May 15, 1923. 1,455,252

H. O. JACKSON

ROTARY PUMP

Filed July 15, 1921 2 Sheets-Sheet 1

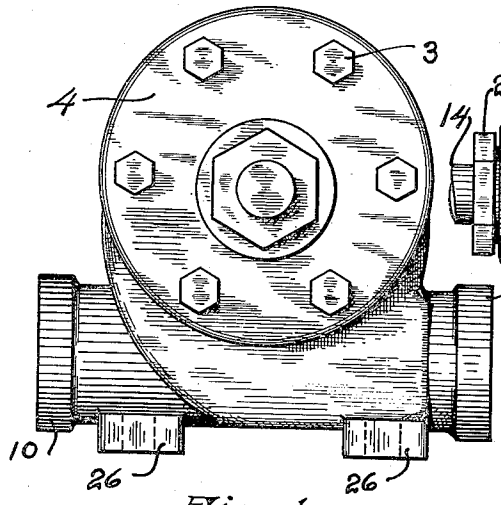


Fig. 1.

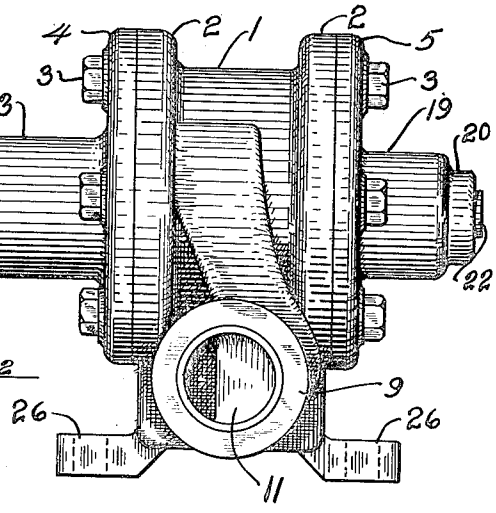


Fig. 2.

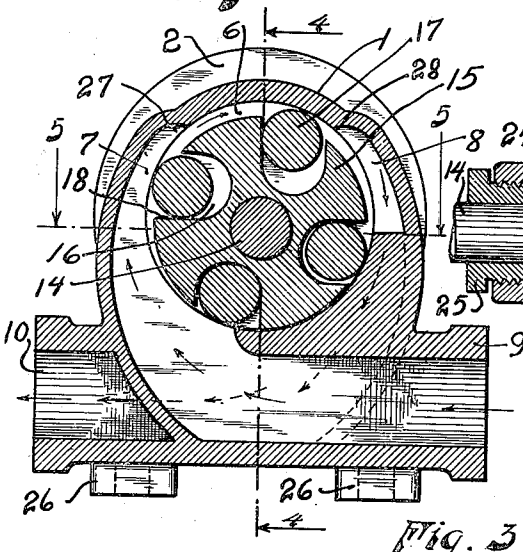


Fig. 3.

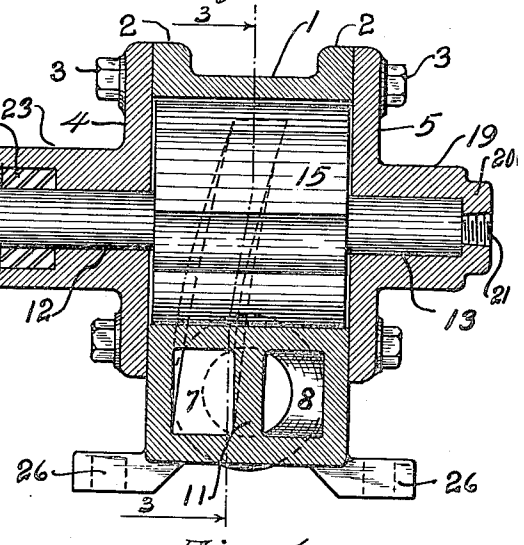


Fig. 4.

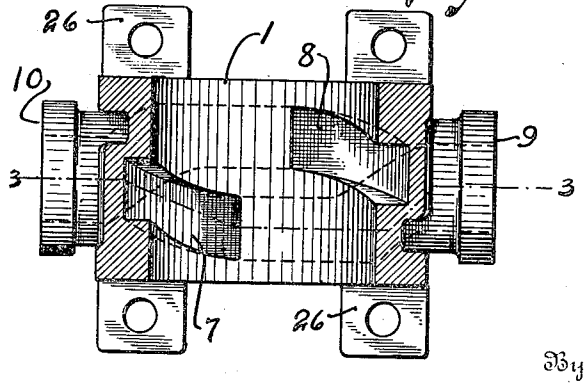


Fig. 5.

Inventor

H. O. Jackson.

By A. J. Bell

Attorney

May 15, 1923.

1,455,252

H. O. JACKSON

ROTARY PUMP

Filed July 15, 1921

2 Sheets-Sheet 2

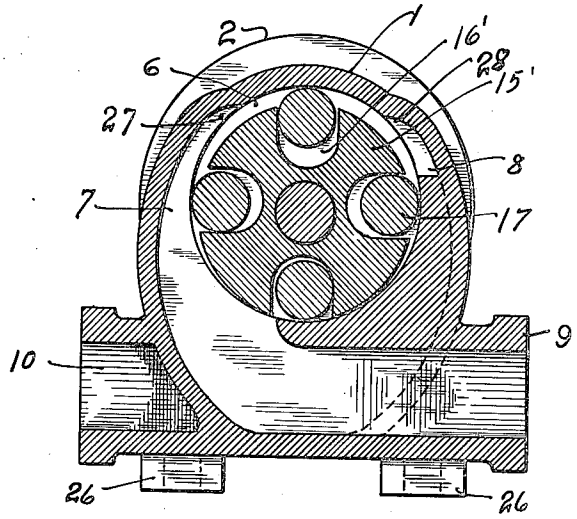


Fig. 6.

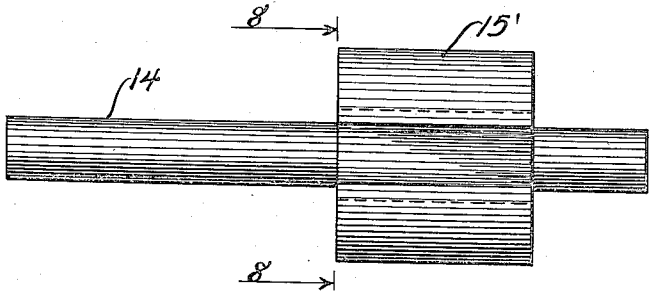


Fig. 7.

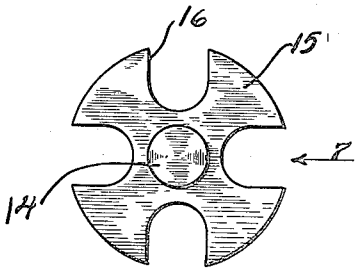


Fig. 8.

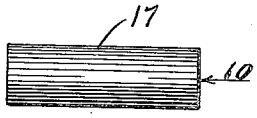


Fig. 9.

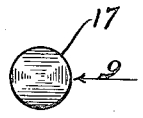


Fig. 10.

Inventor

H. O. Jackson.

By A. J. Brown

Attorney

Patented May 15, 1923. 1,455,252

UNITED STATES PATENT OFFICE.

HENRY ORR JACKSON, OF DENVER, COLORADO, ASSIGNOR TO NATIONAL PUMP COMPANY, A CORPORATION OF COLORADO.

ROTARY PUMP.

Application filed July 15, 1921. Serial No. 484,877.

To all whom it may concern:

Be it known that I, HENRY O. JACKSON, a citizen of the United States, residing at the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Rotary Pumps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to the art of rotary pumps and has for its object to produce a pump that shall be of exceedingly simple construction, efficient in its operation, of neat, substantial design and which can be cheaply manufactured.

I am aware that rotary pumps of various kinds have been made and sold and that some of them have been used with more or less success. I believe, however, that the pump which I have invented, and which I am about to describe in detail by reference to the accompanying drawing, has features that are new and which are of great importance.

In the drawings:

Fig. 1 shows a side elevation of my pump.

Fig. 2 shows a side elevation of Fig. 1 looking in the direction of arrow 2.

Fig. 3 is a longitudinal section taken on line 3—3 Fig. 4.

Fig. 4 is a cross section taken on line 4—4 Fig. 3.

Fig. 5 is a section taken on line 5—5 Fig. 3.

Fig. 6 is a longitudinal section similar to Fig. 3 but showing a modified form of rotor.

Fig. 7 is a side elevation of the rotor shown in Fig. 6.

Fig. 8 is an end elevation looking in the direction of arrows 8, 8 Fig. 7.

Fig. 9 is a side elevation of one of the rollers and

Fig. 10 is an end elevation thereof.

In the drawings the same reference characters represent the same elements throughout the several views.

My improved pump comprises a main body portion or cylinder 1 provided with outwardly extending flanges 2 for the reception of top bolts 3 by which the cylinder heads or ends 4 and 5 are secured thereto, cylinder 1 is provided with a transverse cylindrical chamber 6 into which open intake and exhaust ports 7 and 8 respectively. In the drawings I have shown only one intake and one exhaust port but it is obvious that there may be as many of each as may be necessary for the proper operation of the size pump under consideration.

I desire to call special attention to the shape and location of the ports for I consider this to be an important feature of my present structure. Referring now to Figs. 3, 4 and 5, it will be noticed that intake port 7 has its inception at the opening 9 and passes inwardly under the cylinder 1 offsetting as it passes under the cylinder, as indicated by the dotted lines in Fig. 5. As the opening passes the center line it offsets towards the middle of the cylinder. Exhaust port 8 is similar in all essential features to the intake port 7 which has just been described but has its inception in opening 10 and as it passes under the cylinder it offsets to the other side of the middle portion thus leaving a partition or web 11 between the two openings at this point. Each one of the ports open into the piston chamber 6 near the lower middle portion thereof and extends upwardly to a point near the upper middle portion as plainly shown in Figs. 3 and 6. It will be seen from the above description that the main body portion 1 is entirely symmetrical with respect to a plane passing vertically thru its center and with a horizontal plane. This feature permits the pump to be reversed at will without reversing the body portion, a feature that will be described more in detail hereafter.

The cylinder heads or ends 4 and 5 are each provided with a bearing 12 and 13 respectively, for the reception of the shaft 14 which is attached to the rotary piston member 15. The center line of the bearings 12 and 13 is offset with respect to the center of the cylindrical piston chamber 6 and is nearer the bottom than the top of said chamber.

Rotary piston 15 is of such a diameter that it will almost come in contact with the lowermost part of the piston chamber: this will leave a space between the top of the chamber and the top of the piston which is substantially equal to twice the distance between the axis of the piston and that of the

cylinder. It was stated above that the piston "almost came in contact with the lowermost part of the piston chamber." In explanation of the statement it is pointed out here that for the reason that sealing rollers, to which reference will be made later, are used, it is not necessary that the piston should make contact with the piston chamber and therefore a space a few thousandths of an inch is left so as to avoid wear or friction.

The rotary piston is provided with four grooves or slots 16 which extend the entire length of the piston. In Fig. 3 these slots are shown as placed entirely on the leading side of diameters spaced 90° apart, but this is not essential; they may be placed so that the diameters pass thru the center of the slots as indicated in Fig. 6.

Located in each of the slots 16 is a roller 17 which fits loosely therein, the length of the roller being such as to fit snugly against the inner surfaces of cylinder ends 4 and 5. When piston 15 is rotated in the direction of the arrow in Fig. 3, the rollers 17 will be forced outwardly against the inner surface of the cylinder by the action of the centrifugal force developed by rotation, the force with which they engage the walls of the cylinder being, of course, a function of the speed at which the piston rotates and the diameter thereof. Since the rollers 17 fit loosely within the slots 16 they will roll on the inner surface of the cylinder and thus reduce the wear and friction to a minimum.

The driving surface 18 of slots 16 will engage the roller 17 along one element of its surface and form a seal. There will be a sliding contact between the driving surface 18 and the roller, but when the pump is engaged in raising water, oil or other liquids, there will always be a liquid film between the moving surfaces which will act as a lubricant and prevent any excessive wear of surfaces that are in movable contact.

Cylinder end 5 has a protruding portion 19 which contains the bearing surface 13. The protruding portion 19 has a closed end 20 which has a screw threaded opening 21 for the reception of a plug 22. By this means this end can be sealed air and water tight without the aid of stuffing boxes and packing. The shaft 14 must extend through end member 4 and beyond the same in order that power may be applied to it for turning the piston 15. End member 4 is therefore provided with a protruding portion 23 of considerably greater length than member 19, this protruding portion is provided with a bearing surface 12 and a space 24 for the reception of packing material which is held in place by means of plug 25, the action of the stuffing box thus provided is relied upon to seal the pump on this side.

The motive power is applied to a pulley or gear secured to the outer end of shaft 14 in a manner well understood.

The operation of my pump is as follows:

The pump having been secured to some suitable base by means of bolts passing through lugs 26 and having been assembled as shown in the drawings and described above has the intake opening 9 connected by suitable piping to a liquid supply and the discharge opening connected to the distributing system which may be a pipe leading to a reservoir, a hose or any other suitable means. The pump is then rotated in the direction indicated by the arrow in Fig. 3. Due to the centrifugal force set up rollers 17 will fly outwardly until they come in contact with the inner curved surface of the cylindrical chamber 6, they will then act as valves and form a sealed space between the piston wall 18 and the inner surface of the cylinder chamber. Owing to the eccentric position occupied by the rotary piston in the cylinder, the sealed chamber referred to above increases in volume as the piston is rotated, thus producing a suction which lifts the liquid and causes it to flow into intake port 7 where it enters and fills the space between the cylinder chamber and the piston surface. As the piston rotates another roller comes into operative position relative to the intake port and as it passes the upper end 27 of port 7 a certain amount of water will be held in the space between the two rollers which now occupy the space between the upper ends 27 and 28 of ports 7 and 8 respectively, a further rotation of piston 15 will cause the leading roller to pass point 28 and permit the liquid to flow into outlet port 8, the following roller acting as a piston to force the liquid out through port 8. It is pointed out at this place that the distance between the upper ends of the intake and outlet ports, represented by 27 and 28 in Fig. 3, should, as a rule, never be less than the distance between the elements of rollers 17 that simultaneously engage the inner surface of the cylindrical chamber; if the distance is less than that pointed out, an open passage will at times exist between the intake and discharge ports which would prevent the formation of the required vacuum for starting.

Owing to the fact that rollers 17 are held against the sides of the cylinder chamber by centrifugal force alone it follows that if the pressure against which the pump is forcing the liquid should become greater than that which corresponds to the centrifugal force by which the rollers 17 are held against the cylinder surface, then the rollers will not move out of slots 16 and the pump will cease to function as such, the piston 15 will however, continue to rotate quite freely in the cylinder. The feature just pointed out is considered to be of special importance for

the reason that should the discharge pipe become closed for any reason, the pump will not continue to build up a great pressure with a final breakage of parts or burning out of the motor but will merely cease to function as a pump until the pressure is reduced to a predetermined amount when it will automatically begin to function.

The maximum pressure under which the pump operates can be varied by varying the speed of rotation or by varying the weight of the rollers 17 and for the purpose it may be advisable to make them hollow in some instances and in other instances to make them with a lead core.

It will be noted that the liquid does not have to make any sudden turns while passing through my pump but that when it enters at the intake opening 9 it is deflected upwardly by the walls of intake port 7 and carried across the top of the cylinder chamber 6 to the discharge port 8 from whence it passes downwardly and is directed into the discharge opening 10 by the gradually changing curvature of the passage leading thereto. From the above it is seen that the liquid as it passes through my pump makes a complete loop and that at no time is it subjected to any sudden changes in direction or reversals and that as a consequence the kinetic energy due to its velocity is never lost as is the case in so many pumps.

In Figs. 6, 7 and 8 I have shown my pump equipped with a rotary piston 15′ which differs from piston 15 in this that the slots 16′ which are occupied by rollers 17 are so placed that they are bisected by diametrical planes placed 90 degrees apart. As pointed out above, such a pump is reversible without resorting to any alterations.

In the above specification the pump has been described with relation to a rotary piston having four longitudinal slots and four rollers, but it is evident that any number of rollers can be used, I have simply used four for convenience in drawing and describing and not in any limiting sense.

Although my pump as described above is especially well adapted for use in connection with liquids, it is by no means limited thereto and can be used to pump other fluids.

Having now described my improved pump what I claim as my invention or discovery and what I desire to have protected by Letters Patent is:

1. In a rotary pump having a piston chamber and a rotor mounted eccentrically therein; a ringlike casing having a circular chamber therein, said chamber being open at both ends; intake and discharge ports opening into said chamber on the opposite sides thereof; intake and discharge passages connected respectively to the intake and discharge ports, said passages being tangential to the side of said chamber and crossing within the casing, said intake passage opening on the side of the discharge port and said discharge passage opening on the side of the intake port.

2. A device in accordance with claim 1 in which the ports open into the chamber on a diagonal line.

In testimony whereof I affix my signature.

HENRY ORR JACKSON.