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PRIMING DEVICE FOR PUMPS

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2 Sheets-Sheet 1

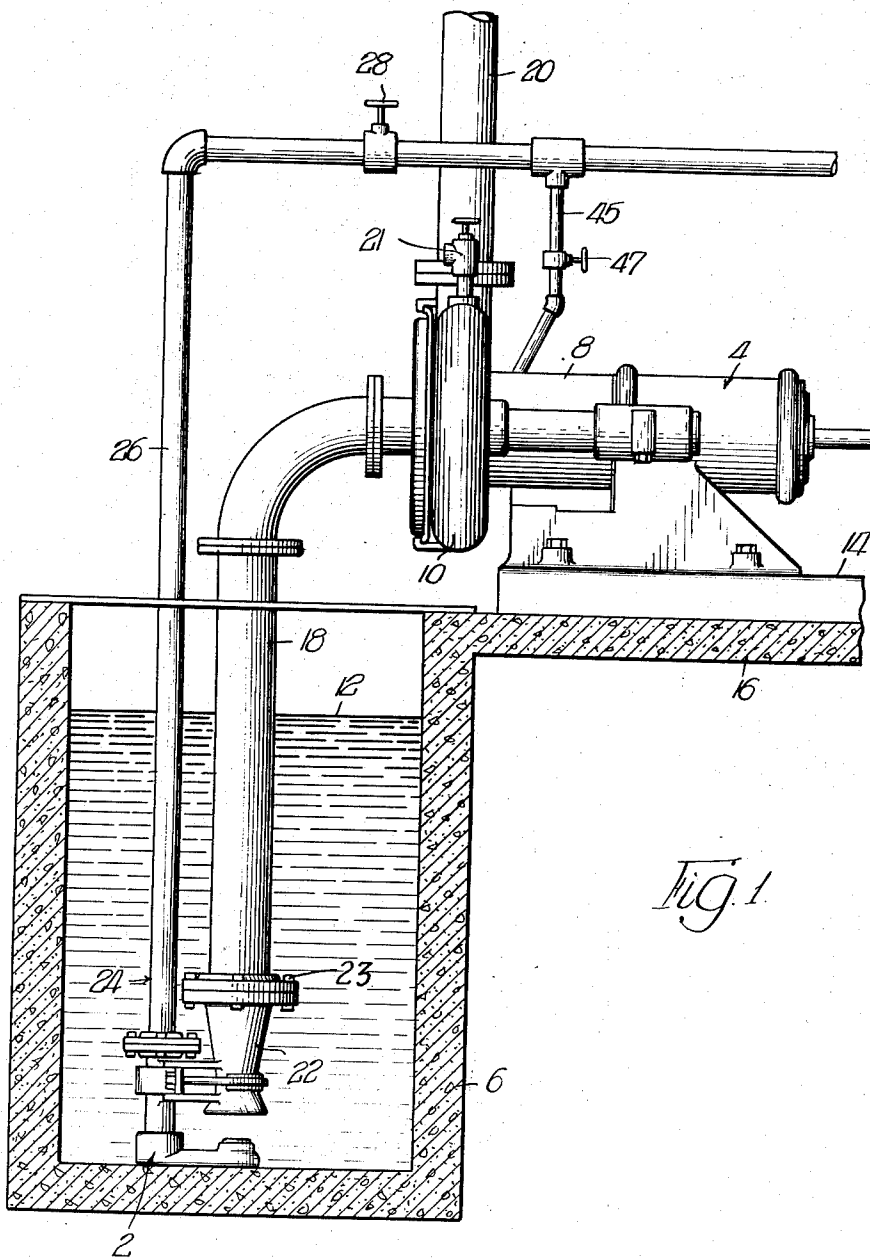


Fig. 1.

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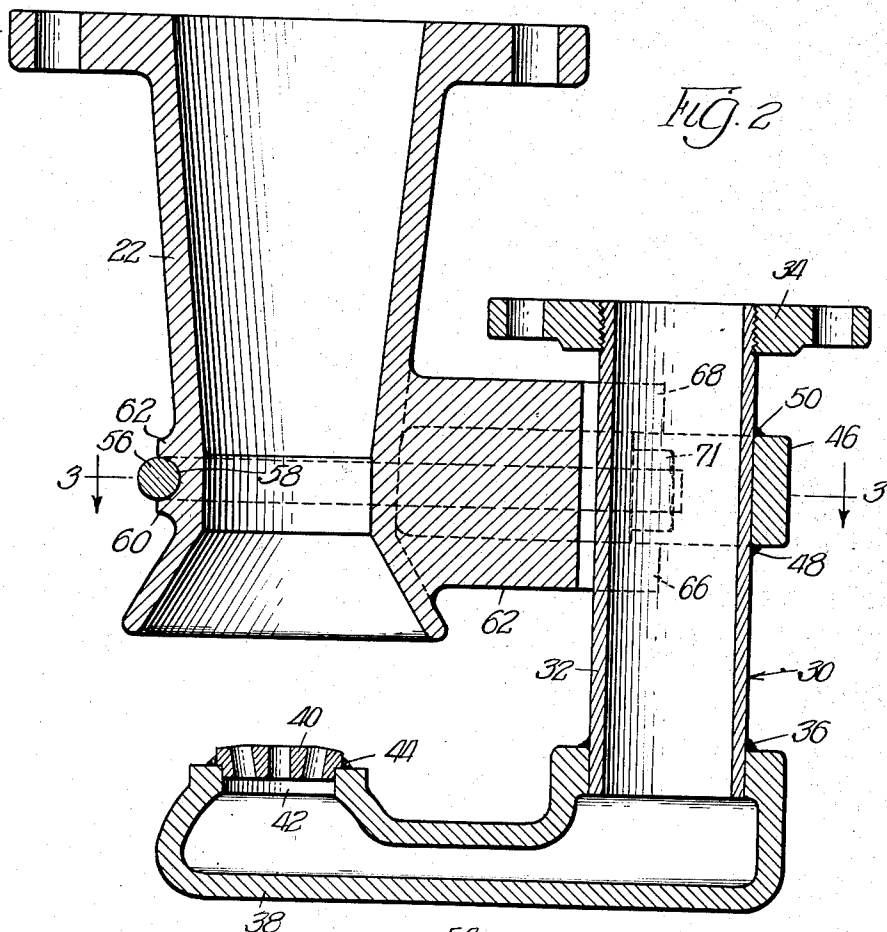


Fig. 2

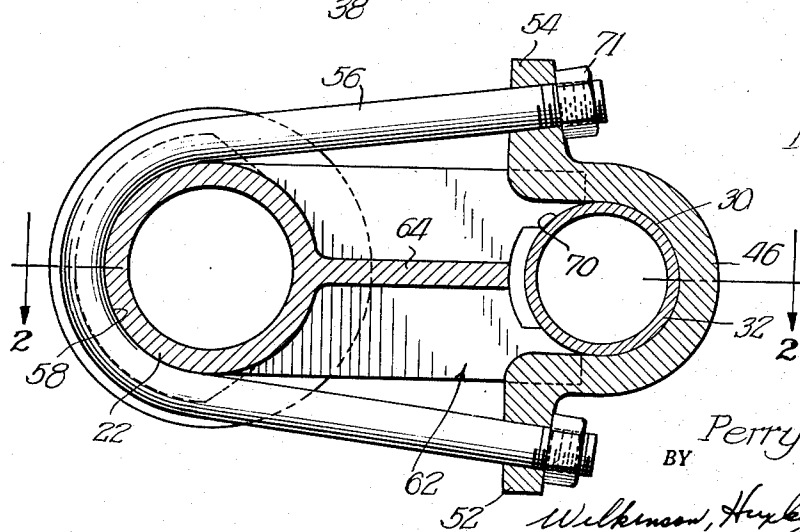


Fig. 3

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PRIMING DEVICE FOR PUMPS

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The present invention relates to priming devices for pumps and more particularly to such devices for use in priming pumping systems where the pump is located above the liquid level.

Among the objects of the present invention is to provide a positive pressure priming device which is of simple construction and may be fabricated at relatively low cost and which may be readily incorporated as a part of a new pumping system or installed in pumping systems now in use.

Another object of the present invention is to provide a novel priming device for priming pumping systems which is positive in its operation under all circumstances even though the entrance pipe so the pump is covered over with solid material.

Still another object of the present invention is to provide a positive acting priming device for pumping systems which in its operation is independent of valves in the entrance and discharge pipes for the pump and in which leaks in the pumping system, such as the entrance pipe or stuffing box, are not critical.

The invention further contemplates a priming device adapted for use in pumping systems which, by virtue of the incorporation of a solenoid valve and a float switch in the system, may be made to operate entirely automatically.

Other objects, features, capabilities and advantages are comprehended by the invention, as will later appear and as are inherently possessed thereby.

Referring to the drawings:

Figure 1 is a view in side elevation of a pumping system in which is incorporated a priming device made in accordance with the present invention;

Figure 2 is a vertical cross-sectional view of the priming device taken on line 2—2 of Figure 3; and

Figure 3 is a view in cross-section taken in the plane represented by line 3—3 of Figure 2 of the drawings.

Referring now more in detail to the drawings, a priming device, generally referred to as 2, and selected to illustrate the present invention, is disclosed as being incorporated in a pumping system, generally referred to as 4, for discharging water or other liquid which may be laden with solid material from the sump 6. The pumping assembly includes a centrifugal pump 8 having an impeller (not disclosed) enclosed within a housing 10 located above the liquid level 12 within the sump, said pump being mounted upon the base 14 secured to the foundation 16, laterally of the sump 6. The impeller housing 10 has communication with a suction pipe or conduit 18 extending downwardly into the liquid within the sump toward the bottom thereof. The impeller housing is also provided with a discharge pipe or conduit 20 extending upwardly therefrom, the liquid and the contained solid material, if any, in the sump being lifted upwardly by the impeller through the suction or intake pipe 18 into the impeller housing and thence outwardly through the discharge pipe 20 to a point of disposal. The impeller housing is also provided with a vent valve 21 for exhausting air in the system during the priming operation.

The priming device 2 is particularly adapted for priming a pump stationed above the liquid level, as disclosed in Figure 1 of the drawings. Such a priming device consists essentially of a flanged fitting 22 connected by means of bolts 23 to the flanged lower end of the intake pipe 18, and a liquid supply means, generally referred to as 24, for directing liquid into the fitting 22 to fill the intake

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pipe 18 and the impeller housing 10 to initiate operation of the pump. In the illustrated example of the invention, the fitting 22 is in the form of a Venturi tube for the most efficient operation of the device, although as it will be appreciated that the fitting 22 may be of uniform diameter. Liquid under pressure is supplied from a suitable source through a pipe 26, controlled by a valve 28, which extends downwardly adjacent the suction pipe 18 and to which a fitting 30 forming a part of the priming device is connected. This fitting 30 is constituted by an upwardly disposed flanged conduit 32 having the flange 34 threaded thereto at its upper end and connected, as by means of bolts or the like, to the lower flanged end of the pipe 26, the other end of the conduit 32 being secured, as by welding 36, to a chambered foot portion 38. The foot portion 38 is formed with an upper opening 42 adapted to receive an orifice plate 40 secured therein for example, by means of the weld joint 44, the said orifice plate being disposed in substantial axial alignment with the Venturi tube 22 whereby liquid from the service supply is directed into the Venturi tube and up into the suction pipe 18 and housing 10. A conduit 45 controlled by a valve 47 is adapted to supply liquid from the conduit 26 to the pump gland mechanism.

Inasmuch as the invention contemplates the provision of a Venturi tube which may be used where the liquids pumped are impregnated with abrasive materials, it becomes desirable to form the same of some non-machinable material such as "Ni-hard" or other similar metal. Because of the non-machinability of such metals, a special and unique connection is provided between the Venturi tube and the fitting 30 whereby the priming device may be readily assembled. The connection is one which prevents slipping, sliding or other movement which would permit the Venturi tube from getting out of alignment.

The connection comprises a yoke 46 which partially embraces the conduit 32 and is connected thereto, for example, by the weld joints 48 and 50. This yoke is provided with the outwardly extending apertured lugs or ears 52 and 54 adapted to receive the threaded ends of a U-bolt 56 which embraces the Venturi tube 22 and is positioned in the partial peripheral groove 58 formed by the peripherally disposed abutment shoulders 60 and 62. The Venturi tube is further formed with an outwardly or laterally extending saddle part 62 constituted by the central vertically disposed web 64 and the upper and lower positioning webs, such as 66 and 68, extending laterally of the web and being formed with arcuate surfaces, such as 70, for abutting the conduit 32. These webs 66 and 68 fit over and embrace the opposite end portions of the yoke 46 to prevent vertical or axial displacement of the Venturi tube with respect to the conduit 32. Relative angular adjustment of the Venturi tube 22 with respect to the fitting 30 is provided within a limited range by the provision of the nuts 71 threaded on the threaded ends of the U-bolt 56 and tightened to secure the Venturi tube to the fitting 30. Such a connection provides a rigid assembly permitting accurate alignment of the Venturi tube 22 with the orifice 40 yet preventing relative movement of the Venturi tube with respect to the fitting 30 once the same have been assembled and connected together in the manner disclosed.

As will be apparent, the priming device constitutes a unit of relatively simple construction which is designed for ready attachment to the intake pipe of the pumping unit. For its operation, the priming device must be connected to a service liquid supply of sufficient capacity and pressure to meet the priming requirements of the particular pumping unit to which the same is applied. Where the service liquid pressure is much in excess of the pressure required for priming, as sometimes occurs, the jet area of the priming device is reduced to avoid excessive consumption.

A priming device made and operated in accordance with the present invention has distinct advantages for use in pumping systems of the type herein described. For example, no valves are necessary in either the intake or discharge pipes for the pump. In addition, since the priming device is a positive pressure device, any leaks

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which may exist in the intake pipe or stuffing box are not critical which might make priming difficult, if not impossible, were an exhaust or foot valve used for such purposes. With the priming device of the present invention, priming is accomplished in a very few seconds and the service liquid to the priming device can be left on or turned off after pumping is initiated, as desired. In the event the liquid supply is maintained, the priming device functions merely as a booster pump tending to increase the head developed by the pump and the capacity of the system.

Of special importance in many applications handling mixtures, is the fact that the operation of the pump may be initiated even when the intake pipe is well covered over with solid material. Under such circumstances, after the entrance pipe and pump are filled, the water back-flows and creates a "quick" condition at the intake which is necessary in handling solids.

While I have herein described and upon the drawings shown an illustrative embodiment of the invention, it is to be understood that the invention is not limited thereto but may comprehend other constructions, arrangements of parts, details and features without departing from the spirit of the invention.

It is claimed:

1. A priming device for centrifugal pumps, comprising a liquid discharge fitting having an upstanding conduit provided with means for connecting the same to a liquid supply under pressure, and a laterally extending foot portion having a chamber communicating with said conduit provided with an outlet orifice means, a Venturi tube having means for connecting the same to the intake passage of a pump and being provided with saddle means engaging said upstanding conduit for positioning the same in substantial alignment with said orifice means, a yoke embracing said upright conduit, and a U-bolt connection between said yoke and Venturi tube for adjustably connecting the same to said upstanding conduit.

2. A priming device for centrifugal pumps, comprising a liquid discharge fitting having an upstanding conduit provided with means for connecting the same to a liquid supply, a laterally extending foot portion communicating with said conduit provided with an outlet orifice means, a second fitting having means for connecting the same to the intake passage of a pump, a yoke embracing said conduit and secured thereto, said second fitting having a laterally extending saddle means abutting said upstanding conduit and interlocking with said yoke, and means embracing said second fitting and being connected to said yoke for securing said fittings together.

3. A priming device for centrifugal pumps, comprising a liquid discharge fitting having an upstanding conduit provided with means for connecting the same to

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a liquid supply, a laterally extending foot portion communicating with said conduit provided with an outlet orifice means, a second fitting having means for connecting the same to the intake passage of a pump, a yoke embracing said conduit and secured thereto, said second fitting having a laterally extending saddle means provided with spaced flanges abutting said upstanding conduit and interlocking with said yoke, and means embracing said second fitting and being connected to said yoke for securing said fittings together.

4. A priming device for centrifugal pumps, comprising a liquid discharge fitting having an upstanding conduit provided with means for connecting the same to a liquid supply, a laterally extending foot portion communicating with said conduit provided with an outlet orifice means, a second fitting having means for connecting the same to the intake passage of a pump, a yoke embracing said conduit and secured thereto, said second fitting having a laterally extending saddle means comprising a centrally disposed web and axially spaced positioning flanges disposed on opposite sides thereof abutting said upstanding conduit and interlocking with said yoke, and means embracing said second fitting and being connected to said yoke for securing said fittings together.

5. A priming device for centrifugal pumps, comprising a liquid discharge fitting having an upstanding conduit provided with means for connecting the same to a liquid supply, a laterally extending foot portion communicating with said conduit provided with an outlet orifice means, a Venturi tube having means for connecting the same to the intake passage of a pump, a yoke embracing said conduit and secured thereto, said Venturi tube having a laterally extending saddle means comprising a centrally disposed web and axially spaced positioning flanges disposed on opposite sides thereof abutting said upstanding conduit and straddling said yoke to prevent axial displacement of said Venturi tube with respect to said conduit, and a U-bolt connected to said yoke and embracing said Venturi tube for securing the same to said conduit.

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