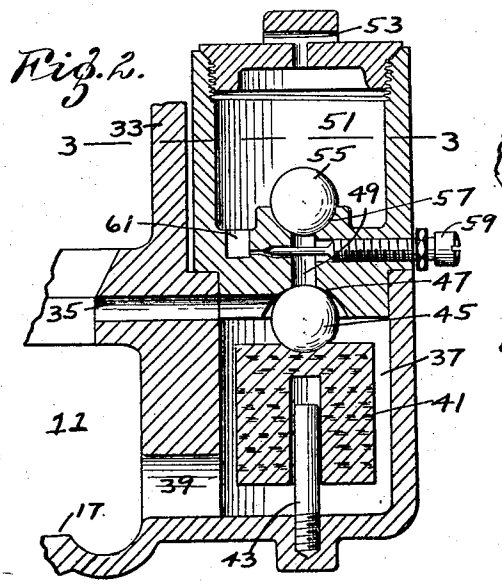
April 7, 1925. 1,532,439

H. S. PARDEE

PUMP

Filed May 26, 1920

Fig. 2.



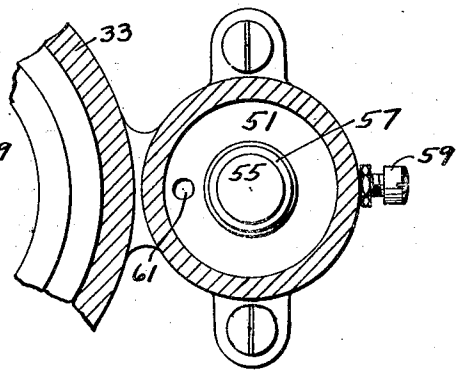


Fig. 3.

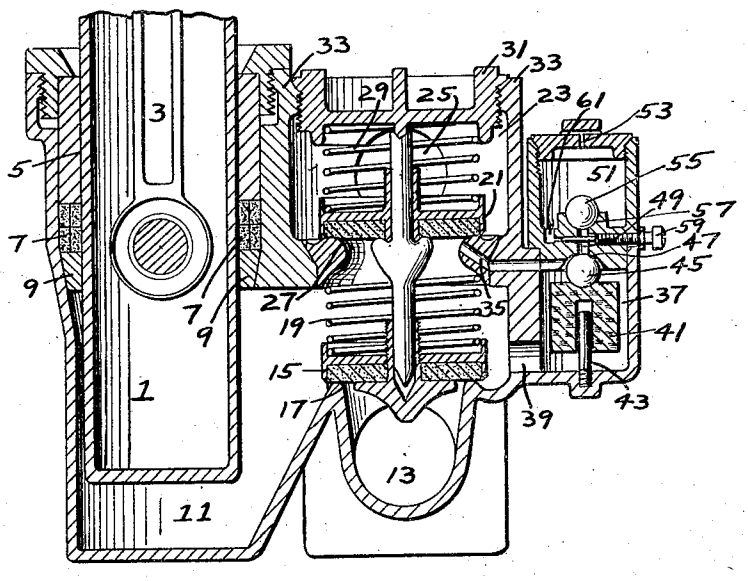


Fig. 1.

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UNITED STATES PATENT OFFICE.

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PUMP.

Application filed May 26, 1920. Serial No. 384,498.

To all whom it may concern:

Be it known that I, HARVEY S. PARDEE, a citizen of the United States, and a resident of Chicago, Illinois, have invented an Improvement in Pumps, of which the following is a specification.

This invention relates to pumps, and with regard to certain more specific features, to the pumping of liquids such as water.

Among the several objects of the invention may be noted the provision of a simple and inexpensive pump, particularly useful in installations of the pressure-reservoir type; the provision of a reliable and durable structure that is self-priming; and the provision of a pump that is effective in action, easily assembled and readily disassembled for such purposes as inspection and repair. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists of the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structure hereinafter described and a scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is shown one of various possible embodiments of the invention,

Fig. 1 is a sectional elevation of a preferred pump construction;

Fig. 2 is a similar view, showing the right-hand portion of Fig. 1 on an enlarged scale; and

Fig. 3 is a section on the line 3—3, Fig. 2.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Fig. 1 of the accompanying drawings, there is illustrated a pump, in this instance a plunger-type pump having a piston 1 operated by a connecting rod 3 in a cylinder 5 and retained in position therein by packing 7 held by glands 9. The vertical reciprocation of the piston is effected by a source of power (not shown) acting through the connecting rod 3. The upward stroke is the intake or suction stroke; the downward stroke is the delivery or pressure stroke. With certain modifications within the scope of this invention the features hereinafter described and claimed may be embodied in a double-acting pump, as well as in other related apparatus.

The fluid, in this instance water, normally enters the pump chamber 11 from the source of supply such as a pipe-line (not shown) through the intake port 13 under the intake valve 15 during the upward stroke of the pump. At this time the pressure in the pipe-line is greater than the pressure in the main chamber 11 by an amount sufficient to force the intake valve 15 upwardly off its seat 17, against the pressure of the compression spring 19, and water is thus admitted to the main chamber 11.

At the end of the upward or suction stroke of the pump this pressure difference disappears, the intake valve 15 reseats itself, and during the downward or pressure stroke of the pump water is forced from the main chamber 11 upwardly past the delivery valve 21 into the discharge chamber 23 and thence into the discharge port 25, the excess of pressure in main chamber 11 as compared with discharge chamber 23 forcing the discharge valve 21 upwardly off its seat 27, against the action of the compression spring 29.

The two valves 15, 21, as will be clear from Fig. 1, are preferably so constructed as to afford substantially a line-contact, affording accuracy of fit and facilitating the maintenance of the valves in proper condition. By removing the threaded cap 31 and the seat member 27 (which is preferably wedged in its support 33), the valve gear may be lifted out and the valves and seats thus readily made accessible for inspection, regrinding and repair.

The pump of the present invention is particularly useful in supplying water to a so-called pressure-reservoir system, in which the receiving tank is partly filled with water and partly with air under pressure, the air acting to maintain the water pressure and deliver the water through the supply conduits when the pump is not working. Water in such a tank, however, has a tendency to absorb the air therein, with the result that the amount of air is progressively decreased and the effectiveness of the system thereby lessened, and the air may even be all absorbed by the water, causing the reservoir to become what is known as water-logged. As hereinafter described, the pump of the present invention is adapted to pump a given amount of air into the storage tank along with the water, this air compensating for the absorption above mentioned and serving

to maintain in the reservoir the quantity of air needed for satisfactory operation.

This inspiration of air into the water passing through the pump is effected through the inspirating port 35 leading from a float chamber 37, through the support 33 and valve seat 27, and terminating at a point close to the discharge valve 21, so that air passing through said inspirating port is delivered in close proximity to the discharge valve and is, therefore, not liable to become trapped, but passes through into the discharge chamber 23 as soon as the discharge valve is lifted.

The float chamber 37 communicates with the main pump chamber 11 by a passage 39 and thus has water in it when the main chamber has water in it. This causes the float 41 to rise on its pin 43 and press the ball 45 upwardly against its seat 47, thereby preventing communication between the float chamber and the passage 49 leading to an upper chamber 51 open to atmosphere at 53.

During the upward or suction stroke of the pump the upper ball 55 rests on its seat 57 and prevents any flow of air from atmosphere in the upper chamber 51 directly into the passage 49. There is, however, a needle valve 59 controlling the by-pass 61 from the upper chamber 51 to the passage 49 and this valve is preferably so adjusted as to allow the desired amount of air to flow from atmosphere 51 through the by-pass 61 into the passage 49, under the influence of the sub-atmospheric pressure in the main chamber 11 at this time (that is, during the suction stroke). During this flow of air the lower ball 45 is depressed slightly away from its seat to allow the air from the passage 49 to pass into the inspirating port 35 and thence under the discharge valve 21, where it collects until the pressure stroke takes place, whereupon the discharge valve is lifted as above described and the air is forced into the discharge chamber and port together with the water. During this pressure stroke of the pump the pressure in the main chamber 11 is above atmospheric, and the float 41 raises the lower ball 45 against its seat and prevents any discharge of air or water through the passage 49. The amount of inspirated air can be adjusted within wide limits by the needle valve 59.

Another feature of this invention is the automatic priming above mentioned. When the pump is started dry, there is air in the main chamber 11 and float chamber 37, and the float 41 and lower ball 45 are down, leaving the passage 49 open to the float chamber 37. On the downward or pressure stroke of the piston 1 some of the air in the main chamber 11 will be forced outward through the passage 49, lifting the upper ball 55 from its seat 47, and passing thence to atmosphere at 51, 53. On the succeeding suction stroke the ball 55 will seat itself, preventing a rapid flow of air into the pump chamber, the needle valve 59 allowing only a small amount of air to be admitted. Suction is thus created in the main chamber. Succeeding cycles of this operation increase the suction in the main chamber until the pressure (initially atmospheric) ordinarily existing in the pipe-line and intake port 13 is sufficient to lift the intake valve 15 against its spring 19, drawing into the main chamber 11 some of the air from the pipe-line and intake port 13. This air is in turn discharged through the passage 49 as above described. After a sufficient number of cycles have occurred the suction in the intake port 13 is great enough to raise the level of the water in the pipe-line until the water reaches the intake valve 15 and enters the main chamber 11. When this occurs the float 41 will rise and seat the lower ball 45. After this on the pressure stroke any air in the main chamber is forced out under the discharge valve 21 as during normal operation, and the pump automatically begins to operate in the normal manner.

The priming feature and the inspirating feature may of course be used together, or either may be provided without the other, without departing from the spirit or scope of the present invention.

From the above it will be seen that in the apparatus of the present invention the several objects above noted are attained and other advantageous results secured.

As various possible embodiments might be made of the above invention and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In apparatus of the class described, in combination, a pump having a piston and intake and discharge valves, means for drawing in air during each suction stroke and delivering it adjacent the discharge valve, the air being forced into the discharge port during the succeeding pressure stroke of the pump, and a check valve with restricted by-pass, for automatically priming the pump.

2. In apparatus of the class described, in combination, a pump, and means for automatically priming the pump, said means comprising a check valve open to atmosphere, a float valve adapted to shut off the passage to the check valve except when the pump is dry, whereby the pump exhausts the air in the intake, discharging said air through said check valve until the water

in the intake is lifted to the pump, whereupon the float cuts off further escape of air to atmosphere through said check valve.

3. In apparatus of the class described, in combination, a pump having a piston, a main chamber, an intake valve, and a discharge valve, both of said valves having substantially line contact with their seats, and means for automatically priming the pump, said means comprising a check valve opening to atmosphere, a float valve adapted to shut off the passage from main chamber to check valve except when the main chamber is dry, whereby the pump exhausts the air in the main chamber and in the intake, discharging said air through said check valve until the water in the intake is lifted to the main chamber, whereupon the float valve cuts off further escape of air to atmosphere through said check valve.

4. In apparatus of the class described, in combination, a pump having a piston, a main chamber, an intake valve, a discharge valve, means for preventing water-logging of the system supplied by the pump and means for automatically priming the pump, said last means comprising a check valve with restricted by-pass, for progressively increasing the suction in the pump chamber during successive cycles of operation when the pump is started dry.

5. In apparatus of the class described, in combination, a pump, means for preventing water-logging of the system supplied by the pump, and means for automatically priming the pump, said second means comprising a check valve to atmosphere, a float valve adapted to shut off the passage to said check valve except when the pump is dry, whereby the pump exhausts the air in the intake, discharging said air through said check valve until the water in the intake is lifted to the pump, whereupon the float valve cuts off further escape of air to atmosphere and the pump begins to operate normally.

6. In apparatus of the class described, in combination, a pump having a piston, a main chamber, an intake valve and a discharge valve, means for drawing in automatically a predetermined amount of air during each suction stroke and delivering it adjacent the discharge valve, the air being forced into the discharge port during the succeeding pressure stroke of the pump; and means for automatically priming the pump, said second means comprising a check valve to the atmosphere, and means adapted to shut off the passage from main chamber to check valve except when the main chamber is dry.

7. In apparatus of the class described, in combination, a suction plunger pump having a piston, a main chamber, an intake valve, and a discharge valve, both of said valves having substantially line contact with their seats, means for automatically priming the pump, said means comprising an auxiliary chamber having a check valve to atmosphere, a float valve adapted to shut off the passage from main chamber to check valve except when the main chamber is dry, whereby the pump exhausts the air in the main chamber and in the intake, discharging said air through said check valve until the water in the intake is lifted to the main chamber, whereupon the float valve cuts off further egress of air to atmosphere through said check valve and the pump automatically begins to operate normally.

8. In apparatus of the class described, in combination, a suction plunger pump having a piston, a main chamber, an intake valve, and a discharge valve, both of said valves having substantially line contact with their seats, means comprising an auxiliary chamber provided with a check valve for inspirating automatically a predetermined adjustable amount of air during each suction stroke and delivering it directly beneath the discharge valve, the air being forced into the discharge port during the succeeding pressure stroke of the pump; and means for automatically priming the pump, said last named means comprising said auxiliary chamber having a check valve to atmosphere, a float valve adapted to shut off said passage except when the main chamber is dry, whereby the pump exhausts the air in the main chamber and in the intake, discharging said air through said check valve until the water in the intake is lifted to the main chamber, whereupon the float valve cuts off further egress of air to atmosphere through said check valve, and the pump automatically begins to operate normally.

In testimony whereof, I have signed my name to this specification this 22nd day of May, 1920.

HARVEY S. PARDEE.