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(54) **Titre : AMELIORATIONS APPORTEES A DES CHARNIERES OU COMPOSANTS SIMILAIRES**
(54) **Title: IMPROVEMENTS TO HINGES OR THE LIKE**

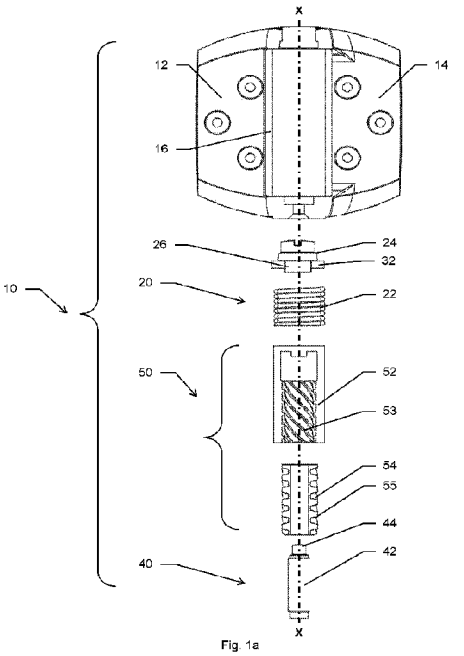

Fig. 1a

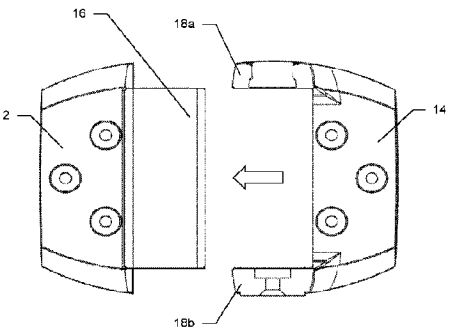

Fig. 1b

(57) **Abrégé/Abstract:**
Disclosed is a hinge mechanism comprising first and second hinge leaves rotatable relative to one another about a hinge axis from a closed to an open position. A drive arrangement including a first member and second member and arranged to induce relative movement between the first member the second member along the hinge axis upon movement of the first and second hinge leaves between the closed and open positions. A biasing arrangement operative to bias relative movement between the first member and the second member along the hinge axis to bias the first and second hinge leaves towards the closed position. A dampener arrangement, wherein during the relative movement between the first and second members under a biasing force of the biasing arrangement, the dampener arrangement is operative to resist further relative movement of the first and second members to dampen movement of the first and second hinge leaves towards the closed position.

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Abstract:

Disclosed is a hinge mechanism comprising first and second hinge leaves rotatable relative to one another about a hinge axis from a closed to an open position. A drive arrangement including a first member and second member and arranged to induce relative movement between the first member the second member along the hinge axis upon movement of the first and second hinge leaves between the closed and open positions. A biasing arrangement operative to bias relative movement between the first member and the second member along the hinge axis to bias the first and second hinge leaves towards the closed position. A dampener arrangement, wherein during the relative movement between the first and second members under a biasing force of the biasing arrangement, the dampener arrangement is operative to resist further relative movement of the first and second members to dampen movement of the first and second hinge leaves towards the closed position.

Improvements to Hinges or the like

Technical Field

[0001] The present invention relates to hinge mechanisms for movable barriers or the like.

Background Art

[0002] Known self-closing hinges may include various biasing arrangements, e.g., a spring, to apply an overriding closing force to close the gate without any manual assistance. Self-closing hinges can be utilised for pool or playground gates, for example, where the gate is desired to be biased to a closed position and the latching device to self-latch without any assistance for safety purposes. The problem with self-closing hinges is the impact caused by the gate slamming closed, which can injure bystanders such as children and cause damage to the gate and/or the gate hardware such as the hinge itself.

[0003] Furthermore, the parts of the hinge are made from materials such metal and plastic, the performance characteristics of the hinge in the long term can diminish as the parts are susceptible to corrosion and general wear respectively. As safety of the users in relation to the gated area is of the utmost concern, proper closure of the gate is always the priority. Known dampening hinges provide a 'soft-close' function for doors, gates, covers, etc. to limit closing speed. Although some known hinges include dampening mechanisms to mitigate the closure impact caused by self-closure, over time and with deteriorating performance characteristics, some dampening mechanisms can cause the gate to not reliably close properly which compromises safety.

[0004] It is to be understood that, if any prior art is referred to herein, such reference does not constitute an admission that the prior art forms a part of the common general knowledge in the art, in Australia or any other country.

Summary

[0005] According to an aspect, disclosed is a hinge mechanism comprising: first and second hinge leaves rotatable relative to one another about a hinge axis from a closed to an open position; a drive arrangement including a first member and second member and arranged to induce relative movement between the first member the second member along the hinge axis upon movement of the first and second hinge leaves between the closed and open positions; a biasing arrangement operative to contact the first member to bias relative movement between the first member and the second member along the hinge axis to bias the

first and second hinge leaves towards the closed position; and a dampener arrangement, wherein during the relative movement between the first and second members under a biasing force of the biasing arrangement, the dampener arrangement is operative to contact the first member to apply a resisting force to resist further relative movement to dampen movement of the first and second hinge leaves towards the closed position.

[0006] The hinge mechanism is directed to providing controlled closure to reduce closure impact of the movable barrier, while ensuring reliable closure of the movable barrier. Safety is the primary priority and concern. The hinge mechanism including a combination of the dampener arrangement reduces impact or slamming of the movable barrier against a structure or post during closure and the biasing arrangement ensures self-closure of the movable barrier. The hinge mechanism balances both functionality and safety.

[0007] In some forms, the biasing arrangement exerts the biasing force on the second member that is active through a first angular displacement of the first and second hinge leaves between the open and closed positions. The biasing arrangement being active over the first angular displacement ensures the closure of the movable barrier to the closed position, which prioritises safety and reliability.

[0008] In some forms, the dampener arrangement becomes active over a second angular displacement of the first and second hinge leaves from an intermediate position towards the closed position.

[0009] In some forms, the second angular displacement is less than the first angular displacement such that the dampener arrangement is inactive over a third angular displacement towards the open position to the intermediate position while the biasing arrangement is active during the first angular displacement. The biasing arrangement is active while the dampener arrangement is inactive and active during the first angular displacement.

[0010] In some forms, the biasing force of the biasing arrangement is greater than the resisting force of the dampening arrangement through the second angular displacement.

[0011] According to an embodiment, the first member is moving axially relative to the second member under the biasing force of the biasing arrangement.

[0012] In some forms, the drive arrangement further includes a retaining structure to prevent rotation of the first member relative to first and second hinge leaves.

[0013] In some forms, the second member is fixed relative to one of the first or the second hinge leaves, such that the second member is configured to rotate about the hinge axis upon movement of the first and second hinge leaves.

[0014] In some forms, the first member and the second member are in threaded engagement such that when the first and second hinge leaves move from the closed position to the open position, rotational movement of the second member imparts axial movement to the first member and when the first and second hinge leaves move from the open position to the closed position, axial movement of the first member imparts rotational movement to the second member.

[0015] In some forms, the first member is externally threaded, and the second member is internally threaded.

[0016] In some forms, the first hinge leaf includes a central housing extending between two ends along the hinge axis, and the second hinge leaf includes opposed end structures configured to engage the two ends of the central housing, the end structures and the housing rotate relative to one another about the hinge axis when the first and second hinge leaves move relative to one another between the open and closed positions.

[0017] In some forms, the second member is arranged about the dampener arrangement towards one of the end structures of the second hinge leaf, and the biasing arrangement is arranged towards the other of the end structures of the second member.

[0018] In some forms, the first member includes a first and a second engagement surface facing in opposite axial directions such that when the first and second hinge leaves are moved from the open position to the closed position, the biasing arrangement engages the first engagement surface to bias the first member towards the dampener arrangement.

[0019] In some forms, from the intermediate position to the closed position of the first and second hinge leaves, the second engagement surface engages the dampener arrangement to dampen the relative movement of the first and second hinge leaves towards the closed position.

[0020] In some forms, the retaining structure includes complementary key surfaces formed on an internal surface of the central housing and an external surface of the second member.

[0021] In some forms, the drive arrangement includes an adjustment mechanism having one end coupled to the biasing arrangement and the other end coupled to one of the two opposed end structures of the second hinge leaf.

[0022] In some forms, the biasing arrangement is located between the second member and the adjustment mechanism.

[0023] In some forms, the adjustment mechanism is further coupled to a piston and, upon rotation of the adjustment mechanism, the piston moves in an axial direction to alter the

compression or biasing force of the biasing arrangement. In this way, the biasing force applied by the biasing arrangement can be adjusted to suit the weight of the movable barrier to ensure closure of the movable barrier. The heavier the movable barrier, the stronger the force required to self-close the movable barrier.

[0024] According to a further embodiment, disclosed is the first hinge leaf including a central housing extending between two ends along the hinge axis and including an internal wall defining a passage, and the second hinge leaf includes opposed end structures configured to engage the two ends of the central housing, the end structures and the housing rotate relative to one another about the hinge axis when the first and second hinge leaves move relative to one another between the open and closed positions.

[0025] In some forms, the second member is arranged about the dampener arrangement towards one of the end structures of the second hinge leaf, and the biasing arrangement is arranged towards the other of the end structures of the second member.

[0026] In some forms, the drive arrangement includes a third member fixed relative to one of the two opposed end structures such that upon movement of the second hinge leaf relative to the first hinge leaf from the closed to the open position, the third member rotates to impart axial movement to the first member.

[0027] In some forms, the drive arrangement further includes a retaining structure to prevent rotation of the first member relative to first and second hinge leaves.

[0028] In some forms, the second member is fixed to the internal wall of the passage of the central housing of the first hinge leaf such that upon movement of the first hinge leaf relative to the second hinge leaf from the closed to the open position, the second member rotates to impart axial movement to the first member.

[0029] In some forms, the first member and the second member are in threaded engagement.

[0030] In some forms, the first member is externally threaded and the second member is internally threaded.

[0031] In some forms, the biasing arrangement is located between the first member and the third member.

[0032] In some forms, the biasing arrangement having one end coupled to the first member and the other end coupled to the third member.

[0033] In some forms, the third member is coupled to the first member of the drive arrangement.

[0034] In some forms, when the third member is selectively rotatable and upon rotation of the third member the first member moves in an axial direction to alter the compression or biasing force of the biasing arrangement.

[0035] In some forms, the third member engageable with said one of the two opposed end structures, such that when the third member is disengaged with said one of the two opposed end structures the third member can be rotated to alter the compression or biasing force of the biasing arrangement, and when the third member is reengaged with said one of the two opposed end structures, the altered compression or biasing force is registered. The adjustability of the biasing force applied by the biasing arrangement facilitates the hinge mechanism reliably closing a variety of different movable barriers that are different weights.

[0036] In some forms, the third member includes a shaft fixed to the one of the two opposed end structures of the second hinge leaf, and the retaining structure includes complementary key surfaces formed on an external surface of the shaft and an internal surface of second member.

[0037] In some forms, the first member includes a first and a second engagement surface facing in opposite axial directions, and wherein when the first and second hinge leaves are moved from the open position to the closed position, the biasing arrangement engages the first engagement surface to bias the first member towards the dampener arrangement.

[0038] In some forms, when the first and second hinge leaves move from the intermediate position to the closed position, the second engagement surface engages the dampener arrangement to dampen the relative movement of the first and second hinge leaves towards the closed position.

[0039] In some forms, the biasing arrangement is in the form of a compression spring.

[0040] In some forms, the dampening mechanism is selectively fixed so that the distance between the dampening mechanism and the biasing arrangement can be altered. In this way, the second angular displacement can be increased by shifting the operating range of the dampening mechanism to suit the movable barrier. For example, for heavier or larger movable barrier early dampening may be required.

[0041] According to another aspect, disclosed is a hinge mechanism comprising: first and second hinge leaves rotatable relative to one another about a hinge axis from a closed to an open position; a drive arrangement including a first member and second member and arranged to induce relative movement between the first member the second member along the hinge axis upon movement of the first and second hinge leaves between the closed and open

positions; a biasing arrangement operative to contact the first member to bias relative movement between the first member and the second member along the hinge axis to bias the first and second hinge leaves towards the closed position; and a dampener arrangement, wherein during the relative movement between the first and second members under a biasing force of the biasing arrangement, the dampener arrangement is operative to contact the first member to apply a resisting force to resist further relative movement to dampen movement of the first and second hinge leaves towards the closed position, wherein at least one of the drive arrangement, the biasing arrangement and/or the dampener arrangement is/are arranged coaxially with the hinge axis.

[0042] In some forms, the dampener arrangement includes a discrete dampener that is removably secured to the hinge mechanism. This allows the discrete dampener to be easily removed and replaced without the need for disassembling the entire hinge mechanism. Advantageously, the discrete dampener may be removably secured to the hinge mechanism by a thread arrangement.

[0043] According to a further aspect, disclosed is a hinge assembly for a gate or a movable barrier comprising at least two or more hinge mechanisms according to the previous aspects. In some forms, the two or more hinge mechanisms facilitate closing the gate or the movable barrier.

Brief Description of the Drawings

[0044] There now follows, by way of example only, a detailed description of embodiments of the present disclosure, with reference to the Figures identified below.

Figure 1a is an exploded view of an embodiment of a hinge mechanism;

Figure 1b is an exploded view of hinge leaves of the hinge mechanism of Fig. 1a;

Figure 2is a partial section view of the hinge mechanism of Fig. 1a in an open position;

Figure 3 is a partial section view of the hinge mechanism of Fig. 1a in a closed position;

Figure 4 is a graph illustrating the operation of biasing arrangements of the hinge mechanism of Fig. 1a;

Figure 5a is an exploded view of a further embodiment of a hinge mechanism;

Figure 5b is an exploded view of hinge leaves of the hinge mechanism of Fig. 5a;

Figure 6 is a partial section view of the hinge mechanism of Fig. 5a in an open position; and

Figure 7 is a partial section view of the hinge mechanism of Fig. 5a in a closed position.

The Figures above are schematic illustrations of the embodiments and they are provided solely for illustrative purposes, and the dimensions, scale or proportions of the components or parts do not characterise the present disclosure.

Detailed Description of the Embodiments

[0045] In the following description, functionally similar parts carry the same reference numerals between different embodiments. The drawings are intended to be schematic, and dimensions, scale and/or angles may not be determined accurately from them unless otherwise stated.

[0046] It is understood that, unless otherwise stated, the upward and downward directions refer to the orientation of a hinge when mounted onto a substantially vertical surface.

[0047] It is understood that, unless otherwise stated, the structure may include a moveable barrier, a gate, a fence, a panel, a post or any other suitable structure for mounting a hinge assembly.

[0048] It is understood that, unless otherwise stated, the term movable barrier includes, for example, a structure, hatch, gate, door, skylight or window, i.e. a member suitable for closing or opening an aperture, but not limited to the pivotal or direction of movement. For example, the member may pivot or slides horizontally and/or vertically.

[0049] It is understood that, unless otherwise stated, the terms aligned and/or alignment are not limited to concentric alignment, horizontal alignment, vertical alignment and planar alignment etc.

[0050] Figure 1a is an exploded view of an embodiment of hinge mechanism 10. Figure 1b is an exploded view of hinge leaves 12, 14 of the hinge mechanism 10. Figures 2 and 3 are partial section views of the hinge mechanism 10 in open and closed positions respectively.

[0051] Referring to Figures 1a to 3, the hinge mechanism 10 comprises a first hinge leaf 12 and a second hinge leaf 14, i.e. first and second hinge leaves, wherein the first hinge leaf 12 is connected to the second hinge leaf 14 to allow the first hinge leaf 12 to be rotatable relative to the second hinge leaf 14 about hinge axis X-X. Details of the coupling between the first hinge leaf 12 and the second hinge leaf 14 will be described in more detail below.

[0052] The first hinge leaf 12 comprises a central housing 16 extending along the hinge axis X-X. In the forms shown in Figures 1a to 7, the central housing 16 which may take the form of a substantially cylindrical body. The central housing 16 includes an internal wall defining a passage. Substantially located in the passage is a biasing arrangement 20, a dampening arrangement 40 and a drive arrangement 50 therebetween, which shall be described in more detail later.

[0053] The second hinge leaf 14 comprises opposed end structures 18a, 18b configured to engage the ends of the central housing 16, such that the end structures 18a, 18b and the central housing 16 rotate relative to one another about the hinge axis X-X when the first and second hinge leaves 12, 14 move relative to one another between the open and closed positions.

[0054] The biasing arrangement 20 comprises at least a spring 22 and the dampening arrangement 40, wherein the dampening arrangement 40 may be a discrete dampener 42 and is arranged towards one of the end structure 18b.

[0055] In the embodiment shown in Figs. 1a to 3, the drive arrangement 50 comprises a first member in the form of lead nut 52 and a second member in the form of lead screw 54. The lead nut 52 and lead screw 54 are arranged to induce relative movement between one another along the hinge axis X-X upon movement of the first and second hinge leaves 12, 14 between the closed and open positions.

[0056] The lead nut 52 extends between two ends, a closed end and an open end. The lead nut 52 includes a wall defining an internal passage extending longitudinally from the open end into a body of the lead nut 52. The lead screw 54 extends between two ends and includes a central passage extending between the two ends.

[0057] In the form shown in Figures 1a to 3, the lead nut 52 is prevented from rotating relative to the central housing 16 of the first hinge leaf 12 via a retaining structure, but is able to move axially relative to the lead screw 54 under the biasing force of the biasing arrangement 20. The retaining structure may include key surfaces.

[0058] In the illustrated embodiment, the key surfaces are in the form of a series of mutually engaging splines or anti-rotational means (not shown) provided between the central housing 16 and the lead nut 52. However, the splines or anti-rotational means (not shown) allow the lead nut 52 to move axially along the central housing 16, which shall be described in more detail below. When the first hinge leaf 12 rotates relative to the second hinge leaf 14, the lead nut 52 remains only rotationally fixed relatively to the first hinge leaf 12. In

alternative embodiments, the key surfaces may include a variety of complementary profiles that prevent rotation of the lead nut and the central housing 16.

[0059] The lead screw 54 is both rotationally and axially fixed to one of the first or second hinge leaves 12, 14. In the illustrated embodiment, the lead screw 54 is fixed relative to the second hinge leaf 14. The lead screw 54 is configured to rotate about the hinge axis upon movement of the first and second hinge leaves. When the first hinge leaf 12 rotates relative to the second hinge leaf 14, the lead screw 54 rotates relative to the first hinge leaf 12.

[0060] The lead nut 52 and the lead screw 54 are in threaded engagement. In the form shown in Figures 1a to 3, the lead nut 52 is provided with an internal helicoidal thread 53, i.e. an internal thread and the lead screw 54 is provided with an external helicoidal thread 55, i.e. an external thread. When the drive arrangement 50 is assembled as shown in Figures 2 and 3, the lead screw 54 resides substantially in lead nut 52 and the helicoidal threads 53, 55 mutually engage.

[0061] Figure 2 shows the hinge mechanism 10 assembled and in the open position and for clarity purposes, the second hinge leaf 14 is not shown as it would obscure or partially obscure the first leaf 12. Figure 3 show the hinge mechanism assembled and in the closed position. For clarity and illustrative purposes, a portion of the hinge mechanism 10 is sectioned to illustrate the function and operation of the components.

[0062] When the lead nut 52 and the lead screw 54 are assembled in the hinge mechanism 10, the lead screw 54 rotates around the hinge axis X-X as the hinge leaves 12, 14 move between the open and closed positions. As the lead screw 54 rotates around the hinge axis X-X, the helical threads 53, 55 engage and move the lead nut 52 axially along hinge axis X-X. In the illustrated embodiment, when the first and second hinge leaves 12, 14 move from the closed position to the open position, rotational movement of the lead screw 54 imparts axial movement to the lead nut 52, i.e., the rotation of the lead screw 54 drives axial movement of the lead nut 52 and compresses the biasing member 20. Conversely, when the first and second hinge leaves 12, 14 move from the open position to the closed position, the biasing member 20 imparts an axial force to create axial movement of the lead nut 52 which in turn imparts rotational movement to the lead screw 54, i.e., axial movement of the lead nut 52 drives the rotation of the lead screw 54.

[0063] When the hinge mechanism 10 is in the open position, the lead nut 52 is closer to one end of the hinge mechanism 10, i.e. closer a first end of the opposed end structures of the second hinge leaf 14. When the hinge mechanism 10 is in the closed position, the lead nut 52

is brought closer to the other end of the hinge mechanism 10, i.e. closer to a second end of the opposed end structures and towards the discrete dampener 42.

[0064] The biasing arrangement 20 comprises at least a spring 22 (e.g., a compression spring) wherein the discrete dampener 42 is arranged towards the end structure 18b, and is operative to contact the lead nut 52 to bias relative movement between the lead nut 52 and the lead screw 54 along the hinge axis, i.e. to bias the lead nut 52 towards the second end of the opposed ends structure. This configuration biases the first and second hinge leaves 12, 14 towards the closed position.

[0065] As shown in Figures 2 and 3, the spring 22 is energised, i.e. applies a biasing force in both open and closed positions to enable the hinge mechanism 10 to be biased towards the closed position. When the hinge mechanism 10 is in the open position as shown in Figure 2, the spring 22 is further energised (i.e. has a greater biasing force than when in the closed position) and has an increased closure force. This biases the hinge mechanism 10 towards the closed position as shown in Figure 3.

[0066] Therefore, it can be envisaged when the hinge mechanism 10 is mounted to a gate (not shown) with a latching device (not shown) in a closed position, the hinge mechanism 10 is biased to the closed position to assist positive engagement of the latching device to ensure the gate is always secured, which shall be described in more detail below. When the gate is opened, the spring 22 is further energised and its increase closure force biases the gate towards the closed position over a first angular displacement from the open position to the closed position.

[0067] The dampener arrangement 40 is provided to slow the movement of the lead screw 54 within the lead nut 52 over a second angular displacement from an intermediate position to the closed position. The intermediate position is between the open and the closed position. In effect, this slows the movement of the hinge mechanism 10 towards the closed position (shown in Figure 3). During the relative movement between the lead nut 52 and lead screw 54 under the biasing force of the biasing arrangement 20, the dampener arrangement 40 is operative to contact the lead nut 52 to apply a resisting force. This force resists further relative movement of the lead nut and lead screw to dampen movement of the first and second hinge leaves 12, 14 towards the closed position.

[0068] The lead nut 52 includes first and second engagement surfaces facing in opposite axial directions such that when the first and second hinge leaves 12, 14 are moved from the open position to the closed position, the biasing arrangement 20 engages the first engagement

surface to bias the lead nut 52 towards the dampener arrangement 40. In the illustrated embodiment, the first engagement surface is formed on an end surface of the lead nut 54. Further, the second engagement surface 56 is arranged to engage the dampener mechanism and is formed on the end surface of the internally threaded passage. From the intermediate position to the closed position of the first and second hinge leaves 12, 14, the second engagement surface 56 engages the dampener arrangement 40 to dampen the relative movement of the first and second hinge leaves 12, 14 towards the closed position.

[0069] The dampening arrangement 40 extends between two ends along the axis and the lead screw 54 is concentrically positioned about the dampening arrangement 40 such that the ends of both the dampening arrangement and the lead screw are substantially aligned. One of the ends of both the dampening arrangement 42 and the lead screw 54 are fixed to one of the end structures as discussed herein. The discrete dampener 42may be in the form of a piston and cylinder arrangement, wherein the piston extends from the other end of the dampening arrangement and is axially moveable relative to the cylinder. A mating surface 44 is formed on the piston to engage the second engagement surface 56. From the intermediate position to the closed position of the first and second hinge leaves 12, 14, the piston is compressed relative to the cylinder to dampen movement of the first and second hinge leaves 12, 14 until the piston abuts an end of the cylinder. From the closed position to the open position, the piston is biased to extend from the cylinder and a piston head is arranged to be spaced apart from the end of the cylinder. In alternative embodiments, the dampener arrangement may include a hydraulic dampener positioned within the cylinder, or any suitable dampener arrangement that is able to apply a resisting force to dampen movement of the first and second hinge leaves from the intermediate position to the closed position.

[0070] As shown in DETAIL A of Figure 2, a clearance Z is provided between the second engagement surface 56 of the lead nut 52 and the mating surface 44 of the discrete dampener 42 when the hinge mechanism 10 is in the open position. As the hinge mechanism 10 moves toward the closed position, i.e. the lead nut 52 moves along the lead screw 54 towards the discrete dampener 42, the clearance Z decreases to the point that the surfaces 44, 56 abut and the discrete dampener 42 will begin to operate, which will be described in more detail below.

[0071] Figure 4 shows a graph illustrating the individual forces of the spring 22 and discrete dampener 42 of the hinge mechanism 10 between the open and closed positions. As described above, in the open position the spring 22 is energised and biases the hinge mechanism 10 towards the closed position through a first angular displacement, i.e. biasing

the lead nut 52 towards the lead screw 54. The clearance *Z* is demonstrated in Figure 4 by the Discrete Dampener Inactive Range *D*, i.e., a third angular displacement. Within range *D*, i.e. through a part of the first angular displacement, the discrete dampener 42 is inactive. As the hinge moves from an intermediate position towards the closed position, the surfaces 44, 56 abut over a second angular displacement. The discrete dampener 42 will be active over the second angular displacement to apply the resisting force and slow the movement of the lead nut 52 towards the discrete dampener 42, i.e. slows the closing motion of the hinge mechanism 10.

[0072] In the closed position, the biasing force of the spring 22 is always greater than the resisting force of the discrete dampener 42, and this is indicated by the force differential *Y*. As described above, it can be envisaged that the force differential *Y* assists in the positive engagement of the latching device (not shown) to ensure the gate (not shown) is always secured. This ensures the hinge mechanisms of the present disclosure can be used in relation to gate for playgrounds, pools, child care centres, safety of children is the primary concern. As a result of the embodiments of the hinge mechanism disclosed herein, the gate is able to reliably close and allows the latching device to latch to restrict access to fenced/gate areas, especially children trying to enter a pool area. The dampening arrangement 40 provides resistance against slamming which allows for a slow and soft closure of the gate. In this way, impact to the hinge and gate hardware is reduced and extends the life of the components. Further, injuries to the users caused by sudden closure or slamming of the gate are prevented.

[0073] As shown, an adjustable mechanism is provided to further increase or reduce the biasing force of the spring 22. It can be envisaged that the adjustable mechanism may increase or reduce force differential *Y* between the spring 22 and the discrete dampener 42. This allows for gates of different types and weights to be used in combination with the hinge mechanism. The weight of the gate may be taken into account to ensure the existence of the force differential Y. In this way, a variety of different gates will reliably close when paired with the embodiment of the hinge mechanism according to the present disclosure. The adjustable mechanism comprises a drive member 24 supported by the opposite end structure 18a, wherein the drive member 24 comprises a shaft 26 extending therefrom. Located around the shaft 26 is a flange 32, which is radially fixed with respect to the central housing 16. As shown in the Figures 1a to 3, the spring 22 is located between the piston 32 and the lead nut 52. A thread arrangement may be provided between the shaft 26 and the piston 32 and an anti-rotation feature may be provided between the piston 32 and the internal wall of the

central housing 16, such that as the drive member 24 is rotated, the rotation of the shaft 26 drives the piston 32 axially such that the piston 32 may be able to change the height of the spring 22, i.e. varying the biasing force of the spring 22.

[0074] As described above, when the biasing force of the spring 22 is adjusted, the relationship (i.e. relative distance) between the lead nut 52 and the discrete dampener 42 is maintained so the position of the discrete dampener 42 may be fixed relative to the lead nut 52. However, the discrete dampener 42 may be adjustable, so that either the force differential *Y* between the spring 22 and the discrete dampener 42 may be increased or decreased, or adjust / alter the inactive range *D* of the discrete dampener 42.

[0075] Although the embodiment of Figures 1a to 3b demonstrates the lead nut 52 moving axially along hinge axis X-X as the lead screw 54 rotates around the hinge axis X-X, it can be envisaged this drive arrangement 50 can be reversed. In this variant (not shown), the lead nut 52 is rotationally and axially fixed to the central housing 16 of the first hinge leaf 12. When the first hinge leaf 12 rotates relative to the second hinge leaf 14, the lead nut 52 remains rotationally and axially fixed relatively to the first hinge leaf 12 and to drive the lead screw 54 to move axially along hinge axis X-X. The axial movement of the lead screw 54 allows it to engage or disengage with the discrete dampener 42.

[0076] Figures 5a to 7 show a second embodiment of a hinge mechanism of the present disclosure. Figure 5a is an exploded view of a hinge mechanism 100. Figure 5b is an exploded view of hinge leaves 12, 14 of the hinge assembly 100. Figures 6 and 7 are partial section views of the hinge mechanism 100 in the open and closed positions respectively. Referring to the second embodiment in Figures 5a to 7, like parts have been given like reference numerals. In the case that a part is of a modified form compared with the first embodiment for different functionality, its reference numeral is 100 greater than the reference numeral used with reference to the first embodiment.

[0077] Referring to Figures 5a to 7, the hinge mechanism 100 comprises a first hinge leaf 12 and a second hinge leaf 14, wherein the first hinge leaf 12 is connected to the second hinge leaf 14 to allow the first hinge leaf 12 to be rotatable relative to the second hinge leaf 14 about the hinge axis X-X. Details of the coupling between the first hinge leaf 12 and the second hinge leaf 14 will be described in more detail below.

[0078] The first hinge leaf 12 comprises a central housing 16 extending between two ends along the hinge axis. In the illustrated embodiment, the central housing 16 is in the form of a substantially cylindrical body. The central housing 16 includes an internal wall defining a

passage. Substantially located in the passage is a biasing arrangement 20, a dampener arrangement 40 and a drive arrangement 50 therebetween, which shall be described in more detail below.

[0079] The second hinge leaf 14 includes opposed end structures 18a, 18b configured to engage the two ends of the central housing 16, such that the opposed end structures 18a, 18b and the central housing 16 rotate relative to one another about the hinge axis X-X when the first and second hinge leaves 12, 14 move relative to one another between the open and closed positions.

[0080] The biasing arrangement 20 comprises at least a spring 22, and the dampener arrangement 40 comprises a discrete dampener 42 arranged towards the end structure 18b.

[0081] The drive arrangement 50 comprises a first member in the form of a lead screw 54 and a second member in the form of a lead nut 52, whereby the lead nut 52 is rotationally and axially fixed to the central housing 16 of the first hinge leaf 12. When the first hinge leaf 12 rotates relative to the second hinge leaf 14, the lead nut 52 remains rotationally and axially fixed relatively to the first hinge leaf 12.

[0082] The drive arrangement 50 also comprises a third member in a form of a drive member 124. In the illustrated embodiment, the third member 124 is selectively fixed relative to one of the first or second hinge leaves 12, 14. Upon movement of the second hinge leaf relative to the first hinge leaf from the closed to the open position, the third member 124 rotates to impart axial movement to the lead screw 54. Further details of the engagement between the third member 124 and the first or second hinge leaf 12, 14 will be described in more detail below.

[0083] The lead nut 52 extends along the hinge axis between two ends and is provided with an internal helicoidal thread 53, i.e. an internal thread, and is fixed to the internal wall of the central housing 16. Alternatively, the internal helicoidal thread 53 may be moulded or formed on the inner surface of the central housing 16 of the first hinge leaf 12, so that a separate lead nut 52 may not be required.

[0084] The lead screw 54 extends between two ends and is coupled to a shaft 126 of the third member 124 via a retaining structure, such that the lead screw 54 is rotationally fixed to the shaft 126 but is allowed to move axially along the shaft 126. The retaining structure prevents rotation of the lead screw 54 relative to first and second hinge leaves 12, 14. The retaining structure includes complementary key surfaces in the form of mutually engaging splines 128 and 156 provided on an external surface of the shaft 126 and on an internal

surface of the lead screw 54, respectively. As shown in Figure 5a, the spline 128 is provided on a portion of the shaft 126. Alternatively, the spline 128 may be provided along the length of the shaft 126. In alternative embodiments, the key surfaces may be formed of any complementary profile that prevents rotation of the lead screw 54 relative to the shaft of the third member 124.

[0085] The lead screw 54 includes an external helicoidal thread 55 and said spline 156 is arranged on an internal surface of a central bore formed in the lead screw 54. When the drive arrangement 50 is assembled as shown in Figures 6 and 7, the lead screw 54 resides substantially in the lead nut 52 and the helicoidal threads 53, 55 mutually engage, and the splines 128 and 156 are also mutually engaged. When the first hinge leaf 12 rotates relative to the second hinge leaf 14, the third member 124 rotates and drives the lead screw 52 to rotate relatively to the first hinge leaf 12 via the mutually engaging splines 128 and 156. As the lead screw 52 rotates, it also moves axially along the splines 128, 156 and the hinge axis X-X as it is guided by the helicoidal threads 53, 55 between the lead nut 52 and lead screw 54.

[0086] Figure 6 shows the hinge mechanism 100 assembled and in an open position, and for clarity purposes, the second hinge leaf 14 is not shown as it would obscure or partially obscure the first leaf 12. Figure 7 shows the hinge mechanism assembled and in a closed position. For clarity and illustrative purposes, a portion of the hinge mechanism 100 is sectioned to illustrate the function and operation of the components.

[0087] When the lead nut 52 and the lead screw 54 are assembled in the hinge mechanism 100, the lead nut 54 is guided by the helicoidal threads 53, 55 between the lead nut 52 and lead screw 54 as the hinge leaves 12, 14 move between the open and closed positions. For example, in this embodiment, upon movement of the second hinge leaf 14 relative to the first hinge leaf 12 from the closed to the open position, the third member 124 rotates to impart axial movement to the lead screw 54. The lead nut 52 may be considered as the guide. Conversely, upon movement of the first hinge leaf relative to the second hinge leaf from the closed to open position, the lead nut 52 rotates to impart axial movement to the lead screw 54.

[0088] When the hinge mechanism 100 is in the open position, the lead screw 54 is closer to the first end of the hinge mechanism 100, i.e. as shown in Figure 6, closer the end structure 18a of the second hinge leaf 14. When the hinge mechanism 100 is in the closed position, the

lead screw 54 is brought closer to the second end of the hinge mechanism 100, i.e. as shown in Figure 7, closer to the end structure 18b and towards the discrete dampener 42.

[0089] As shown on Figures 6 and 7, the spring 22 is positioned between the third member 124 and the lead screw 54, whereby the spring 22 is concentric with the shaft 126 of the member 124, such that the spring 22 is able to:

a. bias the lead screw 54 from the first end towards the second end of the hinge mechanism 100, i.e. towards the discrete dampener 42, so the hinge mechanism 100 is biased to the closed position; and

b. bias the third member 124 to engage with the second leaf 14, which will be described in more detail below.

[0090] The spring 22 is energised, i.e. applies a biasing force in both open and closed positions to enable the hinge mechanism 100 to be biased towards the closed position. When the hinge mechanism 100 is in the open position as shown in Figure 6, the spring 22 is further energised (i.e. has a greater biasing force than when in the closed position) and has an increased closure force. This biases the hinge mechanism 100 towards the closed position as shown in Figure 7. The third member 124 also functions as a mechanism to vary the biasing force of the spring 22, which will be described in more detail below.

[0091] To slow the movement of the hinge mechanism 100 towards the closed position as shown in Figure 7, i.e. to slow the movement of the lead screw 54 within the lead nut 52, the discrete dampener 42 is provided. In the illustrated embodiment, the discrete dampener 42 may be in the form of a piston and cylinder arrangement. Alternative dampening arrangements may also be suitable provided the arrangement is able to apply the resisting force to resist further relative movement to dampen movement of the first and second hinge leaves towards the closed position, for example a spring.

[0092] The lead screw 54 includes first and second engagement surfaces facing in opposite axial directions. When the first and second hinge leaves 12, 14 are moved from the open position to the closed position, the biasing arrangement 22 engages the first engagement surface to bias the first member towards the discrete dampener 42. When the first and second hinge leaves move from the intermediate position to the closed position, the second engagement surface engages the discrete dampener 42 to dampen the relative movement of the first and second hinge leaves 12, 14 towards the closed position. As shown in DETAIL B of Figure 6, a clearance Z is provided between the first engagement surface 56 of the lead screw 54 and a mating surface 44 of the discrete dampener 42 when the hinge mechanism

100 is in the open position. As the hinge mechanism 100 moves toward the closed position, i.e. the lead screw 54 moves within the lead nut 52 towards the discrete dampener 42, the clearance Z decreases to the point that the mating surfaces 44, 56 abut and the discrete dampener 42 will begin to operate, which will be described in more detail below.

[0093] The individual forces of the spring 22 and discrete dampener 42 of the hinge mechanism 100 between the open and closed positions are also illustrated by Figure 4 and described in detail above. The clearance Z is demonstrated in Figure 4 by the Discrete Dampener Inactive Range *D* when the hinge leaves move from the open position to the intermediate position over the second angular displacement. Within range *D*, the discrete dampener 42 is inactive. As the hinge moves from the intermediate position towards the closed position, the surfaces 44, 56 abut and the discrete dampener 42 will be active and slows the movement of the lead screw 54 towards the discrete dampener 42, i.e. slows the closing motion of the hinge mechanism 100 over the third angular displacement.

[0094] In the closed position, the biasing force of the spring 22 is always greater than the resisting force of the discrete dampener 42, and this is indicated the force differential *Y*. As described above, the force differential *Y* assists in the positive engagement of the latching device (not shown) to ensure the gate (not shown) is always secured. This provides reliable closure and latching of the gate to restrict access to fenced/gated areas, such as a pool.

[0095] An end cap 160 is provided and is secured to the central housing 16 or to the end structure 18b, such that when the first hinge leaf 12 rotates relative to the second hinge leaf 14, the end cap 160 remains fixed relatively to either the first hinge leaf 12 or the second hinge leaf 14. The discrete dampener 42 may be secured to the end cap 160 via a thread, such that the inset depth of the discrete dampener 42 relative to the end cap 160 can be adjusted. By adjusting the inset depth of the discrete dampener 42, the Discrete Dampener Inactive Range *D* can be increased or decreased. This can account for gates of different weights (and sizes) to ensure soft closure of the gate.

[0096] The third member 124 is selectively engageable to the second hinge leaf 14 via a drive surface 130 provided on the third member 124 and a mutually engaging seat 114 provided in the second hinge leaf 14. As mentioned above, the force of the spring 22 biases the third member 124 to engage with the second leaf 14, and in this case causing the drive surface 130 to engage with the mutually engaging seat 114.

[0097] In order to increase or decrease the biasing force of the spring 22, the position of the lead screw 54 relative to the third member 124 is required to be altered. This achieved by

depressing the third member 124 to allow the drive surface 130 to disengage from the mutually engaging seat 114, so that the third member 124 can be rotated while it is depressed. As the third member 124 is rotated, the spline 128 drives the lead screw 54. As the lead screw 54 rotates, it is guided by the helical threads 53, 55, which alters the position or distance of the lead screw 54 in relation to the third member 124. This increases or decreases the length of spring 22, which reduces or increases the biasing force of the spring 22. Once the desired tension has been reached, the third member 124 may be released causing the drive surface 128 to engage with the mutually engaging seat 114. It can be envisaged that altering the biasing force of the spring 22 can only be achieved when the hinge mechanism 100 is near the closed position, where the lead screw 54 is further away from the third member 124 otherwise the third member 124 may abut the lead screw 54 as it is depressed.

[0098] It can be envisaged when the height of the spring 22 is decreased, the biasing force of the spring 22 is increased. To enable the lead screw 54 to engage with the discrete dampener 42, the inset depth of the discrete dampener 42 relative to the end cap 160 can be adjusted, so that the surface 56 of lead screw 54 abuts the discrete dampener 42 as the gate is being closed to prevent slamming of the gate. In this embodiment when spring 22 is decreased, the relationship (i.e. relative distance) between the lead screw 54 and the discrete dampener 42 is altered so it may be advantageous for the position of the discrete dampener 42 to be adjusted to maintain relationship (i.e. relative distance) with the lead screw 54.

[0099] In the open position as shown in DETAIL C of Figure 6, a small clearance W is provided between the third member 124 and the lead screw 54. In some embodiments, the clearance W can be larger or smaller by altering the height of the of the lead screw 54 or the protrusion of the third member 124. This can either allow the lead screw 54 to abut or be positioned clear of the third member 124 as the hinge mechanism 100 opens. In such arrangement, altering the clearance W can provide a 'stop' feature to prevent the hinge from opening beyond a certain angle, i.e. to prevent the first hinge leaf from rotating relative to the second hinge leaf beyond a predetermined angle.

[00100] As described in the hinge mechanism 100 above, it can be appreciated that the third member 124 member and the variable inset depth of the discrete dampener 42 provide independent closure and dampener adjustment for the hinge mechanism 100.

Applications

[00101] Although the embodiments disclose the latch and system being used on gates, it can be envisaged that the latch and system can be used on other applications such as security fencing, zone restriction fencing, doors, safety barriers, security barriers, care homes, garden gates, swimming pool and child care applications etc.

Alternative Embodiments

[00102] In the claims which follow and in the preceding disclosure, except where the context requires otherwise due to express language or necessary implication, the word "comprise" or variations such as "comprises" or "comprising" is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the present disclosure.

[00103] Accordingly, the present disclosure is not to be limited in terms of the particular embodiments described in this application, which are intended as illustrations of various aspects. Many modifications and variations can be made without departing from its scope, as will be apparent to those skilled in the art. Functionally equivalent methods and apparatuses within the scope of the disclosure, in addition to those enumerated herein, will be apparent to those skilled in the art from the foregoing descriptions. Such modifications and variations are intended to fall within the scope of the appended claims. The present disclosure is to be limited only by the terms of the appended claims, along with the full scope of equivalents to which such claims are entitled. It is to be understood that this disclosure is not limited to particular methods which can, of course, vary. It is also to be understood that the terminology used herein is for the purpose of describing particular embodiments only, and is not intended to be limiting.

[00104] From the foregoing, it will be appreciated that various embodiments of the present disclosure have been described herein for purposes of illustration, and that various modifications may be made without departing from the scope and spirit of the present disclosure. Accordingly, the various embodiments disclosed herein are not intended to be limiting, with the true scope being indicated by the following claims.

Claims

1. A hinge mechanism comprising:

first and second hinge leaves rotatable relative to one another about a hinge axis from a closed to an open position;

a drive arrangement including a first member and second member and arranged to induce relative movement between the first member the second member along the hinge axis upon movement of the first and second hinge leaves between the closed and open positions;

a biasing arrangement operative to contact the first member to bias relative movement between the first member and the second member along the hinge axis to bias the first and second hinge leaves towards the closed position; and

a dampener arrangement, wherein during the relative movement between the first and second members under a biasing force of the biasing arrangement, the dampener arrangement is operative to contact the first member to apply a resisting force to resist further relative movement to dampen movement of the first and second hinge leaves towards the closed position.

2. A hinge mechanism according to claim 1, wherein the biasing arrangement exerts the biasing force on the second member that is active through a first angular displacement of the first and second hinge leaves between the open and closed positions.

3. A hinge mechanism according to claim 2, wherein the dampener arrangement becomes active over a second angular displacement of the first and second hinge leaves from an intermediate position towards the closed position.

4. A hinge mechanism according to claim 3, wherein the second angular displacement is less than the first angular displacement such that the dampener arrangement is inactive over a third angular displacement towards the open position to the intermediate position while the biasing arrangement is active during the first angular displacement.

5. A hinge mechanism according to claim 4, wherein the biasing force of the biasing arrangement is greater than the resisting force of the dampening arrangement through the second angular displacement.

6. A hinge mechanism according to any one of the preceding claims, wherein the first member is moving axially relative to the second member under the biasing force of the biasing arrangement.

7. A hinge mechanism according to claim 6, wherein the drive arrangement further includes a retaining structure to prevent rotation of the first member relative to first and second hinge leaves.

8. A hinge mechanism according to claim 7, wherein the second member is fixed relative to one of the first or the second hinge leaves, such that the second member is configured to rotate about the hinge axis upon movement of the first and second hinge leaves.

9. A hinge mechanism according to claim 8, wherein the first member and the second member are in threaded engagement such that when the first and second hinge leaves move from the closed position to the open position, rotational movement of the second member imparts axial movement to the first member and when the first and second hinge leaves move from the open position to the closed position, axial movement of the first member imparts rotational movement to the second member.

10. A hinge mechanism according to claim 9, wherein the first member is externally threaded, and the second member is internally threaded.

11. A hinge mechanism according to any one of claims 6 to 10, wherein the first hinge leaf includes a central housing extending between two ends along the hinge axis, and the second hinge leaf includes opposed end structures configured to engage the two ends of the central housing, the end structures and the housing rotate relative to one another about the hinge axis when the first and second hinge leaves move relative to one another between the open and closed positions.

12. A hinge mechanism according to claim 11, wherein the second member is arranged about the dampener arrangement towards one of the end structures of the second hinge

leaf, and the biasing arrangement is arranged towards the other of the end structures of the second member.

13. A hinge mechanism according to any one of claims 6 to 12, wherein the first member includes a first and a second engagement surface facing in opposite axial directions such that when the first and second hinge leaves are moved from the open position to the closed position, the biasing arrangement engages the first engagement surface to bias the first member towards the dampener arrangement.

14. A hinge mechanism according to claim 13 when dependent on claim 3, wherein from the intermediate position to the closed position of the first and second hinge leaves, the second engagement surface engages the dampener arrangement to dampen the relative movement of the first and second hinge leaves towards the closed position.

15. A hinge mechanism according to any one of claims 7 to 14, wherein the retaining structure includes complementary key surfaces formed on an internal surface of the central housing and an external surface of the second member.

16. A hinge mechanism according to claim 15 when dependent on claim 11, further comprising an adjustment mechanism having one end coupled to the biasing arrangement and the other end coupled to one of the two opposed end structures of the second hinge leaf.

17. A hinge mechanism according to claim 16, wherein the biasing arrangement is located between the second member and the adjustment mechanism.

18. A hinge mechanism according to claim 16 or 17, wherein the adjustment mechanism is further coupled to a piston and, upon rotation of the adjustment mechanism, the piston moves in an axial direction to alter the biasing force of the biasing arrangement.

19. A hinge mechanism according to any one of claims 1 to 5, wherein the first hinge leaf includes a central housing extending between two ends along the hinge axis and including an internal wall defining a passage, and the second hinge leaf includes opposed end structures configured to engage the two ends of the central housing, the end structures and the housing rotate relative to one another about the hinge axis when

the first and second hinge leaves move relative to one another between the open and closed positions.

20. A hinge mechanism according to claim 19, wherein the second member is arranged about the dampener arrangement towards one of the end structures of the second hinge leaf, and the biasing arrangement is arranged towards the other of the end structures of the second member.

21. A hinge mechanism according to either claim 19 or 20, wherein the drive arrangement includes a third member fixed relative to one of the two opposed end structures such that upon movement of the second hinge leaf relative to the first hinge leaf from the closed to the open position, the third member rotates to impart axial movement to the first member.

22. A hinge mechanism according to claim 21, wherein the drive arrangement further includes a retaining structure to prevent rotation of the first member relative to first and second hinge leaves.

23. A hinge mechanism according to either claim 21 or 22, wherein the second member is fixed to the internal wall of the passage of the central housing of the first hinge leaf such that upon movement of the first hinge leaf relative to the second hinge leaf from the closed to the open position, the second member rotates to impart axial movement to the first member.

24. A hinge mechanism according to claim 23, wherein the first member and the second member are in threaded engagement.

25. A hinge mechanism according to claim 24, wherein the first member is externally threaded and the second member is internally threaded.

26. A hinge mechanism according to any one of claims 19 to 25, wherein the biasing arrangement is located between the first member and the third member.

27. A hinge mechanism according to claim 26 when dependent on claim 21, wherein the biasing arrangement has one end coupled to the first member and the other end coupled to the third member.

28. A hinge mechanism according to claim 27, wherein the third member is coupled to the first member of the drive arrangement.

29. A hinge mechanism according to claim 28, wherein when the third member is selectively rotatable and upon rotation of the third member the first member moves in an axial direction to alter the compression or biasing force of the biasing arrangement

30. A hinge mechanism according to claim 29, wherein the third member engageable with said one of the two opposed end structures, such that when the third member is disengaged with said one of the two opposed end structures the third member can be rotated to alter the compression or biasing force of the biasing arrangement, and when the third member is reengaged with said one of the two opposed end structures, the altered compression or biasing force is registered.

31. A hinge mechanism according to claim 22, wherein the third member includes a shaft fixed to the one of the two opposed end structures of the second hinge leaf, and the retaining structure includes complementary key surfaces formed on an external surface of the shaft and an internal surface of first member.

32. A hinge mechanism according to any one of claims 19 to 31, wherein the first member includes a first and a second engagement surface facing in opposite axial directions, and wherein when the first and second hinge leaves are moved from the open position to the closed position, the biasing arrangement engages the first engagement surface to bias the first member towards the dampener arrangement.

33. A hinge mechanism according to claim 32 when dependent on claim 3, wherein when the first and second hinge leaves move from the intermediate position to the closed position, the second engagement surface engages the dampener arrangement to dampen the relative movement of the first and second hinge leaves towards the closed position.

34. A hinge mechanism according to any one of the preceding claims, wherein the biasing arrangement is in the form of a compression spring.

35. A hinge mechanism according to any one of claims 1 to 34, wherein the biasing arrangement is in the form of a torsional spring.

36. A hinge mechanism according to any one of claims 3 to 5, wherein the dampening mechanism is selectively fixed so that the distance between the dampening mechanism and the biasing arrangement can be altered.

37. A hinge mechanism comprising:

first and second hinge leaves rotatable relative to one another about a hinge axis from a closed to an open position;

a drive arrangement including a first member and second member and arranged to induce relative movement between the first member and the second member along the hinge axis upon movement of the first and second hinge leaves between the closed and open positions;

a biasing arrangement operative to contact the first member to bias relative movement between the first member and the second member along the hinge axis to bias the first and second hinge leaves towards the closed position; and

a dampener arrangement, wherein during the relative movement between the first and second members under a biasing force of the biasing arrangement, the dampener arrangement is operative to contact the first member to apply a resisting force to resist further relative movement to dampen movement of the first and second hinge leaves towards the closed position, wherein at least one of the drive arrangement, the biasing arrangement and/or the dampener arrangement is/are arranged coaxially with the hinge axis.

38. A hinge mechanism according to claim 37, wherein the dampener arrangement includes a discrete dampener that is removably secured to the hinge mechanism.

39. A hinge mechanism according to claim 37 or 38, wherein the first member is moving axially relative to the second member under the biasing force of the biasing arrangement.

40. A hinge mechanism according to claim 39, wherein the first member and the second member are in threaded engagement such that when the first and second hinge leaves move from the closed position to the open position, rotational movement of the second member imparts axial movement to the first member and when the first and second

hinge leaves moves from the open position to the closed position, axial movement of the first member imparts rotational movement to the second member.

41. A hinge assembly for a gate or a movable barrier comprising at least two or more hinge mechanisms according to any one of the preceding claims.

42. A hinge assembly according to claim 41, wherein the two or more hinge mechanisms facilitate closed the gate or the movable barrier.

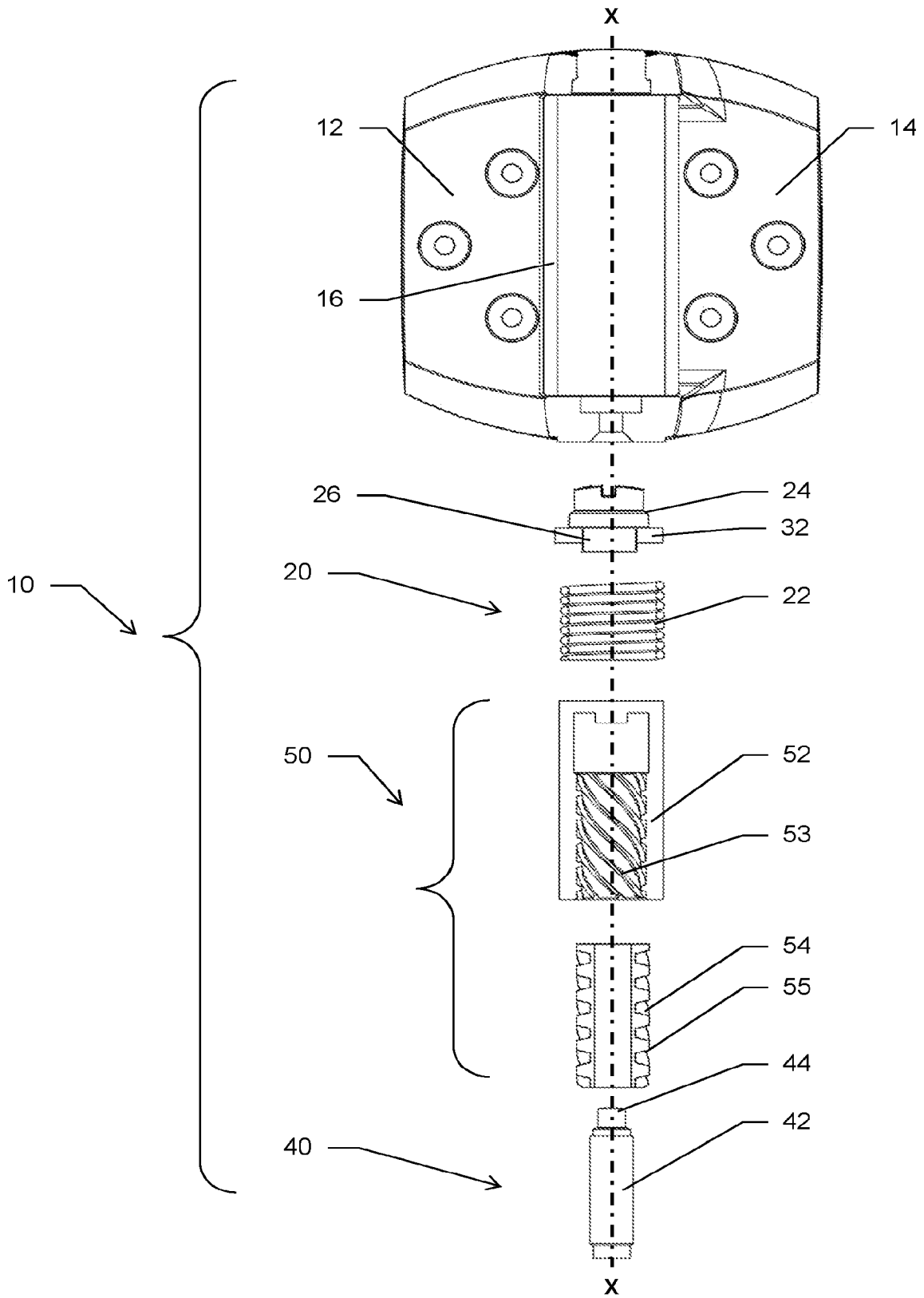


Fig. 1a

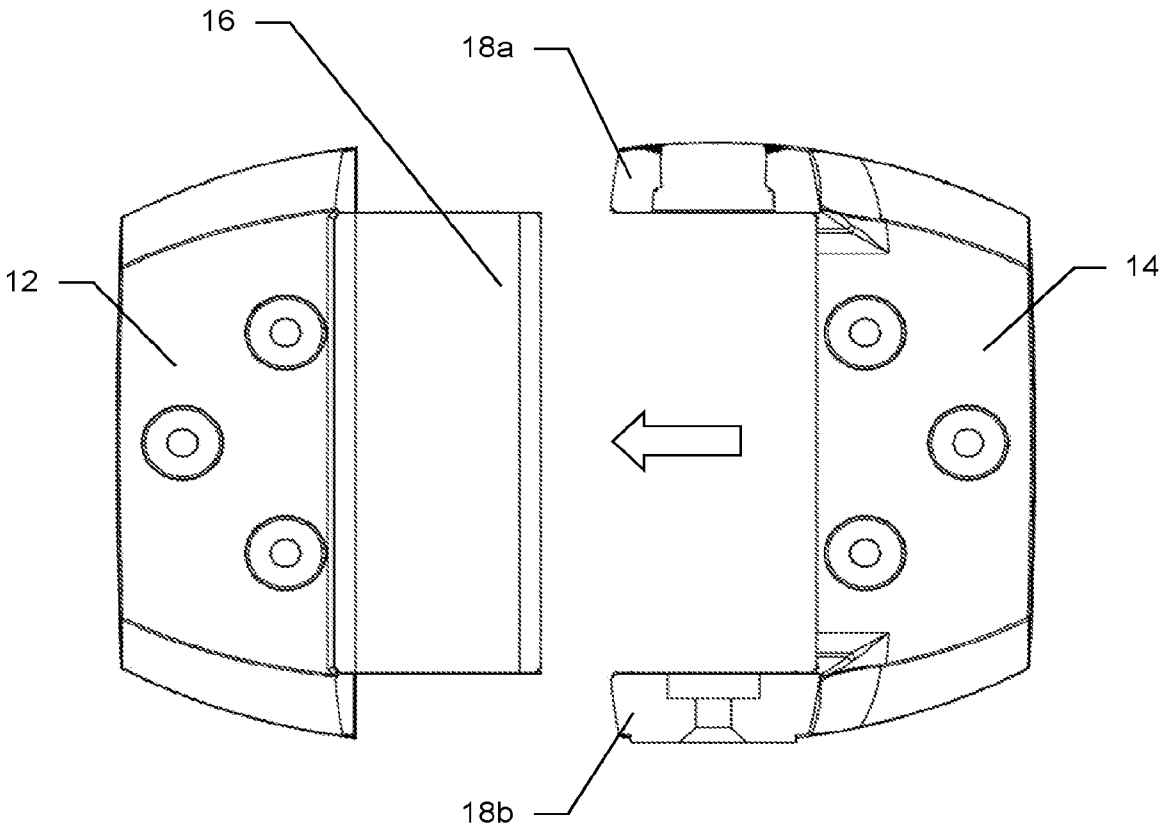


Fig. 1b

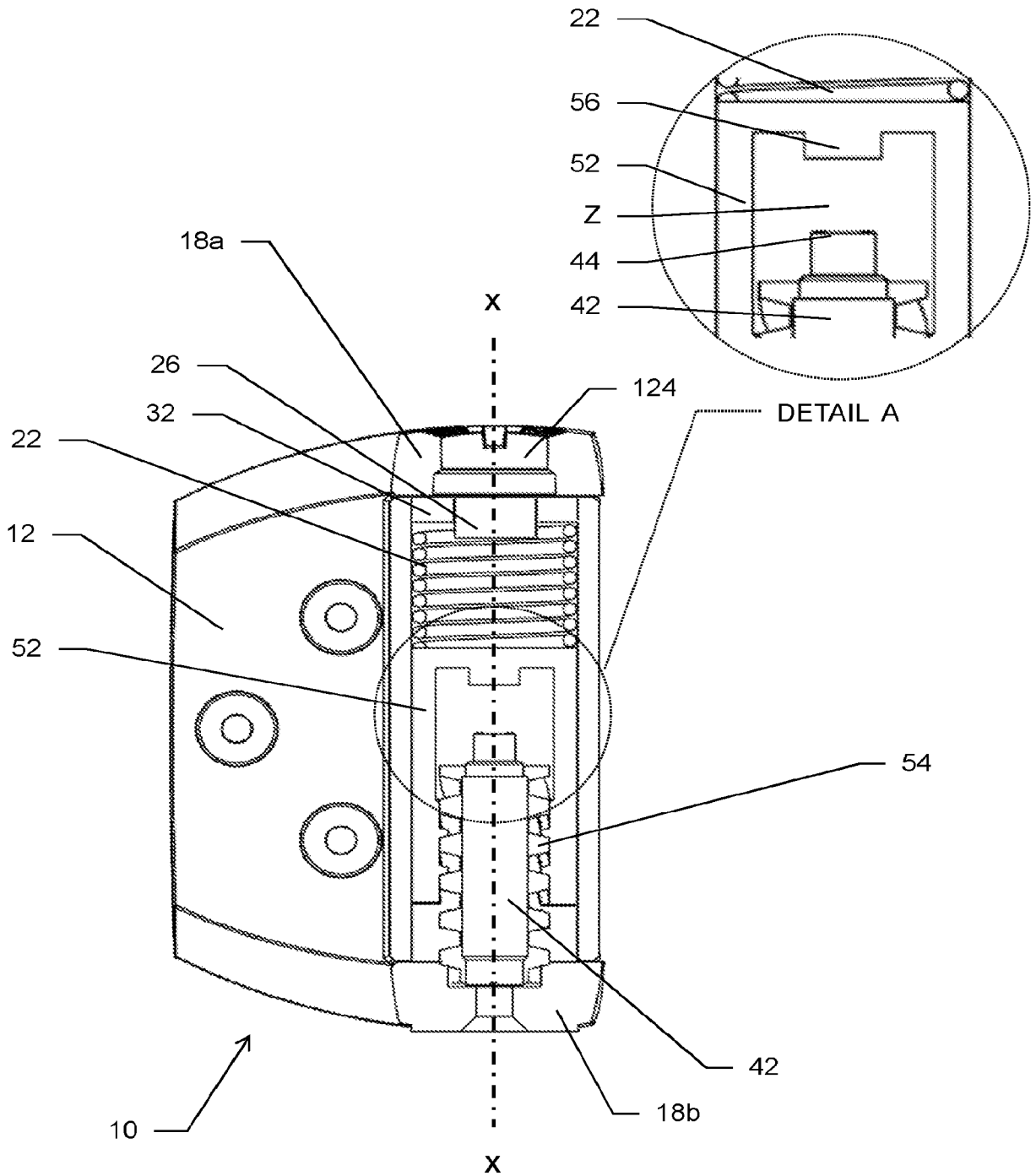


Fig. 2

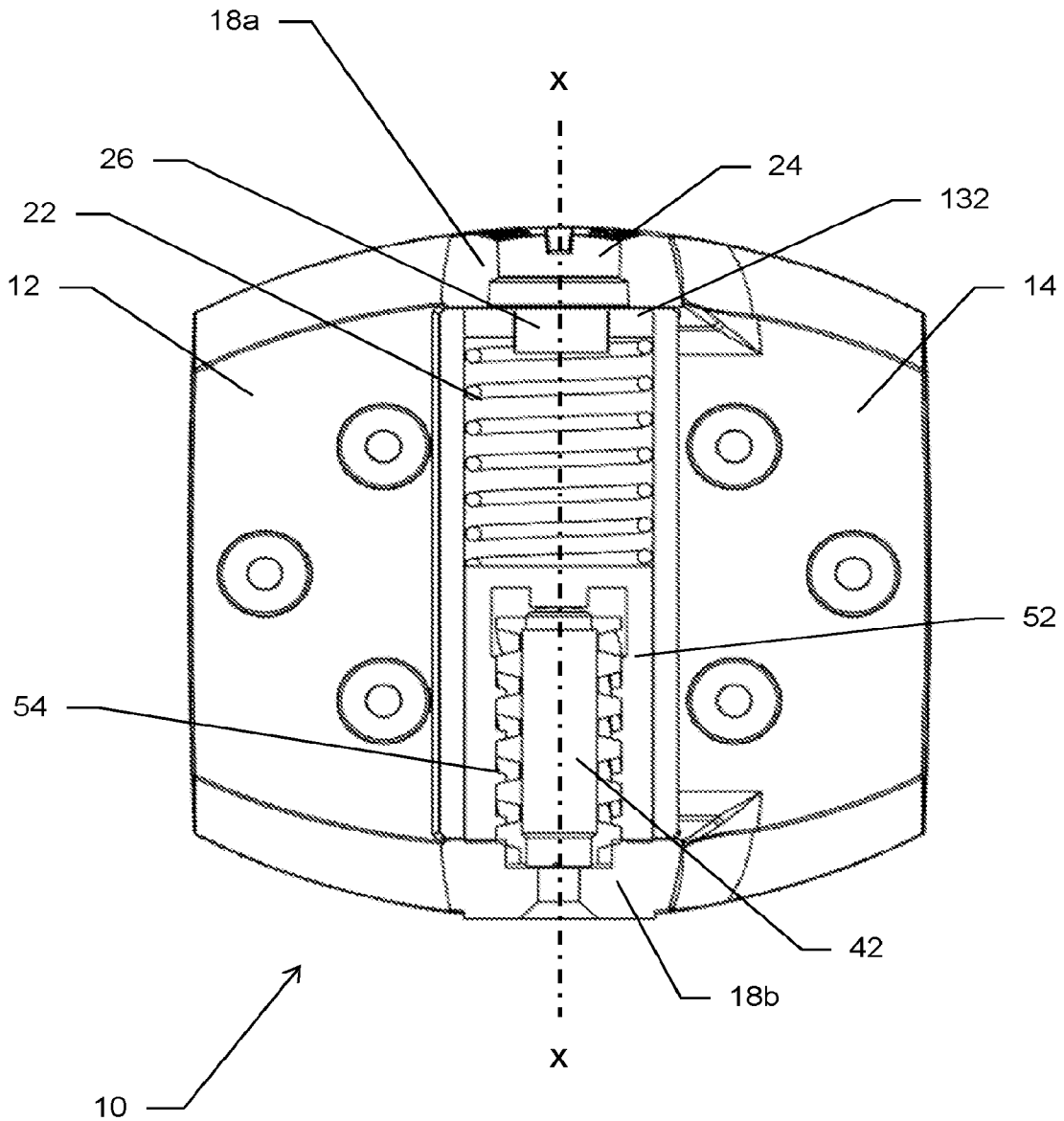
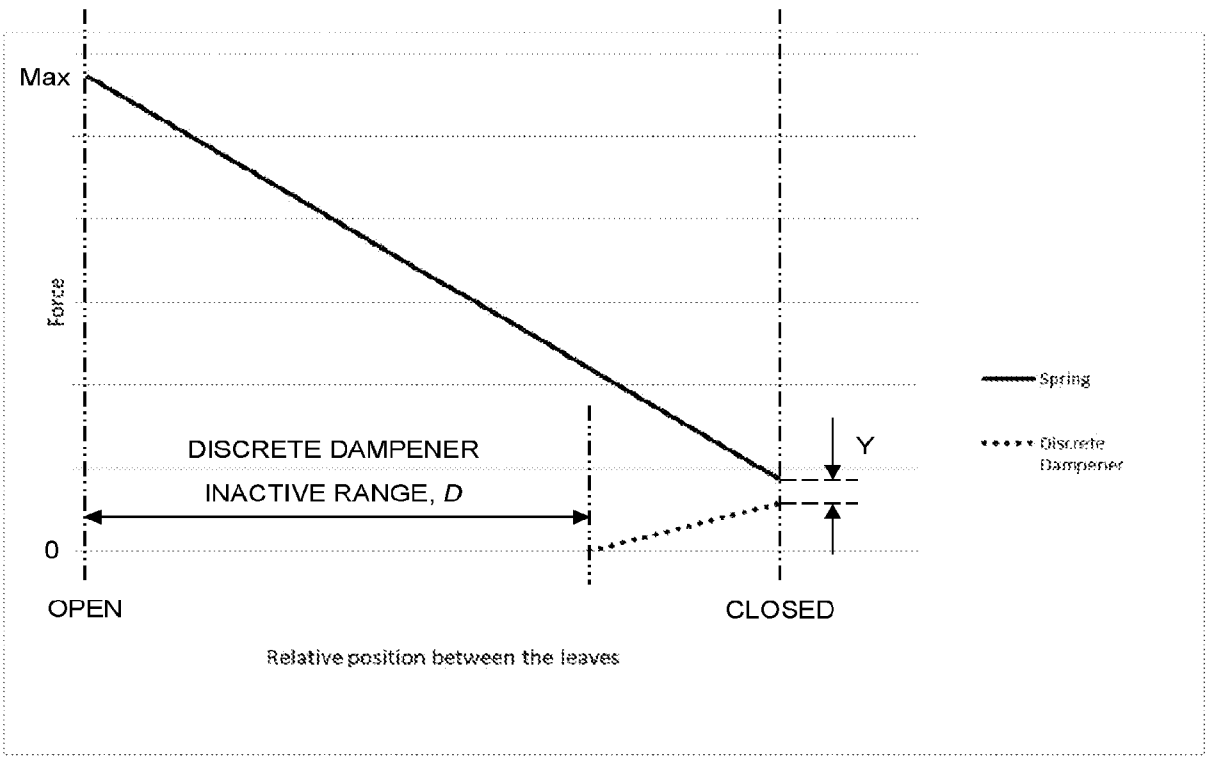


Fig. 3


Max
Force
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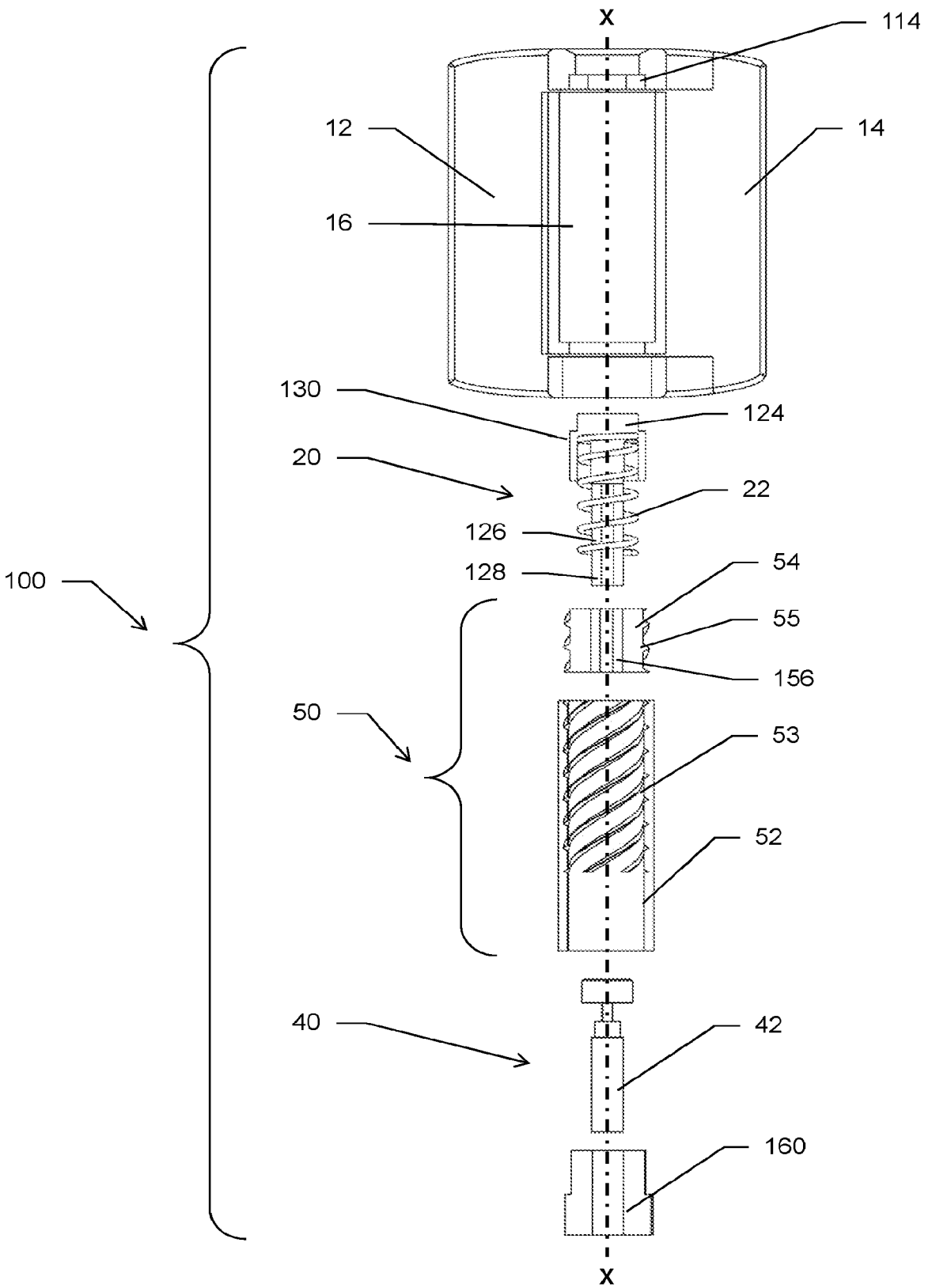
DISCRETE DAMPENER
INACTIVE RANGE, D
Y
OPEN
CLOSED
Relative position between the leaves
Spring
Discrete Dampener

Fig. 4


X
114
12
14
16
130
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22
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54
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55
156
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52
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42
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X

Fig. 5a

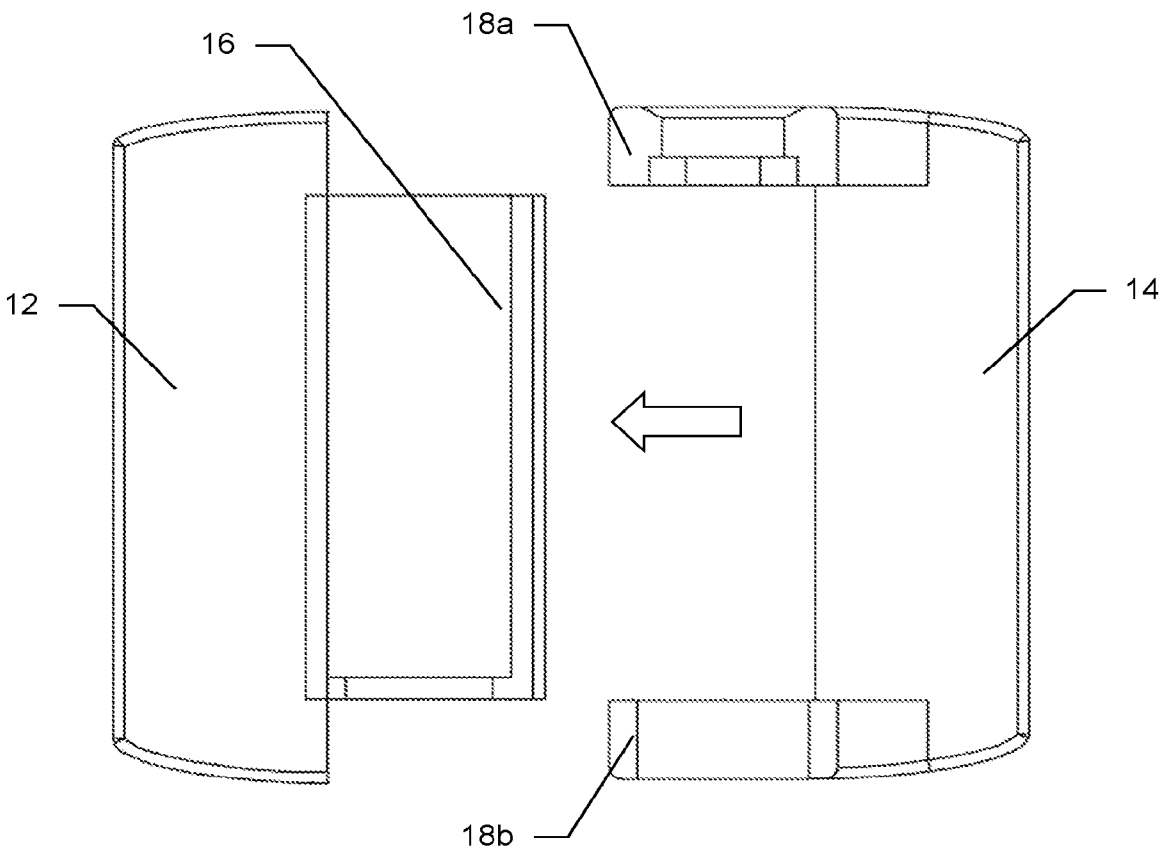
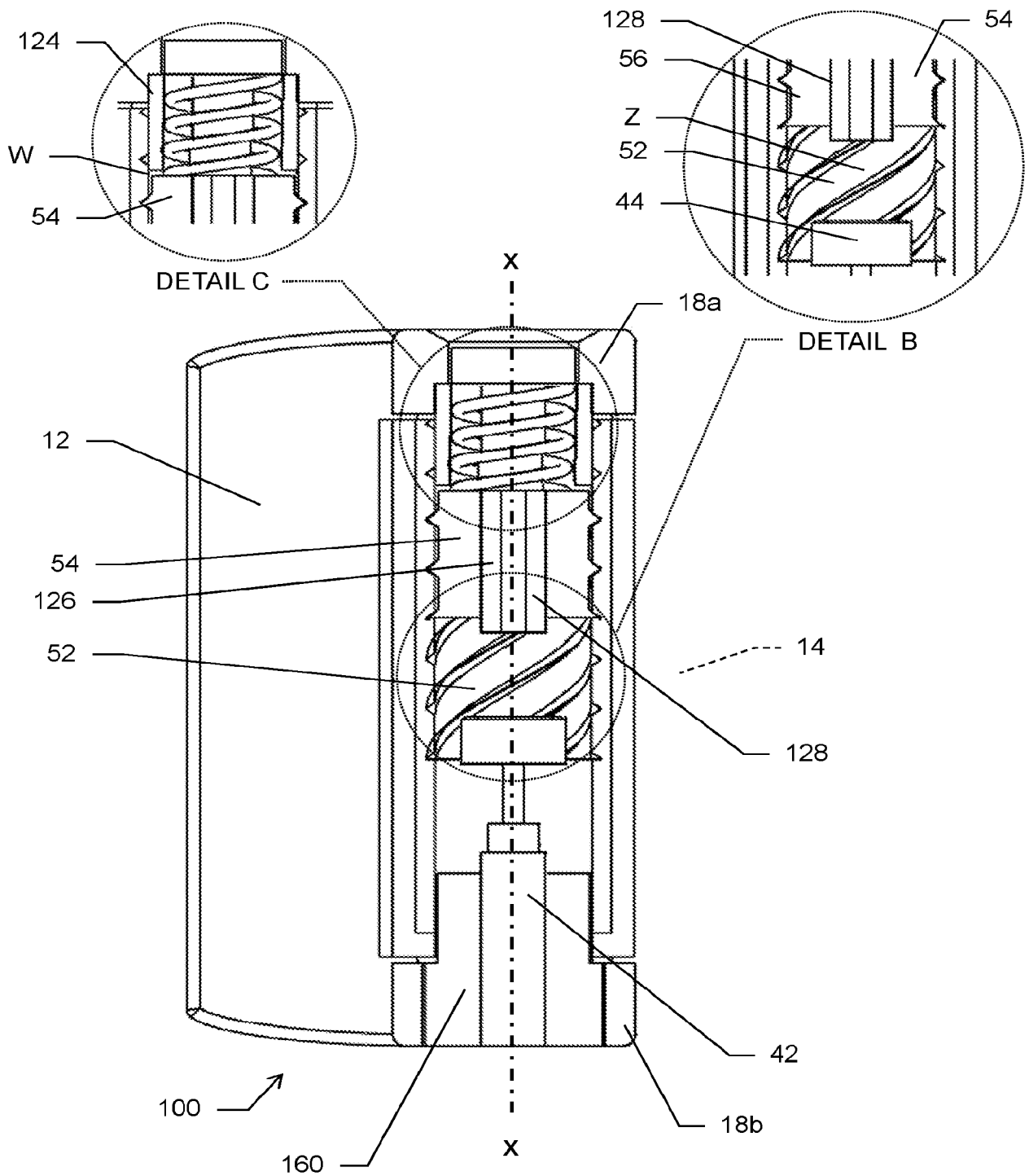


Fig. 5b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W
54
DETAIL C
128
56
Z
52
44
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DETAIL B
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12
54
126
52
14
128
42
18b
100
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X

Fig. 6

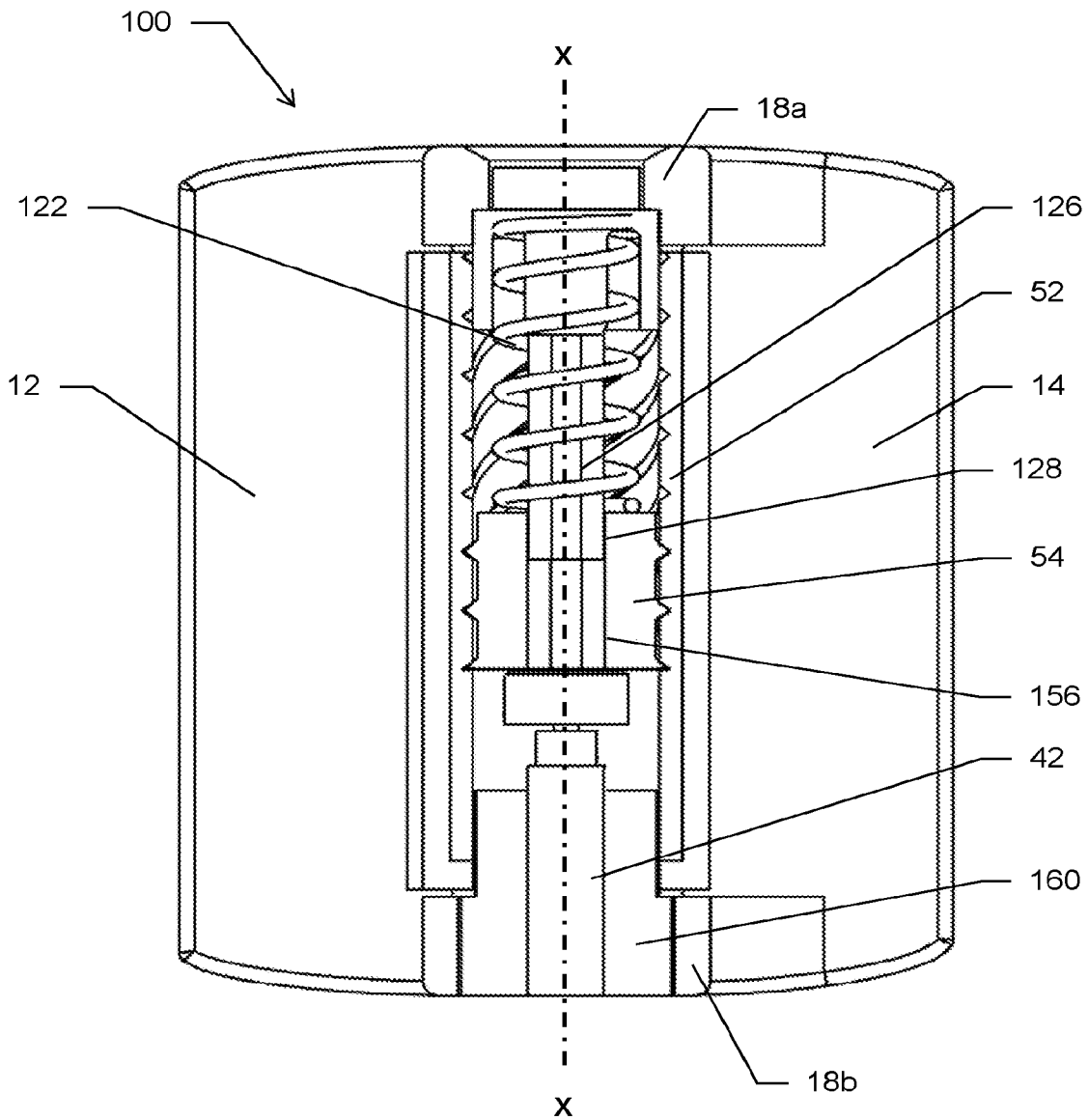

Fig. 7