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(54) **A DAMPER**

(57) A damper (100) for slowing down the closing movement of a sliding door (20) is provided. The damper (100) comprises a damper housing (130), a damping member (110), and a latch (120) being guided by the damping member (110) relative the housing (130) along a first guiding track (140), wherein the latch (120) protrudes outside the housing (130) when moving along the first guiding track (140) and being, when moving along the first guiding track (140), adapted for receiving a lug (17) of an associated guiding profile (16). The first guiding track (140) is connected to a second guiding track (150) being non-parallel to the first guiding track (140), and the latch (120) is moveable from the first guiding track (140) to an end position (170) being defined by said second guiding track (150) and in which end position (170) the latch (120) is at least to some extent retracted into the housing (130) and is adapted to be out of contact with the guiding profile (16).

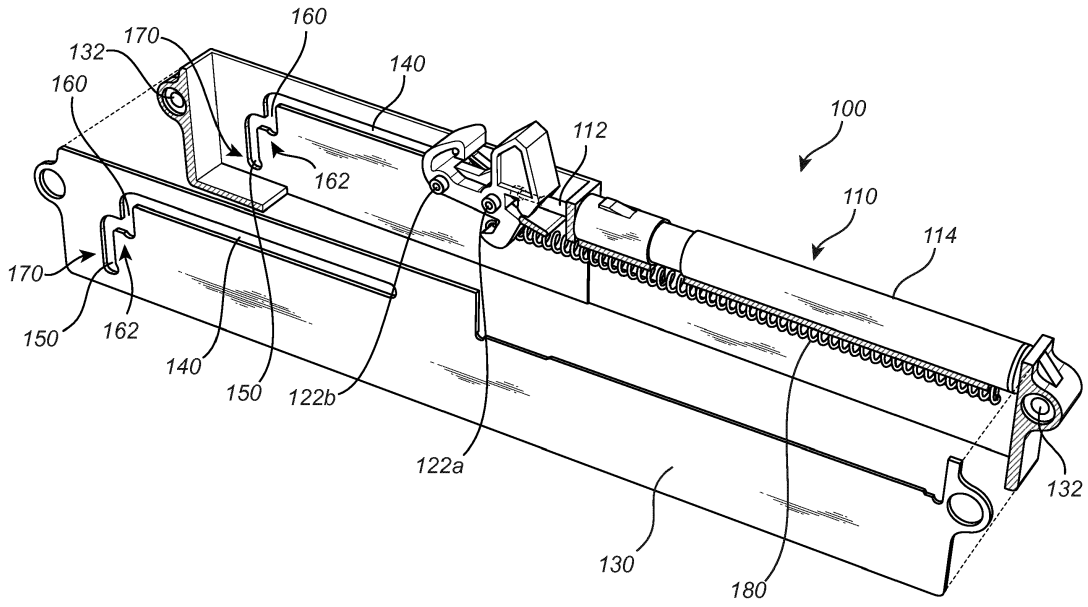

Fig. 7a

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Description

Technical Field

[0001] The present invention relates to a damper, as well as to a sliding door having such damper attached thereto.

Background

[0002] Sliding doors may be provided with dampers, or soft closers, for preventing the door from slamming shut. The damper is normally attached to the inside of an upper or lower end of the sliding door, and has a hook which moves linearly with the movement of an attached piston of a dashpot. During the closing movement of the door the hook will engage with a lug on the door frame. Upon this, the closing movement will continue as the lug urges the hook to push the piston into a surrounding cylinder. Due to viscous friction between the piston and the cylinder of the dashpot the closing movement will be soften.

[0003] Except for the damper, the sliding door also requires a guide that fits within a recess of the sliding door frame. The guide ensures that the sliding door remains in a vertical plane. Typically, the guide may be removed from its guiding position when mounting or dismounting the sliding door from the frame.

[0004] Suggestions have been made for adding the guiding functionality to the damper. In WO2012038494 a solution is proposed in which the entire dashpot and hook assembly, together with a separate guide bolt, is moveable inside a damper housing between an installation position, in which the sliding door can be pivoted unhindered under a profiled guide, and an operating position in which the hook and the guide bolt project into the profiled guide.

[0005] The damper of WO2012038494 reduces the need for separate guide brackets. However, the solution requires a very complex construction of moving parts and it would therefore be desirable to provide an improved damper in terms of more robust and cost-effective construction.

Summary

[0006] The damper according to the embodiments of the present invention provides for a solution to the problems mentioned above being associated with the prior art.

[0007] According to an aspect a damper for slowing down the closing movement of a sliding door is provided. The damper comprises a damper housing, a damping member, and a latch being guided by the damping member relative the housing along a first guiding track. The latch protrudes outside the housing when moving along the first guiding track and the latch is adapted for receiving a lug of an associated guiding profile when moving along the first guiding track. The first guiding track is connected to a second guiding track being non-parallel to, or displaced relative the first guiding track, and the latch is moveable from the first guiding track to an end position being defined by said second guiding track and in which end position the latch is at least to some extent retracted into the housing. Hence the latch is adapted to be out of contact with the guiding profile.

[0008] In an embodiment the latch comprises at least two guiding members arranged on the same side but spaced apart in the moving direction of the latch, which guiding members are slidably received in the guiding tracks. The two guiding members allow for a pivoting movement of the latch, whereby retraction of the latch is made easily and in a very robust manner.

[0009] An intermediate guiding track may be arranged between the first guiding track and the second guiding track. The intermediate guiding track is non-parallel relative the first guiding track such that the latch, when at least partly moved into the intermediate guiding track will pivot. Such pivoting is advantageous in that the latch may thus release the engaged lug without any mechanical control from exterior components; once the latch pivots, the lug is released.

[0010] The intermediate guiding track may be connected to the second guiding track at a receiving section in which the latch may rest without moving further along the intermediate guiding track into the second guiding track. The latch is thus prevented from being positioned in the second guiding track, i.e. in a retracted position, unintentionally.

[0011] In an embodiment, the receiving section is formed by a plateau.

[0012] The latch may have a first end facing the piston of the damping member, and a second end facing away from the piston of the damping member. The first end is provided with a first engagement member for moderating the closing movement of the sliding door, and the second end is provided with a second engagement member for loading the damping member during opening of the sliding door. A single latch thus accomplishes both soft closing and reloading of the damping member.

[0013] The latch may have a connector device to which the piston of the damping member is releasably attached. This solution makes it possible to rearrange the latch in the retracted position without affecting the damping member at all.

[0014] In an embodiment the latch comprises gripping means for allowing a user to manually arrange the latch at the end position, and to manually move the latch from the end position to the first guiding track. This is advantageous in that the damper does not need to be removed for this operation.

[0015] According to a second aspect a sliding door is provided. The sliding door comprises a damper according to the first aspect.

[0016] According to a third aspect, a frame structure is provided. The frame structure comprises a damper ac-

cording to the first aspect.

[0017] According to a fourth aspect, a sliding door system is provided. The system comprises a guide profile and a sliding door according to the second aspect. The latch of the damper forms a guiding member for the sliding door when the latch is guided by the first guiding track such that the latch protrudes into the guide profile.

Brief Description of Drawings

[0018] These and other aspects, features and advantages of which the invention is capable of will be apparent and elucidated from the following description of embodiments of the present invention, reference being made to the accompanying drawings, in which

Fig. 1 is an isometric view of a sliding door system according to an embodiment;
Fig. 2 is a further isometric view of the sliding door system shown in Fig. 1;
Fig. 3 is a rear view of a sliding door according to an embodiment, the sliding door being arranged in a semi-opened position;
Fig. 4 is a further rear view of the sliding door shown in Fig. 3, the sliding door being arranged in a closed position;
Fig. 5a is a cross-sectional side view of a sliding door according to an embodiment;
Fig. 5b is a further cross-sectional side view of the sliding door shown in Fig. 5a;
Fig. 6 is a cross-sectional side view of a sliding door system according to an embodiment; Figs. 7a-c are side views of a damper according to an embodiment; and
Figs. 8a-c are isometric views of parts of a damper according to an embodiment.

Detailed Description

[0019] In the following a sliding door system will be described, as well as details of sliding doors associated with such systems. In particular the following description will provide details of dampers for use with sliding doors.

[0020] Starting with Figs. 1-2, a sliding door system 10 is shown. The sliding door system 10 comprises a rigid frame structure 12 for supporting one or more sliding doors 20. In the shown example the frame structure 12 is a storage cabinet having an upper piece 14a, a bottom piece 14b, and two side pieces 14c, 14d connecting the upper piece 14a to the bottom piece 14b thus forming a rectangular cabinet. As is shown in Fig. 2, the cabinet 12 is opened and closed by moving the sliding door 20 relative the side pieces 14c, 14d.

[0021] For allowing movement of the sliding door 20 the upper piece 14a has a guiding profile 16 attached at its front edge. The sliding door 20 is for this purpose provided with a guiding member (see e.g. Fig. 5a) which is received in a track of the guiding profile 16 for preventing the sliding door 20 from being tilted and fall out from the frame structure 12.

[0022] Additionally, the bottom piece 14b may be provided with a lower guiding profile 18 which receives and accommodates rollers or small wheels (not shown) arranged at the lower part of the sliding door 20. When the sliding door 20 is provided with lower guiding rollers and an upper guiding member, smooth movement of the sliding door 20 is provided.

[0023] According to another embodiment, the sliding door system 10 is instead supporting the sliding door(s) 20 in a hanging manner, such that the sliding door(s) 20 is provided with rollers or wheels resting on the upper guiding profile 16. For this embodiment lower guiding means may also be provided in order to ensure the correct position of the sliding door(s) 20 relative the frame structure 12.

[0024] However, the provision of lower and upper guiding means on the sliding door 20 may present some problems during mounting. As can be seen in Fig. 1, the sliding door 20 is normally connected to the frame structure 12 by first engaging the lower part of the sliding door 20 with the lower guiding profile 18, and thereafter tilted in the correct vertical position. Hence the upper guiding member of the sliding door 20 must be moveable between a retracted position and an protruding position, or otherwise the guiding member must be attached to the sliding door 20 only once the sliding door 20 is in the correct vertical position. For natural reasons, the latter alternative is highly undesired.

[0025] The sliding door 20 is provided with a damper 100 as is shown in Figs. 3 and 4. The damper 100 is provided at the upper edge of the sliding door 20, preferably on the inner side of the sliding door 20. The damper 100 provides a soft closing functionality of the sliding door 20, and includes a damping member 110 as will further be described below. The damping member 110 is connected to a latch 120 which, as is shown in Figs. 3 and 4, protrudes upwards away from the sliding door 20 and into the upper guiding profile 16. The latch 120 thus forms a guiding member of the sliding door 20.

[0026] A lug 17 in the form of a protrusive engagement member is arranged inside the upper guiding profile 16. The lug 17 is positioned such that the sliding door 20 is free to move pass the lug 17, but the latch 120 will engage with it. As can be seen in Fig. 3, when the sliding door 20 is moving to the left in order to close the door 20, the latch 120 comes into contact with the lug 17 preventing the latch to move further along with the movement of the sliding door 20. As the sliding door 20 continues moving to the left, the movement will force contraction of the damping member 110 thus achieving a soft closing of the sliding door 20. The closed position of the sliding door 20, and in particular the position of the latch 120 relative the sliding door 20, is shown in Fig. 4. For opening the sliding door 20 a movement to the right is performed, whereby the latch 120 will again be prevented from moving relative the sliding door 20 due to the engagement of

the lug 17. Therefore, the latch 120 will initially be forced to stay still while the sliding door 20 moves to the right until the latch 120 changes its position (as will be further described below) and releases the lug 17.

[0027] Before turning into details of the damping functionality of the damper 100, mounting and dismounting of the sliding door 20 will be further described. Fig. 5a shows a cross-sectional side view of a sliding door system, wherein the damper 100 is inserted into a recess of the sliding door 20. Of course, the damper 100 may be attached directly onto a planar surface of the sliding door panel as well. The damper 100 is arranged at a vertical position such that the latch 120 protrudes upwards and into the upper guiding profile 16. The lug 17 is schematically shown by the dashed lines. This position of the latch 120 however prevents mounting in the manner shown in Fig. 1. Therefore, the latch 120 may be repositioned as is shown in Fig. 5b, i.e. withdrawn into a damper housing 130. When in this position, the sliding door 20 may be tilted outwards away from the upper guiding profile 16 and thereafter lifted away from the bottom guiding profile 18. A mounting procedure is made in a similar manner, although in a reversed order.

[0028] So far the sliding door system has only been described using one sliding door 20. However, as is shown in Fig. 6, a sliding door system may include an additional number of sliding doors 20 all connected to the same frame structure 12. In Fig. 6 three sliding doors 20 are provided, each running in its own upper guiding profile 16. Each sliding door 20 is provided with a damper 100 and is being guided in the upper guiding profile 16 by means of the latch 120 acting as a guiding element.

[0029] Now turning to Figs. 7a-c details of the damper 100 will be described. The damper 100 acts as a soft closing device for the sliding door 20. The damper 100 has a damper housing 130 which comprises means, e. g. in the form of through holes 132, for securely attaching the damper 100 to an associated sliding door 20. The soft closing device 100 may also be attached to the sliding door 20 by other means, such as clips or interacting tongues/grooves. In case of the provision of holes and screws, the through holes 132 are preferably arranged at lateral ends of the housing 130. Further, the damper 100 comprises a damping member 110 securely attached to the housing 130. The damping member 110 is preferably formed by a piston 112 received in a cylinder 114. The cylinder 114 may be a pneumatic cylinder, a hydraulic cylinder, or any other cylinder operating by means of a viscous fluid. The piston 112 is configured to move in a linear direction in a reciprocal manner whereby the damping effect is formed by compressing fluid when the piston 112 moves into the cylinder 114.

[0030] According to one embodiment, the free end of the piston 112 is connected to the latch 120 while the cylinder 114 is securely attached to the housing 130. In another embodiment, the cylinder 114 is attached to the latch 120 while the piston 112 is securely attached to the housing 130. For the first case where the piston 112 is connected to the latch 120, while the movement of the latch 120 will be defined by the allowed reciprocal movement of the piston 112, the latch 120 is further guided by guiding tracks 140, 150 in the damper housing 130. A first guiding track 140 is arranged horizontally, and is formed by a groove in the damper housing 130. The first guiding track 140 extends from a start position in the near vicinity of the cylinder 114 of the damping member 110, to an end position at which the first guiding track 140 connects with the second guiding track 150 via an intermediate guiding track 160. The intermediate guiding track 160 is tilted relative the first guiding track 140 and thus extends from the first guiding track 140 at an angle. Preferably, the angle at which the intermediate guiding track 160 extends from the first guiding track 140 is slightly less than 90°, such that the latch 120 will experience a rapid drop downwards when reaching the intermediate guiding track 160. The first guiding track 140 and the intermediate guiding track 160 are used for guiding the latch 120 during opening and closing of the sliding door 20. Similar to the first guiding track 140, the intermediate guiding track 160 is formed by a groove in the damper housing 130.

[0031] The second guiding track 150 extends from the end of the intermediate guiding track 160. The direction of the second guiding track 150 is preferably substantially the same as the direction of the intermediate guiding track 160, i.e. tilted in a direction downwards. However, the second guiding track 160 is displaced relative the intermediate guiding track 160 such that a receiving section 162, preferably in the form of a plateau, is formed where the second guiding track 150 connects with the intermediate guiding track 160. The plateau 162, preferably being planar (i.e. having a horizontal extension) or slightly tilted upwards relative the first guiding track 140, may thus form a stop for the latch 120 to stop in this position during normal operation providing soft closing of the door 20.

[0032] The first guiding track 140, the second guiding track 150, the intermediate guiding track 160, and the receiving section 162 form a continuous guiding track in which the latch 120 is moveable.

[0033] The guiding tracks 140, 150, 160 are preferably arranged on each sides of the damper housing 130. The latch 120 may thus be provided with guiding members 122, formed as pins extending laterally outwards from the main body of the latch 120, which pins 122 are received in the guiding tracks 140, 150, 160. Preferably, each side of the latch 120 is provided with two pins 122a, 122b spaced apart horizontally. The provision of two pins 122a, 122b on each side allows the latch 120 to pivot when entering the intermediate guiding track 160 and the second guiding track 150. During normal operation, the end position is defined by the plateau 162 which receives the pin 122b. During installation, the position of the latch 120 is manually changed such that the pin 122b of the latch 120 instead is positioned at an end position 170 defined as the lowermost portion of the second guiding

track 160.

[0034] The latch 120 is formed as a U-shaped member. The legs 124 of the U-shape extend upwards and into the guiding profile 16 of the frame structure 12. As is understood from Figs. 3 and 4, the rearward leg 124a of the latch 120 is used for engaging the lug 17 of the guiding profile 16 during the closing movement of the sliding door 20, while the forward leg 124b of the latch 120 is used for loading the damping member 110 during opening of the sliding door 20. As will be further described with reference to Figs. 8a-c below, the forward leg 124b actually serves two purposes; i) to pull the door 20 to the closed position, and ii) to load a spring used for self-closing of the door 20 during opening of the door 20.

[0035] Operation of the damper 100 will now be described. Starting in Fig. 7a the latch 120 is in a position corresponding to when the sliding door 20 is closed. The lug 17 is thus received in between the legs 124a, 124b of the latch 120. The legs 124a, 124b thus forms engagement members for the lug 17. When the sliding door 20 is urged to the right for door opening (or door closing depending on the actual position of the damper 100), the engagement with the lug 17 will force the latch 120 to slide in the first guiding track 140 relative the housing 130 until the pin 122b drops downwards into the intermediate guiding track 150. Hence the entire latch 120 will pivot, releasing the lug 17 from engagement with the forward leg 124b whereby the sliding door may move further. This is shown in Fig. 7b. During this movement, the latch 120 will also load a spring 180 (see Figs. 8a, c) arranged in the housing 130 and having one end 182 attached to the latch 120.

[0036] During closing of the sliding door, a similar procedure is performed. Now starting in Fig. 7b, the sliding door 20, as well as the damper 100, will move to the left in the drawing until the leg 124a engages with the lug 17. Upon this the latch 120 is prevented from moving further leftwards, whereby the sliding door movement will urge the pin 122b, entrapped at the receiving section 162, upwards and into the first guiding track 140. The loaded spring 180 will now be allowed to retract to its idle position, thus causing a forced movement of the latch 120 relative the housing 130. This forced movement of the latch 120 provides a self closing movement of the sliding door 20. Due to increased friction in the damping member 110 a soft closing will occur until the latch 120 reaches its end position, as indicated in Fig. 7a.

[0037] The second guiding track 160 is used for retracting the latch 120, i.e. its legs 124a, 124b which are used for guiding as well, such that it does not protrude out from the damper housing 130. The latch 120 may move into the second guiding track 150 by manually pushing the latch 120 further away from the damping member 110. Upon this, the latch 120 will automatically disconnect from the piston 112 of the damping member 110 and fall into the second guiding track 150. This is provided by a further pivoting movement of the latch 120, whereby the rear pin 122a will drop into the intermediate guiding track 160 while the forward pin 122b will drop into the second guiding track 150.

[0038] Details of the latch 120, the piston 112, and the spring 180 are shown in Figs. 8a.c. In Fig. 8a, the latch 120 is shown in a position where it is connected to the spring 180 as well as to the piston 112. As is further shown in Fig. 8b, the latch 120 includes a connector device 125 for engaging with the piston 112. In the shown embodiment, the connector device 125 is formed by a fork-like structure, wherein a flange of the piston is received in the gab between two webs 125a, 125b. In other embodiments the connector device 125 may include a resilient, or yielding, material being securely attached to the latch 120 as well as to the piston 112. The spring 180 is preferably securely attached to the latch 120. Connection/disconnection of the piston 112 may be achieved automatically, for example by allowing the latch 120 to connect to the piston 112 by means of a fork-like portion 125 gripping a flange of the piston 112. When the latch 120 pivots during retraction, the fork-like portion 125 will lift upwards relative the piston flange such that disconnection is accomplished. This position of the latch 120, shown in Fig. 7c, is used when mounting the sliding door 20 to the frame structure 12. Connection between the latch 120 and the piston 112 may be realized in other ways as well; for example by magnetic connection, a ball joint, a resilient connection, etc.

[0039] Similarly, when the sliding door 20 is put in the correct position relative the frame structure 12 the latch 120, currently being in the position shown in Fig. 7c, is manually urged towards the piston 112. Due to the pivoting movement caused by the construction of the guiding tracks 140, 150, 160 the connector device 125 will connect with the flange of the piston 112.

[0040] Manual movement of the latch 120 may be realized in many ways, for example by allowing the pins 122a, 122b to extend through the guiding tracks 140, 150, 160. By gripping the pins 122a, 122b the latch can be moved into its connected position. The latch 120 may also be provided with additional portions extending out from the damper housing 130, which portions can be maneuverable by a user.

[0041] In the claims, the term "comprises/comprising" does not exclude the presence of other elements or steps. Furthermore, although individually listed, a plurality of means, elements or method steps may be implemented by e.g. a single unit or processor. Additionally, although individual features may be included in different claims, these may possibly advantageously be combined, and the inclusion in different claims does not imply that a combination of features is not feasible and/or advantageous. In addition, singular references do not exclude a plurality. The terms "a", "an", "first", "second" etc do not preclude a plurality. Reference signs in the claims are provided merely as a clarifying example and shall not be construed as limiting the scope of the claims in any way.

Claims

1. A damper (100) for slowing down the closing movement of a sliding door (20), comprising a damper housing (130), a damping member (110), and a latch (120) being guided by the damping member (110) relative the housing (130) along a first guiding track (140), wherein the latch (120) protrudes outside the housing (130) when moving along the first guiding track (140) and being, when moving along the first guiding track (140), adapted for receiving a lug (17) of an associated guiding profile (16), wherein
the first guiding track (140) is connected to a second guiding track (150) being non-parallel to the first guiding track (140), and
the latch (120) is moveable from the first guiding track (140) to an end position (170) being defined by said second guiding track (150) and in which end position (170) the latch (120) is at least to some extent retracted into the housing (130) and is adapted to be out of contact with the guiding profile (16).

2. The damper according to claim 1, wherein the latch (120) comprises at least two guiding members (122a, 122b) arranged on the same lateral side but spaced apart in the moving direction of the latch (120), which guiding members (122a, 122b) are slidably received in the guiding tracks (140, 150, 160).

3. The damper according to claim 1 or 2, wherein an intermediate guiding track (160) is arranged between the first guiding track (140) and the second guiding track (150), said intermediate guiding track (160) being non-parallel relative the first guiding track (140) such that the latch (120), when at least partly moved into the intermediate guiding track (160) will pivot.

4. The damper according to claim 3, wherein the intermediate guiding track (160) is connected to the second guiding track (150) at a receiving section (162) in which the latch (120) may rest without moving further along the intermediate guiding track (160) into the second guiding track (150).

5. The damper according to claim 4, wherein the receiving section (162) is formed by a plateau.

6. The damper according to any one of the preceding claims, wherein the latch (120) has a first end (123a) facing the damping member (110), and a second end (123b) facing away from the damping member (110), wherein said first end (123a) is provided with a first engagement member (124a) for moderating the closing movement of the sliding door (20), and said second end (123b) is provided with a second engagement member (124b) for loading the damping member (110) during opening of the sliding door (20).

7. The damper according to any one of the preceding claims, wherein the latch (120) has a connector device (125) to which the piston (112) of the damping member (110) is releasably attached.

8. The damper according to any one of claims 1-6, wherein the latch (120) has a connector device (125) to which the piston (112) of the damping member (110) is resiliently attached.

9. The damper according to any one of the preceding claims, wherein the latch (120) comprises gripping means (122a, 122b) for allowing a user to manually arrange the latch (120) at the end position (170), and to manually move the latch (120) away from the end position (170) towards the first guiding track (140).

10. A sliding door, comprising a damper (100) according to any one of the preceding claims.

11. A frame structure (12) for supporting one or more sliding doors (20), comprising a damper (100) according to any one of claims 1-9.

12. A sliding door system, comprising a guide profile (16) and a sliding door (20) according to claim 10, wherein the latch (120) of the damper (100) forms a guiding member (124a, 124b) for the sliding door (20) when the latch (120) is guided by the first guiding track (140) such that the latch (120) protrudes into the guide profile (16).

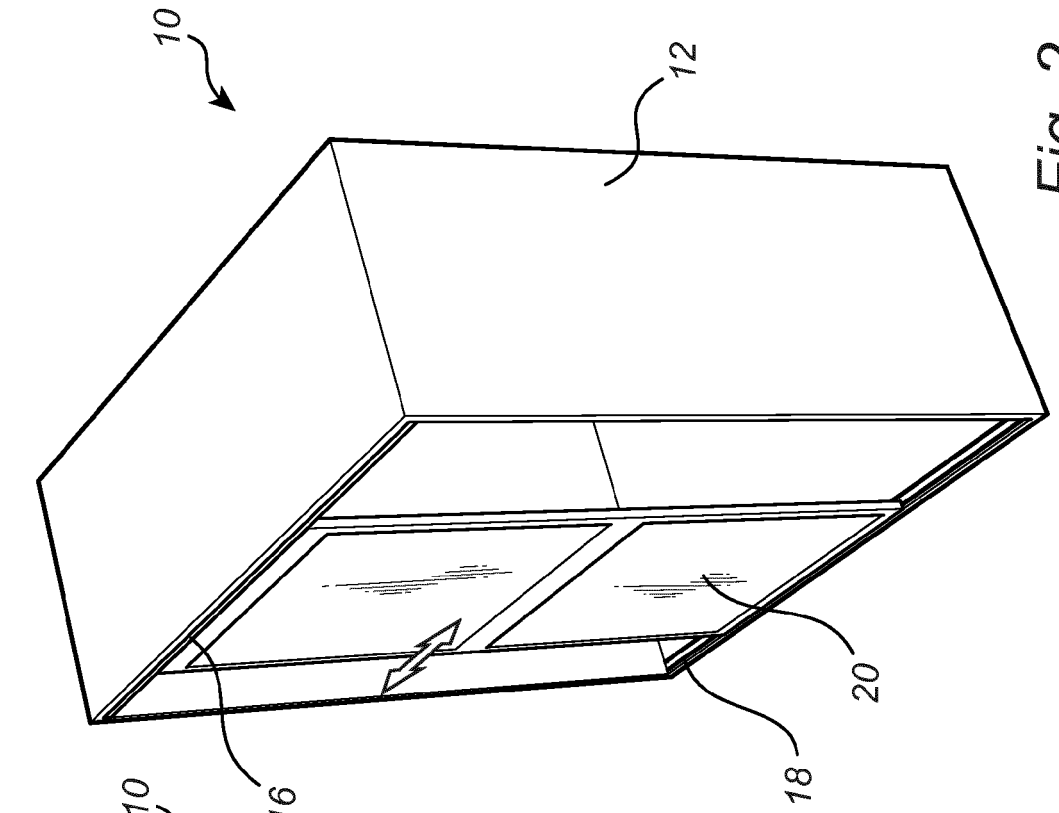

Fig. 2

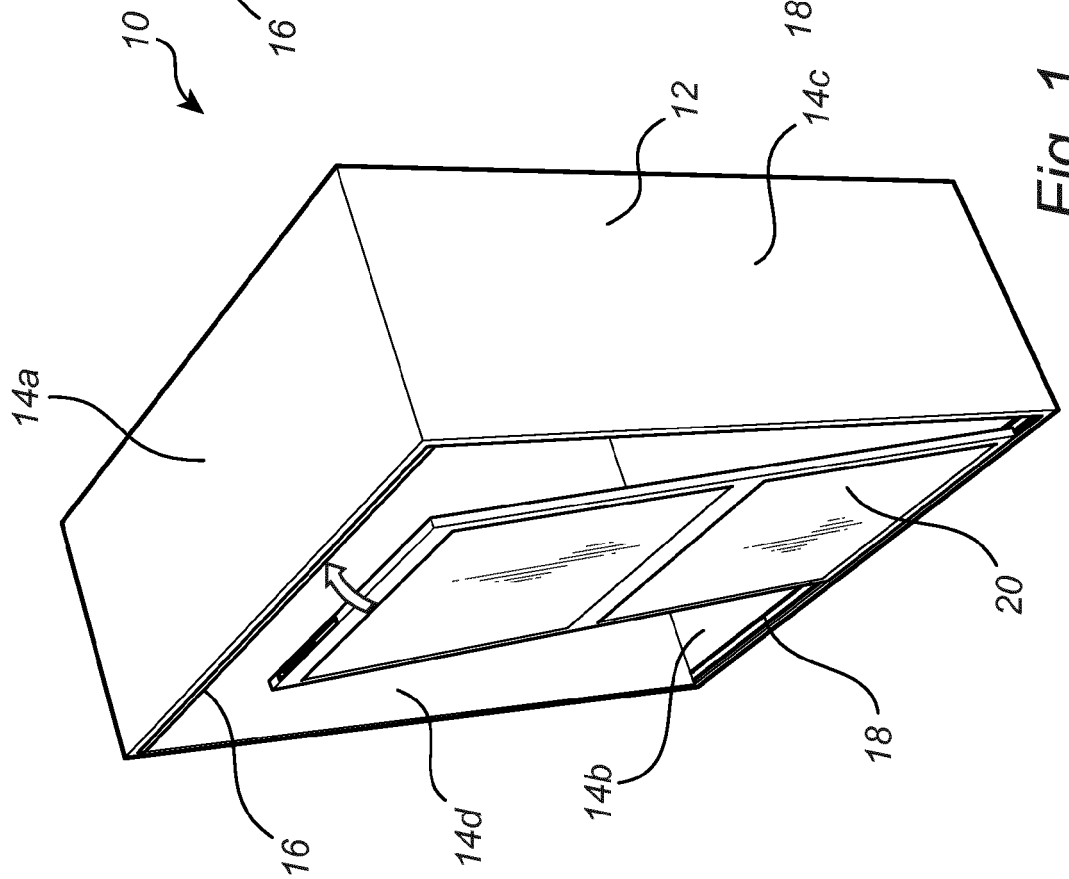

Fig. 1

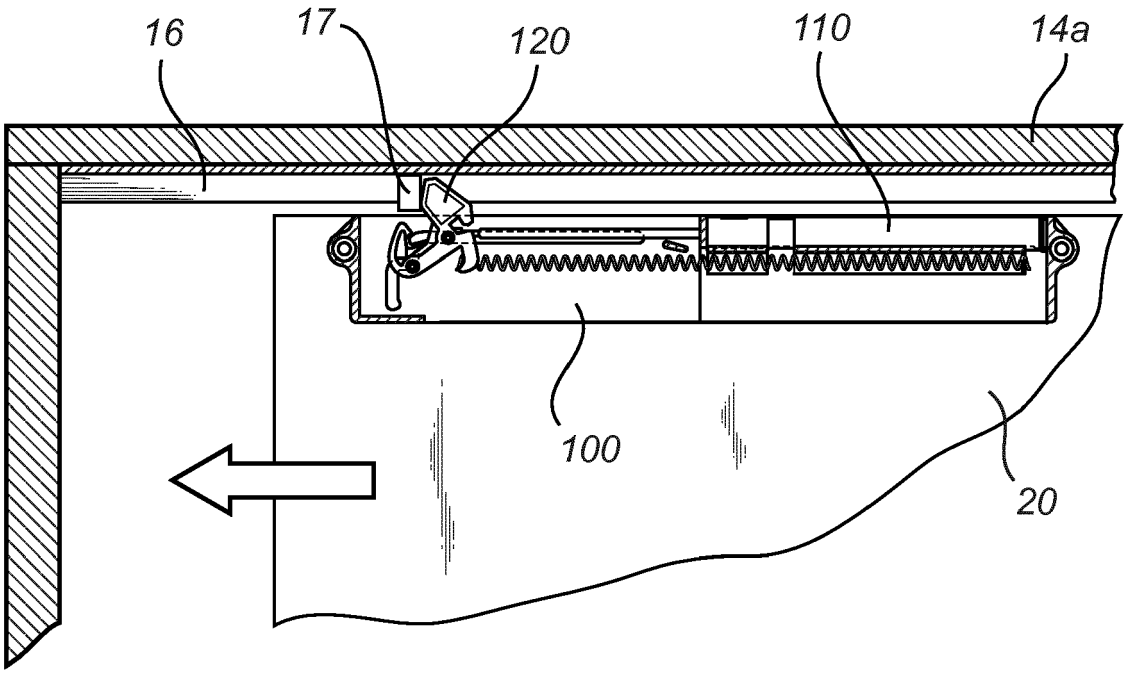

Fig. 3

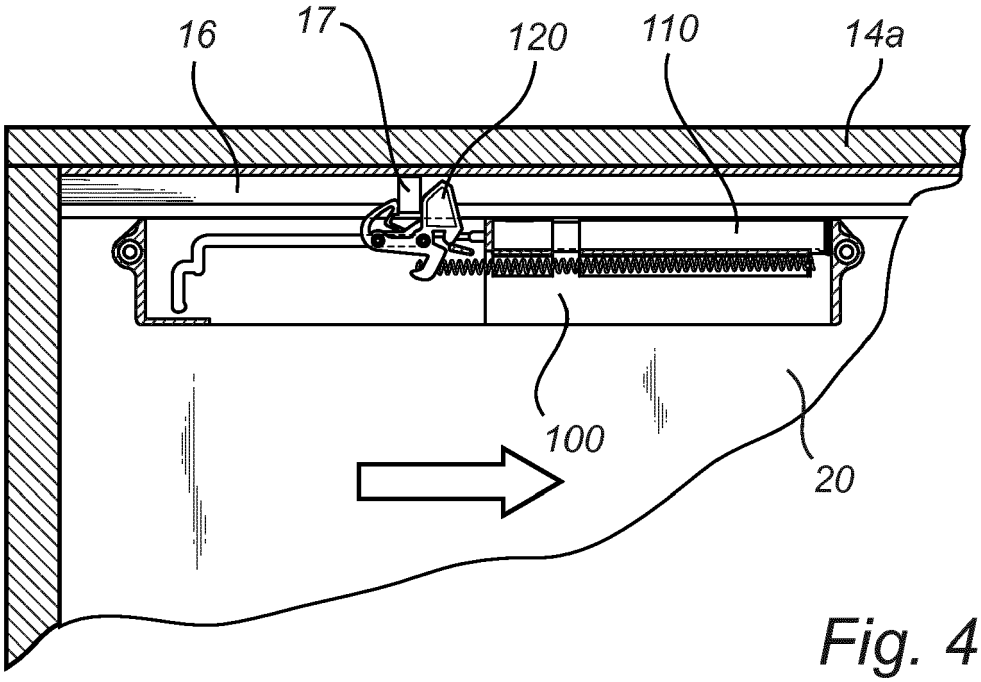

Fig. 4

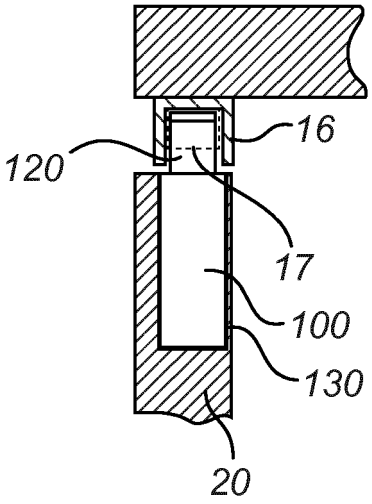

Fig. 5a

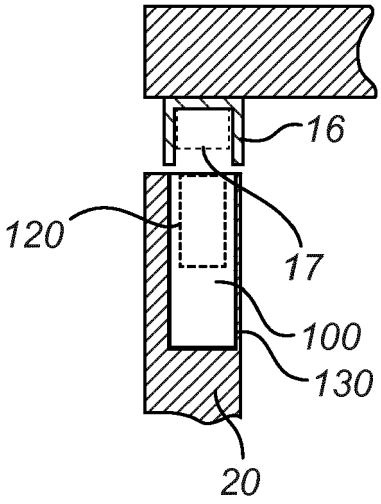

Fig. 5b

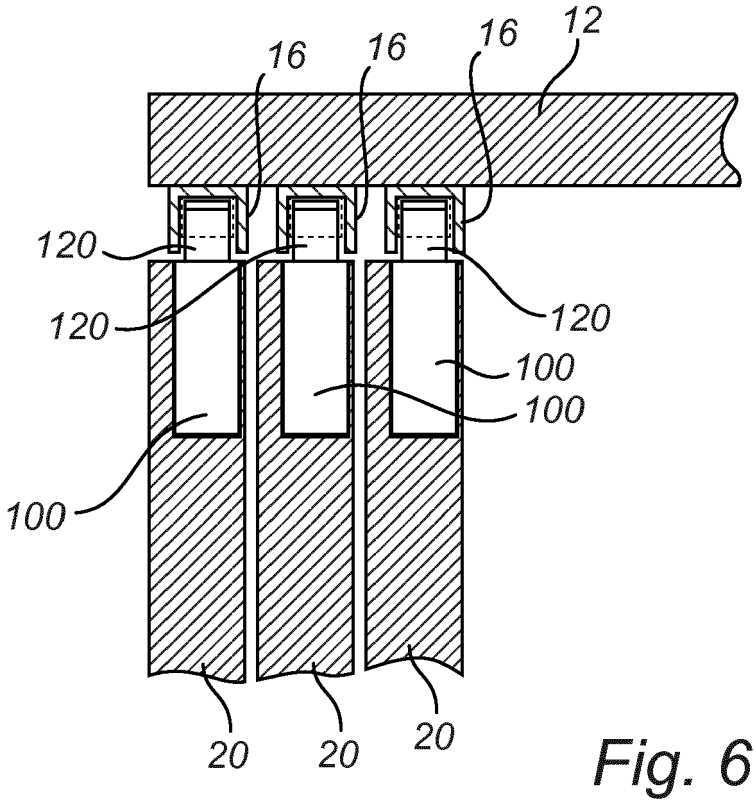

Fig. 6

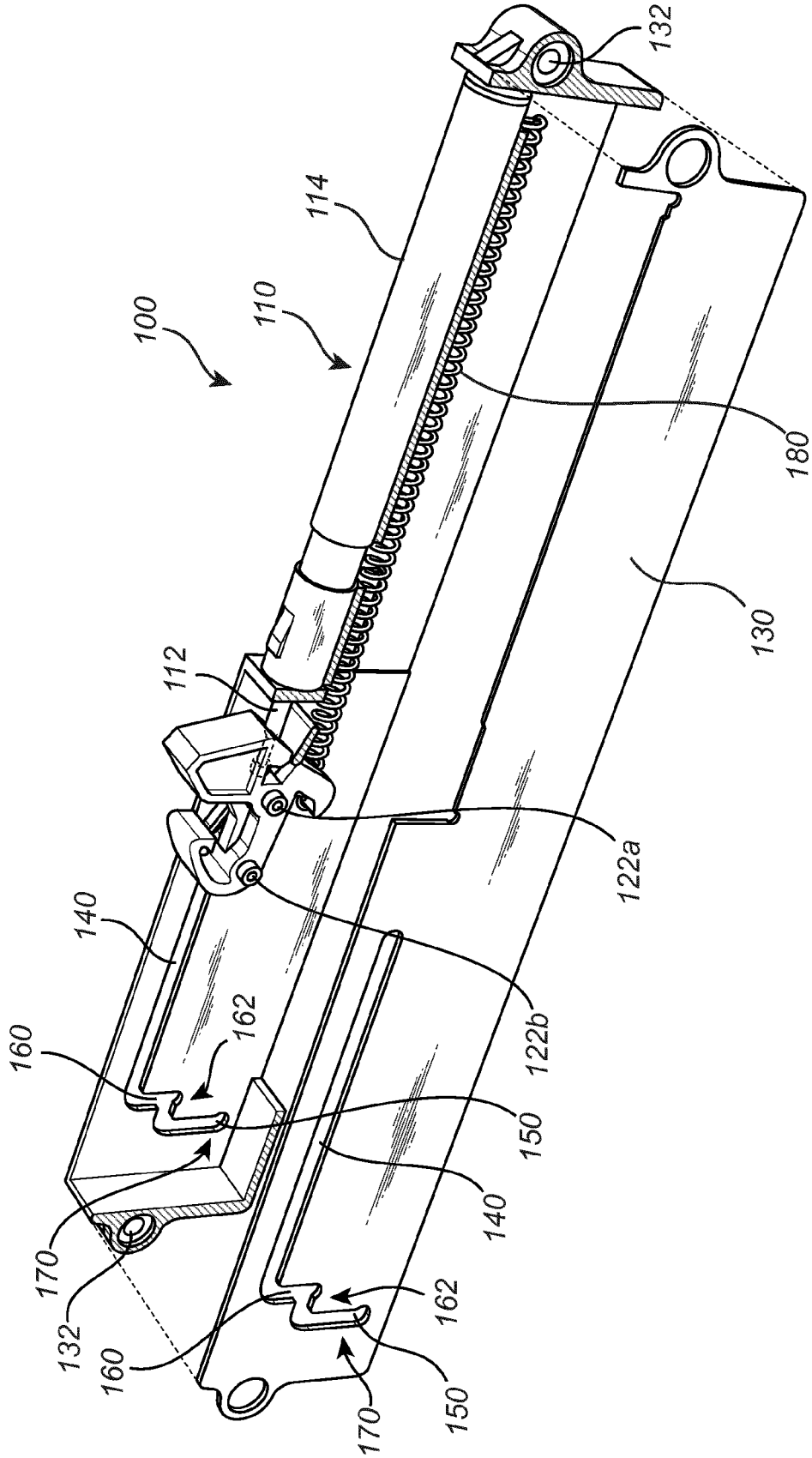

Fig. 7a

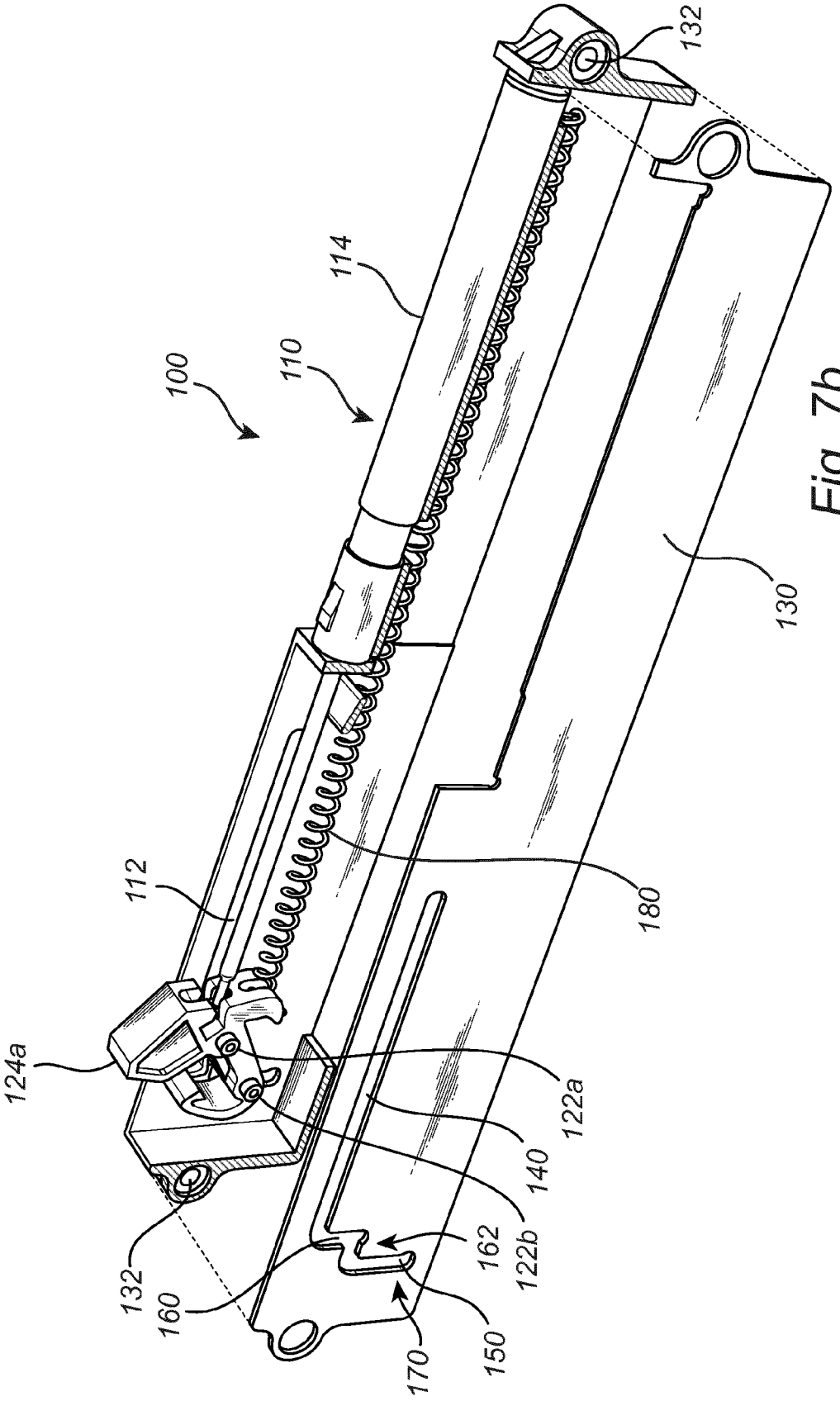
132
114
100
110
130
112
180
124a
122a
140
162
122b
132
160
150
170

Fig. 7b

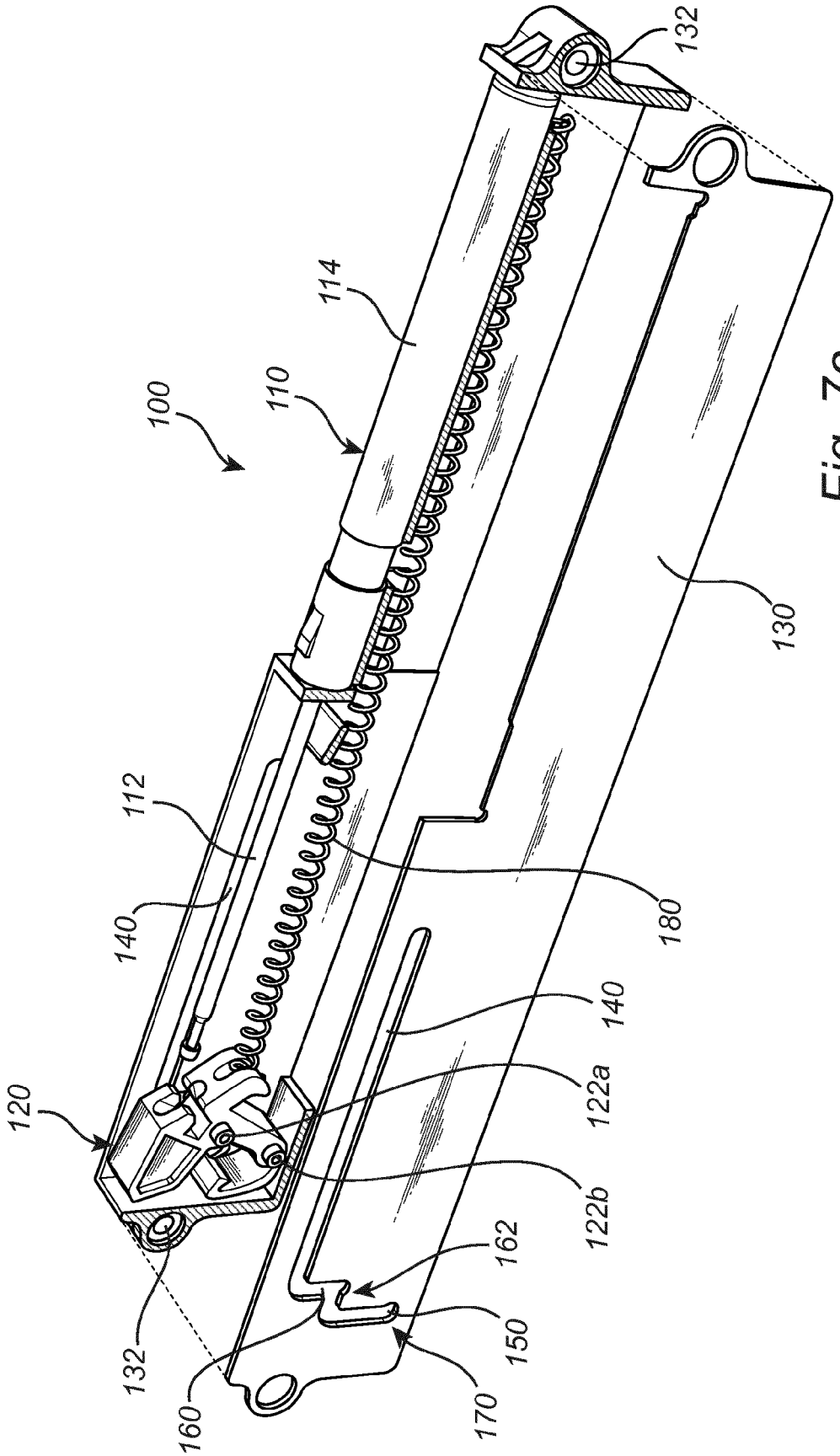
132
114
100
110
130
112
140
180
140
120
122a
122b
162
150
132
160
170

Fig. 7c

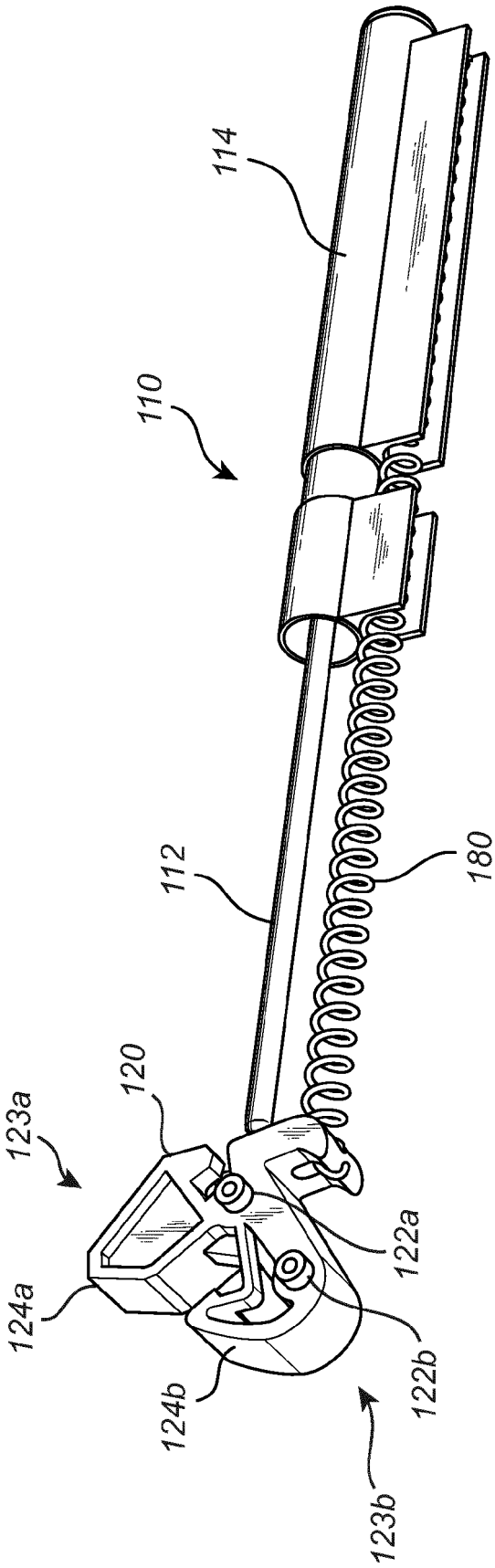

Fig. 8a

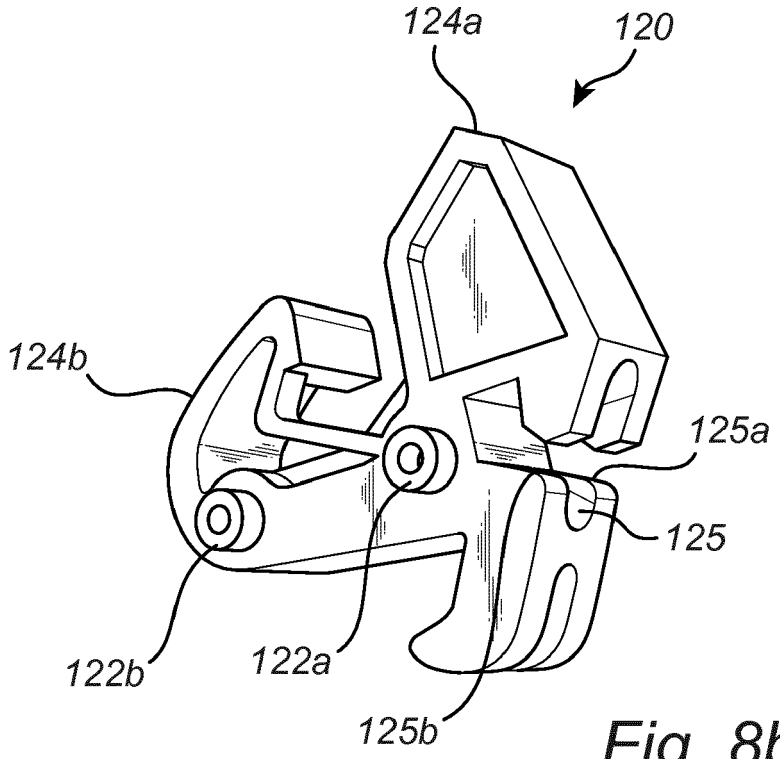

Fig. 8b

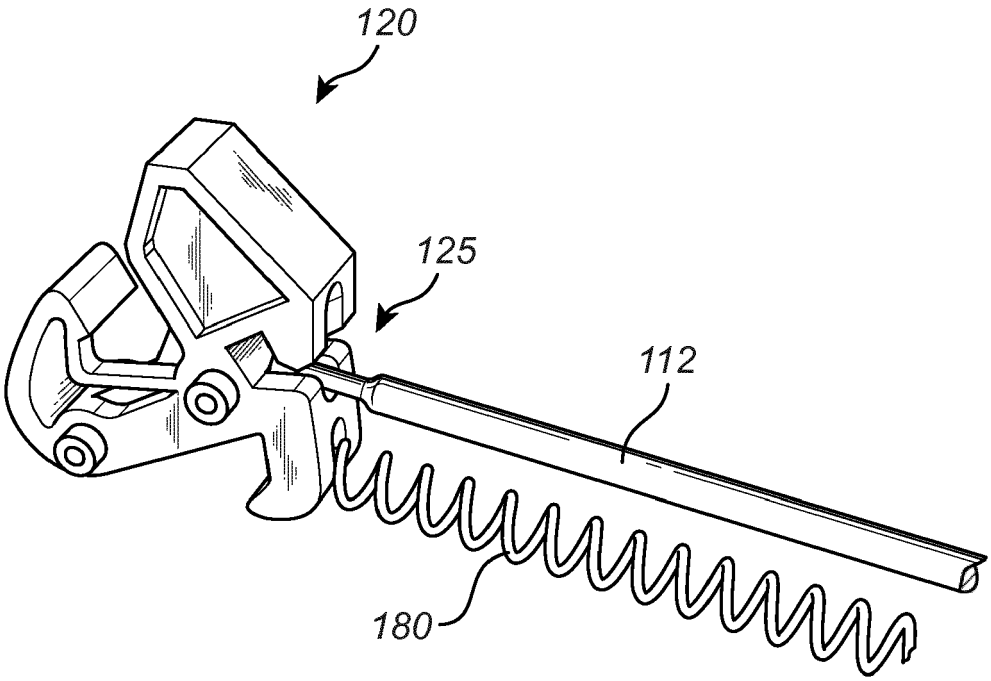

Fig. 8c

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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 7010

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The Hague	27 October 2015	Mund, André

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