Dec. 13, 1932. O. J. HUGHES 1,890,683

FOOT VALVE

Filed Sept. 11, 1929

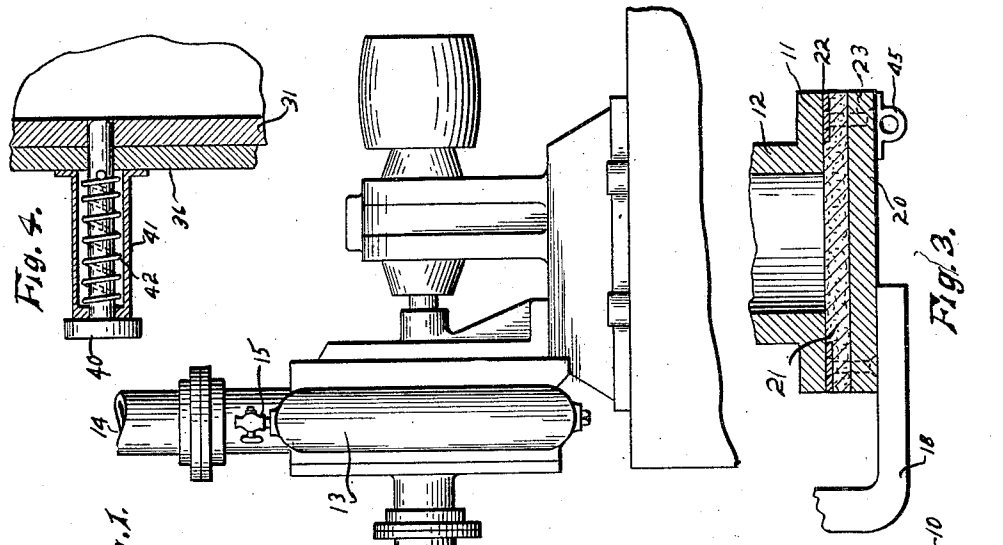


Fig. 4.

Fig. 3.

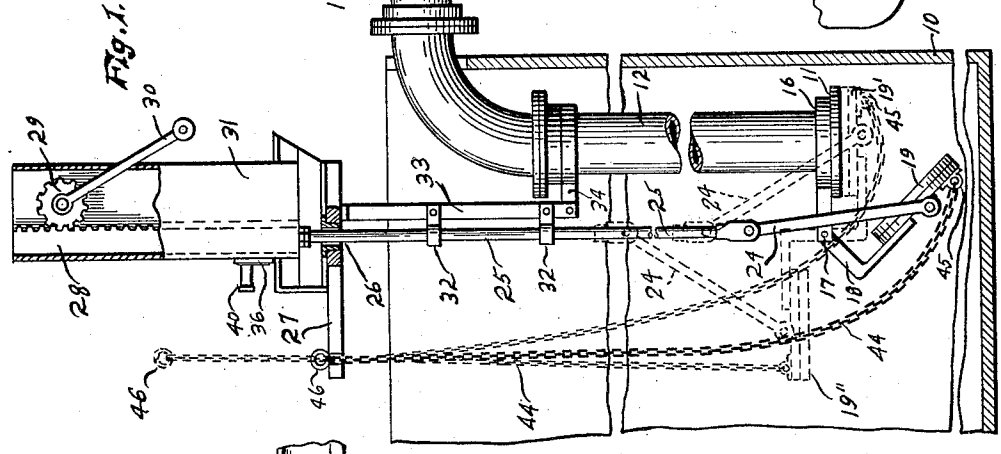


Fig. 1.

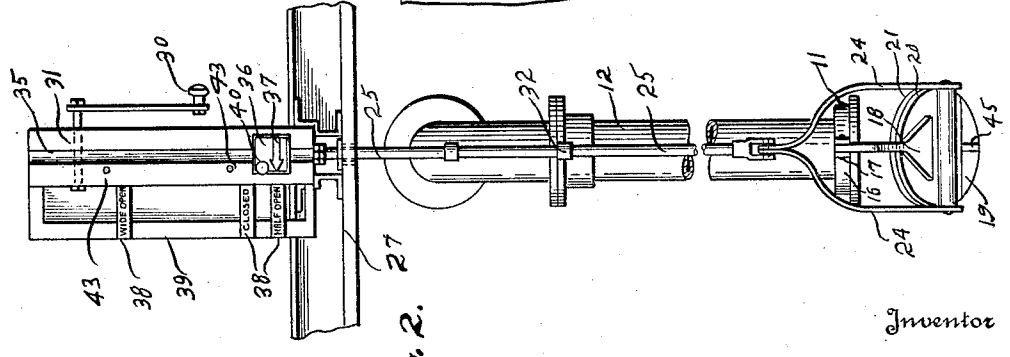


Fig. 2.

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Patented Dec. 13, 1932

1,890,683

UNITED STATES PATENT OFFICE

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FOOT VALVE

Application filed September 11, 1929. Serial No. 391,727.

This invention relates to a valve construction and particularly to an improved type of foot or terminal valve for the inlet end of a suction pipe for a centrifugal or other pump and is used principally for priming the pump. At the present time, the foot or terminal valve usually employed is a double flap check valve which opens upwardly and inwardly as the pump operates. Such a valve reduces the effective area of the suction pipe and also prevents draining of water from the suction pipe and pump when the pump is not operating.

This invention has for an object to provide a terminal which may be independently operated to either closed, half open or wide open position by the operator so as to either completely close off the end of the suction pipe or to swing the valve entirely away from the entrance to the suction pipe leaving the full effective area of the pipe for inlet of liquids.

A further object of this invention is to provide a positively operated means for turning the valve from wide open through half open to closed position, allowing gravity to assist the valve past dead center position when in this process of closing, and to provide a supplemental means to assist the valve past dead center when the aforesaid means is turning the valve from closed to half open and then to wide open position.

With the foregoing and other objects in view, this invention comprises the combinations, arrangements and construction of parts hereinafter set forth, disclosed and claimed in connection with the accompanying drawing.

In this drawing:

Fig. 1 is an elevation of one embodiment of this invention as applied to a suction pump which is being used in a septic tank, for example.

Fig. 2 is a view looking from the left end of Fig. 1, certain parts being omitted.

Fig. 3 is an enlarged cross section through the valve and inlet pipe end, and

Fig. 4 is an enlarged cross section through the spring pressed location pin for holding the operating means in either open or closed position.

There is shown at 10 a septic tank having an embodiment of this invention applied to the inlet end 11 of a suction pipe 12 leading to the suction pump 13 and thence to the discharge end 14, there being a petcock 15 attached to the pump 13 that may be opened to release the vacuum and permit entrance of air when draining the pump. Although shown as being applied to a suction pipe in a septic tank, it is obvious that this device may be used on a suction pipe when used in a well, reservoir, excavation or any other location for pumping liquids.

A member 16 clamped about the pipe 12 near the inlet or mouth 11 has affixed thereto an offset pivoting or hinging pin 17 to which is hinged an arm 18 which in turn is affixed to the valve 19. By this offset hinging means, it will be observed that the valve 19 may be hinged to swing across the mouth or inlet 11 to close it entirely as at 19′ or may be swung entirely away from the mouth through more than a right angle, and in fact, as much as two right angles to bring the valve entirely away from the mouth or inlet 11, as at 19″ as shown in dotted lines in Fig. 1.

This valve 19 as shown in Fig. 3 may comprise a bottom plate or disk 20 to which the arm 18 is affixed. A leather facing 21 is affixed to the disk 20 by a bronze ring 22, this ring being attatched by countersunk copper rivets 23 passing through the plate 20.

The means for operating the valve 19 comprises a bifurcated link 24 connected to the valve and to a reciprocal rod 25. The upper end of rod 25 passes through an opening 26 in the flooring 27 about the tank and is affixed to a gear rack 28 which is operated by a pinion 29 having a crank handle 30 for manual operation thereof, the rack and gear being in a box 31, while a pair of rod guides 32 are affixed to a brace 33 clamped to pipe 12 as at 34.

Affixed to the gear rack 28 through a slot 35 in box 31 is an indication plate 36 having an arrow 37 adapted to cooperate with the indications 38 on a board 39 affixed to the box 31. A location pin 40 is likewise affixed to the plate 36 and comprises housing 41 for enclosing the spring 42 which serves to hold the pin 40 in place, while location holes or stops 43

cooperate with pin 40 to hold the gear in either closed or wide open position unless the pin be withdrawn against the spring 42.

A flexible means as a chain 44 is affixed to an eye 45 on the valve 19 and has its other end 46 passed through another opening in flooring 27, and serves to draw the valve 19 past dead center, as will be apparent.

In operation, this invention is intended to use valve 19 to close bottom or mouth 11 of the suction pipe 12 to retain liquid therein and permit the pump 13 to be primed and then to have valve 19 swung entirely away from the mouth 11 to allow the full area of the pipe to be used to secure maximum efficiency.

Assuming the valve 19 to be in the wide open position as shown in dotted lines at 19″ in Fig. 1, pin 40 may be withdrawn against its spring 42, and crank handle 30 manually turned to lower rack 28 and rod 25 until the arrow 37 shows that the valve is in half open position, as at 19 in full lines in Fig. 1. Due to the center of gravity of valve 19 being offset because of its hinging means, the link 24 will pass slightly beyond dead center, or that is, beyond or to the right of pivot 17 and then the handle 30 may be rotated in the opposite direction to draw the valve to closed position, as will be shown by the indication arrow 37, while pin 40 will serve to hold it in this position. The pump may be then primed by pouring water through the discharge end 14 or by a suitable priming supply until pipe 12 is full, the pet cock 15 being open to allow the air in pipe 12 to escape as it is filled. Then pet cock 15 is closed, thereby serving to prevent the priming water or liquid from escaping. Next the valve 19, which is now in the closed position at 19′ is opened by rotating handle 30 to bring the valve from closed position to half open position, where it hangs just before the dead center position. At this time, end 46 of chain 44 may be manually grasped and the chain 44 drawn upward until the valve 19 is drawn just beyond dead center position or swung outwardly until link 24 passes to the left of pivot 17 as seen in Fig. 1, whereupon handle 30 may be again reversed to bring valve 19 to the wide open position at 19″, where it will be held by pin 40 and wide open stop 43. Pump 13 may then be operated to withdraw the liquid for as long as desirable, and due to the position of the valve at 19″, it will operate at the maximum efficiency, having the full area of the suction pipe entirely unobstructed by any valve or valve parts. When the pumping operation is completed or suspended, the pet cock 15 may be opened. This will serve to allow the liquid in the pump to escape.

Having thus set forth and described this invention, what is claimed is:

1. In a valve construction for the inlet end of a pump, a valve, an offset hinge for said valve, a control means for said valve comprising a vertical rod, a link connecting said rod and said valve, said means and valve having a dead center position relative to one another, said rod being reciprocable to actuate said valve, and a supplementary means for actuating said valve beyond dead center.

2. In a valve construction, an upright pipe, a valve adapted to close an inlet at the bottom of said pipe, offset means for hinging said valve to said pipe, an upright control rod, a link connecting said control rod and said valve, said valve, rod and link having a dead center position relative to one another, said valve being before dead center when in half open position, and an independent flexible means to draw said valve beyond dead center toward wide open position.

3. In a valve construction for the inlet end of a suction pump, a valve, offset means for hinging said valve, means having a dead center position relative to said valve to swing said valve across said inlet end and swing it entirely clear of said inlet end, said means including supplementary means to swing said valve past dead center.

4. In a valve construction, a valve, offset means for pivoting said valve to close the bottom end of an inlet pipe, said means permitting said valve to be moved more than a right angle away from said closed position, a reciprocatory means linked to said valve for moving said valve and having a dead center position relative to said valve, said reciprocatory means being adapted to positively open and positively close said valve, and supplementary means for swinging said valve past dead center position towards the open position.

5. In a valve construction for the inlet of a suction pump, a valve fitting across the inlet, a pivot supported away from said inlet, a hinge arm on said valve swinging about said pivot, a bifurcated link pivoted to said valve, a reciprocable rod, said link being connected to said rod, said valve, rod and link having a dead center position relative to one another, means to reciprocate said rod to a desired position to swing said valve to half open or shut position, independent means to swing said valve beyond dead center when in half open position, said rod being then reciprocable to swing said valve to full open position.

6. In a valve construction for closing the inlet end of a pump pipe, a valve, an offset pivot supported by said pipe, a correspondingly offset hinge member on said valve swingable about said pivot through more than a right angle, a vertically reciprocable control rod, a link connecting said rod and said valve, said valve, rod and link having a dead center position relative to one another, supplementary means to pivot said valve beyond dead center toward full open position.

7. In a valve construction for closing the inlet end of a pump pipe, a valve, an offset

pivot supported by said pipe, a correspondingly offset hinge member on said valve swingable about said pivot through more than a right angle, a vertically reciprocable control rod, a link connecting said rod and said valve, said valve, rod and link having a dead center position relative to one another, supplementary means to pivot said valve beyond dead center toward full open position, a rack for reciprocating said rod, and a gear to operate said rack.

8. In a valve construction for closing the inlet end of a pump pipe, a valve, an offset pivot supported by said pipe, a correspondingly offset hinge member on said valve swingable about said pivot through more than a right angle, a vertically reciprocable control rod, a link connecting said rod and said valve, said valve, rod and link having a dead center position relative to one another, supplementary means to pivot said valve beyond dead center toward full open position, a rack for reciprocating said rod, and a gear to operate said rack, means on said rack indicating the valve position, and means for holding said rack in an indicated position.

9. In a valve construction for the inlet end of a suction pump, a valve, means hinging said valve, means having a dead center position relative to said valve to swing said valve across said inlet end and swing it entirely clear of said inlet end, and an independent flexible means to draw said valve beyond dead center position.

In testimony whereof I affix my signature.

OWEN J. HUGHES.