July 29, 1924. 1,503,362

H. H. HAIGHT

ROTARY PUMP

Filed March 23, 1922 2 Sheets-Sheet 1

Fig. 1.

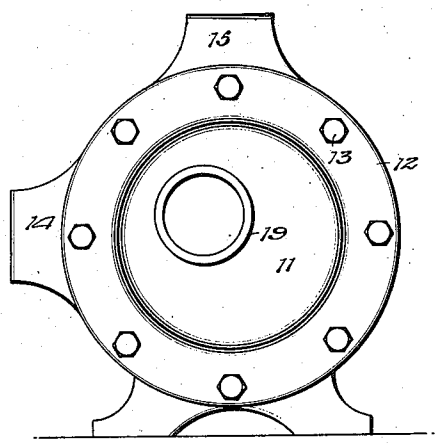


Fig. 2.

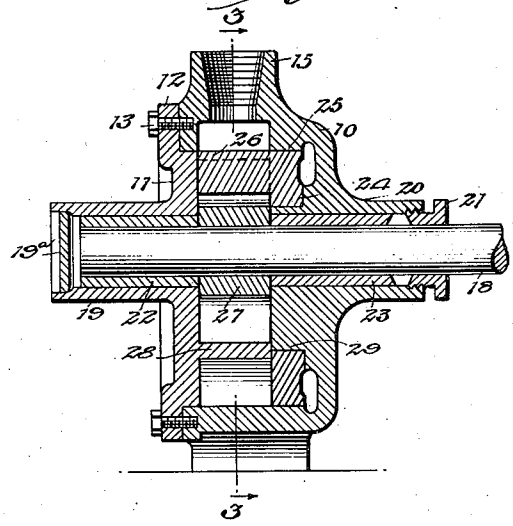


Fig. 3.

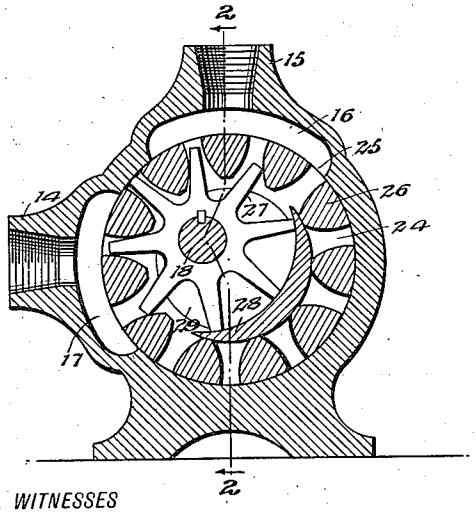
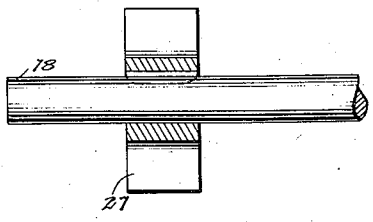


Fig. 4.



WITNESSES

W. J. Jones

J. L. McAuliffe

INVENTOR

Hiram H. Haight

BY Munn & Co

ATTORNEYS

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H. H. HAIGHT

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Fig. 5.

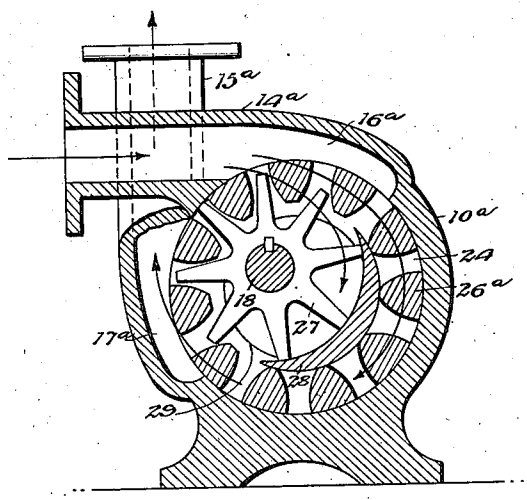


Fig. 6.

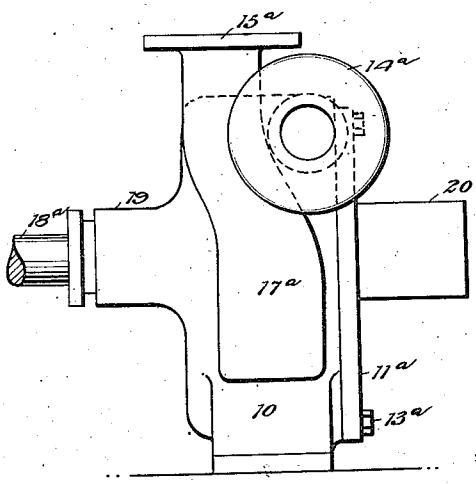
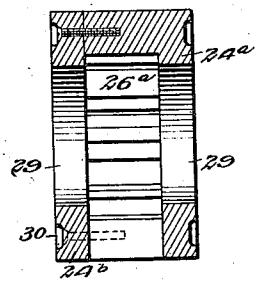


Fig. 7.



WITNESSES

W. E. Jones

A. L. Macauliffe

INVENTOR

H. H. Haight

BY Munn & Co

ATTORNEYS

Patented July 29, 1924. 1,503,362

UNITED STATES PATENT OFFICE.

HIRAM H. HAIGHT, OF MILWAUKEE, WISCONSIN.

ROTARY PUMP.

Application filed March 23, 1922. Serial No. 546,069.

To all whom it may concern:

Be it known that I, HIRAM H. HAIGHT, a citizen of the United States, and a resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and Improved Rotary Pump, of which the following is a description.

My invention relates to rotary pumps and more particularly to the type of pump in which an annular gear is revolubly mounted within a casing as well as a pinion eccentric to the annular gear and in engagement therewith at one side and usually a stationary crescentic member extending between the internal gear and the pinion at a side of the latter opposite the engagement between the pinion and internal gear.

The general object of my invention is to provide a pump of the indicated type improved in various particulars with a view to promote efficiency in the pump and to provide a construction for handling high pressures.

The nature of the invention and its distinctive features and advantages will clearly appear as the description proceeds.

Reference is to be had to the accompanying drawings forming a part of this specification, it being understood that the drawings are merely illustrative of practical examples of the invention.

Figure 1 is an elevation of a rotary pump constructed in accordance with my invention;

Figure 2 is a vertical section in the transverse plane as indicated by the line 2—2, Figure 3;

Figure 3 is a vertical section in the plane of the pump as indicated by the line 3—3, Figure 2;

Figure 4 is a sectional elevation showing the pinion and a portion of the shaft on which the pinion is fast;

Figure 5 is a view similar to Figure 3 but illustrating a slight modification in the form of the casing;

Figure 6 is an edge elevation of the pump constructed with the casing shown in Figure 5;

Figure 7 is a modified form of the annular gear.

Referring at first more particularly to Figures 1 to 4, a suitable casing 10 is provided to present a cylindrical working chamber for the rotary parts, said casing having one side 11 removable and having its flange 12 secured by screws 13. Said casing is formed with an inlet and discharge designated by the numerals 14, 15 disposed, in the form of the casing shown in Figures 1 to 3, radial to the working cylinder of the casing. At the inner end of the inlet is a fluid chamber 17 extending above and below the inlet and a similar chamber 16 is provided at the inner end of the outlet 15, said chambers affording free inlet and outlet for the fluid.

A drive shaft 18 is provided having in practice any suitable means (not shown) for turning the same. Said shaft extends across the chamber of the casing and has bearings at both sides, the bearing at one side, 11, for example, being indicated at 19 and the other bearing at the opposite side of the casing being indicated by the numeral 20. The shaft 18 may or may not terminate within the bearing 19 and said bearing is closed at the end by any suitable means such as a disk 19ª or a stuffing box. The opposite bearing has a suitable stuffing box 21 through which the drive shaft 18 extends. The bearing 19 includes a sleeve 22 about the shaft 18 and the bearing 20 includes a sleeve 23, said sleeve being flush with the opposite sides of the cylindrical chamber of the casing.

A ring 24 is provided within the casing and adapted to freely turn in an annular groove 25 formed in one side wall of the cylinder. The numeral 26 indicates the gear teeth of said ring gear 24, said teeth presenting interdental spaces extending through from the interior to the exterior of the ring gear. The ring gear 24, it will be observed is eccentric to the shaft 18, the shaft being also eccentric to the cylindrical chamber of the casing. Within the teeth 26 of the ring gear is a pinion 27 fast on the shaft 18 and therefore eccentric to the ring gear 24. The pinion has elongated teeth extending at one side of the pinion into the interdental spaces presented by the ring gear 24. Disposed at that side of the pinion 27 opposite the side meshing with the ring gear 24, a stationary crescentic element 28 is provided, lying between said pinion 27 and the teeth 26 of ring gear 24.

The ring gear 24 presents a large bore or central opening, the annular groove 25, in which said gear runs, being correspondingly large so that said gear may turn freely about the shaft 18 and internal pinion

27. The ring gear may as shown in Figure 7 be formed with a side 24^b in the form of a ring secured to the outer ends of the teeth (26^a) by any suitable means such as screws 30 or any construction equivalent thereto.

In Figures 5 and 6 the casing, 10^a, instead of being formed with inlets and outlets radially of the cylindrical chamber of the casing is shown as formed with tangential inlets and outlets 14^a, 15^a in order to promote smoothness of running and facilitate the entrance and discharge of the fluid. At the inner ends of said inlet and outlet 14^a, 15^a, are chambers 16^a, 17^a corresponding with the chambers 16, 17.

With a pump constructed as described, it will be clear that the driving of the shaft 18 will directly turn the pinion 27 keyed thereto and the meshing of the pinion at one side with the ring gear 24 will rotate the latter, the pinion and gearing turning past the crescentic element 28. As the gear 24 and the pinion 27 turn past the inlet chamber 17 fluid will be drawn in through the inlet 14 and enter the interdental spaces of the ring gear 24. In the continued rotation of said ring gear, the teeth of the pinion will withdraw from the interdental spaces and a suction will be produced drawing the fluid inwardly. The fluid will be carried about by the ring gear and pinion until the discharge chamber 16 is reached adjacent to which chamber the teeth of the pinion 27 will again enter the interdental spaces of the ring gear and force the water through the discharge 15. The keying of the pinion 27 to the drive shaft having a solid bearing in the casing at opposite sides makes for strength and durability and the described arrangement of said shaft and pinion together with the ring gear 24 having the large bore facilitates the assemblage, the whole making for an efficient and smooth operation of the pump against high pressures.

I would state in conclusion that while the illustrated examples constitute practical embodiments of my invention, I do not limit myself strictly to the exact details herein illustrated, since, manifestly, the same can be considerably varied without departure from the spirit of the invention as defined in the appended claim.

Having thus described my invention, I claim:

A rotary pump of the class described including a casing presenting spaced heads forming a cylindrical chamber having an inlet and an outlet, said casing having an annular groove in one of said heads of said chamber, bearings in the opposite heads of the casing, said groove being concentric and said bearings eccentric to said chamber, the said groove being radially outward of the eccentrically disposed bearing surfaces, a gear having an annular body revoluble in said groove and the teeth of said gear projecting from the face of said annular body and presenting interdental spaces, the teeth and spaces extending across said cylindrical chamber and the spaces extending from the interior to the exterior of the teeth to communicate with said cylindrical chamber at the interior and exterior of the teeth, a drive shaft supported in said eccentric bearings and therefore eccentric to said gear, said shaft being supported in both heads of the casing, a pinion fixed on said shaft in said chamber and within said gear teeth and meshing with said teeth at one side of the pinion, and a crescentic element disposed between the opposite side of the pinion and said gear.

HIRAM H. HAIGHT.