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(54) Adjustment of spring tension

(57) A collar system (50) for being rotatably mounted upon a shaft and thus enabling tensioning of springs (57) mounted upon rotatable shafts. The collar system (50) comprises a secondary attachment portion (54) adapted for mechanical connection to one end of said spring (57) mounted upon said shaft; a primary attachment portion (51) on said collar (50) having longitudinally (C) extending splines (52) formed on the outer periphery of said primary attachment portion (51); and said primary attachment portion (51) is provided with at least one groove (53) propagating transverse (D) to said splines (52).

It is also disclosed a method for adjusting tension in springs (57) mounted upon rotatable shafts and a wrench assembly (1) suitable for performing the method.

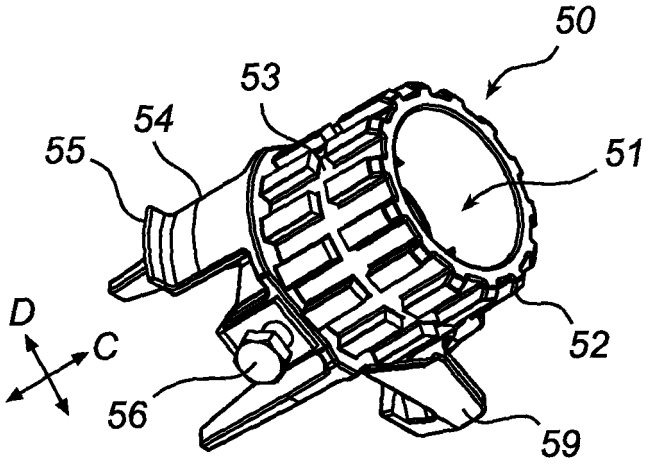

Fig. 4

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Description

Field of the Invention

[0001] The invention relates to a method for adjusting tension in springs mounted upon rotatable shafts. Furthermore, the invention relates to a wrench suitable for utilizing the method. Moreover, the invention relates to a collar system adapted for receiving said wrench.

Technical Background

[0002] The installation of industrial, residential and in particular overhead doors usually involves installing guides that support each side of a moveable door structure and upon which the sides of the door structure are freely slideable. As most moveable door structures are too heavy for a normal person to lift some sort of counterbalancing device is usually provided so that the full weight of the moveable door structure is not encountered when the moveable door structure is transferred between an opened and closed condition or vice versa. Even with power operated door opener devices a counter balance device is provided so as to be able to reduce the horsepower requirements of the drive motor. For safety reasons the counter balancing device is also necessary in the event of failure of the door openers.

[0003] A prevailing type of counter balancing device in wide use with such door openers, especially ones that have power operated motors to assist the opening and closing of the doors, is a coiled spring mounted upon a rotatable shaft. The shaft is usually located above the opening that is to be covered by the door and is transversely located across the path of the door. Upon this shaft is mounted a coiled spring in a somewhat concentric manner such that the longitudinal centerline of the spring approximately locates upon the longitudinal centerline of the shaft. One end of the spring is fixedly attached to a structure upon which the shaft is rotatably mounted and the other end of the spring is held releasably attached to the rotatable shaft.

[0004] The tensioning for the door takes the form of adjusting the tension exerted by the coiled spring upon the rotatable shaft that also holds a wound drag element usually attached to the lowermost end of the door. When properly adjusted the tension exerted by the spring is supposed to just about counterbalance the weight of the door that is being transferred during opening and closing movement.

[0005] The counterbalancing effect of the weight of the door may origin from the mid of the door for some roller door arrangements or arranged such that it origins from a fully opened condition. In original installation of the doors, when replacing broken springs, and even during periodic maintenance, it is necessary to adjust the tension of the springs to the desired degree so that the door can close and counterbalance almost the entire weight of the door during the raising and lowering of the door. To adjust the tension of the spring it is necessary for one to loosen the releasably fixed end of the coil spring that is attached to the rotatable shaft and rotate the end of the spring relative to the shaft, either in a manner to lessen the tension or to tighten the tension.

[0006] The springs used in such installations are not insubstantial in the force and/or torque that they exert to accomplish their task and it is therefore considered by those skilled in the art a potentially dangerous operation. When the one end of the spring attached to the rotatable shaft is loosened it must be securely held so as not to freely uncoil back to a tension free state. Such an uncoiling while a workman or other person is in the area may produce some very severe injuries.

[0007] It is an object of the present invention to provide a safe and efficient method for the tensioning of coiled springs used in door installations. It is an object of the present invention to provide an improved tool for use in properly tensioning springs used in door installations. It is a further object of the present invention to provide a new attachment for coil springs that will ease the operation of adjusting the tension of coiled springs in door installations.

Summary of the Invention

[0008] These and other objects, which will be presented further on, are achieved by the method according to independent claim 6. Preferred steps of the method are described in the dependent claims. It is also disclosed a wrench assembly according to independent claim 18 and a collar system according to independent claim 1. Preferred embodiments of the invention are presented in the respective dependent claims.

[0009] Now, according to the present invention it is disclosed a method for adjusting tension in springs mounted upon rotatable shafts, said method comprises the steps of, applying a first and a second wrench for splined engagement with a collar of said shaft so as to hold the collar against movement in an undesired direction, said collar being mechanically connected to at least one spring, positioning of an axial locking device, said axial locking device being provided on at least one of said wrenches, to said collar thereby forming an axial locking engagement of said wrenches to said collar, adjusting tension in said at least one spring by winding said collar with at least one of said wrenches until an appropriate tension of the spring is achieved. The collar comprises a locking device for fixing said collar to said shaft when the tension of the spring is properly adjusted.

[0010] Accordingly, during tension adjustment each wrench may be held in the axial direction at all times. This enables secure working conditions and support for finding correct position and a thorough splined engagement during holding or working against the resilient force from the spring. In addition the splined engagement allows for service work and installation work even where there is little room for such operations.

[0011] Preferably, the axial locking engagement is maintained during a whole spring tension adjusting cycle, involving splined disengagement during alternation of said wrenches.

[0012] Advantageously, the axial locking engagement is enabled by a tongue and groove engagement in which said tongue propagates circumferentially and in the transverse direction (B) in relation to the axial direction (A). Accordingly, the axial locking device engagement comprises a tongue and groove locking relative to the axial direction (A) of the shaft.

[0013] More preferably, the axial locking device comprises a U-shaped retractable plate for complementary engagement with a recess in said collar. Alternatively, although not preferred, the collar comprises a U-shaped protruding portion for complementary engagement with a recess in said axial locking device.

[0014] Preferably, the splined engagement of the wrench and collar is accomplished with a wrench spline angle less than 90 degrees and preferably between 80 and 90 degrees. A complementary fit of the splines of the wrench and the splines of the collar reduces the risk for slipping. It has been discovered that an angle between the front edge of the wrench spline of slightly less than 90 degress measured between the inner near surface of the jaw and said front edge provides for improved grip. Advantageously, the splined engagement involves engagement with splines propagating in the axial direction (A) of said shaft.

[0015] A further advantage is that the splined engagement is controllable by a latch function maneuverable from a latch operating handle of said wrench. Hence, the serviceman or installer do not have to change the grip of the wrench handle e.g when disengaging the splined engagement when adjusting tension.

[0016] According to a preferred embodiment of the invention the torque of said splined engagement is controllable and lockable by a torque locking mechanism being maneuverable from said wrench.

[0017] Preferably, each wrench having an open ended jaw, with a close fit around a substantial portion of said collar and said opened ended jaw being provided for splined engagement with said collar.

[0018] The method of adjusting tension in springs is particularly well suited for a group consisting of overhead sliding doors, sliding doors and winding roller doors according to any one of the preceding claims. The skilled person knowing of the invention may however find other areas of interest.

[0019] According to a second aspect of the invention a wrench assembly which comprises, an elongate handle,

an open ended jaw formation located on one end of said handle for closely surrounding and engaging a majority of the perimeter of a splined shaft, a spring loaded spline latch mechanism mounted on said handle and having a latch that, in a first position, protrudes into a jaw engagement area for splined engagement on said shaft and, in a second position is retracted from the jaw engagement area for splined disengagement, a latch operating device for moving said latch from one of said first position and said second position to the other of said first and second position, said open ended jaw formation being provided with a retractable tongue arranged on one side of the open ended jaw, said tongue being provided with a recess for closely surrounding at least part of a groove perimeter in proximity to said splined shaft.

[0020] Preferably, the wrench spline angle is less than 90 degrees and preferably between 80 and 90 degrees.

[0021] Advantageously, the splined engagement is controllable by a latch maneuverable from a latch operating handle of said wrench assembly.

[0022] As a further advantage and an important safety aspect the disengagement of said splined engagement is prevented by a spring loaded spline latch mechanism as long as the latch is subject to an external loading resulting from the splined engagement. The latch operating handle is operatively connected to the latch via a spring. If the loading on the latch exceeds the loading from the spring resulting from activating the latch operating handle the latch will remain in position for splined engagement, i.e. the force provided by the spring too the spring loaded latch mechanism is too low to disengage the splined engagement. Thus, if the installer or serviceman due to a mistake let go of both splined engagements at the same time at least one wrench when arranged properly will maintain the splined engagement.

[0023] The spring load in the spring loaded splined engagement is preferably provided by a push spring. The push spring is connected to a rod of the latch. The latch operating handle is operatively connected to the rod of the latch via a spring. The spring characteristics of the push spring is low. Since the wrench spline angle is less than 90 degrees and preferably between 80 and 90 degrees the external loading does not have to be substantial in order to provide enough resistance to disengagement. On the other hand when there is no external load on said latch and the latch operating handle is activated the latch is retracted by the pull force transferred from the latch operating handle to said push spring. When the latch operating handle is released the latch is pushed back in position for splined engagement in the jaw area by said push spring.

[0024] Moreover, the torque of said splined engagement is controllable and lockable by a torque locking mechanism being maneuverable from said wrench assembly. In order to allow smooth access and transfer the force from the wrench assembly efficiently to said spring via the collar the wrench assembly has an asymmetric opening of the open ended jaw.

[0025] Furthermore, the wrench assembly is provided with a hook for enabling hanging of said wrench assembly. It is realized that many doors requires such work on a substantial altitude and the hook facilitates for such situations.

[0026] According to a preferred embodiment of the in-

vention the wrench assembly is provided with replaceable handle portions in order to enable a wrench assembly with different lengths. The replaceable handle portion having the most suitable length may be screwed on to the elongate handle of the wrench assembly.

[0027] A further advantage is that the handle is provided with a knob on the end portion in order to facilitate picking up of said wrench assembly. Preferably, the knob extends from the handle portion to an extent such that if there is a risk for an operator's fingers to become pinched between a structural element, such as a wall, and the handle portion the knob will provide enough room there between to avoid serious finger pinching. A further object with the knob is to enable protection against slipping of the wrench in that it provides for support against loosing the grip during use in the axial direction of the elongate handle.

[0028] Now according to a third aspect of the invention a collar system for being rotatably mounted upon a shaft and thus enabling tensioning of springs mounted upon rotatable shafts is presented, which collar system comprises, a secondary attachment portion adapted for mechanical connection to one end of said spring mounted upon said shaft, a primary attachment portion on said collar having longitudinally (C) extending splines formed on the outer periphery of said primary attachment portion, and said primary attachment portion is provided with at least one groove propagating transverse (D) to said splines. The secondary attachment portion and the primary attachment portion may be mounted together on location. Preferably, the secondary attachment portion and the primary attachment portion form one unit.

[0029] The collar system comprises a locking device for fixing said collar to said shaft. During this step holding of one wrench against the spring tension is sufficient and allows for fixing the collar in relation to the shaft when the tension in the spring is properly adjusted.

[0030] According to an alternative embodiment of the third aspect of the invention said collar system comprises a body formed for attachment to at least said primary attachment portion, said body comprising complementary engagement means on its inside and holes propagating from the outside towards the inside of said body, said holes being arranged for receiving an alternative tension adjusting tool such as an iron bar. This body enables the use of a currently conventional method of adjusting springs, using bars, e.g. in case wrenches of the preferred type is not available

[0031] Preferably, said holes are arranged at given distances around a periphery of said body when following the periphery in the transverse (D) direction.

Brief description of the drawings

[0032] A preferred method together with currently preferred embodiments of the invention will now be disclosed by means of the appended drawings in which:

fig. 1a schematically discloses an overhead sliding door or sectional door of conventional type,

fig. 1b schematically discloses a winding roller door of conventional type,

fig. 2 discloses a wrench according to a preferred embodiment of the invention as seen in perspective,

fig. 3 discloses a wrench according to a preferred embodiment of the invention as seen from the side in an opened up manner in order to more clearly illustrate the features of the wrench,

fig. 4 discloses a collar according to a preferred second aspect of the invention in a perspective view,

fig. 5 discloses a preferred manner of applying the method according to a preferred method of the invention in a cut out perspective view,

fig. 6 discloses schematically a collar system body in an opened up condition taken in a perspective view,

fig. 7 discloses an alternative embodiment of the invention according to a second preferred embodiment,

figs. 8(1) and 8(2) discloses the initial step in adjusting tension according to the claimed method by means of the second preferred embodiment, and

fig. 9 discloses a third alternative embodiment of the invention.

Detailed description of a preferred method and embodiments

[0033] In the following some non restricting embodiments will be described with support from the drawings and with reference to the numbering thereof in order to more clearly illustrate the functions and features. Referring now to figs. 4 and 5 the method will be disclosed in more detail.

[0034] A coiled spring 57 is arranged around a shaft and fixed arranged to the surrounding structure of the door in one end (not shown). This represents a more typical type of spring tensioned shafts for doors that are designed for being wound up today. A collar 50 is threaded onto the coiled spring 57 from the side such that a flange 55 follows the spiral path of the coiled spring 57. A connecting element 59 is provided on the collar for connection with the end portion of the coiled spring, which is normally cranked. When the cranked end portion connects with the connecting element 59 the collar 50 is fixed in relation to the coiled spring 57 which is held between the flange 55 and connecting element 59. The collar 50 is however rotatable in relation to said shaft. The rotatable collar will have a set of screws 56 that may be positioned so as to engage the shaft member and hold the collar non-rotatable with the shaft.

[0035] When the coil spring 57 is in its free state there is no danger to personnel in the area of the spring mechanism. However, when the rotatable collar 50 has been wound so that the end is in a tension position with respect to the end a dangerous condition exists. At that point the

collar 50 must be held firmly in position so that it will not suddenly uncoil.

[0036] Furthermore, the primary attachment portion 51 on said collar 50 has longitudinally (C) extending splines 52 formed on the outer periphery of said primary attachment portion 51, and said primary attachment portion (51) is provided with at least one groove 53 propagating transverse (D) to said splines 52. As will be seen in fig 4 the secondary attachment portion 54 and the primary attachment portion 51 form one unit. Thus it is possible to perform a safe and smooth tension adjustment with the wrenches 1,1' only by access to the primary attachment portion 51.

[0037] Now, also turning to fig 3 a wrench assembly 1 according to the present invention having an elongate handle 2 an engagement section in the form of an open ended jaw 3 is disclosed. The wrench is designed so that the area within the engagement section will form a close fit over the outer diameter of the splined section of the collar 50. When the latch operating device 5 is in normal condition the spline latch mechanism 4 is protruding upwardly so that the engaging splines of the wrench 15 is in the area of the engagement section 3. Initially a lever arm 10 activates the recessed tongue 7 for axial locking of the wrench 1.

[0038] A pull of the latch operating device 5 towards the elongate handle 2 allows the plunger member to travel inwardly pulling the spline latch mechanism 4 in to the elongate handle 2. In this manner the engagement section 3 may then be slid over the spline section of adapter. When the wrench splines 15 are engaged with the spline section the exerting of a force on handle 2 of wrench 1 will exert a force so as to tend to rotate the rotatable collar 50.

[0039] As it will become more clear two wrenches 1, 1' may engage the spline section of the collar 50. When two such wrenches 1, 1' engage the collar 50 the set screws 56 on the rotatable collar 50 may be loosened. When the rotatable collar 50 is loosened from its connection of the shaft wrenches 1, 1' may be used to hold collar 50 from rotating on the shaft. While holding one wrench 1 that has its spline latch mechanism 15 engaged with the splines 53 of the collar the second wrench may have the latch operating device 5 activated so as to disengage its wrench splines 15 from the spline section of collar 50. With the first wrench 1 holding the collar non rotatable with the shaft, the second wrench 1' may then be advanced pivotal around the splined section of the collar 50. When the second wrench 1' is in a new position the spline latch mechanism 4 may be released so that its wrench splines 15 engages the spline section of collar 50. When the second wrench l' being held in such a position, the latch operating device 5 of the first wrench 1 may be activated so that spline latch mechanism 15 is disengaged from the splines of the collar. The second wrench 1' may now be rotated back until its elongated handle 2 is in alignment with the first wrench 1. Repeating the above procedure with the first wrench 1 and the second wrench 1' will allow one to properly adjust tension of the coil spring 57 while maintaining an axial locking of the respective wrench 1,1' by means of the activated axial locking device 7. This describes the alternation of the wrenches in more detail.

[0040] As a further advantage and an important safety aspect the disengagement of said splined engagement is prevented by said spring loaded spline latch mechanism as long as the latch is subject to external loading. The spline latch mechanism 4 comprises a tensioned push spring 13 working against a rod 6 connecting said latch operating device 5 with said spline latch mechanism 4.

[0041] As a further advantage and an important safety aspect the disengagement of said splined engagement is prevented by a spring loaded spline latch mechanism 4 as long as the latch 15 is subject to an external loading resulting from the splined engagement. The latch operating handle 5 is operatively connected to the spline latch mechanism 4 via a spring 13. If the loading on the latch 15 exceeds the loading from the spring 13 resulting from activating the latch operating handle 5 the latch 15 will remain in position for splined engagement, i.e. the force provided by the spring 13 to the spring loaded latch mechanism 4 is too low to disengage the splined engagement. Thus, if the installer or serviceman due to a mistake activate the latch operating handles 5 of bothe wrenches at the same time at least one wrench when arranged properly will maintain the splined engagement due to the external loading from the coiled spring.

[0042] The spring load in the spring loaded splined engagement is preferably provided by a push spring. The push spring is connected to a rod of the latch. The latch operating handle is operatively connected to the rod of the latch via a spring. The spring characteristics of the push spring is low. Since the wrench spline angle is less than 90 degrees and preferably between 80 and 90 degrees the external loading does not have to be substantial in order to provide enough resistance to disengagement. On the other hand when there is no external load on said latch and the latch operating handle is activated the latch is retracted by the pull force transferred from the latch operating handle to said push spring. When the latch operating handle is released the latch is pushed back in position for splined engagement in the jaw area by said push spring.

[0043] Moreover, the torque resistance of said splined engagement is controllable and lockable by a torque locking mechanism 14 being maneuverable from said wrench assembly. The torque locking mechanism 14 consist of a screw or similar attached through the wall of the elongated handle 2. The screw may enter a pocket of the spline latch mechanism 4 from the side and support the bottom of the pocket. At the same time the pocket is stretched in the axial direction of the elongated handle 2 so as to allow for movement of the spline latch mechanism 4 if activated. Moreover, in order to allow smooth access and transfer of the force from the wrench assem-

bly 1 efficiently to said spring 57 via the collar 50 the wrench assembly 1 has an asymmetric opening of the open ended jaw 3.

[0044] The axial locking engagement is enabled by a tongue 7 and groove 53 engagement in which said tongue 7 propagates circumferentially and in the transverse direction (B) in relation to the axial direction (A). This is probably more clear in fig 2. The axial locking device 7 comprises a U-shaped retractable plate for complementary engagement with a recess 53 in said collar 50. Alternatively, although not shown, the collar may comprise a U-shaped protruding portion for complementary engagement with a recess in said axial locking device.

[0045] Furthermore, the wrench assembly 1 is provided with a hook 18 for enabling hanging of said wrench assembly 1. It is realized that many doors requires such work on a substantial altitude and the hook 18 facilitates for such situations since there is often not so much space for laying tools when not used.

[0046] According to a preferred embodiment of the invention the wrench assembly 1 is provided with replaceable handle portions 23 in order to enable a wrench assembly 1 with different lengths. The replaceable handle portion 23 having the most suitable length may be screwed on to the elongate handle of the wrench assembly (not shown).

[0047] A further feature of the invention is that the handle 23 is provided with a knob 24 on the end portion in order to facilitate picking up said wrench assembly. According to a preferred embodiment of the invention, the knob extends from the handle portion to an extent such that if there is a risk for an operator's fingers to become pinched between a structural element, such as a wall, and the handle portion the knob will provide enough room there between to avoid serious finger pinching. A further object with the knob is to enable protection against slipping of the wrench in that it provides for support against loosing the grip during use in the axial direction of the elongate handle.

[0048] Fig 6 discloses a further aspect of the invention in which said collar system 50 comprises a body 70 formed for attachment to at least said primary attachment portion 51. The body 70 comprises complementary engagement means 73 on its inside and holes 72 propagating from the outside towards the inside of said body 70. The holes 72 being arranged for receiving an alternative tension adjusting tool such as an iron bar.

The holes 72 are arranged at given distances around a periphery of said body 70 when following the periphery in the transverse (D) direction. Axial locking in relation to the shaft is enabled by a pin which may be appied in a hole 78 for further engagement with the groove 53 in the collar. It is appreciated that the various features for enabling improved tension adjustment described in the above given examples may readily be combined in various ways without departing from the scope of protection.

[0049] In fig 7 is depicted an alternative wrench for performing the claimed method. The wrench comprises a closed jaw portion 128 for being arranged from the side to the shaft 158. A resilient member 115 is provided for splined engagement with a radially splined collar. Furthermore, a pivotal axial locking device 107 is provided for inner engagement with a hollow space of the collar extending circumferentially. In fig 8(1) it is disclosed how the wrench is applied to the shaft and in fig 8(2) it is disclosed how the axial locking device is arranged to the collar. A second wrench (not shown) of similar type may be arranged next to said first wrench. Suitably, said first wrench is "pumped" back and forth while the second wrench is used for holding the collar in position during disengagement and so forth of said first wrench.

[0050] A second alternative wrench is disclosed for enabling the claimed method on doors. The wrench comprises a closed jaw portion 228 for being arranged from the side to the shaft 258. A resilient member 215 is provided for splined engagement with a longitudinally (A) extending splines 252 on the inner side of a collar. Furthermore, a pivotal axial locking device 207 is provided for inner engagement with a hollow space 253 of the collar extending circumferentially.

In addition to the claims appended hereto, the present application also embodies the subject matter set out in the claims as originally filed with the European Patent Application from which the present application is derived, namely the aspects (and combinations thereof) set out in the following clauses.

ASPECTS OF THE INVENTION

[0051]

Aspect 1. A method for adjusting tension in springs (57) mounted upon rotatable shafts, said method comprises the steps of:

applying a first and a second wrench (1, 1') for splined engagement with a collar (50) of said shaft so as to hold the collar (50) against movement in an undesired direction, said collar (50) being mechanically connected to at least one spring (57),

positioning of an axial locking device (7), said axial locking device (7) being provided on at least one of said wrenches (1, 1'), to said collar (50) thereby forming an axial locking engagement of said wrenches (1, 1') to said collar (50),

adjusting tension in said at least one spring (57) by winding said collar (50) with at least one of said wrenches (1, 1') until an appropriate tension of the spring (57) is achieved.

Aspect 2. The method according to aspect 1, in which the axial locking engagement is maintained during a whole spring tension adjusting cycle, involving splined disengagement during alternation in position

of one of said wrenches (1, 1').

Aspect 3. The method according to any one of aspects 1-2, in which said axial locking engagement is enabled by a tongue and groove engagement in which said tongue propagates circumferentially and in the transverse direction (B) in relation to the axial direction (A).

Aspect 4. The method according to any one of aspects 1-3, in which said axial locking device engagement comprises a tongue and groove locking relative to the axial direction (A) of the shaft.

Aspect 5. The method according to any one of aspects 1-4, in which said axial locking device (7) comprises a U-shaped retractable plate for complementary engagement with a recess (53) in said collar (50).

Aspect 6. The method according to any one of aspects 1-4, in which said collar comprises a U-shaped protruding portion for complementary engagement with a recess in said axial locking device.

Aspect 7. The method according to any one of aspects 1-6, in which the splined engagement of the wrench (1, 1') and collar (50) is accomplished with a wrench spline angle (16) less than 90 degrees and preferably between 80 and 90 degrees.

Aspect 8. The method according to any one of aspects 1-7, in which said splined engagement involves engagement with splines (53) propagating in the axial direction (A) of said shaft.

Aspect 9. The method according to any one of aspects 1-8, in which said splined engagement is controllable by a latch function maneuverable from a latch operating handle (5) of said wrench (1, 1').

Aspect 10. The method according to any one of aspects 1-9, in which torque of said splined engagement is controllable and lockable by a torque locking mechanism (14) being maneuverable from said wrench (1, 1').

Aspect 11. The method according to any one of aspects 1-10, in which each wrench (1, 1') having an open ended jaw (3), with a close fit around a substantial portion of said collar (50) and said opened ended jaw (3) being provided for splined engagement with said collar (50).

Aspect 12. Method of adjusting tension in springs (57) mounted on any one from the group consisting of overhead sliding doors (81), sliding doors and winding roller doors (91) according to any one of the preceding aspects.

Aspect 13. A wrench assembly (1) which comprises:

an elongate handle (2);
an open ended jaw formation (3) located on one end of said handle (2) for closely surrounding and engaging a majority of the perimeter of a splined shaft;
a spring loaded spline latch mechanism (4) mounted on said handle (2) and having a latch (15) that, in a first position, protrudes into a jaw engagement area for splined engagement on said shaft and, in a second position is retracted from the jaw engagement area for splined disengagement;
a latch operating device (5) for moving said latch (15) from one of said first position and said second position to the other of said first and second position;
said open ended jaw formation (3) being provided with a retractable tongue (7) arranged on one side of the open ended jaw, said tongue (7) being provided with a recess for closely surrounding at least part of a groove (53) perimeter in proximity to said splined shaft.

Aspect 14. The wrench assembly (1) according to aspect 13, in which the wrench spline angle (16) is less than 90 degrees and preferably between 80 and 90 degrees.

Aspect 15. The wrench assembly (1) according to any one of aspects 13-14, in which said splined engagement is controllable by a latch function (4) maneuverable from a latch operating handle (5) of said wrench assembly (1).

Aspect 16. The wrench assembly (1) according to any one of aspects 13-15, in which disengagement of said splined engagement is prevented by said spring loaded spline latch mechanism (4) as long as the latch (15) is subject to external loading.

Aspect 17. The wrench assembly (1) according to any one of aspects 13-16, in which torque of said splined engagement is controllable and lockable by a torque locking mechanism (14) being maneuverable from said wrench assembly (1).

Aspect 18. The wrench assembly (1) according to any one of aspects 13-17, in which the wrench assembly (1) has an asymmetric opening of the open ended jaw (3).

Aspect 19. The wrench assembly (1) according to any one of aspects 12-18, in which the wrench assembly (1) is provided with a hook (18) for enabling

hanging of said wrench assembly (1).

Aspect 20. The wrench assembly (1) according to any one of aspects 12-19, in which the wrench assembly (1) is provided with replaceable handle portions (23) in order to enable a wrench assembly (1) with different lengths.

Aspect 21. The wrench assembly (1) according to any one of aspects 12-20, in which said handle (2) is provided with a knob (24) on the end portion in order to facilitate picking up said wrench assembly (1).

Claims

1. A collar system (50) for being rotatably mounted upon a shaft and thus enabling tensioning of springs (57) mounted upon rotatable shafts, which collar system (50) comprises,
a secondary attachment portion (54) adapted for mechanical connection to one end of said spring (57) mounted upon said shaft,
a primary attachment portion (51) on said collar (50) having longitudinally (C) extending splines (52) formed on the outer periphery of said primary attachment portion (51), and said primary attachment portion (51) is provided with at least one groove (53) propagating transverse (D) to said splines (52).

2. A collar system (50) according to claim 1, in which collar system (50) the secondary attachment portion (54) and the primary attachment portion (51) form one unit.

3. A collar system (50) according to any one of claims 1-2, in which said collar system (50) comprises a locking device (56) for fixing said collar (50) to said shaft.

4. A collar system (50) according to any one of claims 1-3, in which said collar system (50) comprises a body (70) formed for attachment to at least said primary attachment portion (51), said body (70) comprising complementary engagement means (73) on its inside and holes (72) propagating from the outside towards the inside of said body (70), said holes (72) being arranged for receiving an alternative tension adjusting tool such as an iron bar.

5. A collar system (50) according to claim 4, in which said holes (72) are arranged at given distances around a periphery of said body (70) when following the periphery in the transverse (D) direction.

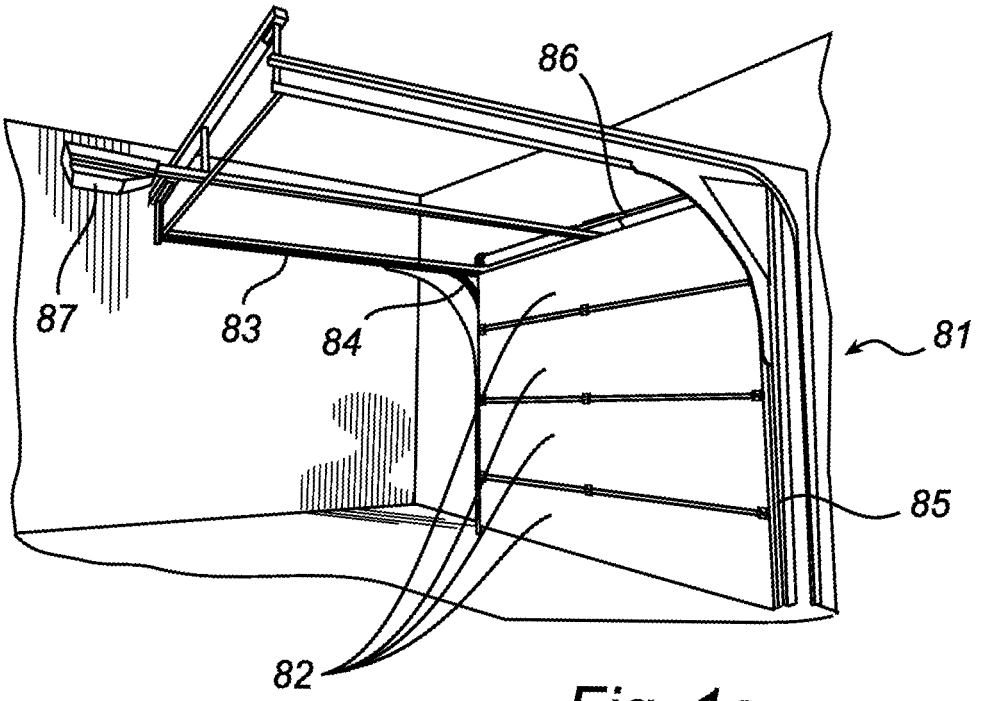

Fig. 1a

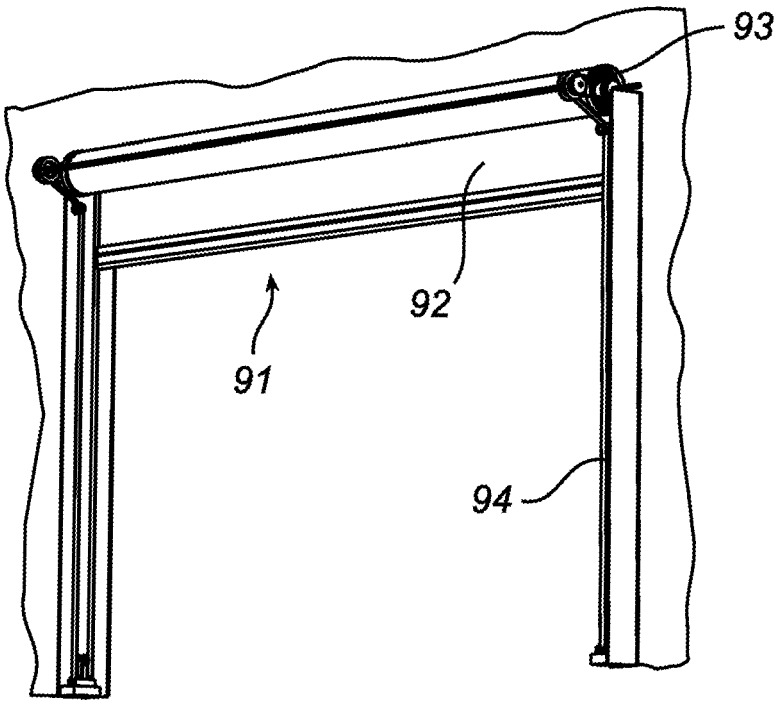

Fig. 1b

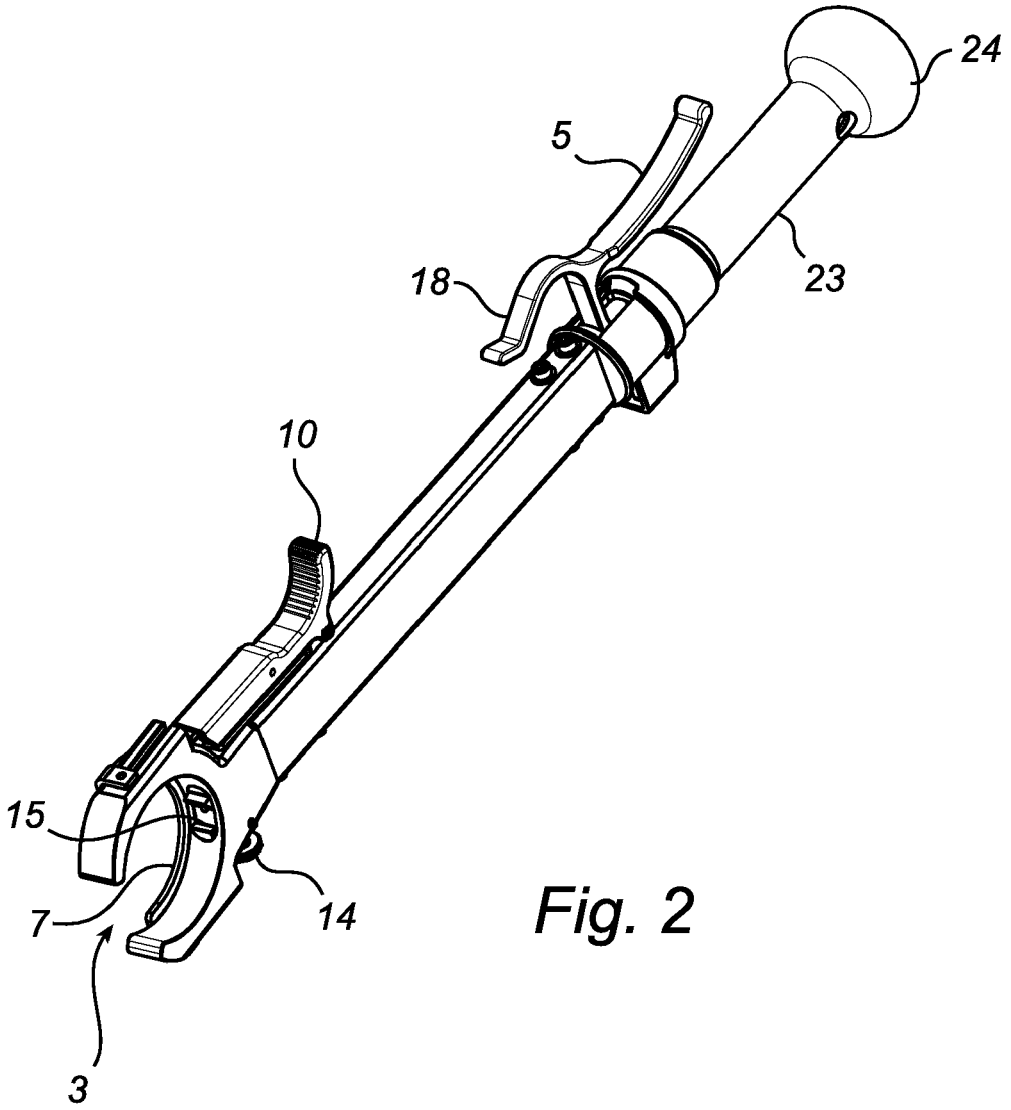

Fig. 2

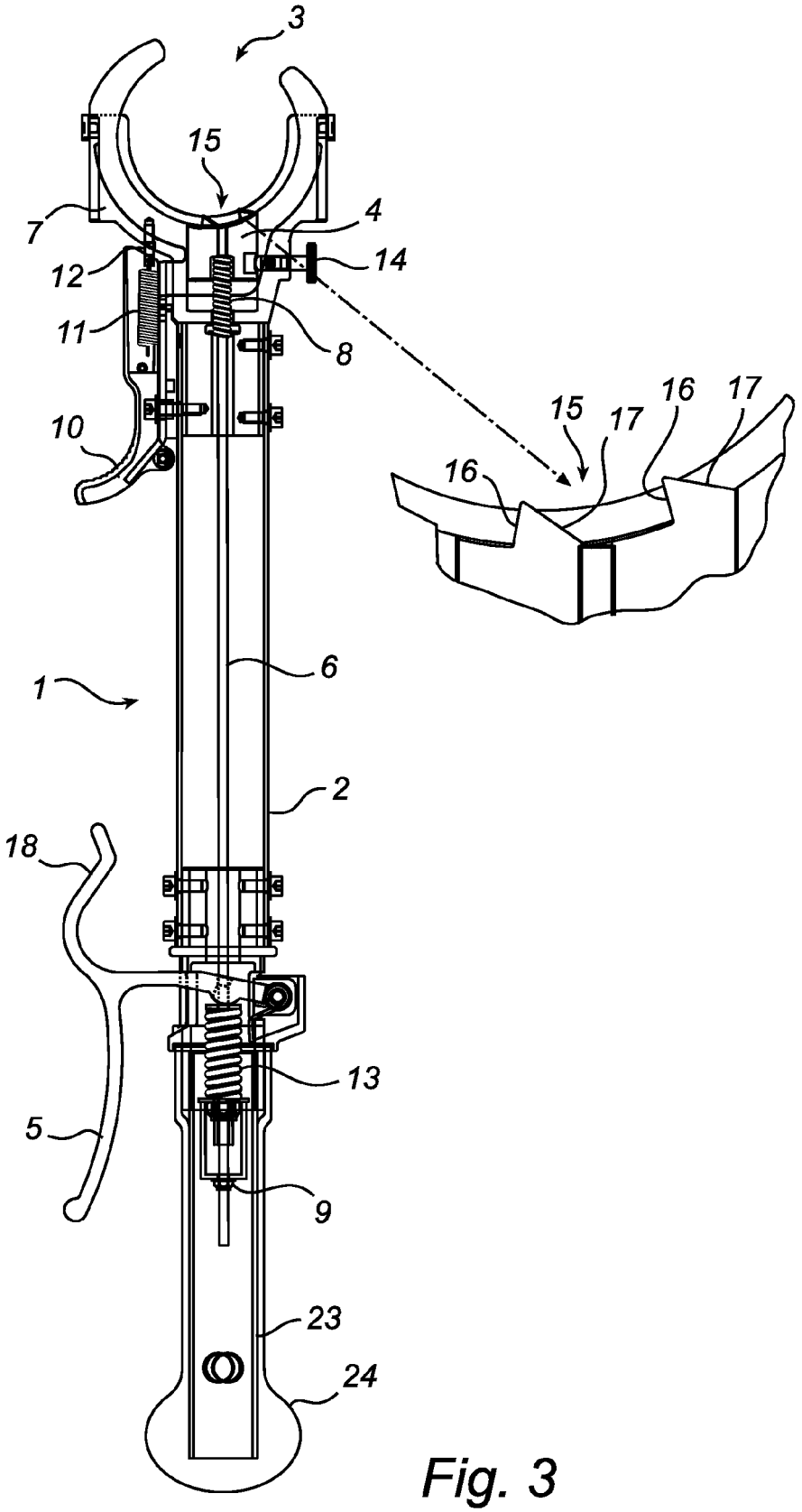

Fig. 3

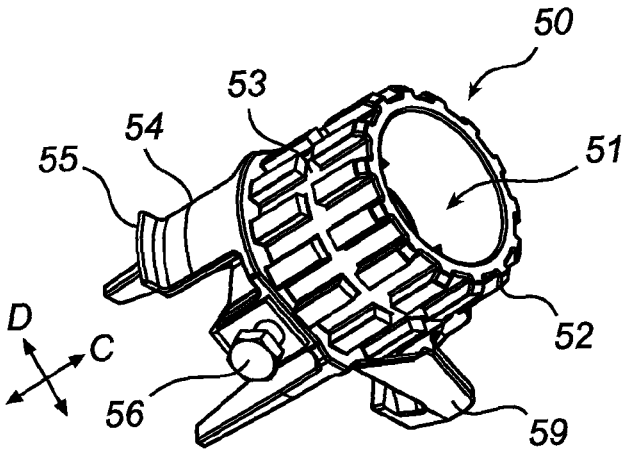

Fig. 4

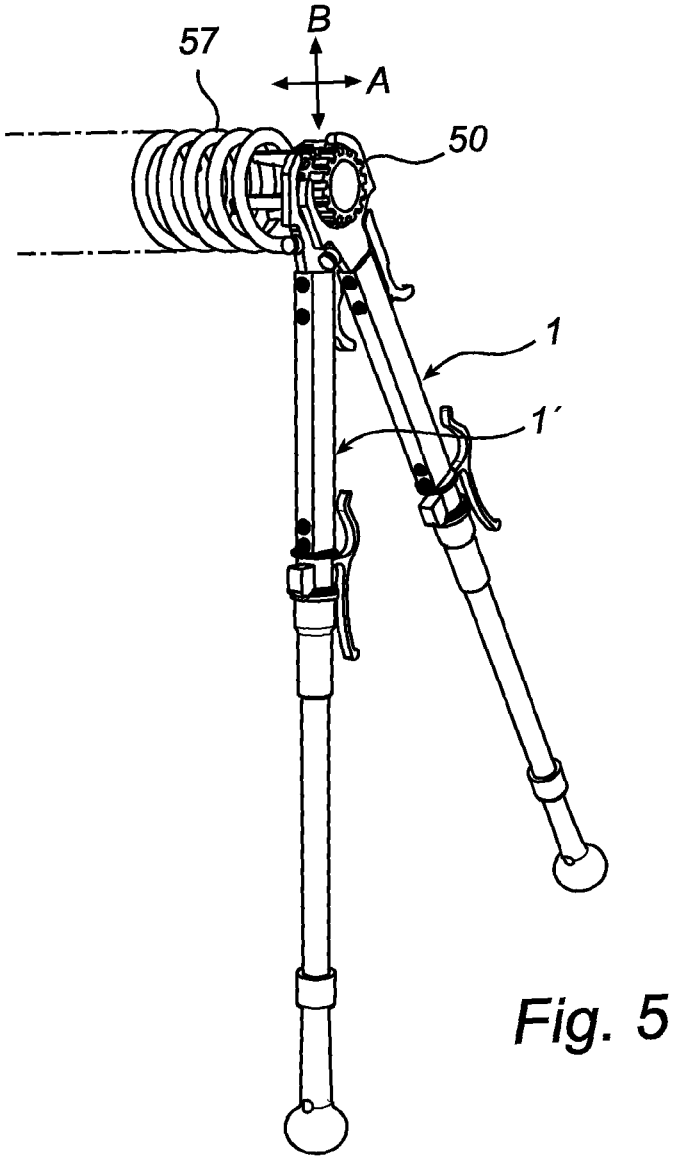

Fig. 5

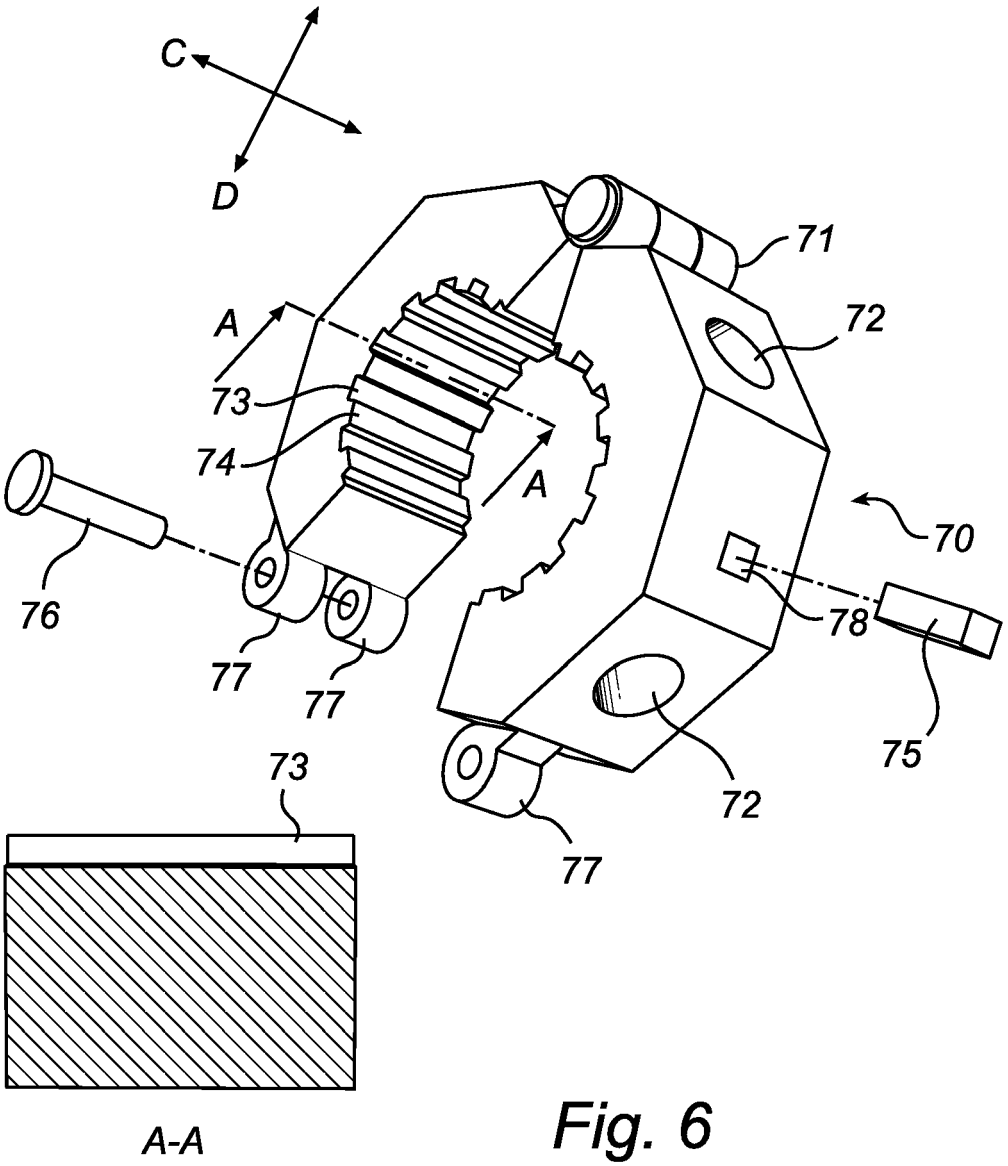

Fig. 6

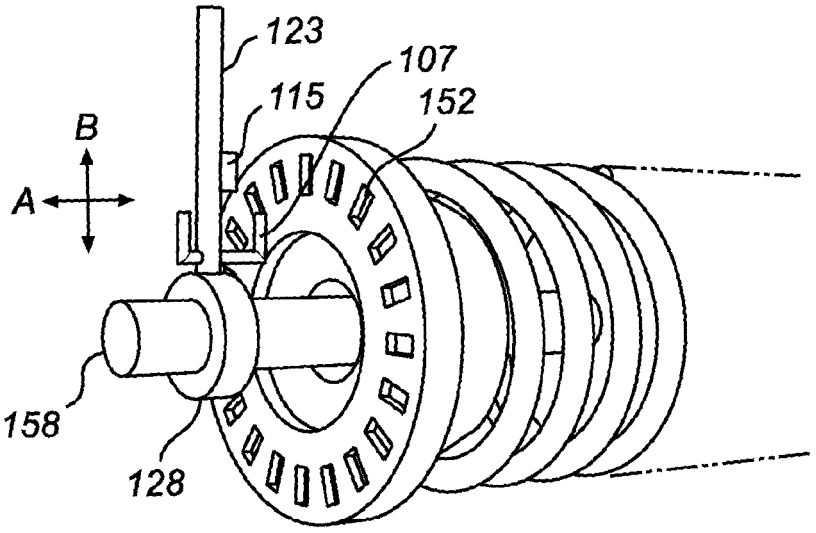

Fig. 7

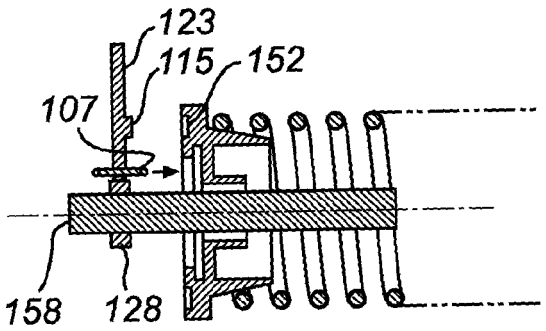

Fig. 8(1)

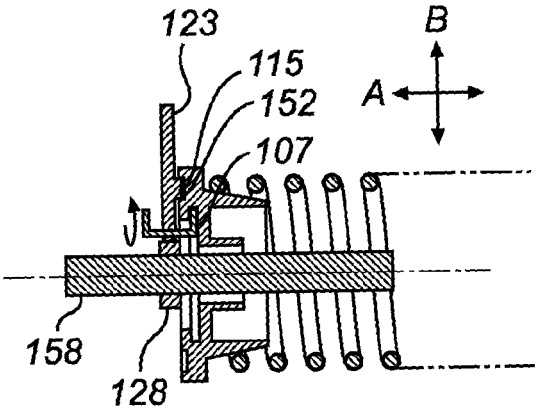

Fig. 8(2)

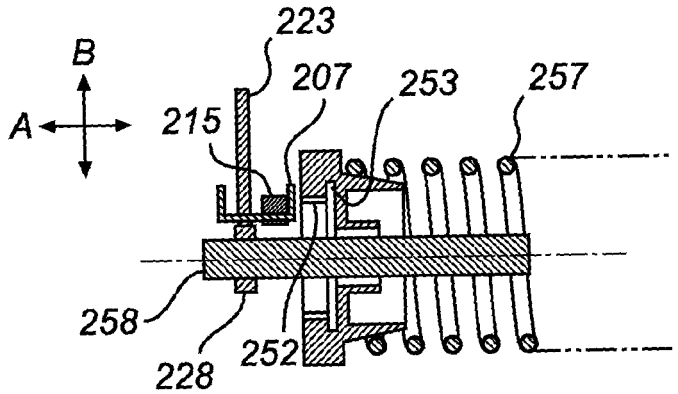

Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 08 15 7647

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	US 2004/020609 A1 (SAVARD NORMAND ET AL) 5 February 2004 (2004-02-05) * paragraph [0059]; claims 1,18; figures 4,12-14 *	1-5	INV. E06B9/17 E06B9/174 E06B9/62 B25B13/50 B25B13/46 B25B13/08 B25B13/18
A	US 2002/170688 A1 (DAUS MARK ET AL) 21 November 2002 (2002-11-21) * paragraph [0021]; figure 2 *	1-5	
A	US 1 977 070 A (LIMPERT JOHN A) 16 October 1934 (1934-10-16) * page 2, column 2, lines 81-148; figure 1 *	1-5	
A	WO 2005/065890 A (KEMPPAINEN, GUNNAR) 21 July 2005 (2005-07-21) * abstract; figures 1,2 *	1-5	
A	WO 2004/091946 A (THE OHIO STATE UNIVERSITY; WILLIAMS, DONALD, EDWARD, SR) 28 October 2004 (2004-10-28) * page 9, line 6 - page 10, line 2; figures 8A,8B *	1-5	TECHNICAL FIELDS SEARCHED (IPC) B25B E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 April 2009	Kofoed, Peter

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17-04-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004020609 A1	05-02-2004	US 2007012410 A1	18-01-2007
US 2002170688 A1	21-11-2002	AT 361409 T	15-05-2007
		CA 2444799 A1	21-11-2002
		DE 60219908 T2	17-01-2008
		EP 1387922 A1	11-02-2004
		WO 02092950 A1	21-11-2002
US 1977070 A	16-10-1934	NONE	
WO 2005065890 A	21-07-2005	SE 527594 C2	18-04-2006
		SE 0400001 A	03-07-2005
WO 2004091946 A	28-10-2004	NONE	

EPO FORM P0459

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