Dec. 29, 1931. L. M. PERSONS 1,838,443

PUMP

Filed Feb. 5, 1926 2 Sheets-Sheet 1

Fig. 1.

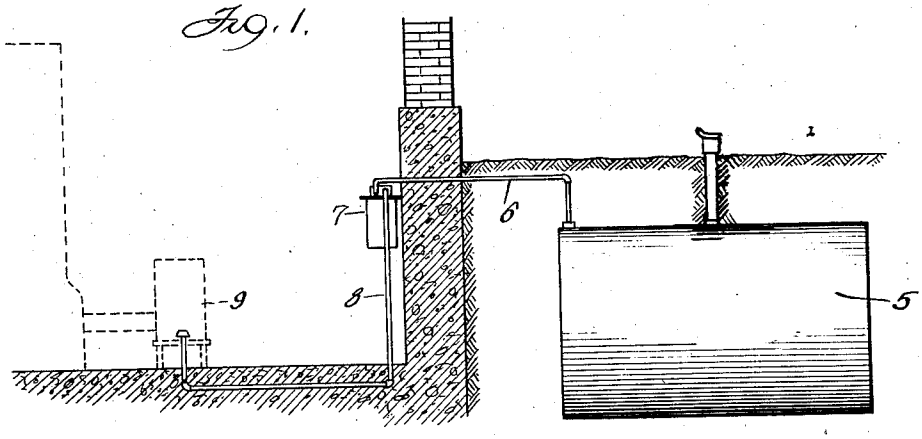
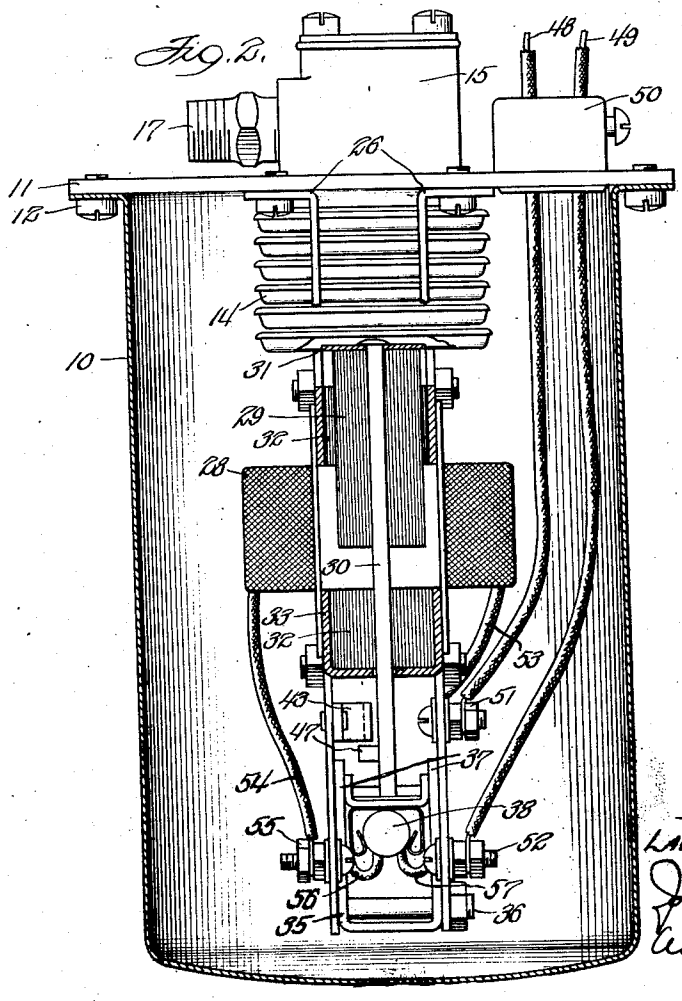


Fig. 2.



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Fig. 4.

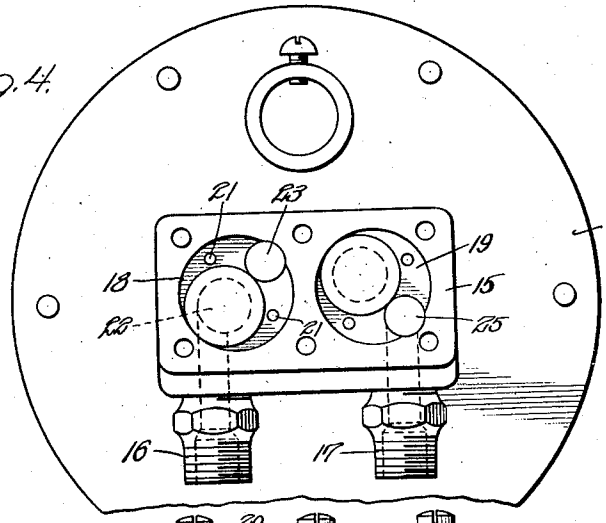
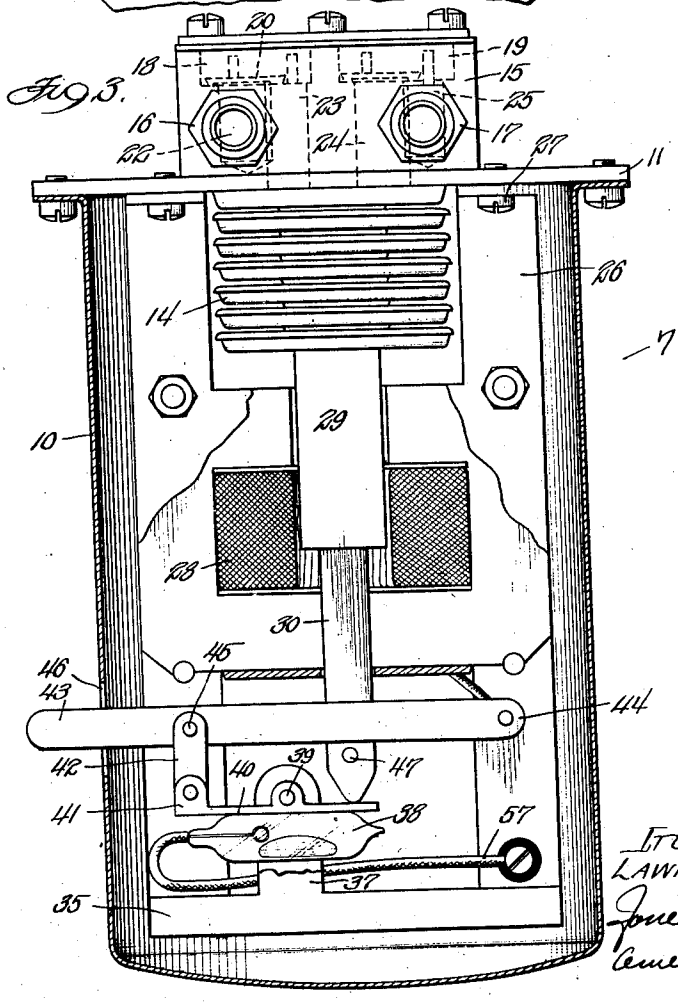


Fig. 3.



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Patented Dec. 29, 1931

1,838,443

UNITED STATES PATENT OFFICE

LAWRENCE M. PERSONS, OF CHICAGO, ILLINOIS, ASSIGNOR TO COOK ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

PUMP

Application filed February 5, 1926. Serial No. 86,127.

My invention relates to pumps.

More particularly my invention has reference to an improved type of pump embodying a new and advantageous type of control, being characterized among other things by its simple and economical operation.

It will be observed that the control herein disclosed is exceedingly accurate. The principle of operation relied upon permits of certain features of safety and protection which were not heretofore obtained in the normal automatic starting and stopping of the pump.

Specifically, the pump is electrically driven and is of the type known as the vibratory pump, viz., a pump wherein the moving part is driven by an electromagnet, the circuit of which is automatically made and broken by a switch operated by a solenoid, armature, or spring. Devices of this type were heretofore impractical in that they required frequent repair. The present invention provides for a pump which may be used for a considerable period of time without involving attention and overcomes certain difficulties of the prior art which limited the practical usefulness of a pump of this type.

This invention is particularly applicable to liquid fuel feeding systems for pumping liquid fuel to an oil burner or to a carburetor of an internal combustion engine. It is essential to minimize, as far as possible, the amount of oil necessary to store within the building while feeding the oil to the burner. Provisions requiring storage tanks or the like in the basement or elsewhere in the building are undesirable. It is also essential to provide means for automatically starting and stopping the pump in accordance with the demand of the burner, but it will be noted, on the other hand, that if the piping from the supply tank to the burner should become broken, or if any leakage should occur which would permit the oil to flow out faster than being pumped, the pump might continue in operation until all of the oil from the storage tank is pumped out into the basement or room in which the leak occurred. This is, of course, an exceedingly dangerous condition, and many fires have resulted therefrom.

I have found that it is possible to so arrange the normal automatic control of a pump as to care for such a situation. While this improved control is disclosed in connection with a magnetic or vibratory type of pump, it will be understood that it may be also applied to other types of pumps, or even provided as an appliance to a fuel feeding system apart from the pump.

The principal object of the present invention is to provide an automatic control of the above type so that in the event the pressure in the discharge line of the pump lowers or increases beyond predetermined points, the pump will automatically stop. The pump is permitted to operate in its normal manner to feed oil continuously as it is consumed by feeding it directly under pressure into the discharge line of the pump and as long as the pressure remains within predetermined limits the pump continues to operate. In the event, however, the fuel is not consumed as rapidly as it is pumped, the pressure increases, thereby causing the pump to stop. On the other hand, if a leak should occur in this discharge pipe, or in the pipe leading to the intake of the pump, the pressure decreases, likewise causing the pump to stop. By virtue of this arrangement, greater safety and protection may be obtained in the normal automatic control of a fuel feeding pump.

In order to apprise those skilled in the art how to construct and practice my invention, I shall now describe the preferred embodiment in connection with the accompanying drawings, which form a part hereof.

In the drawings:

Figure 1 is a diagrammatic view of a fuel feeding system embodying my invention:

Fig. 2 is a sectional view of a pump used therein;

Fig. 3 is a similar view of the pump, but taken at right angles to the view shown in Fig. 2; and

Fig. 4 is a top plan view of the pump, illustrating the valve head with the cover removed to show the valves.

In the accompanying drawings, my invention is disclosed in connection with a fuel feeding system for feeding fuel to oil burners. It will be observed, however, that the invention is capable of embodiment in other types of fuel feeding or liquid supply systems. In the system illustrated, fuel oil is adapted to be drawn out of a reserve supply tank 5 through a suction pipe 6 by pump 7 and pumped through a delivery pipe 8 to a burner 9.

Pump 7 comprises a tank or receptacle 10 having a cover plate 11 fastened to the open end by means of screws 12. A resilient piston in the form of metallic bellows 14 is adapted to be secured to the underside of cover-plate 11. As indicated in Fig. 3, a valve housing 15 is suitably placed upon the top of cover-plate 11. The valve housing may be furnished with a suitable inlet nipple 16 and an outlet nipple 17, the inlet nipple communicating with the inlet valve chamber 18 and the outlet nipple 17 communicating with an outlet valve chamber 19. In these chambers any suitable form of valve may be employed, but I prefer employing flap valves 20, as shown, which are held in position over their ports by rigid vertical pins 21. The inlet connection 16 communicates directly with a vertical inlet passage 22, over which the inlet valve 20 is adapted to be held. A similar vertical passage 23 communicates with valve chamber 18 and the interior of piston 14, and on the suction stroke of this piston, permits a charge of fuel to be drawn into the interior of the piston. The outlet side of the valve housing 15 is similarly constructed, being furnished with a vertical passage 24, through which the fuel oil is pumped on the delivery stroke of the piston. The other vertical passage 25 receives the fuel oil for discharging it into the delivery pipe 8.

The motor for operating piston 14 is carried by a suitable frame construction comprising a pair of spaced frame members 26 suitably bolted to the underside of cover plate 11 by means of bolts 27. On these frame members 26, a motor winding 28 is carried. The movable part of the motor comprises a core 29 secured to the underside of the bellows piston 14, as indicated in Fig. 2. I prefer making core 29 of laminated construction and extending a centrally disposed bar 30 therethrough; the upper end of the bar 30 may be riveted over a plate 31 suitably sealed to the base of the lower section of bellows 14. If so desired, a series of magnetic plates 32 are disposed about motor winding 28, these plates being carried by the U-shaped bracket 33. Any suitable form of motor may be employed, although I have illustrated a reciprocating solenoid type of motor because of its particular adaptation to the structure herein shown. It will be observed, however, that a rotary type of motor may be employed, or, on the other hand, a motor may be employed which is of the reciprocating type but not of the magnetic type. Broadly, the frame members 26 serve to carry the motor in a suitable location with respect to the piston 14, and, at the same time, provide a unique structural arrangement permitting easy assembly and providing a simple and inexpensive construction.

The lower end of frame members 26 are secured together by a channel 35 suitably bolted in place by a plurality of bolts 36. Upstanding lugs 37 are formed on channel 35 for receiving in pivotal relation a switch 38, which may be of the mercury type. A mercury switch is, however, not necessary because other types of switches may be advantageously used. A cross pin 39 extends between the lugs 37 for pivotally receiving a carriage 40, to which the switch 38 is suitably secured. Carriage 40 may have a lug 41 furnished thereon to receive a link 42. A manually operable lever 43 is adapted to be pivoted at one end, as indicated at 44, to one side of the frame and to be pivoted at 45 to the upper end of intermediate link 42. An opening 46 is formed in tank 10 to permit the manually operated lever 43 to extend therethrough so as to be accessible from the exterior of the tank. The arrangement of this circuit controlling mechanism permits the weight of links 42 and 43 to be placed upon one end of the switch 38. The switch is thereby assisted in its movement by gravity to closed position.

The lower end of piston extension 30 is adapted to engage the opposite end of switch 38 on the downward or suction stroke of the pump. This action momentarily moves the switch to open position to open the circuit to the motor. A transverse pin 47 extends from said extension 30 to engage the manually operated lever 43 in the event that the piston is permitted to move upwardly the entire extent of its delivery stroke.

It will be observed in Fig. 2 that the electrical connections for the pump comprise the conductors 48 and 49 leading into a conductor box 50 and from there extending downwardly to connect with binding posts 51 and 52. A suitable conductor 53 leads from binding post 51 to the motor winding 28. On the opposite side the conductor 54 leads from the motor winding to the binding post 55. A flexible lead 56 extends from the binding post 55 to the switch 38 on one side, and a

second flexible lead 57 extends from the other side of switch 38 to the binding post 52.

In the normal operation of the device, pressure of the fuel oil in the delivery pipe 8 will be maintained at a predetermined pressure, say for example, from four to three pounds, and in the event that this pressure is decreased, either, by the fuel oil being consumed at the burner 9, or by a leak in the delivery pipe 8, the bellows 14 will contract slightly, thereby drawing the projection 30 upwardly to allow the switch 38 to pivot to closed position. The motor circuit is thereby closed and the solenoid core 29 is drawn downwardly into the winding 28, thereby producing the suction stroke of the pump and drawing a charge of fuel oil through the suction pipe 6 into the bellows 14. This downward movement drawing core 29 into the winding 28 will again cause the extension 30 to engage one end of switch 38, thereby opening the switch. Hence, it will be observed that the pump may be kept in constant operation during normal operation. The pressure preferably remains below four pounds, because, if it does not, the resiliency of the bellows will not return the extension 30 upwardly a distance sufficiently to release this extension from one end of the switch. The switch is then obliged to remain in open position. On the other hand, if the pressure drops below three pounds, the pump is automatically rendered inoperative. This feature is accomplished by the piston moving upwardly on its delivery stroke sufficiently to permit pin 47 to engage the manually operated lever 43 and to cause this lever to move upwardly therewith and thereby tilt the switch to open position. The pump is thereby disabled and cannot be operated again until the attendant moves the lever 43 downwardly and holds it in this position until the pressure in the delivery pipe 8 reached or exceeds three pounds. Thereupon, the pump will again work automatically. The advantage of providing such a safety feature will be appreciated when it will be remembered that considerable danger is incurred by a leak or break in the delivery pipe, which otherwise is apt to permit the pump to continue pumping oil out of the reserve pipe supply tank and flood the floor of the basement and possibly cause a fire. By placing the bellows piston under tension, the controlling mechanism including switch 38 may be made to operate in response to the pressure conditions in the system. The resiliency of the piston returns the piston to its normally contracted position when the pressure therein lowers to a point permitting this resiliency to overcome the pressure. Consequently, this permits the feature of safety and accuracy to be embodied in the usual form of automatic control without rendering the control mechanism intricate. With a simple control mechanism accuracy is assured.

It will be observed that the control mechanism opens the switch 38 at the extreme limit of movement of either stroke. Normally, the weight of lever 43 and link 42 assists the switch 38 to pivot to closed position by gravity. Lever 43 is provided with the dual function of cooperating with the piston to open switch 38 when the pressure lowers below the minimum predetermined limit, and to close the switch 38 when restoring the pump to its normal operating condition after the abnormal condition causing the lowering of the pressure in the system has been removed.

I believe that I am the first to suggest employing this safety feature in a pressure control pump and shall accordingly claim the same broadly.

I wish it to be understood that the control mechanism herein shown may be employed in the system separate and apart from the pump.

Various embodiments and variations of the details herein described and shown in the drawings may be made without departing from the spirit and scope of my invention.

I claim:

1. A fluid supply system having a piston for controlling the supply of fluid thereto, an electric motor for operating said piston, a pivotally mounted switch for the motor circuit adapted to move by gravity to closed position and to be moved by the piston to open position, said piston opening said switch when permitted to operate the maximum length of its stroke.

2. A fluid supply system having a resilient piston for controlling the supply of fluid thereto, an electric motor for operating said piston, a pivotally mounted switch for the motor circuit adapted to move by gravity to closed position and to be moved by the piston to open position when the pressure in the system reaches a predetermined minimum limit.

3. A fluid supply system having a resilient piston for controlling the supply of fluid thereto, an electric motor for operating said piston, a pivotally mounted switch for the motor circuit adapted to move by gravity to closed position and to be moved by the piston to open position when the pressure in the system reaches a predetermined minimum limit, and a manually operated resetting lever for closing said switch against the action of said piston.

4. A fluid supply system including a piston, a motor for operating said piston, and a switch for controlling the motor, said piston opening said switch when permitted to operate the maximum length of its suction or delivery strokes.

5. A pumping unit comprising the combination with a pump, a motor for driving said pump, a housing for enclosing the pump and motor, a cover plate to which said pump is attached, and a pair of spaced frame mem-

bers secured to the cover plate for supporting said motor in driving relation with said pump.

6. A pumping unit comprising the combination with a pump, a motor for driving said pump, a housing for enclosing the pump and motor, a cover plate to which said pump is attached, spaced frame members secured to the cover plate for supporting said motor, and a switch pivotally connected between said frame members.

In witness whereof, I have hereunto subscribed my name.

LAWRENCE M. PERSONS.