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(54) **TOILET HINGE ARRANGEMENT**

(57) Toilet hinge arrangement for fastening of a toilet cover assembly, including a toilet seat and a toilet seat cover, to a toilet bowl, where by means of the toilet hinge arrangement, the toilet seat and toilet seat cover may pivot around a central axis, where said toilet hinge arrangement comprises a rotational dampener, a catch ring and an adapter ring.

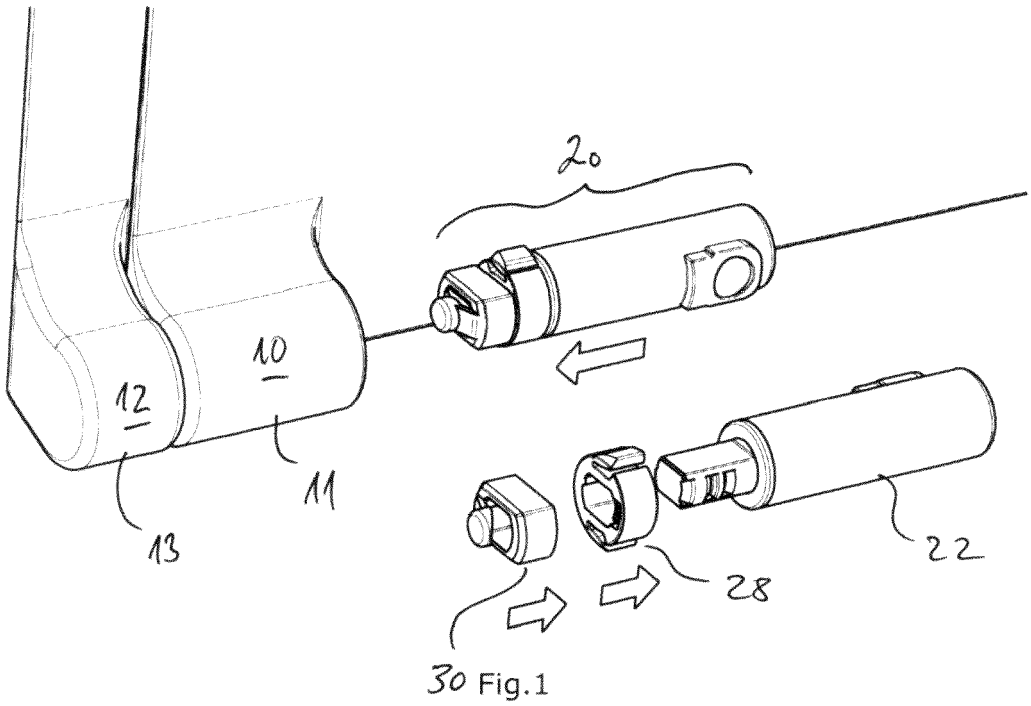

Fig.1

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Description

Field of the Invention

[0001] The present invention relates to a toilet hinge arrangement for fastening a toilet cover assembly to a toilet bowl.

Background of the Invention

[0002] In the art it is well-known to provide dampers for dampening the movement of the toilet seat and the toilet cover when desiring to close the cavity in the toilet bowl. Numerous examples of this are historically known.

[0003] A further aspect is that in many cases it is desirable to be able to easily remove the toilet cover assembly and for this reason a number of systems exist where the hinge mechanism may easily be manipulated in order to release the hinge mechanism from the toilet bowl in order to remove the toilet cover assembly.

[0004] However, these toilet cover assemblies tend to be very closely assembled in the hinge arrangements in order to provide a stable and controlled movement of the seat/cover relative to the toilet bowl in order to give the user a feeling of quality.

[0005] On the other hand it is also necessary to provide a certain tolerance in that the injection moulded toilet seats and covers have a tendency not to be 100% dimensionally stable such that the tolerances shall be able to provide enough space whereby the toilet cover may move unhindered relative to the toilet seat and vice versa.

[0006] This provision of tolerances on the other hand does provide the possibility that the toilet seat and cover may move laterally relative to the toilet bowl, i.e. in the direction of the hinge access around which the toilet seat and cover rotate.

Object of the Invention

[0007] Consequently it is an object of the present invention to allow for tolerances between the seat and cover and at the same time minimize or reduce the lateral movement of the toilet seat and cover relative to the rotation axis.

Description of the Invention

[0008] The invention addresses this by providing a toilet hinge arrangement for fastening of a toilet cover assembly, including a toilet seat and a toilet seat cover, to a toilet bowl, where by means of the toilet hinge arrangement, the toilet seat and toilet seat cover may pivot around a central axis, where said toilet hinge arrangement comprises:

- A rotational damper, said damper having a pivot axis parallel to the central axis, where the damper has a housing enclosing the dampening mechanism, such that a damper shaft extends outside the housing in one end, and engagement means, for engaging fastening means on the toilet bowl, are provided in the opposite end of the damper;
- A catch ring, adapted to be mounted on and held by the part of the damper shaft extending from the damper housing, where the catch ring has a central body, where one or more spring action catches resiliently extend from said central body, where the spring action catches may be urged towards the central body such that the one or more spring action catches lie within an outer perimeter of said central body;
- An adapter ring adapted to be mounted on and held by the part of the damper shaft extending from the damper housing, and abutting the catch ring, and where opposite to the side abutting the catch ring a resilient member is provided, said resilient member being biased away from the adapter ring in a direction parallel to the central axis, and where said adapter ring is provided with at least one engagement surface;

and where the toilet seat and the toilet seat cover respectively each is provided with two ear lugs, one adjacent to each side of the toilet seat and toilet seat cover respectively, where the ear lugs of the seat are arranged either inside or outside the ear lugs of the cover, where the innermost ear lugs are provided with a through-going aperture and where the outermost ear lugs are provided with cavities, said cavities having a bottom wall, where said through-going apertures and cavities are arranged coaxially with and covering part of the damper, catch ring and adapter ring, and where the end of the damper with the engagement means will not be covered by the ear lugs; where on one side of the toilet cover assembly one or more of the spring action catches will be inserted into one or more catch cavities provided on the inside of the through-going aperture provided in the inner-most ear lugs, thereby releasably fixing the ear lug to the shaft of the damper, and in the opposite side the engagement surface of the adapter ring is engaged with an inner side of the cavity of the outermost ear lug; and the resilient member on the adapter ring being in resilient engagement with the bottom wall of at least one of the outermost ear lugs.

[0009] Particularly the provision of a resilient member being biased away from the adaptor ring in a direction parallel to the central axis will constantly urge the cover slightly away from the seat thereby allowing for complete independent

rotational movements of both seat and cover. In this manner it is also assured that as the resilient forces provided by the resilient members is substantially equal, the seat and cover will be better superposed, i.e. the seat will not be displaced relative to the cover, but will be nicely placed substantially perfectly one over the other.

[0010] Another advantage relating to the tolerances mentioned above is the fact that if the cover and seat are touching and one or the other is being rotated it may create unwanted noises particularly when the damper is active in that the downwards movement of the seat/cover will be prolonged and thereby the noise (seat grating against cover) will be for a substantial period of time creating nuisance.

[0011] The further advantages derived from providing a catch ring engaging with catch cavities in the ear lugs foresee a very simple easy and universal mounting procedure such that the hinge arrangement may be adapted relatively easily by simply providing different catch rings for different through-going apertures in the seat or cover.

[0012] Likewise, the adaptor ring will centrally have an opening adapted to accommodate the shaft of the damper in such a manner that the rotational forces from the cover/seat will be transferred to the damper shaft if the adaptor ring is engaging the engagement surfaces on the seat/cover as explained above.

[0013] Consequently, the provision of the catch ring and adaptor ring foresees that the damper may be suitable for use with a number of various seats or covers and at the same time the apertures and cavities provided in the ear lugs of the seat/cover may be formed substantially freely in that the catch ring and/or adaptor ring shall be shaped such that they will work as interface between the damper shaft and the interior surfaces and engagement surfaces of the ear lugs.

[0014] In a further advantageous embodiment of the invention the catch cavities have a substantially partly spiral surface initiating at the inner surface of the through-going aperture with increased distance to the rotation axis said substantially spiral surface terminating in a further engagement side arranged radially relative to the rotation axis, such that as the catch ring is inserted into the through-going aperture the spring action catches will expand into the catch cavities and the terminal ends of the spring catches will engage the engagement side.

[0015] With this construction it is possible to depress the spring action catches such that they are within the periphery of the catch ring as such which is specifically designed to the geometry of the through-going aperture such that as the catch ring is pushed inside the aperture the spring action catches will be urged outwards from the catch ring body as such and engage the catch cavities.

[0016] In this manner no tools are necessary in order to mount the catch ring, and consequently the ear lug of the seat or cover may easily and without special tools and special skills be arranged on the catch ring which again may be arranged on the shaft of the damper.

[0017] In a still further advantageous embodiment of the invention at least two catch cavities are provided, and where the substantially partly spiral surfaces are arranged with opposite orientation.

[0018] Particularly the feature of having the spiral surfaces in opposite directions/orientation is advantageous in that the spring action catches when engaging the engagement sides of the cavities will engage and thereby block rotation in both directions of the ear lug relative to the catch ring.

[0019] In this manner any rotational movement of the ear lug, i.e. the seat/cover, will be transferred to the catch ring which again will transfer it to the damper shaft.

[0020] In a still further advantageous embodiment of the invention the adaptor ring has two parallel engagement surfaces arranged symmetrically around the axis of rotation, and where two corresponding engagement surfaces are provided on the inner side of the cavity of the outermost ear lug.

[0021] By providing two parallel surfaces on the adaptor ring, i.e. one on either side of the rotation axis, a larger overall engagement surface is provided in order to engage the corresponding engagement surfaces provided in the cavity of the ear lugs of either this cover or seat. Consequently, the forced transfer capabilities of the adaptor ring to the shaft of the damper is increased without putting extra strain on the ear lug construction.

[0022] In a still further advantageous embodiment of the invention the engagement means for engaging fastening means on the toilet bowl, provided in the opposite end of the damper comprises a radial bore adapted in use to receive a mounting pin mounted on the toilet bowl, where said pin adjacent a distal end is provided with at least one circumferential groove, and where the damper in the end opposite from the end from where the damper shaft extends is provided with a slit perpendicular to the axis of the bore, such that when the pin is inserted in the bore, the circumferential groove will be positioned superposed the slit, such that a lock tab may be inserted in the slit, and engaging at least a part of said circumferential groove, thereby retaining the pin relative to the damper.

[0023] By this construction the advantages of providing a removable fitting structure is integrated with the inventive hinge construction as discussed above.

[0024] In a still further advantageous embodiment of the invention the damper shaft and the catch ring and/or adaptor ring are removably fitted on the damper shaft by a snap feature.

[0025] This snap feature may for example be in the shape of grooves or indentations provided in the shaft of the damper and corresponding protrusions or ridges provided in the catch ring and/or adaptor ring.

[0026] In some embodiments, the catch ring, and the adapter ring and the resilient member are one integrated unit.

[0027] In some embodiments, the catch ring comprises a body section and a separate resilient member, where the

separate resilient member is fitted in tracks in the body section, such that a part of the separate resilient member extends past the periphery of the body section, in use extending into catch cavities in an ear lug.

Description of the Drawing

[0028] The invention will now be explained with reference to the accompanying drawing wherein

Figure 1	illustrates the rear side of a part of a toilet cover assembly;
Figures 2a and 2b	illustrate details of an ear lug and an earlug with the catch ring engaged;
Figures 3a and 3b	illustrate the damper assembly in an assembled situation in figure 3a and in an exploded view in figure 3b;
Figure 4	illustrates details of how the hinge arrangement is attached to the toilet bowl;
Figure 5	illustrates the damper mounted to the hinge pin;
Figure 6	illustrates a cross section orthogonal to the cross-section illustrated in figure 5, as well as the release of the lock tab;
Figure 7	illustrates a cross-section through a hinge arrangement;
Figure 8	illustrates a cross-section of a damper shaft with catch ring and adapter ring mounted;
Figure 9	illustrates a cross section of part of a left-hand and a right-hand damper assembly
Figure 10	illustrates an isometric schematic illustration of the left-hand side damper assembly illustrated in figure 9;
Figure 11a	illustrates an isometric schematic illustration of the right-hand side damper assembly illustrated in figure 9;
Figure 11b	illustrates the aperture in the ear lug and corresponding engagement surfaces on the adapter ring
Figure 12	illustrates an alternative embodiment of the catch ring
Figures 13a, 13b and 13c	illustrate yet another alternative embodiment of a detail of the invention
Figure 14	illustrates an alternative embodiment to figure 13a.

Detailed Description of the Invention

[0029] In figure 1 is illustrated the rear side of a part of a seat 10 and a cover 12 where the rear part of the seat and cover respectively is provided with ear lugs 11, 13. The ear lugs 11, 13 are provided with a cavity 14, 15. The cavity is suitable to accommodate a damper assembly 20 as will be explained with reference to figures 3a-3b.

[0030] Turning to figures 3a-3b the damper assembly 20 is illustrated in an assembled situation in figure 3a and in an exploded view as illustrated in figure 3b. The damper assembly comprises five main parts. The damper 22 is provided with a damper shaft 24 which extends from one end of the damper 22. The damper shaft 24 may rotate around a central axis 100 illustrated by a dashed line.

[0031] Typically a toilet cover assembly will be provided with two hinge arrangements and as such the central axis 100 will pass through the rotation axis of both hinges in order to create a coordinated pivotable movement of the toilet cover assembly, i.e. the toilet seat and the toilet seat cover.

[0032] In the opposite end of the damper shaft 24 the damper 22 is provided with engagement means 26 such that the damper may be fastened to a corresponding fastening means extending from the toilet bowl. This fastening concept will be explained with reference to figure 4, 5 and 6.

[0033] On the damper shaft 24 is arranged a catch ring 28 and an adaptor ring 30. Once the damper assembly 20 is inserted in the cavities 14 and 15 of the ear lugs 11, 13 (see figure 7) spring action catches 32 provided on the catch ring 28 will engage corresponding catch cavities 34 provided on the inside wall of the cavity 14 provided in the seat. The spring action catches 32 are resilient such that they work as springs whereby when inserting the damper assembly into the cavities 14, 15 the spring action catches 32 are compressed towards the main body 28' of the catch ring such that the outside periphery of the catch ring 28 fits inside the cavity 14, 15 provided in the lugs 11, 13.

[0034] As the catch ring 28 is positioned correctly with respect to the seat the spring action catches 32 will expand into the catch cavities 34 thereby locking the seat for rotation. The seat may now only be rotated by also rotating the damper shaft 24 such that the dampening action provided by the damper 22 is transferred to the seat.

[0035] The adaptor ring 30 which is also mounted on the damper shaft 24 is not provided with engagement rings such that the cover may pivot freely relative to the adaptor ring. In order to secure that the catch ring and the adaptor ring are firmly secured to the damper shaft 24 ridges 36, 38 may be provided in the catch ring and the adaptor ring respectively, and corresponding grooves 40, 42 are provided in the damper shaft 24.

[0036] Consequently, as illustrated in figure 8, as the catch ring 28 and the adaptor ring 30 are arranged on the damper shaft the ridges 36, 38 will engage the grooves 40, 42 thereby fixing the adaptor ring and the catch ring 30, 28 to the

damper shaft 24.

[0037] In the opposite end the engagement means 26 are as will be explained with reference to figures 4, 5 and 6 suitable to engage and lock onto a hinge pin 50. The hinge pin 50 has a diameter such that it may be inserted into the aperture 26' provided in the damper 22.

[0038] In the illustrated embodiment the hinge pin 50 has a number of grooves 51, 52, 53 which serve various purposes. The lowermost groove 53 accommodates a stabilizing O-ring such that as the hinge pin 50 is inserted in the aperture 26', the stabilizing O-ring 53' having an outer diameter slightly larger than the diameter of the hinge pin will engage the walls of the aperture 26' thereby creating a stable fit between the hinge pin and the damper 22.

[0039] In the groove 52 is accommodated a friction spring which as the hinge pin 50 is inserted in the aperture 26' will be slightly compressed thereby offering a slight resistance, but once the hinge pin is completely inserted into the damper aperture 26' the friction spring will help to retain the hinge pin in a stabilized manner relative to the aperture 26'.

[0040] Finally, the groove 51 is a locking groove such that when the hinge pin 50 is completely inserted into the aperture 26' as illustrated in figure 5 a lock tab 56 may be inserted radially relative to the hinge pin in a direction corresponding to the central axis 100 such that the lock tab 56 will engage the locking groove thereby fixing the damper relative to the hinge pin 50.

[0041] In the cross-section illustrated in figure 5 the damper 22 is mounted to the hinge pin 50 in a firm and stable manner. The hinge pin 50 is fully inserted into the aperture 26' and the stabilizing O-ring 53' engages the sides of the aperture and the friction spring accommodated in the groove 52 furthermore stabilizes and assists in holding the hinge pin relative to the aperture 26'.

[0042] The lock tab 56 is fully inserted and engaging the locking groove 51 such that the damper 22 is held by the hinge pin 50. Although not illustrated the hinge pin is by its own means mounted to the toilet bowl and in this manner the toilet cover assembly is fixed in a releasable manner due to the releasable action of the lock tab to the toilet bowl.

[0043] In figures 2a and 2b is illustrated how the catch ring 28 co-operates with an ear lug 11, 13. In the ear lug 11 one or more, in this embodiment two catch cavities 34 are provided. Each catch cavity has a spirally curved surface 41 connecting with an engagement side 43. The resilient spring action catches 32 provided on the catch ring will when assembled as illustrated in fig 2b expand into the catch cavities 34, thereby coupling the ear lugs 11, 13 to the catch ring 28. In fig 2b being an end view of the assembly, the resilient member 35 may be seen centrally in the assembly.

[0044] The releasable manner of fastening the toilet cover assembly to the toilet bowl may be illustrated with reference to figure 6 where a cross section orthogonal to the cross-section illustrated in figure 5 is illustrated.

[0045] In the left part of figure 6 the lock tab 56 is fully inserted such that it engages the groove 51 of a hinge pin 50 whereby removal of the damper 22 is impossible. By removing the lock tab 56 in the direction illustrated by the arrow 56' the lock tab 56 has released its engagement with the locking groove 51 and consequently the hinge pin 50 may be withdrawn from the aperture 26' thereby removing the toilet cover assembly from the toilet bowl.

[0046] In figure 9 is illustrated a cross section of part of a left-hand and a right-hand damper assembly where the damper shaft 24 is provided with both a catch ring 28 and an adaptor ring 30.

[0047] Turning to figure 10 an isometric schematic illustration of the left-hand side damper assembly illustrated in figure 9 is illustrated in a situation where it is ready to be mounted on the ear lugs 11, 13 of same side of the cover and the seat respectively.

[0048] As is evident from figure 10 the through-going aperture 14 provided in the ear lug 11 is provided with catch cavities 34. The catch ring 28 will therefore when inserted in the through-going aperture 14 be expanded such that the spring action catches 32 will expand into the catch cavities 34 thereby locking the ear lug 11 relative to the catch ring 28 whereby any rotation of the ear lug 11 due to the engagement of the catch ring 28 by means of the spring action catch's 32 engagement with the catch cavities 34 transfer any rotational force to the damper 22.

[0049] At the same time the ear lug 13 is provided with a cavity which in a cross-section has a circular cross-section such that the engagement surfaces 31 of the adapter ring 30 are not locked relative to the ear lug 13 such that the ear lug 13 may rotate freely with respect to the adaptor ring 30. Therefore, in this embodiment the left-hand side as illustrated in figure 10 will transfer rotational forces from the seat's ear lug 11 to the damper 22 whereby the left-hand side cover ear lug 13 is not influenced by the damper and therefore may move freely with respect to the damper mounted in the left-hand side of the toilet seat arrangement as illustrated in figure 9.

[0050] The opposite is the case in the right-hand side illustrated in figure 11a where the through-going aperture 14 has a completely circular cross-section such that the spring catches 32 will not gain resistance inside the through-going aperture 14 whereby any rotational movement of the ear lug 11' will not be influenced by the right-hand side damper. On the other hand the adaptor ring 30 will fit inside a cavity having parallel sides 31', 33' such that the engagement surfaces 31, 33 will engage and be held by corresponding surfaces 31', 33' provided inside the cavity provided in the ear lug 13'.

[0051] In this manner any rotational movement of the ear lug 13' and thereby the cover will transfer its forces through the engagement surfaces 31, 33 of the adaptor ring 30 and thereby to the damper shaft which will then cause dampening of the movement of the ear lug 13'. In figure 11b is illustrated the aperture in the ear lug 13' where the cavity has

engagement surfaces 31', 33' suitable to firmly engage the engagement surfaces 31, 33 on the adaptor ring 30.

[0052] In a further alternative embodiment illustrated in fig. 12 the catch ring 28, and the adapter ring 30 and the resilient member 35 is one integrated unit 54. This unit may be inserted over the shaft of the damper, and retained by the damper.

[0053] In fig. 13a, fig. 13b and fig.13c is illustrated yet another alternative embodiment of a detail of the invention. In the illustrated embodiment the catch ring 28 is comprises a body section 28' provided with a track or groove 55 in a peripheral side face. A separate resilient member 58 fits inside the track/groove 55, such that in use the resilient member 58 being provided with a bend 57, where said bend 57 engages one or more catch cavities provided in the ear lug 11, 13.

[0054] In fig. 14 a similar embodiment is depicted where the separate resilient member 58' is a clip-structure, but has the same function as described above with respect to fig. 13a, fig. 13b and fig. 13c.

Claims

1. Toilet hinge arrangement comprising a toilet cover assembly including a toilet seat (10) and a toilet seat cover (12) cover for fastening to a toilet bowl, where by means of the toilet hinge arrangement, the toilet seat (10) and toilet seat cover (12) may pivot around a central axis, where said toilet hinge arrangement comprises:

    - A rotational damper, said damper (22) having a pivot axis parallel to the central axis (100), where the damper (22) has a housing enclosing the dampening mechanism, such that a damper shaft (24) extends outside the housing in one end, and engagement means (26), for engaging fastening means on the toilet bowl, are provided in the opposite end of the damper (22);
    - A catch ring (28), adapted to be mounted on and held by the part of the damper shaft (24) extending from the damper housing, where the catch ring (28) has a central body, where one or more spring action catches (32) resiliently extend from said central body, where the spring action catches (32) may be urged towards the central body such that the one or more spring action catches (32) lie within an outer perimeter of said central body;
    - An adapter ring (30) adapted to be mounted on and held by the part of the damper shaft (24) extending from the damper housing, and abutting the catch ring (28), and where opposite to the side abutting the catch ring (28) a resilient member is provided, said resilient member being biased away from the adapter ring (30) in a direction parallel to the central axis, and where said adapter ring (30) is provided with at least one engagement surface (31);

    and where the toilet seat (10) and the toilet seat cover (12) respectively each is provided with two ear lugs (11, 13), one adjacent to each side of the toilet seat (10) and toilet seat cover (12) respectively, where the ear lugs of the toilet seat are arranged either inside or outside the ear lugs of the toilet seat cover, where the innermost ear lugs are provided with through-going apertures (14) and where the outermost ear lugs are provided with cavities (15), said cavities (15) having a bottom wall, where said through-going apertures and cavities are arranged coaxially with and covering part of the damper (22), catch ring (28) and adapter ring (30), and where the end of the damper with the engagement means will not be covered by the ear lugs (11, 13); where on one side of the toilet cover assembly one or more of the spring action catches (32) will be inserted into one or more catch cavities (34) provided on the inside of the through-going aperture provided in the inner-most ear lugs, thereby releasably fixing the ear lug (11, 13) to the shaft (24) of the damper, and in the opposite side the engagement surface of the adapter ring (30) is engaged with an inner side of the cavity of the outermost ear lug; and the resilient member on the adapter ring being in resilient engagement with the bottom wall of at least one of the outermost ear lugs.

2. Toilet hinge arrangement according to claim 1 wherein the catch cavities (34) have a substantially partly spiral surface (41) initiating at the inner surface of the through-going aperture with increased distance to the rotation axis said substantially spiral surface (41) terminating in a further engagement side (43) arranged radially relative to the rotation axis, such that as the catch ring (28) is inserted into the through-going aperture the spring action catches (32) will expand into the catch cavities (34) and the terminal ends of the spring catches will engage the engagement side (43).

3. Toilet hinge arrangement for fastening of a toilet cover assembly according to claim 2 where at least two catch cavities (34) are provided, and where the substantially partly spiral surfaces (41) are arranged with opposite orientation.

4. Toilet hinge arrangement for fastening of a toilet cover assembly according to claim 1 wherein the adapter ring (30) has two parallel engagement surfaces (31, 33) arranged symmetrically around the axis of rotation, and where two

corresponding engagement surfaces (31', 33') are provided on the inner side of the cavity of the outermost ear lug.

5. Toilet hinge arrangement for fastening of a toilet cover assembly according to claim 1 wherein the engagement means (26), for engaging fastening means on the toilet bowl, provided in the opposite end of the damper comprises a radial bore (26') adapted in use to receive a mounting pin (50) mounted on the toilet bowl, where said pin (50) adjacent a distal end is provided with at least one circumferential groove (51, 52, 53), and where the damper in the end opposite from the end from where the damper shaft extends is provided with a slit perpendicular to the axis of the radial bore, such that when the pin is inserted in the radial bore (26'), the circumferential groove will be positioned superposed the slit, such that a lock tab (56) may be inserted in the slit, and engaging at least a part of said circumferential groove, thereby retaining the pin relative to the damper.

6. Toilet hinge arrangement for fastening of a toilet cover assembly according to claim 1, wherein the damper shaft (24) and the catch ring (28) and/or adapter ring (30) are removably fitted on the damper shaft (24) by a snap feature.

7. Toilet hinge arrangement according to any preceding claims 1 to 6, wherein the catch ring (28), and the adapter ring (30) and the resilient member (35) are one integrated unit.

8. Toilet hinge arrangement according to any one of claims 1 to 6, wherein the catch ring (28) comprises a body section (28') and a separate resilient member (58, 58'), where the separate resilient member is fitted in tracks in the body section, such that a part of the separate resilient member extends past the periphery of the body section, in use extending into catch cavities in an ear lug (11, 13).

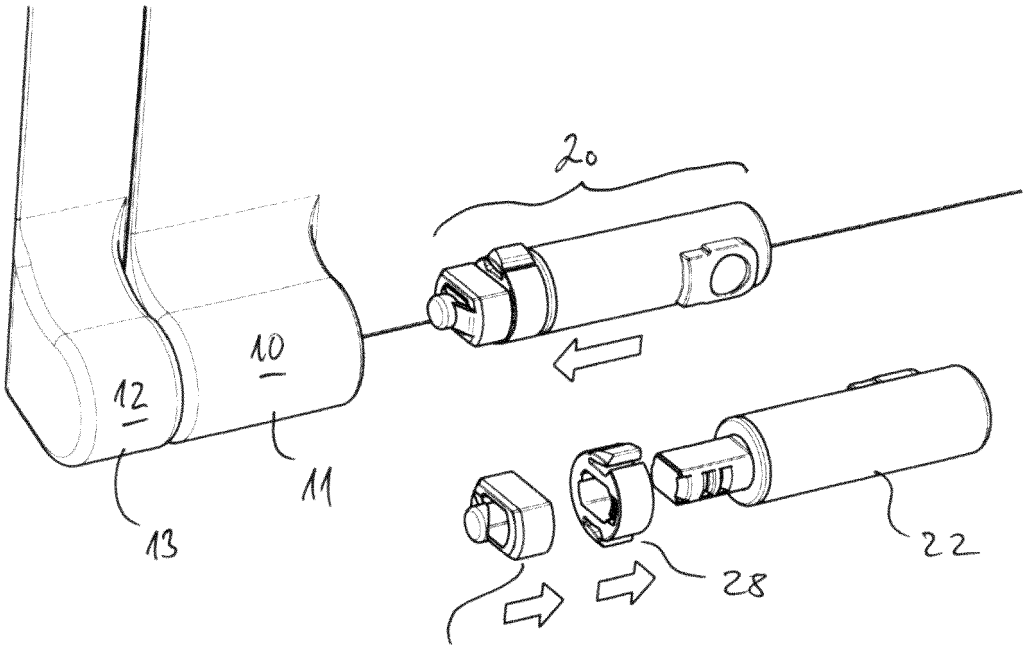

Fig.1

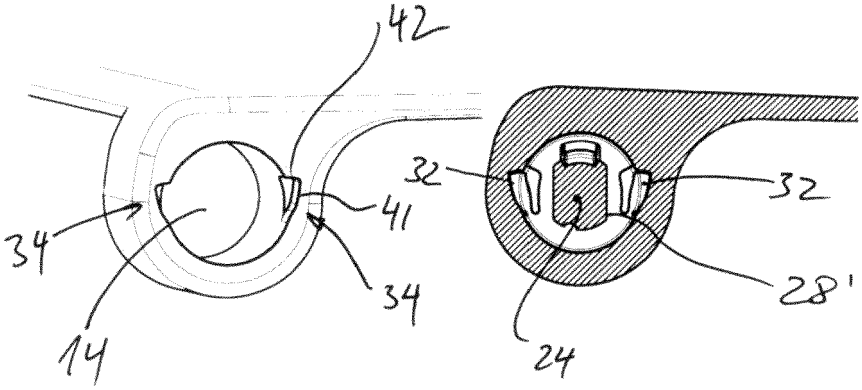

Fig. 2

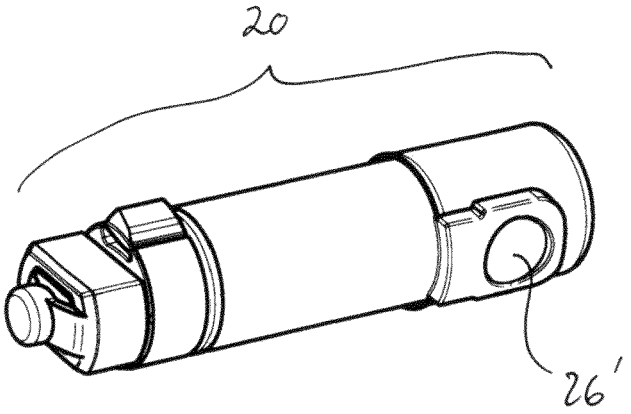

Fig. 3a

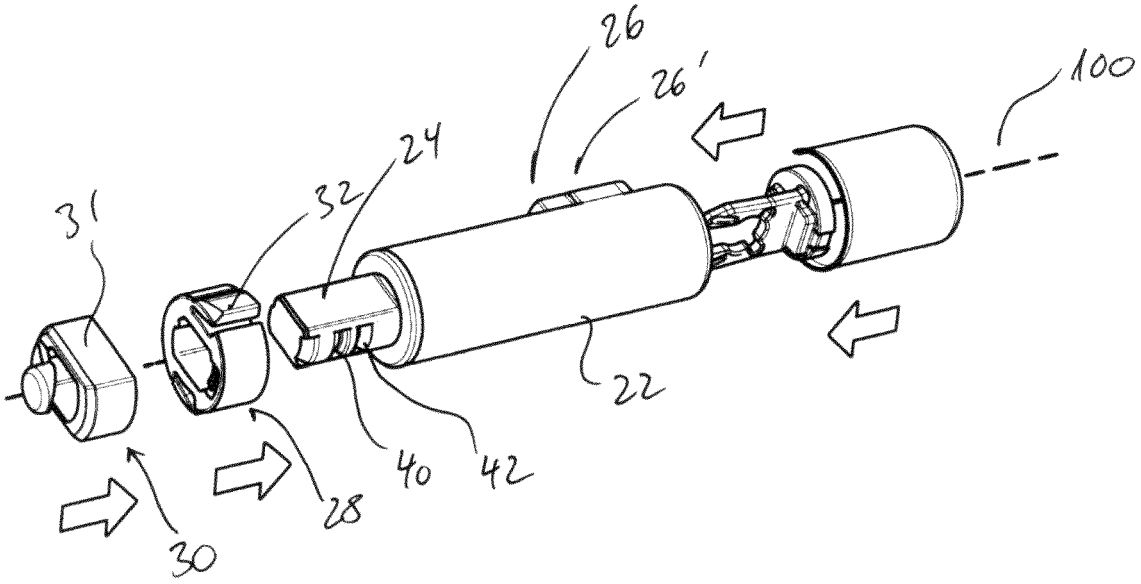

Fig. 3b

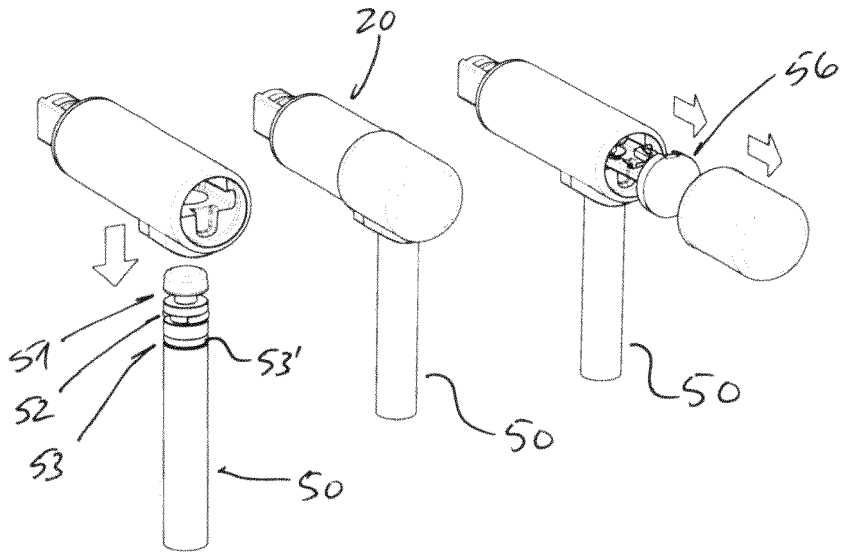

Fig. 4

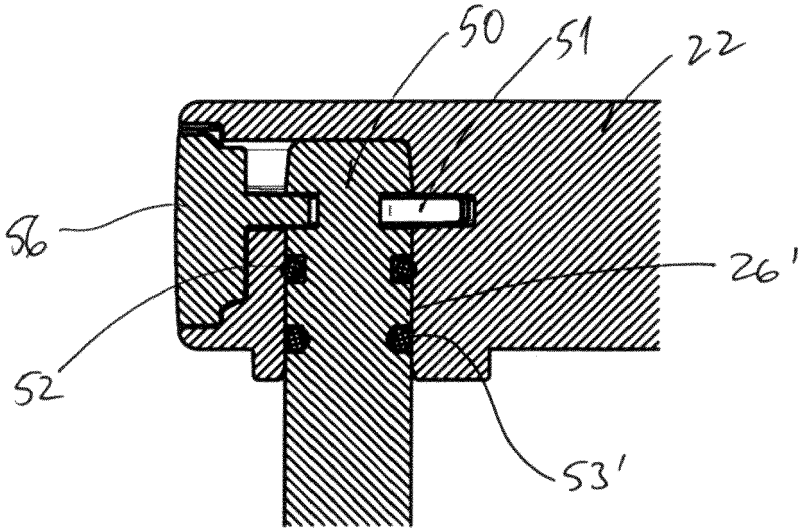

Fig. 5

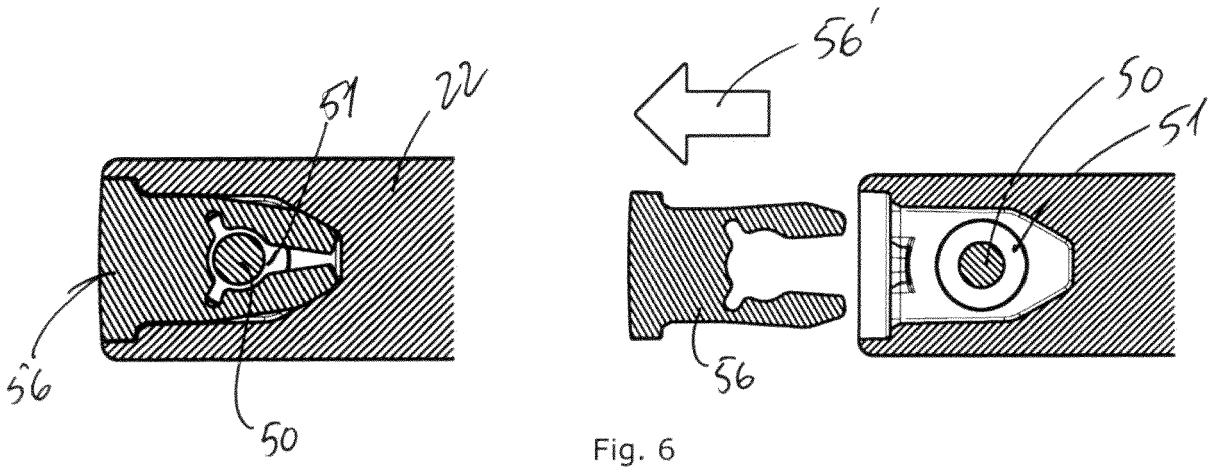

Fig. 6

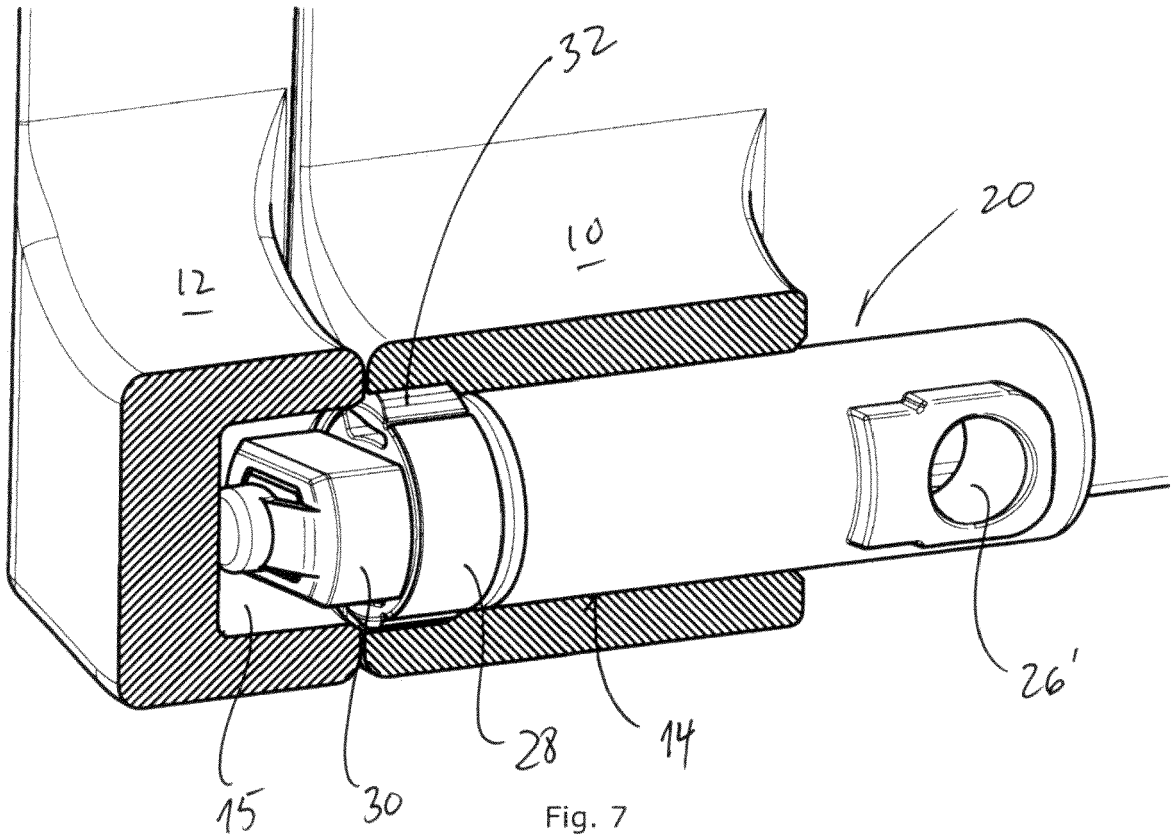

Fig. 7

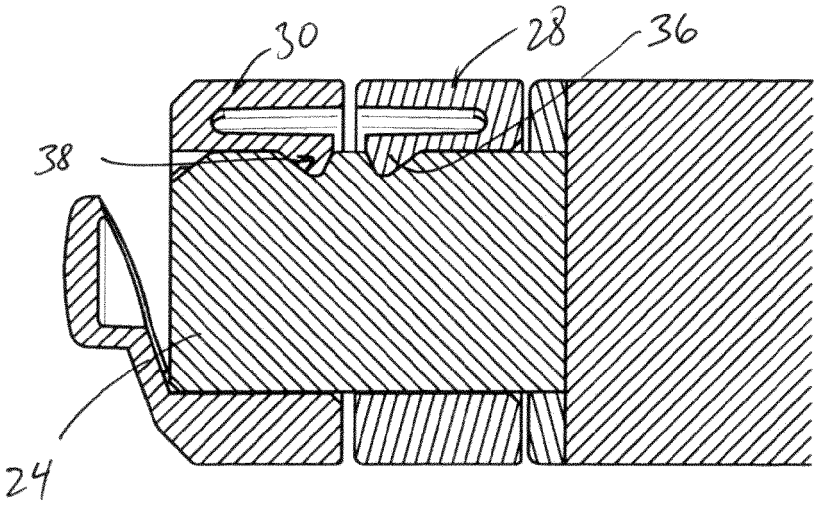

Fig. 8

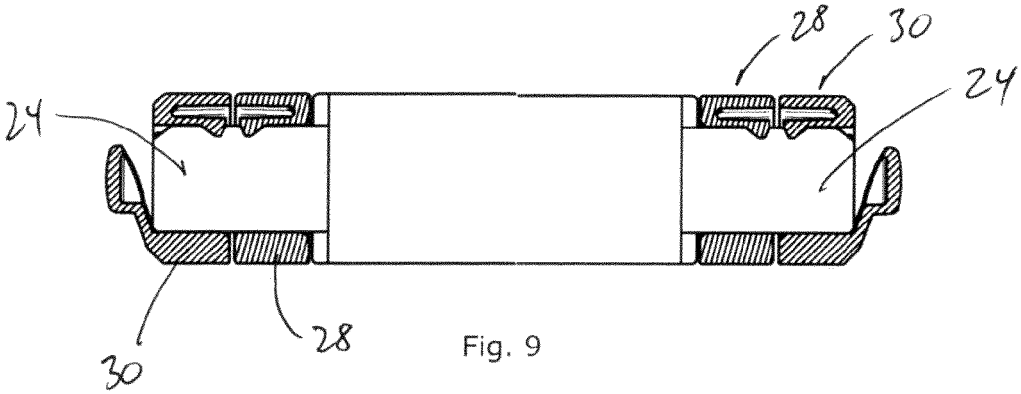

Fig. 9

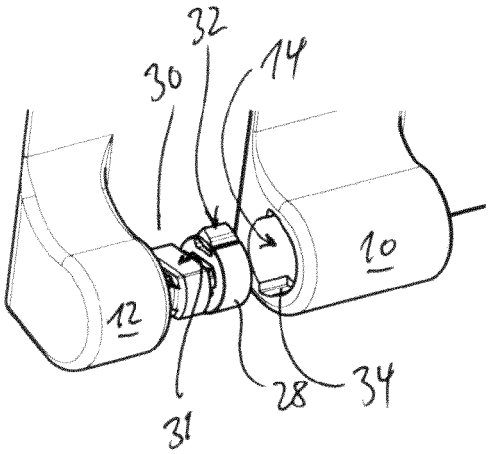

Fig. 10

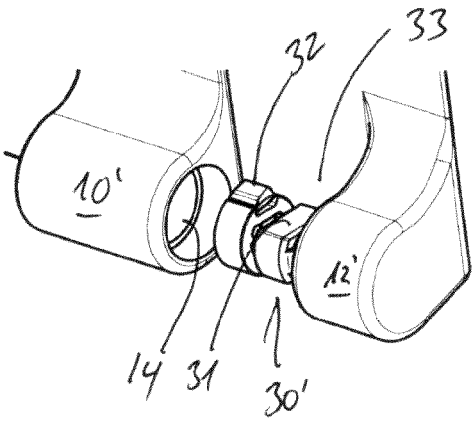

Fig. 11a

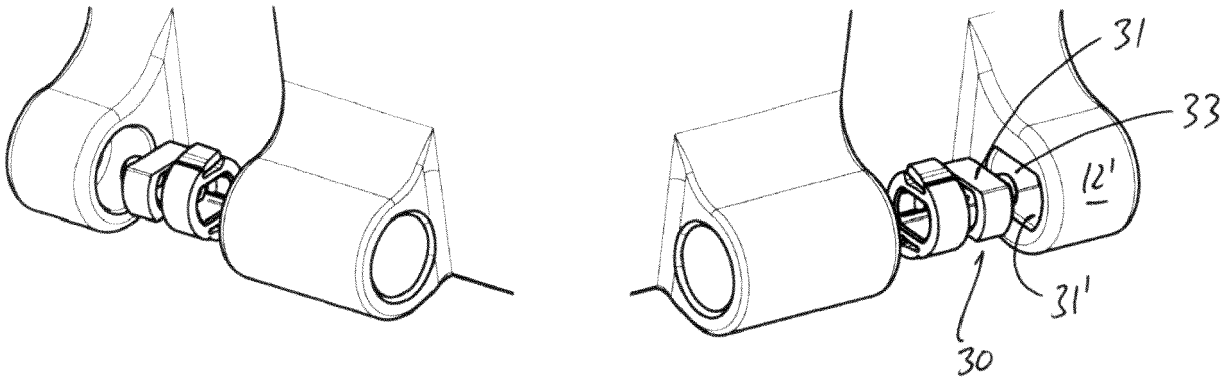

Fig. 11b

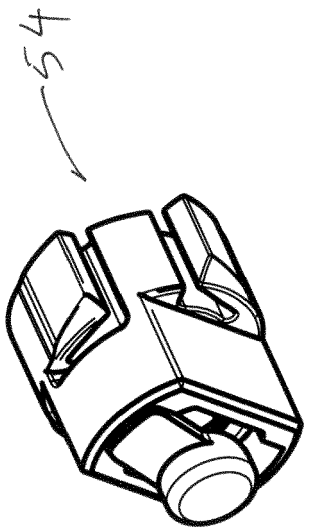

Fig. 12

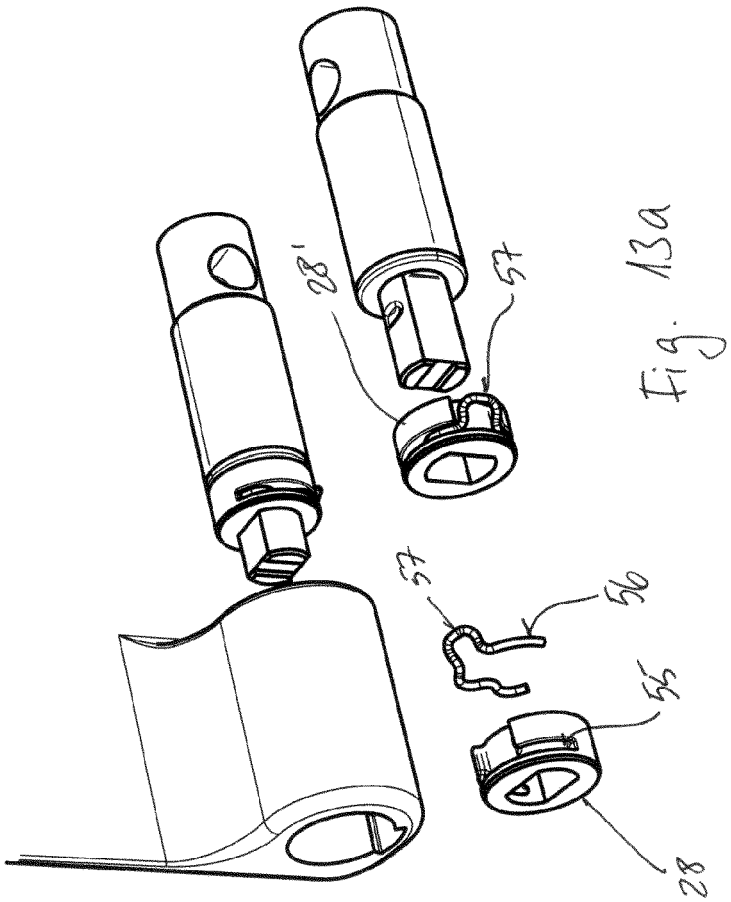

Fig. 13a

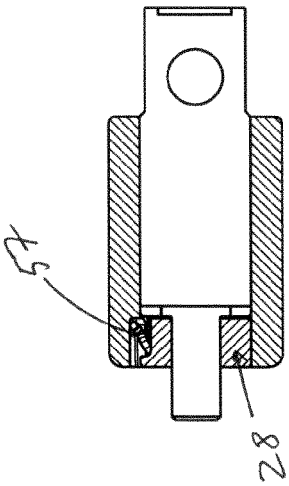

Fig. 13b

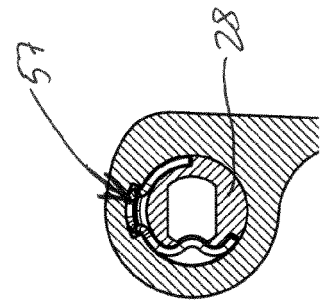

Fig. 13c

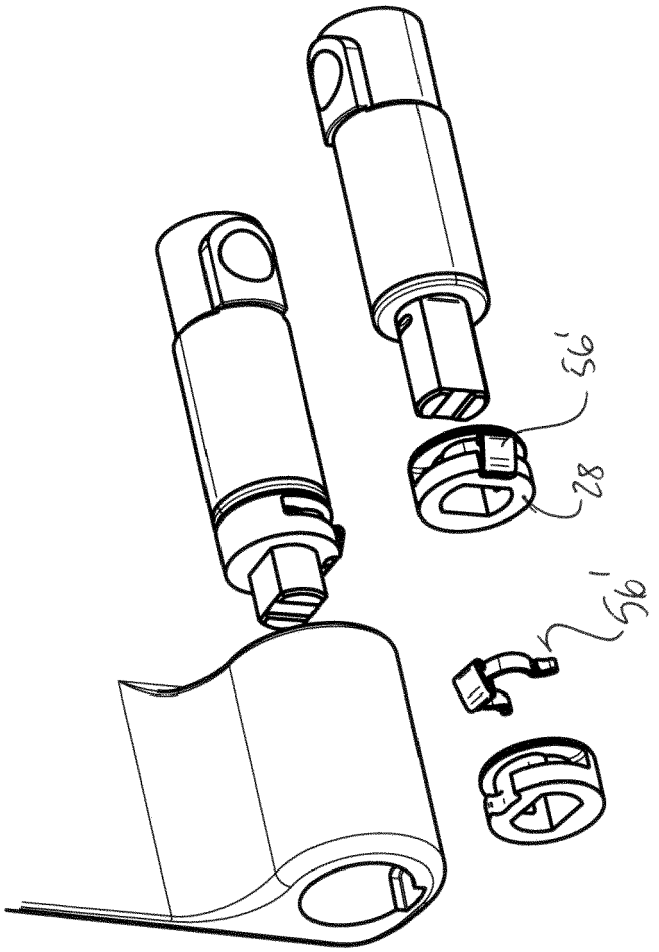

Fig. 14

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EUROPEAN SEARCH REPORT

Application Number
EP 19 19 5596

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 2 504 210 A (PENG DONG [CN]; YU XINGYI [CN]) 22 January 2014 (2014-01-22) * figures 1,4,12 * -----	1,4,5,7	INV. A47K13/12
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TECHNICAL FIELDS SEARCHED (IPC)

A47K
F16F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 January 2020	Boyer, Olivier

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