P. CHRISTMAN.

ROTARY PUMP.

APPLICATION FILED FEB. 19, 1917.

1,275,388.

Patented Aug. 13, 1918.

2 SHEETS—SHEET 1.

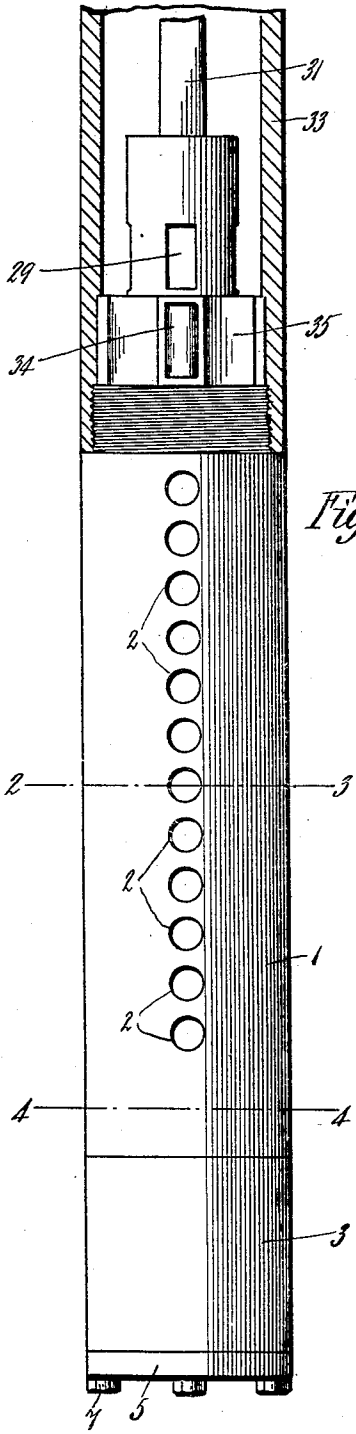


Fig. 1.

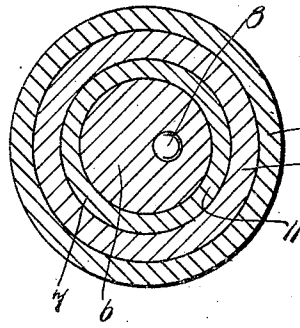


Fig. 4.

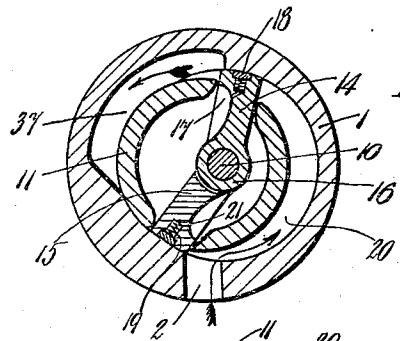


Fig. 2.

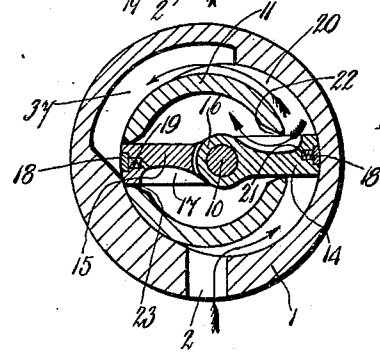


Fig. 3.

P. Christman INVENTOR.

BY E. F. Bond

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2 SHEETS—SHEET 2.

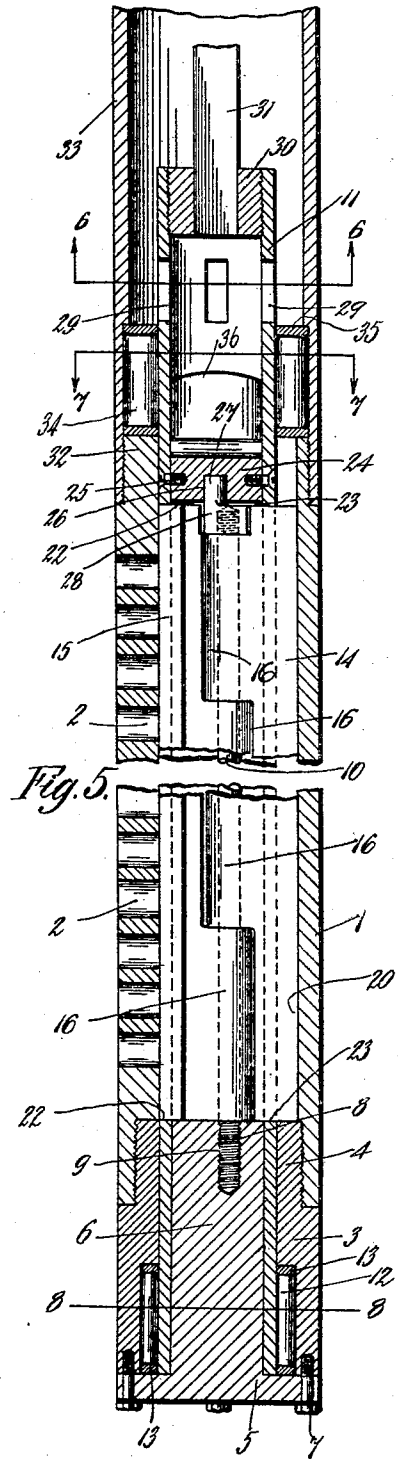


Fig. 5.

Fig. 6.

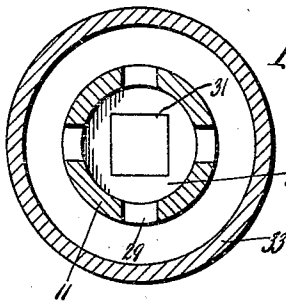


Fig. 7.

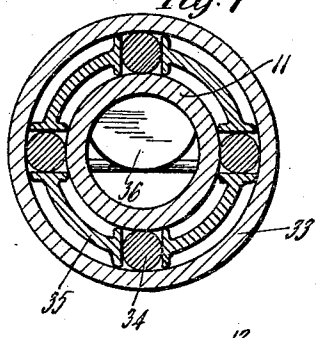
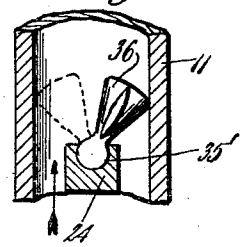


Fig. 9.



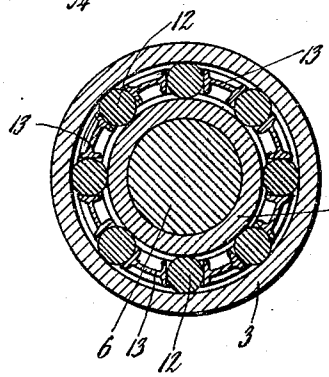


Fig. 8.

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UNITED STATES PATENT OFFICE.

PETER CHRISTMAN, OF GREEN BAY, WISCONSIN.

ROTARY PUMP.

1,275,388. Specification of Letters Patent. Patented Aug. 13, 1918.

Application filed February 19, 1917. Serial No. 149,511.

To all whom it may concern:

Be it known that I, PETER CHRISTMAN, a citizen of the United States of America, residing at Green Bay, in the county of Brown and State of Wisconsin, have invented certain new and useful Improvements in Rotary Pumps, of which the following is a specification, reference being had therein to the accompanying drawing.

The invention relates to rotary pumps of the kind described in my Patent No. 1,092,139.

It is an object of the invention to provide a rotary pump with roller bearings, whereby friction is eliminated to a large extent and the efficiency of the pump is considerably enhanced.

A further object aims at the increase of the capacity of the pump by enlarging the passage areas.

It is also an object of the invention to provide means for preventing back-flow of the fluid.

It also constitutes an object of the invention to provide certain details of construction and arrangement tending to increase the effectiveness and general desirability of a device of this particular character.

With these and other objects in view, the preferred embodiment of the invention consists in the novel combination and arrangement of parts particularly set forth in the following specification and illustrated in the accompanying drawing, in which—

Figure 1 is a side elevation of the lower portion of this pump;

Figs. 2 and 3 are enlarged cross-sections on line 2—3 of Fig. 1, showing internal parts on different positions;

Fig. 4 is an enlarged section on line 4—4 of Fig. 1;

Fig. 5 is a vertical section of the pump;

Fig. 6 is a section on line 6—6 of Fig. 5;

Fig. 7 is a section on line 7—7 of Fig. 5;

Fig. 8 is a section on line 8—8 of Fig. 5, and

Fig. 9 is a perspective view of the piston in section, indicating a check valve.

Referring to the drawings, 1 designates an upright cylinder provided with an eccentric bore 20 and with a series of inlet ports or openings 2 along one side thereof. The cylinder is closed at its lower end by a tubular member 3, which is formed at its upper end with a reduced portion 4 provided with external screw thread, which is received in threaded engagement in a countersunk opening of the cylinder. Within the tubular member 3 a plug 5 is arranged, which comprises a disk 6 closing the lower open end of the tubular member and a body member 6 integrally formed with said plate and extending within said tubular member, but spaced thereof to a point flush with its upper end. The plug 5 is secured to the tubular member by bolts 7; but if preferred, any other fastening means may be employed, which permit that the parts may be readily disassembled, if so required. The body member 6 of the plug 5 is provided with a bore 8, eccentrically arranged and adapted to receive the lower end 9 of a pin 10, which extends uprightly in eccentric relation to the outside diameter of cylinder 1, and in registry with the true axis of the bore 20.

As will be seen by reference to Fig. 5, the cylinder, provided with the eccentric bore 20, surrounds a piston 11, which is arranged in concentric relation with respect to the outside diameter of the cylinder and contacts with the cylinder wall just in advance of the series of inlet ports, as may be readily seen by reference to Figs. 2 and 3. The lower end of the piston 11 enters the space between the tubular member 3 and part 6 of the plug, and is adapted to rotate therein. In order to diminish the frictional resistance when the piston is rotated relative to the stationary plug 5, rollers 12 are interposed between the tubular member 3 and the piston, said rollers being maintained in spaced relation by a plurality of retaining members 13 interconnected by ribs (Fig. 8). The piston 11 is of tubular construction and surrounds the eccentric pin 10, which serves as a pintle for a pair of abutments or wings 14 and 15, which are hinged at 16 to said pin, as may be readily seen by reference to Fig. 5. The wings 15 and 16 are dished or cut away at their front faces, as at 17, and have rounded outer edges to fit the cylinder wall. The outer edge of each wing is provided with a longitudinal groove to receive a correspondingly shaped bar 18, against which a plurality of springs 19 act to maintain the bars in tight contact with the wall of the cylinder. A plurality of small holes 21 lead from the base of the spring hole to the front face of the abutment so as to equalize the pressure of the water on the bars 18.

The length of the wings corresponds to the length of slots 22 and 23, and their thickness substantially is equal to the width of these slots. The radial dimensions of these wings are such that the latter extend from the pin outward to tight contact with the cylinder wall, and this contact is constantly maintained by reason of the fact that the pin 10 is concentrically arranged with respect to the eccentric bore 20 of the cylinder 1 and forms the axis about which the wings are rotated, as will be hereinafter further explained. At the upper end of the piston a transverse member 24 is provided, which is secured in proper position within the piston by means of threaded members 25, and which is provided at its lower face with a bore 26, centrally arranged to receive the upright portion 27 of a crank 28, which continues in a horizontal piece to receive in threaded engagement the upper end of the pin 10. The transverse member 24 forms a bridge and forces the water to pass at the left or right side thereof, as viewed in Fig. 9. Above the transverse member, at proper distance therefrom, a plurality of openings 29 are provided, in order to establish communication between the interior and exterior of the piston 11. The piston 11 is closed up at its uppermost portion by a plug 30 having a central square opening for the reception of the lower square end of a shaft 31, which, being connected in suitable manner to a source of motive power, transmits rotary motion to the piston for a purpose hereinafter further specified.

The cylinder 1 at its upper end is formed with a reduced portion 32 having exterior threads to receive the lower end of a pipe 33, which serves for the discharge of the raised fluid. Between the piston and the discharge pipe the roller bearing 34 is provided, comprising a plurality of rollers maintained in spaced relation by retaining member 35, which, as will be seen by reference to Fig. 7, are so constructed as to provide passages for the fluid, as hereinafter further specified. The transverse member 24 serves as a support for a check valve and is provided at its upper side with a circular recess 35′ for the reception of the circular base portion of a check valve 36, which is adapted to be oscillated so as to close up selectively the aforementioned left or right passage obtained interiorly of the piston 11 by reason of the pressure of said transverse member and the wings. By reference to Figs. 2 and 3, it may be seen that the cylinder wall is provided with a longitudinal recess 37, which forms, in addition to the interior passage through the piston, an additional passage for the water.

The operation of the pump is as follows:

Rotary power being supplied to the member 26, the piston is rotated about an axis concentric to the outside diameter of the cylinder. The wings are thereby rotated about the pintle 10, eccentric to the outside diameter of the cylinder, but concentric to the eccentric bore of the cylinder, so as to be constantly in proper engagement with the cylinder wall. The wing 14, after passing the series of inlet ports 2, creates a vacuum, and consequently water is drawn in through these openings by virtue of the fact that the pump is submerged in the water. The further rotation of the wings causes the following wing 14 to displace the water drawn in by the preceding wing, and when the wings are in the position shown in Fig. 3, the water forwardly of wing 14 can take two courses, as indicated by the arrows. It flows interiorly of the piston by virtue of the dished front face, and also flows exteriorly thereof along the cutaway portion 37 of the cylinder wall. The water thus rises in the two passages, and is discharged through the discharge pipe provided for this purpose. The fluid rising in the inner passage of the piston actuates the check valve so as to close up the passage not used; this effectively prevents the water from flowing back. The provision of the roller bearings furthermore aids in driving the pump with considerable speed without affecting the efficiency or life of the pump.

While I have shown the preferred embodiment of the invention, it is understood that I do not intend to confine myself to the exact details shown, but want to avail myself of such departures, alterations, and changes as fairly fall within the scope of my invention, as pointed out in the appended claims.

I claim:—

1. In a rotary pump, an upright cylinder provided with a row of inlet openings along one side and being eccentrically bored; a plug closing the lower end; an outlet pipe leading upward from said cylinder; an eccentric pin upstanding from the plug; a concentric rotary piston inclosing said pin and contacting with the cylinder wall in advance of said row of openings, said piston being provided with upright slots; means leading to the outlet pipe for rotating said piston; and wings hinged on said pin and projecting through said slots in contact with the cylinder wall, said piston and cylinder being arranged and formed to permit the flow of the fluid interiorly and exteriorly of said piston.

2. In a rotary pump, an upright cylinder provided with a row of ports along one side and being eccentrically bored, said cylinder being closed at its upper end; an outlet pipe connected to the upper end of said cylinder; a concentric rotary piston contacting with the cylinder wall in advance of said ports; a plurality of wings slidably pro-

jecting through said piston and rotatable about an axis interior of and eccentric to said piston; and means for rotating said piston, said piston and cylinder being constructed and arranged to permit the flow of the fluid interiorly and exteriorly of said piston.

3. In a rotary pump, an upright cylinder provided with a row of ports along one side and being eccentrically bored, said cylinder being closed at its lower end; an outlet pipe connected to the upper end of said cylinder; a concentric rotary piston contacting with the cylinder wall in advance of said ports, said piston communicating at its upper end with said outlet pipe; a plurality of wings slidably projecting through said piston and rotatable about an axis interior of and eccentric to said piston, and means for rotating said piston, said piston and cylinder being constructed and arranged to permit the flow of the fluid interiorly and exteriorly of said piston.

4. In a rotary pump, an upright cylinder provided with a row of ports along one side and being eccentrically bored, said cylinder being closed at its lower end; an outlet pipe connected to the upper end of said cylinder; a concentric rotary tubular piston contacting with the cylinder wall in advance of said ports, said piston communicating at its upper end with said outlet pipe and having upright slots; wings loosely projecting through said slots and being rotatable about an axis interior of but eccentric to said piston, said wings being dished at their front faces and in contact with the cylinder wall, the cylinder wall being bored out to provide a fluid passage exteriorly of said piston; and means for preventing the return flow of the raised fluid.

5. In a rotary pump, an upright cylinder provided with a row of ports along one side and being eccentrically bored, said cylinder being closed at its lower end, an outlet pipe connected to the upper end of said cylinder; a concentric rotary tubular piston contacting with the cylinder wall in advance of said ports, said piston communicating at its upper end with said outlet pipe and having upright slots; wings loosely projecting through said slots and being rotatable about an axis interior of but eccentric to said piston, said wings being dished at their front faces and in contact with the cylinder wall, the cylinder wall being bored out to provide a fluid passage exteriorly of said piston, and fluid operated means for preventing the return flow of the raised fluid.

6. In a rotary pump, an upright cylinder provided with a row of ports along one side and being eccentrically bored, said cylinder being closed at its lower end; an outlet pipe connected to the upper end of said cylinder; a concentric rotary tubular piston contacting with the cylinder wall in advance of said ports, said piston communicating at its upper end with said outlet pipe and having upright slots; wings loosely projecting through said slots and being rotatable about an axis interior of but eccentric to said piston, said wings being dished at their front faces and in contact with the cylinder wall, the cylinder wall being bored out to provide a fluid passage exteriorly of said piston; and means secured to said piston and actuated by the fluid to prevent the return flow of the raised fluid.

7. In a rotary pump, an upright cylinder provided with a row of ports along one side and being eccentrically bored, said cylinder being closed at its lower end; an outlet pipe connected to the upper end of said cylinder; a concentric rotary tubular piston contacting with the cylinder wall in advance of said ports, said piston communicating at its upper end with said outlet pipe and having upright slots; wings projecting through said slots in contact with the cylinder wall and being rotatable about an axis interior of but eccentric to said piston, said wings being dished at their front faces and defining fluid passages in said piston, said cylinder being bored out to provide an additional passage exterior of said piston; and a check valve oscillatorily secured to said piston and actuated by the raised fluid.

8. In a rotary pump, an upright cylinder provided with a row of ports along one side and being eccentrically bored; a plug closing the lower end; an outlet pipe connected to the upper end of said cylinder; an eccentric pin upstanding from said plug; a concentric rotary piston inclosing said pin and contacting with a cylinder wall in advance of said ports, said piston being provided with upright slots; wings hinged to said pin and projecting through said slots in contact with the cylinder wall; rollers interposed between the piston and cylinder at the upper and lower end; and means for retaining said rollers in operative position.

9. In a rotary pump, an upright cylinder provided with a row of ports along one side and being eccentrically bored, the cylinder being closed at its lower end; an outlet pipe connected to the upper end of said cylinder; a concentric rotary piston contacting with the cylinder wall in advance of said ports, said piston communicating at its upper end with said outlet pipe and having upright slots; wings projecting through said slots in contact with the cylinder wall and being rotatable about an axis interior of but eccentric to said piston, said wings being dished at their front faces and spacing off fluid passages in said piston, said cylinder being bored out to provide an additional passage exterior of said piston; an oscillating valve controlling said piston passages; roller bear-

ings interposed between the piston and cylinder at the upper and lower end; and means for retaining the rollers in operative position.

10. In a rotary pump, an upright cylinder provided with a row of ports along one side and being eccentrically bored, the cylinder being closed at its lower end; an outlet pipe connected to the upper end of said cylinder; a concentric rotary piston contacting with the cylinder wall in advance of said ports, said piston communicating at its upper end with said outlet pipe and having upright slots; wings projecting through said slots in contact with the cylinder wall and being rotatable about an axis interior of but eccentric to said piston, said wings being dished at their front faces and spacing off fluid passages in said piston, said cylinder being bored out to provide an additional passage exterior of said piston; an oscillating valve controlling said piston passages; roller bearings interposed between the piston and cylinder at the upper and lower end; and means for returning the rollers in operative position, said means being constructed to permit the passage of the fluid at the upper end between said piston and cylinder, substantially as described.

In testimony whereof I hereunto affix my signature.

PETER CHRISTMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."