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1,466,904

H. O. JACKSON

ROTARY PUMP

Filed Dec. 27, 1921

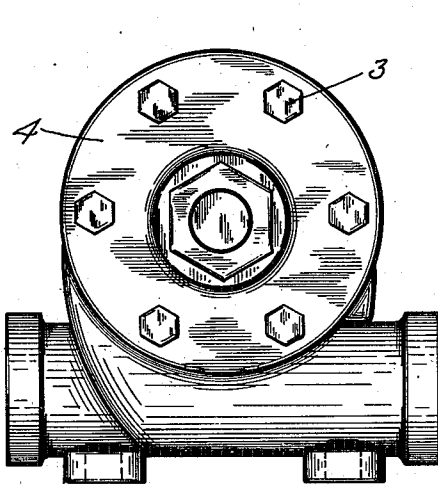


Fig. 1.

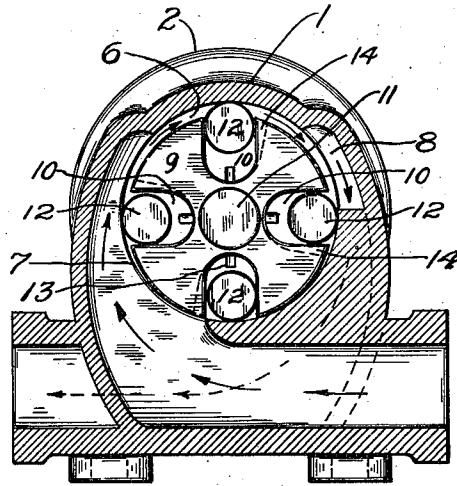


Fig. 2.

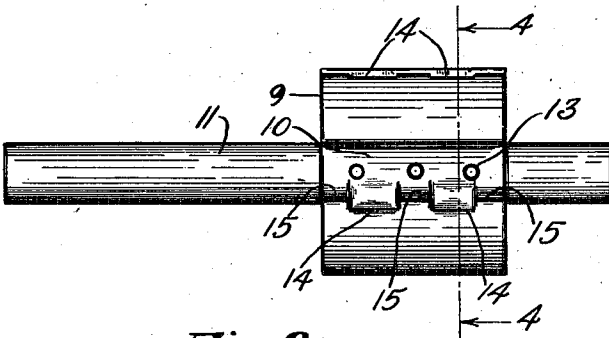


Fig. 3.

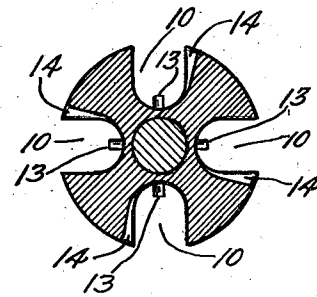


Fig. 4.

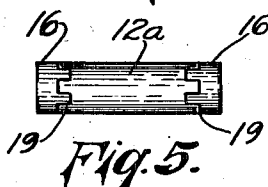


Fig. 5.



Fig. 6.

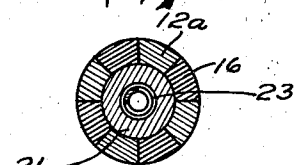


Fig. 8.

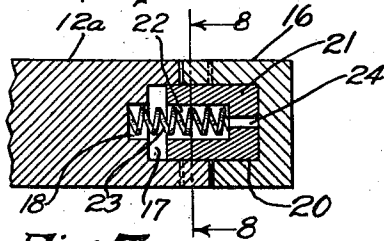


Fig. 7.

Inventor

H. O. Jackson.

A. J. O'Brien

Attorney

UNITED STATES PATENT OFFICE.

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

ROTARY PUMP.

Application filed December 27, 1921. Serial No. 524,977.

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.

This invention relates to an improvement in the art of rotary pumps of the type described and claimed in my copending application, Serial No. 484,877, filed July 15, 1921.

In the application above referred to, I have shown a rotary pump which is so designed that the liquid as it passes through the pump does not have to make any sharp or sudden changes in the direction of flow, and in this manner the loss of head, due to sudden changes in direction, is prevented. The rotor employed in the pump referred to is provided with longitudinal grooves within which are placed rollers which are free to move therein and which engage the inner surface of the cylinder within which they rotate.

The rotary pump referred to above and described in the above mentioned application is found to be a very efficient and effective pump for places where the liquid is to be pumped against moderate heads. I have found, however, that the pump described in my application above referred to, is somewhat noisy, especially when starting and stopping, due to the fact that the rollers must fit the grooves in the rotor loosely, and they are therefore free to drop to the bottom of the grooves and to strike against the sides with a resultant metallic sound, which is undesirable. I have also found that where it is necessary to pump against high pressures, the rollers do not form a positive seal, but permit the fluid to pass between them and the cylinder wall.

It is the object of this invention to improve on the construction shown in the above mentioned application, so as to produce noiseless operation, and so as to adapt the pump for high pressure work.

In order to more clearly describe my invention, I shall have reference to the accompanying drawing, in which—

Fig. 1 is a side elevation of my improved pump;

Fig. 2 is a longitudinal vertical section thereof;

Fig. 3 is an elevation of my improved rotor;

Fig. 4 is a transverse section of the rotor taken on line 4—4, Fig. 3;

Fig. 5 is a side elevation of one of my improved rollers;

Fig. 6 is an end elevation of the roller shown in Fig. 5;

Fig. 7 is a diametrical section on an enlarged scale of one end of the roller shown in Fig. 5; and

Fig. 8 is a section taken on line 8—8, Fig. 7.

The same reference characters will be used to indicate the same parts 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 tap bolts 3, by which the cylinder heads or ends 4 are secured thereto. Cylinder 1 is provided with a transverse cylindrical chamber 6, into which open intake and exhaust ports 7 and 8, respectively. Since the cylindrical body member 1 is the same as that described by me in my copending application, above referred to, I will not describe the same in detail, as it forms no part of my present invention, except in so far as it cooperates with my improved rotor in the same manner as it does in the structure described in my application.

My improved rotor or rotary piston 9 consists of a cylindrical body portion of a diameter somewhat less than the diameter of the cylindrical chamber 6; this body portion is provided with a plurality of slots 10 which are parallel to the axis of the rotor and spaced equidistantly along its circumference. In the drawing, I show four slots spaced 90 degrees apart, but any desired number may be employed, depending upon the size of the rotor and other conditions. Rotor 9 is mounted on a shaft 11 which is adapted to rotate in suitable bearings. Within each slot 10 I place a roller 12 which has a diameter of about three thousandths (.003) of an

inch less than the width of the slot, so that it may move freely therein but cannot cause any appreciable noise. In order to prevent a metallic click as the rollers 12 fall to the bottom of the slots, I provide each slot 10 with a plurality of wooden plugs 13, whose ends project above the bottom of the slots. The rollers 12, when they fall towards the bottom of the slots, will therefore strike the ends of wooden plugs 11 and produce no metallic sound.

The rotor 9 is arranged to rotate in a clockwise direction when viewed as in Fig. 2, and as it rotates the rollers 12 are flung outwardly against the inner surface of the cylindrical chamber 6 by virtue of the centrifugal force due to the rotation; they will then form seals between the rotor and the inner surface of the cylindrical chamber, all as described in the above referred to application. In order that the sealing rollers 12 shall move freely in slots 10, it is essential that the liquid that is being pumped can freely pass into and out of the space between the bottom of the slots and the rollers. In the construction forming the subject matter of this invention, I provide one or more cut away portions 14 on the leading side of the slots 10, as clearly shown in Figs. 2, 3 and 4. These cut away portions provide a path through which the liquid may freely enter and leave the space between the bottom of the slots and the rollers, and at the same time the rollers will not be permitted to rattle, as the portions 15 which have not been cut away engage the sides of the rollers with a small clearance, in the manner mentioned above. When the pump is operating and forcing liquid out through the outlet port 8 against a high pressure, the liquid will fill the spaces between the rollers and the bottom of the slots and force the rollers outwardly against the cylinder wall. The liquid will also subject the opposite side of the roller to the same pressure per unit area, but since the roller forms a seal between it and the cylinder surface, the inward pressure affects only one-half the cylinder area. In this manner it is apparent that there is always an excess of force tending to force the rollers outward over that tending to force the rollers inwardly, and this force added to the force produced by the centrifugal action, keeps the rollers in sealing contact with the cylinder surface, regardless of the pressure against which the pump is working.

As rollers 12 are free to rotate in slots 10, they will roll on the inner surface of the cylinder and, consequently, there will be very little, if any, wear on these surfaces. The rollers 12 have sliding contact with the following surface of the slots 10, but as the chamber is always filled with liquid, a film of liquid will always separate the roller sur-

face from the surface of the slot and thus reduce the wear at this point to a minimum. The ends of the rollers 12 slide along the inner surfaces of the cylinder heads 4 and must be in reasonably close contact with these surfaces and are guided by them, with the result that they are slowly worn away. In order to compensate for the wear of the ends of the rollers, I propose to make them in the manner shown in Figs. 5, 6 and 7, where 12^a represents the central part of the roller and 16 the end portions thereof. The ends of central portion 12^a have holes 17 drilled therein, as shown in Fig. 7, and in the bottom of these holes is another hole 18, the purpose of which will hereinafter appear. The annular ends of the part 12^a are notched radially as indicated by numeral 19 in Fig. 5, and the cooperating ends of parts 16 are correspondingly notched so as to permit relative longitudinal movement of the parts. End pieces 16 have holes 20 drilled therein; these holes register with holes 17 in the central part 12^a. A plug 21 is inserted in holes 17 and 18, and serves to hold the parts 12^a and 16 in alignment. Plug 21 has a hole 22 drilled into one end thereof and a spring 23 extends from the bottom of hole 18 to the bottom of hole 22 in the manner shown in Fig. 7. A small hole 24 extends from the bottom of hole 22 to the other end of plug 16. The spring 23 tends to force members 16 and 12^a apart, and as the ends of the composite roller are worn, the wear will be automatically compensated for by a corresponding extension of the roller.

From the above it will appear that I have produced an improved rotary piston member adapted to be used in pumps of the type disclosed in my copending application above referred to, and in which I have provided means to prevent the rollers from operating in a noisy manner, and in which means is provided to permit the fluid to enter readily into the space between the bottom of the slots 10 and the rollers 12, whereby the rollers will be forced against the surface of the cylinder by a force directly proportional to the pressure against which the pump operates, thus insuring successful operation at all pressures. I have also provided sealing rollers that are provided with resilient means for compensating for end wear, thereby obtaining a pump that automatically keeps tight and prevents leakage due to wear.

Having thus described my invention, what I claim as new and desire to have protected by Letters Patent, is—

1. In a rotary pump having a casing, a piston chamber in said casing, intake and discharge ports opening into said piston chamber, a rotary piston member in said casing, and longitudinally extending slots in the surface of said rotary piston member, rollers adapted to lie in said slots and

cooperating with the sides of said piston chamber to form seals, said rollers being provided with means whereby they will automatically extend to compensate for any
5 end wear.

2. An extensible roller adapted for use in a rotary pump comprising a main body section having an opening in one end whereby an annular wall is formed, said annular
10 wall being provided with a plurality of notches, an end member having an opening in one side thereof whereby an annular wall is provided, notches in said last named wall

cooperating with the notches in the first named wall, means for holding said parts 15 in alignment, and resilient means tending to separate said parts.

3. A roller comprising two parts, means for preventing relative rotation of said parts, but permitting relative longitudinal 20 movement, means for holding said parts in axial alignment, and resilient means tending to move said parts relatively in an axial direction.

In testimony whereof I affix my signature.
HENRY O. JACKSON.