

Oct. 30, 1928.

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A. W. BURKS

ROTARY PUMP

Filed Aug. 24, 1921

Fig. 1.

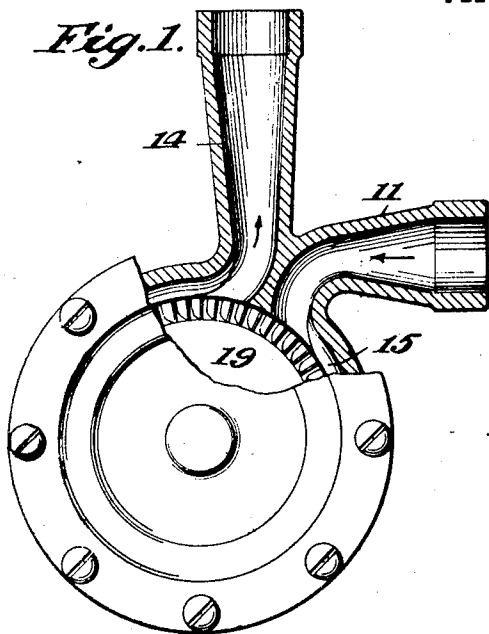


Fig. 2.

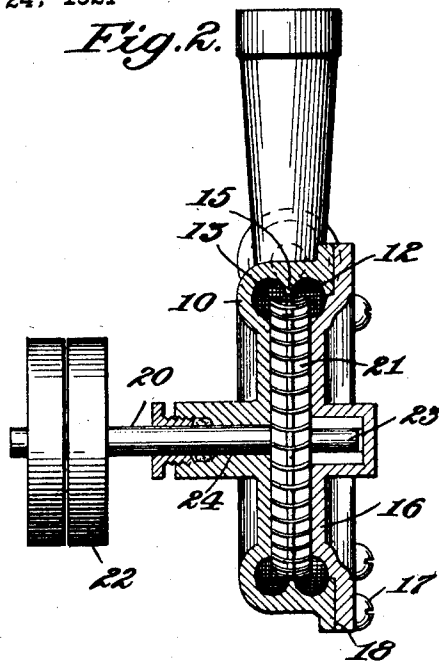


Fig. 3.

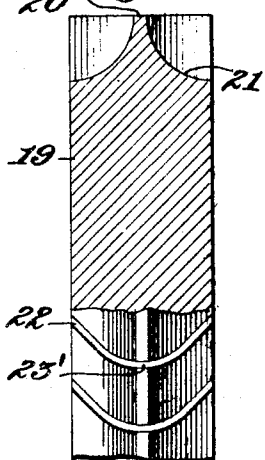


Fig. 4.

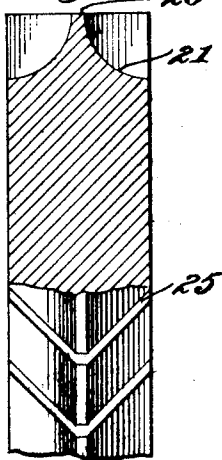


Fig. 5.

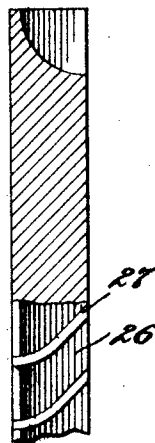


Fig. 6.

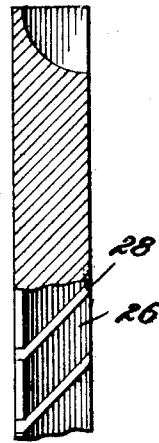
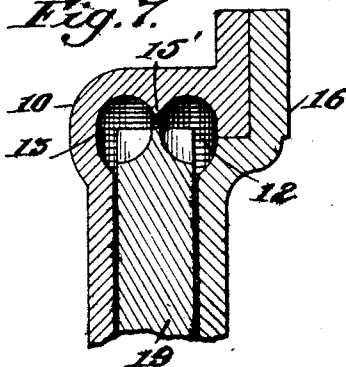


Fig. 7.



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ROTARY PUMP.

Application filed August 24, 1921. Serial No. 494,995.

This invention relates to improvements in rotary pumps of the general type disclosed in my co-pending application Serial No. 444,830, filed February 14, 1921, and comprising a rotor having fluid impelling means, such as a series of buckets, operating within a raceway.

An object of this invention is to eliminate eddy currents and other power decreasing conditions, and thereby to increase the efficiency of the pump.

Another object of the invention is to provide a rotor having a novel bucket construction adapted to operate within a fluid raceway and extending from an inlet to an outlet.

The above and other objects of a more obvious character are accomplished by providing a pump comprising a casing having a plurality of separate raceways, and, positioned within the casing, a rotor provided around its periphery with a plurality of series of buckets, each series being within a separate raceway. The buckets are separated by equi-distant blades which extend laterally from the rotor and are inclined in the direction of rotation of the rotor.

In the accompanying drawings, there is shown one form of a device in which the invention may be embodied, and in these drawings:—

Fig. 1 is a sectional elevational view of the pump.

Fig. 2 is a vertical cross section of the casing with the rotor shown in elevation.

Fig. 3 is a view showing the rotor partly in elevation and partly in section.

Fig. 4 is a view similar to Fig. 3 showing a modified form of bucket construction.

Fig. 5 is a view similar to Fig. 3 of a rotor having a single series of buckets.

Fig. 6 is a view similar to Fig. 4 showing a rotor provided with a single series of buckets of the type shown in Fig. 4, and

Fig. 7 is a fragmentary sectional view showing a slightly modified form of raceway construction.

Referring to the drawings for a more detailed description, 10 indicates a casing section of dished formation having an inlet 11 communicating with circular raceways 12, 13 extending around the casing to an outlet 14. The raceways are separated by a rib 15 which serves as a separating partition and extends from the inlet opening 11 to the outlet opening 14, the raceways being provided with a common inlet and a common outlet.

A second casing section 16 serves to complete the casing and is secured to the first mentioned section, as by screws 17 extending through facing flanges 18 upon the two sections. A rotor 19 fixedly secured upon a shaft 20, having bearings 23, 24, is mounted within the casing, and has a plurality of series of peripheral buckets operating within the raceways.

Referring to Figs. 3 and 4, it will be noted that the rotor around its periphery slopes downwardly and outwardly from a central peripheral rib 20' toward each side to form a series of buckets 21 on each side of the peripheral rib 20'.

Referring more particularly to Fig. 3, the buckets of each series are spaced by equi-distant blades 22 extending laterally from the rib 20' and laterally inclined in the direction of the rotation of the rotor. It will be observed that the blades are entirely within the planes of the two sides of the rotor, and their outer ends are positioned forwardly in advance of the inner ends 23' at the rib 20. Each blade is thus provided with an impelling face laterally inclined in the direction of rotation of the rotor; and it has been found that by forming the blades as above described, the efficiency of the pump is materially increased, as compared with a pump provided with the blades extending at right angles to the sides of the rotor as in prior constructions. In such pumps, the water entering the raceway through the inlet 11 acquires the velocity of the impeller almost instantaneously, and, as a result, there is a considerable loss of power due to friction and eddy-currents thus created. In the pump of this invention, the water entering the inlet 11 is met by the impelling face of the blade which is inclined in substantially the direction of the course of the water, and the water, therefore, acquires more gradually the velocity of the impeller.

Referring to Fig. 2, it will be noted that the two series of buckets are positioned within separate raceways; and the partition 15, extending inwardly about the rib 20 of the rotor, serves to prevent leakage of the fluid from one raceway to the other. I am aware that it is broadly old to employ a rotor provided with a plurality of series of peripheral buckets, but in prior constructions, so far as I am aware, the two series operate within a single raceway; and there arises a considerable loss of power due to the friction and

eddy-currents between the fluid operated upon by the separate series of buckets. It will be understood that each series of buckets causes the fluid to take a substantially helical path through the raceway, the course of the fluid being a component of the centrifugal and tangential forces created by the rotor. By forming two distinct raceways, I have found that it is possible to eliminate these eddy-currents to a considerable degree, and thus, to materially increase the operating efficiency of the pump.

Referring to Fig. 4, it will be observed that the blades, instead of having the curved impelling faces of the blades shown in Fig. 3, have substantially straight impelling faces which operate in substantially the same manner as the curved impelling faces shown in Fig. 3.

The rotors shown in Figs. 5 and 6 are provided with but a single series of buckets 26, and, obviously when such a rotor is employed, it is not necessary to provide a casing with the rib 15 forming a plurality of raceways. The blades 27, shown in Fig. 5, are the same as the blades of Fig. 3, and the blades 28 of Fig. 6, function in the same manner as the blades shown in Fig. 4.

In the modified form of the invention shown in Fig. 7 it will be noted that the partition or rib 15' does not extend inwardly to a point immediately adjacent the periphery of the rotor, as in Fig. 2. The edge of the rib 15' is considerably spaced from the periphery of the rotor; and it has been found that with this arrangement the operation of the pump is substantially as satisfactory as when the raceways are entirely separated, as in Fig. 2. When but a single raceway is employed it has been observed that the eddy-currents are created at substantially the space occupied by the rib 15'; and, therefore, the provision of this rib, which serves to deflect the outwardly and forwardly impelled fluid particles in opposite lateral directions, eliminates eddy-currents. In describing the partitions 15 and 15' as "separating" the raceways 12 and 13 I do not limit the invention to an entire separation, as is shown in Fig. 2, since the term is used in its broadest sense and is intended to cover any means, such as the rib 15', which will perform the function above set forth and provide separate raceways.

It should be understood that the invention is not limited to the details of construction shown in the accompanying drawings and

above described, since the showing is merely illustrative and not restrictive of the invention; and it would be possible to modify materially the construction hereinbefore set forth without departing from the scope of the invention.

I claim:

1. A pump comprising a casing and a rotatable disc therein forming a rotor, said casing having a plurality of annular raceways partially separated by an interposed web paralleling the raceways and directed radially inwardly toward the periphery of the rotor, said rotor having two independent annular series of buckets, the buckets of each series being disposed adjacent the margin of the rotor with the buckets opening radially outwardly and also laterally into one of said raceways, a common inlet and a common outlet for said series of buckets whereby fluid entering the inlet is impelled by said buckets partially through one raceway and partially through the other raceway simultaneously, said rotor and said casing making substantially fluid-tight joints at the sides of the rotor whereby to resist flow of fluid radially inwardly from said buckets.

2. A pump comprising a casing and a rotatable disc therein forming a rotor, said casing having a plurality of passages partially separated by an interposed web paralleling the raceways and directed radially inwardly toward the periphery of the rotor, said rotor having two independent annular series of buckets, the buckets of each series being disposed adjacent the margin of the rotor and opening radially outwardly and also laterally into one of said raceways, a common inlet and a common outlet for said series of buckets whereby fluid entering the inlet is impelled by said bucket partially through one raceway and partially through the other raceway simultaneously, said rotor and said casing making substantially fluid-tight joints at the sides of the rotor whereby to resist flow of fluid radially inwardly from said buckets, each of said raceways having a curved wall extending on a continuous curve from substantially the edge of said web to a lateral face of said rotor adjacent the bottoms of said buckets whereby fluid thrown outwardly by the rotor is directed through a curved path again into the rotor.

In testimony whereof I have hereunto set my hand.

ARTHUR W. BURKS.