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2,722,896

PUMP VALVE

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Fig. 1.

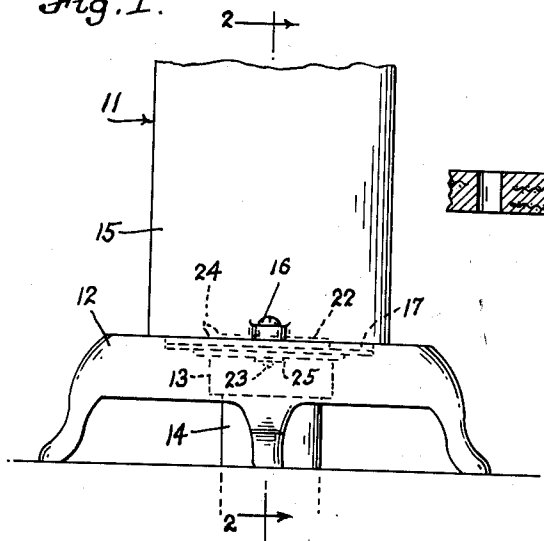


Fig. 4.

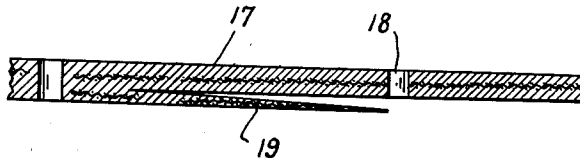


Fig. 2.

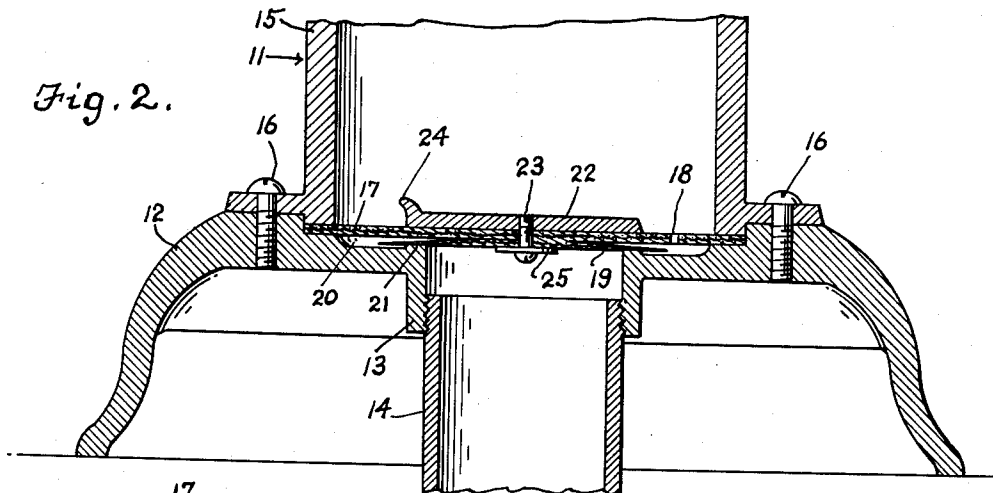


Fig. 3.

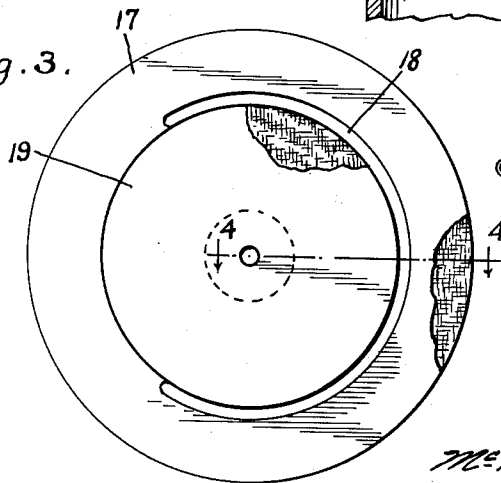
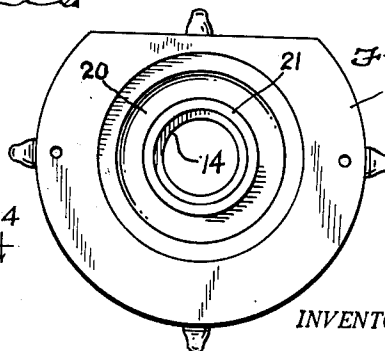


Fig. 5.



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PUMP VALVE

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4 Claims. (Cl. 103—221)

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This invention relates to pumps, and more particularly to an improved pump valve structure.

The main object of the invention is to provide a novel and improved valve structure in a pump of the lift type, such as pumps employed for raising water from wells, the improved valve structure involving simple parts, providing a substantially positive sealing action, and eliminating the necessity for frequently priming the pump while it is being used.

A further object of the invention is to provide an improved valve structure for a lift pump, the improved structure involving inexpensive components, requiring a minimum amount of maintenance, preventing freezing of the pump in cold weather, and providing reliable operation of the pump.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a fragmentary side elevational view of the lower portion of an improved pump constructed in accordance with the present invention.

Figure 2 is an enlarged cross sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a bottom plan view of the apertured flexible cover element employed between the pump cylinder and the base of the pump in the structure shown in Figures 1 and 2, and showing the sealing element integrally connected therewith, a portion of the sealing element being broken away.

Figure 4 is an enlarged cross sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a top plan view of the pump base, the cylinder of the pump being removed.

Referring to the drawings, the pump is generally designated at 11 and comprises a base 12 formed with a central inlet passage 13 to which is connected the depending inlet conduit 14 which leads to the source of water to be raised, such as to a well or the like. Designated at 15 is a vertical cylinder which is secured on the base 12, as by the diametrically opposed bolts 16, 16, the cylinder 15 being provided with the conventional water-elevating piston, not shown, which is commonly employed in pumps of this type. It will be understood that on the upward stroke of the piston, suction is developed in the lower portion of the cylinder 15 below the piston, causing water to be raised from the well or other source through the inlet pipe 14 and the passage 13 into the cylinder 15. On the downward stroke, the piston valve opens, allowing the piston to descend freely, and on the upward stroke, the piston valve closes, causing the water in the upper portion of the cylinder to be elevated and to be delivered from the pump.

Designated at 17 is a circular cover member of flexible material, such as of rubberized fabric, having a fabric main body embedded in a matrix of rubber. The cover member 17 is formed with the arcuate slot 18 concentric with the cover member, as shown in Figure 3, and is further integrally formed with a depending, relatively

flat, downwardly flaring sealing element 19 which normally sealingly engages the top edges of the inlet passage 13, said top edges being slightly elevated above the bottom surface 20 of the top wall of base 12, as shown in Figure 2. The rim of the inlet passage 13 is designated by the reference numeral 21. As shown in Figure 2, the relatively thin tapered peripheral edge of the sealing element 19 rests on the rim 21, and because of the downwardly flaring shape of the sealing element 19, a clearance is provided whereby the peripheral portion of the sealing element may flex upwardly toward the main body of the cover member 17.

As shown in Figure 3, the sealing element 19 has substantially the same radius as the inner edge of the arcuate slot 18, whereby said arcuate slot is unobstructed at all times by the sealing element 19. Designated at 22 is a rigid disc which is secured centrally to the top surface of the cover 17, as by a bolt 23 threadedly engaged in the center of the disc 22 from below and extending through the center of the cover 17, as is clearly shown in Figure 2. The rigid disc 22 is formed at its periphery with an upstanding lug 24 which is engageable by the piston when the piston reaches the lower end of the cylinder. When the piston thus engages the lug 24, the plate 22 is tilted, causing the sealing element 19 to be likewise tilted, since said sealing element is secured to the center of disc 22 by the bolt 23 and by a washer 25 engaging a substantial area of the central portion on the bottom surface of the sealing element 19. This insures positive opening of the sealing element 19 when the piston reaches the lower end of the cylinder, whereby water in the cylinder may be drained back into the inlet conduit 14 when operation of the pump is terminated, preventing freezing of the pump in cold weather.

When the piston reaches the top end of the stroke, the water which has been drawn upwardly into the cylinder 15 will be retained in the cylinder, since the flexible sealing element 19 makes sealing contact with the top rim 21 of the inlet passage 13, and the water will be retained in the lower portion of the cylinder 15 when the piston is moved downwardly, as above described. The sealing element 19 remains in sealing contact with the top rim 21 of passage 13 during the entire downward movement of the piston during normal operation of the pump and prevents leakage of the water in the cylinder 15 back through the conduit 14 during this portion of the piston stroke, whereby it is not necessary to constantly prime the pump when it is operated.

It will be understood that the relatively thin peripheral portion of the sealing element 19 is yieldable to the upward pressure of water thereon when the piston is elevated, to allow the water to flow upwardly through the passage 13 and through the arcuate slot 18 into the lower portion of the cylinder 15. Therefore, on the upward, or suction stroke of the pump piston, the peripheral portion of the sealing element 19 flexes upwardly toward the main body of the cover 17 and allows the water to be raised by the suction developed by the piston into the cylinder 15. At the end of the suction stroke, the peripheral portion of the sealing element 19 descends into sealing engagement with the top rim 21 of the water inlet passage 13.

While a specific embodiment of an improved sealing structure for a water pump has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In a pump having a vertically reciprocating piston, a base formed with a central inlet passage having a top

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peripheral rib element extending above the adjacent surface of said base, a vertical cylinder secured on said base concentrically around said passage and housing said piston, an apertured flexible cover element secured between said cylinder and said base concentrically with said rib element, and a depending relatively flat, downwardly flaring sealing element tapering outwardly in thickness and integrally formed on said cover element concentrically therewith and overlying said rib element, the peripheral portion of said sealing element being relatively flexible as compared with the central portion of said sealing element and normally sealingly engaging said rib element, said peripheral portion being yieldable to the upward pressure of water thereon.

2. In a pump having a vertically reciprocating piston, a base formed with a central inlet passage having a top peripheral rib element extending above the adjacent surface of said base, a vertical cylinder secured on said base concentrically around said passage and housing said piston, an apertured flexible cover element secured between said cylinder and said base concentrically with said rib element, a depending relatively flat, downwardly flaring sealing element tapering outwardly in thickness and integrally formed on said cover element concentrically therewith and overlying said passage, the peripheral portion of said sealing element being relatively flexible as compared with the central portion of said sealing element and normally sealingly engaging said rib element, said peripheral portion being yieldable to the upward pressure of water thereon, and rigid means on the top of said cover element and offset from the center of the sealing element acting to tilt said sealing element responsive to the abutment of the pump piston therewith when the piston is moved downwardly in the cylinder.

3. In a pump having a vertically reciprocating piston, a base formed with a central inlet passage having a top peripheral rib element extending above the adjacent surface of said base, a vertical cylinder secured on said base concentrically around said passage and housing said piston, an apertured flexible cover element secured between said cylinder and said base concentrically with said rib element, a depending relatively flat, downwardly flaring, substantially circular sealing element tapering outwardly in thickness and integrally formed on said cover element concentrically therewith and overlying said passage, the

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peripheral portion of said sealing element being relatively flexible as compared with the central portion of said sealing element and normally sealingly engaging said rib element, said peripheral portion being yieldable to the upward pressure of water thereon, a rigid circular plate secured to the top of said cover element, and upstanding abutment means on said rigid plate offset from the center of the sealing element and acting to tilt said sealing element responsive to the abutment of the pump piston therewith when said piston is moved downwardly in the cylinder.

4. In a pump having a vertically reciprocating piston, a base formed with a central inlet passage having a top peripheral rib element extending above the adjacent surface of said base, a vertical cylinder secured on said base concentrically around said passage and housing said piston, an apertured flexible cover element secured between said cylinder and said base concentrically with said rib element, a depending relatively flat, downwardly flaring, substantially circular sealing element tapering outwardly in thickness and integrally formed on said cover element concentrically therewith and overlying said passage, the peripheral of said sealing element being relatively flexible as compared with the central portion of said sealing element and normally sealingly engaging said rib element, said peripheral portion being yieldable to the upward pressure of water thereon, a rigid circular plate secured to the top of said cover element and an upstanding lug on the periphery of said rigid plate offset from the center of the sealing element and acting to tilt said sealing element responsive to the abutment of the pump piston with said lug when said piston is moved downwardly in the cylinder.

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