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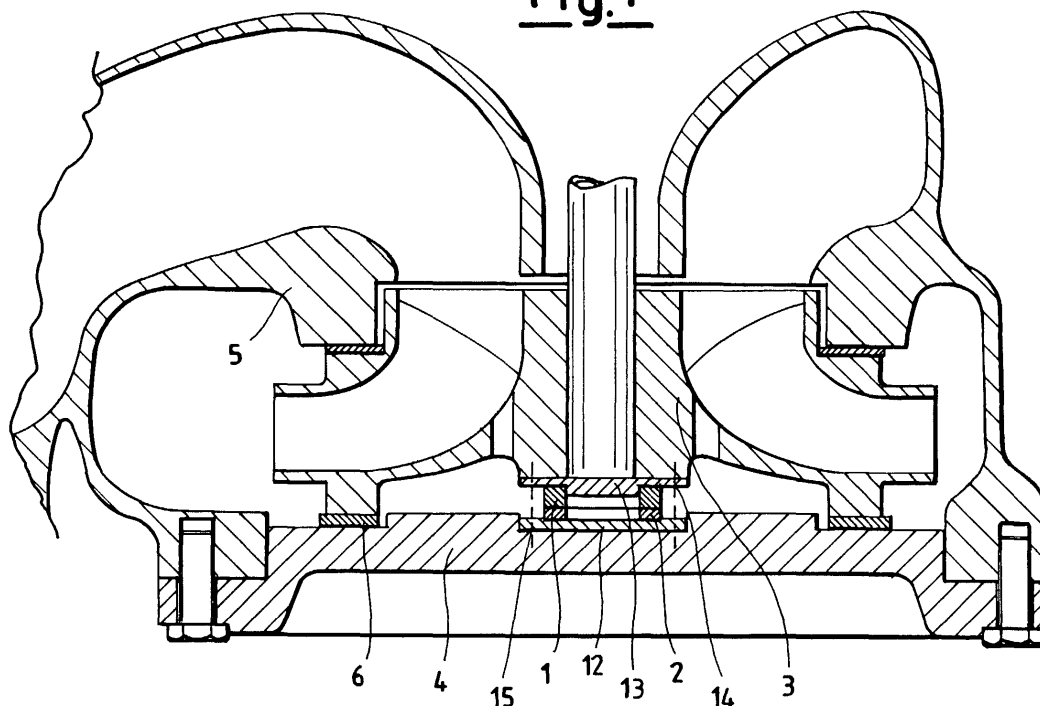
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(54) **Sliding-contact bearing for a centrifugal pump**

(57) A protection device (20) for centrifugal pumps with a vertical axis, where the aforementioned pump comprises a case (5) containing a shaft (21), with the pump also comprising an impeller (3) connected to said shaft (21) and free to rotate inside said case (5). The

device (20) comprises a first ring (1), mobile in rotation with the impeller (3) and a second ring (2), in a fixed position with respect to the case (5), in such a way that the sliding contact between the aforementioned first and second ring (1, 2) allows the dry operation of the centrifugal pump.

Fig.1



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Description

[0001] The object of the present invention is a protection device for centrifugal pumps with a vertical axis.

[0002] The current state of the art of said centrifugal pumps does not foresee dry operation amongst the possible working conditions.

[0003] Indeed, in such a condition there is an extremely rapid deterioration of the radial wear rings, which leads to the consequent jamming of the pump itself.

[0004] With reference to the prior art, it can be observed that during start-up the pump's impeller is rested with a ring upon the lid surface of the pump body.

[0005] In the case of a lack of fluid inside said pump body, e.g. in the case of start-up with the intake valve closed, there would be a direct contact between the wear ring and the metal of the lid, with the consequent high friction and heat production which would lead to an extremely rapid deterioration of said ring and to the jamming of the pump.

[0006] The purpose of the present invention is, therefore, to provide a device which eliminates this drawback, foreseeing, indeed, a device which allows said pump to start up, run and stop in dry conditions without being damaged.

[0007] These and other purposes are achieved by a protection device for centrifugal pumps with a vertical axis, where the aforementioned pump comprises a case which contains a shaft, with the pump also comprising an impeller connected to said shaft and free to rotate inside said case, characterised in that the aforementioned device comprises a first ring, which is mobile in rotation with the aforementioned impeller and a second ring, in a fixed position with respect to the case, so that the sliding contact between the aforementioned first and second ring allows the dry operation of the centrifugal pump.

[0008] Further characteristics of the present invention are defined, moreover, in the other claims.

[0009] Further purposes and advantages of the present invention will become clear from the following description and from the annexed drawings, provided only as an explanatory and not limiting example, in which:

- figure 1 shows a detail, in section, of a centrifugal pump with a vertical axis, to which the protection device according to the present invention is applied; and
- figure 2 shows the protection device for centrifugal pumps of the invention in greater detail.

[0010] The invention will now be explained with reference to the attached drawings, relative to figures 1-2, showing an exemplifying and not limiting embodiment of said device.

[0011] With reference to figure 1 the protection device

for centrifugal pumps, wholly indicated with the reference number 20, is applied to a pump which comprises a case or pump body 5 containing a shaft 21.

[0012] The pump also comprises an impeller 3, connected to the shaft 21 and free to rotate inside the case 5.

[0013] In fact, the device 20 comprises a first ring 1, fixed upon the hub of the impeller 3 and a second ring 2, in a fixed position on the case 5.

[0014] More precisely, the second ring 2 is fixed to the closing lid 4 of the case 5, while the impeller 3 is provided with a wear ring 6.

[0015] A first holding member 13 is associated with the impeller 3, and a first ring 1 is integral with said member 13.

[0016] A second holding member 12 is associated with the lower lid 4 of the pump, and the second ring 2 is integral with said member 12.

[0017] Preferably, the first and the second ring are of the removable type.

[0018] In fact, a plurality of screws 14, arranged on the hub of the impeller 3, allows a simple replacement of the first holding member 13 during the pump's maintenance operations; in the same way a plurality of screws 15, arranged on the closing lid 4 allows a simple replacement of the second holding member 12.

[0019] At least one of the two rings is made of self-lubricating material with a very low friction coefficient.

[0020] Moreover, at least one of the two rings is made of a very hard material with a mirror-shine finish of the sliding face.

[0021] The operation of the protection device for centrifugal pumps with a vertical axis, according to the present invention, is briefly illustrated in the rest of the present description.

[0022] The first ring 1, arranged on the hub of the impeller 3 and the second ring 2, arranged on the closing lid 4 of the case 5 position said impeller 3 in such a way that it is raised with its wear ring 6 from the plane of the cover 4 of the case 5.

[0023] During dry operation the surfaces of the ring 1 arranged on the hub of the impeller 3 and thus rotating with it, and that of the ring 2 arranged on the lid 4 and thus stationary, are in contact with each other.

[0024] The ring 1 made of very hard material, with a mirror-shine finish and an excellent resistance to wear, guarantees an excellent duration and operation.

[0025] The ring 2 made of self-lubricating material with an extremely low friction coefficient, or alternatively made of very hard material with a mirror-shine finish guarantees favourable conditions for dry operation.

[0026] Such a device substantially takes on the characteristics of an axial sliding bearing.

[0027] The ways of housing the rings 1 and 2, described previously, allows a simple replacement during maintenance operation by unscrewing the screws 14 arranged on the hub of the impeller 3 and the screws 15 arranged on the closing lid 4 of the case 5.

[0028] From the description which has been made the characteristics of the protection device for centrifugal pumps with a vertical axis are clear, just as the advantages and the operation are also clear.

[0029] The following concluding considerations and comments are now provided, in order to define the said advantages more clearly and accurately.

[0030] The device of the invention can, for example, be installed in centrifugal pumps with a vertical axis, provided with wear rings with radial surfaces and a simple inlet.

[0031] It can also be installed in centrifugal pumps with a vertical axis, provided with wear rings with a radial surface and a double inlet.

[0032] It is particularly important to repeat, finally, that the device of the invention allows the pump to start up, run and stop in dry working conditions without incurring damage of any sort.

[0033] Essentially, what has been described and represented is only one of the possible mechanical embodiments of the device and it can thus have different obvious variants, which it would be pointless to attach here, all falling within the scope of the finding and hence of protection of the present patent.

[0034] The scope of the invention is defined in the claims attached to the present application.

Claims

1. Protection device (20) for centrifugal pumps with a vertical axis, where the aforementioned pump comprises a case (5) containing a shaft (21), with the pump also comprising an impeller (3) connected to said shaft (21) and free to rotate inside said case (5), **characterised in that** the aforementioned device (20) comprises a first ring (1), mobile in rotation with the aforementioned impeller (3) and a second ring (2), in a fixed position with respect to the aforementioned case (5), in such a way that the sliding contact between the aforementioned first and second ring (1, 2) allows the dry operation of the aforementioned centrifugal pump.
2. Device according to claim 1, **characterised in that** the aforementioned first ring (1) is fixed to the hub of the aforementioned impeller (3).
3. Device (20), according to claim 1, **characterised in that** the aforementioned second ring is fixed to the closing lid (4) of the aforementioned case (5).
4. Device (20), according to claim 3, **characterised in that** a first holding member (13) is associated with the aforementioned impeller (3), and the aforementioned first ring (1) is integral with said member (13).
5. Device (20), according to claim 3, **characterised in that** a plurality of screws (14), arranged on the hub of the aforementioned impeller (3), allows a simple replacement of the aforementioned first holding member (13).
6. Device (20), according to claim 1 or 2, **characterised in that** a second holding member (12) is associated with the lower lid (4) of the aforementioned pump and the aforementioned second ring (2) is integral with said member (12).
7. Device (20), according to claim 6, **characterised in that** a plurality of screws (15), arranged on the closing lid (4) allows a simple replacement of the aforementioned second holding member (12).
8. Device (20), according to any one of the previous claims, **characterised in that** the aforementioned first and second rings (1, 2) are of the removable type.
9. Device (20), according to any one of the previous claims, **characterised in that** it is installed in centrifugal pumps with a vertical axis, provided with wear rings with radial surfaces and a simple inlet.
10. Device (20), according to any one of the previous claims, **characterised in that** it is installed in centrifugal pumps with a vertical axis, provided with wear rings with radial surfaces and a double inlet.
11. Device (20), according to any one of the previous claims, **characterised in that** at least one of the two rings (1, 2) is made of a self-lubricating material with a very low friction coefficient.
12. Device (20), according to any one of the previous claims, **characterised in that** at least one of the two rings (1, 2) is made of a very hard material with a mirror-shine finish of the sliding face.

Fig.1

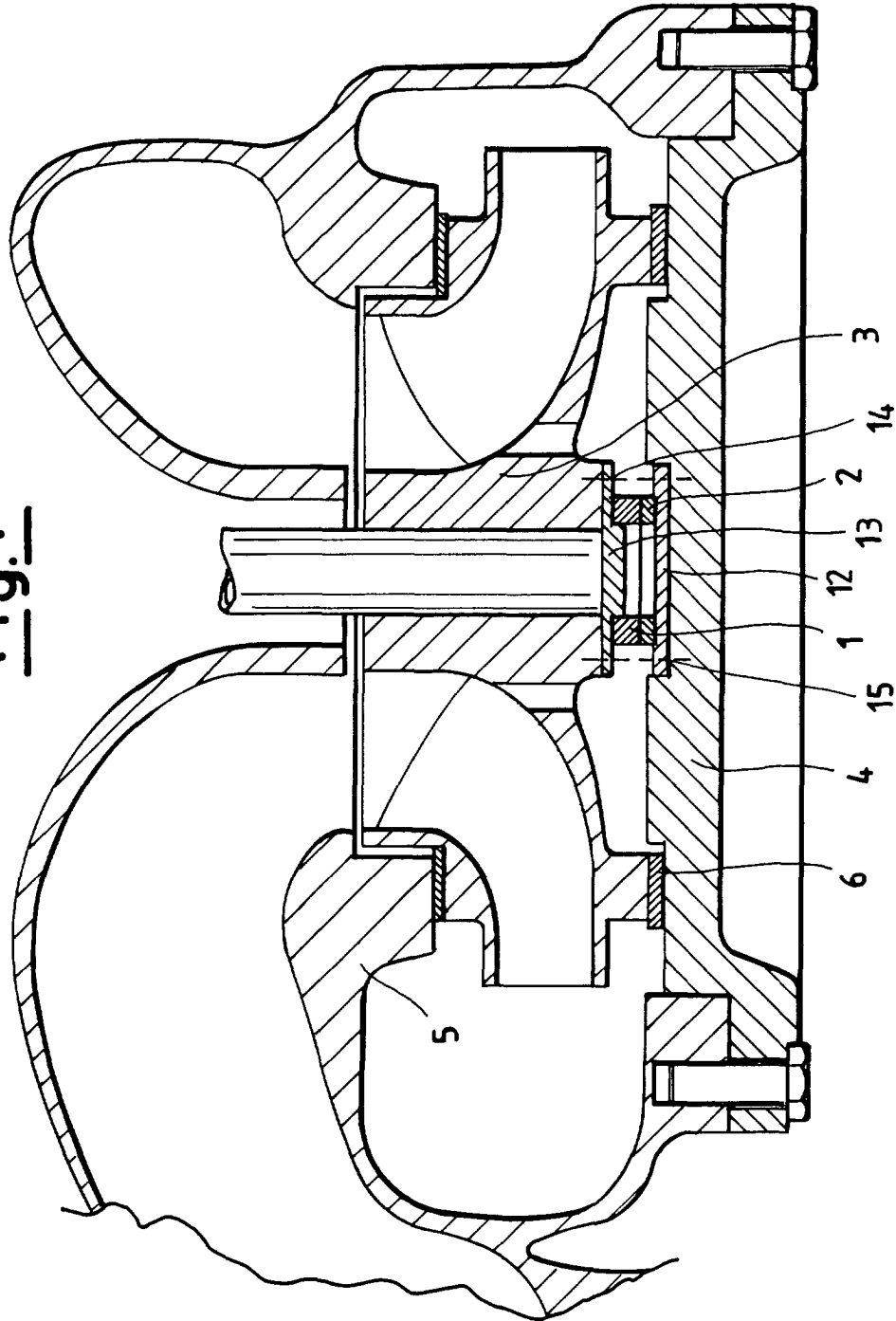


Fig.2

