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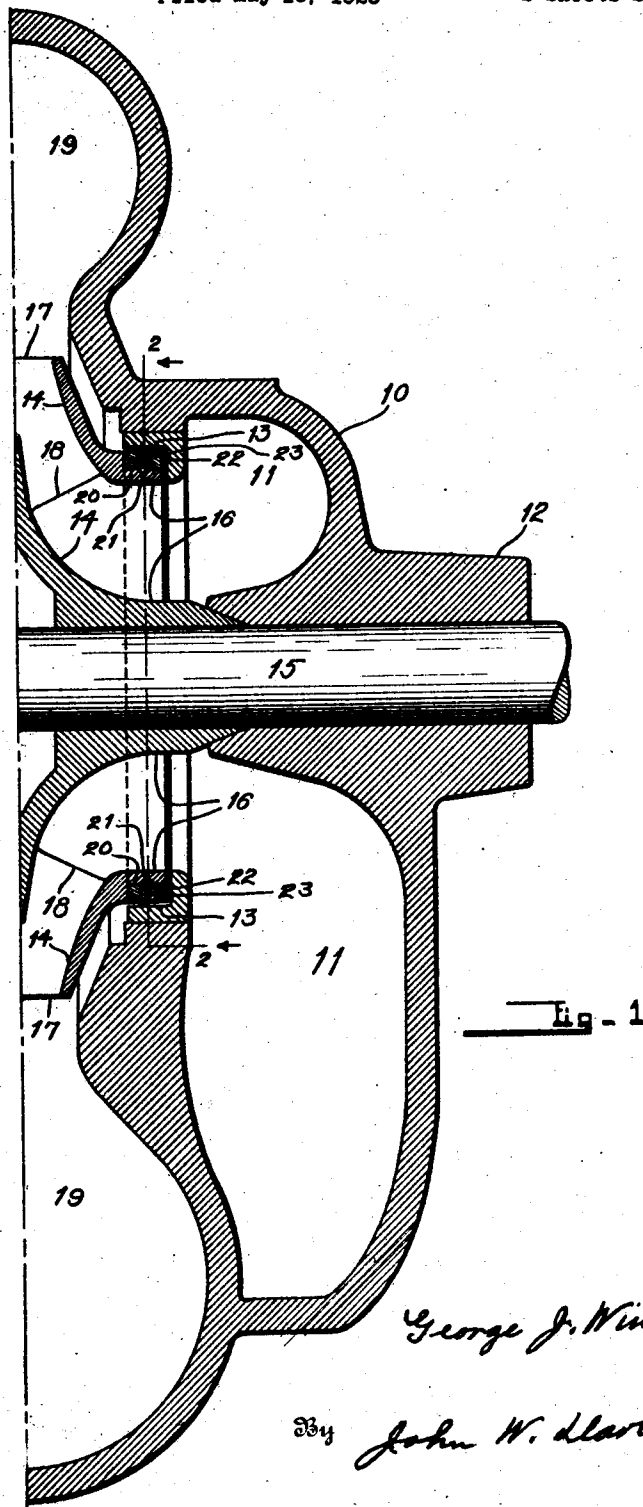
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WEARING RING FOR ROTARY ELEMENTS

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2 Sheets-Sheet 1



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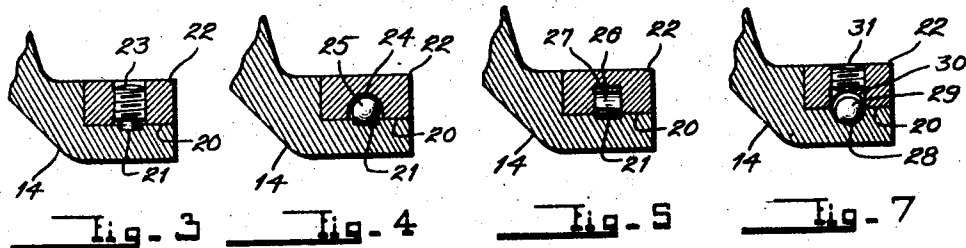
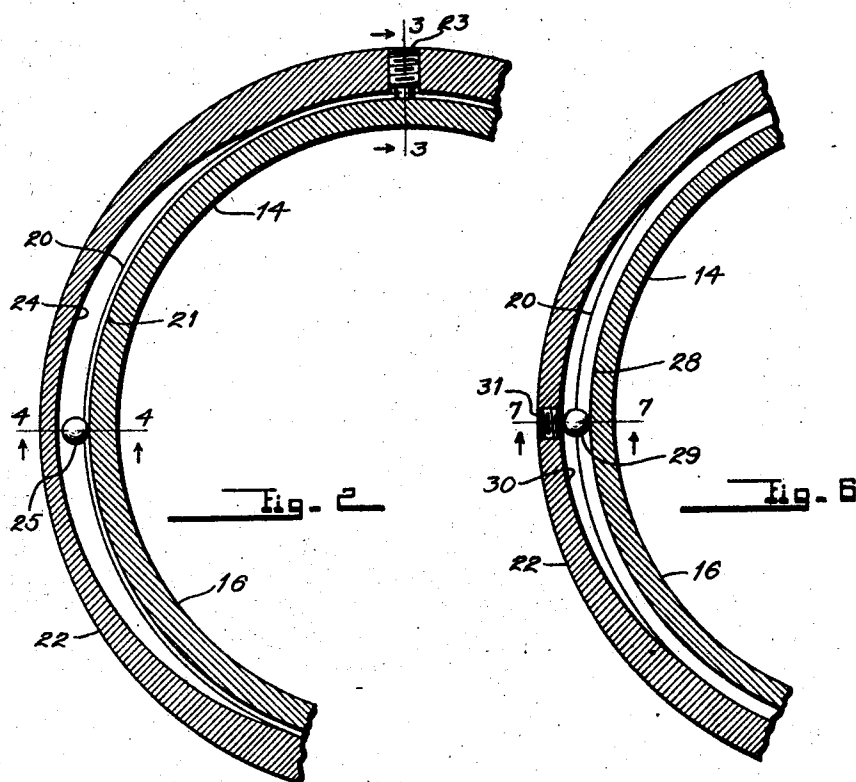
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WEARING RING FOR ROTARY ELEMENTS

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2 Sheets-Sheet 2



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WEARING RING FOR ROTARY ELEMENTS.

Application filed May 16, 1923. Serial No. 639,324.

My invention relates to wearing rings for rotary devices where one rotating surface is always subjected to abrasion and wear by an adjacent surface.

5 In order to clearly illustrate my invention I have described the same in connection with centrifugal pumps but it will be understood that my invention is capable of many other uses.

10 Centrifugal pumps as now constructed are provided with a casing which comprises a suitable bearing, or bearings, for the revolving impeller. The casing also comprises a cylindrical surface that is coaxial
15 with the bearings and the impeller has a threaded end on the intake side thereof upon which a wearing ring is screwed and the outer surface of said wearing ring closely approaches the cylindrical surface formed
20 in the casing in order to prevent leakage from the intake chamber of the casing to the delivery chamber of the casing.

It has been found practically impossible to make coaxial with the shaft of the im-
25 peller the outer cylindrical surface of wearing rings that were made to replace the original wearing rings formed upon the impeller. The replacement wearing rings would not screw up truly upon the threaded
30 intake side of the impeller notwithstanding that all precautions were observed to insure close workmanship.

As a consequence of this defect, replacement wearing rings could not be made to
35 have a sufficiently close approach to the cylindrical surface formed in the casing and as a consequence, considerable leakage existed between the intake chamber of the casing and the delivery chamber thereof. Fur-
40 thermore, by reason of the eccentricity of the outer surface of the replacement wearing ring with reference to the axis of the shaft of the impeller, said ring would at
45 times touch the cylindrical surface of the casing and cause the ring to unscrew if for any reason the impeller should be inadvertently turned backwardly.

Among the objects of my invention are:—

50 To so construct the intake side of the impeller and provide a wearing ring therefor that the cylindrical surface of the original ring mounted upon said impeller and the cylindrical surfaces of any replacement
55 rings that may be mounted thereon will be coaxial with the shaft of said impeller.

To provide means for preventing axial displacement of the wearing ring with reference to the impeller.

To provide means for preventing other than a limited circumferential movement of
60 the wearing ring with reference to the impeller.

To provide means for locking the wearing ring upon the impeller in both directions circumferentially so that if the im-
65 peller is inadvertently reversed the ring will not become disengaged therefrom.

To provide locking means for locking the wearing ring with reference to the impeller in both directions circumferentially, said
70 locking means being so arranged that it will lock said wearing ring upon said impeller firmly in both directions and yet will yield in a direction opposite to that in which
75 it may be locked in order to permit the removal of said ring from said impeller when a replacement ring is to be placed thereon.

These and further objects of my invention will be disclosed in the following specification, reference being had to the accom-
80 panying drawing, and the means by which said objects are effectuated will be definitely pointed out in the claims.

In the drawings:—

Figure 1 is a central section of one half
85 of a centrifugal pump containing my invention.

Fig. 2 is an enlarged section of the intake end of the impeller and my improved wearing ring, the section being taken as
90 along the line 2—2 in Fig. 1 looking in the direction of the arrows.

Fig. 3 is a section along the line 3—3 in Fig. 2 looking in the direction of the arrows.

Fig. 4 is a section along the line 4—4 in
95 Fig. 2 looking in the direction of the arrows.

Fig. 5 is a section similar to Fig. 4 but illustrating the use of a roller instead of a
100 ball as a locking means.

Fig. 6 is a view similar to Fig. 2 but showing a variation in the form of the grooves.

Fig. 7 is a section along the line 7—7
105 in Fig. 6 looking in the direction of the arrows.

Referring to Fig. 1 which shows one half of a centrifugal pump, it being understood
110 that the half not shown is a counterpart of that shown, 10 represents the casing

which is provided with an intake chamber 11 that is connected in any approved manner with a source of the fluid that is to be pumped. Said casing is also provided with
 5 a bearing shown diagrammatically at 12, which is representative of any approved form of bearing that it may be desired to use, but whatever bearing is used, the casing is provided with a cylindrical surface 13
 10 that is coaxial with the bearing. The surface 13 may be formed in a removable ring or otherwise, as desired.

14 is the impeller which is fixed upon the shaft 15 and revolved in any suitable manner.
 15 The impeller terminates in an annular opening 16 which is in communication with the intake chamber 11. The opening 16 communicates with the annular opening 17 which forms the delivery side of the impeller 14 and
 20 suitable vanes as 18 are formed in the impeller in any usual or approved manner for the purpose of forcing the fluid that is to be pumped.

The opening 17 communicates with the delivery chamber 19 of the casing and the latter is connected in any approved manner to a delivery pipe, not shown.

The impeller 14 is provided with a cylindrical surface 20 that is coaxial with the
 30 shaft 15 and an annular groove 21 extends inwardly from the surface 20.

The wearing ring 22 has an interior cylindrical surface which fits closely upon the surface 20 of the impeller 14 and said ring
 35 has two screws 23—23 threaded therein and provided with cylindrical ends which extend into the groove 21. The ring 22 is provided with a groove 24 that is eccentric to the axis of the shaft 15 and said groove extends, at its maximum depth, from the inner
 40 cylindrical surface of the ring 22 to a depth somewhat greater than the diameter of the locking ball 25.

The mode of assembling the impeller and
 45 ring just described is as follows:—

The ball 25 is placed within the groove 24 and the ring 22 is held in such a position that the deepest part of the groove 24 will be downward. In this position the upper
 50 surface of the ball 25 will be below the inner cylindrical surface of said ring and, consequently, the ring may be slipped on the cylindrical surface 20 of the impeller 14. The screws 23—23 are then placed in position
 55 with their ends extending into the groove 21 and then the ring 22 is turned in a direction opposite to that in which the impeller is to revolve until the ball 25 contacting with the surfaces of the grooves 21 and 24 prevents
 60 further motion of said ring with reference to said impeller.

It is to be noted that if the impeller should by any means be turned inadvertently in the opposite direction to that in which it normally
 65 revolves there would be no possibility of

the ring 22 becoming displaced from the impeller 14 for if the ring 22 is moved in a direction opposite to that just described it will become unlocked and will again lock when the ball contacts with the eccentric groove 24
 70 near its other end.

It is to be noted that the screws 23—23 merely insure that the ring 22 will not be axially displaced upon the impeller 14 should the impeller be reversed and the ring 22 be-
 75 come unlocked, as just described.

It is also to be noted that when the ring is locked in position the ball 25 locks the ring in both directions circumferentially and
 80 axially.

In place of the ball 25, I may use the roller 26 as shown in Fig. 5. When the roller is used the groove 27 is formed flat at the bottom thereof instead of curved as shown in
 85 Fig. 4.

In the variation shown in Figs. 6 and 7, the groove 28 has a depth one-half the diameter of the ball 29 and the groove 30 has a depth slightly more than one-half the diameter of the ball 29.
 90

The groove 28 may be formed with a curved bottom as shown in Fig. 7, if so desired, or with a flat bottom such as the groove 21 in Fig. 4. These grooves are made
 95 of the depths just noted in order to insure that should the ball 29 at any time move to the greatest depth of the groove 30, then the ring 22 could not be axially displaced upon the impeller 14 notwithstanding that said ring was unlocked circumferentially.
 100

With this construction a hole is provided in the ring 22 for the insertion of the ball 29 and this hole is closed by the screw 31.

While I have shown a ball 29 for use with the structures shown in Figs. 6 and 7, it is to be understood that a roller 27 may be used if
 105 desired, the grooves 28 and 30 being shaped to accommodate said roller.

Thus it will be seen that I provide a wearing ring that has a plain cylindrical fit upon
 110 the impeller and I consequently insure that the outer wearing surface of a new ring will always be coaxial with the axis of the impeller shaft and also insure that the outer cylindrical surfaces of replacement rings
 115 will also be coaxial with said shaft.

While I have shown and described two forms of carrying out my invention, it is to be understood that they are merely illustrative and in nowise to limit the scope of my
 120 invention, for changes may be made in the structures shown and described without departing from the spirit of my invention.

It will also be understood that while I have described my invention as particularly
 125 applicable to centrifugal pumps that the invention is equally adapted to any type of rotating device and that I intend no limitations upon the invention other than are imposed
 130 by the scope of the appended claims.

I claim:—

1. In combination with a rotatable element having its surface aligned with the surface of a surrounding casing, a wearing ring having an internal circumferential groove arranged to be aligned with a corresponding external groove on said rotatable element and means extending between said grooves for locking said wearing ring against axial or circumferential displacement from said rotatable element.

2. In a rotary machine, a bearing, a cylindrical surface co-axial with said bearing, a rotating element comprising a shaft revolvably mounted in said bearing, a second cylindrical surface co-axial with said shaft having an annular groove adjacent one edge of said rotating element, a wearing ring mounted upon said rotating element and closely approaching said co-axial cylindrical surface, and screws threaded in said ring and having their ends projecting into the groove in said cylindrical surface to prevent axial displacement of said ring upon said rotating element.

3. In a rotary machine, a bearing, a cylindrical surface co-axial with said bearing, a rotating element comprising a shaft revolvably mounted in said bearing, a cylindrical surface co-axial with said shaft having an annular groove co-axial with said shaft, a wearing ring having a groove eccentric to said shaft mounted upon said rotating element and closely approaching said last named co-axial cylindrical surface, and rolling locking means mounted in said first named groove and extending into said groove in said ring for limiting the circumferential displacement of said ring on said rotating element.

4. In a rotary machine, a bearing, a cylindrical surface co-axial with said bearing, a rotating element comprising a shaft revolvably mounted in said bearing and a cylindrical surface co-axial with said shaft, a wearing ring mounted on said rotating element and closely approaching said last named co-axial cylindrical surface, said wearing ring and cylindrical surface each being grooved and means extending between said grooves for preventing axial movement and for limiting circumferential displacement of said ring on said rotating element.

5. In a rotary machine, a bearing, a cylindrical surface co-axial with said bearing, a rotating element comprising a shaft revolvably mounted in said bearing, a cylindrical surface co-axial with said shaft, a ring carried by said last named cylindrical sur-

face having an annular groove eccentric thereto, and means extending into said groove for preventing axial displacement of said ring on said rotating element.

6. In a rotary machine, a bearing, a cylindrical surface co-axial with said bearing, a rotating element comprising a shaft revolvably mounted in said bearing, a cylindrical surface co-axial with said shaft having an annular groove therein co-axial with said shaft, a wearing ring containing a groove eccentric to said shaft mounted upon said rotating element, and closely approaching said last named co-axial cylindrical surface, rolling locking means having a radius equal to the depth of said first named groove and positioned between said first named groove and the groove in said ring to limit displacement of said ring on said rotating element, said ring including screw threaded means extending into said grooves for locking said ring with respect to said rotating element.

7. A wearing ring for rotatable elements comprising in combination with a rotatable element having a circumferential groove adjacent one end thereof, a wearing ring adapted to be mounted over the end of said rotatable element and having an internal groove arranged to be aligned with the groove in said rotatable element, a pair of screw threaded members in said wearing ring arranged to be projected into the groove in said rotatable element for locking said wearing ring upon said rotatable element against axial movement, and auxiliary means extending between said grooves for preventing circumferential displacement of said wearing ring from said rotatable element.

8. A wearing ring for rotatable elements comprising in combination with a rotatable element having a circumferential groove adjacent one end thereof, a wearing ring having internal eccentric grooves arranged to be aligned with the circumferential groove on said rotatable element, screw threaded members carried in diametrically opposed positions in said wearing ring and arranged to extend into the groove formed in said rotatable element, and locking rollers disposed between the eccentric grooves in said wearing ring and the circumferential groove in said rotatable element for preventing displacement of said wearing ring from said rotatable element.

In testimony whereof, I affix my signature.

GEORGE J. WINKLE.