Jan. 22, 1946. J. B. PARSONS 2,393,406

MOTOR-PUMP UNIT

Filed July 30, 1942

Fig. 1.

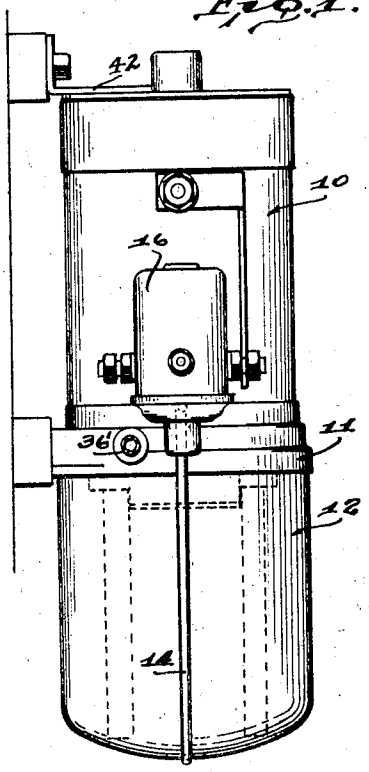


Fig. 2.

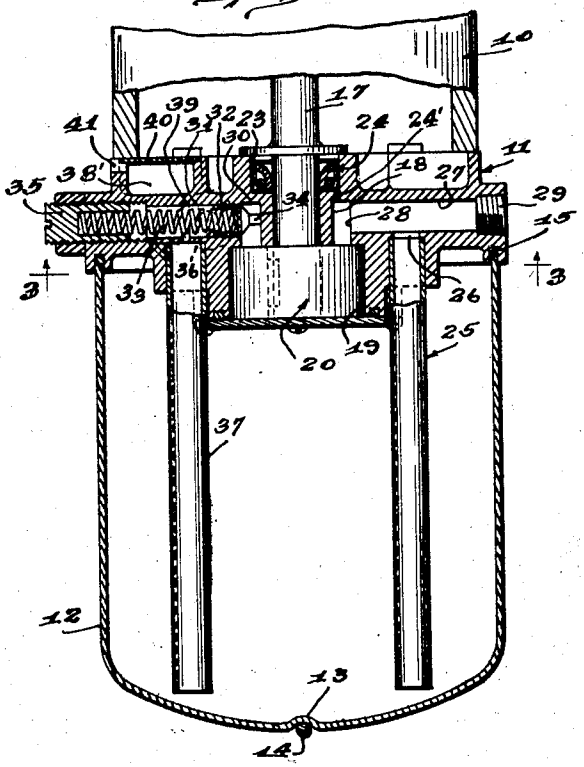


Fig. 3.

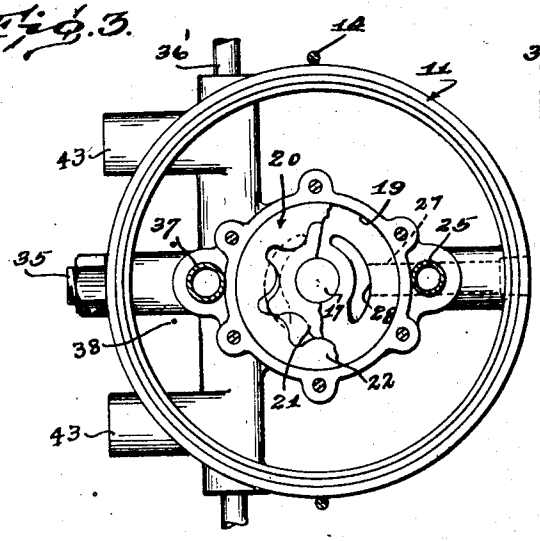
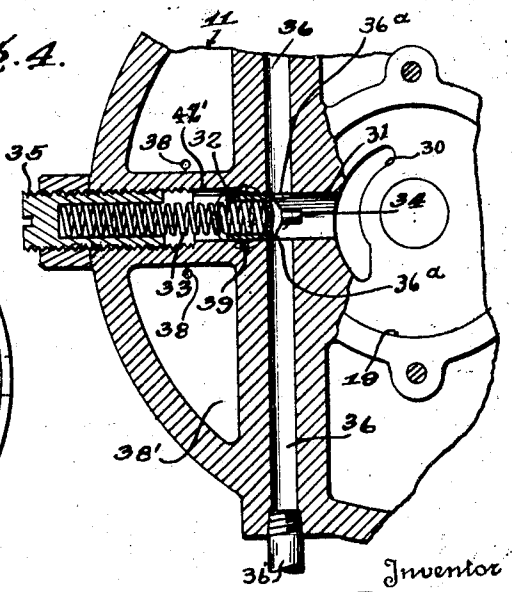


Fig. 4.



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MOTOR-PUMP UNIT

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Application July 30, 1942, Serial No. 452,865

2 Claims. (Cl. 103—42)

This invention relates to fluid pumps but more particularly to liquid pumps adapted for use in automatic systems, such as for operating windows of automobiles, and an object is to produce a simple and efficient assembly by which the motor, pump and reservoir form a compact unit adapted to be readily and conveniently mounted in position of use, thereby materially to reduce assembly and installation expense, as well as space required for such apparatus.

Another object is to produce a pump unit of the character described having the novel features of construction, arrangement and operation hereinafter described.

For purposes of illustration but not of limitation, an embodiment of the invention is shown on the accompanying drawing in which

Figure 1 is a side elevation of a unit including a motor, pump and reservoir mounted in position of use;

Figure 2 is an enlarged fragmentary vertical sectional elevation showing particularly the pump, mounting therefor, valve, associated ports and passages, and reservoir;

Figure 3 is a transverse sectional view substantially on the line 3—3 of Figure 2; and

Figure 4 is an enlarged fragmentary sectional view showing the pump mounting and spring tensioned outlet valve, the latter being in partially depressed position.

The illustrated embodiment of the invention comprises an upright assembly including an electric motor arranged within a housing 10, a block or casting 11 containing a pump and valve unit, and a reservoir 12. The reservoir 12, which may be of sheet metal, is cup-shaped and is formed with a transverse groove 13 at the bottom end to receive a bail 14 which is hingedly connected to the block 11 at its inner end. By swinging the bail 14 upwardly away from the reservoir 12, the latter can be removed. It will be observed that the block 11 is formed with an annular packing-containing groove 15 to receive the open end of the reservoir, thereby affording a satisfactory seal between these parts.

Mounted on the outer side of the motor housing 10 is a solenoid actuated switch 16 of any suitable construction controlling the operation of the electric motor within the housing 10. The motor has an armature shaft 17 which extends through a sleeved portion 18 of the block 11 into an annular cavity 19 which contains a rotary pump 20. The pump 20 may be of any suitable form but in this instance there is shown a gear pump, the rotor 21 of which is keyed to the armature shaft 17. This rotor has a series of teeth which progressively mesh with teeth formed on a second rotor 22. Pumps of this character are old in the art so that more detail description is not considered necessary. Suffice it to say that the pump illustrated is available on the open market under the trade name of "Gerotor."

On the upper side of the sleeve 18 is a socket 23 to receive a packing unit 24 which provides an oil seal for the shaft 17 so that in the operation of the pump, the liquid drawn from the reservoir will not find its way along the shaft 17 to the electric motor. In order to relieve pressure imposed by the liquid on the packing unit 24, a small passage 24' leads from the under side of the unit 24 to the port 28, hereinafter described. In this manner excessive wear of the packing against the armature shaft 17 is prevented.

At one side of the pump is a tube 25, the lower end of which terminates adjacent the closed or bottom end of the reservoir 12 in order at all times to be immersed in the liquid contained in same. The upper end of the tube 25 fits within the member 11 and communicates with a port 26 which opens into a transverse or inlet passage 27. The passage 27 communicates with an arcuate port 28 which opens to the inlet side of the pump 20. Thus liquid is drawn from the reservoir 12, through the tube 25 and through the port 26, and then is forced through the passage 27 and port 28 to the inlet side of the pump 20. The outer end of the passage 27 has screw threads 29 to receive either a plug for closing that end or to receive one end of a tube which may lead, for example, from a cylinder-piston arrangement in which liquid is forced into one or the other end of the cylinder for driving the piston in one direction or the other and to enable the liquid at one side of the piston to be returned to the reservoir. In any case, a tube may be connected to the screw threaded opening 29 for returning the liquid to the reservoir 12 and it will be observed that this connection is so arranged that the returned liquid will augment the supply drawn through the tube 25.

Liquid from the discharge end of the pump 20 passes through an arcuate port 30 formed in the member 11. Communicating with the port 30 is a lateral passage 31 substantially in alignment with the passage 27. In the passage 31 is a cup-shaped or piston valve 32 which is normally forced to its inward position by a coil spring 33. As shown, the valve 32 has a projecting pin 34 which limits its inward movement. The coil spring 33 has its opposite end disposed within a

screw threaded adjusting screw 35, the adjustment of which predetermines the tension on the spring 33 to regulate the pressure necessary to move the valve 32 to its open position. Thus it will be apparent that when the pressure generated by the pump 20 is sufficient to overcome the tension of the spring 33, the valve 32 is moved to the left. In the normal position of the valve 32, the lateral outlet passage 36 which is disposed at substantially right angles to the passage 31 and which communicates therewith through ports 36a, is uncovered. The passage 36 communicates with a suitable fitting 36' on the outer side of the member 11 to receive a suitable delivery tube for conveying liquid, for instance, to and from a cylinder (not shown) for operating a piston. The passage 36 leads to both sides of the member 11 in order that two tubes may, if desired, be connected, one leading to one apparatus to be operated, and the other to another.

In the inward or normal position of the valve 32, it will be understood that the ports 36a are disposed in rear of the valve and uncovered thereby, so that liquid may return from the passages 36 to the reservoir through passage 31, port 39 and return tube 37. In this manner liquid may be drained out of the passages 36 and tubes which are connected to the same, when the pump is not operating. In such event the same passages enable liquid to flow to and from the reservoir.

In the event the force of the liquid from the pump 20 exceeds the pressure required to uncover the outlet passage 36, the valve 32 is still further depressed sufficiently to uncover a circumferential groove or port 39 leading to the return tube 37 which is similar to the tube 25 and is likewise carried by the member 11. In this manner liquid can be by-passed back to the reservoir 12 whenever a predetermined pressure builds up to overcome the resistance of the coil spring 33, such pressure being in excess of that necessary to move the valve to uncover the passage 36.

Drilled through the member 11 on opposite sides of the housing for the valve 32, are ports 38 which are arranged within a chamber 38' formed in the upper side of the member 11. A plate 40 closes the top of this chamber and the latter communicates with the atmosphere through an opening 41. Thus the inside of the reservoir 12 is open to the outside, through the ports 38, chamber 38' and port 41. In this manner the liability of a partial vacuum or pressure being created within the reservoir is eliminated. A groove 42' in the valve housing enables fluid in rear of the valve and in front of the adjusting plug 35 to be relieved in order that free valve movements may be secured.

Bracket 42 and bosses 43 enable the assembly to be readily mounted in position of use. Thus separate mounting for the motor, the pump and the reservoir are dispensed with and these parts are compactly arranged in a single unit which can be installed without difficulty.

It is to be understood that numerous changes in details of construction, arrangement and operation may be effected without departing from the spirit of the invention especially as defined in the appended claims.

What I claim is:

1. A pump unit having a pump for generating pressure fluid having an inlet and an outlet, a pressure fluid supply, means providing communication between said supply and the inlet of said pump, a valve operating passage communicating at one end with the outlet of said pump and being closed at its opposite end, a piston valve reciprocable in said valve operating passage, a compression spring urging said valve toward a normal position adjacent the pump end of said valve operating passage, a port in said valve operating passage disposed between the closed end thereof and the spring engaging end of the valve when the latter is in normal position, a main passage leading from said port for conducting fluid to or from said valve operating passage, a drain port in said valve operating passage disposed between the closed end thereof and said first port, and a return passage leading from said drain port to said pressure fluid supply, said valve being movable against the force of said spring in response to fluid pressure generated by said pump to establish communication between said valve operating passage and said first port and main passage and being further movable in response to excessive pressure to uncover said drain port, fluid from said main passage passing through said valve operating passage to said drain port when the valve is in normal position.

2. A pump unit having a body portion, a fluid reservoir suspended from said body portion, a fluid pump carried by said body portion and provided with an inlet and an outlet for fluid, said body portion having two radially extending passages respectively in communication with said inlet and outlet, two tubes for fluid extending respectively from said radially extending passages toward and terminating adjacent the bottom of said reservoir, one tube constituting a fluid supply line from the reservoir to one of said passages and the other of said tubes constituting a return line to the reservoir from the other of said passages, said other passage having an outlet port, valve means controlling the flow of fluid from said other passage to said port and to said return line, and means for normally holding said valve means in position to establish communication between said outlet port and said return line through said other passage, said valve means being operable to establish communication between said pump and outlet port in response to fluid under pressure from said pump.

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