C. A. CRIQUI AND E. T. LARKIN.

PUMP.

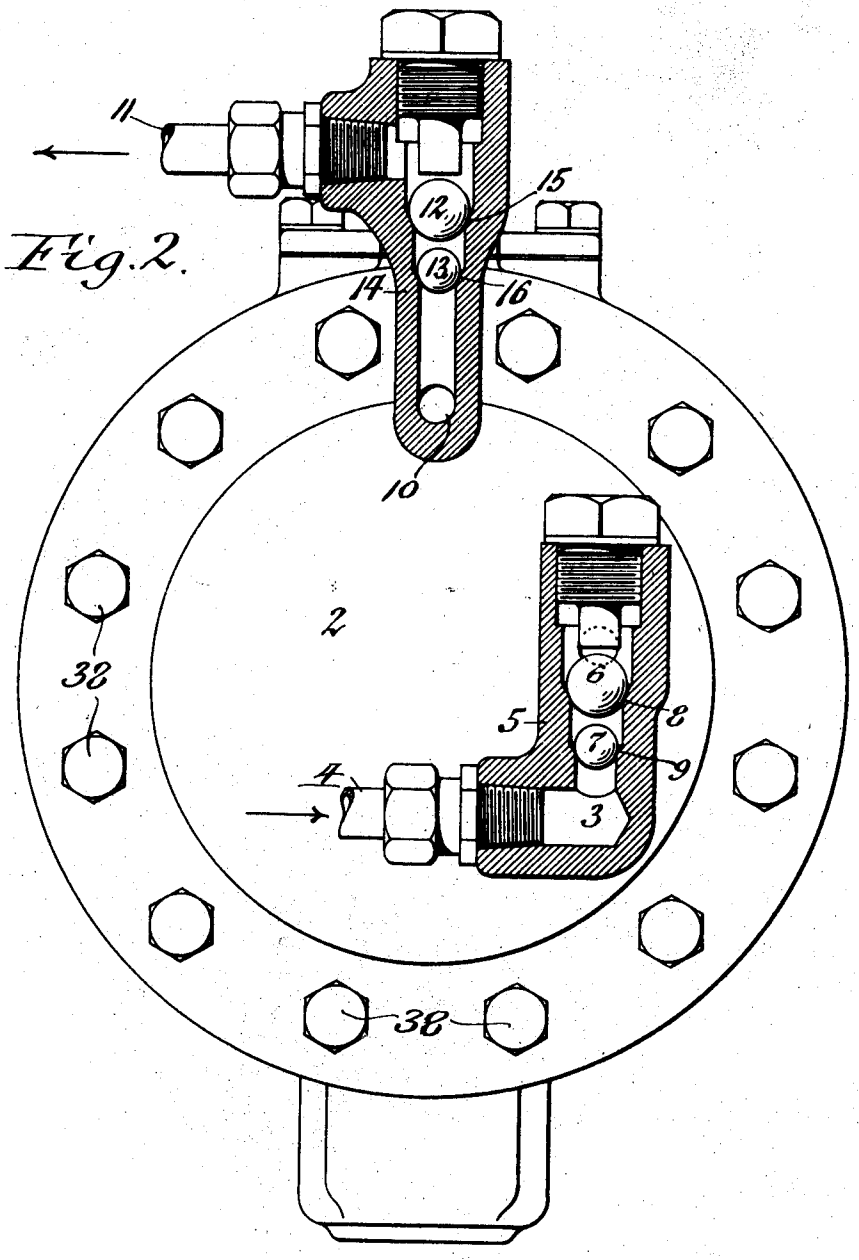
APPLICATION FILED JAN. 22, 1919.

1,339,500.

Patented May 11, 1920.

2 SHEETS—SHEET 2.

Fig. 2.



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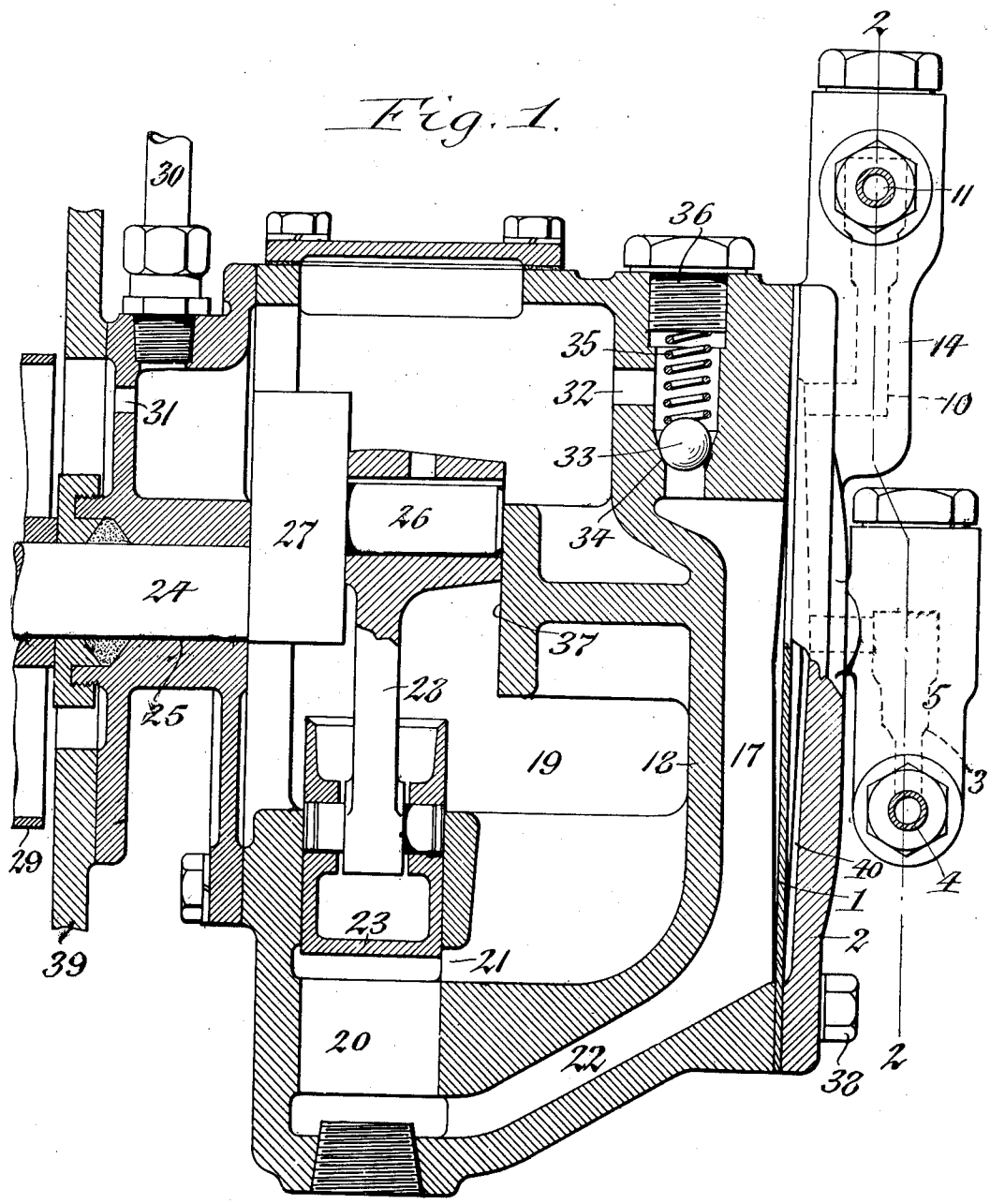
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2 SHEETS—SHEET 1.

Fig. 1.



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UNITED STATES PATENT OFFICE.

CHARLES A. CRIQUI AND ELWOOD T. LARKIN, OF BUFFALO, NEW YORK; SAID LARKIN ASSIGNOR TO SAID CRIQUI.

PUMP.

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To all whom it may concern:

Be it known that we, CHARLES A. CRIQUI and ELWOOD T. LARKIN, citizens of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Pumps, of which the following is a specification.

This invention relates to a pump which is more particularly designed for pumping gasolene or similar fluids or liquids.

As is well known great difficulty is experienced in pumping gasolene by means of the conventional forms of pumps now in general use owing to the difficulty in keeping the working parts of the pump which come in contact with the gasolene properly lubricated, thereby causing leakage of the gasolene which results in loss of material and reduced efficiency and also endangers life and property.

It is the object of this invention to produce a pump for transporting gasolene or similar fluids which will not leak and which can be safely used in closed compartments without liability of accumulating dangerous fumes therein and insuring greater economy and efficiency.

In the accompanying drawings:

Figure 1 is a vertical longitudinal section of one form of our improved pump showing the same applied to the base of a marine gas engine. Fig. 2 is a vertical transverse section of the same taken on line 2—2, Fig. 1.

Similar characters of reference refer to like parts in both views.

Although our invention may be embodied in a variety of forms to suit different installations, that shown in the drawings, as an example, has been found practical in actual use and as there shown is constructed as follows:

40 represents a pumping chamber, one wall 2 of which is constructed of rigid material such as cast metal while another wall 2 of the same is constructed in the form of a flexible diaphragm which can be vibrated laterally for producing an alternate suction and expelling effect within the pumping chamber. This pumping chamber is provided with an inlet passage 3 which is connected by means of a pipe or conduit 4 with any suitable source from which the gasolene or other fluid to be pumped is supplied. The backward movement of the fluid from the pumping chamber through the inlet passage and supply pipe is prevented by means of a check valve which preferably comprises two balls 6, 7 of different diameters engaging with a large and small valve seat 8, 9 within the valve body 5 containing the inlet passage. This pumping chamber is also provided with an outlet passage 10 which is connected with a delivery pipe 11 leading to the place intended to receive the gasolene or other fluid. Backward movement from this delivery pipe into the pumping chamber is prevented by a check valve which preferably comprises two balls 12, 13 of different diameters arranged within the outlet passage formed in the valve body 14 and provided with valve seats 15, 16 of different sizes which are engaged by the balls 12, 13.

Upon drawing the diaphragm 1 away from its companion rigid wall 2 a suction is produced within the pumping chamber which causes liquid to be drawn through the inlet pipe past the inlet check valve into the pumping chamber and upon moving the diaphragm toward its companion rigid wall the liquid contents of the pump chamber are expelled therefrom past the outlet check valve and through the delivery pipe.

Our invention relates more particularly to the means whereby this diaphragm is vibrated and in the preferred form shown in the drawings these means are constructed as follows:

17 represents an actuating chamber which is arranged on that side of the diaphragm opposite to the pump chamber. This actuating chamber has that wall 18 opposite the diaphragm constructed of rigid material such as cast metal and the diaphragm is clamped at its edge between opposing marginal portions of the rigid walls of the actuating chamber and the pumping chamber by means of bolts 38 so that this diaphragm forms a partition between these chambers and a flexible wall for each of them.

19 represents a tank or reservoir which is arranged adjacent to the outer side of the actuating chamber and which is adapted to contain a supply of actuating liquid, such as oil. This liquid is so actuated that the same is alternately forced into the actuating chamber and exhausted therefrom so as to produce a vibrating or pulsating effect on

the diaphragm. Although the details of the means whereby this is accomplished may be varied those which are shown in the drawings are preferred and are constructed as follows:

20 represents a pump barrel which opens at its rear end into the reservoir and has its front end connected by an inlet passage 22 with the actuating chamber preferably the lower part of the latter, while the central part of the pump barrel about midway between its front and rear ends communicates by means of a port or intake passage 21 with the lower part of the liquid reservoir. Within the pump barrel is arranged a longitudinally reciprocating plunger 23 which may be actuated in any suitable manner, for instance, by means of a crank shaft 24 journaled in a bearing 25 on one side of the reservoir and provided within the latter with a crank 27 which has its wrist pin 26 connected by means of a pitman or connecting rod 23 with the pump plunger. This crank shaft may be turned in any approved manner and from any suitable source but as shown in the drawings this is accomplished by means of a pulley 29 secured to the shaft outside of the reservoir and adapted to receive a driving belt. The oil is supplied to the reservoir from any suitable source, for instance, by a pipe 30 forming part of the oil pressure line of the engine with which this pump is associated which supply pipe opens into the upper part of the reservoir, any excess oil delivered into the latter being discharged through an outlet opening 31 at the top of the reservoir into the crank case 39 of the engine where the same is again picked up by the usual lubricating pumping mechanism and delivered to the various places of the engine which require oil.

Leading from the actuating chamber to the reservoir is an overflow or relief passage 32 which preferably connects the upper parts of this chamber and reservoir. In this overflow passage is arranged a check valve which operates to permit the flow of the liquid from the actuating chamber into the reservoir but prevents such flow in the opposite direction. This valve may be of any well known form, but preferably comprises a ball 33 which engages with an internal valve seat 34 formed in the overflow passage and held yieldingly against its seat by means of a spring 35 arranged within the overflow passage and bearing at one end against the back of the check valve 33 while its other end bears against a screw 36 engaging with a threaded opening in the adjacent part of the wall of the overflow passage. In order to guide the rear or inner end of the connecting rod 23 and confine the same properly in engagement with the crank pin or wrist 26 of the crank shaft, the other end of the connecting rod is confined between the crank 27 of the shaft and a guide 37 arranged within the reservoir and engaged slidingly by the connecting rod, as shown in Fig. 1.

When the plunger is in its rearmost or retracted position its front end uncovers the supply port 21 which connects the pump barrel with the lower part of the reservoir, thereby permitting the oil or other actuating fluid to pass from the reservoir into the pump barrel. During the first part of the forward or downward stroke of the plunger the same covers the supply port so that no further oil passes from the reservoir into the pump barrel. During the continued forward or downward movement of the plunger the oil or liquid contained in the lower part of the pump barrel is forced out of the same and through the inlet passage 22 into the actuating chamber 17 in which latter a pressure is developed which causes the diaphragm 1 to be forced toward the rigid wall of the pump chamber and thereby expel the liquid contents from the pumping chamber through the outlet thereof. The capacity of the pump is preferably so determined that a larger charge or quantity of oil is forced from the pump barrel into the actuating chamber than is necessary to force the diaphragm the proper distance toward the pumping chamber and such excess oil under the pressure of the plunger causes the overflow or relief valve 33 to be lifted in opposition to the resistance of its spring and permit the excess oil to pass from the actuating chamber into the oil reservoir. During the backward or return stroke of the pump plunger the check valve 33 in the overflow passage is closed so that an exhausting effect is produced upon the oil within the actuating chamber which operates to draw the diaphragm inwardly relatively to the actuating chamber and outwardly relatively to the pumping chamber, whereby additional gasolene is drawn through the supply pipe into the pumping chamber preparatory to expelling the same therefrom during the next outward deflection of the diaphragm when the plunger makes its next following forward stroke. This exhausting effect upon the actuating chamber continues from the beginning of the rearward stroke of the plunger until the latter has uncovered the supply port 21 after which the suction of this plunger is broken and additional oil is permitted to pass from the reservoir into the pump barrel. This operation is repeated during each forward and backward movement of the plunger so that when the pump is in normal operation a continued pulsating or vibrating action is produced upon the diaphragm which has the effect of causing the latter to alternately draw liquid into the pumping chamber then expelling the same therefrom.

By so proportioning the capacity of the pump barrel and plunger relatively to the actuating chamber that a greater amount of oil is delivered to the actuating chamber during each stroke of the plunger than is necessary for moving the diaphragm to its maximum extent toward the pumping chamber and permitting the excess quantity of oil to pass the spring pressed check valve into the reservoir, uniformity in the operation of the diaphragm is insured at all times regardless of any slight variation in the quantity of oil in the reservoir and also insuring a uniform pressure on the oil which operates upon the diaphragm. By alternately covering and uncovering the inlet port 21 the pump plunger serves the double function of an intake valve which controls the admission of oil from the reservoir into the pump barrel and also as the means for forcing the oil into the actuating chamber and withdrawing the same therefrom. The level of the oil is preferably maintained at such a height that the pump plunger and its connection with the crank shaft are constantly submerged in oil, thereby not only keeping the same constantly lubricated and reducing the wear thereon, but also eliminating the passage of any air between the pump barrel and plunger and the loss of efficiency which otherwise would occur if there were any leakage between these elements.

By thus operating the diaphragm by liquid shifting means the movable parts of which at no time come in contact with the gasolene which is being pumped, leakage of gasolene is positively prevented from any of the conduits into adjacent compartments, thereby effectually eliminating all danger from fumes and safeguarding the health of the operators as well as avoiding loss from accidents which might occur if such leakage were possible.

This pumping apparatus is very simple and compact in construction, it can be readily installed where a limited amount of room is available and it can be readily operated with a minimum expenditure of power.

Furthermore, this pump avoids exposing any pump plungers, gears, bearings, or packings to the action of gasolene which would be liable to cause the same to leak, it is more positive in its action than a pump which employs a plunger exposed to gasolene, or one in which a vacuum tank is employed.

We claim as our invention:

1. A pump comprising a pumping chamber having an inlet and an outlet, an actuating chamber having a supply passage and an overflow passage, a flexible diaphragm arranged between said pumping and actuating chambers, a pump barrel having its front part communicating with said supply passage and its rear part communicating with said overflow passage, and a pump plunger reciprocating in said barrel.

2. A pump comprising a pumping chamber having an inlet and an outlet, an actuating chamber having a supply passage and an overflow passage, a flexible diaphragm arranged between said pumping and actuating chambers, a check valve arranged in said overflow passage, a pump barrel having its front part communicating with said supply passage, and its rear part communicating with said overflow passage and a pump plunger reciprocating in said barrel.

3. A pump comprising a pumping chamber having an inlet and an outlet, an actuating chamber having a supply passage and an overflow passage, a flexible diaphragm arranged between said pumping and actuating chambers, a check valve arranged in said overflow passage, a pump barrel having its front part communicating with said supply passage and communicating in the side of its rear part by a port with said overflow passage, and a pump plunger reciprocating in said barrel and adapted to alternately cover and uncover said port.

4. A pump comprising a pumping chamber having an inlet and an outlet, an actuating chamber having a supply passage and an overflow passage, a flexible diaphragm arranged between said pumping and actuating chambers, a check valve arranged in said overflow passage, a pump barrel having its front part communicating with said supply passage, and communicating in the side of its rear part by a port with said overflow passage, a pump plunger reciprocating in said barrel and adapted to alternately cover and uncover said port, and a crank shaft having its crank connected with said plunger.

5. A pump comprising a pumping chamber having an inlet and an outlet, an actuating chamber having a supply passage and an overflow passage, a flexible diaphragm arranged between said pumping and actuating chambers, a check valve arranged in said overflow passage, a reservoir communicating with said overflow passage, a pump barrel having its front part communicating with said supply passage and communicating in the side of its rear part by a port with said reservoir, a pump plunger reciprocating in said barrel and adapted to alternately cover and uncover said port, and means for supplying fluid to said reservoir and discharging the surplus fluid therefrom.

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