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W. R. WOOCK ET AL

CENTRIFUGAL PUMP WITH SELF CENTERING RUNNER

Filed Oct. 26, 1921

Fig. 1

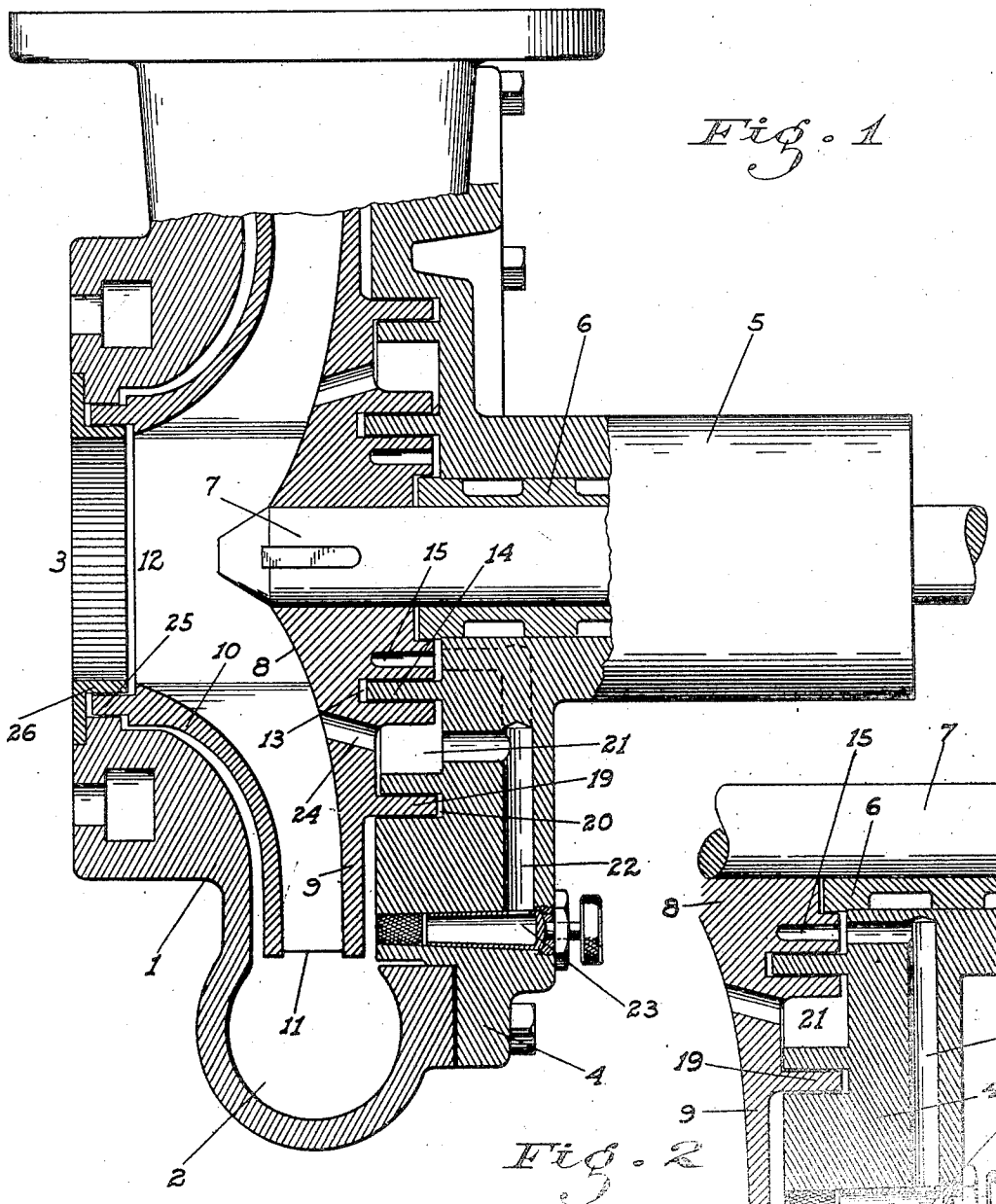
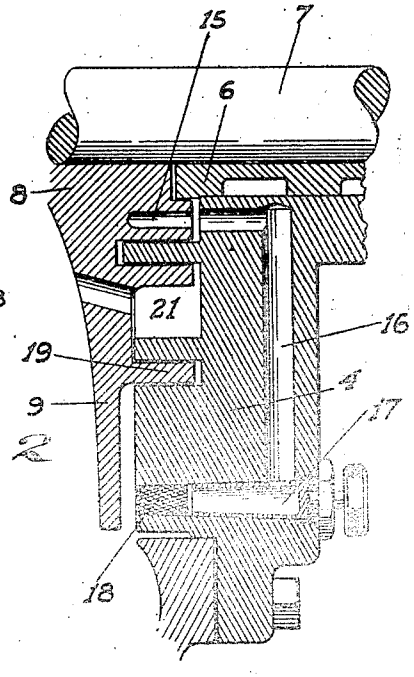


Fig. 2



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UNITED STATES PATENT OFFICE.

WALTER R. WOOCK, HERBERT J. WOOCK, AND ERIC M. WOOCK, OF LODI, CALIFORNIA, ASSIGNORS TO SUPERIOR MANUFACTURING COMPANY, OF LODI, CALIFORNIA, A CORPORATION.

CENTRIFUGAL PUMP WITH SELF-CENTERING RUNNER.

Application filed October 26, 1921. Serial No. 510,503.

To all whom it may concern:

Be it known that we, WALTER R. WOOCK, HERBERT J. WOOCK, and ERIC M. WOOCK, citizens of the United States, residing at Lodi, county of San Joaquin, State of California, have invented certain new and useful Improvements in Centrifugal Pumps with Self-Centering Runners; and we do declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this application.

This invention relates to improvements in centrifugal pumps, and is particularly intended as an improvement over that type of pump shown in our co-pending application for patent on a "packless pump" filed June 18th, 1921, Serial No. 478,521.

The principal object of the present invention is to provide, in addition to the features of construction shown in the above mentioned application, means for positively causing the runner to be centrally balanced under all conditions of operation, regardless of whether the vacuum pressure is greater than the water pressure or vice versa.

We have also provided hand controlled means for quickly and easily adjusting or controlling the balancing of the runner to suit different conditions of operation, without altering the construction of one pump over another in any way, and without necessarily stopping the pump to do so.

A further object is to arrange for a water seal at the intake or suction end of the pump between the suction and pressure sides of the runner thereby preventing sand or other abrasive matter being drawn between the bearing of the runner and casing, which of course wears away the bearing surfaces of the runner and casing and destroys the efficiency of the pump.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purposes which it is designed.

These objects we accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a sectional elevation of the pump.

Fig. 2 is a fragmentary section of the same taken on a line in a similar but offset plane from Fig. 1.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes the casing of the pump provided with the usual discharge and pressure chamber 2, and intake opening 3.

Fixed onto the end of the casing opposite the intake is a cap 4 having an outwardly projecting hub 5 in which are fitted bearing sleeves 6 forming journals for the pump shaft 7 on the inner end of which is a runner member 8, comprising a pair of walls 9 and 10 adjacent the cap and opposite face of the casing respectively, and transversely disposed vanes 11, this runner having a central intakes opening 12 in alinement with and adjacent the casing intake 3, and being arranged to discharge the water into the chamber 2. The construction and arrangement of parts thus far described is substantially the same as shown in the aforementioned application.

The face of the wall 9 adjacent the cap 4 is provided with an annular groove 13, concentric with the shaft 7, into which groove a flange 14 formed with the cap 4 projects with an easy running fit.

Intermediate the groove 13 and the plane of the outer periphery of the bearing 6 is another groove 15 in the wall 9, concentric with the shaft 7, to which groove a water passage 16 leads from the chamber 2, with a hand regulated control valve 17 interposed therein (see Fig. 2), a screen 18 being placed in the passageway between the valve and chamber 2.

Positioned outwardly of the groove 13 and formed with the wall 9 is an annular flange 19, projecting into a groove 20 formed in the cap 3. These members might be reversed in position, except that at this point the wall 9 is too thin to allow of a groove of any depth being cut therein.

Positioned between the flanges 14 and 19, and formed and enclosed between the wall 9 and cap 3, is an annular chamber 21, whose face area adjacent the wall 9 is preferably about 8% greater than that of the intake openings 3 or 12. A water passage-

way 22 leads to this chamber from the pressure chamber 2, which passage has a hand actuated control valve 23 interposed therein similar to the valve 17.

The chamber 21 also communicates with the vacuum chamber of the runner 8 through the medium of holes 24 therebetween.

This form of vacuum chamber itself is not novel, as its value is recognized in this type of pump.

It will be noted however that in our pump this chamber is water sealed on each end by reason of the co-operating grooves and flanges, while at the same time water may be admitted thereto by reason of the passageway 22 and its controlling valve.

The general function of various flanges and grooves, and of the chamber 21 and groove or chamber 15 has been already set forth in the co-pending application aforementioned; so we will here confine ourselves to showing how the runner may be perfectly and adjustably balanced for all conditions of operation. In operation, owing to the relative size of the areas 3 and 21, the runner will be drawn toward the shaft end of the pump under all conditions of vacuum and pressure.

By proper manipulation of the valves 17 and 23, the runner may be accurately balanced and centered under any and all conditions, and to permit of this, the runner and its sundry flanges and grooves are sufficiently spaced from the corresponding members of the cap and casing, to allow a certain amount of lateral play of the runner.

If working with a very high vacuum, the valve 17 alone is opened, throwing pressure into the annular chamber 15, and thus causing the runner to be thrust toward the intake, the intensity of this thrust depending on the extent to which the valve is opened. In this case, the valve 23 is not opened, since this would tend to weaken the vacuum in the chamber 21 and runner, which is not desirable. With a low vacuum and a high pressure, or with a low vacuum and low pressure, both valves are used, being adjusted so as to bring the runner into perfect balance while running.

It is to be noted that while under some conditions, the valve 23 is not used, the valve 17 is always open, if only slightly, in order to give the water-film or pressure bearing for the pump shaft.

The intake end of the runner terminates in a flange 25, formed with the wall 10, and which bears against the casing with a running fit. The inner surface of this flange is covered by a sleeve 26, fixed onto the casing, and thus making with the casing an enclosed and annular groove in which the flange fits, thus providing a water seal joint which prevents the suction at the intake from exerting any influence tending to draw any water, and likewise any sand etc. in suspension therewith, between the casing and runner walls and between the bearing surfaces of these two members at the intake end.

From the foregoing description it will be readily seen that we have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a deparature from the spirit of the invention, as defined by the appended claims.

Having thus described our invention, what we claim as new and useful and desire to secure by Letters Patent is:

1. A centrifugal pump comprising a casing, a runner turnably mounted therein, and a pair of annular and concentric chambers separated from each other and formed between the runner and the casing on the side thereof opposite to the intake of the pump, one of said chambers communicating with the vacuum chamber of the runner and both chambers communicating with the pressure chamber of the pump.

2. A centrifugal pump comprising a casing, a runner turnably mounted therein, and a pair of annular and concentric chambers separated from each other and formed between the runner and the casing on the side thereof opposite to the intake of the pump, one of said chambers communicating with the vacuum chamber of the runner and both chambers communicating with the pressure chamber of the pump, and sealing-wall means on both sides of the first named chamber concentric therewith.

3. A centrifugal pump comprising a casing, a runner turnably mounted therein, and a pair of annular and concentric chambers separated from each other and formed between the runner and the casing on the side thereof opposite to the intake of the pump, one of said chambers communicating with the vacuum chamber of the runner and both chambers communicating with the pressure chamber of the pump, and sealing wall means between the chambers and between the first named chamber and the pressure chamber of the pump, said first named chamber being outwardly of the other chamber relative to the axis of the pump.

4. A centrifugal pump comprising a casing, a runner turnably mounted therein, a pair of annular and concentric chambers formed between the runner and the casing on the side thereof opposite to the intake of the pump, one of said chambers communicating with the vacuum chamber of the runner and both said chambers communicating with the pressure chamber of the

pump and means for each such chamber for controlling the flow of water from the pressure chamber thereto.

5. A centrifugal pump comprising a casing, a runner turnably mounted therein, a pair of annular and concentric chambers formed between the runner and the casing on the side thereof opposite to the intake of a pump, one of said chambers communicating with the vacuum chamber of the runner, an independent water passageway leading to each chamber from the pressure chamber of the pump, and hand controlled valve means interposed in each passageway.

In testimony whereof we affix our signatures.

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