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(54) **Ágyazó elrendezés egy jármű-futómű rugójához**

BEARING ARRANGEMENT FOR A SPRING OF A VEHICLE CHASSIS

Description

The present invention concerns a bearing arrangement for a spring, especially for a spring of a vehicle chassis, with at least one spring insert in which at least one part of a spring coil of the spring is accommodated.

Spring plates are most often used to hold a spring, especially in a vehicle chassis, and the spring is braced by at least part of an end-side spring coil in the spring plate. In order to prevent the spring made of metal from working in direct contact with a metallic spring plate or having a metallic contact for the necessary bracing, spring inserts are known, which can receive the end-side spring coil at both the first and the second end of the spring. With a spring insert arranged at the lower end of the spring, the insert can be braced in the spring plate. Suitable materials for the formation of spring inserts are elastomers, so that the spring end is mounted in a soft, resilient material.

When the spring is in operation, it executes a movement both relative to the spring plate and also relative to the spring insert, resulting in particular from a rolling movement of the spring coil in which the spring insert is received.

Due to the rolling movement of the spring end occurring in this way, an opening and closing gap may arise between the spring insert and the rolling spring coil. Due to intense action of moisture and grime, despite the elastic and resilient spring insert design, an abrasive and grinding effect may occur on the surface of the spring coil, so that a paint coat applied to the spring may become damaged.

PRIOR ART

From DE 10 2008 046 939 A1 there is known a bearing arrangement for a spring of a vehicle chassis. It is proposed here to vulcanize the spring insert directly on the spring. In this way, the forming of a gap between the spring coil of the spring and the spring insert is avoided, but the process of vulcanizing an elastomer onto the spring is very costly and greatly limits the possible choice of material for the spring insert. It is proposed in particular for this that a spring insert should be provided for mounting on the spring which is in a not fully vulcanized mounting condition. Only in a final condition, when the spring insert is to be vulcanized on the spring, will the material of the spring insert be finally vulcanized. Moreover, it is necessary to apply a primer coat to the spring coil on which the spring insert is to be vulcanized, which further increases the cost for the vulcanization of the spring insert on the spring coil of the spring.

Document EP0791491A1 discloses a bearing arrangement according to the preamble of Claim 1. Documents DE 10 2007 003 782 A1, US 7213802 B2 and US 3141660 disclose other bearing arrangements for a spring.

Therefore the problem which the present invention proposes to solve is to create a bearing arrangement for a spring which overcomes the drawbacks of the above indicated prior art and enables a simple arrangement of a spring insert on the spring.

This problem is solved starting from a bearing arrangement for a spring according to the preamble of Claim 1 in conjunction with the characterizing features. Advantageous modifications of the invention are indicated in the dependent claims.

DISCLOSURE OF THE INVENTION

The invention involves the technical teaching that an adhesive is introduced between the spring and the spring insert so that the connection of the spring insert to the spring comprises an adhesive connection.

The notion of the design of a bearing arrangement according to the invention consists in creating an integrally bonded connection between the spring and the spring insert, which is easily accomplished and can be integrated with no additional time expenditure in an assembly process for the bearing arrangement. Thanks to the simple application of an adhesive to the spring and/or to the spring insert, one accomplishes an extremely simple process for making an integrally bonded joint between the spring and the spring insert, without the need for a special choice of the material of the spring insert for making the integrally bonded connection and without requiring costly intermediate fabrication steps. Preferably, the adhesive may be applied to the spring insert before the spring is joined with the spring insert. Alternatively or additionally, the adhesive may also be applied to the spring. According to the invention, the adhesive is designed as an adhesive which is hardenable at room temperature. This affords the further benefit that the adhesive connection between the spring and the spring insert requires no additional process step in order to prepare the adhesive connection. Once the adhesive has been introduced between the spring and the spring insert and the spring insert is joined to the spring, the assembly so formed of the spring and the spring insert can be further processed to form a spring system, for example, to provide a spring strut of a vehicle chassis. The hardening of the adhesive at room temperature can occur in or during a following mounting process or after completion of the spring system for the vehicle chassis.

The spring may have a first lower end, preferably facing a vehicle axle, and a second upper end, preferably facing a spring dome, wherein the arrangement of a spring insert at least at the first and/or at the second end of the spring is provided. The arrangement of the spring insert on the spring with the adhesive connection may preferably occur at the first lower end of the spring, pointing in the direction of the vehicle axle, since at this end the influence of contaminants on the bearing arrangement is the greatest. In particular, the bearing arrangement may be with a spring plate especially to catch sand and dust contaminants which might have an abrasive effect on the spring if it is not integrally bonded to the spring insert. The aforementioned benefits of the adhesive connection between the spring insert and the spring may also, however, be used for the second upper end of the spring, pointing preferably in the direction of the spring dome. According to the invention, the spring insert comprises an elastomer and is flexible in configuration, while the spring insert is designed to move along in the spring coil. In this way, the spring insert may consist of a shape-stable, yet elastically deformable plastic, and the spring characteristic of the spring is not influenced by the assembly of the spring insert with the end-side spring coil. Thanks to the moving of the spring insert along with the spring coil, the rolling movement of the spring no longer occurs at the contact site with the spring insert or even with the spring plate, and the rolling movement occurs preferably between the spring insert and the spring plate.

The spring insert may be designed in the manner of a ring and extend over an angle of at least 180°, preferably of at least 270° and in particular of up to 360° or more. If the angle is less than 360°, the spring insert is fashioned as a kind of open ring, and for an angle of 180° it has the shape, for example, of a half moon. If the angle by which the spring insert extends about a centre axis is 360°, for example, it may be designed as a slit ring. A first end region of the spring insert rests against the spring plate here, and a second end region of the spring insert moves along with the spring coil of the spring.

Advantageously, the spring insert has an approximately rectangular basic cross section which is in particular formed consistently over the annular circumference. The rectangular basic cross section may have an encircling depression into which the spring coil can be adhesively bonded, wherein the depression in particular has a semicircular cross section. The spring coil may be glued in the semicircular cross section, so that the rectangular base cross section of the spring insert extends about the at least half spring coil.

Furthermore, the bearing arrangement may comprise at least one spring plate in which preferably the first end of the spring is accommodated, wherein the spring insert is in particular arranged between the end-side spring coil and a bearing surface of the spring plate. Thanks to the rectangular basic cross section of the spring insert, the latter can have a base surface by which the spring insert rolls along the bearing surface of the spring plate when the spring is compressed. Alternatively, the basic cross section of the spring insert may also have a variable configuration along the ring-shaped circumference, and for example the spring insert may have a planar base surface over the entire circumference, by which the spring insert lies against the spring plate. The top side may have, for example, an encircling depression with a pitch corresponding to the pitch of the spring coil. In a spring suspension, and consequently upon movement of the spring coil along the spring plate, a compression of the spring insert may occur, so that no relative movement, especially no rolling movement, would occur either between the spring coil and the spring insert or between the spring insert and the spring plate.

The bearing arrangement is part of a suspension system of a spring strut of a vehicle chassis, in which the helical compression spring is configured. In particular, a shock absorber may be led through the helical compression spring, being arranged concentrically or eccentrically to the axis of rotation of the helical compression spring. In particular, the spring plate may be brought into connection with the shock absorber, and the helical compression spring may be braced by the lower end side against the spring plate and by the upper side against a corresponding mounting arrangement. According to the invention, a compressive prestress is introduced into the spring, while the adhesive can be hardened under the action of the compressive prestress. This accomplishes a special advantage, since by virtue of the hardening of the adhesive between the spring and the spring insert no independent process step is required for the hardening of the adhesive, and the assemblage of the spring and the spring insert may also be further processed when the adhesive has already been introduced into the joint, but has not yet hardened. However, especially advantageously the hardening occurs under the compressive prestress of the spring in the suspension system, so that a pressure between the parts being joined is easily applied in order to make an adhesive connection which can be prestressed. Alternatively, the assemblage of the spring and the suspension system may also be hardened without compressive prestress, for example in a corresponding fixture.

The problem of the present invention is moreover solved by a method according to Claim 7. With the method according to the invention, a bearing arrangement for a spring, especially for a spring of a vehicle chassis, can be created, wherein an adhesive is introduced between the spring and the spring insert so that the connection of the spring insert to the spring comprises an adhesive connection. The special benefit of the method according to the invention is accomplished in that the hardening of the adhesive may occur under the applied spring biasing, so that the hardening of the adhesive requires no separate fabrication step.

In particular, before the adhesive is arranged on the spring insert, that surface of the spring insert which is to be brought into contact with the adhesive may be activated. Preferably, that surface in the encircling depression of the spring insert may be activated in which the spring coil of the spring is glued. Alternatively or additionally, the surface of the spring coil may also be activated in order to achieve a better adhesion of the adhesive to the surface of the spring coil. Preferably, the activation may occur at room temperature, so that no means need to be provided for heating the adhesive connection after it has been made.

The spring of the bearing arrangement is designed as a helical compression spring and is prestressed axially with a compressive prestress in order to form a spring strut of a vehicle chassis, wherein the adhesive is hardened under the action of the compressive prestress.

PREFERRED SAMPLE EMBODIMENT OF THE INVENTION

Further measures improving the invention shall be presented more closely below together with the description of preferred sample embodiments of the invention with the aid of the figures. There are shown:

Figure 1, a sample embodiment of a bearing arrangement for a spring in a perspective view before the joining of the spring insert to the spring,

Figure 2, a view of a spring with a spring insert joined to the spring with a joint according to the present invention,

Figure 3, a perspective view of a spring insert to form a bearing arrangement for a spring and

Figure 4, a view of the basic cross section of a spring insert according to Figure 3.

Figure 1 shows a bearing arrangement 1 of a spring 10. The spring 10 forms, together with a shock absorber 17 which is led through the spring 10, the spring and shock absorber unit of a spring strut for a vehicle chassis. The spring 10 comprises a first lower end, pointing in the direction of a vehicle axle, and a second upper end, pointing in the direction of a spring dome, while the arrangement of a spring insert 11 is shown for example on the first, lower end of the spring 10. The spring insert 11 is shown in a nonmounted state, and for its mounting it can be glued to a portion of a spring coil 10' of the spring 10. The spring insert 11 extends about the centre axis of the spring 10 by an angle of around 360°, so that the spring insert 11 is configured as a slit ring.

The spring 10 is braced by the spring insert 11 against a spring plate 15, and the spring plate 15 has a bearing surface 16, against which the spring insert 11 may lie. If the spring 10 in the spring strut assembly is tensioned

with a compressive force, the spring 10 will be braced by the spring insert 11 against the bearing surface 16 of the spring plate 15. The spring plate 15 here is arranged at the lower end of the shock absorber 17.

In order to create an integrally bonded connection between the spring 10 and the spring insert 11 by means of an adhesive 12 according to the present invention, the adhesive is applied for example to the joint side of the spring insert 11. If the spring coil 10' is brought into contact with the spring insert 11, the adhesive 12 can harden, and the spring insert 11 has an integrally bonded connection to the spring coil 10' of the spring 10.

At the second, upper end of the spring 10, pointing in the direction of a spring dome, the spring 10 is braced against another spring plate 18. The spring plate 18 can form a pack arrangement with an elastic element 19, which can be designed for example as a rubber pad, and an upper mounting arrangement 20, in order to be installed in the spring dome of a vehicle. The upper mounting arrangement 20 may comprise a strut bearing, in order to enable a rotating ability of the spring strut with the spring 10 and the shock absorber 17. The arrangement depicted is ordinarily used for a front axle of a motor vehicle, while the bearing arrangement 1 of the invention with an adhesive connection between the spring 10 and the spring insert 11 may also find use for a mounting of a spring 10 for the rear axle of a motor vehicle.

Figure 2 shows more closely the bearing arrangement 1 with a connection between a spring 10 and a spring insert 11 according to the present invention. The spring insert 11 is shown in an arrangement joined to the spring coil 10'. The spring insert 11 extends by an angle of 360° about the centre axis of the spring 10, and forms a slit ring. Thanks to the integrally bonded connection between the spring insert 11 and the spring coil 10', the spring insert 11 has a pitch which corresponds to the pitch of the spring coil 10'. During operation of the spring 10, the spring insert 11 can move along with the spring coil 10', and a rolling movement can occur between the spring insert 11 and the spring plate 15 (for this, see Figure 1), whereas no relative movement occurs between the spring coil 10' and the spring insert 11.

The cross section of the spring insert 11 has a basic cross section 14 which is configured to be unchanged and constant over the ring-shaped circumference of the spring insert 11. The rectangular basic cross section 14 is further developed by an encircling depression 13, in which the spring coil 10' is glued. The depression 13 is shown as a depression with a semicircular cross section, so that the spring coil 10' is approximately halfway received in the depression 13 of the spring insert 11.

Figure 3 shows in a perspective view the spring insert 11, which extends by an angle of around 300° about a centre axis of the spring 10, not otherwise shown. The spring insert 11 has a basic cross section 14, having at its upper end pointing in the direction of the spring 10 an encircling depression 13. At the opposite end, pointing downward, the spring insert 11 has a base surface 21 which is approximately planar in configuration and serves as a bracing surface against the bearing surface 16 of the spring plate 15, see Figure 1 for this.

In the encircling depression 13 there is introduced for example an adhesive 12, in the form of an adhesive 12 which hardens at room temperature. If the spring insert 11 with the introduced adhesive 12 is brought into contact with the spring coil 10' of the spring 10, the integrally bonded connection can be produced between the spring 10 and the spring insert 11 according to the present invention.

Figure 4 shows another representation of the spring insert 11 with the basic cross section 14, with the encircling depression 13 introduced at the top end and with the base surface 21 present at the lower end. The surface of the spring insert 11 in the encircling depression 13 may form an activation region 22, which is indicated by several arrows.

The invention is not confined in its embodiment by the above indicated preferred sample embodiments. Instead, a number of variants are conceivable, which make use of the represented solution, albeit with fundamentally different configurations. All of the features and/or benefits emerging from the claims, the specification, or the drawings, including design details, spatial arrangements, and method steps, may be essential to the invention either in themselves or in the most diverse combinations.

List of reference numbers

1	Bearing arrangement
10	Spring
10'	Spring coil
11	Spring insert
12	Adhesive
13	Encircling depression
14	Basic cross section
15	Spring plate
16	Bearing surface
17	Shock absorber
18	Spring plate
19	Elastic element
20	Upper mounting arrangement
21	Base surface
22	Activation region

Ágyazó elrendezés egy jármű-futómű rugójához

Szabadalmi igénypontok

1. Ágyazó elrendezés (1) egy jármű-futómű rugójához (10), amely ágyazó elrendezés legalább egy rugóbetéttel (11) rendelkezik, amelyben a rugó (10) egy tekercsmenetének (10') legalább egy része van befogadva, ahol az ágyazó elrendezés (1) egy jármű-futómű rugóstagjának a részét képezi, amelyben a rugó (10) nyomó csavarrugóként van kialakítva és amelyen keresztül egy lengéscsillapító (17) van keresztülvezetve, emellett a rugóbetét (11) egy elasztomert tartalmaz és hajlékonyan van kiképezve, ahol a rugóbetét (11) egy a rugó-tekercsmenetben (10') jelentkező mozgással együtt mozgathatóan van kialakítva, és ahol a rugó (10) és a rugóbetét (11) közé egy ragasztóanyag (12) van bejuttatva, így a rugóbetét (11) összeköttetése a rugóval (10) egy ragasztott kötéssel rendelkezik,

azzal jellemezve,

hogy a ragasztóanyag (12) egy szobahőmérsékleten kikeményíthető a ragasztóanyagként (12) van kialakítva, és hogy a rugó (10) a rugórendszerben nyomó előfeszültséggel rendelkezik, ahol a ragasztóanyag (12) nyomó előfeszültség hatására keményíthető ki.

2. Az 1. igénypont szerinti ágyazó elrendezés (1), ***azzal jellemezve***, hogy a rugó (10) egy első, előnyösen egy járműtengely felé néző alsó véggel és egy második, előnyösen egy rugófedél felé néző felső véggel rendelkezik, ahol egy rugóbetét (11) elrendezése legalább a rugó (10) első és/vagy a második végén van előirányozva.

3. Az 1. vagy 2. igénypont szerinti ágyazó elrendezés (1), ***azzal jellemezve***, hogy a rugóbetét (11) gyűrűszerűen van kialakítva és egy legalább 180°-os, előnyösen legalább 270°-os, és különösen 360°-os szögre terjed ki.

4. Az 1-3. igénypontok bármelyike szerinti ágyazó elrendezés (1), ***azzal jellemezve***, hogy a rugóbetét (11) egy előnyösen megközelítőleg négyszögletes alapkeresztmetszettel (14) rendelkezik, amely főként a gyűrű alakú kerület mentén azonosan van kialakítva.

5. A 4. igénypont szerinti ágyazó elrendezés (1), ***azzal jellemezve***, hogy alapkeresztmetszet (14) egy körbefutó bemélyedéssel (13) rendelkezik, amelybe a rugó-tekercsmenet (10') beragasztható, ahol a bemélyedés (13) főként egy félkör alakú keresztmetszettel rendelkezik.

6. Az előző igénypontok bármelyike szerinti ágyazó elrendezés (1), ***azzal jellemezve***, hogy legalább egy rugótányér (15) van beépítve és ebben előnyösen a rugó (10) első vége van befogadva, ahol a rugóbetét (11) főként a végoldali rugó-tekercsmenet (10') és a rugótányér (15) felfekvő felülete (16) között van elrendezve.

7. Eljárás egy az 1-6. igénypontok bármelyike szerinti ágyazó elrendezés (1) kialakítására egy jármű-futómű rugójához (10), amely ágyazó elrendezés legalább egy rugóbetéttel (11) rendelkezik, amelyben a rugó (10) rugó-tekercsmenetének (10') legalább egy része van befogadva, ahol a rugóbetét (11) egy elasztomert tartalmaz és hajlékonyan van kiképezve, így a rugóbetét (11) egy a rugó-tekercsmenetben (10') jelentkező mozgással együtt mozgathatóan van kialakítva és ahol az eljárás legalább az alább következő lépéseket tartalmazza:

- egy ragasztóanyagot (12) rendezünk el a rugó (10) és a rugóbetét (11) között,
- a rugóbetétet (11) a rugóhoz (10) illesztjük,
- rugóelőfeszítést viszünk be a rugóba (10) és
- a rugóelőfeszítés hatása alatt kikeményítjük a ragasztóanyagot (12).

8. A 7. igénypont szerinti eljárás, ***azzal jellemezve***, hogy a ragasztóanyag (12) rugóbetéten (11) való elrendezése előtt aktiváljuk a rugóbetétnek (11) a ragasztóanyaggal (12) érintkezésbe hozandó felületét.

9. A 7. vagy 8. igénypont szerinti eljárás, ***azzal jellemezve***, hogy ágyazó elrendezés (1) rugóját (10) nyomó csavarrugóként alakítjuk ki és a jármű-futómű rugóstagjának kialakításához nyomó előfeszültséggel ágyazó elrendezés axiálisan előfeszítjük, ahol a ragasztóanyagot (12) a nyomó előfeszültség hatása alatt kikeményítjük.

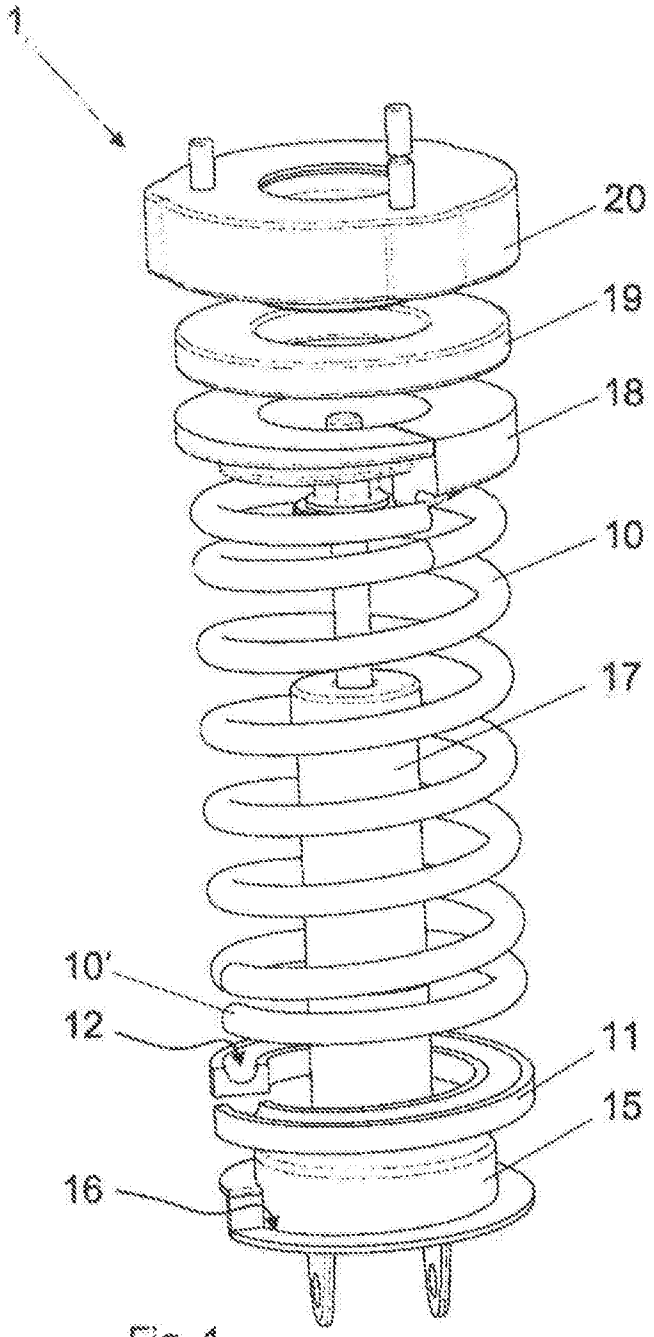

Fig. 1

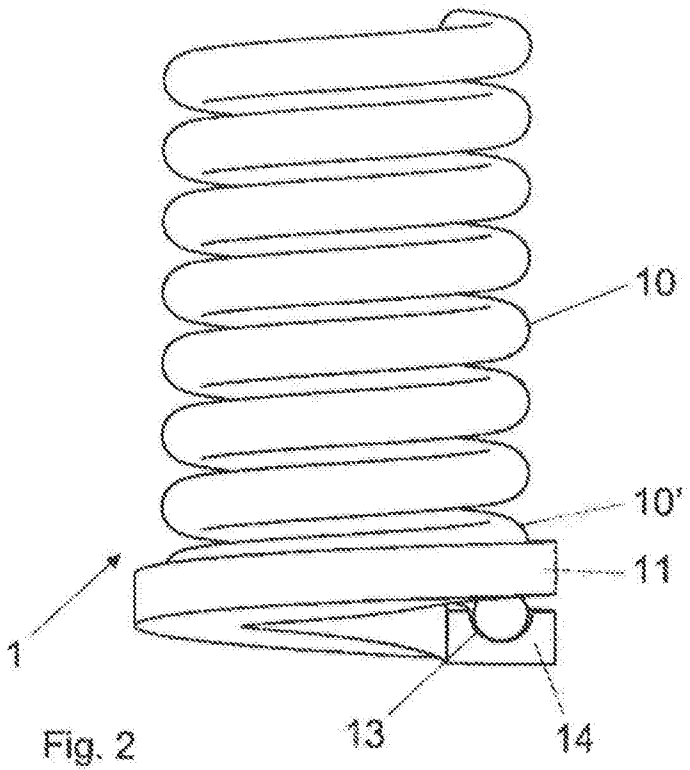

Fig. 2

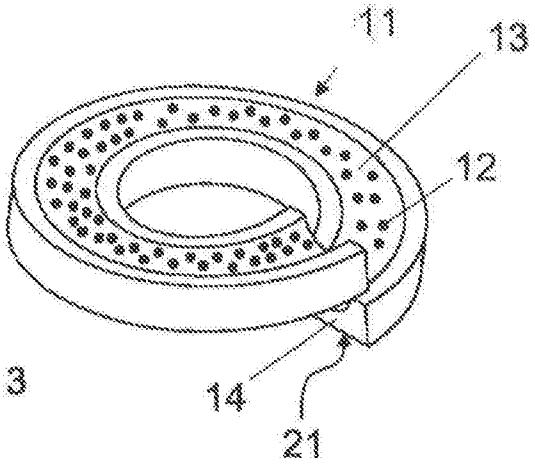

Fig. 3

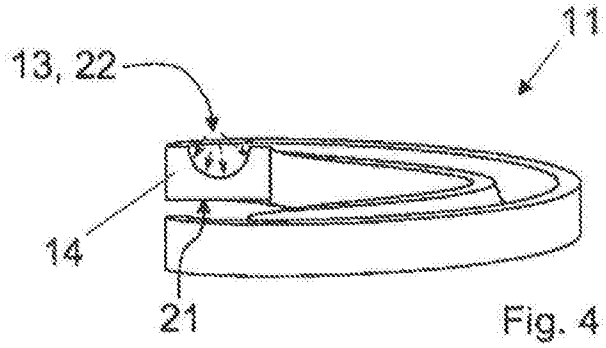

Fig. 4