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(54) **SPINDLE APPARATUS AND METHOD OF USE THEREOF**

(57) There is provided spindle apparatus for a handle mechanism. The spindle apparatus comprises a spindle body portion having a first end and at least a second end. At least a first stop means is provided on the spindle body portion between the first and at least second ends to prevent or substantially prevent movement or removal of the spindle body portion in at least a first direction when fitted

to a handle mechanism in use. The spindle body portion includes weakened means and/or resilient biasing means at or adjacent the first stop means to allow the spindle body portion to deform, break and/or bend when force is applied to the spindle body portion in use above a pre-determined threshold.

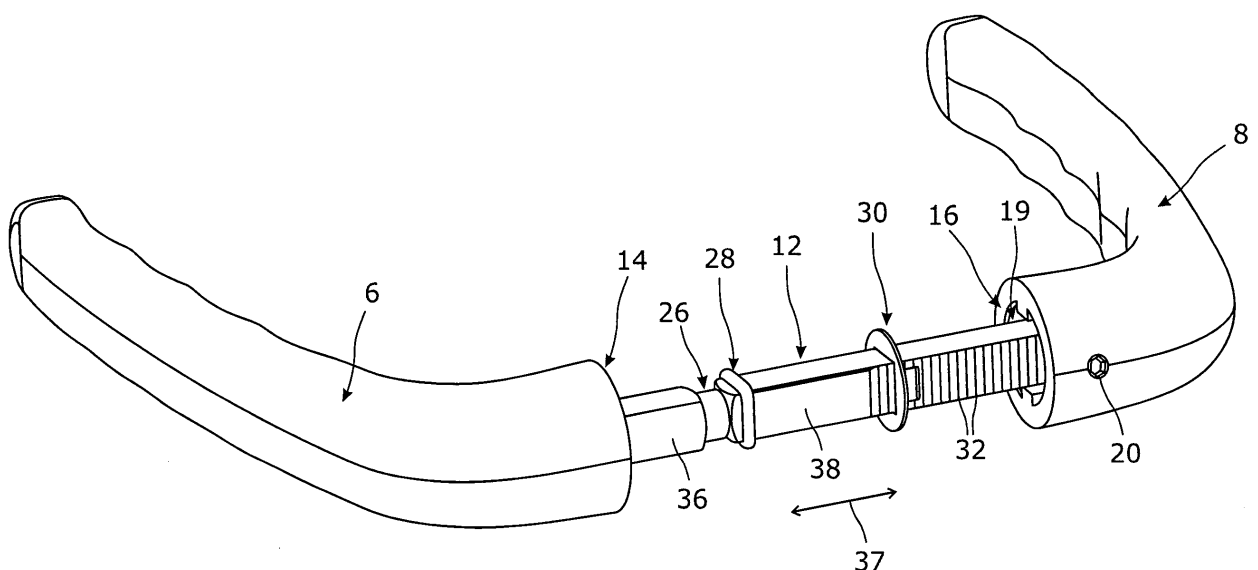
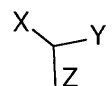


Figure 1b



Description

[0001] This invention relates to spindle apparatus and to a method of use thereof.

[0002] Although the following description refers almost exclusively to spindle apparatus for use with a door handle mechanism including spindle locking apparatus, it will be appreciated by persons skilled in the art that the spindle apparatus could be used on any handle mechanism, such as a window mechanism, a furniture handle mechanism, on any item where a handle may be required and/or the like. It will also be appreciated by persons skilled in the art that the spindle apparatus could be used on any handle mechanism with or without spindle locking apparatus.

[0003] It is known to provide locking apparatus for selectively locking a handle spindle in use. One example of spindle locking apparatus is disclosed in the applicant's co-pending patent application WO2016/050213, the entire content of which is incorporated herein by reference. The locking apparatus includes a slidable locking plate movable relative to a handle frame and spindle in use between a spindle locking position, wherein rotation of the spindle is prevented in use, and a spindle release position, wherein the spindle is capable of rotation in use. User actuation means for actuating movement of the locking plate between the spindle locking position and the spindle release position is provided. The locking plate is provided with a spindle location aperture for location of the spindle therethrough in use. The spindle location aperture has a first portion corresponding to the spindle locking position and at least a second portion corresponding to the spindle release position. The spindle location aperture is arranged such that the spindle is retainable within the spindle locking aperture in both the spindle locking position and the spindle release position in use.

[0004] A further example of spindle locking apparatus is disclosed in the applicant's co-pending patent application GB1620405.9, the entire content of which is incorporated herein by reference. In this locking apparatus, a security locking mechanism is provided for preventing the spindle locking plate from being moved from the spindle release position to the spindle locking position without the bolt means being in the locked position and/or the handle means being in a locked position. This prevents a user from inadvertently locking the spindle without first actuating the door bolts and securing the door, window or other item on which the locking apparatus is used.

[0005] A problem associated with the use of spindle locking apparatus in some instances is that if excess force is applied to the door handle mechanism in which the spindle locking apparatus is provided, or to the locking plate forming part of the spindle locking apparatus, such as for example by a potential intruder forcing the handle mechanism repeatedly in an upwardly and downwardly direction, this can cause excessive wear on the external surface of the spindle and/or the locking plate aperture

through which the spindle is located in use. This can cause the spindle to freely rotate within the spindle locking apparatus, such that the spindle locking apparatus and/or the door handle lock or bolt is no longer operational. This could, in some instances, allow a potential intruder to open the door and gain access to the area beyond the locked door.

[0006] An example of an improved spindle is disclosed in GB2521521, the entire contents of which are incorporated herein by reference. This spindle includes first and second stop means to limit movement of the spindle in a handle in a direction perpendicular to the door or window in which the spindle and handle mechanism are provided in use.

[0007] It is therefore an aim of the present invention to provide spindle apparatus that overcomes the above-mentioned problems.

[0008] It is a further aim of the present invention to provide a method of using spindle apparatus that overcomes the abovementioned problems.

[0009] It is a yet further aim of the present invention is to provide spindle locking apparatus including spindle apparatus.

[0010] It is a yet further aim of the present invention to provide a method of using spindle locking apparatus including spindle apparatus.

[0011] It is an aim of the present invention to provide handle apparatus including spindle apparatus.

[0012] It is a further aim of the present invention to provide a method of using handle apparatus including spindle apparatus.

[0013] According to a first aspect of the present invention there is provided Spindle apparatus for a handle mechanism, said spindle apparatus comprising a spindle body portion having a first end and at least a second end, at least a first stop means provided on the spindle body portion between the first and at least second ends to prevent or substantially prevent movement or removal of the spindle body portion in at least a first direction when fitted to a handle mechanism in use, characterised in that the spindle body portion includes weakened means and/or resilient biasing means at or adjacent the first stop means to allow the spindle body portion to deform, break and/or bend when force is applied to the spindle body portion in use above a pre-determined threshold.

[0014] Thus, the spindle body portion is arranged to break, deform and/or bend when a minimum known force is applied to the same in use. This therefore allows controlled "sacrifice" of the spindle body portion if excess force, such as that which may be incurred during an attempted break in via the handle mechanism, is applied to the same.

[0015] Preferably the weakened means are arranged such that the spindle body portion will break, substantially break, separate, snap off or create sufficient deformity of the spindle body portion such that the spindle body portion no longer is able to rotate in use, at the point or location of the weakened means if a force beyond a pre-

determined threshold or excessive force is applied to the spindle apparatus, spindle locking apparatus and/or the handle mechanism incorporating the spindle apparatus in use. By allowing the spindle body portion to break or become significantly deformed (i.e. bent or twisted) at the weakened point or section, this prevents other components of the handle mechanism from breaking, thereby preventing a potential intruder from accessing the handle mechanism in use. Thus, the weakened means are acting as a sacrificial point in the spindle body portion that will break or become significantly deformed so as to prevent further damage to other parts of the handle mechanism and/or spindle locking apparatus in use.

[0016] Preferably the weakened means and/or resilient biasing means are provided immediately adjacent the first stop means.

[0017] By providing the weakened means, break or snap off point or section and/or resilient biasing means at, adjacent to or immediately adjacent the first stop means, this prevents or reduces the likelihood of there being sufficient spindle body portion protruding from the handle mechanism to pull or move the same from an exterior side of the door or window, or a side of the door or window in which access is to be prevented.

[0018] Preferably the weakened means and/or resilient biasing means are provided between the first stop means and the first end of the spindle body portion.

[0019] Preferably the weakened means and/or resilient biasing means are arranged such that they are provided on a side of the first stop means that is on the exterior side of the door, window or closure member on which the handle mechanism is used and/or on a side where access to unauthorised persons or animals is to be prevented.

[0020] Preferably the resilient biasing means are arranged such that at least one part of the spindle body portion will bend at the point or location of the resilient biasing means if a force above a pre-determined threshold or excessive force is applied to the spindle body portion, spindle locking apparatus and/or handle mechanism incorporating the spindle apparatus in use. By allowing the spindle body portion to bend at the point or location of the resilient biasing means, this prevents other components of the spindle locking apparatus and/or handle mechanism from breaking, thereby preventing a potential intruder from accessing the handle mechanism in use.

[0021] Preferably the resilient biasing means returns or substantially returns to its original position and/or shape following release of the pre-determined or excessive force on the spindle body portion.

[0022] Preferably the weakened means and/or resilient biasing means are formed such that they break, are significantly deformed or bend when a force above a pre-determined threshold is applied to the spindle body portion at least at the point of the weakened means and/or resilient biasing means. Thus, the weakened means and/or resilient means are actuated in a controlled manner when a known minimum force is applied to the same.

[0023] The force above a pre-determined threshold that is applied to the spindle body portion can be applied via handle means with which the spindle body portion is located and/or associated with in use and/or via spindle locking apparatus that may be associated with the spindle body portion in use. The spindle locking apparatus is preferably of a form to allow the spindle body portion to be moved between locked and unlocked positions in use.

[0024] Examples of spindle locking apparatus that can be used with the spindle apparatus of the present invention are described in WO02016/050213 and GB1620405.9, the contents of which are incorporated herein by reference.

[0025] Preferably with the spindle locking apparatus in a locked position, the spindle body portion is prevented or substantially prevented from rotating in use. This in turn prevents or substantially prevents a handle means or mechanism from being rotated and/or pivoted in use.

[0026] Preferably with the spindle locking apparatus in an unlocked position, the spindle body portion is able to rotate in use, thereby allowing rotation and/or pivotal movement of one or more handle means that may be associated with the same in use.

[0027] Preferably the spindle locking apparatus includes a locking plate having a spindle aperture. The spindle body portion is located through the spindle aperture in use and the locking plate moves relative to the spindle body portion between the locked and unlocked positions.

[0028] Preferably the weakened means and/or resilient biasing means are placed between the at least first stop means and the end of the spindle body portion that is to be located with an exterior door handle (i.e. the exterior side of the door through which intruder access is to be prevented).

[0029] In one embodiment the weakened means can include or consist of any or any combination of a reduced diameter part of the spindle body portion that is sufficient to allow breakage or deformity of the spindle body portion prior to any other part of the spindle body portion when a force is applied to the same above a pre-determined threshold; a reduced diameter part of the spindle body portion of 10% or more (i.e. having 10% less material in one cross section compared to a non-weakened cross section); a part having a reduced cross sectional area (i.e. a cross sectional area when taken perpendicular to a longitudinal axis of the spindle body portion) compared to another or remaining part of the spindle body portion; a part of the spindle body portion formed from or having a reduced amount of material compared to one or more other parts or remaining parts of the spindle body portion; a part where one or more apertures are provided in or through the spindle body portion; a join between two or more parts of the spindle body portion; frangible means; a section of the spindle body portion that is relatively thinner compared to a remaining part of the spindle body portion; joining means; a spring; one or more cut or partially cut sections; one or more sections formed from a

different material to another or remaining one or more sections of the spindle body portion; one or more sections having a different shape to another or remaining section or sections of the spindle body portion and/or the like.

[0030] Preferably the frangible means includes one or more cuts, cut out sections and /or the like.

[0031] In one example, the weakened means can include a point or location on the spindle body portion that has a circular cross sectional shape when taken in an axis or plane perpendicular to the longitudinal axis of the spindle body portion. This circular cross section can, for example, have an 8mm diameter. The adjacent section or remaining section of the spindle body portion can have an 8mm diameter but have a square cross sectional shape. The difference in the amount of material present in the circular cross section compared to an adjacent square cross section is sufficient to cause the spindle body portion to break at the point where the circular cross section is provided.

[0032] Preferably a longitudinal axis of the weakened means and/or resilient biasing means are provided parallel or substantially parallel to a longitudinal axis of the spindle body portion.

[0033] Preferably the weakened means and/or resilient biasing means are provided in line, in a linear manner and/or in a non-protruding manner (i.e. the weakened means and/or resilient biasing means do not protrude beyond the outer cross sectional perimeter of the spindle body portion) with the spindle body portion.

[0034] In one embodiment the resilient biasing means includes one or more springs, coiled springs, sprung material and/or the like.

[0035] In one embodiment the spindle body portion includes two or more sections and the weakened means and/or resilient biasing means is provided between the two or more sections.

[0036] Preferably the weakened means and/or resilient biasing means are joined to the two or more sections via adhesive, welding, one or more inter-engaging members, screws, mechanical linkage and/or the like.

[0037] Preferably a longitudinal axis, or the axis of compression and/or extension, of the resilient biasing means is provided parallel to or substantially parallel to the longitudinal axis of the spindle body portion.

[0038] Preferably the weakened means and/or resilient biasing means is of such strength that it remains in a stationary or relative stationary position, or at rest position, when a normal handle operating force range or force is applied to the spindle body portion including the resilient biasing means and/or weakened means. Thus, the resilient biasing means and/or the weakened means does not or does not significantly deform, bend and/or move into extension or compression when the handle mechanism is being used in a conventional manner. Preferably the resilient biasing means and/or weakened means is of such strength that when a force is applied to the spindle body portion above a pre-determined threshold, such as might be incurred if someone is trying to

break the handle mechanism, this cause the resilient biasing means and/or weakened means to bend, deform or move into extension, thereby causing the resilient biasing means and/or weakened means to move with movement of the handle mechanism, thereby preventing the handle mechanism from being able to operate in a conventional manner to open a door, window or closure member. In the embodiment with the resilient biasing means, once the excess force is released from the spindle body portion, the resilient biasing means returns to its original stationary or relatively stationary position, or at rest position. This removes the requirement for the spindle body portion having to be replaced or repaired following an attempted break in for example.

[0039] Preferably the resilient biasing means is used for a handle mechanism application where a keyless lock is being used, such as for example where an electronic or solenoid actuated handle or locking mechanism is provided.

[0040] Preferably the resilient biasing means bends in a clockwise or anticlockwise direction when sufficient force is applied to the handle mechanism.

[0041] In one embodiment the weakened means and/or a reduction in the diameter of the spindle body portion is adjacent one or more peripheral edges of the same. Thus, for example, the spindle body portion can be thinner, is provided with a recess and/or is tapered at one section compared to an adjacent section.

[0042] In the embodiment the weakened means and/or a reduction in the diameter of the spindle body portion on each side or surface of the spindle body portion is the same or substantially the same.

[0043] In one embodiment the depth of a recess of the weakened means defined by a reduction in the diameter of the spindle body portion is preferably the same or substantially the same around the entire peripheral edge of the reduced diameter section.

[0044] In one embodiment the weakened means and/or reduction in the diameter of the spindle body portion on one side or surface is different, greater or substantially greater than on another side or surface and/or opposite side or surface of the spindle body portion.

[0045] In one embodiment the depth of the recess of the weakened means defined by the reduction in the diameter of the spindle body portion is preferably unequal around the peripheral edge of the reduced diameter section.

[0046] In one embodiment the cross section of the weakened means and/or reduced diameter point or section (i.e. a cross section taken perpendicularly to a longitudinal axis of the spindle body portion) is symmetrical or substantially symmetrical.

[0047] In one embodiment the cross section of the weakened means and/or reduced diameter point or section (i.e. a cross section taken perpendicularly to a longitudinal axis of the spindle body portion) is asymmetrical or substantially asymmetrical.

[0048] In one embodiment the reduction in diameter

and/or the weakened means of the spindle body portion can be around an entire or substantially entire peripheral edge of the spindle body portion.

[0049] In one embodiment the weakened means and/or reduction in diameter of the spindle body portion is around part of the peripheral edge of the spindle body portion only.

[0050] In one embodiment the spindle body portion is integrally formed and the weakened means are formed in or defined in the integrally formed spindle body portion.

[0051] For example, the weakened means could be cast, machined, drilled, and/or pressed into the spindle body portion.

[0052] In one embodiment the spindle body portion includes two or more sections that are joined together. The joint between the two or more sections typically forms the weakened means. The joint preferably breaks in preference to the two or more sections as a result of it being able to withstand less force and/or pressure.

[0053] Preferably the two or more sections of the spindle body portion that are joined together are joined in a plane perpendicular or substantially perpendicular to the longitudinal axis of the spindle body portion.

[0054] Preferably the two or more sections of the spindle body portion are joined together by welding, adhesive, one or more inter-engaging members, screws, a mechanical linkage and/or the like.

[0055] Preferably the spindle body portion includes second stop means.

[0056] Preferably the second stop means are provided between the first stop means and an end of the spindle body portion, such as for example a second end of the spindle body portion.

[0057] Preferably the weakened means and/or resilient means are provided between a first end and the first stop means, and the second stop means are provided between the first stop means and a second end. The second end is preferably opposite to the first end.

[0058] Preferably the first and second stop means are provided a spaced distance apart on or in associated with the spindle body portion.

[0059] Preferably the first and second stop means are provided a spaced distance apart along a longitudinal axis of the spindle body portion.

[0060] Preferably the second stop means are provided on or associated with a part of the spindle body portion that is on or facing towards an interior side of the door, window or closure member, or a side on which spindle locking apparatus may be actuated from in use.

[0061] Preferably the first and second stop means are provided to prevent movement or removal of the spindle body portion in a first direction, and at least a second direction respectively when fitted to handle apparatus or handle mechanism in use.

[0062] Preferably the first and/or at least second direction are parallel to or substantially parallel to the longitudinal axis of the spindle body portion, and further preferably are in opposite or substantially opposite directions

to each other.

[0063] In one embodiment the first stop means includes at least one protrusion means provided on said spindle body portion which protrudes outwardly of the spindle body portion.

[0064] Preferably the at least one protrusion means is of a form that increases one or more outer dimensions and/or diameter of a cross section of the spindle body portion so as to prevent or substantially prevent passage of the spindle body portion through a spindle aperture in use. The spindle aperture can be defined in the handle mechanism or apparatus and/or in spindle locking apparatus.

[0065] Preferably where the weakening means includes or consists of a reduction in the diameter of the spindle body portion, the reduction in the diameter of the spindle body portion is with respect to both the first stop means and a further or opposite adjacent section of the spindle body portion.

[0066] In one embodiment the second stop means can include any or any combination of one or more grub screws, screws, protruding members, engaging members, inter-engaging members, resilient biasing means.

[0067] In one embodiment one way engagement means can be provided on or associated with the second stop means to allow movement of the second stop means in one direction, in the direction towards the first stop means and/or the first direction only on the spindle body portion in use but to prevent movement of the second stop means in the second direction (i.e. towards the second end of the spindle body portion).

[0068] In one embodiment the handle mechanism with which the spindle apparatus can be used is a door handle mechanism or a window handle mechanism.

[0069] Preferably the spindle body portion is elongate or substantially elongate in form.

[0070] Preferably the direction in which movement or removal of the spindle body portion is prevented or substantially prevented in use is in the direction of an exterior side of a door or window and/or an interior side of a door or window in which the spindle apparatus is fitted to in use.

[0071] In one embodiment where the spindle body portion is used on a door, window or closure member having a handle mechanism provided on both side of the same, the spindle body portion is preferably of sufficient length so as to allow a first end of the spindle body portion to engage with handle means provided on or associated with a first side of the door, window or closure member and a second end of the spindle body portion to engage with handle means provided on or associated with a second or opposite side of the door, window or closure member.

[0072] In one embodiment the first stop means and/or protrusion means are integrally formed with the spindle body portion. However, the first stop means could be attached or detachably attached to the spindle body portion using any or any combination of attachment means,

such as for example, friction fit, welding, one or more clips, screws, inter-engaging members and/or the like.

[0073] Preferably the protrusion means could include anything that increases one or more outer dimensions of a cross section of the spindle body portion so as to prevent or substantially prevent passage of the spindle body portion through a spindle aperture in use. For example, the protrusion means can include any or any combination of one or more flanges, protrusions, thickenings, teeth ribs and/or the like.

[0074] Preferably the first stop means and/or second stop means could be provided on one side or surface of the spindle body portion only, on two sides or surfaces of the spindle body portion only, on three sides or surfaces of the spindle body portion only, on four sides or surfaces of the spindle body portion only, on all sides or surfaces of the spindle body portion, on opposing sides or surfaces of the spindle body portion and/or the like.

[0075] In one embodiment the resilient biasing means of the second stop means is in the form of a sprung clip, one or more sprung flanges and/or the like. This resilient biasing means is typically separate to, independent of and/or different to the resilient biasing means provided on the spindle body portion to cause bending of the spindle body portion under certain force conditions.

[0076] In one embodiment the one way engagement means of the second stop means includes any or any combination of one or more teeth, a ratchet mechanism and/or the like.

[0077] Preferably the first and second stop means has an aperture defined in the same which allows the spindle body portion to be inserted therethrough in use.

[0078] Preferably the resilient biasing means of the second stop means protrude inwardly of the aperture on the second stop means. As the spindle body portion is inserted through the aperture, the resilient biasing means are biased into engagement with one or more outer walls of the spindle body portion.

[0079] In one embodiment the weakened means has the same or substantially the same cross sectional shape as an adjacent section of the spindle body portion.

[0080] In one embodiment the weakened means has a different cross sectional shape to an adjacent section of the spindle body portion.

[0081] For example, the cross sectional shape of the weakening means and/or spindle body portion can be square, circular and/or the like.

[0082] In one embodiment the handle mechanism can include one or more handles, knobs and/or the like.

[0083] In one embodiment the spindle body portion is formed from any or any combination of one or more metals, plastics, rubbers and/or the like.

[0084] In one embodiment the spindle body portion is made from chromium vanadium.

[0085] In one embodiment the join between two sections of the spindle body portion that forms weakening means can be made from mild steel, aluminium and/or the like.

[0086] Thus, in one embodiment the spindle body portion is provided with at least one relatively weakened section and at least one relatively strong section. Preferably the relatively weakened section breaks on application of a force above a pre-determined threshold more easily than the at least one relatively strong section on application of the same force.

[0087] Preferably the force applied to the spindle body portion that causes bending or breaking of the resilient biasing means and/or weakening means respectively includes or consists of any or any combination of a pulling force, compressive force, bending force, twisting force and/or the like.

[0088] In one embodiment the spindle body portion is formed from a material that is weaker or that can withstand less force compared to the spindle locking apparatus.

[0089] According to a second aspect of the present invention there is provided a method of forming spindle apparatus.

[0090] According to further independent aspects of the present invention there is provided a handle mechanism including spindle apparatus; a method of using handle mechanism including spindle apparatus; spindle locking apparatus including spindle apparatus; a method of using spindle locking apparatus including spindle apparatus; a method of using spindle apparatus.

[0091] Preferably when a force is applied to the spindle apparatus below the pre-determined threshold, the spindle body portion operates in a conventional manner and does not deform, break or bend. The spindle body portion is typically able to rotate with rotation of the handle mechanism.

[0092] Preferably when a force is applied to the spindle apparatus above the pre-determined threshold, the spindle body portion operates in a manner according to the present invention and the spindle body portion is arranged to deform, break and/or bend. This preferably prevents rotation of the spindle body portion on rotation of the handle mechanism.

[0093] Embodiments of the present invention will now be described with reference to the following figures, wherein:

Figure 1a is a perspective view of spindle apparatus according to an embodiment of the present invention fitted to a handle mechanism in use;

Figure 1b is a perspective view of the spindle apparatus in figure 1a with part of the handle mechanism removed;

Figure 1c is an enlarged partial perspective view of the spindle apparatus in figure 1a with the handle mechanism removed;

Figure 2a is a perspective view of the spindle apparatus according to a second embodiment of the

present invention with part of a handle mechanism shown;

Figure 2b is an enlarged partial perspective view of the spindle apparatus in figure 2a with the handle mechanism removed;

Figure 3a is a perspective view of the spindle apparatus according to a third embodiment of the present invention with part of a handle mechanism shown;

Figure 3b is an enlarged partial perspective view of the spindle apparatus in figure 3a with the handle mechanism removed;

Figures 4a and 4b show perspective views of the spindle apparatus as shown in figures 1a-1c with a spindle locking plate shown in a locked position and an unlocked position respectively.

[0094] Referring firstly to figures 1a-1c, there is illustrated spindle apparatus 2 for use in a door handle mechanism 4 (the door is not shown for clarity purposes).

[0095] The handle mechanism 4 includes an exterior door handle 6, an interior door handle 8 and door locking mechanism 10 located between the same. For the purposes of this illustration, the door locking mechanism 10 is part of the handle mechanism but it could be separate if required. In addition, the door locking mechanism could include spindle locking apparatus if required.

[0096] The spindle apparatus 2 comprises a spindle body portion 12 having a first end 14 located in an aperture defined in exterior door handle 6 and a second end 16 located in an aperture 19 defined in interior door handle 8. The spindle body portion 12 is engaged to the exterior door handle 6, and is engaged to the interior handle 8 via grub screws 20.

[0097] The engagement of the spindle body portion 12 with the door handles 6, 8 is such that rotation or pivotal movement of one of the handles 6, 8 causes rotation of the spindle body portion therewith and also the other handle in normal use.

[0098] The door locking mechanism 10 includes a latch 22 that is movable from a latched or relatively protruding position, as shown in figure 1a, wherein it can engage with a latch recess in a door frame in use to door maintain the door in a closed position, to an unlatched or relatively recessed position (not shown), wherein it can be moved clear of the latch recess in the door frame to allow the door to be opened and closed in use. Movement of handles 6 or 8 in a downwardly direction from the resting position shown in figure 1a typically moves the latch 22 from the latched position to the unlatched position in use. A resilient biasing mechanism is typically associated with latch 22 such that release of handles 6 or 8 moves the latch 22 from the unlatched position to the latched position in use.

[0099] The door locking mechanism 10 also includes

a bolt 24 that is movable from a bolted or relatively protruding position, as shown in figure 1a, wherein it can engage with a bolt recess in the door frame in use to maintain the door in a locked or bolted position, to an unbolted or relatively recessed position (not shown), wherein it can be moved clear of the bolt recess in the door frame to allow the door to be unlocked in use. Movement of handles 6 or 8 in an upwardly direction from the resting position shown in figure 1a typically moves the bolt 24 from the unbolted position to the bolted position in use. A lock release means and/or key (not shown) typically needs to be provided and moved from a locked position to an unlocked position in order to allow a handle 6, 8 to move the bolt 24 from the bolted position to the unbolted position by moving the handle 6, 8 from the rest position in a downwardly direction in use.

[0100] The spindle body portion 12 is of a similar type to that described in the applicant's co-pending applications GB2521521, WO2016/128715 and/or GB1620405.9, the contents of which are incorporated herein by reference, with the exception that the spindle body portion 12 has weakened means in the form of a reduced diameter section 26.

[0101] Thus, the spindle body portion 12 is elongate in form and is provided with first stop means in the form of an outwardly protruding flange 28, optional second stop means in the form of a sprung clip 30, and a reduced diameter section adjacent the first stop means and between the same and the first end 14.

[0102] On assembly of the handle mechanism 4, the first end 14 of the spindle body portion 12 is located in the aperture of the exterior handle 6, the spindle body portion 12 is then located through a spindle aperture 32 defined in the body portion 34 of the door locking mechanism 10. The outwardly protruding flange 28 has a larger diameter than the spindle aperture 32, thereby preventing spindle body portion 12 from moving any further towards the interior side of the door/handle mechanism in use. The outwardly protruding flange 28 typically abuts against the exterior facing surface of body portion 34 of the door locking mechanism 10 in use. With the exterior door handle 6 in position, the sprung clip 30 is located on spindle body portion 12 from the second end 16. A one way mechanism in the form of a plurality of angled teeth 32 are defined on the exterior surface of the spindle body portion 12 between the second end 16 and the first stop means, such that sprung clip 30 can only move in one direction on the spindle body portion 12 in use towards first end 14. The sprung clip 30 is typically moved into abutting engagement with the interior facing surface of the body portion 34 of the door locking mechanism 10 in use. The interior door handle 8 is then located around the second end 16 of the spindle body portion 12.

[0103] In the illustrated example, spindle body portion 12 has a longitudinal axis shown by arrow 37.

[0104] The reduced diameter section 26 is provided between the first end 14 of the spindle body portion 12 and the outwardly protruding flange 28, and is preferably

immediately adjacent the outwardly protruding flange 28 on the exterior side of the door and handle mechanism. Section 26 is of reduced diameter relative to flange 28 but also relative to the section 36 of the spindle body portion 12 between first end 14 and the reduced diameter section 26. It is also of reduced diameter relative to the section 38 of the spindle body portion 12 between the second end 16 and the flange 28. As can be seen from figure 1a, the reduced diameter section 26 is adjacent the exterior facing side of the door in use.

[0105] If a potential intruder tries to apply excessive force to the exterior handle 6 in use, this will eventually apply sufficient force to spindle body portion 12 that it will break off at the reduced diameter section 26 since this is the weakest point of the spindle body portion. Further application of force to handle 6 will no longer apply any force (or very little force) to the remainder of the spindle body portion (i.e. from the broken section to the second end 16) or to the door locking mechanism 10, thereby preventing further damage to the handle mechanism in use. This prevents the potential intruder from gaining access through the handle/locking mechanism. Thus section 36 is caused to separate or break from section 38. The reduced diameter section 26 has a reduction in spindle body material sufficient that when a force is applied to the same above a pre-determined threshold force, this causes the reduced diameter section to break.

[0106] Although a potential intruder could remove the exterior handle 6 and broken section 36 of the spindle body portion, since the body portion 12 broke at section 26 immediately adjacent flange 28, there is insufficient length of remaining spindle body portion protruding from door locking mechanism 10 for the potential intruder to gain purchase or grip on the broken spindle. This prevents the intruder from gaining access through the door. The second stop means in the form of sprung clip 30 prevents the potential intruder from trying to push the spindle body portion 12 in the direction towards second end 16, thereby making the door very secure to unauthorised access by an intruder.

[0107] In the illustration, the reduced diameter section 26 is circular in cross sectional shape in contrast to the square cross sectional shape of the spindle body portion 12. However, the reduced diameter section 26 can be of any suitable shape and can be the same or different to the cross sectional shape of the spindle body portion.

[0108] In addition, the reduced diameter section 26 is substantially symmetrical in form about the longitudinal axis 37. However, the reduced diameter section 26 could be asymmetrical in form about axis 37 if required.

[0109] The amount of material removed from or not present at the reduced diameter section 26 is typically such that the cross sectional area is approximately at least 10% less than the cross sectional area of an adjacent cross sectional area taken between section 26 and first end 14. However, the reduced diameter section could be reduced by any suitable amount relative to the opposing sections of the spindle body portion such that

it allows breaking of the spindle body portion at point 26 when force above a pre-determined threshold is applied to the spindle body portion 12 in use.

[0110] The reduced diameter section 26 can be provided as a result of some of the material of the spindle body portion being removed from this section once formed, or the reduced diameter section 26 could be formed with a smaller diameter than the surrounding sections during manufacture.

[0111] Figures 2a and 2b show a spindle body portion 12 wherein the weakened section immediately adjacent flange 28 and on the exterior door side of the handle mechanism comprises an aperture 40 defined through spindle body portion 12, in accordance with a second embodiment of the present invention. The aperture 40 has openings on opposing sides of spindle body portion 12. The orientation of aperture 40 can be any orientation as required. The removal of spindle material or the lack of spindle material at point 42 immediately adjacent flange 28 or the first stop means on the exterior side of the handle mechanism, is sufficient that it results in the spindle body portion 12 breaking at point 42 when excessive force is applied to the spindle body portion, typically via the handle 6, in use.

[0112] Once the spindle is broken in the embodiments shown in figures 1a-2b, a user is required to repair the handle mechanism from the interior facing side of the mechanism by removing interior handle 8 from spindle body portion 12, breaking off second stop spring clip 30 and removing the spindle body portion 12 from the handle mechanism 4. A new spindle body portion then has to be fitted to the handle mechanism.

[0113] Figures 3a and 3b illustrate a yet further embodiment of the present invention wherein the spindle body portion 12 is provided with resilient biasing means in the form of a spring 44 at point 42 immediately adjacent flange 28 and on the exterior door side of the handle mechanism. Thus, in this example, a first end 46 of spring 44 is joined to the exterior facing surface 48 (or surface facing first end 14) of flange 28 or the first stop means. A second end 50 of spring 44 is joined to the interior facing surface 52 (or surface facing the second end 16) of the spindle body portion section 36.

[0114] When excessive force is applied to spindle body portion 12 adjacent first end 14, such as for example as a result of a potential intruder applying excessive force to exterior handle 6, the spring 44 bends, thereby preventing further excess force being transmitted along spindle body portion between surface 48 and the second end 16 of spindle body portion 12. This helps to prevent damage to the handle/locking mechanism 4 in use. A further advantage of this embodiment is that it does not require replacement of the spindle body portion and/or the handle mechanism does not need to be dismantled. The spring is typically resiliently biased back to its original position once the excess force has been removed, thereby allowing the spindle body portion 12 to function in a conventional manner. In the event that the spring 44 is

damaged, then the handle mechanism can be dismantled as previously described to replace the spindle body portion 12.

[0115] Figures 4a and 4b illustrate the spindle body portion arrangement as shown in figures 1a-1c but with a spindle locking plate 100 shown forming part of spindle locking apparatus. The locking plate 100 has a spindle locking aperture 102 in the shape of a keyhole having a first portion 104, which is of complementary shape to the spindle body portion 12 and having only slightly larger dimensions than spindle body portion 12, and a second portion 106, which is circular in shape and has larger dimensions than spindle body portion 12. When spindle body portion 12 is located in first portion 104 of the locking plate 100, this corresponds to a spindle locked position and rotation of the spindle 12 is prevented and rotation and/or actuation of handles 6, 8 is prevented. When spindle body portion 12 is located in second portion 106 of the locking plate 100, this corresponds to a spindle unlocked position and rotation of the spindle 12 can take place, together with rotation and/or actuation of handles 6, 8.

[0116] The spindle locking plate 100 can be moved between the spindle locked position and the spindle unlocked position via user actuation means, any mechanical means, electrical means, remotely and/or the like.

[0117] The spindle locking plate 100 is provided between the second stop means 30 and the second end 16 of the spindle body portion.

[0118] It will be appreciated that movement of the locking plate 100 between the locked and unlocked spindle positions applies force on the spindle body portion 12 and this force, if it exceeds the pre-determined threshold of force of the spindle body portion, can cause the spindle body portion to break and prevent damage to the spindle locking plate 100.

Claims

1. Spindle apparatus for a handle mechanism, said spindle apparatus comprising a spindle body portion having a first end and at least a second end, at least a first stop means provided on the spindle body portion between the first and at least second ends to prevent or substantially prevent movement or removal of the spindle body portion in at least a first direction when fitted to a handle mechanism in use, **characterised in that** the spindle body portion includes weakened means and/or resilient biasing means at or adjacent the first stop means to allow the spindle body portion to deform, break and/or bend when force is applied to the spindle body portion in use above a pre-determined threshold.
2. Spindle apparatus according to claim 1 wherein the weakened means and/or resilient biasing means are provided between the first stop means and the first

end of the spindle body portion and/or on a side of the stop means that is on an exterior side of a door, window or closure member on which the handle mechanism is to be used and/or on a side where access to unauthorised persons or animals is to be prevented.

3. Spindle apparatus according to claim 1 wherein a longitudinal axis of the weakened means and/or resilient biasing means is provided parallel or substantially parallel to a longitudinal axis of the spindle body portion.
4. Spindle apparatus according to claim 1 wherein the weakened means and/or resilient biasing means are provided in-line, in a linear manner and/or in a non-protruding manner with the spindle body portion.
5. Spindle apparatus according to any preceding claim wherein the resilient biasing means includes one or more springs, coiled springs and/or sprung material.
6. Spindle apparatus according to any preceding claim wherein the spindle body portion includes two or more sections and the weakened means and/or resilient biasing means are provided between the two or more sections.
7. Spindle apparatus according to any preceding claim wherein the resilient biasing means is used for or forms part of a handle mechanism comprising a keyless lock or an electronic or solenoid actuated handle or locking mechanism.
8. Spindle apparatus according to any preceding claim wherein the weakened means includes or consists of any or any combination of a reduced diameter part of the spindle body portion that is sufficient to allow breakage or deformity of the spindle body portion prior to any other part of the spindle body portion when a force is applied to the same above the pre-determined threshold; a reduced diameter part of the spindle body portion of 10% or more; a part having a reduced cross sectional area compared to another or remaining part of the spindle body portion; a part of the spindle body portion formed from or having a reduced amount of material compared to one or more other parts or remaining parts of the spindle body portion; a part where one or more apertures are provided in or through the spindle body portion; a join between two or more parts of the spindle body portion; frangible means; a section of the spindle body portion that is relatively thinner compared to a remaining part of the spindle body portion; joining means; a spring; one or more cut or partially cut sections; one or more sections formed from a different material to another or remaining one or more sections of the spindle body portion; one or more sec-

tions having a different shape to another or remaining section or sections of the spindle body portion.

9. Spindle apparatus according to claim 8 wherein the weakened means, a reduction in diameter of the spindle body portion or a depth or a recess of the weakened means is the same or substantially the same and/or is equal on each side or surface of the spindle body portion. 5
10. Spindle apparatus according to claim 8 wherein the weakened means, a reduction in diameter of the spindle body portion or a recess of the weakened means is different and/or unequal on one side or surface of the spindle body portion compared to another side or surface of the spindle body portion. 10 15
11. Spindle apparatus according to any preceding claim wherein the weakened means are integrally formed with the spindle body portion. 20
12. Spindle apparatus according to claim 2 wherein second stop means are provided on the spindle body portion between the first stop means and the second end of the spindle body portion. 25
13. Spindle apparatus according to claim 2 or 12 wherein the first stop means includes at least one protrusion means which protrudes outwardly of the spindle body portion and/or the second stop means includes any or any combination of one or more grub screws, screws, protruding members, one-way engaging means, engaging members, inter-engaging members or resilient biasing means. 30 35
14. Spindle apparatus according to any preceding claim wherein spindle locking means are provided on or associated with the spindle body portion, the spindle locking means movable between a locked position, wherein the spindle body portion is prevented or substantially prevented from rotating in use, and an unlocked position, wherein the spindle body portion can rotate in use. 40
15. A method of forming spindle apparatus for a handle mechanism, said spindle apparatus comprising a spindle body portion having a first end and at least a second end, at least a first stop means provided on the spindle body portion between the first and at least second ends to prevent or substantially prevent movement or removal of the spindle body portion in at least a first direction when fitted to a handle mechanism in use, **characterised in that** said method includes the step of incorporating weakened means and/or resilient biasing means at or adjacent the first stop means in the spindle body portion, and arranging the weakened means and/or resilient biasing means such that when force is applied to the spindle 45 50 55

body portion in use above a pre-determined threshold, the weakened means and/or resilient biasing means deforms, breaks and/or bends.

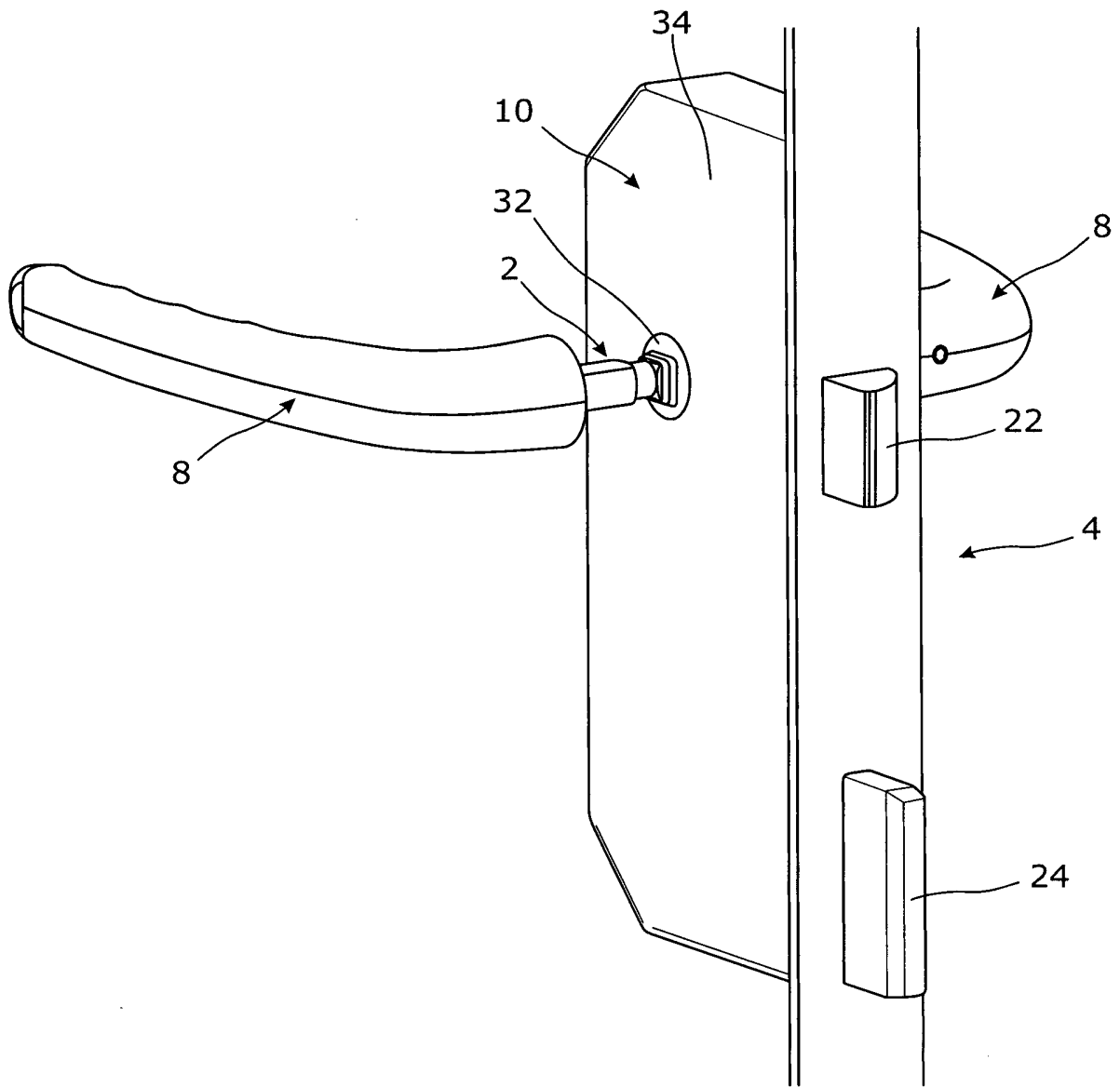
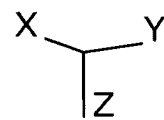


Figure 1a



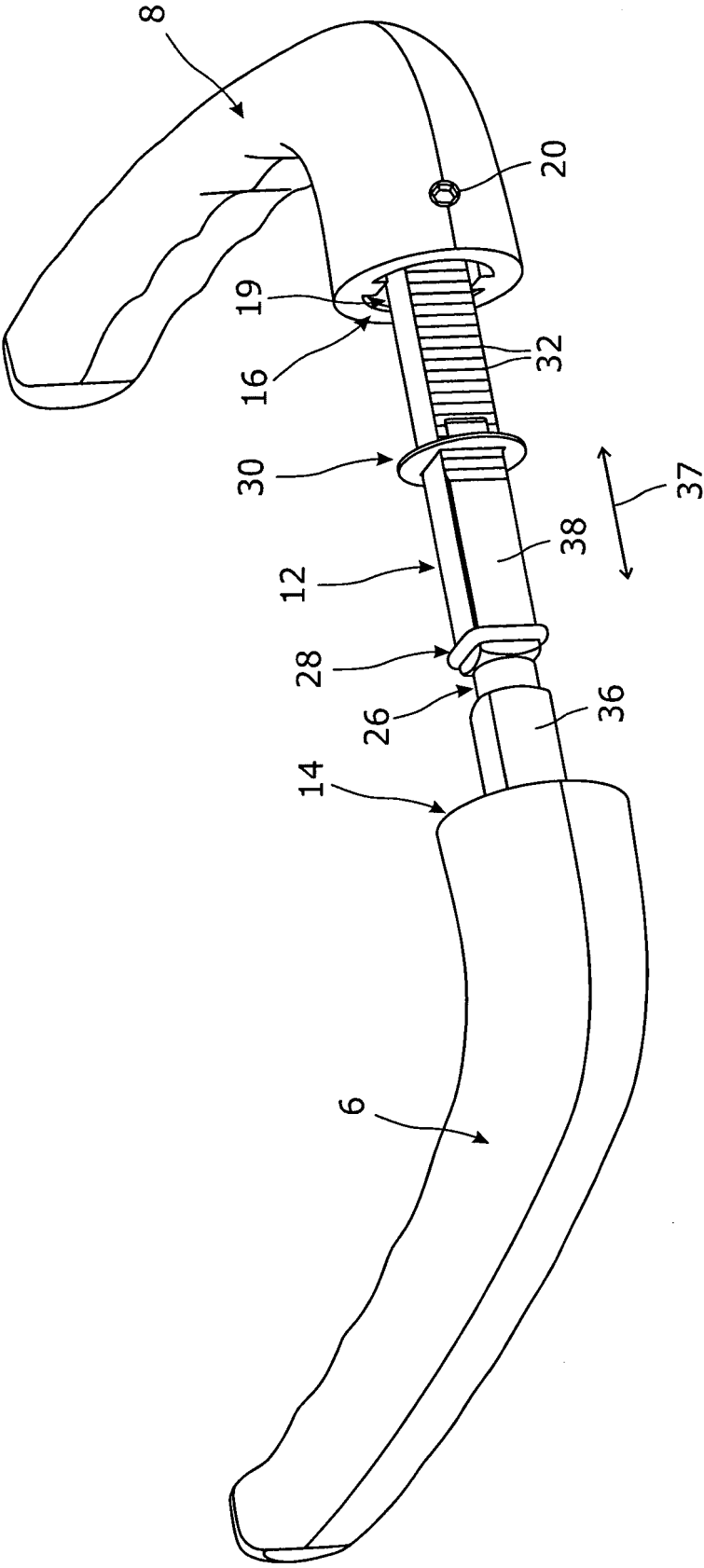


Figure 1b

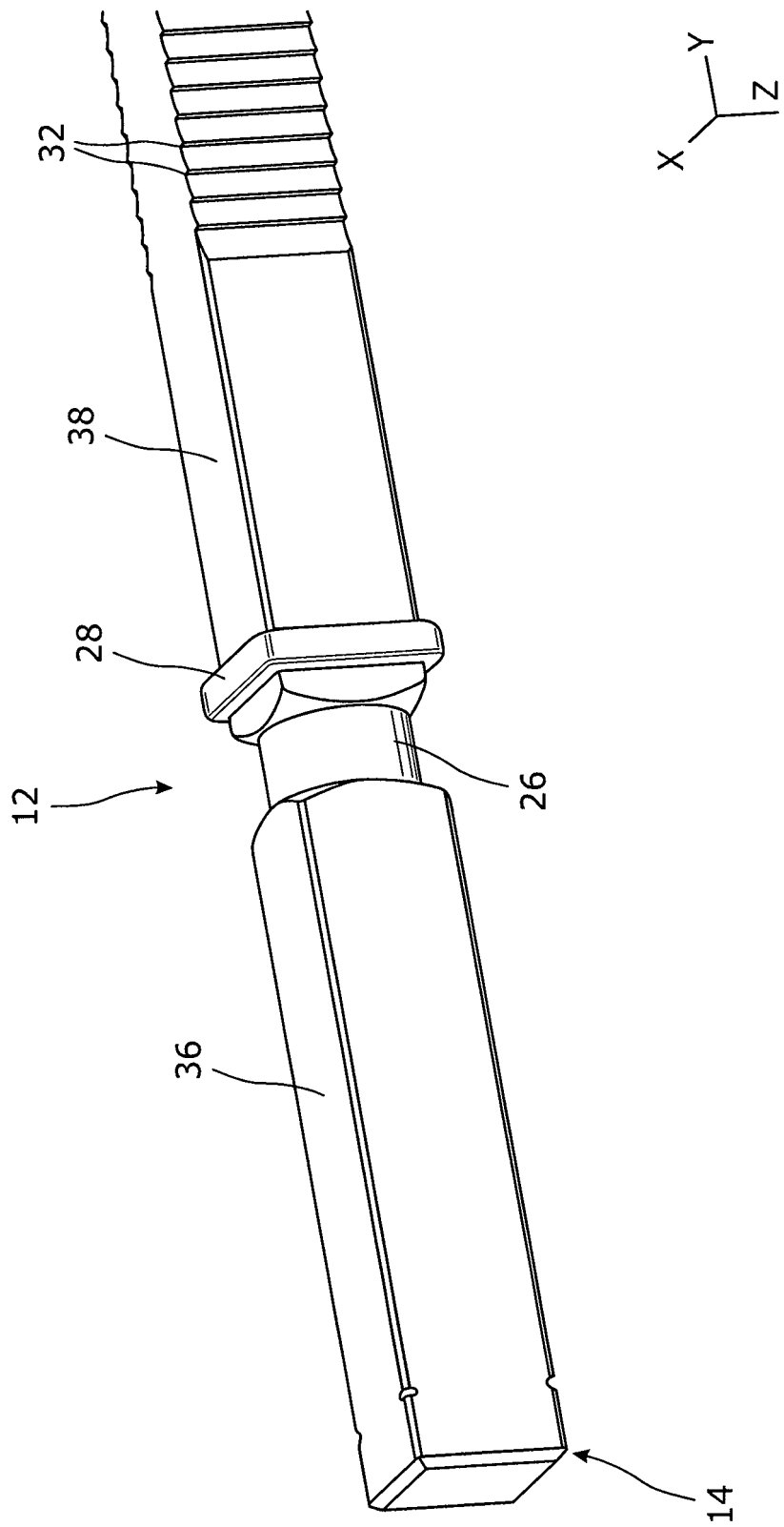


Figure 1c

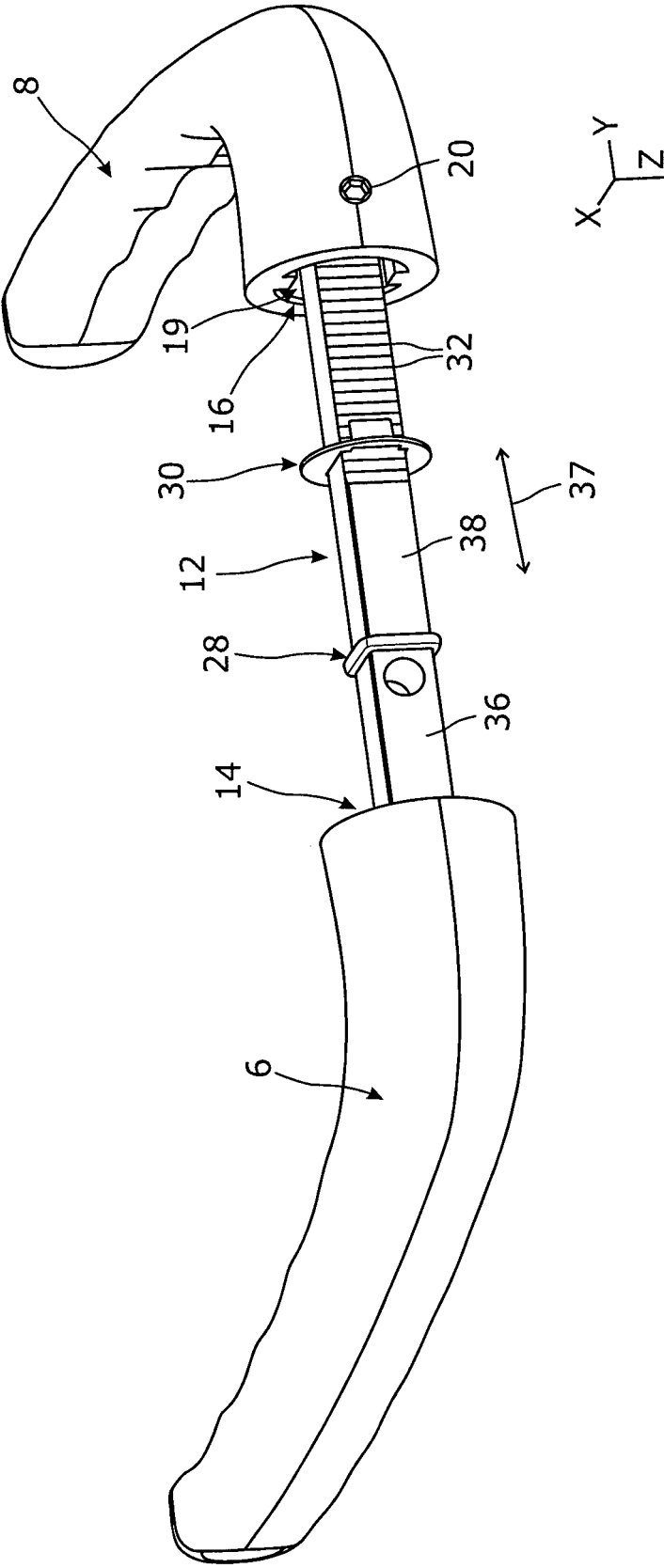


Figure 2a

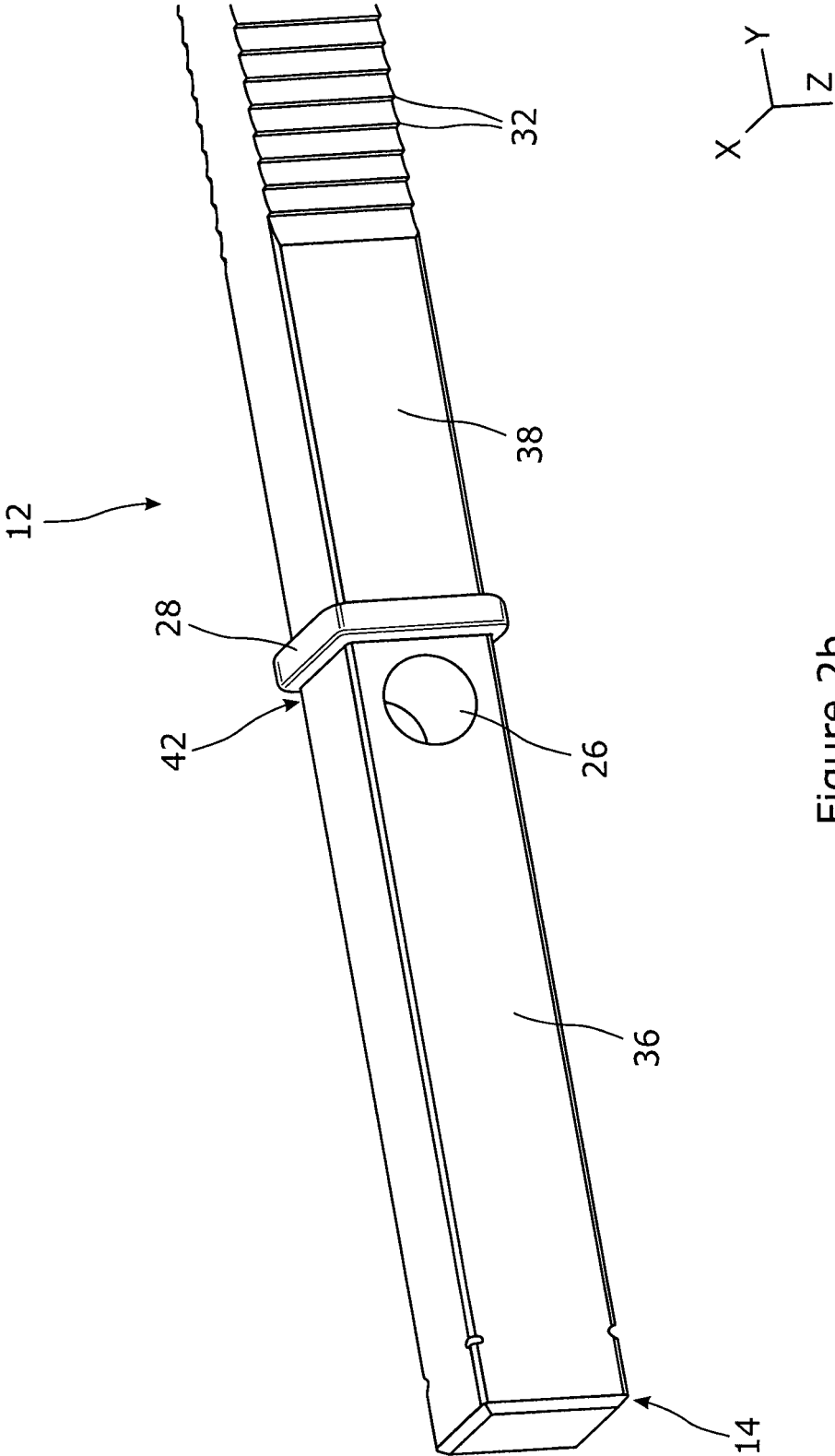


Figure 2b

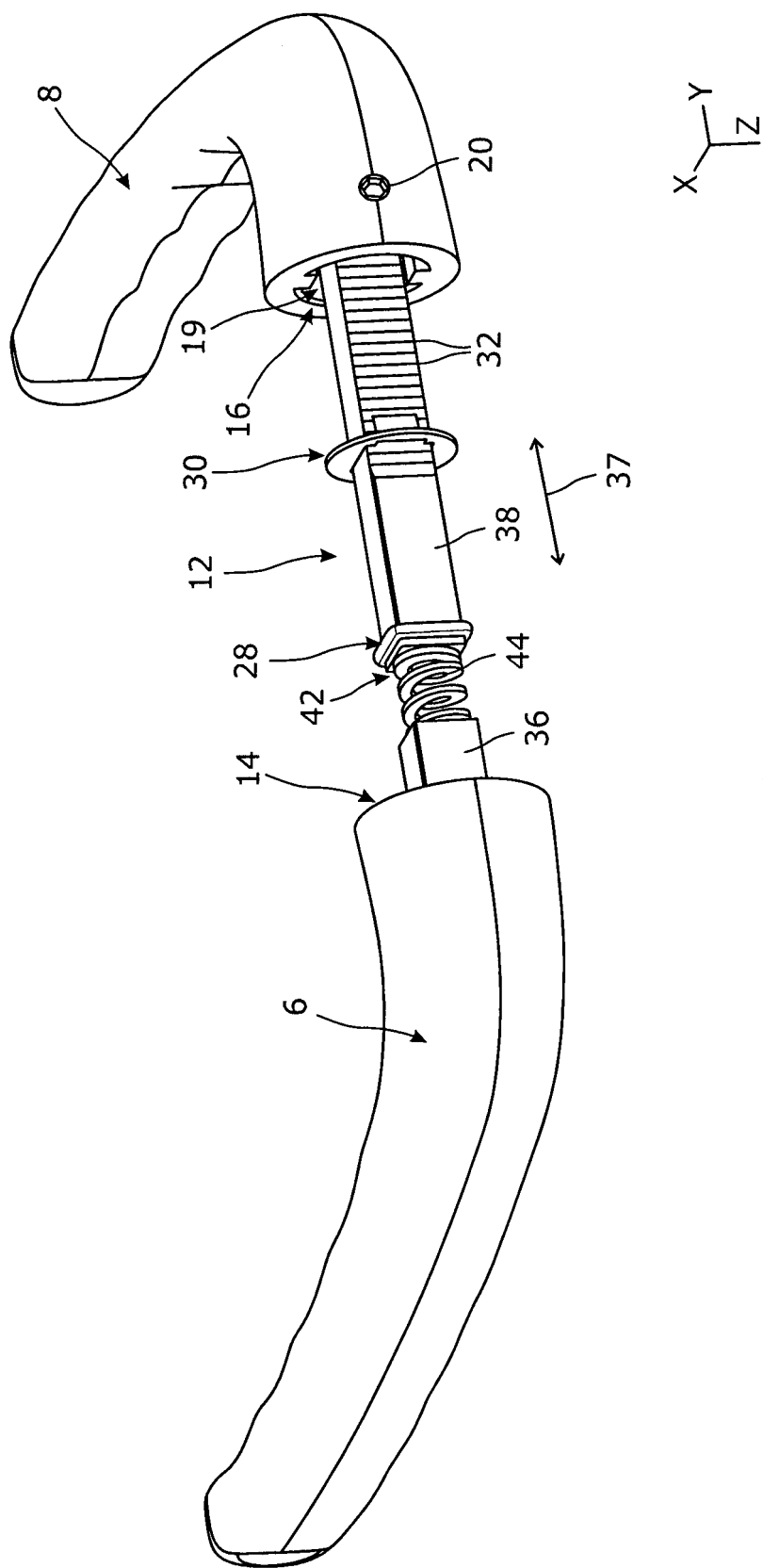


Figure 3a

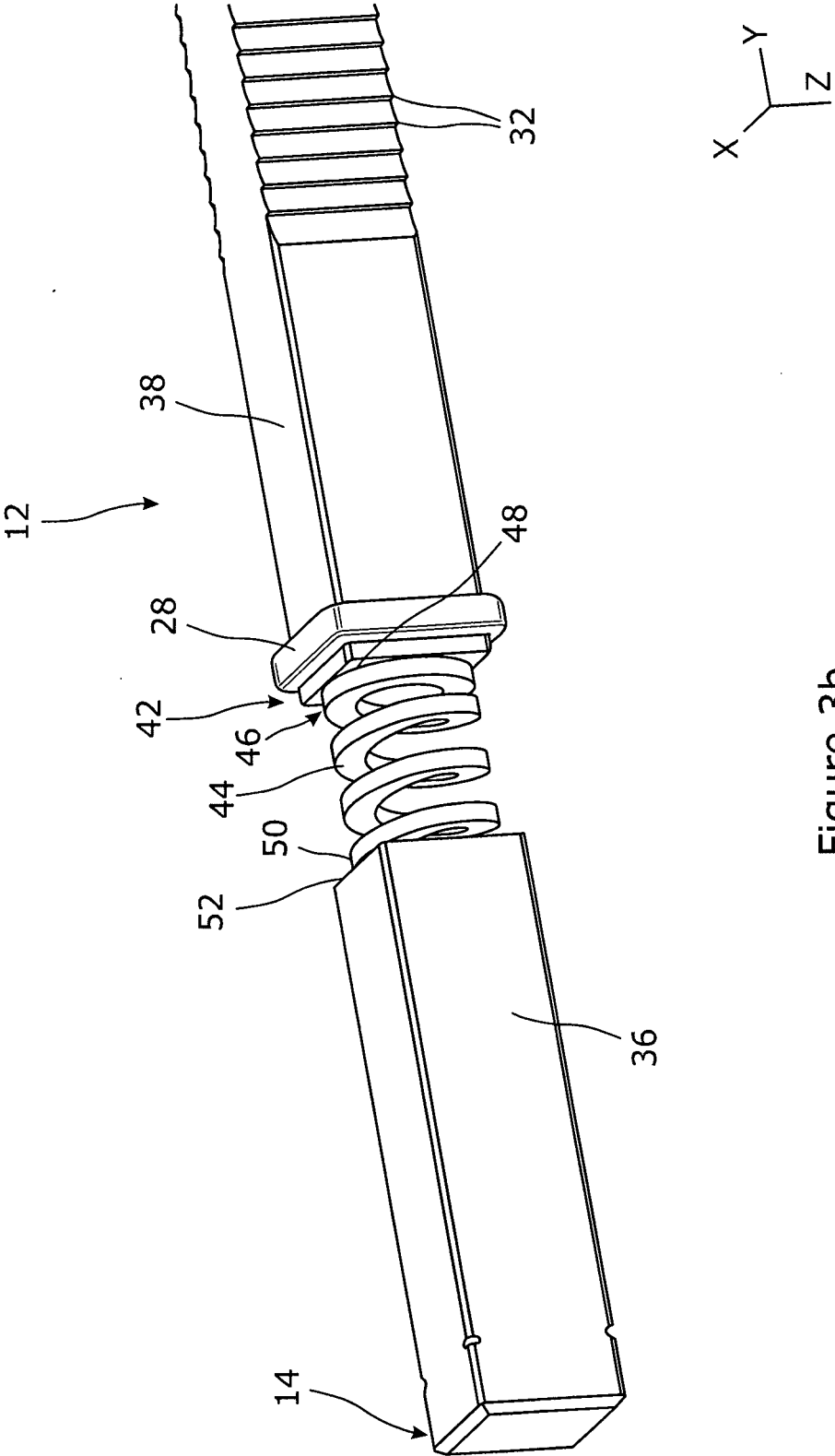


Figure 3b

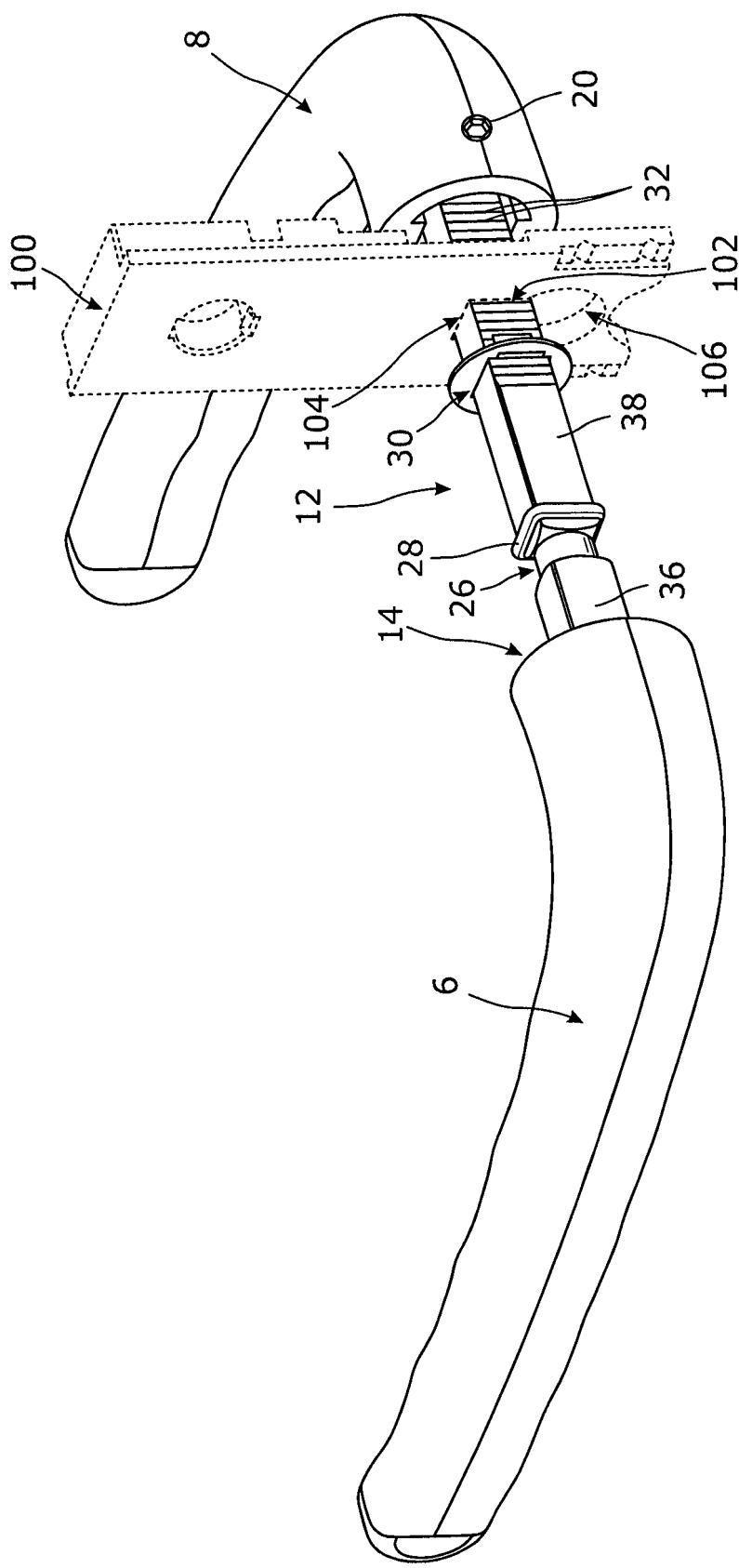


Figure 4a

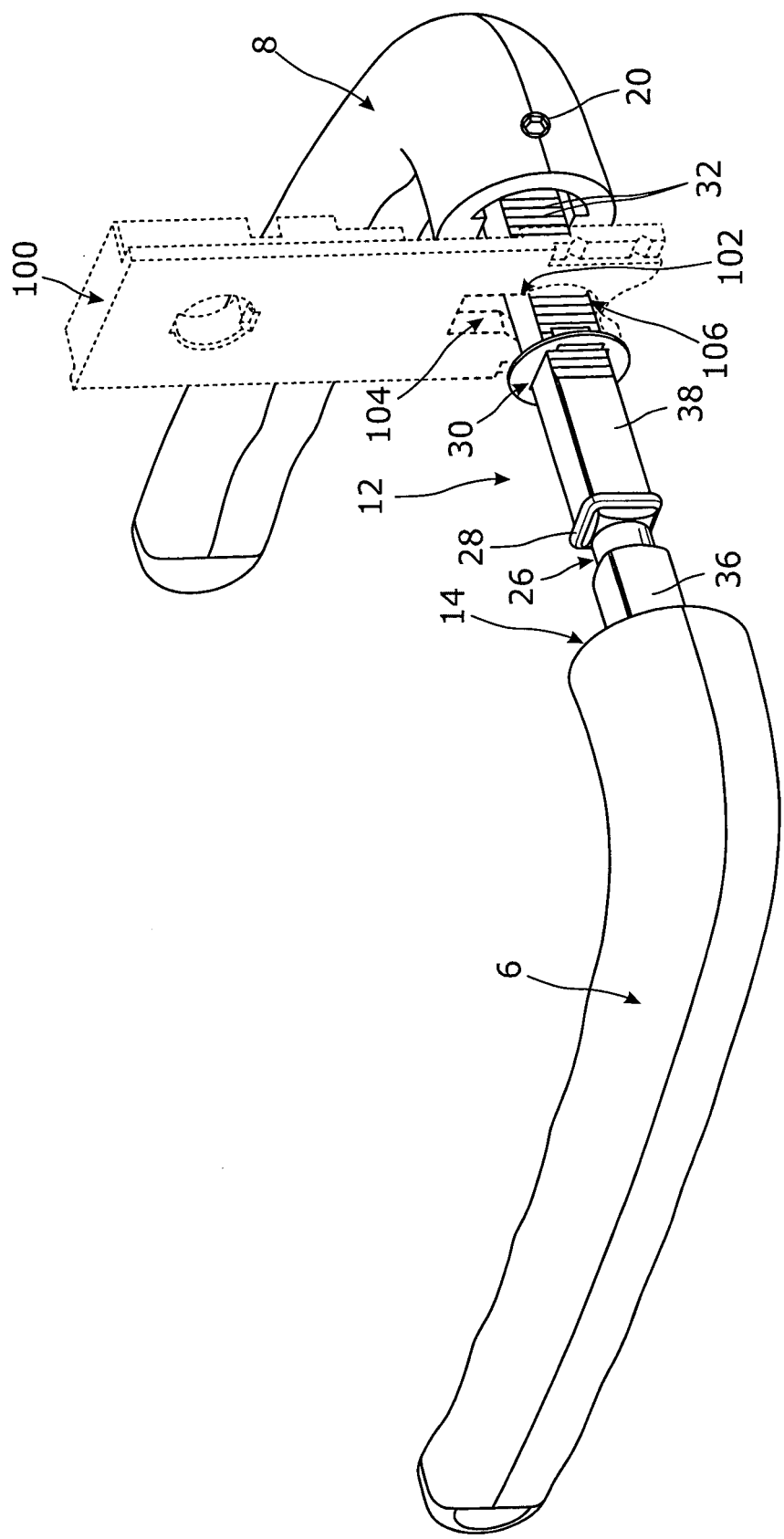


Figure 4b



EUROPEAN SEARCH REPORT

Application Number
EP 18 27 5048

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 215 811 A (GOODWIN W J & SON LTD [GB]) 27 September 1989 (1989-09-27) * the whole document *	1-4,6-9, 11-15	INV. E05B15/00 E05B13/00 E05B17/20 E05B17/00
X	US 2 609 679 A (BREMER FREDERICK J ET AL) 9 September 1952 (1952-09-09) * column 5, line 1 - line 10; figure 1 *	1-4,6-9, 11,13,15	
X	US 2004/160068 A1 (DALSING TROY A [US]) 19 August 2004 (2004-08-19) * the whole document *	1,5	
A	FR 2 279 912 A1 (FRANK GMBH WILH [DE]) 20 February 1976 (1976-02-20) * the whole document *	1,15	
A	FR 2 607 859 A1 (LEWINER JACQUES [FR]; FONTAINE SA [FR]) 10 June 1988 (1988-06-10) * page 7, line 1 - line 4; figure 3 *	1	
A	US 4 667 994 A (FOSHEE WILLIAM R [US]) 26 May 1987 (1987-05-26) * the whole document *	1,15	TECHNICAL FIELDS SEARCHED (IPC) E05B
X	WO 00/24993 A1 (EMHART INC [US]; CHONG GERALD B [US]; TAYLOR CHRISTOPHER L [US]) 4 May 2000 (2000-05-04) * page 4, line 26 - page 5, line 10; figures 7-9 *	1,10	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 June 2018	Examiner Ansel, Yannick
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 27 5048

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2215811 A	27-09-1989	NONE	
US 2609679 A	09-09-1952	NONE	
US 2004160068 A1	19-08-2004	NONE	
FR 2279912 A1	20-02-1976	AT 365716 B DE 2435228 A1 ES 214129 U FR 2279912 A1 YU 185975 A	10-02-1982 05-02-1976 01-07-1976 20-02-1976 27-04-1983
FR 2607859 A1	10-06-1988	NONE	
US 4667994 A	26-05-1987	NONE	
WO 0024993 A1	04-05-2000	AU 1222500 A BR 9914751 A CA 2348791 A1 CN 1328613 A GB 2359334 A JP 2003526749 A US 6151934 A WO 0024993 A1	15-05-2000 02-01-2002 04-05-2000 26-12-2001 22-08-2001 09-09-2003 28-11-2000 04-05-2000

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2016050213 A [0003]
- GB 1620405 A [0004] [0024] [0100]
- GB 2521521 A [0006] [0100]
- WO 02016050213 A [0024]
- WO 2016128715 A [0100]