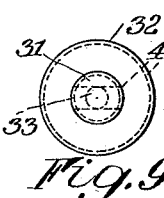
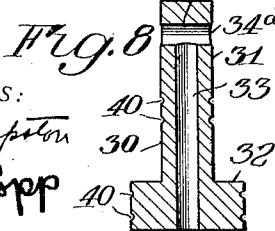
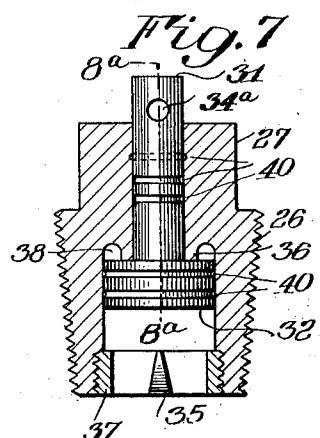
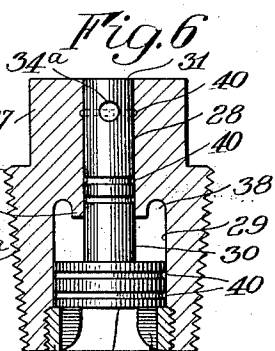
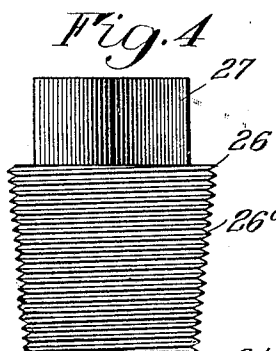
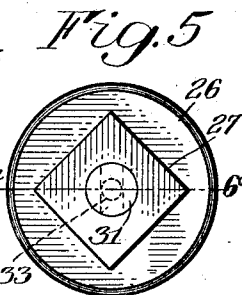
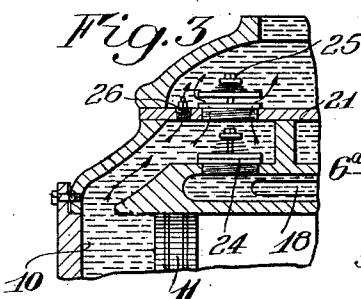
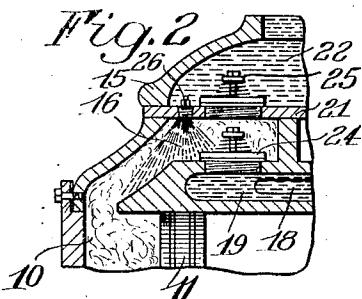
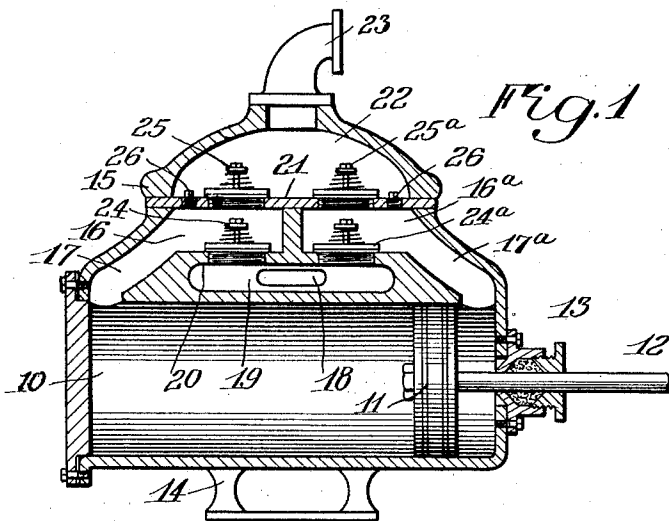


R. MILLER.
 AUTOMATIC PUMP PRIMING DEVICE.
 APPLICATION FILED JULY 5, 1919.

1,343,574.

Patented June 15, 1920.



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UNITED STATES PATENT OFFICE.

RAYMOND MILLER, OF ROCHESTER, NEW YORK.

AUTOMATIC PUMP-PRIMING DEVICE.

1,343,574.

Specification of Letters Patent. Patented June 15, 1920.

Application filed July 5, 1919. Serial No. 308,816.

To all whom it may concern:

Be it known that I, RAYMOND MILLER, of the city of Rochester, county of Monroe, and State of New York, have invented certain new and useful Improvements in Automatic Pump-Priming Devices; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-numerals marked thereon.

This invention relates to pumping apparatus, and, more particularly, to pump priming devices, one object of the invention being to provide a simple, convenient and efficient device of this character for relieving accumulated gases and admitting priming fluid to the pump chamber.

Another object is the provision of a pressure actuated device of the above character to be placed in communication with the pump chamber and with a pressure head of the fluid, as, for instance, the discharge outlet of the pump, and adapted to be actuated by a comparatively low pressure in the pump chamber, relative to that of the pressure head for operation by the gases accumulated in the cylinder and compressed by the piston. To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is a vertical longitudinal section of the pump showing the invention applied thereto.

Figs. 2 and 3 are fragmentary views of the same character illustrating the operation of the device and of the pump valves.

Fig. 4 is an exterior elevation of the priming device.

Fig. 5 is a top plan view of the same.

Figs. 6 and 7 are sections on the line 6^a—6^a of Fig. 5 illustrating the valve in closed and open position respectively.

Fig. 8 is a section on the line 8^a—8^a of Fig. 7 showing the movable part or valve body.

Fig. 9 is a top plan view of the latter.

Similar reference characters throughout the several views indicate the same parts.

This invention, in the embodiment at present preferred as best illustrating the principles involved, is applied to a common variety of reciprocating type pump, although it is adapted for use with other types of such apparatus, and comprises an automatic, pressure operated valve for controlling communication between the pump chamber and a supply of the fluid under pressure, as for example that in the discharge outlet of a pump, for the purpose of admitting such fluid to the pump chamber to prime the pump, as in starting the latter, to prevent racing or pounding of the apparatus due to trapped gases in the pump chamber, and also for the purpose of permitting the escape of such gases. The device has a pressure responsive surface subjected to the pressure developed in the pump chambers of larger area than that subjected to the pressure head, so that it is sensitive to quite low pressure in the pump chamber relative to that of the discharge head, for operation by gases compressed in the chamber or cylinder by the piston.

Referring to the drawings:

10 denotes one cylinder of a double acting, reciprocating type pump, having a piston 11 actuated by a piston rod 12 working in a packing gland and bearing 13, the apparatus being supported on a pedestal or base 14. The housing of the pump is indicated generally at 15, inclosing valve chambers 16 and 16^a communicating by passages 17—17^a with the ends of the cylinder. The intake pipe is indicated at 18, communicating with the intake chamber 19 which is separated from the valve chamber by a partition 20, while a partition 21 separates the valve chamber from the discharge chamber or outlet 22, which communicates by means of pipe 23 with the discharge head of the pump. In the partition 20 are valves 24—24^a and in the partition 21, valves 25—25^a, these valves being of the usual or any suitable type for apparatus of this character, adapted to be operated automatically by the pressures on opposite sides of the partitions or diaphragms, for the admission and discharge of fluid to and from the valve chamber during the operation of the pump. The priming device is shown as located in

the partition between the valve chamber and discharge outlet of the pump, but, of course, could be located so as to afford communication between the pump chamber and some other pressure head of the fluid, the present arrangement being desirable because of its convenience. The device comprises preferably a plug or sleeve 26 having a tapered and threaded portion 26^a securely fitted in a correspondingly threaded opening formed in the partition 21, one of these devices, of course, being provided for each valve chamber 16 and 16^a of the double acting pump. The plug or sleeve has an angular portion 27 to facilitate handling and screwing it into position and is formed with a central bore in two sections, one of smaller diameter 28 and one of relative larger diameter 29. Reciprocating longitudinally in the bore of the plug is a movable part comprising a valve or plunger 30 having a portion of smaller diameter 31 slidably fitted in the section 28 of the bore, and a portion 32 of relatively larger diameter similarly fitted in the section 29 of the bore. As apparent from the drawings, the bore of the plug is open at both ends so that the ends of the plunger are subjected to the pressures at its opposite ends, the plunger having a pressure surface of larger area on its portion 32 than on its portion 31, the latter being intended to be subjected to the pressure of the pump outlet or discharge head and the former or larger area to the pressure produced in the pump chamber.

The plunger is preferably formed centrally thereof with a channel 33 opening through the end 32 thereof, and communicating at its upper end in the portion 31 of the plunger with a transverse channel 34, Fig. 8, opening laterally of the plunger and forming a port 34^a which is opened or closed to external communication depending upon the position of the plunger in the sleeve, the latter operating to close the port 34^a and to clear the latter of any accumulated dirt or obstruction as the corresponding end of the plunger is drawn within the sleeve during its reciprocation as shown in Fig. 6. The other position of the plunger in which communication is established between the ends of the sleeve is shown in Fig. 7. The section 29 of the bore of the sleeve is provided with abutments or stops 35 and 36 for limiting the reciprocatory movement of the plunger, the latter being formed preferably integral with the sleeve and the former on a ring 37 screwed into the end of the bore. The bore is extended beyond the stop 36, providing an air chamber 38 in which any air accumulated in the bore interiorly of the end 32 of the plunger may be compressed during the movement of the plunger without obstructing the movement of the latter.

The plunger, or the bore of the sleeve, may be formed with suitable sealing means to prevent the entrance of water to the space in the bore inside the end 32 of the plunger, and there is shown for this purpose in the present instance a plurality of annular grooves 40 formed in the plunger and in the bore of the sleeve in which moisture or lubricant collects and forms a seal, as is well understood in the art.

The operation of the device will be clear from a brief explanation in connection with the above description of its construction. When a pump has stood idle for a time the water frequently escapes from the cylinder so that when it is again started air and gases partially or completely fill the cylinder and valve chamber and the pump races or pounds ineffectively for a period with objectionable noise and danger to the mechanism until sufficient fluid has been drawn in to fill these chambers and operate the valves. Various devices have been employed for overcoming this difficulty with various objectionable features attending their use which are overcome by the present invention. As explained, the areas of the pressure surfaces of the plunger subjected to the pressures on opposite sides of the partition 21 are different with the larger area on the side of the pump chamber and the ratio of these areas is intended to be selected or designed with reference to the degree of pressure of the discharge head against which the pump works, as well as to the character of fluid being handled, and other operating conditions, so that a comparatively low pressure generated by the piston in the gases filling the pump chamber or cylinder, operating on the larger area of the valve or plunger, will raise the latter, during the discharge strokes of the pump, exposing the port 34 and thereby opening communication between the pump chamber and the discharge head or outlet of the pump, and permitting fluid to flow down through the plunger into the pump cylinder to prime the latter in a short while, and the spray of fluid thus admitted serves to condense the gases or vapors frequently formed in pumping hot or volatile liquids, thus assisting in the priming action. As soon as the cylinder is supplied with a considerable quantity of fluid the latter will reach on the discharge stroke of the pump up to the discharge and intake valves and open the latter thus starting the operation of the pump. Should the pressure of the gases exceed that of the pressure head they will escape through the priming device and through the discharge valves as well. During the intake strokes of the pump the priming device, of course, closes, preventing the entry of fluid, so that during the operation of the pump the efficiency of the latter is

in no wise reduced by the priming device. The device is extremely simple, comprising but a few parts which are inexpensive to manufacture and is generally and readily applicable to the common types of pumps, requiring only the formation of an aperture in the partition of the pump casing to receive the screw plug. The bore of the plug and the plunger may be manufactured with a considerable range of area ratios so that the device may be supplied to the trade in proper dimensions to accommodate the requirements of any working conditions.

I claim as my invention:

1. The combination with a pump, of an automatic priming device communicating with the pump chamber and the pump discharge outlet and having a movable part operating to establish communication between said chamber and outlet during the discharge stroke of the pump, and to close communication between said chamber and outlet during the intake stroke of the pump.

2. The combination with a pump, of an automatic priming device communicating with the pump chamber and the pump discharge outlet and comprising a valve adapted to be closed by the pressure in said outlet during the intake stroke of the pump, and to be opened by the pressure in said pump chamber during the discharge stroke of the pump.

3. The combination with a pump, of a pressure operated, priming valve communicating with the pump chamber and the pump discharge outlet, comprising a part adapted to be moved by the pressure in the pump discharge outlet during the intake stroke of the pump to close communication between said pump chamber and discharge outlet, and to be moved by the pressure in the pump chamber during the discharge stroke of the pump to open communication between the pump chamber and discharge outlet.

4. The combination with a pump, of a pressure responsive priming valve controlling communication between the pump chamber and discharge outlet and comprising a movable part having surfaces of different areas subjected to the pressures in said chamber and outlet, respectively, and moved by said pressures to open said communication during the discharge stroke of the pump, and to close said communication during the intake stroke of the pump.

5. The combination with a pump, of a pressure responsive priming valve controlling communication between the pump chamber and a pressure head, and comprising a movable part having pressure surfaces of differential areas subjected to the pressures in said chamber and of said head, respectively, and movable by said pressures

to open said communication during the discharge stroke of the pump, and to close said communication during the intake stroke of the pump.

6. The combination with a pump, of a pressure responsive priming valve controlling communication between the pump chamber and discharge outlet and comprising a movable part having a surface subjected to the pressure in said chamber and also a surface of less area than the first mentioned surface subjected to the pressure in said outlet, and moved by said pressure to open said communication during the discharge stroke of the pump, and to close said communication during the intake stroke of the pump.

7. The combination with a pump, of an automatic priming valve controlling communication between the pump chamber and a pressure head, comprising a supporting means and a part movable on said means by the pressures in said chamber and of said head and responsive to a less pressure in said chamber than that of said head for opening said communication during the discharge stroke of the pump, and closing said communication during the intake stroke of the pump.

8. The combination with a pump, of an automatic priming valve controlling communication between the pump chamber and a pressure head, comprising a sleeve and a plunger in said sleeve having a surface subjected to said pressure head and a surface larger than the first mentioned surface subjected to the pressure in said pump chamber, said plunger being movable by said pressures to open said communication during the discharge stroke of the pump, and to close said communication during the intake stroke of the pump.

9. The combination with a pump, of an automatic priming valve therefor, comprising a sleeve communicating with the pump chamber and discharge outlet, and a plunger in said sleeve having a channel therethrough communicating at one end with the pump chamber and opening laterally of the plunger adjacent its other end for communication with said outlet, said plunger having a surface subjected to the pressure of said outlet and a second surface larger than the first subjected to the pressure in said pump chamber, and being movable in the sleeve by said pressures to open communication between said lateral opening and outlet during the discharge stroke of the pump and to close said communication during the intake stroke of the pump.

10. The combination with a reciprocating type pump, having a discharge outlet and a valve chamber separated by a partition provided with an opening, of a sleeve in said

opening, a plunger reciprocating in said sleeve having a bore therethrough communicating at one end with said chamber and opening laterally of said plunger adjacent
5 its other end in position to be covered and uncovered by said sleeve during the reciprocation of said plunger, and pressure surfaces of different areas on said plunger subjected to the pressures in said outlet and chamber, respectively, for reciprocating said plunger 10 and controlling communication between said outlet and chamber.

RAYMOND MILLER.