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(73) Patenthaver: **Rheinisch-Westfälische Technische Hochschule Aachen, Templergraben 55, 52062 Aachen, Tyskland**

(72) Opfinder: **SCHRÖDER, Tim, Westend 9, 52064 Aachen, Tyskland**

(74) Fuldmægtig i Danmark: **Zacco Denmark A/S, Arne Jacobsens Allé 15, 2300 København S, Danmark**

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Plain bearing device

[0001] The invention relates to a plain bearing device comprising an inner ring element and an outer ring element, wherein two plain bearings axially spaced apart are provided between the inner and outer ring elements, the plain bearing surfaces of these two spaced-apart plain bearings are arranged nonparallel to each other and are each arranged at an angle other than zero degrees and/or other than ninety degrees to the axis of rotation of the plain bearing device, wherein, in each of the two plain bearings, one of the two interacting plain bearing surfaces forms a continuous surface in the direction of the circumference and the other one of the two interacting plain bearing surfaces is formed by plain bearing pads arranged one beside the other in the circumferential direction.

[0002] The axially spaced-apart arrangement of the two plain bearings is understood to mean that these are arranged with a distance between each other in the direction of the axis of rotation, the two respective ring elements being formed and/or arranged around this axis of rotation.

[0003] The arrangement of the plain bearing surfaces nonparallel to each other and at an angle other than zero degrees and/or other than ninety degrees to the axis of rotation is preferably understood to mean that said orientations exist when the plain bearing device is seen in a section parallel through the axis of rotation, that is, in a sectional plane including the axis of rotation itself. Preferably, said orientation applies to every possible plane parallel through the axis of rotation, which implies that the plain bearing surfaces of the two axially spaced-apart plain bearings are essentially conical.

[0004] In this respect, that plain bearing surface that forms a circumferentially continuous surface will form a conical frustum, and that plain bearing surface that

is formed by plain bearing pads arranged one beside the other in circumferential direction will form a conical frustum surface segmented by the pads. The plain bearing surface of each pad thus corresponds to a surface segment of a conical frustum.

[0005]The conical frustums of the two axially spaced-apart plain bearings preferably point towards each other with their tapering areas.

[0006]A plain bearing device of the kind referred to above is known for example from the publication WO 2011/127510 A1. The plain bearing device it describes is likewise designed for supporting a rotor hub of a wind turbine, which is also the preferred application of this invention. The invention is, however, not limited to this application but can also be used for supporting other rotary elements.

[0007]The state of the art cited here envisages the arrangement of the plain bearing pads with full surface contact at the outer ring element, with a direct contact between the rear surface of the plain bearing pad and a surface of the ring element. With a screw radially screwed into the outer ring element and the associated washers, the plain bearing pads are screw fastened to the outer ring element and form an internally rigid whole with it. One of the advantages described is that worn plain bearing pads can be replaced.

[0008]With a plain bearing arrangement of that kind, with the plain bearing surfaces of the two axially spaced-apart plain bearings forming an angle between each another, the location of the rotating element, such as the rotor hub, is defined both in radial and in axial direction. The angle formed in the mentioned sectional view between the plain bearing surfaces and the axis of rotation is preferably in a range of 30 degrees to 75 degrees and especially preferably in a range of 35 to 55 degrees.

[0009]EP 2 863 076 A1 discloses a plain bearing device according to the pre-characterizing clause of claim 1.

[0010]US 2013/287574 A1, US 1 805 992 A, US 4 260205 A and US 2011/057451 disclose other kinds of plain bearing devices.

[0011]A problem noted by the applicant is that in case of a load exerted on the rotor hub, e.g. by the weight of the rotor, but also in case of wind loads, the axis of rotation of the rotor hub is tilted relative to the target axis of rotation in which the outer ring element is oriented. This tilting reduces the surface-to-surface contact between the plain bearing surfaces of the two plain bearings, and a situation may even develop in which the load is borne in a merely linear area between the involved bearing surfaces which may result in a significantly increased wear and tear at the bearing surfaces.

[0012]Against this backdrop, it is an object of the invention to achieve a largest possible area of contact between the involved plain bearing surfaces of the two respective axially spaced-apart plain bearings even under the influence of load. According to the invention, this objective is achieved in that a respective plain bearing pad is fastened to the ring element in a radially and/or axially flexible manner.

[0013]In this respect, it is therefore the essential core concept of the invention that, in contrast to the state of the art where the respective plain bearing pads are rigidly screw-fastened to the ring element with a direct contact being established between these two elements, according to the invention, a respective plain bearing pad is fastened in a flexible manner which means that a plain bearing pad can move relative to the ring element.

[0014]This can be achieved in that the rear surface of the plain bearing pad does not have a direct rigid contact with the ring element.

[0015]According to the invention, a plain bearing pad may be indirectly fastened at the ring element using a fastening element.

[0016]The indirect fastening is understood to mean that the respective fastened plain bearing pad and the ring element to which it is fastened do not have direct

contact with each other but that the fastening is realized by means of a fastening element and hence the fastening element effects the flexibility of the plain bearing pad relative to the ring element.

[0017]In a specially preferred embodiment, a respective fastening element may for this purpose be designed to have the properties of an elastic spring, for example by using spring steel for forming such a fastening element.

[0018]According to the invention, for each of the two axially spaced-apart plain bearings, the continuous circumferential plain bearing surface is preferably formed at the inner ring element and the segmented plain bearing surface composed of several plain bearing pads is preferably arranged at the outer ring element. Basically, however, this design may also be the other way round. In a preferred embodiment of the invention, the fastening element is arranged between the ring element and each of its plain bearing pads, wherein the fastening element forms a flexure bearing through which the plain bearing pad is movable relative to the ring element. Such a flexure bearing may, for instance, be designed such that it comprises an area of reduced bending stiffness compared with two adjacent areas of a higher bending stiffness. For example, the area of reduced bending stiffness may be created by a reduced cross section compared with the adjacent areas. However, the forming of a flexure bearing is not limited to this design. A flexure bearing may e.g. also be created with or without reduction of the cross section in the connecting area of two limbs arranged at an angle other than zero degrees.

[0019]Referring to the preferred embodiment mentioned above, said fastening element may preferably be arranged at the outer ring element.

[0020]According to the invention, the plain bearing pad may, by means of the fastening element, be movable about at least one axis in relation to the ring element at which the fastening element is fastened. In an especially preferred embodiment, this axis is perpendicular to the axis of rotation. With the mobility about such an axis, the plain bearing pad fastened itself at the fastening element is fastened at the ring element in a both radially and axially flexible manner

because a movement about said axis has the effect of a change in the axial as well as the radial position of the fastened plain bearing pad.

[0021]The invention achieves that, in the presence of loads that lead to a tilting of the axis of the rotor hub of a wind turbine in relation to the target axis of rotation that is defined by the orientation of the outer ring element, the individual flexibly supported plain bearing pads can adapt to the tilted axis of rotation so that a large-area contact between the involved plain bearing surfaces is in each case maintained and the abrasive linear contact between the plain bearing surfaces is avoided.

[0022]As according to the state of the art, the local plain bearing pads have a full-surface contact of their rear surfaces with a solid rigid area of the ring element, the local plain bearing pads are likewise rigidly fixed in their position.

[0023]According to the invention, however, the fastening elements have the effect that the rear surface of the plain bearing pad does not rest on the ring element by means of contact. Rather, the design is such that the rear surface of the plain bearing pad together with that part of the fastening element to which it is fastened, leaves a clearance to the ring element, i.e. is free of contact relative to the ring element.

[0024]According to the invention, a fastening element is formed by a limb which extends away from the ring element in axial direction at an angle other than zero degrees in relation to the axis of rotation, wherein the limb carries the plain bearing pad on that of its sides that points towards the axis of rotation and wherein in particular the limb is fastened at the ring element or is formed as one piece with the same. Preferably, the angle in relation to the axis of rotation corresponds to the already mentioned 30 to 75 degrees, especially preferably 35 to 55 degrees.

[0025]According to the invention, a respective fastening element is separate from the ring element and itself fastened to the ring element.

[0026]According to the invention, all plain bearing pads of a plain bearing may be fastened by means of a common fastening element to the respective ring element, in particular the outer ring element. In this respect, such a common fastening element may exhibit a ring area which can be fastened to the ring element, which ring area exhibits projecting limbs in axial direction and in the direction of progressively larger radii, wherein at each such limb, a plain bearing pad may be fastened.

[0027]However, in an embodiment of the invention that is preferred over the above, either each plain bearing pad of each of the two axially spaced-apart plain bearings may be fastened to the ring element by means of its own dedicated fastening element or alternatively, two plain bearing pads of the two plain bearings, which are arranged at the same circumferential position and are spaced apart in axial direction, may be fastened to a common fastening element. Accordingly, such a fastening element according to the invention will therefore in the one embodiment carry exactly one plain bearing pad and in the other embodiment exactly two plain bearing pads, in particular on opposite sides of the fastening element.

[0028]In a preferred development of the design according to the invention, each respective fastening element may generally exhibit a first limb, by means of which it is fastened to the ring element, and at least one second limb, especially a limb that axially widens to the outside, which adjoins the first limb at an angle other than zero degrees and to which a plain bearing pad is fastened. The directions in which the limbs extend are therefore different.

[0029]Preferably, the angle is selected such that in case of a fastening of the first limb to the ring element, said at least one second limb forms an angle to the axis of rotation that is in the preferred range of 30 to 75 degrees, especially in the further preferred range of 35 to 55 degrees.

[0030]Through the transition of the two limbs at an angle to each other, it is already achieved that this angular transition acts like a flexure bearing between

the two limbs so that especially with the selection of a material with the properties of an elastic spring, the two limbs are elastically movable relative to one another. If the limb that is designed to be fastened to the ring element is rigidly connected with the ring element, the flexibility is achieved in that the limb with which a plain bearing pad is connected, can move flexibly in relation to the ring element through elastic deformation. Preferably, the flexibility is such that starting from an unloaded target position, a limb with the plain bearing pad it carries can move about the possible axis of the flexibility in both clockwise and anti-clockwise direction. Accordingly, starting from the unloaded target position, the flexibility is possible in both opposite directions.

[0031]A respective fastening element may be fastened to the ring element in any possible manner. For instance, said first limb intended for this purpose may be screw-fastened or riveted to the ring element. Also a material-formed joint may be designed, e.g. by attaching said limb at the ring element by welding.

[0032]A fastening element may also be designed as an integral part of the ring element. In this case, said first limb is not identifiable as a separate component but only the limb designed for the fastening of the plain bearing pad. This embodiment will then correspond to the one-piece embodiment described first above. In this one-piece embodiment, the fastening element thus forms a limb projecting from the ring element in axial direction at an angle to the axis of rotation. This angle is the angle other than zero degrees mentioned above, which defines the conical surface of the plain bearing surfaces.

[0033]Preferably, the fastening element limb designed for the fastening of a plain bearing pad is free of contact with the ring element on its rear surface facing away from the plain bearing pad independent of the kind of the fastening of the fastening element at the ring element. So, a clearance is formed between this rear surface of the limb and the ring element.

[0034]In the embodiment in which one respective fastening element only carries a single plain bearing pad, the fastening element may have a first limb by means of

which it is attached to the ring element and a single second limb which adjoins the first limb at an angle, preferably an acute angle, and to which a plain bearing pad is fastened, wherein the limb fastened to the ring element is fastened to an axial front face of the ring element.

[0035]So, in this embodiment, the preferably outer ring element has, at each of the two opposite axial front faces a number of fastening elements, wherein the fastening elements on the one axial front face are allocated to the one of the two axially spaced-apart plain bearings and the fastening elements on the other axial front face are allocated to the other of the two axially spaced-apart plain bearings.

[0036]This offers the special advantage that also the fastening areas of the fastening elements at the axial front faces of the ring element are also accessible in operating condition of a wind turbine, so that maintenance work such as the replacement of worn plain bearing pads is possible in a particularly simple way.

[0037]In the other preferred embodiment of the invention, a respective fastening element may have one first limb, by which it is fastened at the ring element, and two second limbs arranged opposite to each other on either side of the first limb, each of which adjoins the first limb at an angle and to each of which one plain bearing pad is fastened, wherein the limb fastened to the ring element is fastened at a radial inner surface of the ring element.

[0038]The zone of a reduced bending stiffness is in all embodiments preferably located in the area of the transition between the first and second limbs where these adjoin at an angle. Additionally, this area may have a smaller cross section than the adjoining limbs. However, for the creation of an elastic mobility between the limbs, this is not absolutely necessary.

[0039]In a possible embodiment of the invention, which is not part of the claimed invention, the rear surface opposite the sliding surface of a respective plain bearing pad may, in case of the above but also other not mentioned forms of the fastening elements, have full-surface contact with the limb of the fastening element provided for this purpose.

[0040] With that design, a mobility of the plain bearing pad is essentially defined by the mobility between the two limbs of a fastening element that transition into one another at an angle. This mobility is, as stated above, essentially a mobility about a single axis which is preferably perpendicular to the axis of rotation. Essentially, this has the effect that a maximum mobility of the plain bearing pad primarily exists in that part of the plain bearing pad that is, relative to the ring element, axially the outer part.

[0041] According to the invention, a respective plain bearing pad, on the side opposite the sliding surface, that is, on its rear surface facing the fastening element, in particular facing the limb designed for the fastening of the plain bearing pad, partly forms a clearance, i.e. does not have full-surface contact.

[0042] This way, it is accomplished that a plain bearing pad fastened to the fastening element cannot only move as a whole together with the limb of the fastening element relative to the ring element but that a fastened plain bearing pad can also move relative to the limb of the fastening element because a fastened plain bearing pad can also enter into the zone of the fastening element and/or the limb where it leaves a clearance, i.e. does not have full-surface contact.

[0043] According to the invention, the plain bearing pad has full-surface contact with the limb of the fastening element in a first sub-region of the rear surface of the plain bearing pad and is arranged free of contact with the limb in a second sub-region of the rear surface of the plain bearing pad. This may, for example, be accomplished in that the material of the limb of the fastening element is thinner in the region opposite the second sub-region than the material in the first sub-region, wherein especially preferably, said two sub-regions adjoin at a step, the edge adjoining the first sub-region being perpendicular to the axis of rotation.

[0044] This way, a fastened plain bearing pad can be swivelled both about a first flexure bearing axis, which, due to its arrangement in the area of the transition between the two limbs, is close to the ring element, and about a second axis, which, due to its arrangement in the step area between the two sub-regions, is

further away from the ring element, so that this may lead to a better adaptation of the plain bearing surface of such a plain bearing pad to the opposite, preferably inner plain bearing surface that is tilted in the axis of rotation. Preferably, the two axes about which a plain bearing pad can be flexibly moved are parallel to one another and hence perpendicular to the axis of rotation.

[0045] In the preferred embodiment, the first sub-region is arranged at the axially outer end of the fastening element to achieve a spaced-apart arrangement of the two flexible regions. Further, it is preferred that the first sub-region has a smaller surface area than the second sub-region so that the zone of flexibility that is axially remote from the ring element can be arranged axially further to the outside.

[0046] In a development of all possible embodiments, the limbs carrying plain bearing pads of two circumferentially adjacent fastening elements of each respective plain bearing may be connected with each other, in particular in the circumferential direction, in particular in a releasable manner and preferably in an axially outer and/or inner area. This way, a load acting on a limb of a fastening element that leads to a change in the position of the plain bearing pad is, through this connection, transferred also to adjacent limbs and their plain bearing pads, so that in particular, a coupling of the limbs and the plain bearing pads exists.

[0047] Circumferentially adjacent plain bearing pads may be connected, in particular connected in a releasable manner, with one another in this circumferential direction, in particular at their axially outer end regions or the axially inner end regions, especially there where they leave a clearance to the limb of the fastening element.

[0048] Such a connection may be achieved in the two embodiments mentioned above by way of a connecting web which is connected on either side with the respective one of the adjacent limbs or pads, for instance by way of a screw joint.

[0049] The preferred embodiments are described in more detail on the basis of the figures referred to in the following.

Figure 1 shows a plain bearing arrangement according to the invention in a sectional view where the sectional plane, here the paper plane, is parallel to the axis of rotation 4 and includes the axis of rotation 4.

[0050] Figure 1 shows an inner ring element 1 and an outer ring element 2, wherein the inner ring element 1 may be part of the rotating rotor hub of a wind turbine. The rotation is made about the central axis of the shaft 1a, which corresponds to the axis of rotation 4.

[0051] Referring to the view shown here, this plain bearing arrangement has a first plain bearing 3a, which is shown axially left of the ring element 2, and a second plain bearing 3b, which is shown axially right of the outer ring element 2. These two plain bearings 3a and 3b are therefore axially spaced apart in the direction of the axis of rotation 4.

[0052] For both axially spaced-apart plain bearings 3a and 3b, the inner ring element 1 exhibits bearing surfaces 3c that have the shape of a conical frustum and are continuous in circumferential direction. The conical frustum shaped plain bearing surfaces 3c point with their tapered ends towards one another.

[0053] At the outer ring element 2, on the other hand, separate plain bearing pads 6 are arranged by means of fastening elements 5 so as to be distributed adjacent to each other in circumferential direction. Every plain bearing pad 6 forms with its plain bearing surface a surface segment of a conical frustum. Through the conical arrangement, the bearing arrangement defines the position of the hub in axial and radial direction.

[0054] Figure 2 is a perspective view of the same device.

[0055] Figure 3 shows a detail in a perspective view of only the outer ring element 2 with the fastening elements 5 fastened thereto, each of which supports a plain bearing pad 6. Figure 4 shows the fastening element 5 according to the invention, which is separate from the ring element 2, with the plain bearing pads arranged thereon. From Figure 4, it can be seen that a fastening element 5 exhibits a first

limb 5a, here in particular arranged in the middle of the fastening element 5, and two limbs 5b on either side of it, which each adjoin the limb 5a at an angle, in particular at the same angle α. The middle limb region 5a serves to fasten the fastening element 5 to the radial inner ring surface 2a (Figure 3) of the ring element 2. Here, the middle limb region 5a is fastened to the ring surface 2a essentially with full-surface contact, for instance by means of a screw joint, so that this connection is rigid.

[0056] In contrast to the rigid connection between the limb 5a and the ring element 2, the limbs 5b, which carry the plain bearing pads 6, are flexible because of their elasticity in the zone of transition between the limbs 5a and 5b and can hence essentially in the zone of this transition between the two limbs 5a and 5b, move about an axis 5c. In contrast to the state of the art, the arrangement of the plain bearing pad 6 relative to the ring element 2 is not rigid but elastic.

[0057] Figure 3 shows a clearance between the limb 5b and the ring element 2 so that the held plain bearing pad 6 does not rest on the rigid ring element 2 with its rear surface.

[0058] In particular Figure 4 also shows that the rear surface of a plain bearing pad 6 has only in an axially outer sub-region of the respective limb 5b, a full-surface connection with the limb 5b, whereas in the sub-region 5d, the rear surface of the plain bearing pad 6 does not contact the limb 5b, in particular leaves a clearance. This is achieved in that the thickness of the material of the limb 5b in the sub-region 5d is reduced compared with the thickness in the outer sub-region wherein a full-surface contact exists.

[0059] Figure 5 shows that under an assumed load of the shaft and an elastic rotational mobility about the further axis 5e, which exists at a stepped transition between the two sub-regions, the axial inner end of a plain bearing pad 6 can enter into the clearance created through the reduced material thickness of the subregion 5d. Accordingly, a plain bearing pad 6 can be moved both together with

the limb 5b relative to the limb 5a, which is rigidly connected with the ring element 2a, and about the axis 5e relative to the limb 5b.

[0060] Figure 6 shows another preferred embodiment of the invention in which each individual plain bearing pad has its own dedicated fastening element 5. As shown in Figure 7, a respective fastening element 5 has, as in the embodiment shown in the previous figures, a limb 5a, with which the fastening element 5 is fastened to the ring element 2, in this case, however, to an axial front face 2b thereof, wherein, however, the limb 5b only adjoins limb 5a on one side at an angle a, in particular an acute angle. Accordingly, in this embodiment, one fastening element 5 carries only a single plain bearing pad 6.

[0061] Also here, the limb 5b is resiliently flexibly movable relative to the limb 5a because a flexural bearing is created as a result of the elasticity of the material of the fastening element 5, and also this embodiment comprises the advantageous design that in the sub-region 5d, which is close to the limb 5a, the plain bearing pad 6 is arranged with a clearance, that is, has no contact with the limb 5b, so that, as is the case in the above-mentioned embodiment, the axial inner end of the plain bearing pad 6 can enter into this region.

[0062] Also this embodiment therefore achieves a flexible support of the plain bearing pad 6 about two essentially parallel axes, so that in both the first and the second embodiment, the plain bearing pad 6 can adapt to the changed axis geometry of the rotor hub when the same is affected by a load. This way, the largest possible area of contact between the plain bearing surfaces arranged opposite one another is achieved and a linear contact is avoided.

[0063] Figure 8 shows a slight modification of the embodiment according to Figure 3, in which the fastening element 5 and/or its limb 5b which carries the plain bearing pad is not realized as a separate part to be fastened to the ring element 2 but the limb 5b is formed as one piece with the ring element 2. The execution with the clearance in a sub-region is also implemented in this modification.

[0064] Figure 9 shows a further modification of the embodiment according to Figure 8 which can likewise be applied to the embodiments of Figures 3 and 6. In this case, the limbs 5b of circumferentially adjacent plain bearing pads 6 are connected with one another by means of axially outer connecting webs 5f. Through this coupling, a load exerted on one limb 5b is also directly transferred to an adjacent limb 5b.

[0065] With this embodiment, the coupled limbs 5b of all fastening elements 5 form a conical ring which has axial slits that are circumferentially spaced apart. Each respective slit therefore extends from the region where the limb 5b is connected with the ring element (whether designed as one piece with or fastened to the same) to the axially outer connecting web 5f. Between any two neighbouring slits, the limb 5 is formed which carries a respective plain bearing pad 6.

[0066] Figure 10 shows an individual plain bearing pad 6 as it may be designed in a possible embodiment along to the solid lines and thus with its plain bearing surface 6a essentially represents a surface segment of a cone.

[0067] According to another preferred embodiment, the areas 6b surrounded by dotted lines are formed in deviation from the conical surface profile, i.e. recessed from same, wherein according to the invention such a design may be implemented at one of the two edges only or at both edges as shown here. This design creates wedge-shaped intakes 6c that are designed to take in oil at the plain bearing between the opposite plain bearing surfaces.

Patentkrav

1. Glidelejeindretning, især understøtning af et rotornav på et vindkraftanlæg, omfattende

a. et indre ringelement (1), især som udgør en del af den roterende rotoraksel, og

b. et ydre ringelement (2), især som udgør en del af rotorstatoren,

c. hvor der mellem det indre og ydre ringelement (1, 2) er udformet to glidelejer (3a, 3b), som er anbragt i aksial afstand, og hvis glidelejeflader (3c), især set i et snit parallelt gennem rotationsaksen (4), er anbragt ikke-parallelt i forhold til hinanden og respektivt i en vinkel, som ikke er lig med nul grader og ikke er lig med 90 grader i forhold til rotationsaksen (4),

d. hvor i hvert af de to glidelejer (3a, 3b) en af de sammenvirkende glidelejeflader (3c), især den på det indre ringelement (1), udgør en i omkredsretningen kontinuerlig flade, og den anden af de sammenvirkende glidelejeflader (3c), især den på det ydre ringelement (2), er udformet af glideleje-puder (6), som er anbragt ved siden af hinanden i omkredsretningen,

e. og hvor en respektiv glideleje-pude (6) er fastgjort radialt og/eller aksialt eftergiveligt på ringelementet (2),

f. og hvor bagsiden af glideleje-puden (6) ved hjælp af et fastgørelseselement, som bevirker eftergiveligheden og er udformet som et ben, er indirekte fastgjort på ringelementet, som strækker sig væk fra ringelementet i aksial retning i en vinkel, som ikke er lig med nul grader i forhold til rotationsaksen, og som bærer glideleje-puden (6) på en side, der vender mod rotationsaksen, **kendetegnet ved, at**

g. glideleje-pude-bagsiden og delen af benet, på hvilket den er fastgjort, ligger hult i forhold til ringelementet (2),

h. og glideleje-puden (6) i et første delområde af bagfladen, hvilket delområde er anbragt ved den aksialt udad beliggende ende af fastgørelseselementet, med hele fladen er fastgjort på benet af fastgørelseselementet og er anbragt på et andet delområde af bagfladen på en berøringsfri måde i forhold til benet, således at en respektiv glideleje-pude (6) områdevist ligger hult på en bagside, der vender mod fastgørelseselementet.

2. Glidelejeindretning ifølge krav 1, **kendetegnet ved, at** en respektiv glideleje-pude (6) ved hjælp af et fjederelastisk fastgørelseselement (5) er indirekte fastgjort radialt og/eller aksialt eftergiveligt på ringelementet (2).

3. Glidelejeindretning ifølge et af de foregående krav, **kendetegnet ved, at** fastgørelseselementet (5) er anbragt mellem ringelementet (2), især det ydre ringelement (2), og hver af glideleje-puderne (6), hvor fastgørelseselementet danner et fastlegemsled, ved hjælp af hvilket glideleje-puden (6) er bevægelig i forhold til ringelementet (2), især ved hjælp af hvilket glideleje-puden (6) er bevægelig om mindst en akse (5c), især vinkelret på rotationsaksen (4), i forhold til ringelementet (2).

4. Glidelejeindretning ifølge krav 2 eller 3, **kendetegnet ved, at** benet (5b) er fastgjort på ringelementet (2) eller er i ét stykke med dette.

5. Glidelejeindretning ifølge et af de foregående krav, **kendetegnet ved, at** hver glideleje-pude (6) af hvert af de to glidelejer (3a, 3b) er fastgjort på ringelementet (2) ved hjælp af et eget fastgørelseselement (5).

6. Glidelejeindretning ifølge et af de foregående krav, **kendetegnet ved, at** to glideleje-puder (6) af de to glidelejer (3a, 3b), hvilke glideleje-puder er anbragt i den samme omkredsposition og anbragt i afstand i aksial retning, er anbragt på et fælles fastgørelseselement (5).

7. Glidelejeindretning ifølge et af de foregående krav, **kendetegnet ved, at** et respektivt fastgørelseselement (5) har et første ben (5a), ved hjælp af hvilket det er fastgjort på ringelementet (2), og har mindst et andet ben (5b), som især breder sig aksialt udad, som slutter sig til det første ben (5a) i en vinkel (α), og på hvilket der er fastgjort en glideleje-pude (6).

8. Glidelejeindretning ifølge krav 5, **kendetegnet ved, at** et respektivt fastgørelseselement (5) har et første ben (5a), ved hjælp af hvilket det er fastgjort på

ringelementet (2), og har et enkelt andet ben (5b), som i en vinkel (α), foretrukket en spids vinkel (α) slutter sig til det første ben (5a), og på hvilket der er fastgjort en glideleje-pude (6), hvor benet (5a), der er fastgjort på ringelementet (2), er fastgjort på en aksial endeflade (2b) af ringelementet (2).

9. Glidelejeindretning ifølge krav 5, **kendetegnet ved, at** et respektivt fastgørelseselement (5) har et første ben (5a), ved hjælp af hvilket det er fastgjort på ringelementet (2), og har to andre ben (5b), som på begge sider af det første ben (5a) ligger over for hinanden, og som i en vinkel (α) respektivt slutter sig til det første ben (5a), og på hvilke der respektivt er fastgjort en glideleje-pude (6), hvor benet (5b), der er fastgjort på ringelementet (2), er fastgjort på en radial indvendig flade (2a) af ringelementet (2).

10. Glidelejeindretning ifølge et af de foregående krav, **kendetegnet ved, at** benet (5b) af fastgørelseselementet (5) i sit område, som ligger over for det andet delområde (5d) af bagfladen af glideleje-puden (6), har en materialefortynding i forhold til materialet i det første delområde, især hvor de to delområder på et trin grænser op til hinanden, hvis kant, der grænser op til det første delområde, forløber vinkelret på rotationsaksen (4).

11. Glidelejeindretning ifølge et af de foregående krav, **kendetegnet ved, at** det første delområde har en mindre flade end det andet delområde (5d).

12. Glidelejeindretning ifølge et af de foregående krav 5 til 10, **kendetegnet ved, at** benene (5b) af to i omkredsretningen naboliggende fastgørelseselementer (5), hvilke ben bærer glideleje-puder (6), er forbundet med hinanden, især forbundet aftageligt, foretrukket i et aksialt udad beliggende område (5f).

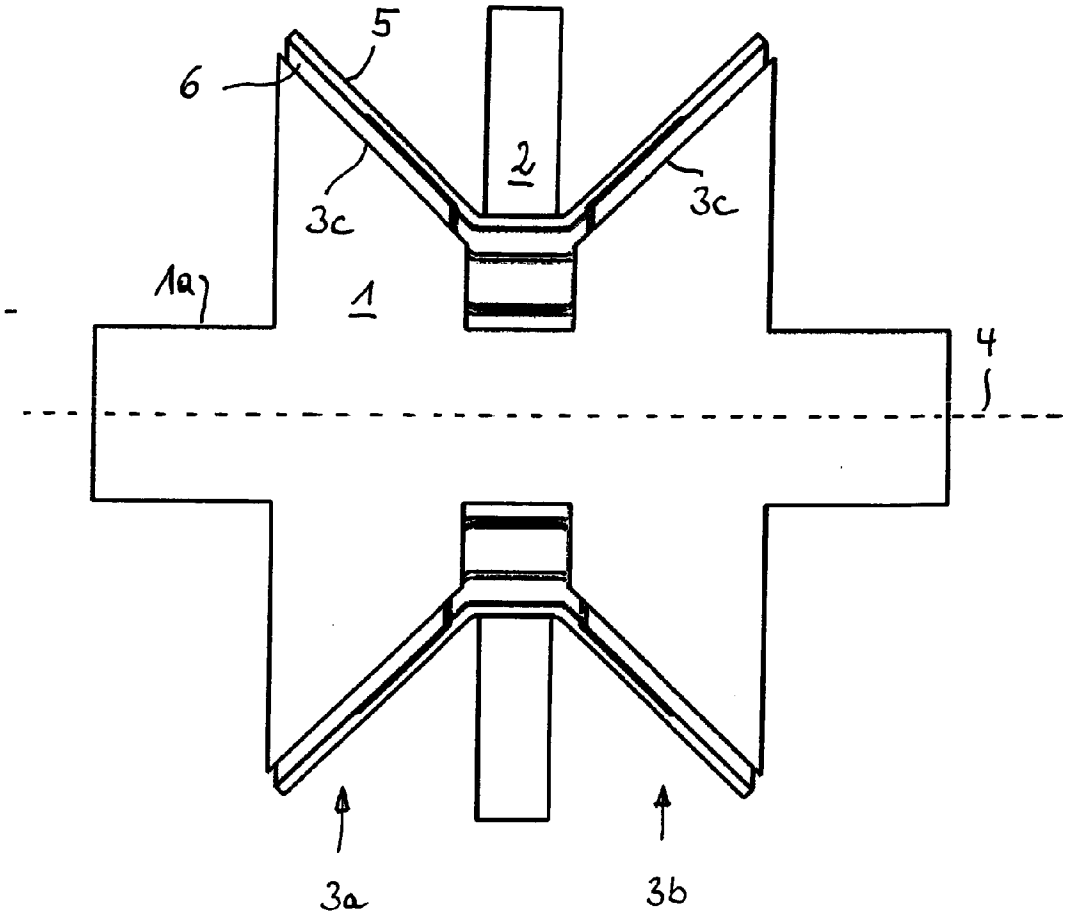

Fig. 1

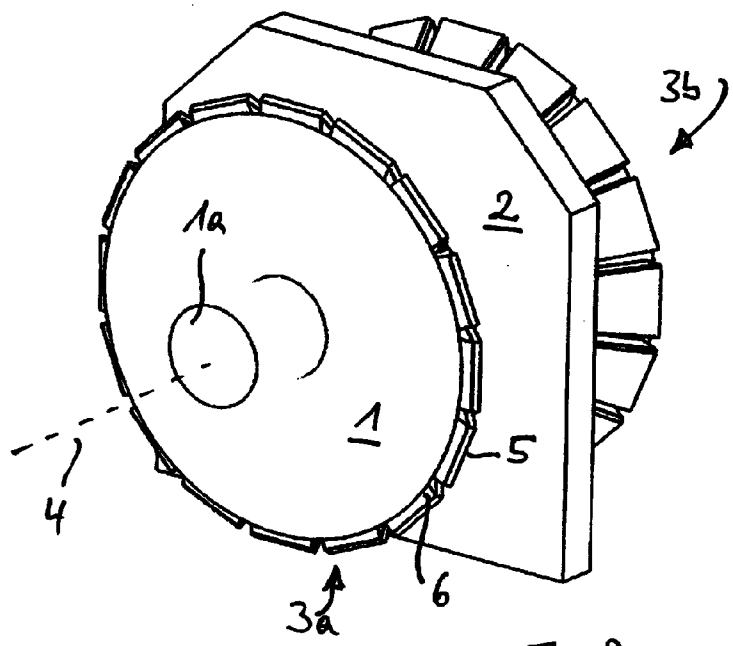

Fig. 2

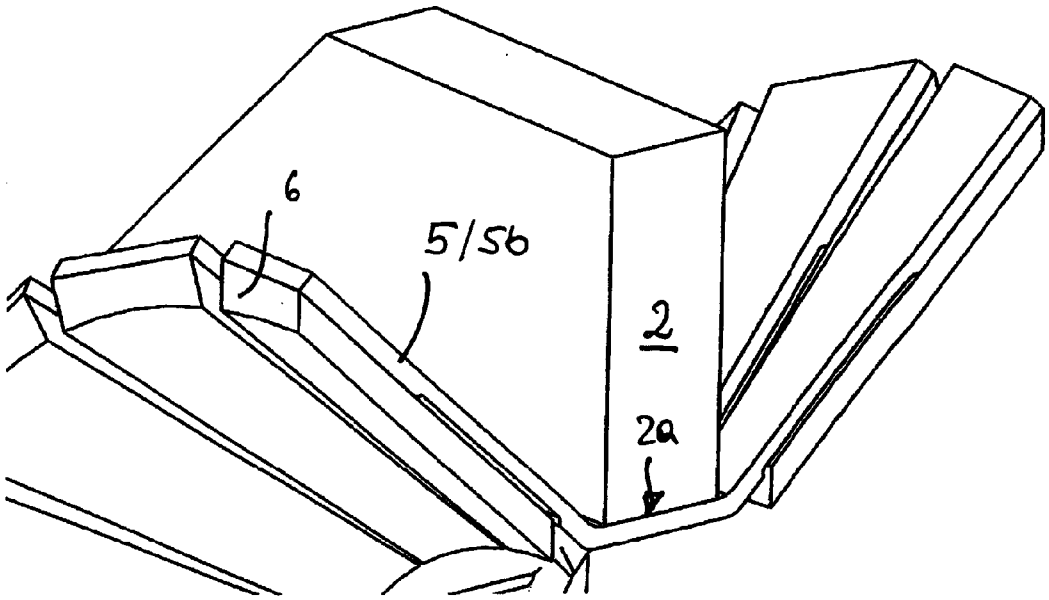

Fig. 3

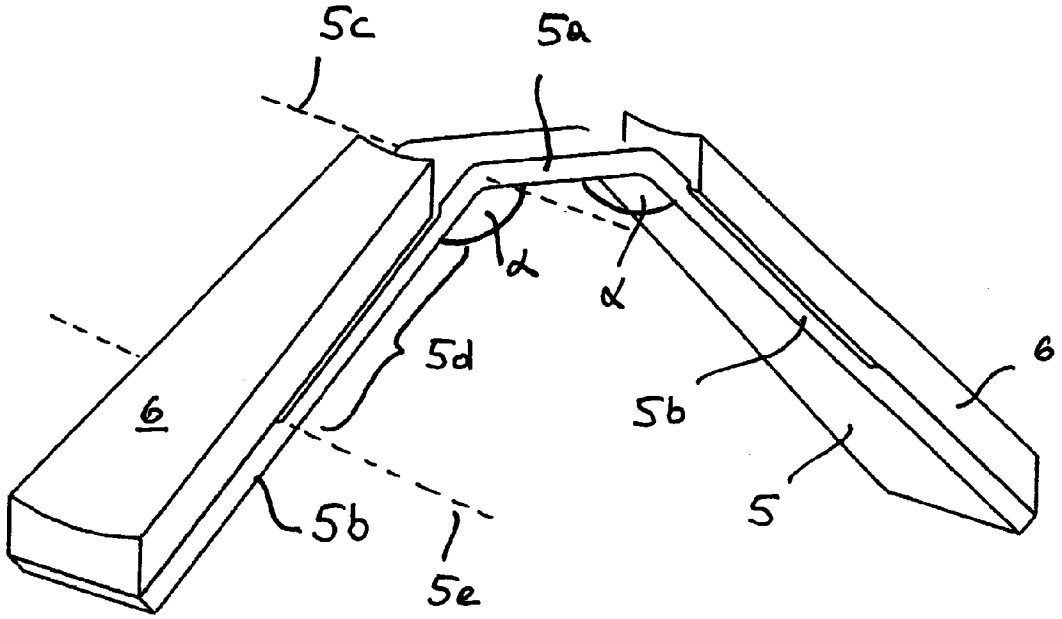

Fig. 4

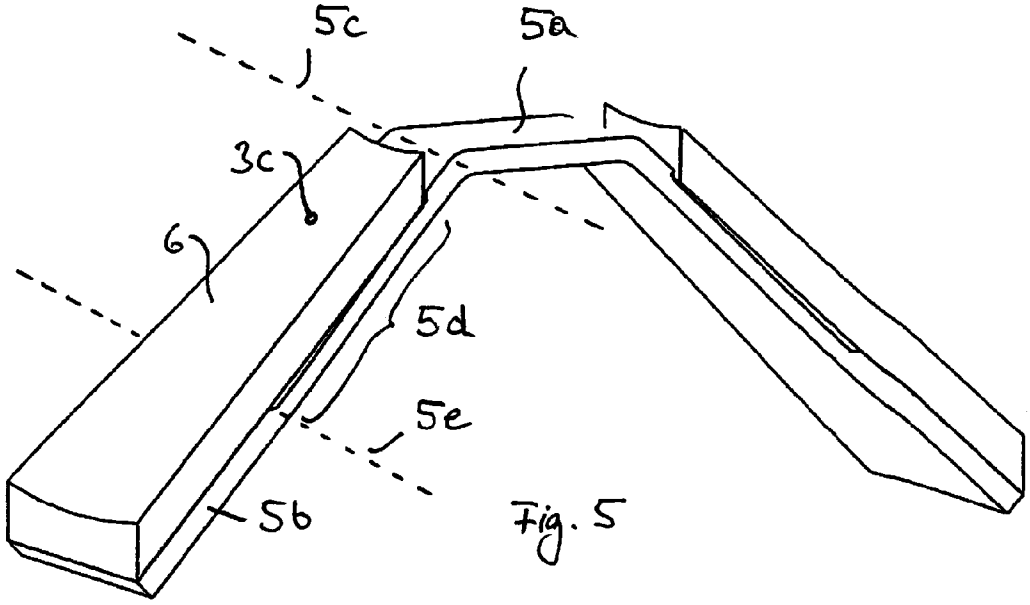

Fig. 5

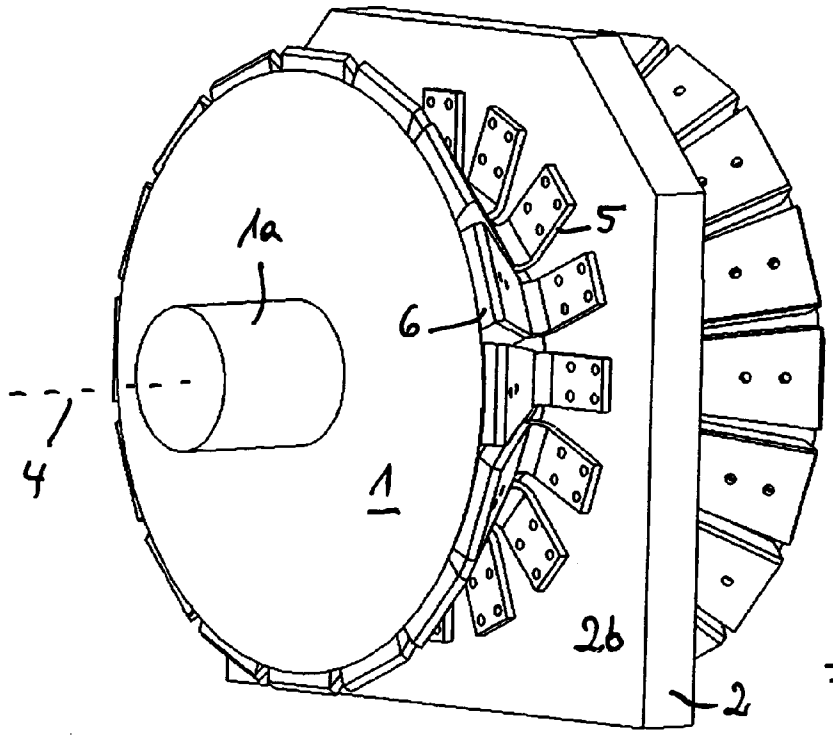

Fig. 6

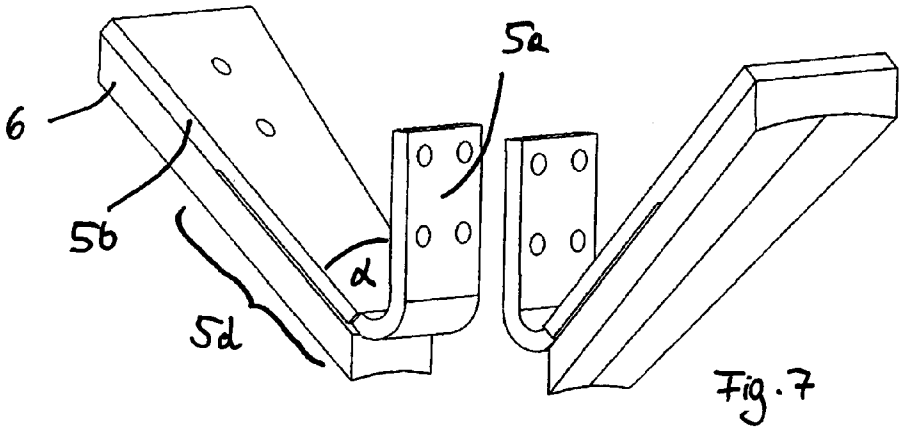

Fig. 7

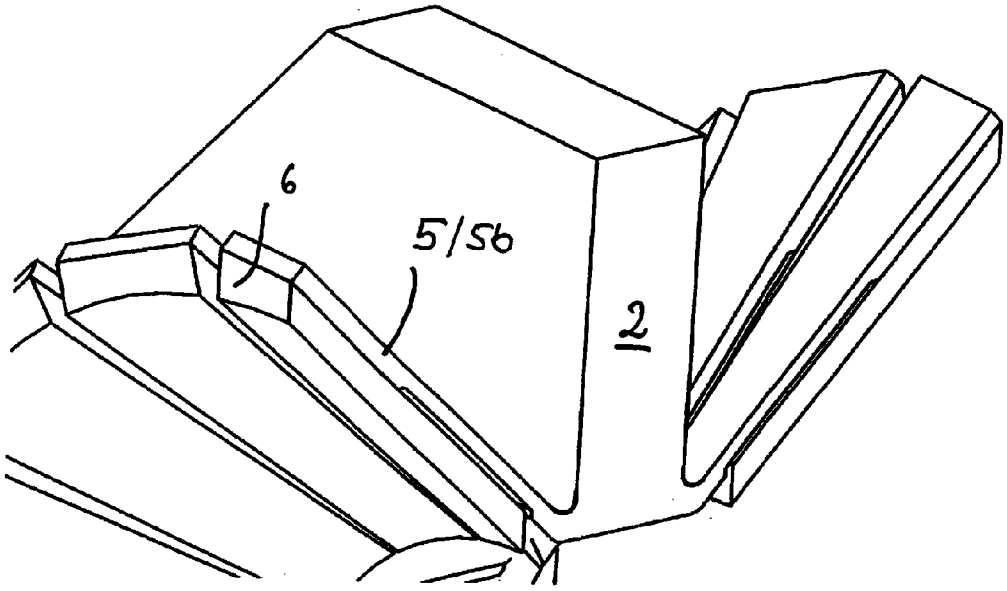

Fig. 8

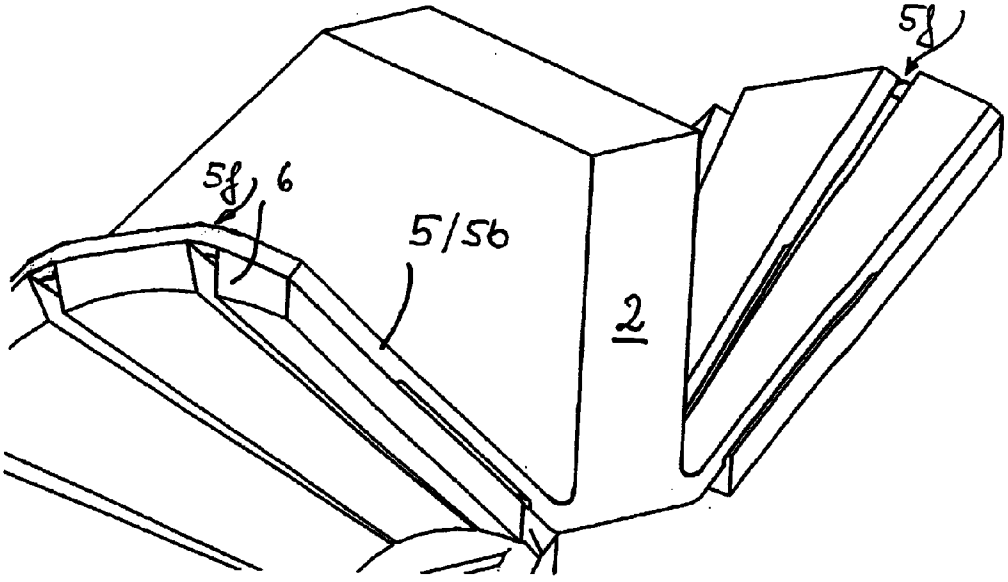

Fig. 9

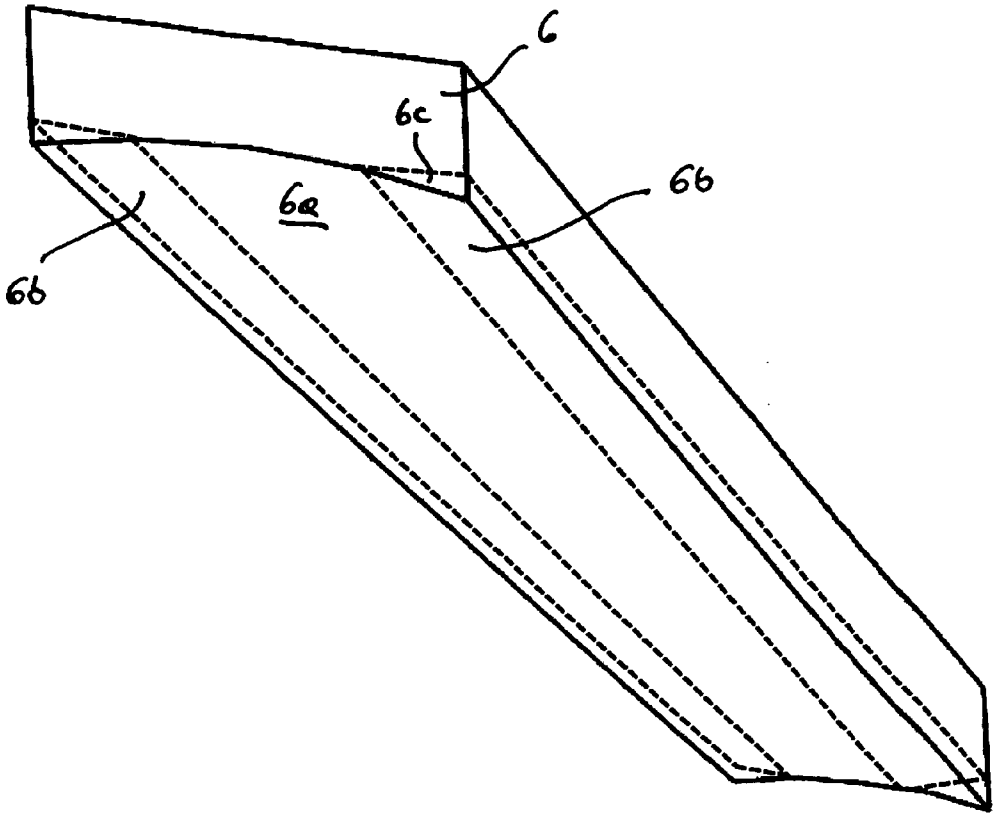

Fig. 10