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ELEMENT THAT DEFINES A GAP AND IS TO BE MOUNTED ON A SHAFT

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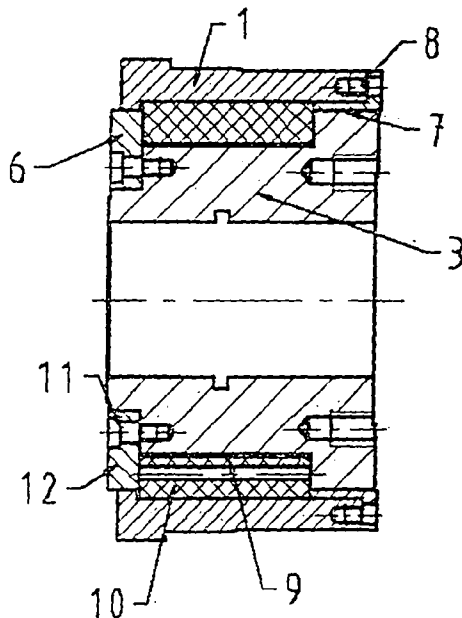
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(54) Title: ELEMENT THAT DEFINES A GAP AND IS TO BE MOUNTED ON A SHAFT

(54) Bezeichnung: EINEN SPALT DEFINIERENDES, AUF EINER WELLE ANZUORDNENDES ELEMENT



(57) Abstract: The invention relates to an element, which is to be mounted on the shaft of a non-positive-displacement machine and which forms a gap for the limited passage of a flowing medium. Said element comprises a bush-like part (2), which is to be mounted on the shaft of the non-positive-displacement machine and whose outer periphery is provided with a recess (4) for accommodating a ring (5). During operation of the non-positive-displacement machine, the ring (5), which is partially surrounded on its faces by circular ring-shaped walls of the recess (4); a) forms an axial gap with the circular ring-shaped walls of the recess (4) and forms a radial gap with the bottom of the recess, and; b) is held via frictional contact by a rigid wall (1) surrounding the ring (5). In order to reduce wear to the rings made of a soft flowable material, the invention provides that a recess is formed in the rigid wall (1) and surrounds the faces of the ring (5) that are free from the walls of the bush-like part. One of the lateral delimitations of the recess (4) is formed by a tubular part (7) detachably joined to the rigid wall (1).

(57) Zusammenfassung: Gegenstand der Erfindung ist ein auf der Welle einer Strömungsmaschine anzuordnendes, einen Spalt für den begrenzten Durchtritt eines Strömungsmediums definierendes Element, mit einem auf der Welle der Strömungsmaschine anzuordnenden

buchsenartigen Teil (2), welches an seinem Außenumfang eine Ausnehmung (4) für einen Ring (5) besitzt, wobei der an seinen Stirnseiten von kreisringförmigen Wänden der Ausnehmung (4) teilweise umschlossene Ring (5) während des Betriebs der Strömungsmaschine a) mit den kreisringförmigen Wänden der Ausnehmung (4) jeweils einen axialen Spalt und mit dem Grund der Ausnehmung einen radialen Spalt bildet, b) von einer den Ring (5) umgebenden starren Wandung (1) durch Reibschluss gehalten wird. Um den Verschleiss der aus einem weichen, fließfähigen Material bestehenden Ringe zu verringern, sieht die Erfindung vor, dass in der starren Wandung (1) eine

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Description

5 Element that defines a gap and is to be mounted on a
shaft

The subject matter of the invention is an element which
is to be mounted on the shaft of a non-positive
10 displacement machine and which forms a gap for the
limited passage of a flowing medium, having a bush-like
part which is to be mounted on the shaft of the non-
positive displacement machine and whose outer periphery
has a recess for a ring, the ring which is partially
15 surrounded at its end faces by circularly annular walls
of the recess during operation of the non-positive
displacement machine

- a) forming an axial gap in each case with the
circularly annular walls of the recess and forming
20 a radial gap with the bottom of the recess,
- b) being held via frictional contact by a rigid wall
surrounding the ring.

An element of this type has already been used in the
25 subject matters of DE 100 38 586 A1 and DE 100 62 204
A1. There, it served as a relief piston in an axial
thrust balancing device or as a sealing bush in a shaft
seal. A common feature of both applications was that a
slotted resilient ring was used which was widened
30 slightly during operation of the non-positive
displacement machine by the prevailing pressure,
pressed against the housing inner wall and fixed in
such a way. However, the invention is not aimed only
at elements with slotted rings, but is intended also to

- be suitable for application in closed rings. Independently of the design, rings made from a soft, flowable material result in the problem that their edge zones on the one side are pressed gradually into the gap between the piston or bush attached to the shaft and the surrounding housing hole by the pressure which acts on them. This results in increasing wear of the ring and the risk of the sealing action diminishing.
- 10 It is an object of the invention to avoid the mentioned wear and thus to increase the service life of the ring and therefore also of the element which is described in the introduction.
- 15 According to the invention, the object set is achieved in that a recess is formed in the rigid wall surrounding the ring and surrounds the end faces of the ring that are free from the walls of the bush-like part, one of the lateral delimitations of the recess being formed by a tubular part detachably joined to the rigid wall.
- 20

As a result of the design according to the invention, the ring is surrounded on all sides; no gap into which the ring could yield therefore remains.

25

In order for it to be possible to move a closed ring into its position within the piston or the shaft-side bush, a delimitation ring which is detachably joined to the piston or the bush is arranged in that wall of the recess of said part which lies opposite the tubular part. It goes without saying that it is also possible in this way to mount a resilient ring which is separated by a longitudinally running gap. However,

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with less expenditure for the shaft-side bush-like part, this can also be widened and pushed over one of the lateral walls of the bush-like part.

5 A particular advantage of the invention consists in that the entire element, including the surrounding wall which in this case is likewise formed by a bush, can be combined outside the non-positive displacement machine from separately manufactured parts to form a cartridge
10 which is ready for installation.

Above all, the invention is to be used advantageously as an axial thrust balancing device or as a shaft seal.

15 The invention will be explained in greater detail using two exemplary embodiments. In the drawing:

fig. 1 shows a sectional illustration of an element which is configured as a cartridge which can be
20 installed, having a resilient ring which is divided in the axial direction by a slot; and

fig. 2 shows a sectional illustration of a cartridge which corresponds largely to fig. 1, having a
25 closed ring.

The cartridges which are shown in figs. 1 and 2 serve as relief pistons in axial thrust balancing devices. A common feature of both refinements is a bush 1 which is
30 to be mounted in a rotationally fixed and nondisplaceable manner in a centrifugal pump housing (not shown). The remaining parts of the elements are inserted in each case into the bush 1. A further bush-

like element, a piston 2 or 3, is to be arranged on the shaft (not shown) of the centrifugal pump.

In the refinement according to fig. 1, the piston 2 has
5 a recess 4 into which a piston ring 5 is inserted. The
piston ring 5 consists of resilient material and is
separated by an axially running slot (not shown). The
resilience and the separation make it possible for the
piston ring 5 to be pushed over the side wall 6 of the
10 piston and to be latched into the recess 4. Provided
on that side of the cartridge which lies opposite the
side wall 6 is a tubular holding ring 7 which is
inserted into the bush 1 after introduction of the
piston 2 and of the piston ring 5 and is fastened to
15 the bush 1 by screws 8. The holding ring 7 has two
effects: Firstly, the cartridge is held together by it.
Secondly, it prevents the piston ring 5 from expanding
into the region between the piston 1 and the bush 2, as
a result of which gradual wear is avoided in the region
20 of an existing gap in the previously known
configuration.

In the refinement according to fig. 2, the piston 3 has
a shoulder 9 onto which a closed piston ring 10 is
25 pushed. In order to form a complete recess in which
the piston ring is held, a delimitation ring 12 which
is fastened to the piston 3 by means of screws 11 is
attached on the open side of the piston 3, that is to
say opposite the holding ring 7. The holding ring 7
30 and the screws 8 correspond to the refinement of
fig. 1.

A modification results if, instead of a cartridge which
is ready for installation, a bush is used which is

fastened in the housing of the non-positive displacement machine and is connected to the other parts of the element only in the housing. The invention is nevertheless also used in a refinement of
5 this type which appears less advantageous.

Although it serves a different purpose, the construction of an element for sealing a shaft is in principle the same as in the relief devices explained
10 here. However, the corresponding parts are denoted there by other designations than in the exemplary embodiments presented here.

Patent Claims

1. An element which is to be mounted on the shaft of a non-positive displacement machine and which forms a gap for the limited passage of a flowing medium, having a bush-like part which is to be mounted on the shaft of the non-positive displacement machine and whose outer periphery has a recess for a ring, the ring which is partially surrounded at its end faces by circularly annular walls of the recess during operation of the non-positive displacement machine
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- 10
- a) forming an axial gap in each case with the circularly annular walls of the recess and forming a radial gap with the bottom of the recess,
- 15
- b) being held via frictional contact by a rigid wall surrounding the ring,
- 20
- characterized in that a recess is formed in the rigid wall and surrounds the end faces of the ring that are free from the walls of the bush-like part, one of the lateral delimitations of the recess being formed by a tubular part detachably joined to the rigid wall.
- 25
2. The element as claimed in claim 1, characterized in that that wall of the recess in the bush-like part which lies opposite the tubular part is formed by a delimitation ring which is detachably joined to the bush-like part.
- 30
3. The element as claimed in claim 1, characterized by a resilient ring which is separated by a

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- longitudinally running gap and can be pushed over one of the lateral walls of the bush-like part by being expanded and can be latched in the recess of the part, the frictional contact between the ring and the rigid wall which surrounds the latter being brought about by expansion which occurs during operation of the non-positive displacement machine.
- 5
- 10 4. The element as claimed in claim 2, characterized by a rigid ring which is inserted with a frictional fit into the rigid wall which surrounds it.
- 15 5. The element as claimed in any one of claims 1 to 4, characterized in that the wall which surrounds the ring is formed by a bush which is to be fastened in the housing of the non-positive displacement machine in a rotationally fixed and nondisplaceable manner.
- 20 6. The element as claimed in any one of claims 1 to 5, characterized in that the element is configured as a cartridge which is to be completed outside the non-positive displacement machine and is ready for installation.
- 25 7. The use of the element as claimed in any one of claims 1 to 6 as an axial thrust balancing device.
8. The use of the element as claimed in any one of claims 1 to 6 as a shaft seal.
- 30 9. An element which is to be mounted on the shaft of a non-positive displacement machine substantially as herein described and illustrated with reference to

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Figure 1 or Figure 2 of the accompanying
diagrammatic drawings.

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Fig. 1

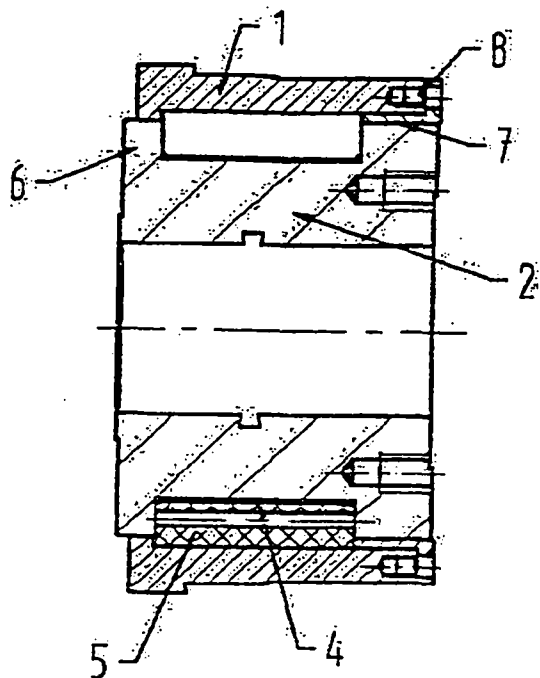


Fig. 2

