

May 23, 1933.

G. L. FERGUSON

1,910,531

PUMPING APPARATUS

Filed May 15, 1930

2 Sheets-Sheet 1

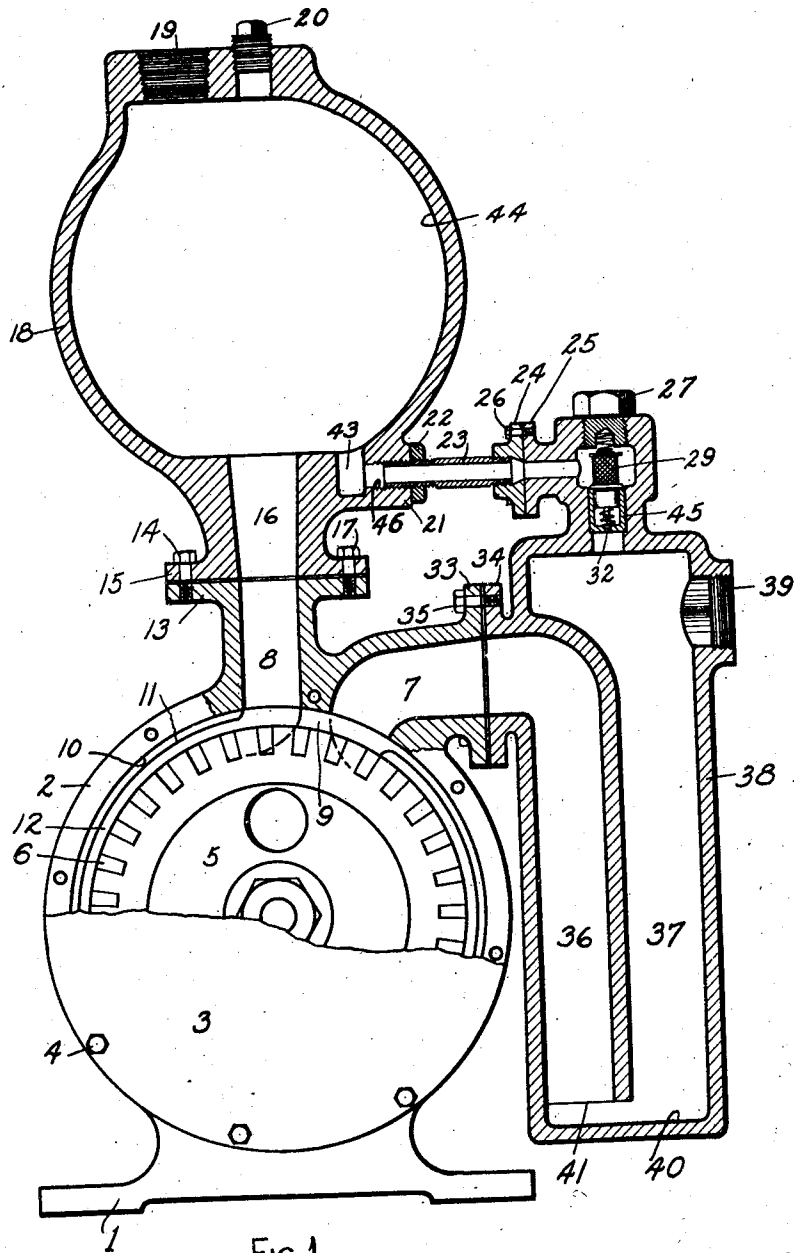


Fig 1

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2 Sheets-Sheet 2

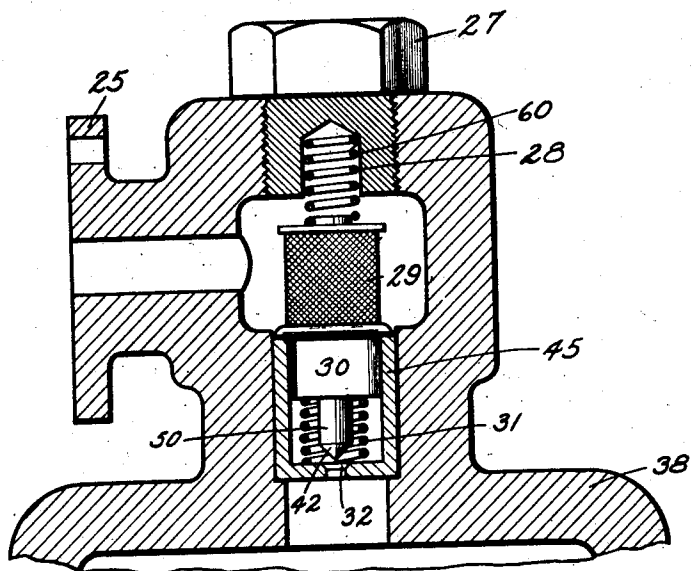


Fig. 2.

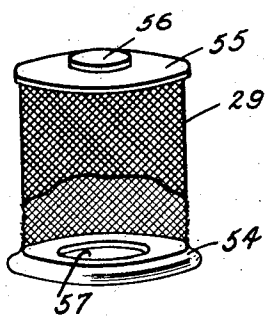


Fig. 3

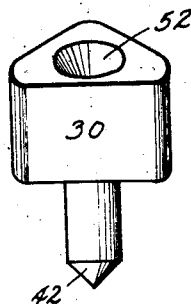


Fig. 4

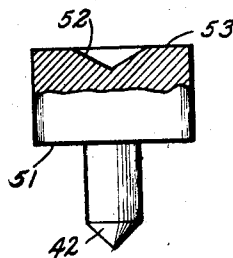


Fig. 5

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GALE L. FERGUSON, OF CLEVELAND, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WESTCO PUMP CORPORATION, OF DAVENPORT, IOWA, A CORPORATION OF DELAWARE

PUMPING APPARATUS

Application filed May 15, 1930. Serial No. 452,779.

This invention, relating, as indicated, to pumping apparatus, is more particularly directed to that type of pump in which it is desirable to have a priming means accessible in order that the pump will operate efficiently under all conditions.

It is one object of the invention to provide a circuit consisting of a priming chamber, a rotary or centrifugal pump, and a separating chamber with a passage connecting the last named chamber with the priming chamber.

A further object of the invention is to provide the above named circuit with a separator in which a mixture of liquid and gas can be separated into its component parts by means of the action of gravity on the liquid.

A still further object of the invention is to provide a rotary pump with efficient priming means and a separator and a valve-controlled passage from the separator to the priming means in order that the fluid may be kept where most necessary.

In securing the above objects I have aimed to provide in such a machine a construction which will be simple, expeditious in operation and which will perform all its several functions automatically and continuously on any quantity of fluid which is desired to be removed by pumping.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Fig. 1 is a vertical transverse section through the pump, priming chamber, separating chamber and valve, with parts in elevation; Fig. 2 is a vertical section view of the valve; Fig. 3 is a detail view of the valve screen; Fig. 4 is a detail perspective view of the valve-actuator; and Fig. 5 is a side elevation of the valve-actuator with a part broken away.

The pump proper, shown in Fig. 1 of the drawings, is similar in construction to that described and illustrated in my copending application filed May 31, 1931, Serial No.

458,457, for "Pumping apparatus," and consists of a rotatably supported impeller 5 which revolves between two allochiral rings 11. These rings are of such size as to fit snugly within the bore 10 of the pump housing 2, and have a circular groove 12 of slightly larger diameter than that of the impeller 5. The impeller 5 revolves in a clockwise direction as viewed in the drawings, and has on its periphery a series of indentations or buckets 6 which carry the fluid from the inlet 7 to the outlet 8, the diversion of the fluid into the outlet 8 being accomplished by means of a stop 9. The pump housing 2 is supported on a base or pedestal 1, and has a removable face plate 3 secured thereby by means of head bolts 4, or other similar means.

Secured to the flange 33 of the inlet port 7, a priming chamber 38 is shown which has a similar flange 34 held to the flange 33 by means of headed bolts 35, or in any other conventional manner. This priming chamber consists of an inner pipe 36 which is directly in line with the inlet port 7, and an outer surrounding chamber 37. The bottom of the priming chamber 38 is shown at 40 and is spaced a slight distance away from the lower end 41 of the inner pipe. The fluid is admitted to the priming chamber 38 by means of the inlet 39 which is screw-threaded for the reception of a pipe which ordinarily would be connected to the inlet line. One result of having the inlet port 39 higher than the passage 7 is to keep the priming chamber 38 almost full of water in spite of any back drainage through inlet 39.

At the uppermost portion of the priming chamber a valve mechanism is shown, which has as its function the control of the flow of the priming fluid from the separating chamber to the priming chamber. This valve consists of a stem 50 having a tapered point 42 which engages a seat 32 and is held thereabove by means of a spring 31, which in turn engages a shoulder 51 on the actuator 30. The spring 31 is of much lighter construction than the spring 28, and has for its purpose to hold valve 30 very lightly against the opening 57 in one end of the screen. The valve actuator designated at 30 has a trian-

gular-shaped body portion in order to provide a seat for the upper extremity of valve spring 31 and also to offer the least resistance to movement. This body portion has its upper central surface recessed as shown at 52, thus providing a miniature catch-basin in which the priming liquid collects, the weight of such liquid being sufficient to overcome the resistance offered by spring 31, causing the point 42 to contact with the seat 32, and thus closing the valve.

Above the valve actuator a screen 29 is shown, which has a lower portion 54 supported adjacent the surface 53 of the actuator, such lower portion being recessed as illustrated at 57, Fig. 3, in order that any priming liquid entering the screen will collect in the basin 52. The upper portion, or top 55, of the screen cylinder is similar to the lower portion with the exception that a boss 56 is placed thereupon, which maintains the upper valve spring 28 in alignment. The cylinder is of such proportions that the lower portion 54 seats upon the valve container 45, which insures the passage of the water through the screen 29 in order to reach the priming chamber. A spring 28 is illustrated above the valve, which is so placed for the purpose of holding the valve cover 29 down, such spring being received in the opening 60 in the plug 27. In order to gain access to the valve and replace parts or make repairs I have provided a plug 27 which is received in a screw threaded opening in the casing of the priming chamber 38. A spring 28 is used as a hold-down for the screen 29 instead of a solid element, or in place of having the stem of the nut 27 go down and engage the top of the screen 29 because such construction makes a convenient method of assembly and permits the nut 27 to be screwed home tight, without the necessity of very accurate fitting of parts, and without any danger of crushing or bending the end portion 55, as might happen if a solid member were used in place of the spring.

Above the discharge port 8 of the pump a separating chamber 18 is shown supported on the flange 13 of the pump, and secured thereto by means of the bolts 14 and 17 which engage the flange 15 of the separating chamber and thus align the inlet 16 of the separating chamber with the outlet 8 of the pump. The separating chamber 18 is approximately spherical in form and has a smooth interior surface 44. The uppermost portion is slightly flattened and has a discharge port 19, which is screw-threaded for the reception of a pipe, and has a screw-threaded plug 20 which provides access to the interior of the separator without removing the pipe from the discharge port 19, which ordinarily is firmly connected thereto. The lowermost interior portion of the separator is likewise

slightly flattened and has a trough 43 therein to receive any priming liquid and to divert it into a pipe 23 which connects with the valve 45. The pipe 23 is received in a screw-threaded opening 46 in the projection 21 of the separator, and is held in place by means of a lock nut 22. At its opposite end the pipe 23 is received in a screw-threaded opening in a flanged member, the flange 24 of which is held to the flange 25 of the priming chamber casing by means of bolts 26.

In order to illustrate the operation of my improved pumping apparatus it will be assumed that the space 37 of the priming chamber is partly filled with water. Under this condition when the pump draws the water down to the bottom 41 of pipe 36 this pipe instantly fills with air. At the same time water continues to flow through the priming valve and rises in both the spaces 37 and 36, the air in 36 passing over to the pump as the water rises. As the water rises near the top of 36 the pump exerts suction enough to draw water over, and air and water are then expelled into the chamber 18 much in the manner of a fountain. The water which, of course, is heavier, rises a short distance and then falls to the bottom of the separating chamber, or perhaps is sprayed against the interior surface 44. In either event the water collects in a trough 43 and passes through the pipe 23 and from there through the valve into the priming chamber, where the operation is repeated. After the pump is thoroughly primed and liquid is being forced over the valve 30 will descend, due to the velocity of the liquid and the arrangement of the opening 57 and the recess or basin on the valve. Of course it will be understood that a substantial head of water is necessary to close the valve, this being brought about by the construction of the body portion 30 which, as stated before, is triangular and permits a certain amount of water to pass down and through the valve opening 32. In this manner the pump is primed and reprimed until the separating chamber is partially filled with liquid, when the necessity for priming ceases, and the valve closes.

From the foregoing description it will be apparent that I have provided a pumping apparatus in which a priming fluid is constantly accessible, and one in which the priming fluid is not lost but conversely is separated from the mixture of gas and liquid. It will be further apparent that I have provided a novel valve means which permits sufficient liquid for priming purposes to pass to the inlet of the pump, but when the pump is functioning as it normally should, this valve closes, and in effect prevents needless handling of the priming fluid.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards

the structure herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a detachable priming apparatus, a chamber having an inlet and an outlet, a screen mounted in said chamber, said screen having an outlet, a valve reciprocably mounted in said chamber and having an enlarged portion adjacent said outlet, a valve seat, and a spring engaging said enlarged portion, there being a depression in said enlarged portion, said depression being aligned with said screen outlet.
2. In a detachable priming apparatus, a chamber having an inlet and an outlet, a screen mounted in said chamber, said screen having an outlet, a valve reciprocably mounted in said chamber, and having an enlarged triangular portion, adjacent said outlet, a valve seat, and a spring engaging said enlarged portion.
3. In an apparatus of the character described, a chamber having an inlet and an outlet, a casing mounted in said chamber having a seat in one end, a valve mounted in said casing, a spring urging said valve away from said seat, and means engaging said valve to limit movement thereof, said means comprising a cylinder with foraminous walls, one end being imperforate and the other end having an opening therein.
4. In an apparatus of the character described, a chamber having an inlet and an outlet, a casing mounted in said chamber having a seat in one end, a valve mounted in said casing having an enlarged triangular portion, resilient means engaging said enlarged portion and urging said valve away from said seat, and a cylinder seated on the other end of said casing to limit movement of said valve.
5. In an apparatus of the character described, a chamber having an inlet and an outlet, a casing mounted in said chamber having a seat in one end, a valve mounted in said casing having an enlarged triangular portion, resilient means engaging said enlarged portion and urging said valve away from said seat, a cylinder seated on the other end of said casing to limit movement of said valve, the walls of said cylinder permitting the passage of fluid, and one end of said cylinder having an opening.
6. In an apparatus of the character described, a chamber having an inlet and an outlet, a casing mounted in said chamber having a seat in one end, a valve mounted in said casing having an enlarged triangular portion, resilient means engaging said enlarged portion and urging said valve away from said seat, a cylinder seated on the other end of said casing to limit movement of said

valve, the walls of said cylinder permitting the passage of fluid, and one end of said cylinder having an opening, there being a depression in said enlarged portion of said valve in alignment with said opening.

Signed by me this 24th day of April, 1930.
GALE L. FERGUSON.

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