June 23, 1931. H. SCHLACHTER 1,811,651

PRIMER FOR IMPULSE PUMPS

Filed July 5, 1929

Fig. 1

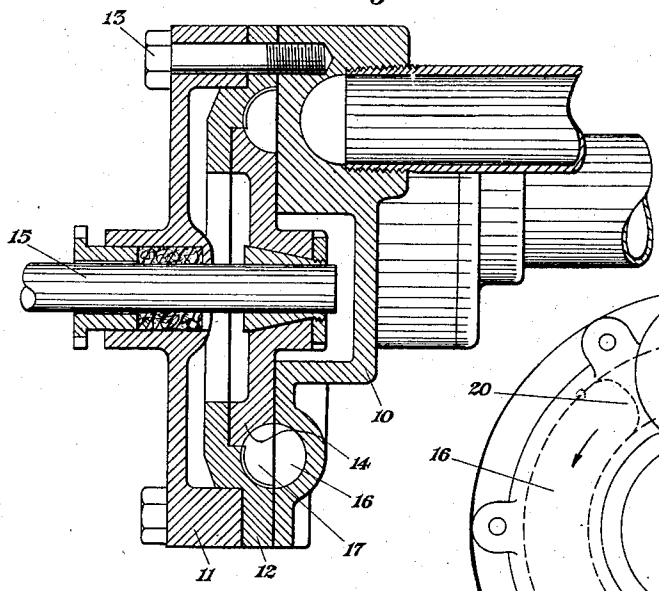


Fig. 2

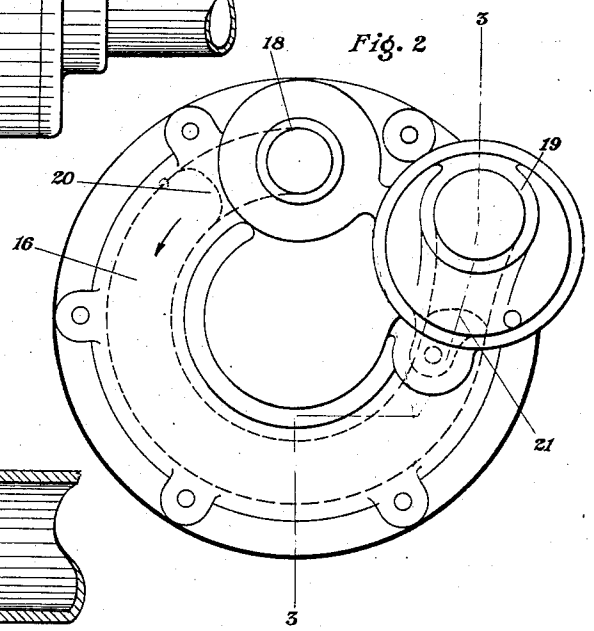
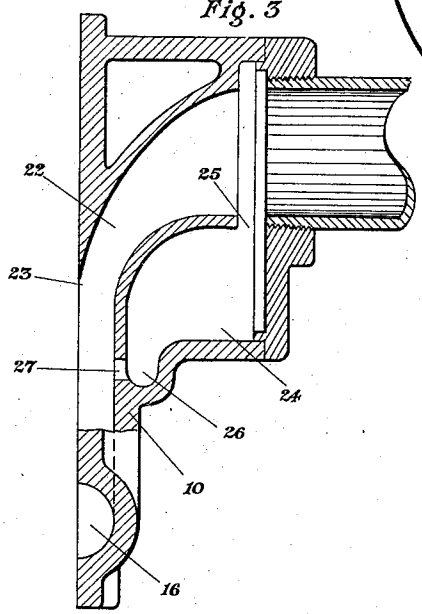


Fig. 3



Inventor
H. Schlachter

By Emil F. Lange

Attorney

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UNITED STATES PATENT OFFICE

HENRY SCHLACHTER, OF BEATRICE, NEBRASKA, ASSIGNOR TO DEMPSTER MILL MANUFACTURING COMPANY, A CORPORATION OF NEBRASKA

PRIMER FOR IMPULSE PUMPS

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My invention relates to primers for rotary pumps, its primary object being the provision of a primer for preventing the buckets of the rotary pump from becoming empty.

One of my objects is the provision of a primer associated with the discharge opening of the pump so that the primer will receive a portion of the water or other liquid passing through the discharge opening.

Another of my objects is the provision of a primer so designed and arranged with reference to the rotary pump that no back pressure will be exerted against the rotor due to centrifugal force generated within the priming chamber.

Another of my objects is the provision of a primer which not only permits but insures the conversion of the velocity head in the discharged water into pressure, the parts being so arranged that there is no loss in velocity head due to the primer.

Having in view these objects and others which will be pointed out in the following description, I will now refer to the drawings, in which

Figure 1 is a medium sectional view of the rotary pump showing both the inlet and discharge passages.

Figure 2 is a view in end elevation of the pump showing the inlet and discharge openings and showing in dotted lines the water passages within the pump.

Figure 3 is a sectional view on the line 3—3 of Figure 2.

The pump has a stationary casing including the parts 10, 11 and 12, these parts being secured together by means of bolts 13 or the like. The rotor 14 is secured to the shaft 15 which is journalled in suitable bearings in the part 11 of the casing. An arcuate passageway 16 is provided in the part 10 of the casing, this passageway being substantially semi-circular in cross section and arcuate in outline. As shown in dotted lines in Figure 2, the passageway 16 is interrupted between the water outlet and the water inlet, this being the common construction for insuring the discharge of water from the rotor which would otherwise merely carry the water around and around. The rotor 14 is provided with a plurality of partitions 17 which form the walls of the so-called buckets of the rotor. The part 10 of the casing has the inlet and outlet pipes 18 and 19 secured thereto.

Thus far the structure is common to many rotary pumps of the centrifugal or impulse type. The rotor 14 is revolved at a high rate of speed to draw water or other liquid through the inlet 18 and to discharge it through the outlet 19. The description thus far given is intended to be illustrative of the general type of pump to which my invention may be applied.

The ends of the passageway 16 are shown by dotted lines 20 and 21. The rotor moving in the direction indicated by the arrow in Figure 2 carries the water to the discharge outlet but the motion of the water within the buckets and passageway is materially altered when it passes the wall at 21 at the point where the water is discharged. The casing portion 10 is modified as shown in Figure 3 in a manner such that a priming chamber is associated with the outlet, the arrangement being such that neither the priming chamber nor the outlet will interfere with the function of the other. The outlet 22 receives the water discharged from the buckets, the movement of the water immediately before discharge being helical so that a large portion of the water is skimmed off when the buckets pass the point 23. The water leaving the buckets and entering the outlet 22 is forced outwardly in a lateral direction toward the outlet 19. The water entering the outlet 22 has a high velocity head which is gradually converted into pressure as the water passes through the passageway 22 since there are no eddy currents or cross currents within the passageway 22 and since the passage way 22 increases in cross section from its inlet toward its outlet. The velocity head of the water is thus converted into pressure without appreciable loss in its passage through the passageway 22.

Immediately beneath the passageway 22 there is a chamber 24 for receiving a portion of the water passing through the passageway 22. The chamber 24 is open at 25 so that the water within the passageway 22 is permitted

to reach the chamber 24 in limited quantities. While the water in the passageway 22 is a rapidly moving body of water, that in the chamber 24 is relatively quiescent. During the movement of the water in the buckets and into the passageway 22, a large amount of air is carried which is separated out from the water in the chamber 24 so that the water reaching the chamber 24 is therefore free from air. The lower portion of the chamber 24 is provided with a channel 26 in which the water normally has no appreciable movement other than a gentle flow toward the outlet of the channel. The wall of the chamber 24 is provided with an aperture 27 for discharging the water passing through the channel 26. The water leaving the channel 26 through the opening 27 is carried back into the buckets between the blades of the rotor near the point from which the discharge of the water from the rotor takes place and thus insures that the buckets will remain sufficiently full for priming purposes in their travel from the wall 21 to the wall 20.

I am aware that numerous attempts have been made to provide primers for rotary pumps and that at least one of these attempts was directed toward the provision of a priming cup. In the prior rotary pump priming chamber the water was given a whirling movement which was imparted to the water by the buckets of the rotor, the outlet conduit being purposely designed for giving the body of water in the priming chamber a whirling movement. In this case the peripheral speed of the water in the priming chamber is equal or nearly equal to the peripheral velocity of the rotor and it creates a back pressure of considerable magnitude against the rotor. Furthermore, the construction converts none of the velocity head of the discharged water into pressure, the velocity head being thus lost. The loss of this velocity head together with the loss due to the back pressure is considerable especially in the normal operating range of the pump.

My pump as hereinbefore described, discharges the water through an elbow of gradually increasing diameter, which changes the velocity energy into pressure. The construction has been so designed as to eliminate as far as possible all whirling movement in the water after the water leaves the buckets between the blades of the rotor. Some of the water from the outlet conduit 22 will reach the priming cup 24 and will pass from thence through the pocket 26 and through the aperture 27 back into the pockets between the blades of the rotor. The separation of the air from the water is facilitated in the priming cup 24 where the water has no movement other than a very gentle flow, the result being that the water passing through the aperture 27 is relatively free from air. Any air in the water is separated in the chamber 24 due to the fact that the water in this chamber is relatively quiet, thus giving gravity a chance to effect the separation. In fact, this is the primary purpose of the chamber 24. The chamber must be made large enough so that water in it will be moving slowly so that gravity will separate the air and water. The great advantage, however, of the present construction is that the water flowing through the conduit 22 exerts no back pressure on the rotor due to whirling movements within the body of water with the further advantage that the shape of the conduit converts practically all of the velocity energy into pressure.

Having thus described my invention in such full, clear, and exact terms that its construction and operation will be readily understood by others skilled in the art to which it pertains, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A fluid outlet for rotary pumps having a rotor with blades in a casing provided with a fluid inlet, said fluid outlet including a conduit for discharging the fluid from the casing, and a chamber for receiving a portion of the fluid from said conduit, the wall of said chamber being provided with an aperture communicating with said conduit at the inlet extremity thereof for conducting fluid from said chamber to the blades of the rotor.

2. A fluid outlet for rotary pumps having a rotor with blades in a casing provided with a fluid inlet, said fluid outlet including a conduit for discharging the fluid from the casing, said conduit increasing in cross section from its inlet to its outlet, and a chamber for receiving a portion of the fluid from said conduit, the wall of said chamber being provided with an aperture communicating with said conduit at the inlet extremity thereof for conducting fluid from said chamber through said conduit and against the blades of the rotor.

3. A fluid outlet for rotary pumps having a rotor with blades in a casing provided with a fluid inlet, said fluid outlet including a conduit for discharging the fluid from the casing, said conduit being inclined in a lateral and tangential direction, and a chamber communicating with said conduit and adapted to receive a portion of the fluid therefrom, the wall of said chamber being provided with an aperture communicating with said conduit at the inlet extremity thereof for conducting fluid from said chamber through said conduit and against the blades of the rotor.

4. A fluid outlet for rotary pumps having a rotor with blades in a casing provided with a fluid inlet, said fluid outlet including a conduit for discharging the fluid from the casing, and a chamber communicating with said conduit and adapted to receive a portion of the fluid therefrom and for maintaining the fluid in a relatively quiescent condition to

thereby permit the separation of air from the fluid, the wall of said chamber being provided with an aperture communicating with said conduit at the inlet extremity thereof for conducting fluid from said chamber through said conduit and against the blades of the rotor.

5. A fluid outlet for rotary pumps having a rotor with blades in a casing provided with a fluid inlet, said fluid outlet including a conduit for discharging the fluid from the casing, a chamber communicating with said conduit and adapted to receive a portion of the fluid therefrom, and a pocket in the bottom of said chamber, the wall of said pocket being provided with an aperture communicating with said conduit at the inlet extremity thereof for conducting fluid from said chamber through said conduit and against the blades of the rotor.

In testimony whereof I affix my signature.

HENRY SCHLACHTER.