Feb. 7, 1933. W. BUCKLEY 1,896,219

ADJUSTABLE CENTRIFUGAL PUMP

Filed Nov. 30, 1931

Fig. 1.

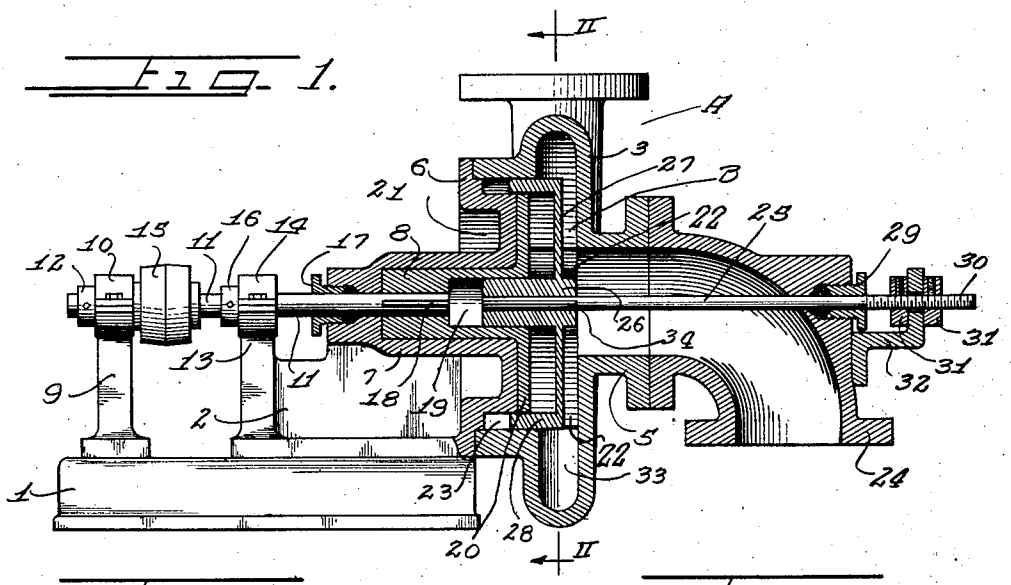


Fig. 2.

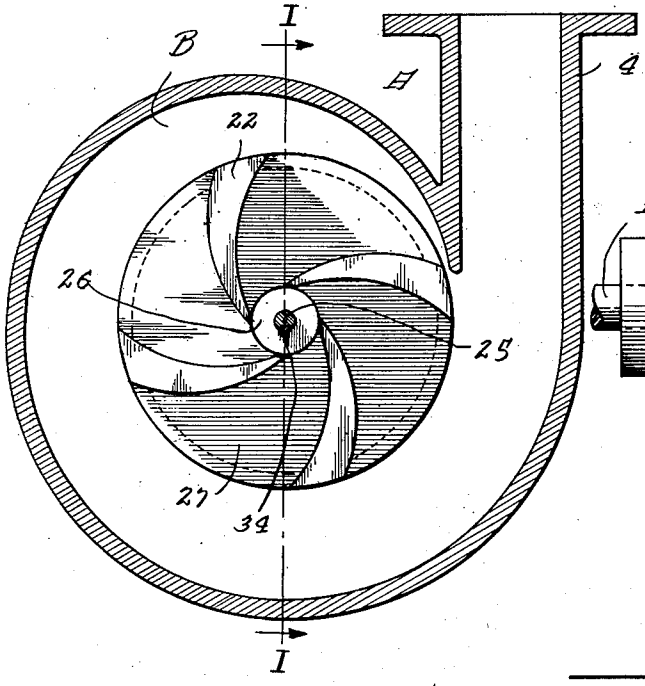
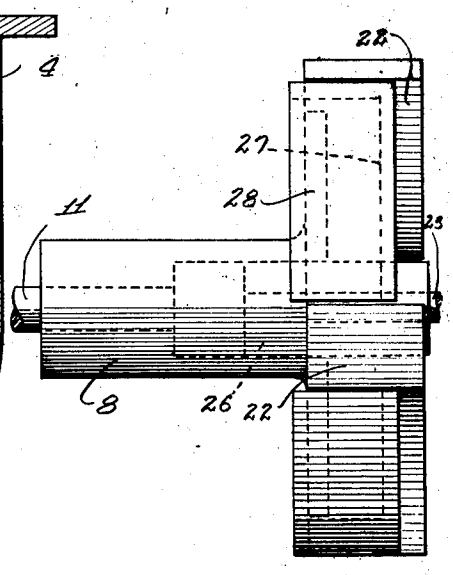


Fig. 3.



Inventor
William Buckley.

by: Charles D. Hills Attys.

Patented Feb. 7, 1933 1,896,219

UNITED STATES PATENT OFFICE

WILLIAM BUCKLEY, OF CHICAGO, ILLINOIS

ADJUSTABLE CENTRIFUGAL PUMP

Application filed November 30, 1931. Serial No. 577,889.

The present invention relates to an adjustable centrifugal pump and particularly to one which may be employed in a pipe line through which passes liquid and non-liquid matter, wherein the pump functions as a valve for controlling the amount of flow in the pipe line.

It has been found in sewage disposal plants, especially, that where valves are interposed in pipe lines carrying sewage the valves become clogged by reason of the insoluble or semi-insoluble matter carried in the liquid stream thus impeding circulation of the fluid through the pipe line.

The present invention contemplates a centrifugal pump having a member within the impeller chamber for varying the size of the impeller chamber so that such pump may be interposed in a pipe line in place or instead of a valve for regulating amount of fluid passage through the pipe line without offering impedance to the passage of solid or semi-solid matter in suspension.

An object of the present invention is to provide a centrifugal pump with means for varying the capacity of the impeller chamber.

Another object of the invention is to provide a centrifugal pump with a movable back wall whereby the effective pumping capacity of the impeller chamber may be varied at will to regulate passage through the pump.

The above and further objects of the invention will be apparent from the following description, accompanying drawing, and appended claims.

The accompanying drawing illustrates an embodiment of the present invention and the views thereof are as follows:

Figure 1 is an elevational view, partially in section, of a centrifugal pump embodying principles of the present invention, the section being taken substantially in the plane I—I of Figure 2.

Figure 2 is an enlarged vertical sectional view taken substantially in the plane of line II—II of Figure 1.

Figure 3 is an enlarged elevational view of the illustrated form of movable back wall showing its association with the impeller blades or vanes of the pump structure.

The drawing will now be explained.

The apparatus chosen to exemplify the present invention illustrates a base 1 on which is supported a part 2 of a centrifugal pump casting. The pump A, as illustrated, includes a casing 3 which, as shown, provides a part of the impeller casing, the inlet neck at the axis of the pump and the tangential outlet portion 4. The axial inlet neck is indicated at 5. The casing 3 and that portion of the casting 2 indicated at 6 are connected together in any suitable manner such as by bolts or the like to form the completed pump structure.

The part 2 is provided with an elongated cylindrical housing 7 which receives the hub 8 of the impeller.

The base 1 supports a pedestal 9 which at its upper end carries a bearing 10 for one end of the impeller shaft 11. A collar 12 is secured to the outer end of the shaft 11 beyond the bearing 10. A part of the casting 2 is a pedestal 13 which carries a bearing 14 for the shaft 10, while a drive connection, such as a pulley 15, is secured to the shaft 11 in any suitable manner. A collar 16 is secured to the shaft adjacent to bearing 14, the collars 12 and 16 acting to maintain the hub 8 of the impeller properly positioned with the housing 7. The bearings 10 and 14 may be ball or roller bearings as desired.

The casting 2 adjacent the outer end of the housing 7 is apertured to receive the shaft 11 and a gland 17 is provided surrounding the shaft to make leaktight joint about the shaft where it enters the housing 7. The shaft 11 is keyed by a key 18 to the hub 7 of the impeller for driving the impeller.

The hub 7 is counterbored at 19 for a purpose to be later described. The impeller includes a part 20 which extends radially with respect to the shaft 11 inwardly of the wall 21 of the housing 8.

The impeller blades or vanes 22 are cast integrally with the member 20 and the balance of the impeller, and extend axially from the member 20. The blades or vanes 22 are preferably curved in end elevation as illustrated in Figure 2.

The inner wall 21 of the pump casing A is

fashioned to provide an annular recess 23 in the rear portion of the casing which recess extends about the peripheral part of the impeller chamber.

The inlet neck 5 is connected by an elbow 24 which, in the present instance, is shown as a 90° elbow for connection to the pipe line. The elbow 24 and the neck 5 are connected by bolts or like means, not shown, for operating with the flanges of these parts as is common practice. A rod 25 is axially movable within the elbow 24 and at its inner end carries a hub 26 which enters a counterbore 19 in the impeller hub 8. The hub 26 is provided, in the present instance, with a plurality of radially extending webs 27 which conform to the faces of the impeller blades 22 and fill the space between the hub 26 and the peripheries of the vanes 22 so as to make a substantially unbroken surface against the inlet 5. The webs 27 constitute in effect a movable backwall for the effective part of the impeller chamber which is designated generally as B in Figure 1. The peripheries of the webs 27 are provided with rearwardly extending flanges 28 which enter the recess 23 in the back portion of the casing thus cutting off access to the rear side of the webs 27.

The rod 25 passes through a gland 29 formed in the elbow 24 which rod at its outer end is threaded as at 30 to engage threaded blocks 31 supported on a bracket 32 outwardly of the elbow. The rod 25 by being turned will therefore advance inwardly or outwardly depending on the direction of rotation of the rod so as to move the hub 26 and its carried webs 27 axially within the impeller chamber B thus moving these webs or movable backwall toward or away from the front wall 33 of the casing thus varying the effective capacity of the impeller chamber, that is, varying that portion of the impeller chamber which is subjected to impeller action as fluid passes into the pump through the neck 5 and is discharged outwardly through the outlet 4.

It will be observed that by movement of the rod 25 and its accompanying hub 26 and webs 27 passage of fluid through the pump is more or less restricted as determined by the position of the webs 27 with respect to the front wall 33 of the casing 3. Thus a centrifugal pump embodying principles of the present invention may be interposed in a pipe line and by regulating the axial position of the webs 27 with respect to the front face 33 of the casing 3 control of the amount of fluid passing through the pump may be secured. It will be apparent that no impedance is offered to the passage of solid or semi-solid matter carried by the fluid stream through the pump.

The webs 27 rotate with the impeller and consequently the rod 25, which is secured to the hub 26 by a key 34, rotates. The position of the locking collars 31 on each side of the upstanding portion of the bracket 32 allows rotation of the rod 25 without axial movement of the rod with respect to the bracket, thus when the rod is once adjusted the effective capacity of the impeller chamber is maintained until the rod is again adjusted.

Figure 3 illustrates the position of the webs 27 and flanges 28 thereof with respect to the blades or vanes 22 of the impeller.

The centrifugal pump of the present invention may be utilized as a centrifugal pump by moving the hub 26 and rod 25 inwardly so that the webs 27 lie against the member 20 of the impeller, thus increasing the capacity of the impeller chamber to maximum, or the pump may be utilized as a valve, as above described, by moving the webs 27 toward the front face 33 of the casing 3 thus restricting passage through the pump but in nowise offering impedance to solid or semi-solid matter carried by the fluid stream. The utilization of the impeller blades aids in keeping the solid or semi-solid matter moving thus serving the important function of preventing stoppage or impedance in a pipe line where sluggish matter such as sewage is continually passing as appears in a sewage disposal or like plant.

The invention is claimed as follows:

1. A centrifugal pump in combination, an impeller casing having an impeller chamber therein, an impeller rotatable within said chamber, said impeller having a hub and blades on the hub, said hub being provided with a counterbore opening into the chamber, a rod disposed coaxially with said hub and carrying a hub movable within said counterbore, said rod hub carrying radially extending webs disposed between the impeller blades and serving as a movable back wall for the impeller chamber, said webs bridging the spaces between the impeller blades, the movement of said rod causing corresponding movement of said movable back wall, and the space between the front wall of the impeller casing and the movable back wall constituting that portion of the impeller chamber subject to impeller action, the movement of said movable back wall within said impeller chamber serving to vary fluid pressure through the pump.

2. A centrifugal pump in combination, an impeller casing having an impeller chamber therein, an impeller rotatable within said chamber, said impeller having a hub and blades on the hub, said hub being provided with a counterbore opening into the chamber, a rod disposed coaxially with said hub and carrying a hub movable within said counterbore, said rod hub carrying radially extending webs disposed between the impeller blades and serving as a movable back wall for the impeller chamber, said webs bridging the spaces between the impeller blades, the movement of said rod causing corresponding movement of said movable back wall, and the space between

the front wall of the impeller casing and the movable back wall constituting that portion of the impeller chamber subject to impeller action, the movement of said movable back wall within said impeller chamber serving to vary fluid passage through the pump, a bracket outwardly of said pump, said rod extending thru said bracket, adjusting nuts at the end of said rod disposed one at each side of the bracket for adjusting the axial position of the rod, said nuts and said rod being rotatable with the impeller without affecting the axial adjustment of the rod and its supported hub.

In testimony whereof I have hereunto subscribed my name at Chicago, Cook county, Illinois.

WILLIAM BUCKLEY.