



(86) Date de dépôt PCT/PCT Filing Date: 2013/07/09

(87) Date publication PCT/PCT Publication Date: 2014/01/16

(45) Date de délivrance/Issue Date: 2021/01/26

(85) Entrée phase nationale/National Entry: 2014/12/31

(86) N° demande PCT/PCT Application No.: DE 2013/000371

(87) N° publication PCT/PCT Publication No.: 2014/008882

(30) Priorité/Priority: 2012/07/09 (DE10 2012 013 686.2)

(51) Cl.Int./Int.Cl. *A01B 71/04* (2006.01),
F16C 33/78 (2006.01)

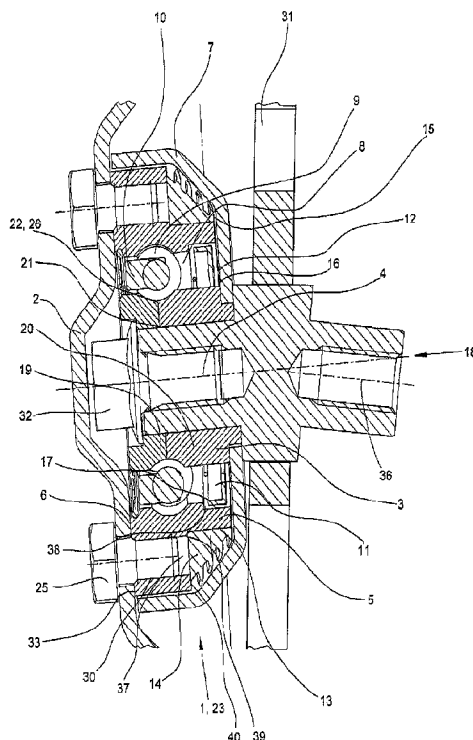
(72) Inventeurs/Inventors:
GEBBEKEN, MARTIN, DE;
WERRIES, DIETER, DE;
PAESSENS, CHRISTIAN, DE;
LUKAS, THOMAS, DE;
BERENDSEN, MARK, NL;
GOTZEN, CHRISTIAN, DE;
GERAATS, MARCEL, DE

(73) Propriétaire/Owner:
LEMKEN GMBH & CO. KG, DE

(74) Agent: SMART & BIGGAR IP AGENCY CO.

(54) Titre : UNITE PALIER POUR SOC A DOUBLE DISQUE

(54) Title: BEARING UNIT FOR A DOUBLE DISC COULTER



(57) Abrégé/Abstract:

The invention concerns a compact bearing unit (1) for a double disc coulters (2) with ball bearing (23) with an inner ring (3), outer ring (5) with a flange and a protective cap (7), which contains a multi-stage sealing system, whereby a first seal (11) is provided between the inner ring (3) and an internal ring race (17) of the outer ring (5), and at least one additional seal (14) is arranged between the protective cap (7) and a ring race (13, 17) of the outer ring (5), whereby said seal does not make any additional installation space necessary in the axial direction of the bearing unit (1).

ABSTRACT

The invention concerns a compact bearing unit (1) for a double disc coultter (2) with
5 ball bearing (23) with an inner ring (3), outer ring (5) with a flange and a protective
cap (7), which contains a multi-stage sealing system, whereby a first seal (11) is
provided between the inner ring (3) and an internal ring race (17) of the outer ring (5),
and at least one additional seal (14) is arranged between the protective cap (7) and a
ring race (13, 17) of the outer ring (5), whereby said seal does not make any
10 additional installation space necessary in the axial direction of the bearing unit (1).

DESCRIPTION

Bearing unit for a double disc coultter

5 The invention concerns a bearing unit for a double disc coultter.

Such bearing units are used also for disc coultters and are under particularly high strain due to the dust produced. They therefore have to be particularly well protected from dirt. In the case of pneumatic seed drills in particular, as well as
10 fertiliser coultters, the bearing units are under particularly high strain because dust is also blown up and seed dressing agents or fertilisers can get to the bearing units as well. The seals are designed accordingly or several seals or cassette seals are used, which make the route to the balls and races of the bearing unit extremely long for any dust that gets in. These sealings need a wide installation space, making the amount
15 of free space considerably smaller, especially when the lateral distances between the disc coultters are narrow. This frequently leads to blockages.

The objective of the invention is to create a bearing unit for a double disc coultter, containing a particularly good sealing, requiring little installation space and
20 thus also ensuring a sufficient amount of free space between the individual disc coultters, even in the case of narrow distances between the rows of disc coultters.

According to an aspect of the present invention, there is provided a bearing unit for a double disc coultter with disc coultters arranged in a V-shape to one another,
25 the bearing unit comprising an inner ring for receiving an axis, an outer ring with a mounting flange for one of said disc coultters, and a protective cap, whereby balls or rollers with a cage are arranged in a gap between the inner ring and the outer ring, the mounting flange being positioned axially on one side of the balls or rollers, and the protective cap extending axially to a position on said one side, a first seal
30 arranged between the inner ring and the outer ring on a side of said bearing unit

opposite the mounting flange, and a second seal arranged on the side opposite the mounting flange, between the outer ring and protective cap on an external ring race of the outer ring.

5 According to another aspect of the present invention, there is provided a bearing unit for a double disc coulters with disc coulters arranged in a V-shape to one another, the bearing unit comprising an inner ring for receiving an axis, an outer ring with a mounting flange for one of said disc coulters and a protective cap, whereby balls or rollers with a cage are arranged in a gap between the inner ring and the outer
10 ring, the mounting flange being positioned axially on one side of the balls or rollers, and the protective cap extending axially to a position on said one side, a first seal arranged between the inner ring and the outer ring on a side of said bearing unit opposite the mounting flange, and a second seal arranged on the side opposite the
15 the outer ring.

Through the provision of a double seal between the inner ring and the outer ring or on the outer ring race of the outer ring, the route to the balls is considerably extended for any dirt that gets in, without having to increase the distance between the disc
20 coulters. This multi-stage sealing system does not make any additional installation space necessary, particularly in the axial direction of the bearing unit.

An advantageous execution of an embodiment of the invention is where the outer edge, facing away from the mounting flange, of the second, additional seal, has
25 approximately the same distance to the mounting flange of the disc coulters as the outer edge of the seal arranged on the internal ring race of the outer ring. The existing seal between the outer ring and inner ring determines the necessary installation space of the bearing unit in axial direction. Through the outer edge of the second seal having roughly the same distance to the mounting flange of the disc

coulter, the necessary installation space in axial direction is not increased despite the additional seal.

Some embodiments provide for the inner ring to be connected to the coult
5 support of the disc coult via the axis and the outer ring to be connected with the
disc coult via the mounting flange.

In some embodiments, sealing is particularly effective if the first seal is arranged in the gap formed by the inner ring, the outer ring as well as the protective cap and the cage. As the first component of the multi-stage seal, the seal sits within this gap, limited by the inner and outer ring on the one hand and the protective cap
5 and cage or balls on the other hand.

As an alternative or supplement to this, it is provided for the second seal to be arranged in the gap formed by the outer ring and the protective cap. It is then located roughly within an extension of the borehole for the receiving of a screw serving for the
10 attachment of the disc coupler and bearing unit and conveniently fills out this space also. Thanks to this multi-stage seal, a particularly compact bearing unit with a small installation space width can be realised.

In some embodiments, in order to make a precise seating of the respective
15 seals possible, it is provided for the seal to be positioned in a force fit between the inner ring and outer ring or outer ring and protective cap, meaning the seal is given its place and is held in its position at the same time. The outer ring and/or inner ring for the first seal provide a recess or projection in the gap for this purpose, giving the seal its forced fit or limiting the latter respectively. As regards the second seal between the
20 outer ring and protective cap, this recess or projection is provided in the outer ring and/or the protective cap.

According to some embodiments of the present invention, it is also conceived for at least two additional seals to be arranged between the outer ring race and the
25 protective cap, which are arranged one behind the other in the axial direction of the axis. Through the provision of several additional seals between the outer ring race and the outer housing, the route mentioned is extended even further, considerably improving the effect of the sealing of the bearing unit. This solution does not increase the necessary installation space mentioned in the axial direction of the axis either.

In one embodiment, the present invention furthermore provides for the inner ring to be designed as a two-piece ring and consist of a first inner ring and a second inner ring, and for the division (or part level) between the first and second inner rings to be located in the centre of the ball race in the case of a single-row ball bearing.

- 5 This embodiment makes a backlash-free use of the bearing unit possible, which can also be used as a preloaded unit thanks to the divided inner ring.

A further embodiment of the invention is where the inner ring is designed as a two-piece ring and the division (or part level) between the ring pieces is located
10 between the races of the two rows of balls in the case of a double-row ball bearing.

The initial objective set can additionally be achieved through a first seal being arranged between the inner ring and the outer ring on the side opposite the mounting flange and a second seal being arranged, on the side opposite the mounting flange,
15 between the outer ring and protective cap on the internal ring race of the outer ring.

With this embodiment, two seals are positioned one behind the other as a kind of seal package in order to ensure sealing between the inner ring and outer ring on the one hand, and between the outer ring and protective cap on the other hand.
20 Looking from the direction of the ball or cage, a first, internal seal sits between the inner and outer ring here and a second, external seal between the outer ring and protective cap. In order to bridge the distances between the inner and outer ring and in order to stabilise the seals formed of flexible material, metal clips can be used, which form a common construction unit together with the seal.

25

Further details of examples of embodiments of the invention can be found in the figures and figure description.

Figure 1: Shows a bearing unit with a single-row ball bearing and divided
30 inner ring and

Figure 2: Shows a bearing unit with a double-row ball bearing and divided inner ring.

Figure 1 shows a bearing unit 1 for a double disc coultter. Of this, only the disc coultter 2 sitting in the axis 4 is shown in the representation according to Figure 1 for the sake of better clarity. With the second coultter sitting in the axis 36 and not shown here, this forms a V-shaped double disc coultter with the respective bearing unit. The coultter 2 has a single-row ball bearing 23 and a divided inner ring 3. It is also conceivable for a divided outer ring 5 to be used instead of a divided inner ring 3. The inner ring 3 consists here of the first inner ring 19 and the second inner ring 20. The part level 21 of the divided inner ring 3 is located in the centre 22 of the race 26 of the balls 9 in the case of this single-row ball bearing 23. The outer ring 5 contains the mounting flange 6 for the attachment of the double disc coultter 2. In the gap 8 of the inner ring 3 and of the outer ring 5, the balls 9 are located along with the cage 10 of the bearing unit 1. The mounting flange 6 has threaded holes 30 for the receiving of the fastening screws 25, with which the disc coultter 2 is fastened to the bearing unit 1. Also conceivable are quick-action fastening systems with a screw or nut or with plug-in systems, with which the disc coultter 2 can be quickly connected to the bearing unit 1. Only the part of disc coultter 2 is shown here that is connected with the flange 6 of the outer ring 5. The bearing unit 1, together with disc coultter 2, is connected with the coultter carrier 31 here by means of the screw 32. Between the inner ring 3 or the second inner ring 20 and the outer ring 5, the first seal 11 is located on the side 12 located opposite the mounting flange 6. It is arranged on the internal ring race 17. The outer ring 5 is offset on the side 12 for the receiving of the second, additional seal 14. The additional seal 14 is located between the outer ring race 13 and the protective cap 7. The outer edge 15 of the additional seal 14 has approximately the same distance to the mounting flange 6 of the outer ring 5 as the outer edge 16, facing away from the mounting flange 6, of the first seal 11. In this case, the additional seal 14 is a kind of axial shaft sealing ring. The first, internal seal 11 is

arranged in the gap 8, which stretches between inner ring 3, outer ring 5, protective cap 7 and cage 10 or ball 9, meaning a particularly targeted sealing is possible. This is particularly the case with a force fit for this seal 11, for which a projection 38 is provided in the outer ring 5. The double seal is then created through the second, 5 outer seal 14, which is arranged in the gap 37. The latter is formed by the outer ring 5 and the protective cap 7, whereby the seal 14 sits within the extension of the screw 25 for the attachment of disc coultter 2 and bearing unit 1 and completely fills out the gap 37. The two offsets 39 and 40, formed by the threaded hole 30, offer permanent firm seating of the seal 14 in the gap 37. Other kinds of seal can also be used here 10 without having a negative effect on the compact structure of the bearing unit 1. In some embodiments, at least two additional seals may be arranged between the outer (external) ring race and the protective cap, and which can be arranged one behind the other in the axial direction 18. In the axial direction 18 of the axis 4 of the disc support 31, the width of the bearing unit 1 is not additionally increased through this. A 15 seal 33 is located between the disc coultter 2 and the mounting flange 6 of the outer ring 5 and thus prevents dirt from getting into the gap 8 of the bearing unit 1 on the side of the mounting flange 6. This seal 33 can be designed as a flat seal as in Fig. 1, or alternatively as an O-ring, or be integrated into the seal 16. The use of a permanently elastic sealant is also conceivable.

Fig 2 shows a bearing unit 1 with a double-row ball bearing 24 and divided inner ring 3. It is also conceivable for a divided outer ring 5 to be used instead of a divided inner ring 3. The inner ring 3 consists of the first inner ring 19 and the second inner ring 20. The part level 21 of the divided inner ring 3 is located
5 between the two races of the two ball rows of the balls 9 in the case of this double-row ball bearing 24. The outer ring 5 contains the mounting flange 6 for the attachment of the disc coulter. In the gap 8 between the inner ring 3 and the outer ring 5, the balls 9 are located. The mounting flange 6 has threaded holes 30 for the receiving of the fastening screws, with which the disc coulter not shown is
10 fastened to the bearing unit 1. Between the inner ring 3 or the second inner ring 20 and the outer ring 5, the seal 11 is arranged on the internal ring race 17 on the side 12 located opposite the mounting flange 6. Between the outer ring race 13 of the outer ring 5 and the protective cap 7, the additional seals 14 are located, which are arranged one beside the other. In this case, the additional seals 14 are radial
15 shaft seals. Other kinds of seal can also be used here without having a negative effect on the compact structure of the bearing unit 1. The outer edge 15 of the outer additional seal 35, 14 has approximately the same distance to the mounting flange 6 of the outer ring 5 as the outer edge 16 of the seal 11. In the axial direction 18 of the axis 4 of the disc support 31, the width of the bearing unit 1 is
20 not additionally increased through this. A press or force fit for additionally securing the position of the seals 14 could be assigned to the protective cap 7 on its inside and/or the outer ring 5 on the outer ring race 13.

25

30

CLAIMS:

1. A bearing unit for a double disc coupler with disc couplers arranged in a V-shape to one another, the bearing unit comprising an inner ring for receiving an axis,
5 an outer ring with a mounting flange for one of said disc couplers, and a protective cap, whereby balls or rollers with a cage are arranged in a gap between the inner ring and the outer ring, the mounting flange being positioned axially on one side of the balls or rollers, and the protective cap extending axially to a position on said one side, a first seal arranged between the inner ring and the outer ring on a side of said
10 bearing unit opposite the mounting flange, and a second seal arranged on the side opposite the mounting flange, between the outer ring and protective cap on an external ring race of the outer ring.

2. The bearing unit according to claim 1, wherein an outer edge, facing away
15 from the mounting flange, of the second seal, has approximately the same distance to the mounting flange of the disc coupler as an outer edge, arranged on an inner ring race of the outer ring, of the first seal.

3. The bearing unit according to claim 1 or 2, wherein the inner ring is
20 connected with a coupler carrier of the disc coupler via the axis and the outer ring is connected with the disc coupler via the mounting flange.

4. The bearing unit according to any one of claims 1 to 3, wherein the first seal
25 is arranged in the gap formed by the inner ring, the outer ring as well as the protective cap and the cage.

5. The bearing unit according to any one of claims 1 to 4, wherein the second seal is arranged in a gap formed by the outer ring and the protective cap.

30 6. The bearing unit according to claim 4 or 5, wherein the first seal is positioned in a force fit between the inner ring and outer ring.

7. The bearing unit according to any one of claims 4 to 6, wherein the second seal is positioned in a force fit between the outer ring and protective cap.

8. The bearing unit according to any one of claims 1 to 7, wherein at least two
5 additional seals in addition to the second seal are arranged between the external ring race and the protective cap, which are arranged one behind the other in the axial direction of the axis.

9. The bearing unit according to any one of claims 1 to 8, wherein the mounting
10 flange has a mounting face for mounting one of said coulters, and said protective cap extends axially substantially to said mounting face.

10. The bearing unit according to any one of claims 1 to 9, wherein said one of
said disc coulters is mounted on said mounting flange, and said protective cap extends
15 axially to a position adjacent said one of said disc coulters.

11. The bearing unit according to any one of claims 1 to 10, wherein the side of
the bearing unit opposite said mounting flange is an inner side of the bearing unit to be
positioned adjacent a coulters carrier, and the mounting flange is positioned on an outer
20 side of the bearing unit, opposite said inner side.

12. The bearing unit according to any one of claims 1 to 11, wherein the
mounting flange has an axially extending outer circumferential face, and the protective
cap surrounds said outer circumferential face.
25

13. The bearing unit according to any one of claims 1 to 12, wherein the inner
ring is designed as a two-piece ring and comprises a first inner ring and a second
inner ring, and wherein the bearing unit is either (1) configured to accommodate a
single race containing a single row of balls or rollers or (2) is configured to
30 accommodate a double race containing a double row of balls or rollers and wherein,
in the case of a single row of balls or rollers, a division between the first inner ring

and the second inner ring is located in a centre of the race of balls or rollers, and in the case of a double row of balls or rollers, a division between the first inner ring and the second inner ring is located between races of the two rows of balls or rollers, the mounting flange is positioned on one side of said double row, and said protective cap
5 extends axially to a position on said one side of said double row.

14. A bearing unit for a double disc coulters with disc coulters arranged in a V-shape to one another, the bearing unit comprising an inner ring for receiving an axis, an outer ring with a mounting flange for one of said disc coulters and a protective
10 cap, whereby balls or rollers with a cage are arranged in a gap between the inner ring and the outer ring, the mounting flange being positioned axially on one side of the balls or rollers, and the protective cap extending axially to a position on said one side, a first seal arranged between the inner ring and the outer ring on a side of said bearing unit opposite the mounting flange, and a second seal arranged on the side
15 opposite the mounting flange, between the outer ring and protective cap on an internal ring race of the outer ring.

15. The bearing unit according to claim 14, wherein the inner ring is connected with a coulters carrier of the disc coulters via the axis and the outer ring is connected
20 with the disc coulters via the mounting flange.

16. The bearing unit according to claim 14 or 15, wherein the first seal is positioned in a force fit between the inner ring and outer ring.

25 17. The bearing unit according to any one of claims 14 to 16, wherein the mounting flange has a mounting face for mounting one of said coulters, and said protective cap extends axially substantially to said mounting face.

18. The bearing unit according to any one of claims 14 to 17, wherein said one
30 of said disc coulters is mounted on said mounting flange, and said protective cap extends axially to a position adjacent said one of said disc coulters.

19. The bearing unit according to any one of claims 14 to 18, wherein the side of the bearing unit opposite said mounting flange is an inner side of the bearing unit to be positioned adjacent a coultter carrier, and the mounting flange is positioned on an outer
5 side of the bearing unit, opposite said inner side.

20. The bearing unit according to any one of claims 14 to 19, wherein the mounting flange has an axially extending outer circumferential face, and the protective cap surrounds said outer circumferential face.

10

21. The bearing unit according to any one of claims 14 to 20, wherein the inner ring is designed as a two-piece ring and comprises a first inner ring and a second inner ring, and wherein the bearing unit is either (1) configured to accommodate a single race containing a single row of balls or rollers or (2) is configured to
15 accommodate a double race containing a double row of balls or rollers and wherein, in the case of a single row of balls or rollers, a division between the first inner ring and the second inner ring is located in a centre of the race of balls or rollers, and in the case of a double row of balls or rollers, a division between the first inner ring and the second inner ring is located between races of the two rows of balls or rollers, the
20 mounting flange is positioned on one side of said double row, and said protective cap extends axially to a position on said one side of said double row.

2 / 2

Fig. 2

