

Description

BACKGROUND OF THE INVENTION

The present invention relates to a liner ring for a pump, and more particularly to a liner ring for a pump which is provided between a pump casing and an impeller to check counterflow therebetween.

Conventionally, in a centrifugal pump, in order to prevent the liquid discharged out of the impeller from being leaked toward the suction side of the pump casing, there are provided a wearing ring (or impeller ring) on the side of the impeller, and a liner ring (or a casing ring) on the side of the casing in confrontation with the wearing ring. The wearing ring and the liner ring are provided in such a manner that the clearance between both rings is kept to be small.

Since the wear condition of the liner ring or the wearing ring cannot be easily observed from the outside, wear resisting material must be used for the liner ring or the wearing ring. In case of non-corrosive liquid, bronze, cast iron or surface hardening steel or the like is employed. On the contrary, in case of corrosive liquid, 18Cr-8Ni stainless steel is often employed, but such stainless steel is not effective against the wear. Therefore, in this case, the clearance between the rotating member and the stationary member must be larger than average clearance which is commonly used.

In addition to the above-mentioned metal for a liner ring it is to be desired that carbon material or teflon (trademark) material having an excellent wear resistance is used.

However, carbon material or teflon material is difficult to handle when it is used in the high temperature environment or the like. That is, since material suitable for a sliding member such as carbon or teflon has different thermal expansion coefficient from that of metal used for a pump casing, such material cannot be installed on the pump casing by means of force fit which is generally used in the liner ring made of metal. Therefore, a housing made of rubber is often used in conjunction with the sliding member made of carbon or teflon, or the usage temperature range of the liner ring is often limited to a certain range.

Attention is drawn to US-A-4,018,544 which shows a clearance ring assembly for a centrifugal pump, which allows the clearance ring and an impeller of said pump to shift radially to natural positions. The clearance ring is directly mounted to an impeller casing and is held against a rotational movement by pins extending from said impeller casing into apertures provided in said clearance ring. Further, an O-ring is provided between said clearance ring and said impeller casing.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a liner ring for a pump comprising carbon material or teflon material which is difficult to handle when it is used in the high temperature liquid, and which can be easily used in the same manner as the liner ring made of metal.

In order to achieve the above object, a liner ring for a pump as claimed in claim 1 and/or a centrifugal pump as claimed in claim 10 are provided. Preferred embodiments of the invention are shown in the dependent claims.

According to another aspect of the present invention, the liner ring further comprises means for preventing said sliding member from rotating relative to the housing.

According to still another aspect of the present invention, the sliding member comprises material having thermal expansion coefficient larger than that of the housing, between the housing and the sliding member there is provided a certain gap corresponding to variation of dimension caused by the difference of thermal expansion coefficient of the housing and the sliding member, and a certain pre-load is applied to the elastic member so as to enable the elastic member to perform sealing function at the lowest usage temperature.

According to still another aspect of the present invention, the sliding member comprises material having thermal expansion coefficient smaller than that of the housing, the sliding member is tightly fitted with the housing, and a certain pre-load is applied to the elastic member so as to enable the elastic member to perform sealing function at the highest usage temperature.

According to still another aspect, the housing is made of sheet metal and pressed to shape, the housing is in the form of a cylindrical receptacle-like body comprising a cylindrical side wall, a bottom wall and a corner portion between the cylindrical side wall and the bottom wall, the cylindrical side wall is formed at the side of the impeller with a flange, and the elastic member is located at the corner portion.

According to still another aspect of the present invention, the flange of the housing is formed with an engaging member which is bent radially inwardly after inserting the sliding member into the housing so that the engaging member prevents the sliding member from moving in an axial direction and/or rotating in a circumferential direction.

According to still another aspect of the present invention, the housing is formed at the bottom wall thereof with a first engaging member, the sliding member is formed with a second engaging member, and the first engaging member is engageable with the second engaging member so as to prevent

the sliding member from rotating relative to the housing.

In accordance with the present invention, the sliding member is housed in the housing made of sheet metal in such a manner that a certain gap is provided between the sliding member and the housing. The gap corresponds to the variation of dimension caused by the difference of thermal expansion coefficient between the sliding member and the housing. The gap is sealed by the elastic member provided between the sliding member and the housing.

Further, the sliding member is prevented from moving in an axial direction by the engaging member which is formed on the flange of the housing and bent radially inwardly. In case of providing an engaging member on the sliding member, the sliding member may be prevented from rotating relative to the housing.

Furthermore, the sliding member is prevented from rotating relative to the housing by engagement of the first engaging member provided on the housing and the second member provided on the sliding member.

The above and other object, features and advantages of the present invention will become apparent from the following description when taken in conjunction with the accompanying drawings in which preferred embodiments of the present invention are shown by way of illustrative example.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a cross-sectional view showing a liner ring incorporated in a pump casing according to an embodiment the present invention;

FIG. 2 is a cross-sectional view showing the liner ring according to the embodiment of the present invention;

FIGS. 3(a) and 3(b) show a sliding member of the liner ring according to the embodiment of the present invention, FIG. 3(a) is a cross-sectional view taken along a line III-III of FIG. 3(b) and FIG. 3(b) is a cross-sectional view showing the sliding member; and

FIGS. 4(a) and 4(b) show a housing according to the present invention, FIG. 4(a) is a front view showing the housing and FIG. 4(b) is a cross-sectional view taken along a line IV-IV of FIG. 4(a).

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A liner ring according to an embodiment of the present invention will be described below with reference to FIGS. 1 through 4.

FIG. 1 shows a liner ring of the present invention which is incorporated in a pump casing. A liner ring 10 is provided between a pump casing body 42 and an impeller 41 which is rotatably supported by a shaft 43 as shown in FIG. 1. The liner ring 10 comprises a sliding member 1 made of carbon material or teflon material, a housing 2 made of metal for housing the sliding member 1 and the O ring 3 made of rubber as shown in FIG. 2. As shown in FIGS. 3(a) and 3(b), the sliding member 1 is formed with an inner cylindrical surface 11 which is in confrontation with an end portion located at the suction side of the impeller 41 so as to have a certain gap therebetween (see FIG. 1). The inner cylindrical surface 11 is slightly inclined so as to make the gap between the sliding member 1 and the impeller 41 smaller from the inlet side toward the outlet side of the impeller 41 as shown in FIG. 1. Further, the sliding member 1 is formed with an outermost cylindrical surface 12, an intermediate cylindrical surface 13, and an end surface 14 which extends vertically and connect the outermost cylindrical surface 12 with the intermediate cylindrical surface 13 as shown in FIGS. 3(a) and 3(b). The intermediate cylindrical surface 13 and the end surface 14 define a space for accommodating the O ring 3. The sliding member 1 has an opposite end, which is opposite side of the impeller 41, on which a plurality of projections 16 (six in this embodiment) are formed at regular intervals.

On the other hand, as shown in FIGS. 4(a) and 4(b), the housing 2 housing the sliding member 1 is provided with a cylindrical side wall 21, a bottom wall 22 and a corner portion 23 which connects the cylindrical side wall 21 and the bottom wall 22. The housing 2 is made of sheet metal pressed to shaped and is provided with a flange 24 which extends vertically from the cylindrical side wall 21 at the side of the impeller 42. The flange 24 serves as a stopper for stopping an axial movement of the housing 2 relative to the pump casing body 42 (see FIG. 1). Further, the flange 24 is formed with pawls 25 constituting an engaging portion which are formed by means of two adjacent slits extending radially outwardly. That is, after inserting the O ring 3 and the sliding member 1 into the housing 2, the pawls 25 are bent radially inwardly, thereby fixing them to the housing 2.

Further, the housing 2 is provided at the bottom wall 22 with a plurality of notches 26, at regular intervals, which are engagable with the projections 16 (FIG. 3) of the sliding member 1.

As shown in FIG. 2, the sliding member 1 is housed in the housing 2 in such a manner that the gap δ is provided between the outermost cylindrical surface 12 and the cylindrical side wall 21 of the housing 2 in order to absorb the variation of the dimension caused by the difference of thermal

expansion coefficient due to the temperature of liquid. Further, the O ring 3 is disposed in the annular space defined by the intermediate cylindrical surface 13, the end surface 14 and the corner portion 23 of the housing 2, whereby the gap δ is sealed by the O ring 3.

With the above structure, the sliding member 1 is in confrontation with the impeller 41 so as to have a certain gap therebetween. The sliding member 1 is inserted into the housing 2 in such a manner that there is provided the gap δ corresponding to the variation of dimension caused by the difference of thermal expansion coefficient of respective members due to the temperature of liquid. The gap δ is sealed by the O ring 3 as mentioned above.

Further, the sliding member 1 is fixed to the housing 2 by the pawls 25 provided on the flanges 24. The pawls 25 are bent radially inwardly after inserting the sliding member 1 and the O ring 3 into the housing 2, thereby stopping the axial movement of the sliding member 1. Further, in order to prevent the sliding member 1 from rotating relative to the housing 2, engaging means may be provided at the inner surface of the pawls 25 and at the end surface of the sliding member 1, respectively.

On the other hand, the sliding member 1 is prevented from rotating relative to the housing 2 by engagement of the notches 26 formed on the bottom wall 22 and the projections 16 formed on the end surface of the sliding member 1.

In the embodiment above mentioned, the sliding member 1 is made of material having thermal expansion coefficient larger than that of the housing. However, in the case where the sliding member 1 is made of material such as ceramics having thermal expansion coefficient smaller than that of the housing, it is not necessary to provide the gap δ between the inner surface of the cylindrical side wall 21 of the housing 2 and the outermost cylindrical surface 21 of the sliding member 1. Alternatively, the size or dimension of the O ring 3 provided between the housing 2 and the sliding member 1 is selected so as to impart a pre-load, corresponding to the difference of thermal expansion coefficient between the housing 2 and the sliding member 1, to the O ring 3 in a radial direction. Accordingly, the pre-load applied to the O ring 3 remains at the maximum usage temperature of the pump.

As is apparent from foregoing description, the liner ring according to the present invention offers the following advantages:

The housing can use the same metal as the pump casing or can use similar metal having almost the same thermal expansion coefficient as that of the pump casing. Therefore, the housing

can be attached to the pump casing by force fit. Further, since the housing is not made of elastic member such as rubber, handling such as replacement of the housing becomes easy.

Further, since an elastic member is provided between the housing and the sliding member, even if eccentricity lies between the sliding member and the impeller, the pump can be operated without hindrance.

Furthermore, since there are provided the necessary gap between the housing and the sliding member, and means for preventing the sliding member from rotating relative to the housing, the liner ring is not rotated together with the impeller, and is prevented from falling off, even at the condition of high temperature.

Further, according to the present invention, the housing is made of sheet metal and pressed to shape, the flange at the opening side of the housing is provided with the pawls which are capable of being bent radially inwardly. The housing is provided with notches or projections at the bottom wall thereof, it is easy to stop the movement of the sliding member in an axial direction and to prevent the sliding member from rotating relative to the housing.

Although certain preferred embodiments of the present invention have been shown and described in detail, it should be understood that various changes and modifications may be made therein without departing from the scope of the appended claims.

Claims

1. A liner ring (10) for a pump comprising:
 - a housing (2) for mounting on a casing body (42);
 - a sliding member (1) provided in said housing (2) in such a manner that a certain gap is provided in a radial direction between said sliding member (1) and an impeller (41); and
 - an elastic member (3) provided between said sliding member (1) and said housing (2).
2. The liner ring (10) according to claim 1, wherein said sliding member (1) comprises one of carbon and teflon.
3. The liner ring (10) according to claim 1, wherein said sliding member (1) comprises ceramics.
4. The liner ring (10) according to any one of claims 1-3, further comprising means for preventing said sliding member (1) from rotating relative to said housing (2).

expansion coefficient due to the temperature of liquid. Further, the O ring 3 is disposed in the annular space defined by the intermediate cylindrical surface 13, the end surface 14 and the corner portion 23 of the housing 2, whereby the gap δ is sealed by the O ring 3.

With the above structure, the sliding member 1 is in confrontation with the impeller 41 so as to have a certain gap therebetween. The sliding member 1 is inserted into the housing 2 in such a manner that there is provided the gap δ corresponding to the variation of dimension caused by the difference of thermal expansion coefficient of respective members due to the temperature of liquid. The gap δ is sealed by the O ring 3 as mentioned above.

Further, the sliding member 1 is fixed to the housing 2 by the pawls 25 provided on the flanges 24. The pawls 25 are bent radially inwardly after inserting the sliding member 1 and the O ring 3 into the housing 2, thereby stopping the axial movement of the sliding member 1. Further, in order to prevent the sliding member 1 from rotating relative to the housing 2, engaging means may be provided at the inner surface of the pawls 25 and at the end surface of the sliding member 1, respectively.

On the other hand, the sliding member 1 is prevented from rotating relative to the housing 2 by engagement of the notches 26 formed on the bottom wall 22 and the projections 16 formed on the end surface of the sliding member 1.

In the embodiment above mentioned, the sliding member 1 is made of material having thermal expansion coefficient larger than that of the housing. However, in the case where the sliding member 1 is made of material such as ceramics having thermal expansion coefficient smaller than that of the housing, it is not necessary to provide the gap δ between the inner surface of the cylindrical side wall 21 of the housing 2 and the outermost cylindrical surface 21 of the sliding member 1. Alternatively, the size or dimension of the O ring 3 provided between the housing 2 and the sliding member 1 is selected so as to impart a pre-load, corresponding to the difference of thermal expansion coefficient between the housing 2 and the sliding member 1, to the O ring 3 in a radial direction. Accordingly, the pre-load applied to the O ring 3 remains at the maximum usage temperature of the pump.

As is apparent from foregoing description, the liner ring according to the present invention offers the following advantages:

The housing can use the same metal as the pump casing or can use similar metal having almost the same thermal expansion coefficient as that of the pump casing. Therefore, the housing

can be attached to the pump casing by force fit. Further, since the housing is not made of elastic member such as rubber, handling such as replacement of the housing becomes easy.

Further, since an elastic member is provided between the housing and the sliding member, even if eccentricity lies between the sliding member and the impeller, the pump can be operated without hindrance.

Furthermore, since there are provided the necessary gap between the housing and the sliding member, and means for preventing the sliding member from rotating relative to the housing, the liner ring is not rotated together with the impeller, and is prevented from falling off, even at the condition of high temperature.

Further, according to the present invention, the housing is made of sheet metal and pressed to shape, the flange at the opening side of the housing is provided with the pawls which are capable of being bent radially inwardly. The housing is provided with notches or projections at the bottom wall thereof, it is easy to stop the movement of the sliding member in an axial direction and to prevent the sliding member from rotating relative to the housing.

Although certain preferred embodiments of the present invention have been shown and described in detail, it should be understood that various changes and modifications may be made therein without departing from the scope of the appended claims.

Claims

1. A liner ring (10) for a pump comprising:
 - a housing (2) for mounting on a casing body (42);
 - a sliding member (1) provided in said housing (2) in such a manner that a certain gap is provided in a radial direction between said sliding member (1) and an impeller (41); and
 - an elastic member (3) provided between said sliding member (1) and said housing (2).
2. The liner ring (10) according to claim 1, wherein said sliding member (1) comprises one of carbon and teflon.
3. The liner ring (10) according to claim 1, wherein said sliding member (1) comprises ceramics.
4. The liner ring (10) according to any one of claims 1-3, further comprising means for preventing said sliding member (1) from rotating relative to said housing (2).



5. The liner ring (10) according to any one of the preceding claims, wherein said sliding member (1) comprises material having a thermal expansion coefficient larger than that of said housing (2), between said housing (2) and said sliding member (1) there is provided a certain gap (5) corresponding to variation of dimension caused by the difference of thermal expansion coefficient between said housing (2) and said sliding member (1), and a certain pre-load is applied to said elastic member (3) so as to enable said elastic member (3) to perform sealing function at the lowest usage temperature.
6. The liner ring (10) according to any one of claims 1-4, wherein said sliding member (1) comprises material having thermal expansion coefficient smaller than that of said housing (2), said sliding member (1) is tightly fitted with said housing (2), and a certain pre-load is applied to said elastic member (3) so as to enable said elastic member (3) to perform sealing function at the highest usage temperature.
7. The liner ring (10) according to any one of the preceding claims, wherein said housing (2) is made of sheet metal and pressed to shape, said housing (2) is in the form of a cylindrical receptacle-like body comprising a cylindrical side wall (21), a bottom wall (22) and a corner portion (23) between said cylindrical side wall (21) and said bottom wall (22), said cylindrical side wall (21) is formed at the side of said impeller (41) with a flange (24), and said elastic member (3) is located at said corner portion (23).
8. The liner ring (10) according to claim 7, wherein said flange (24) is formed with an engaging portion (25) which is bent radially inwardly after inserting said sliding member (1) into said housing (2) so that said engaging portion (25) prevents said sliding member (1) from moving in an axial direction and/or rotating in a circumferential direction.
9. The liner ring (10) according to claim 7 or 8, wherein said housing (2) is formed at said bottom wall side thereof with a first engaging member (26), said sliding member (1) is formed with a second engaging member (16), and said first engaging member (26) is engageable with said second engaging member (16) so as to prevent said sliding member (1) from rotating relative to said housing (2).

10. A centrifugal pump comprising:
 - a pump casing body (42);
 - a shaft (43) rotatably provided in said pump casing body (42);
 - an impeller (41) supported by said shaft (43); and
 - a liner ring (10) provided between said pump casing body (42) and said impeller, the liner ring (10) comprising:
 - a housing (2) provided on said pump casing body (42);
 - a sliding member (1) provided in said housing (2) in such a manner that a certain gap is provided in a radial direction between said sliding member (1) and an impeller; and
 - an elastic member (3) provided between said sliding member (1) and said housing (2).

Patentansprüche

1. Auskleidungs- bzw. Futterring (10) für eine Pumpe, der folgendes aufweist: ein Gehäuse (2) zur Befestigung auf einen Einfassungs- bzw. Gehäusekörper (42);
ein Gleitglied (1) vorgesehen in dem Gehäuse (2), und zwar derart, daß eine bestimmter Spalt in einer radialen Richtung zwischen dem Gleitglied (1) und einem Laufrad (41) vorgesehen ist, und
ein elastisches Glied (3) vorgesehen zwischen dem Gleitglied (1) und dem Gehäuse (2).
2. Auskleidungsring (10) nach Anspruch 1, wobei das Gleitglied (1) Carbon und/oder Teflon aufweist.
3. Auskleidungsring (10) nach Anspruch 1, wobei das Gleitglied (1) Keramik aufweist.
4. Auskleidungsring (10) nach einem der Ansprüche 1 bis 3, der ferner Mittel aufweist zum Verhindern, daß das Gleitglied (1) sich relativ zu dem Gehäuse (2) dreht.
5. Auskleidungsring (10) nach einem der vorhergehenden Ansprüche, wobei das Gleitglied (1) Material aufweist mit einem thermischen Expansionskoeffizienten größer als der des Gehäuses (2), wobei zwischen dem Gehäuse (2) und dem Dichtglied (1) ein bestimmter Spalt (5) vorgesehen ist, und zwar entsprechend der Variation der Abmessung bzw. Dimension, die durch die Differenz der thermischen Expansions- bzw. Ausdehnungskoeffizienten zwischen dem Gehäuse (2) und dem Gleitglied (1) verursacht wird, und wobei eine bestimmte Vorlast an das elastische Glied (3) angelegt wird, um es dem elastischen Glied (3) zu er-



möglichen, eine Dichtfunktion bei der niedrigsten Gebrauchstemperatur durchzuführen bzw. zu leisten.

6. Auskleidungsring (10) nach einem der Ansprüche 1 bis 4, wobei das Gleitglied (1) Material aufweist mit einem thermischen Ausdehnungs- bzw. Expansionskoeffizienten kleiner als der des Gehäuses (2), wobei das Gleitglied (1) dicht bzw. eng mit dem Gehäuse (2) gepaßt ist und wobei eine bestimmte Vorlast an das elastische Glied (3) angelegt wird, um es dem elastischen Glied (3) zu ermöglichen, eine Dichtfunktion bei der höchsten Gebrauchstemperatur durchzuführen bzw. zu leisten.

7. Auskleidungsring (10) nach einem der vorhergehenden Ansprüche, wobei das Gehäuse (2) aus Metallblech hergestellt ist und in seine Form gepreßt ist, wobei das Gehäuse (2) die Form eines zylindrischen gefäßartigen Körpers besitzt und eine zylindrische Seitenwand (21), eine untere bzw. Bodenwand (22) und einen Eckenteil (23) zwischen der zylindrischen Seitenwand (21) und der Bodenwand (22) aufweist, und wobei die zylindrische Seitenwand (21) an einer Seite des Laufrads (41) mit einem Flansch (24) gebildet ist und wobei das elastische Glied (3) bei dem Eckenteil (23) angeordnet ist.

8. Auskleidungsring (10) nach Anspruch 7, wobei der Flansch (24) mit einem Eingriffsteil (25) gebildet ist, der radial nach innen gebogen ist, und zwar nach dem Einsetzen des Gleitglieds (1) in das Gehäuse (2), so daß der Eingriffsteil (25) verhindert, daß sich das Gleitglied (1) in einer axialen Richtung bewegt und/oder in einer Umfangsrichtung dreht.

9. Auskleidungsring (10) nach Anspruch 7 oder 8, wobei das Gehäuse (2) bei der Bodenwandseite davon mit einem ersten Eingriffsglied (26) gebildet ist, wobei das Gleitglied (1) mit einem zweiten Eingriffsglied (16) gebildet ist, und wobei das erste Eingriffsglied (26) in Eingriff bringbar ist mit dem zweiten Eingriffsglied (16), um das Gleitglied (1) daran zu hindern, sich relativ zu dem Gehäuse (2) zu drehen.

10. Zentrifugal- bzw. Kreiselpumpe, die folgendes aufweist:
einen Pumpeneinfassungskörper bzw. einen Pumpengehäusekörper (42);
eine Welle (43), und zwar drehbar in dem Pumpengehäusekörper (42) vorgesehen;
ein Laufrad (41), der durch die Welle (43) getragen wird; und

einen Auskleidungsring (10) vorgesehen zwischen dem Pumpengehäusekörper (42) und dem Laufrad, wobei der Auskleidungsring (10) folgendes aufweist:

- ein Gehäuse (2) vorgesehen auf dem Pumpengehäusekörper (42);
ein Gleitglied (1) vorgesehen in dem Gehäuse (2), und zwar derart, daß ein bestimmter Spalt in einer radialen Richtung zwischen dem Gleitglied (1) und einem Laufrad vorgesehen ist; und
ein elastisches Glied (3), und zwar vorgesehen zwischen dem Gleitglied (1) und dem Gehäuse (2).

Revendications

1. Bague d'étanchéité (10) pour une pompe comprenant :
un boîtier (2) pour monter sur un corps de pompe (42),
un élément glissant (1) prévu dans ledit boîtier (2) de telle manière qu'un certain intervalle soit ménagé dans la direction radiale entre ledit élément glissant (1) et un rotor (41), et
un élément élastique (3) disposé entre ledit élément glissant (1) et ledit boîtier (2).
2. Bague d'étanchéité (10) selon la revendication 1, dans laquelle ledit élément glissant (1) comprend du carbone ou de Teflon.
3. Bague d'étanchéité (10) selon la revendication 1, dans laquelle ledit élément glissant (1) comprend une matière céramique.
4. Bague d'étanchéité (10) selon l'une quelconque des revendications 1 à 3, comprenant par ailleurs des moyens empêchant ledit élément glissant (1) de tourner par rapport audit boîtier (2).
5. Bague d'étanchéité (10) selon l'une quelconque des revendications précédentes, dans laquelle ledit élément glissant (1) comprend un matériau ayant un coefficient de dilatation thermique plus grand que celui dudit boîtier (2), un certain intervalle (δ) correspondant à la variation de dimension due à la différence de coefficients de dilatation thermique entre ledit boîtier (2) et ledit élément glissant (1) est prévu entre ledit boîtier (2) et ledit élément glissant (1), et une certaine charge préalable est appliquée audit élément élastique (3) de manière à permettre audit élément élastique (3) d'effectuer une fonction d'étanchéité à la température d'emploi la plus basse.



6. Bague d'étanchéité (10) selon l'une quelconque des revendications 1 à 4, dans laquelle ledit élément glissant (1) comprend un matériau ayant un coefficient de dilatation thermique inférieur à celui dudit boîtier (2), ledit élément glissant (1) est ajusté étroitement dans ledit boîtier (2), et une certaine charge préalable est appliquée audit élément élastique (3) de façon à permettre audit élément élastique (3) d'effectuer une fonction d'étanchéité à la température d'emploi la plus élevée.

7. Bague d'étanchéité (10) selon l'une quelconque des revendications précédentes, dans laquelle ledit boîtier (2) est constitué de tôle métallique et est conformé par passage à la presse, ledit boîtier (2) se présente sous la forme d'un corps du type à réceptacle cylindrique comprenant une paroi latérale cylindrique (21), une paroi inférieure (22) et une partie de coin (23) entre ladite paroi latérale cylindrique (21) et ladite paroi inférieure (22), ladite paroi latérale cylindrique (21) présente, sur le côté dudit rotor (41), un rebord (24), et ledit élément élastique (3) est situé sur ladite partie de coin (23).

8. Bague d'étanchéité (10) selon la revendication 7, dans laquelle ledit rebord (24) présente une partie d'engagement (25) qui est fléchie radialement vers l'intérieur après introduction dudit élément glissant (1) dans ledit boîtier (2) de manière que ladite partie d'engagement (25) empêche ledit élément glissant (1) de se déplacer dans la direction axiale et/ou de tourner dans la direction périphérique.

9. Bague d'étanchéité (10) selon la revendication 7 ou 8, dans laquelle ledit boîtier (2) présente, sur le côté de sa paroi inférieure, un premier élément d'engagement (26), ledit élément glissant (1) présente un deuxième élément d'engagement (16) et ledit premier élément d'engagement (26) est susceptible de s'engager sur ledit deuxième élément d'engagement (16) de manière à empêcher ledit élément glissant (1) de tourner par rapport audit boîtier (2).

10. Pompe centrifuge comprenant :
un corps de pompe (42),
un arbre (43) monté à rotation dans ledit corps de pompe (42),
un rotor (41) supporté par ledit arbre (43),
et
une bague d'étanchéité (10) disposée entre ledit corps de pompe (42) et ledit rotor, la bague d'étanchéité (10) comprenant :
un boîtier (2) disposé sur ledit corps de

pompe (42),

un élément glissant (1) prévu dans ledit boîtier (2) de telle manière qu'un certain intervalle soit ménagé dans la direction radiale entre ledit élément glissant (1) et un rotor, et

un élément élastique (3) disposé entre ledit élément glissant (1) et ledit boîtier (2).



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