W. J. PIATT.

ROTARY PUMP.

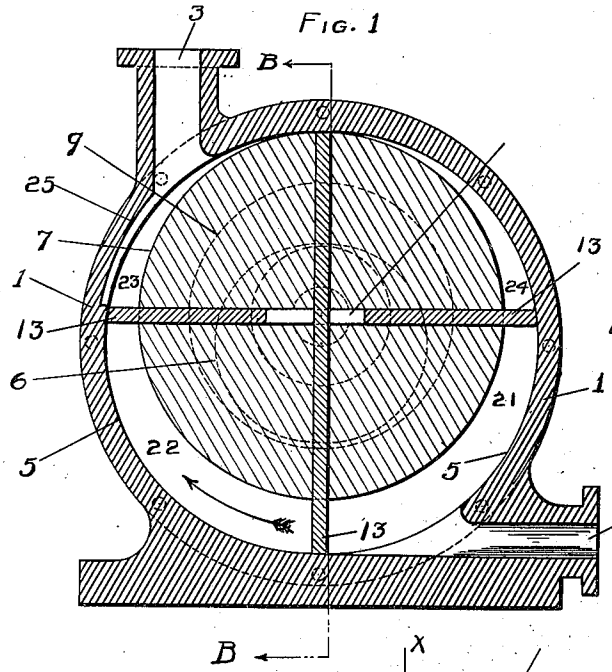
APPLICATION FILED AUG. 2, 1915.

1,196,977.

Patented Sept. 5, 1916.

2 SHEETS—SHEET 1.

FIG. 1



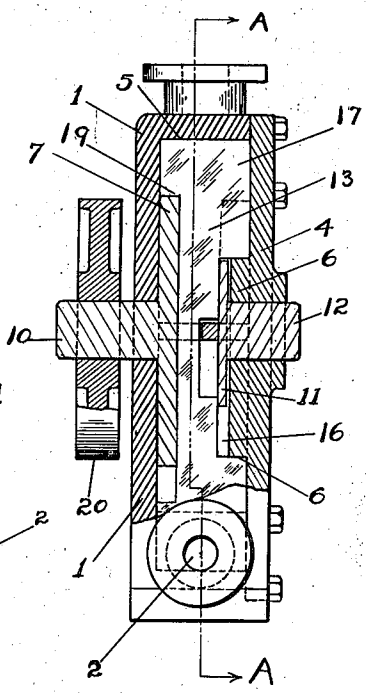


FIG. 2

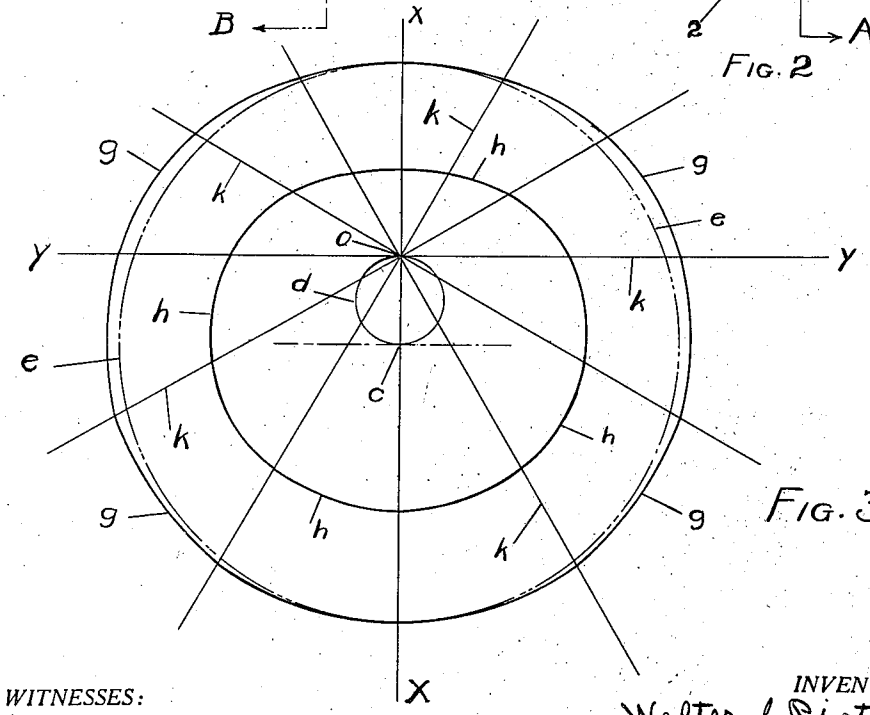


FIG. 3

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2 SHEETS—SHEET 2.

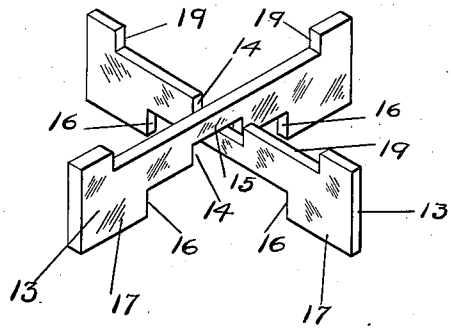


FIG. 4

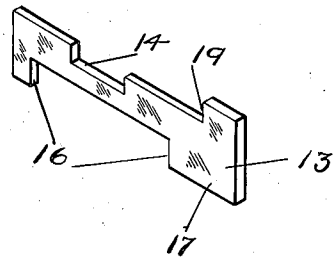


FIG. 5

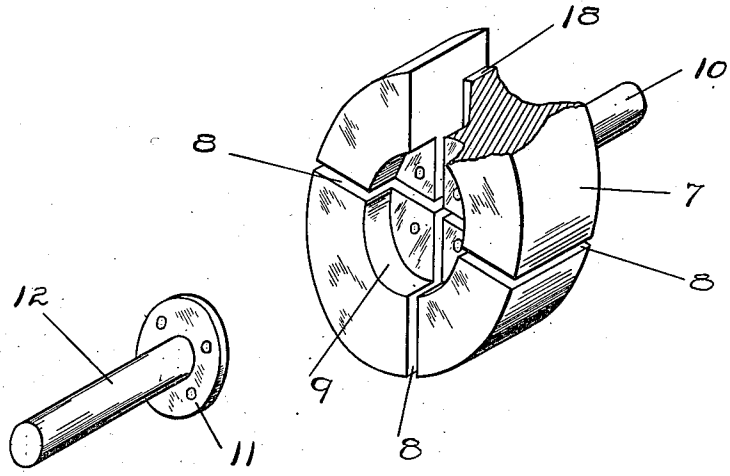


FIG. 6

FIG. 7

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ROTARY PUMP.

1,196,977. Specification of Letters Patent. Patented Sept. 5, 1916.

Application filed August 2, 1915. Serial No. 43,157.

To all whom it may concern:

Be it known that I, WALTER J. PIATT, a citizen of the United States, residing at Portland, county of Multnomah, State of Oregon, have invented certain new and useful Improvements in Rotary Pumps, of which the following is a specification.

My invention relates to that class of rotary pumps having within a casing an eccentrically mounted rotor with radially extending arms or blades thereon.

The objects of my invention are, 1st to increase the efficiency of a pump of the class described herein by reducing the slippage, that is the leakage of fluid past the blades at the periphery of the casing: 2nd, to increase the life of such a pump by reducing the number of parts and by providing ample wearing surfaces for all moving parts: 3rd to produce such a pump that shall be economical of manufacture, simple and satisfactory in use.

The efficiency of such a pump depends upon the closeness of fit between the blades and the casing, particularly at the periphery of the casing, and heretofore such closeness of fit at said periphery has been accomplished by one of two general methods as follows:

A spring has been mounted within the rotor behind each blade, or other method employed to cause each blade to contact with the periphery of the casing, such contact being relied upon to force the blade into the rotor as same revolves, thus resulting in destructive wear upon the ends of the blades and upon the periphery of the casing. Means have been employed to cause substantially such a radial motion of the blade within the rotor as will result in a close fit between the casing periphery and the blade ends; but it has been found that such means result either in a multiplicity of complicated parts, or in the blades having such a motion as results in the blade ends departing slightly from the circular periphery of the casing, thereby allowing slippage of the fluid past the blades at certain points and thus greatly reducing the efficiency of the pump.

I avoid the above defects, and accomplish the objects of my invention by means of the construction illustrated in the accompanying drawings, which therefore form a part of this application for Letters Patent, and in which:—

Figure 1, is a sectional elevation upon line A A of Fig. 2. Fig. 2, is a transverse sectional elevation upon line B B of Fig. 1. Fig. 3, is a diagram showing the method of constructing the periphery curves of the casing and of the blade operating cam. Fig. 4, is a perspective view of two blades as they would appear when inserted into the rotor of a four bladed pump. Fig. 5, is a perspective view of a blade constructed as used in a pump having an odd number of blades. Fig. 6, is a perspective view of the rotor, partially broken away to show the construction of one of the blade slots. Fig. 7, is a perspective view of the retaining flange and rotor shaft.

In a pump constructed according to my invention the rotor is of cylindrical form, and is revolubly mounted within the casing, centrally relative to its own periphery and eccentrically relative to the casing periphery, the periphery of the rotor and the periphery of the casing coinciding at a point adjacent the discharge orifice, the rotor having diametrical slots wherein are mounted the blades, and the casing having a stationary cam for operating the blades.

Referring now to Fig. 3 x—x and y—y represent coördinate axes, the origin O being at the center of rotation of the rotor. The center of the casing is at c, and therefore d is the circle of eccentricity. Were the periphery of the casing a circle it would be represented by circle e struck from center C. The true periphery of the casing is curve g, and the periphery of the cam which operates the blades is shown at h. Radial lines K represent various positions of the blades during one revolution.

The mathematical relation of the eccentricity, the curve h, and the curve g, must be such that, at any point in the revolution of the rotor, that portion of line K lying between curves g, and h, shall remain constant; also such that at any point in the revolution of the rotor that portion of line K lying within curve h shall remain constant. The blades pass through the center of the rotor, which coincides with center O in Fig. 3, and it is obvious from the mathematical relations cited previously, that as the blades are revolved by the rotor, the

blade ends will follow exactly the periphery curve of the casing, thus enabling the use of a very close fit between said blades and said casing, this being the condition upon which the efficiency depends.

In the preferred type of construction illustrated, 1 is the casing, the same being supplied with an entrance orifice 2 and a discharge orifice 3, the casing being made open upon one side thereof and supplied with a cover 4. The interior periphery 5 of said casing is a curve such as previously described and illustrated at *g* in Fig. 3.

To effect the radial movement of the blades a cam 6 is provided, said cam being stationary relative to the casing, and may be secured to the casing or to the casing cover, with the latter of which the cam is shown integrally connected in Fig. 2.

The rotor 7 is provided with slots 8 diametrically arranged, there being a slot for each blade. A centrally located circular recess 9 is formed in one face of the rotor, said recess being of such depth and diameter as to encompass the cam 6 when the pump is assembled. A shaft 10 is secured to, or may be formed integral with, the rotor upon one face thereof, while upon the opposite face of the rotor and within recess 9 is secured a flange 11 mounted upon a shaft 12.

The blades 13 are formed of thin bars having central notches 14 cut therein, said notches being of such depth that the total thickness of the material of all the blades at the crossing point 15 shall be just equal to the depth of slots 8 beneath flange 11. The blades also have notches 16 cut centrally therein, the depth of which notches are exactly equal to the combined thickness of cam 6 and flange 11, as shown in Fig. 2.

The length of notch 16 is exactly equal to the constant width of that portion of the face of cam 6 with which the blade coincides, illustrated diagrammatically by that portion of line *k* within curve *h* in Fig. 3.

The total length, end to end, of the blades is exactly equal to the constant distance across the interior of the casing in the line coincident with the blade, illustrated diagrammatically by that portion of line *k* lying within curve *g* in Fig. 3.

The portion 17 of the blades, being that portion between the end of notch 16 and the end of the blade, is of a length exactly equal to the constant distance between the edge of cam 6 and the periphery 5 of the casing, illustrated diagrammatically by that portion of line *k* included between curves *g* and *h* in Fig. 3.

The slots 8 in rotor 7 are cut diametrically across the end face thereof and also longitudinally across the peripheral face thereof, thus forming a shoulder 18 within the slot, as shown in Fig. 6.

Notches 19 are provided in the blades of a depth equal to the length of the shoulder 18, the length of said notches 19 being equal to the diametrical distance between shoulders 18 plus the difference between the diameter of the rotor and the diameter of the casing.

The pump is operated either by means of a belt pulley 20 as shown, or by means of a gear, mounted upon shaft 10.

The operation of my invention may be understood from a reference to Fig. 1, the direction of revolution of the rotor being shown by the arrow.

The eccentric mounting of the rotor leaves a space of transverse sectional crescent shape between the rotor and the casing, protruding into which space the several blades act as diaphragms, dividing said space into a plurality of chambers, as 21, 22 and 23 and 24.

The position of the rotor and blades being as shown in Fig. 1, the liquid in chamber 23 is being discharged through the discharge orifice 3; in chamber 24 is a vacuum; chamber 21 is receiving a supply of liquid; chamber 22 is conveying a full charge of liquid toward discharge orifice 3.

As chamber 22 continually decreases in volume as it approaches discharge orifice 3 compression of the contained liquid takes place, and to relieve said compression a by-pass port 25 is provided in the casing, said by-pass port communicating with discharge orifice 3 and with chamber 22 just at the point of revolution where said compression arises in said chamber 22. By means of said by-pass the potential energy of compression within chamber 22 is immediately converted into the kinetic energy of velocity of liquid at discharge orifice 3.

My invention may be constructed of any materials and made of any size deemed suitable and convenient in a device of this character, and while I have illustrated and described a preferred form of construction and arrangement of parts found desirable in materializing my invention I wish to include in this application for Letters Patent all substitutes and mechanical equivalents that may fairly be considered to come within the scope and purview of my invention as defined in the appended claims.

Having disclosed my invention so that others skilled in the art may be enabled to construct and use same, what I claim as new, is:—

1. In a rotary pump, a casing, a cam within said casing, a rotor eccentrically mounted within said casing, said rotor having a plurality of diametrically disposed slots, a blade within each of said slots, each of said blades extending entirely across said rotor and each end of the blades contacting with the periphery of said casing, each blade being adapted to engage said cam, the periphery of said cam and the periphery of

said casing being such curves that, at all points of a revolution of said rotor and blades, the lengthwise extension of a blade across said cam shall be a constant distance, and the lengthwise extension of a blade between said cam and said casing shall be a constant distance.

2. In a rotary pump, a casing, a cam stationarily mounted within said casing, a plurality of crossed blades within said casing, said blades being adapted to revolve within said casing, the point of crossing of said several blades being adapted to revolve in an orbit eccentric to said casing, a rotor eccentrically mounted within said casing, said rotor being adapted to engage said blades and revolve same, and means to engage said blades with said cam.

3. In a rotary pump, a casing, a plurality of revoluble blades, each blade being approximately diametrically disposed within said casing, and all said blades crossing at a common point eccentric to said casing, the central point of each blade traveling the orbit of eccentricity, the interior periphery of said casing being the curve traced by the ends of said arms, means to revolve said arms, and means to confine the central point of said arms to said eccentric orbit.

4. In a rotary pump, a casing, a plurality of revoluble blades, all said blades crossing at a common point eccentric to said casing, a given point of each blade traveling the orbit of eccentricity, means to revolve said arms, and means to confine said given point of each blade to said eccentric orbit.

In witness whereof I claim the foregoing as my own I hereunto affix my signature in the presence of two subscribing witnesses.

WALTER J. PIATT.

Witnesses:
DAVID E. LOFGREN,
EMILY LOFGREN.