot valve which eliminates priming.

Still another object of the invention is the provision of a motor pump unit for gasoline or the like which eliminates the use of bypass valves and the necessity for large cabinets above the ground.

These and other objects of the invention will become more apparent from a consideration of the accompanying drawings, constituting a part hereof, in which like reference characters designate like parts, and in which:

Fig. 1 is a side elevational view, partially in cross section, of an underground gasoline storage tank and motor pump unit submerged therein, embodying the principles of this invention;

Fig. 2 a cross sectional view, partially in elevation, of an air motor taken along the line 2-2, Fig. 1;

Fig. 3 a cross sectional view, partially in elevation, of a pump taken along the line 3-3, Fig. 1;

Fig. 4 a cross sectional view of the pump taken along the line 4-4, Fig. 5; and

Fig. 5 a cross sectional view taken along the line 5-5, Fig. 4.

With reference to the drawings, the numeral 1 designates the conventional type gasoline storage tank which is buried under ground, having a fill connection 2 and a vent 3 in the side wall at the top thereof. The tank is provided with an opening 4 for receiving a flange ring 5. A cylindrical

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housing or casing 6 is mounted in the flange ring 5 and contains a motor M and a pump P which consists of the following mechanism. The motor M is mounted in a casing 7 which is connected at one end to a spider 8, Fig. 2, which provides spaced passages 9 for flow of the liquid delivered by the pump, as will be hereinafter explained. The spider 8 is provided with tap openings 10 and 11 which are connected to pipe lines 12 and 13, respectively. The line 12 leads to a source of pressure fluid, such as compressed air, at the connection 14. A valve 15 is connected in the pipe 12 and is provided with a pressure-responsive element 16 for regulating the admission of compressed air to the motor M as will be hereinafter explained. The motor M is connected by a shaft 17 to a cross bar 18 of an impeller 19, the impeller having a hollow shaft which communicates with a bottom chamber 20 having a foot valve 21, the chamber 20 having an opening 22 adjacent the bottom of the liquid storage tank. The casing 7 of the air motor is connected at its bottom end with a spider 23, Fig. 3, having flow passages 24 communicating with a chamber 25, Fig. 1, and the hollow impeller 19 is provided with a flow port 26 through which the fluid passes to chamber 25.

Casing 6 is provided with a vent 27 which is set for maintaining a predetermined pressure in the casing in excess of the pressure required for shutting off the air supply of valve 16 to the motor, and the end of the casing 6 is capped by a threaded nipple 28 having a reduced end for receiving an L 29 of a dispensing line 30.

The specific construction of the pump P will be described in detail in connection with Figs. 4 and 5 of the drawings. The pump consists of a cylindrical housing 31 which has a peripheral slot or groove 32 and a concentric cylindrical bore 33. The rotor 34 is a hollow casting with an eccentric ring 35 having a plurality of hollow shaft ends 36 and 37 which are journaled in ball races 38 and 39, respectively. The rotor is provided with a diagonal partition 40 which divides the pump housing into chambers 41 and 42, the former being a suction chamber communicating through the hollow end 33 with the chamber 20 at the foot of the casing for drawing in the fluid as shown by arrows in Fig. 1. The chamber 42 is a delivery chamber which transmits the fluid upwardly through the hollow end 32 and out the outlet 26 into the chamber 25 as shown by arrows, Fig. 1. The pump housing is provided with slots 43, Fig. 5, for receiving vanes 44 which are provided with slots 45 for receiving a spring

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ring 42 which functions to take up wear on the vanes and to yieldingly urge the inner faces of the vanes 39 against the eccentric 31. The chambers 37 and 38 are sealed, as shown by the shoulders 43 and 44 of the rotor, having faces that engage the sealing faces of the casing or rotor portion.

In operation the vanes slide in the slots 39 and are urged inwardly by the flat circular spring 42, thus maintaining constant contact between all the vanes and the cylindrical surface of the eccentric 31.

The use and function of the motor pump unit is as follows. The air motor and pump are assembled in the lower end of casing 6 as shown in Fig. 1 of the drawing. The flange mounting collar 5 is then slipped over the casing, and the end member forming chamber 20 is screwed on the bottom end of the casing. The whole thing is then lowered into the storage tank 1 as shown.

Pipe line 14 of the air motor is then connected to a source of pressure fluid, such as compressed air, and the chamber of the casing 6 being empty of liquid, valve 16 will be wide open, permitting the full force of the compressed air to act upon the air motor M, which, when energized, actuates the pump P by rotation of shaft 17.

The pump draws liquid through opening 22 from the bottom of the storage tank, lifting the foot valve 21. The fluid is delivered by the impeller 19 through the flow passage 26 into chamber 25 and around flow passages 24 of the spider 23 into the annular chamber surrounding casing 7 of the air motor M. It then flows upwardly, as indicated by the arrows, through the flow passages 9 of the spider 8, Fig. 2, into the large chamber of the casing 6 above the spider 8. The fluid flows through the L 29 to the dispensing line 30 which is controlled by the usual hand valve in common usage in gasoline dispensing stations diagrammatically shown at 30a. As the pressure builds up in the chambered casing 6, it will act on the valve member 16 to cut off the source of compressed air and stop the motor. The compressed air, after operating motor M, passes through the vent pipe 13 to the atmosphere outside of the storage tank. Expansion of the static fluid in the chamber casing 6 is provided for by means of the vent 27 leading to the storage tank, and the foot valve 21 retains the chambered casing 6 full of fluid at all times once it is initially filled. If there is any leakage in the foot valve 21, the motor M will operate intermittently in response to the control of the diaphragm valve 15 to maintain a constant predetermined pressure for the dispensing line 30.

The liquid supply line 30, leading from the motor pump casing 6, may be connected to several dispensing units to maintain a supply of gasoline, since the motor pump will run as fast as necessary to supply the dispensing units, the system being designed to handle any condition of total head, and the gasoline is always held under a slight pressure.

It is a feature of the invention that the pump unit pushes the liquid from the storage tank, which eliminates air resulting from the lifting method of dispensing gasoline in conventional practice, and no air separator is needed between the storage source and the meter. Because the pumping and motor unit is submerged in the storage tank, the meter unit may be relatively small, thereby giving more space to traffic in the dispensing area of gasoline filling stations.

The advantages of the eccentric rotor vane

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pump shown in Figs. 4 and 5 are that there is an unrestricted inlet and outlet opening for the passage of liquid, which eliminates any trapped area at or near the sealing points that might produce cavitation. There is a minimum amount of mechanical friction between the vanes and other surfaces, and the pump design makes possible a reduction of the over-all dimensions of the pump as compared to other pumps of like capacity, which is especially desirable for the use herein disclosed.

Although one embodiment of the invention has been herein illustrated and described, it will be evident to those skilled in the art that various modifications may be made in the details of construction without departing from the principles herein set forth.

I claim:

1. A motor pump unit comprising a relatively small diameter elongated casing having a pump chamber, a motor contained within said casing having pipe connections to a source of compressed air and to the atmosphere, an inlet passage for the pump chamber at the bottom of the casing, a foot valve controlling said inlet passage, a pump outlet to the space within the casing, the said compressed air supply conduit being within the casing and having a valve responsive to the pressure of the fluid in the casing controlling the supply of compressed air to the motor, said casing having a relief valve for maintaining a predetermined maximum pressure in the casing in excess of the pressure required for shutting off the air supply valve to the motor.

2. A motor pump unit comprising a cylindrical casing having a pump chamber with an inlet passage to the pump chamber at the bottom end of the casing, an outlet connection at the top of the casing for delivering fluid to a dispensing station, a motor disposed within the casing at substantially the bottom thereof consisting of an air motor having an inlet connection extending within the casing chamber and through the top connection of the casing to a source of compressed air and having an outlet connection to the atmosphere, a pump outlet to the space within the casing, a control valve disposed in said inlet connection responsive to the fluid pressure within the casing chamber to regulate the supply of compressed air to said motor and to cut off the supply to the motor when the pressure in the casing chamber has reached a predetermined value, and means for limiting the pressure of the fluid in said casing chamber independently of said air control valve.

3. A motor pump unit comprising a cylindrical casing having a pump chamber with an inlet passage to the pump chamber at the bottom end of the casing, a foot valve for maintaining a column of fluid in said cylindrical casing, a liquid pump adjacent the inlet end and above the foot valve, a fluid motor for actuating said pump, said motor and pump being spaced to form a flow chamber and said pump having an outlet flow port communicating with said chamber, said cylindrical casing having an outlet at the top for delivering fluid to a dispensing source, a fluid pressure connection for the motor extending from the top through said cylindrical casing having a control valve exposed to be responsive to the liquid pressure in said casing to regulate the flow of pressure fluid to said motor, said motor having a return connection extending through the cylindrical casing and out at the top thereof, and a relief valve in said cylindrical casing for maintaining

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a predetermined pressure of the liquid in said casing.

4. A motor pump unit comprising a cylindrical casing of substantial length having an impeller mounted for rotation in the bottom of the casing and an air motor spaced above the impeller connected by a shaft to the impeller, a flow passage for liquid extending from the bottom of the casing to the impeller and from the impeller around the motor to the top of the casing to an outlet connection, said impeller and motor being spaced from each other and mounted by spiders having free flowing passages in the periphery thereof, a source of compressed air connected to the motor and a vent line leading from the motor to the atmosphere externally of the casing, and valve means in the motor air line mounted in the casing and exposed to the pressure of the liquid in the casing for regulating the supply of air to the motor in response to variation in the pressure of said liquid.

5. A motor pump unit comprising a relatively small diameter elongated casing, a motor contained within said casing, an inlet passage to the pump chamber at the bottom of the casing, a foot valve controlling said passage, a flow part from the pump to the upper chamber of the casing, a

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fluid delivery outlet at the top of the casing, a control valve for said outlet, and valve means mounted in the casing and exposed to the pressure of the liquid in said casing for regulating the supply of air to the motor when said outlet valve is closed.

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