Feb. 6, 1923. 1,444,269.

W. J. PIATT.

ROTARY PUMP.

FILED NOV. 1, 1920.

Fig. 1

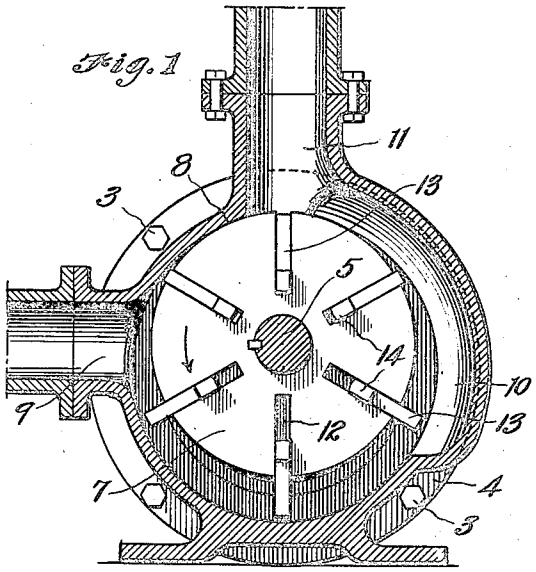


Fig. 2

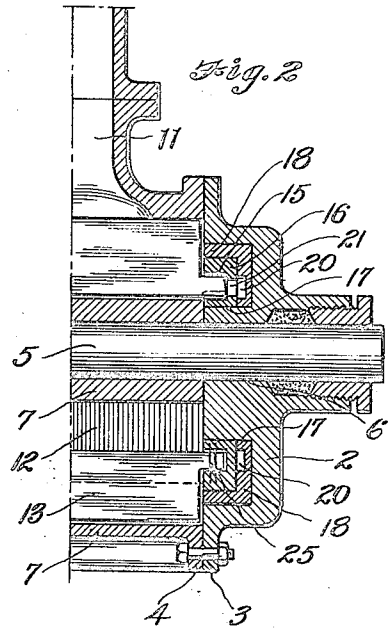


Fig. 3

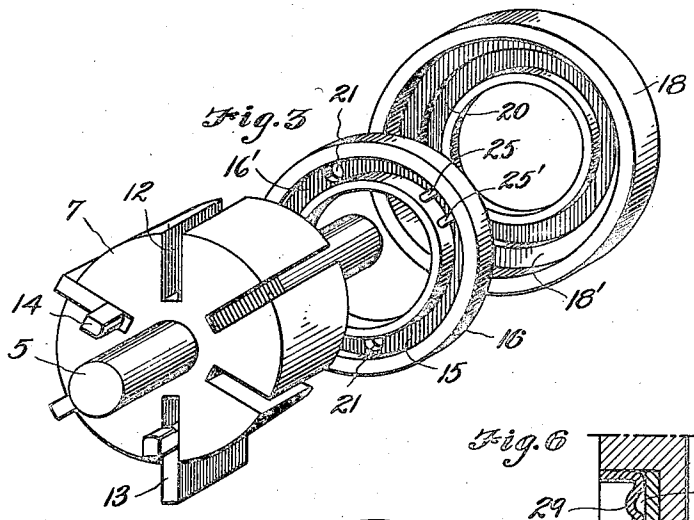


Fig. 4

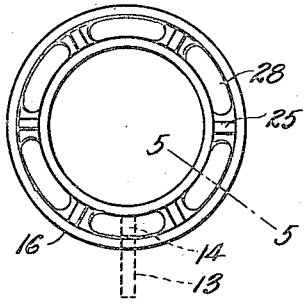


Fig. 6

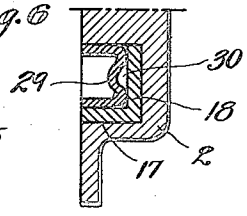


Fig. 5

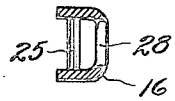
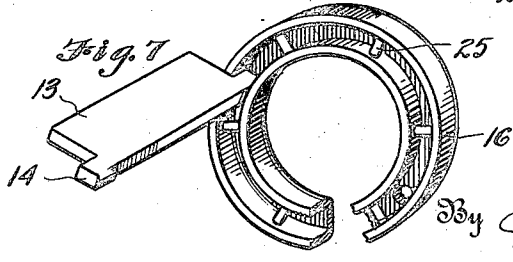


Fig. 7



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Patented Feb. 6, 1923. 1,444,269

UNITED STATES PATENT OFFICE.

WALTER J. PIATT, OF OAKLAND, CALIFORNIA.

ROTARY PUMP.

Application filed November 1, 1920. Serial No. 420,267.

To all whom it may concern:

Be it known that I, WALTER J. PIATT, a citizen of the United States, and resident of the city of Oakland, county of Alameda, State of California, have invented certain new and useful Improvements in Rotary Pumps, of which the following is a specification.

My invention relates to improvements in pumps, and more particularly to pumps of that character wherein a rotor, equipped with a plurality of radially movable blades, is mounted eccentrically within a cylindrical casing and means is provided for actuating the blades to maintain pockets into which water is drawn and discharged as the rotor revolves.

The principal object of the invention is to improve upon pumps of this or similar types by the provision of means whereby the pump will automatically clean itself of sand and gravel carried in with the water, whereby friction and wear on the moving parts is reduced to a minimum, and which makes possible the construction of a durable, efficient and economical pump at a relatively small cost.

In accomplishing these and other objects of the invention I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Figure 1 is a sectional view, taken transversely of the rotor shaft, through a pump constructed in accordance with the present invention.

Figure 2 is a half section of the same, taken longitudinally of the rotor shaft.

Figure 3 is a perspective view of a rotor, a balancing ring and a sand ring or bushing; the parts being shown in disassembled relation.

Figure 4 is a face view of an alternative type of balancing ring having an open base portion.

Figure 5 is a transverse section taken on the line 5—5 in Figure 4.

Figure 6 is a detail sectional view, showing in cross section another type of balancing ring.

Figure 7 is a perspective view of an alternative type of balancing ring provided with stops for each of the rotor blades.

Referring more in detail to the several views of the drawings, wherein like reference numerals designate the same or like parts—

1 designates a cylindrical pump casing, which is closed at its opposite ends by end plates, as shown at 2; the latter being secured to the casing by means of bolts 3 extended through the periphery of the plates and through flanges 4 formed on the casing ends, in such manner as to form a watertight joint.

Extending revolubly through the casing is a rotor drive shaft 5. This is supported eccentrically above the axial line of the casing within suitably packed bearings, as at 6, in the end plates 2, and has a rotor 7 keyed thereon which is of such diameter that at one side, at the point 8 in Figure 1, it will revolve closely adjacent or in engagement with the casing wall. In the present construction, the space between the rotor and the casing, following in the direction of rotation of the rotor, gradually increases from the top of the casing to the bottom side thereof, and then gradually decreases. This condition provides that water taken in at one side of the casing and driven forwardly by the rotor blades, as presently described, will be squeezed out at the opposite side. Accordingly, I have provided the casing, at one side, with an inlet opening 9 and at the opposite side with an outlet channel 10 which extends in open communication with the interior of the casing from near the bottom thereof to adjacent the point of contact of the rotor and casing at the top, where it opens into a discharge spout 11. Suitable connections may be made with the inlet and the outlet openings to lead the water respectively from a source of supply to the pump and then to the point of discharge.

While I have not shown means for actuating the rotor shaft, it is apparent that this may be done in any desirable manner, preferably by means of a belt operated over a belt wheel mounted on the rotor shaft exteriorly of the casing.

The rotor 7 is provided at equally spaced

intervals circumferentially with radially directed slots 12, and fitting slidably therein are blades 13, of the same length as the rotor and provided at their inner corners at their ends with projecting lugs 14 that extend within circularly formed grooves 15 concentrically located within balancing rings 16 that are revolubly contained within guide grooves 17 formed concentrically within the inner faces of the end walls 2.

The balancing rings 16 are mounted to revolve within bushing rings 18 that are fitted within the grooves 17, so that continuous friction caused by the rotation of the rings 16 will not cause wear on the end plates but will be taken by these bushing rings which can be more conveniently replaced.

In order that the bushing rings employed may clean themselves of sand that may be washed into the pump with the water, I have provided the base portions 18′ of these bushing rings with inwardly facing channels 20 and have provided the base portions 16′ of the rings 16 with apertures 21 which are adapted to follow in registration with the channels so that a circulation of water between the bushing rings and balancing rings is provided and which will wash out such sand and gravel that may collect therein and provide a film of water between these parts that will make operation easy.

The disposition of the rings 16 within the casing ends is such that as the rotor revolves, the blades will be actuated radially within the slots 12 in such manner that their outer edges will at all times just nicely clear the casing walls, leaving only enough space for a water film that will substantially prevent leakage.

To prevent excessive wear on the actuating lugs 14 of the blades, such as would result if they should have constant rubbing contact with the balancing rings, I have provided these rings at one side with two closely spaced apart stops 25 and 25′ as shown in Figure 3, between which the end lug 14 of one of the blades may be extended so that, as the rotor revolves, the balancing rings will likewise be revolved and no relative movement of the rings and blades will take place, but the blades will be actuated radially, within the rotor slots, to maintain their position adjacent the casing wall. This construction provides for the distribution of wear and pressure over a maximum area and places it on the ring parts that can be readily and cheaply replaced.

In Figures 4 and 5 I have illustrated a balancing ring of an alternative type of construction, wherein the base portion is mostly cut away leaving large openings 28 to provide for a free and easy flow of water within the sand groove of a bushing wherein the ring may be mounted. In rings of this type I prefer to place individual stops 25 for each of the lugs of the rotor blades.

Another type of balancing ring is shown in cross section in Figure 6. This construction is adapted to be used in pumps where no bushing ring is provided, or where the bushing ring provided is not equipped with the sand channel. The feature of this ring is that it has a raised annular base portion 29 forming an annular channel 30 which provides for the flow of water beneath the same in the same manner as is provided for in the previously described construction. Another feature of this ring is that it may be die stamped and is of cheaper construction than the rings shown in Figure 3, but not as desirable otherwise.

Figure 7 illustrates a ring of a similar construction to that of Figure 6, which is not equipped with the raised base portion, but which is die stamped and has base apertures and stops provided as in the previous types.

Assuming that the different parts of the pump are so constructed, and are assembled as described, in operation the rotor is driven in the direction indicated by the arrow thereon in Figure 1, and as the rotor blades move downwardly across the inlet opening 9, water will be drawn in by the vacuum pressure created within the expanding pockets between blades and will be carried by the blades forwardly to be discharged into the outlet channel 10 and forced from the pump as the volume of the pockets is decreased.

Since the rings 16 rotate with the rotor but eccentrically thereof, the blades are moved into and from the rotor slots to maintain their relation with the casing and to prevent any backflow of water. By providing that the rings 16 turn with the rotor, wear on the lugs 14 of the blades is reduced to a minimum and the pressure exerted to actuate the same is distributed over the entire wall surfaces of the ring members, reducing wear at any one point to a minimum, and placing what wear there is on parts that can be replaced without much trouble or expense.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent, is:

In a pump of the character described, a cylindrical casing having inlet and outlet ports therein, plates enclosing the ends of said casing and having annular grooves therein concentric with the casing, bushing rings fitted within the said grooves having annular outwardly facing channels in their base portions, balancing rings mounted to revolve in said grooves within said bushings and having annular grooves therein and having openings through the bases of said grooves movable in registration with the

channels of said bushings, a shaft mounted revolubly in said end plates to extend eccentrically through the casing, a rotor keyed on said shaft, a plurality of radial slots formed in said rotor, blades slidably mounted in said slots having lugs at their ends extending into the grooves of said balancing rings and stop members within said latter grooves engageable by lugs of said blades to cause rotation of the rings with the rotor.

Signed at Seattle, Washington, this 26th day of October, 1920.

WALTER J. PIATT.