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(54) **Hinge**

(57) The invention provides an inexpensive hinge (1, 12) that has a height adjustment and a strong structure. The invention comprises a metal ball (7) and a retaining ring (8, 11) between the hinge pin (6, 13) and the height

adjustment screw (9) to create a bearing that reduces wear and tear. The retaining ring (8, 11) holds the metal ball (7) within the hinge leaf rolling (4) if the leaf parts (2, 3) are separate. However, the retaining ring allows the ball to move if the height adjustment screw is turned.

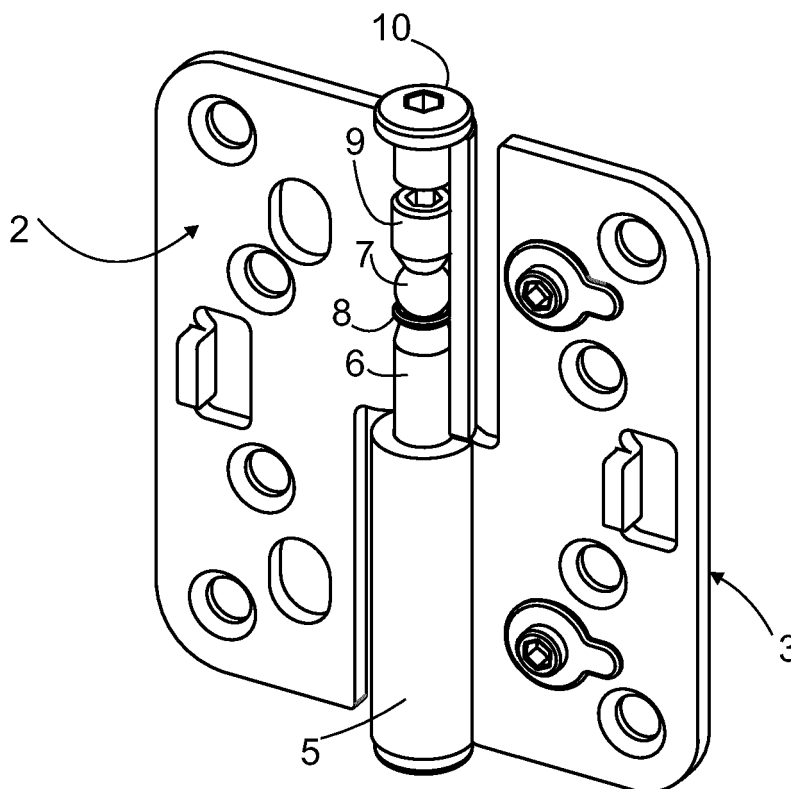


FIG. 2

Description

Field of technology

[0001] This invention relates to hinges to be installed on doors, for example. In particular, the invention relates to hinges with a height adjustment.

Prior art

[0002] Hinges are typically used for attaching a turnable part to a frame structure, such as attaching a door to a wall structure at the door opening so that the door can be turned open and closed. A hinge consists of two main parts: a frame leaf and a door leaf. The frame leaf is a part to be primarily fastened to the frame (edge element of the door opening). In addition to the actual leaf part (plate-type part), it comprises a frame leaf rolling. A pin may have been attached to the rolling. Such a frame leaf is often also called a pin leaf. The door leaf is a part to be primarily fastened on a door, and it also comprises a rolling (door leaf rolling) in addition to the actual leaf part. The protruding part of the frame leaf pin is inside the door leaf rolling. A hinge can also be implemented the other way round, meaning that the pin is fastened to the door hinge rolling and the pin protrusion is fitted into the frame leaf rolling. A pinless (door leaf or frame leaf) rolling may also have different types of solutions for improving durability. It is known from prior art to use ball bearings around the pin. However, a ball bearing solution is expensive and does not apply to hinges with a height adjustment.

[0003] Another prior art solution has been the use of a steel ball between the pin and the height adjustment screw on the pinless leaf. In this solution, the diameter of the hole in the rolling is larger at the free end of the rolling (the end that is not against the other hinge leaf) than at the end towards the hinge pin, which is also a relatively expensive solution. These solutions have been used in the past but have primarily been discontinued at present because less expensive solutions exist. A solution commonly used today is a plastic sliding bearing between the pin and the height adjustment screw. The plastic sliding bearing is a pin with flexible parts (such as plastic claws) on the outer edges. A plastic bearing is applicable to hinges with a height adjustment. However, the problem with a plastic bearing is that it is too flexible, particularly with the heaviest door weights. Also, the level of requirements for hinges has increased and plastic bearings are not considered strong enough, for example in long-term use.

Short description of invention

[0004] The objective of the invention is to create an inexpensive hinge with a height adjustment that would be sufficiently strong for current needs. The objective will be achieved as described in the independent claim. The dependent claims describe various embodiments of the

invention.

[0005] The invention uses a metal ball and a retaining ring between the pin and the height adjustment screw to create a bearing that reduces wear and tear. The retaining ring holds the metal ball within the hinge leaf rolling if the leaf parts are separate. However, the retaining ring allows the ball to move if the height adjustment screw is turned.

10 List of figures

[0006] In the following, the invention is described in more detail by reference to the figures of the enclosed drawings, where

- Figure 1 illustrates an example of a hinge according to the invention in an exploded view,
- Figure 2 illustrates an example of a hinge according to the invention with the door leaf rolling cut out,
- Figure 3 illustrates another example of a hinge according to the invention,
- Figure 4 illustrates an example of a retaining ring according to the invention,
- Figure 5 illustrates the example of Figure 4 from another angle, and
- Figure 6 illustrates another example of a retaining ring according to the invention.

30 Description of the invention

[0007] Figure 1 illustrates a hinge 1 according to the invention. The frame leaf 3 has a pin 6 attached to the frame leaf rolling 5 as known from prior art. The pin 6 forms a protrusion that is intended to be fitted into the rolling 4 in the door leaf 2. The door leaf rolling 4 comprises a height adjustment screw 9 that can be used to adjust the height position of the door or similar element at installation time. There is a metal ball 7 and a retaining ring 8 between the height adjustment screw 9 and the pin 6 to create a bearing that reduces wear and tear. In addition, there can be a covering head 10 at the ends of the hinge rollings.

[0008] Figure 2 illustrates a sectional example of the door leaf rolling with the hinge assembled. The centre hole of the retaining ring 8 is dimensioned so that the ball 7 and the end of the pin 6 are against each other. Thus the hinge bearing is able to endure heavy door weights. The end of the bearing can be bevelled and/or rounded. The height adjustment screw 9 is turnable as known from prior art. (The inside surface of the hinge rolling comprises threads at least in the area of the rolling that houses the height adjustment screw.) When the adjustment screw is turned inwards in the rolling (towards the metal ball), it also pushes the metal ball towards the pin 6. Simultaneously the retaining ring 8 also moves. Correspondingly, when the height adjustment screw 9 is turned outwards from the rolling (that is, upwards), the metal

ball 7 and the retaining ring 8 are able to move to the same direction (upwards), pushed by the pin 6. In other words, the weight of the door pushes the door leaf of the hinge towards the frame leaf and its pin.

[0009] Turning the height adjustment screw 9 imposes a force on the retaining ring 8 that moves the retaining ring to a new position. The force required to move the retaining ring is smaller than the gravitational force of the door or similar part to be attached to the hinges. Thus the retaining ring can be moved both upwards and downwards.

[0010] The retaining ring 8 is dimensioned to be against the inner surface of the rolling 4 in a way that it will stay in place even though the metal ball 7 pushes it. Thus the metal ball cannot drop out of the rolling if the leaf parts 2, 3 of the hinge are separated, for example in storage or during goods transport. In addition, the height adjustment screw 9 also stays in place in its pre-adjusted position during transport because it can be suitably tightened against the retaining ring with the help of the metal ball. This movement of the height adjustment screw (for example during transport) has been considered a disadvantage in prior art as it increases the amount of installation work and makes it more difficult.

[0011] Figure 3 illustrates another embodiment of the invention in which the retaining ring is metal and the hinge 12 is intended for so-called rebated doors/frame structures. In this hinge, the pin 13 is attached to the door leaf rolling, and the adjustment screw 9 and the bearing means 7, 11 are in the frame leaf rolling. A metal retaining ring 11 corresponds to the plastic retaining ring. In the second embodiment, the metal ball 7 and the retaining ring 11 have the same functionality as the corresponding parts in the previous example. In this hinge model, turning the height adjustment screw 9 inwards in the rolling (that is, upwards towards the pin 13) raises the height position of the door, and correspondingly, turning the screw outwards from the rolling (that is, downwards) lowers the height position of the door.

[0012] It can be noted from the previous examples that the inner diameter of the hinge rollings is the same along the entire length of the rolling. This structure is advantageous for manufacture. It can be further noted that the metal ball is between the retaining ring and the height adjustment screw.

[0013] The retaining ring in Figures 1 and 2 is made of plastic. Figures 4 and 5 illustrate the plastic retaining ring 8 in more detail. As noted above, the retaining ring (also the metal retaining ring) is dimensioned to be suitably tightly against the inner surface of the rolling so that the ball 7 stays in place but can also be moved by turning the height adjustment screw 9. (It must also be kept in mind that the gravitational force of the door actually affects the movement of the retaining ring and the metal ball when the height adjustment screw is turned to either direction, depending on the embodiment. Compare the embodiments in Figures 2 and 3.)

[0014] The hole in the centre of the plastic retaining

ring 8 allows the pin 6, 13 and the metal ball 7 to be in contact with each other. The cross-sectional profile of the retaining ring is symmetrical in relation to the radial axis A of the retaining ring. The inner edge and outer edge of the retaining ring may comprise bevelled surfaces 14, 15. Furthermore, a preferred embodiment comprises an outer perimeter section 17 that is thicker than the inner perimeter section 16 of the retaining ring in the direction of the central axis B of the retaining ring. The use of plastic material can create the desired flexibility properties for the retaining ring.

[0015] Figure 6 illustrates another embodiment of a retaining ring 11 in which the material is metal. In this embodiment, one of the cross-sectional profiles C of the perimeter of the retaining ring is round. If a sufficiently flexible/soft metal is used, a closed perimeter can be used to achieve the desired flexibility properties of the retaining ring. When a stronger metal is used, however, it is more practical that the retaining ring comprises a gap section 18 as illustrated in Figure 6. The gap section is made, for example, by cutting a small part out of a closed perimeter in order to create the desired flexibility properties.

[0016] The present invention is applicable for use in many existing hinges. Thus it is possible that the failed bearings of an installed hinge can be replaced with bearings according to the invention. It is evident from the examples presented above that an embodiment of the invention can be created using a variety of different solutions. For example, the metal ball 7 can be steel. A metal retaining ring can also be steel. It is also evident that the invention is not limited to the examples mentioned in this text but can be implemented in many other different embodiments within the scope of the claims.

Claims

1. A hinge (1) comprising a first leaf part (3) and a second leaf part (2), said first leaf part comprising a first rolling (5), said rolling being fitted with a pin (6) forming a protrusion in the axial direction of the pin, said second leaf part (2) comprising a second rolling (4) having an equal inner diameter along the entire length of the second rolling, said second rolling (4) being fitted with a height adjustment screw (9), bearing means and said protrusion formed by the pin, **characterised in that** the bearing means comprise a metal ball (7) and a retaining ring (8, 11) between the height adjustment screw (9) and the pin (6).
2. A hinge according to Claim 1, **characterised in that** the metal ball (7) is between the height adjustment screw (9) and the retaining ring (8, 11).
3. A hinge according to Claim 2, **characterised in that** the outer diameter of the retaining ring (8, 11) in relation to the inner diameter of the second rolling (4) is such that the retaining ring (8, 11) is in contact

against the inner surface of the second rolling (4) and prevents the metal ball (7) from moving in the axial direction of the rolling but simultaneously allows movement of the metal ball (7) when the height adjustment screw (9) is turned.

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4. A hinge according to Claim 3, **characterised in that** the cross-sectional profile of the perimeter of the retaining ring (8, 11) is symmetrical in relation to the radial axis of the retaining ring. 10
5. A hinge according to Claim 4, **characterised in that** the inner edge and outer edge of the retaining ring (8) comprise bevelled surfaces (15, 14). 15
6. A hinge according to Claim 5, **characterised in that** the retaining ring (8) comprises an inner perimeter (16) and an outer perimeter (17), the outer perimeter being thicker than the inner perimeter in the direction of the central axis of the retaining ring. 20
7. A hinge according to any of the Claims 4 to 6, **characterised in that** the retaining ring (8) is plastic.
8. A hinge according to Claim 4, **characterised in that** the cross-sectional profile of the perimeter of the retaining ring (11) is round. 25
9. A hinge according to Claim 7 or 8, **characterised in that** the retaining ring (11) comprises a gap section (18). 30
10. A hinge according to any of the Claims 8 to 9, **characterised in that** the retaining ring (11) is metal. 35

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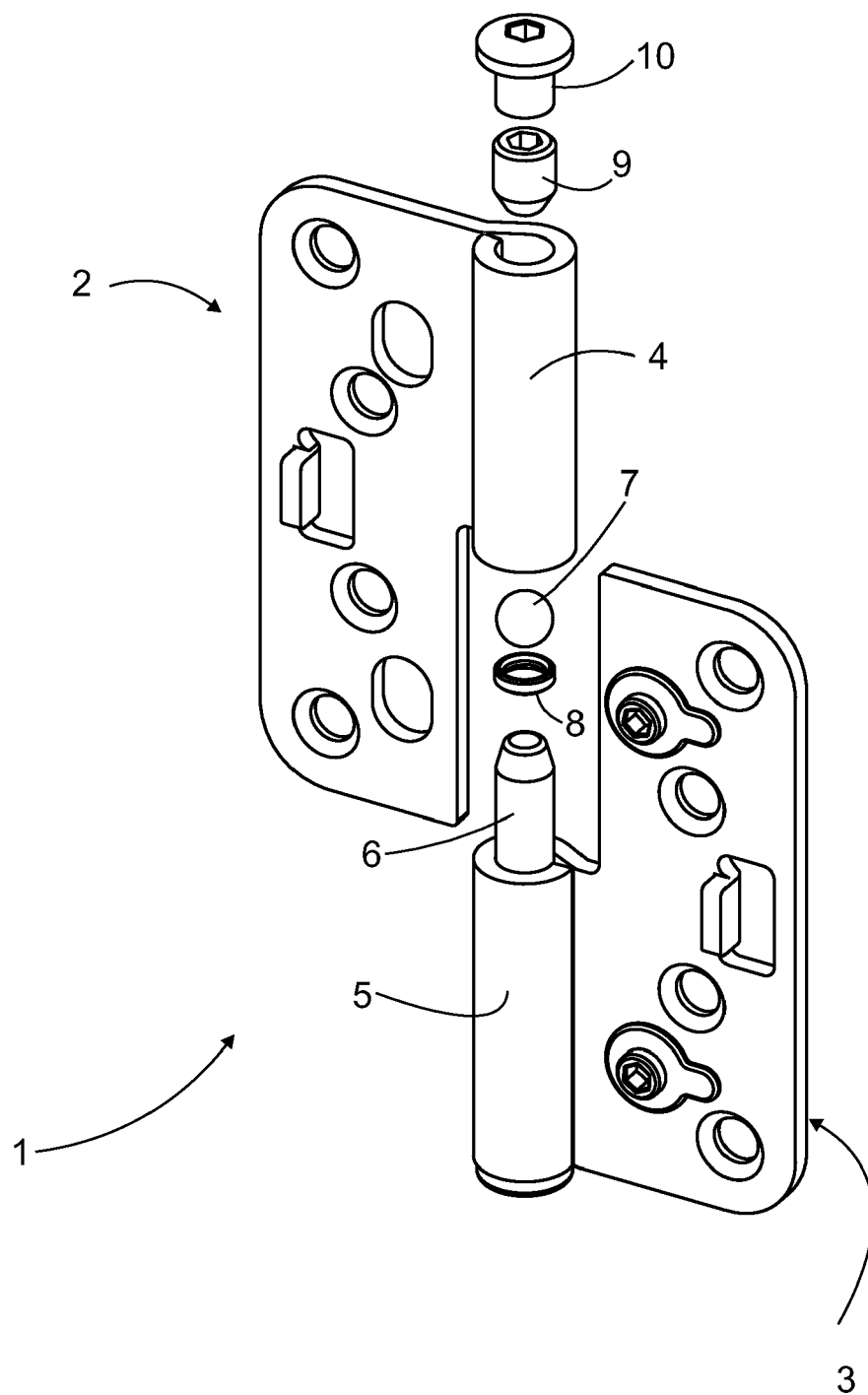


FIG. 1

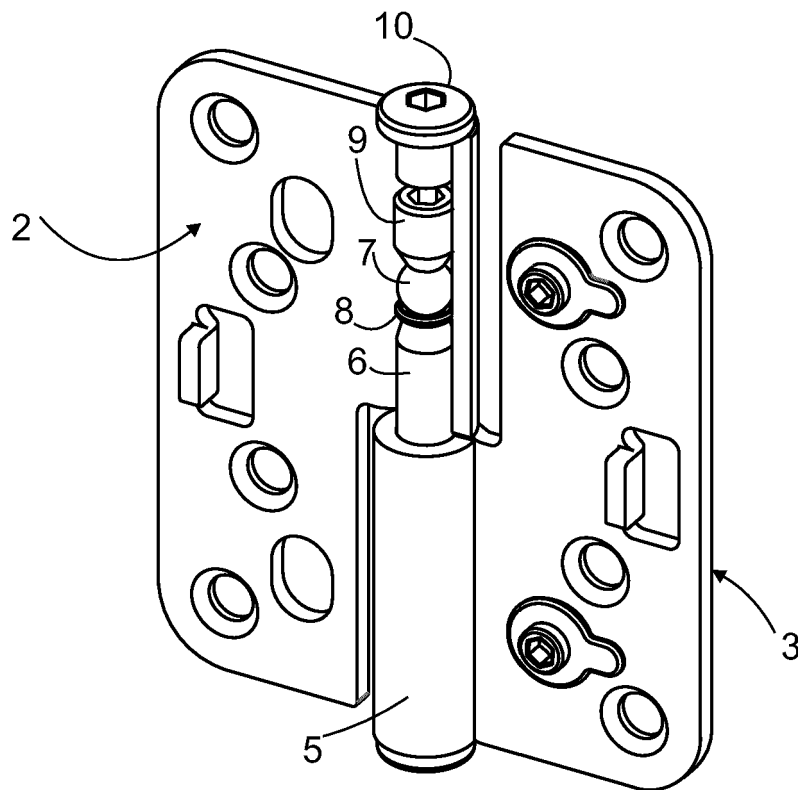


FIG. 2

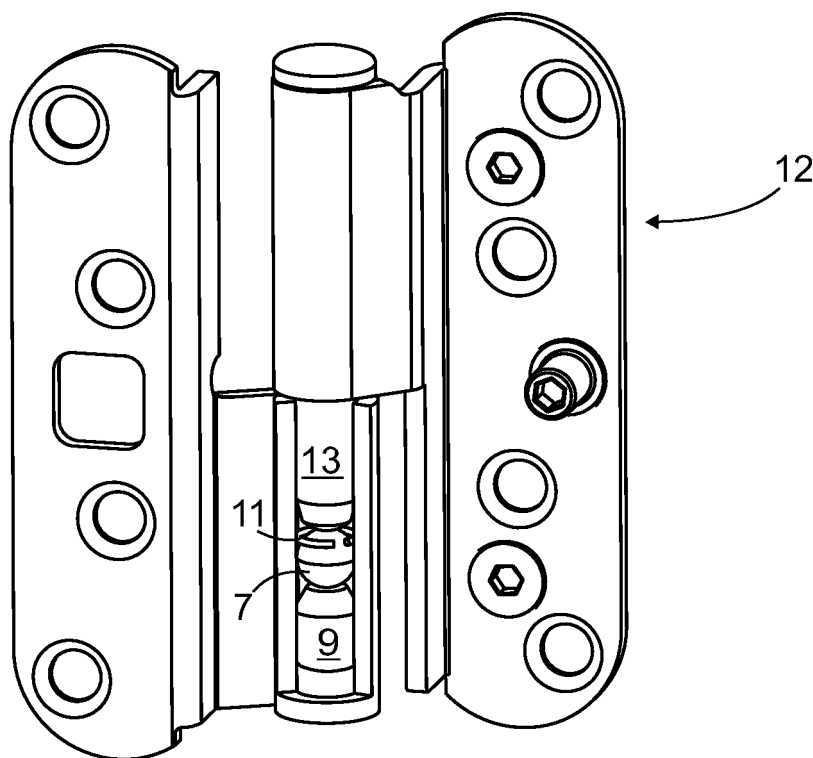


FIG. 3

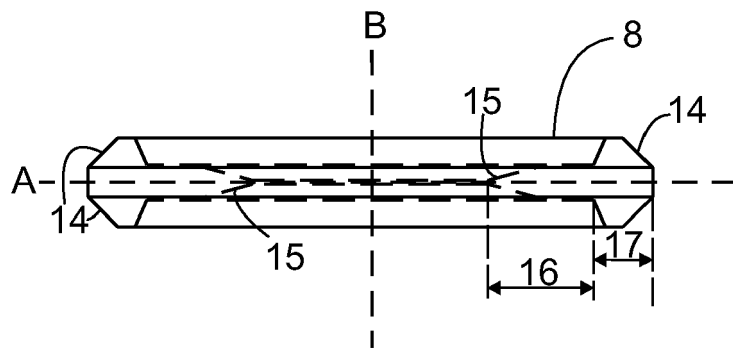


FIG. 4

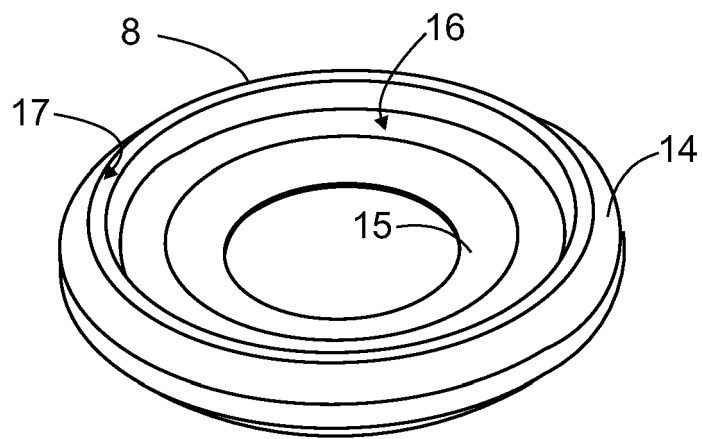


FIG. 5

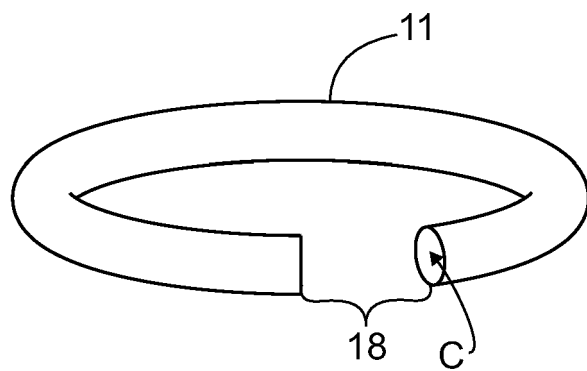


FIG. 6