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(54) **Wearing element for a hinge and hinge provided with one or more wearing elements**

(57) The present invention relates to a wearing element for a hinge comprising a one-part body (1) with at least one wearing surface (3 a), in which a passage (4) for a hinge pin is provided, comprising a portion (2) made of plastic and a portion (3) made of metal, preferably a metal outer ring and a plastic inner ring, in which the

passage (4) is only provided in the plastic portion (2), and in which the metal portion (3) forms at least a part of the wearing surface. This makes a smaller tolerance with respect to the associated hinge pin possible, whereas the wearing elements can easily be fitted and replaced and are also sufficiently resistant to wear.

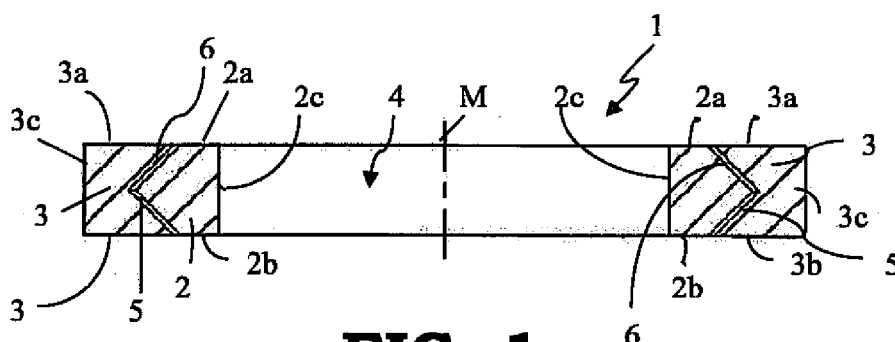


FIG. 1a

Description

[0001] The present invention relates to a wearing element for a hinge comprising a body which comprises at least one wearing surface and in which a passage for a hinge pin is provided. The present invention furthermore also relates to a hinge comprising two hinge parts and a hinge pin for holding both hinge parts together so as to be able to rotate with respect to one another.

[0002] A hinge consists of two hinge parts which are connected to each other so as to be rotatable with respect to one another about a common axis and are designed to be attached to a respective component of a structure. Thus, the one hinge part is for example connected to the fixed frame of a door or window, while the other hinge part is connected to the hinged part of the door or the window.

[0003] Generally, both hinge parts are connected to each other by means of a pin which is either separate from both hinge parts or forms part of one of both hinge parts. In a known type of hinge, each hinge part comprises one or more tubular elements. The passages of the tubular elements of both hinge parts are placed in line with one another and a common pin which passes through said passages keeps both hinge parts together so that they can rotate with respect to one another about said pin.

[0004] With other types of hinges, known as lift-off hinges, the one hinge part comprises a bush which is closed on one side and has a cylindrical hole which is accessible from the top while the other hinge part comprises a pin which fits into this hole. The pin of the latter hinge part is introduced into the hole of the former hinge part. Due to the fact that the pin is rotatable about its longitudinal axis in the hole, the hinge parts are rotatable with respect to each other. This type of hinge has the advantage that both structural parts can easily be detached from one another. Thus, it is for example possible for the structural part which is connected to the hinge part comprising the hole to be readily detachable from the other structural part by lifting the former structural part until the pin is removed from the hole. Thus, in practice, the hinge part comprising the cylindrical hole is attached to a door or window and the hinge part comprising the pin is attached to the fixed frame.

[0005] If these hinge parts are joined directly, the surfaces of the respective hinge parts extending in the vicinity of the pin come into direct contact with each other, as a result of which these contact surfaces slide over one another when the hinge parts rotate with respect to one another. It is known to fit a wearing ring on the pin in order to prevent wear of these contact surfaces. In this case, the hinge pin extends through the central opening of the wearing ring and at the joined hinge parts, the wearing ring is situated between said contact surfaces. As a result thereof, the moving hinge parts will slide over a surface of the wearing ring. In other words, this surface acts as a wearing surface.

[0006] Due to its position between the hinge parts, the height of the wearing ring also determines the mutual position of the hinge parts. Thus, it is for example possible to adjust the height above the ground at which a door is situated by using wearing rings of a larger or smaller thickness.

[0007] The known wearing rings are flat annular elements which are made of metal and have a small height and a flat top side and bottom side. A hard material is usually chosen so that the wearing rings do not suffer from wear quickly. As a result thereof, both the hinge action and the position of the hinge parts with respect to one another remain satisfactory for a long period of time. These wearing rings comprise a central passage which has a diameter which is such that there is sufficient tolerance between the passage and the hinge pin. This is necessary so that the wearing rings can be fitted on the pin quickly and easily and can also readily be removed again.

[0008] However, these known wearing rings have the drawback that they get lost easily and therefore have to be replaced frequently. Often, inter alia during fitting or removal of a hinged structural part, a wearing ring will unintentionally come off the pin and become lost during the operations.

[0009] GB 2 287 063 discloses a two-part hinge component consisting of a plastic bush and a metal wearing element which can be placed on the bush so that only its top side is covered by a metal wearing surface. Both the plastic bush and the metal wearing element are provided with a passage for the hinge pin.

[0010] GB 2415013 describes a multipart heat-resistant hinge element consisting of a plastic portion and a metal portion which are placed on top of one another and each comprise a passage for the hinge pin, and on which, in addition, a metal cap can be fitted in order to prevent the door which is supported by the hinge from sinking when the plastic portion deforms. The metal cap is also provided with a passage for the hinge pin.

[0011] These known hinge elements have the drawback that they are not made in a single piece and therefore they are therefore not particularly user-friendly. In addition, they also have the drawback that at least some components thereof can easily be lost after they have been fitted on the hinge pin.

[0012] It is an object of the present invention to overcome these drawbacks by providing a one-part wearing element which cannot be lost so easily as the existing wearing rings, but, on the one hand, ensures satisfactory operation of the hinge with a high resistance to wear and, on the other hand, can be fitted very easily on the hinge pin and can also readily be removed from the latter again. An additional object of the present invention is to provide a hinge with one or more wearing elements which come off the hinge pin less readily than is the case with existing hinges, but are still easily replaceable.

[0013] The above objects are achieved by providing a wearing element for a hinge comprising a body which

comprises at least one wearing surface and in which a passage for a hinge pin is provided, wherein, according to the present invention, the body comprises a portion made of plastic and a portion made of metal, in which said portions together form a single unit, in which said passage is only provided in the plastic portion, and in which at least a part of the wearing surface is formed by a surface of the metal portion.

[0014] In the present patent application and in particular in the above paragraph and in Claim 1, the term 'metal' is obviously intended to mean any alloy, combination or composition of metals and of one or more metals and non-metals. The term 'plastic' also refers to composites or combinations and compositions of plastics or of plastics and non-plastics.

[0015] Due to the fact that the passage of the wearing element according to the present invention is only provided in a portion made of plastic, this passage can be designed to have a smaller tolerance with respect to the diameter of the hinge pin. With the known one-part metal wearing rings on the other hand, this tolerance has to be significantly greater so that they can readily be fitted on the hinge pin and can also readily be removed from it again. The known multipart hinge elements comprising plastic components do not form a single unit and, in addition, also contain in each case one or more metal components which are provided with a passage for the hinge pin. In this case as well, the passage has to have a sufficiently large tolerance, as a result of which that these hinge elements or components thereof can also be lost easily.

[0016] Due to the fact that plastic has a greater elastic deformability than the metal of the known wearing rings, the wearing ring can readily be fitted on the hinge pin and also be removed from it again at a very small tolerance. In addition, the smaller tolerance ensures that the wearing elements unintentionally come off the hinge pin less easily and are lost. In addition, due to the fact that it consists at least partly of metal, the wearing surface of the wearing element offers an excellent resistance to wear.

[0017] If a plastic is chosen which is sufficiently deformable, even a wearing element whose passage has a diameter which is slightly smaller than the diameter of the hinge pin can still be fitted on and removed from the hinge pin relatively easily. In this case, the wearing element can be fitted on the hinge pin in a clamping manner, as a result of which there is virtually no risk of the wearing element being lost.

[0018] With the wearing rings according to the present invention, the metal portion preferably essentially surrounds the plastic portion. In this case, the plastic portion is preferably essentially laterally surrounded by the metal portion. In other words, the plastic portion forms a central portion and is situated inside the portion made of metal. However, this does not mean that the plastic portion necessarily has to be completely surrounded by the metal portion. The plastic portion may comprise a limited portion which protrudes above or below the metal portion

and, for example, forms a collar which overlaps the metal portion on the top side or the bottom side.

[0019] In a preferred embodiment of this wearing element, the metal part is an edge portion extending along the periphery of the body, while the plastic portion is surrounded by said edge portion. In this case, the term 'surrounded' does not refer solely to the annular shape which this edge portion may have. The edge portion may have any desired shape.

[0020] The appearance of the metal portion of the wearing element is more aesthetic than that of the plastic portion. Usually when the wearing element is fitted on a hinge pin and is situated between both hinge parts, only the metal edge portion of the wearing element is readily visible and the plastic portion is hidden from view.

[0021] In a more preferred embodiment, the plastic portion is countersunk on at least one side of the body with respect to the surface of the metal portion. As a result thereof, the plastic portion is completely invisible from the side of the wearing element.

[0022] In another particular embodiment, the metal portion comprises an opening in which the plastic portion is accommodated and the wall of the opening on one side and the flank of the plastic portion accommodated in the opening on the other side are provided with cooperating retaining means to retain the plastic portion in the opening in the direction of the axis. As a result thereof, both portions are securely connected to one another to form a single unit. The parts can be connected to one another in such a manner that they cannot be detached without breaking and that, inter alia, the plastic portion cannot be pushed out of the metal portion by hand.

[0023] In a particularly preferred embodiment, the advantage indicated in the previous paragraph is achieved by the fact that the metal portion comprises an opening in which the plastic portion is accommodated, while the transverse dimension of the opening varies in the direction of the axis of the opening, so that the plastic portion is retained in the opening in the direction of the axis.

[0024] When producing these wearing elements, it is possible, for example, to first produce the plastic portion and the metal portion separately and to then press the plastic portion into the opening of the metal portion. Another production method consists of forming the plastic portion in the opening of the metal portion by means of an injection-moulding process.

[0025] In a most preferred embodiment, the body is annular and the plastic portion and the metal portion are designed as an inner ring and an outer ring, respectively, which are connected to one another in an adjoining manner so as to form a single unit.

[0026] The metal portion is preferably made of stainless steel (inox). This material offers a good resistance against wear and is also very suitable from an aesthetic point of view.

[0027] The plastic portion may, for example, be made of an elastically deformable plastic. Polyoxymethylene (POM) is also a plastic which is very suitable for this pur-

pose, in particular due to its self-lubricating properties. It is obvious that the elastic deformability and the resistance to wear of the plastic are also important properties.

[0028] The above object is obviously also achieved by providing a hinge comprising two hinge parts and a hinge pin for holding both hinge parts together so as to be able to rotate with respect to one another, in which the hinge comprises one or more wearing elements according to the present invention.

[0029] Moreover, such a hinge is very advantageous if the passage of each wearing element has a smallest inner transverse dimension which is smaller than or equal to the largest outer transverse dimension of the hinge pin. With such a hinge, the risk of loss of the clamping elements is virtually nonexistent. This is all the more true if the passage has a smallest inner transverse dimension which is smaller than the largest outer transverse dimension of the hinge pin, since the wearing element can in that case be fitted on the hinge pin in a clamping manner. In the case of a cylindrical passage and a cylindrical hinge pin, the terms inner transverse dimension and outer transverse dimension in this paragraph can be replaced by inner diameter and outer diameter, respectively.

[0030] The invention will now be explained in more detail by means of the following more detailed description of three possible embodiments of a wearing element according to the present invention. The described embodiments are only examples and can therefore by no means be seen as a limitation of the scope of protection or of the area of application of the invention.

[0031] Reference numerals are used in this detailed description to refer to the attached figures, in which:

Fig. 1a shows a vertical cross section along the axis AA (see Fig. 1c) of a first embodiment of a wearing element according to the present invention, and Figs. 1b and 1c show a side view and a plan view, respectively, of this wearing element;

Figs. 2a to 2g relate to a second embodiment of a wearing element according to the present invention, in which

- Figs. 2a and 2b show a vertical cross section along the axis AA (in Fig. 2b) and a plan view of the inner ring of this wearing ring, respectively,
- Figs. 2c and 2d show a vertical cross section along the axis BB (in Fig. 2d) and a plan view of the outer ring of this wearing ring, respectively,
- Figs. 2e and 2f show a vertical cross section along the axis CC (in Fig. 2f) and a plan view of the entire wearing ring, respectively, and
- Fig. 2g shows the entire wearing ring in perspective; and

Figs. 3a to 3g relate to a second embodiment of a wearing element according to the present invention, in which

- Figs. 3a and 3b show a vertical cross section along the axis AA (in Fig. 3b) and a plan view of the inner ring of this wearing ring, respectively,
- Figs. 3c and 3d show a vertical cross section along the axis BB (in Fig. 3d) and a plan view of the outer ring of this wearing ring, respectively,
- Figs. 3e and 3f show a vertical cross section along the axis CC (in Fig. 3f) and a plan view of the entire wearing ring, respectively, and
- Fig. 3g shows the entire wearing ring in perspective.

[0032] The wearing element illustrated in Figs. 1a to 1c comprises a flat cylindrical body (1) in which a central cylindrical passage (4) is provided. The cylindrical outer side (3c) of the ring and the cylindrical wall (2c) of the passage (4) have the same vertical axis (M). The flat top side (2a,3a) and the flat bottom side (2b,3b) of the ring extend in two parallel planes.

[0033] The body (1) consists of an outer ring (3) made of stainless steel and an inner ring (2) made of polyoxymethylene (POM). For the sake of clarity, the inner ring (2) and the outer ring (3) have been shown in the figures with a small intermediate space in between. However, in reality, these rings closely adjoin one another.

[0034] The outer ring (3) has a flat top side (3a), a flat bottom side (3b) which runs parallel thereto and a cylindrical flank (3c) which forms the outer side of the annular body (1). The opening of the outer ring (3) is concentric with the flank (3c) thereof. The wall of the opening has a V-shaped incision (5) which follows the periphery of the opening, so that the diameter of the opening varies in the vertical direction (the direction of the axis M). At the location of the top surface (3a) and the bottom surface (3b), the diameter of the opening is smallest. From these surfaces (3a), (3b), the diameter gradually increases up to approximately half the height of the outer ring (3), where this diameter is greatest.

[0035] The inner ring (2) has a flat top side (2a), a flat bottom side (2b) which runs parallel thereto and a flank having a V-shaped projecting profile (6) which is complementary to the V-shaped incision (5) in the wall of the opening of the outer ring (3). The V-shaped profile (6) is situated in the incision (5) in such a manner that the walls thereof adjoin one another. The opening of the inner ring (2) has a cylindrical wall (2c) which delimits the central passage (4) of the annular body (1).

[0036] The rings (2), (3) adjoin one another in such a manner that their top surfaces (2a),(3a) and bottom surfaces (2b), (3b) together form the continuous top surface and bottom surface of the single unit.

[0037] Due to the fact that the V-shaped projecting profile (6) is situated in the complementary V-shaped incision (5), the inner ring (2) is retained with respect to the outer ring (3). More particularly, the inner ring cannot be displaced in the direction of the axis (M) and can therefore not be removed without breaking it.

[0038] The top surface (3a) and the bottom surface

(3b) of the stainless-steel outer ring (3) are the surfaces which are designed to act as wearing surface. This material has a very high resistance to wear.

[0039] The inner ring (2) is pressed into the outer ring (3). However, the inner ring (2) can also be formed in the opening of the outer ring (3) by injection-moulding. In both cases, the inner ring and the outer ring form a single unit, the parts of which cannot be separated from one another without breaking.

[0040] Due to the fact that the passage (4) is provided in the inner ring (2) made of plastic (POM), the diameter of this passage (4) can be much smaller than with the known wearing rings compared to the diameter of the associated hinge pin. This diameter may, for example, be defined in such a manner that the wearing ring is fitted on the hinge pin without any tolerance. In other words, the diameter of the passage (4) is then equal to the diameter of the hinge pin. The passage (4) may even have a smaller diameter than the diameter of the hinge pin, so that some force has to be exerted in order to compress the walls of the passage (4) and fit the wearing ring on the pin or the lift-off hinge. As a result thereof, the wearing ring will be fitted on the hinge in a clamping manner and remain securely fixed, but can still be readily detached, so that it can easily be replaced. In addition, the plastic used, POM (polyoxymethylene), has the advantage that no lubrication is required.

[0041] In this example, the wearing ring is made from a combination of stainless steel and POM. It is obvious that numerous other combinations of metal and plastic are possible. Thus, non-ferrous metals, such as aluminium and zamak are certainly eligible as material for the outer ring.

[0042] In the embodiment which is illustrated in the figures, an inner ring (2) having the same height as the outer ring (3) is provided so that the top surfaces (2a), (3a) are in the same plane and the bottom surfaces (2b), (3b) are in another plane which runs parallel to the former plane.

[0043] By designing the inner ring (2) as having a smaller height than the height of the outer ring (3), a wearing ring can be produced whose visible plastic surfaces (2a), (2b) on each side are countersunk (recessed) with respect to the adjacent metal surface (3a), (3b) on that side. Obviously, the wearing ring can also be designed such that the plastic surface of the inner ring (2) is only countersunk on one of the two sides with respect to the metal surface on that side, while these surfaces on the other side are situated in the same plane.

[0044] As a result thereof, the plastic surfaces (2a), (2b) are invisible from the side of the wearing ring, and only the metal surfaces (3a), (3b), (3c) of the outer ring (3) can be seen.

[0045] This wearing ring may, for example, be designed as follows:

- an outer ring made of stainless steel 'INOX 314' having an outer diameter of 12 mm, an inner diameter

of 9.5 mm and a height of 2 mm; and

- a POM inner ring which is pressed into this outer ring and has an outer diameter of 9.5 mm, an inner diameter of 7 mm and a height of 2 mm;

in which all sharp edges are bevelled.

[0046] The wearing element illustrated in Figs. 2a to 2g also comprises a flat cylindrical body (1) in which a central cylindrical passage (4) is provided. The body (1) also consists, for example, of an outer ring (3) made of stainless steel and an inner ring (2) made of polyoxymethylene (POM).

[0047] This wearing ring differs from the wearing ring which is illustrated in Figs. 1a to 1c in that the central opening of the outer ring (3) is delimited by a cylindrical wall (5) which is concentric with the cylindrical outer flank (3c) thereof, and in that the inner ring (2) has a cylindrical outer flank (6). In contrast with the embodiment according to Figs. 1a to 1c, here, these adjacent walls (5), (6) are therefore designed without a V-shaped incision and without a V-shaped projecting profile, respectively.

[0048] The inner ring (2) and the outer ring (3) have the same height and abut one another so that their top surfaces (2a), (3a) and bottom surfaces (2b), (3b) together form the continuous top surface and bottom surface of the single unit. However, an embodiment in which the inner ring has a lower height than the outer ring is also possible. In this case, the inner ring (2) may be countersunk on one side or on both sides with respect to the surface of the outer ring (3). As a result thereof, the plastic surface (2a), (2b) is completely invisible on one or both sides from the side of the wearing ring, and only the more aesthetic metal surfaces (3a), (3b), (3c) of the outer ring (3) can be seen.

[0049] The outer diameter of the inner ring (2) corresponds to the diameter of the central opening of the outer ring (3) in such a manner that the inner ring (2) is clamped in the opening of the outer ring (3). Either the inner ring (2) and the outer ring (3) are formed separated, following which the inner ring (2) is pressed into the central opening of the outer ring (3), or the inner ring (2) is formed in the opening by means of an injection-moulding process. As a result thereof, both rings (2), (3) form a single unit. Consequently, the inner ring (2) cannot be removed from the opening of the outer ring (3) by means of a force which is exerted in the direction of the axis (M) without breaking.

[0050] The top surface (3a) and the bottom surface (3b) of the outer ring (3) made of stainless steel are the surfaces which are designed to act as wearing surface. This material is highly resistant to wear. In this embodiment, the diameter of the passage may also be defined such that it is much smaller than with the known wearing rings, compared to the diameter of the associated hinge pin. It is thus possible to define this diameter such that the wearing ring is fitted on the hinge pin without any tolerance or in a clamping manner.

[0051] The wearing element illustrated in Figs. 3a to

3g differs little from the wearing ring which is illustrated in Figs. 2a to 2g, due to the fact that the inner ring (2) comprises a concentric collar (7) which extends, from the level of the top side of the outer ring (3), over a limited height and the fact that the total height of the inner ring (2), i.e. including the collar (7), is greater than the height of the outer ring (3).

[0052] The collar (7) laterally projects beyond the outer flank (6) of the inner ring (2) over a distance which substantially corresponds to the width of the outer ring (3) so that the peripheral edge (7) virtually completely overlaps the top surface (3a) of the outer ring (3).

[0053] The height of the portion of the inner ring (2) which is situated under the collar (7) essentially corresponds to the height of the outer ring (3) so that this portion extends into the central opening of the outer ring (3) along the entire height.

[0054] The outer diameter of the inner ring (2) corresponds to the diameter of the central opening of the outer ring (3) in such a manner that the inner ring (2) is clamped in the opening of the outer ring (3). Either the inner ring (2) and the outer ring (3) are formed separately, following which the inner ring (2) is pressed into the central opening of the outer ring (3), or the inner ring (2) is formed in the central opening of the outer ring (3) by means of an injection-moulding process. As a result thereof, the two rings (2), (3) form a single unit. The inner ring (2) cannot be removed from the opening of the outer ring (3) by means of a force which is exerted in the direction of the axis (M) without breaking.

[0055] It is also possible to achieve the abovementioned advantages with this embodiment. Inter alia, it is also possible to define the diameter of the passage here in such a manner that the wearing ring is fitted on the hinge pin without tolerance or in a clamping manner.

Claims

1. Wearing element for a hinge comprising a body (1) which comprises at least one wearing surface (3a) and in which a passage (4) for a hinge pin is provided, **characterized in that** the body (1) comprises a portion (2) made of plastic and a portion (3) made of metal, **in that** these portions (2), (3) together form a single unit, **in that** said passage (4) is only provided in the plastic portion (2), and **in that** at least a part of the wearing surface is formed by a surface (3a) of the metal portion (3).
2. Wearing element for a hinge according to Claim 1, **characterized in that** the metal portion (3) is an edge portion extending along the periphery of the body (1) and **in that** the plastic portion (2) is surrounded by said edge portion.
3. Wearing element for a hinge according to Claim 2, **characterized in that** the plastic portion (2) is coun-

tersunk on at least one side of the body (1) with respect to the surface of the metal portion (3).

4. Wearing element according to one of the preceding claims, **characterized in that** the metal portion (3) comprises an opening in which the plastic portion (2) is accommodated, and **in that** the wall of said opening on one side and the flank (2c) of the plastic portion accommodated in the opening on the other side are provided with cooperating retaining means (5), (6) to retain the plastic portion (2) in the opening in the direction of the axis.
5. Wearing element according to one of the preceding claims, **characterized in that** the metal portion (3) comprises an opening in which the plastic portion (2) is accommodated, and **in that** the transverse dimension of the opening varies in the direction of the axis (M) of the opening, so that the plastic portion (2) is retained in the opening in the direction of the axis (M).
6. Wearing element for a hinge according to one of the preceding claims, **characterized in that** the body (1) is annular, and **in that** the plastic portion (2) and the metal portion (3) are an inner ring and an outer ring, respectively, which are connected to one another in an adjoining manner so as to form a single unit.
7. Wearing element for a hinge according to one of the preceding claims, **characterized in that** the metal portion (3) is made of stainless steel.
8. Wearing element for a hinge according to one of the preceding claims, **characterized in that** the plastic portion (2) is made of or comprises an elastically deformable plastic.
9. Wearing element for a hinge according to one of the preceding claims, **characterized in that** the plastic portion (2) is made of polyoxymethylene.
10. Hinge comprising two hinge parts and a hinge pin for holding both hinge parts together so as to be able to rotate with respect to one another, **characterized in that** the hinge comprises one or more wearing elements having the features of one of the preceding claims.
11. Hinge according to Claim 10, **characterized in that** the passage (4) of each wearing element has a smallest inner diameter which is smaller than or equal to the largest outer diameter of the hinge pin.

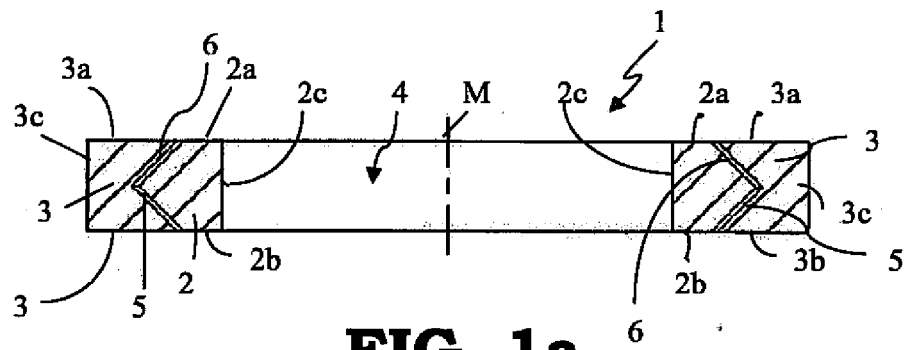


FIG. 1a

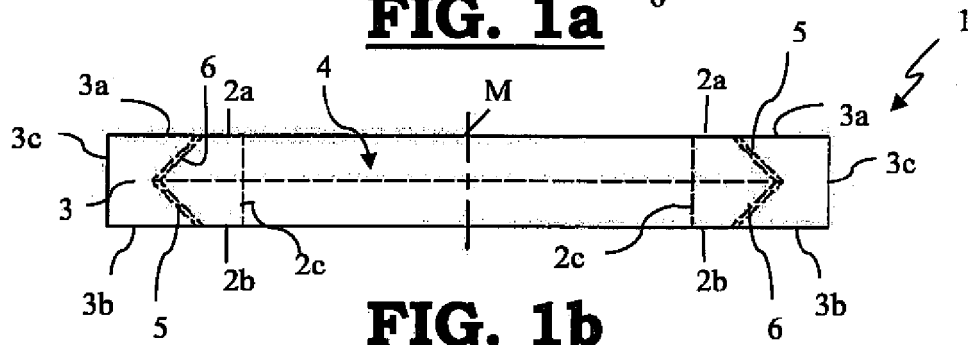


FIG. 1b

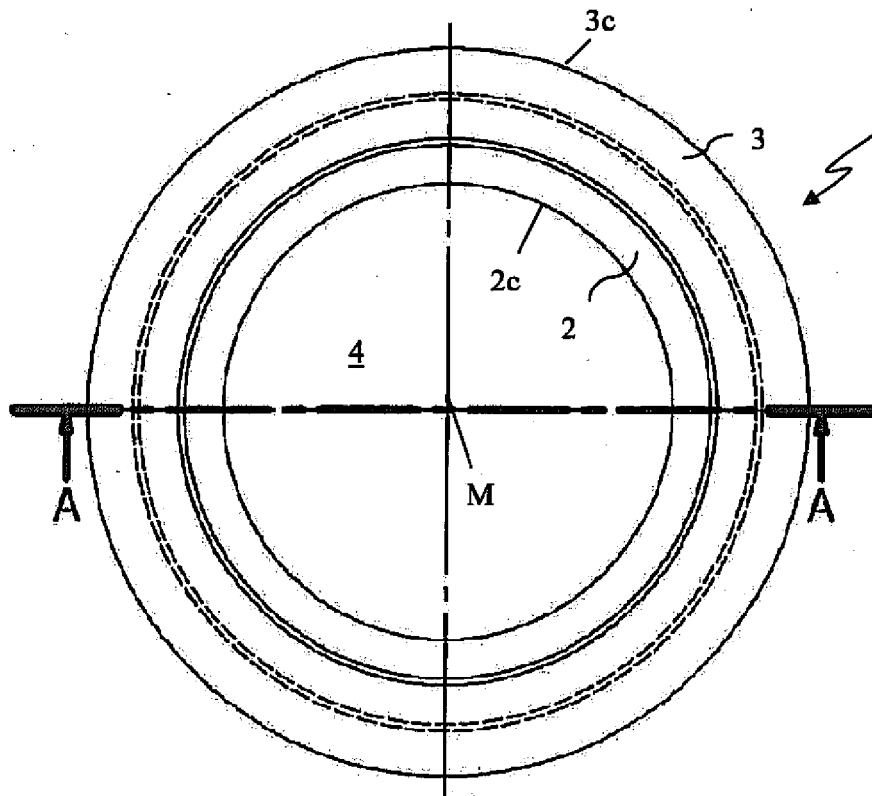


FIG. 1c

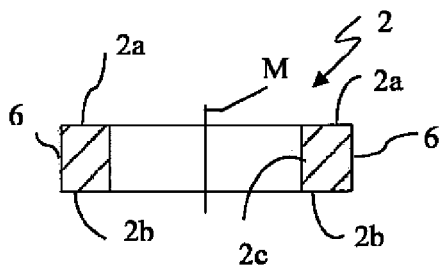


FIG. 2a

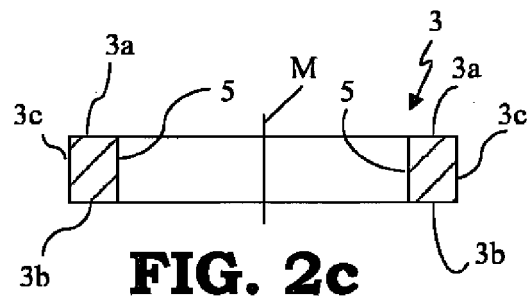


FIG. 2c

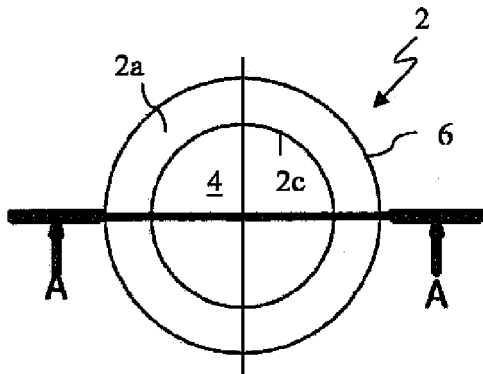


FIG. 2b

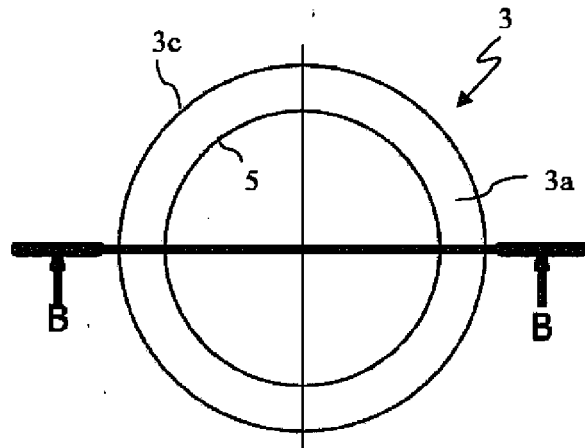


FIG. 2d

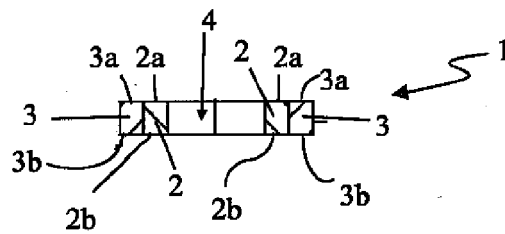


FIG. 2e

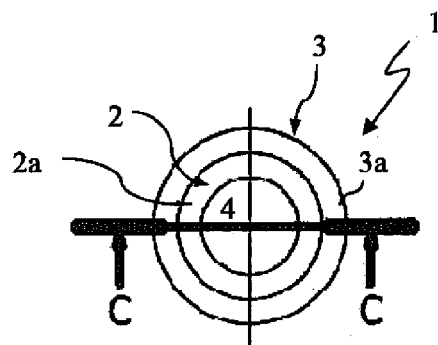


FIG. 2f

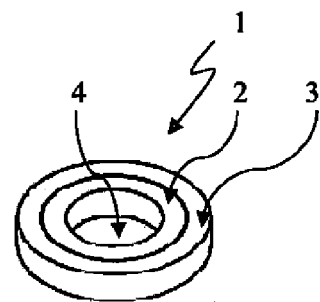


FIG. 2g

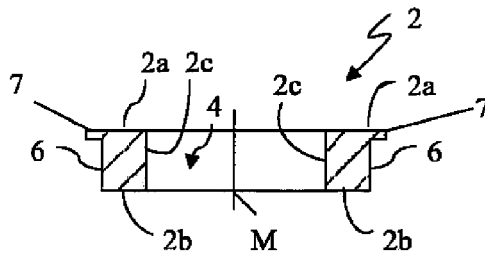


FIG. 3a

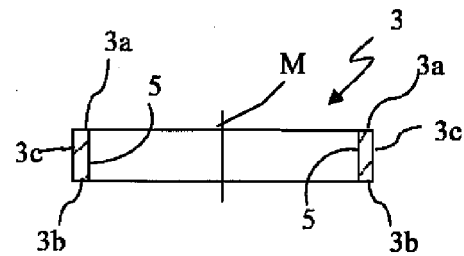


FIG. 3c

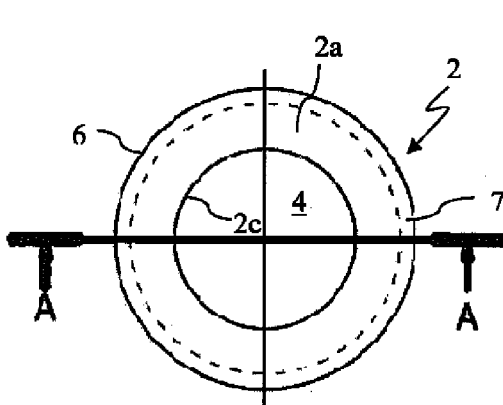


FIG. 3b

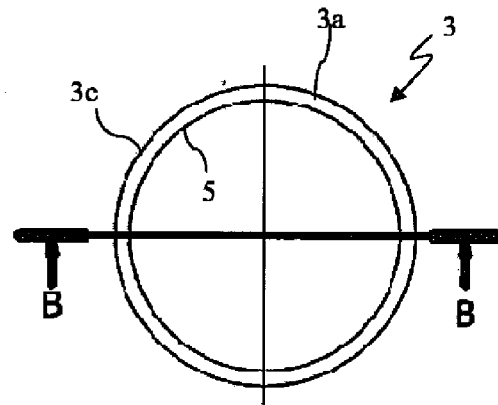


FIG. 3d

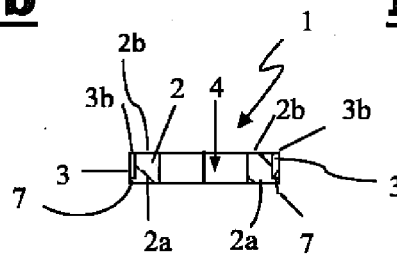


FIG. 3e

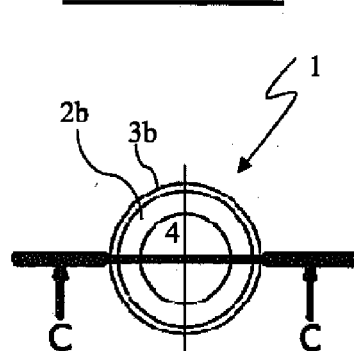


FIG. 3f

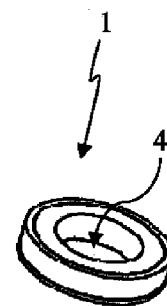


FIG. 3g



EUROPEAN SEARCH REPORT

Application Number
EP 12 16 0321

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			E05D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 July 2012	Examiner Guillaume, Geert
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