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(54) **Sliding door assembly**

(57) A sliding door assembly (1, 201) comprises a guiding rail (10, 210), a door panel (20, 220), and a guiding mechanism connecting said door panel (20, 220) to said guiding rail (10, 210) such that the door panel (20, 220) is slidable in a moving direction along said guiding rail (10, 210). The guiding mechanism comprises a driving means (36, 38, 236) for automatically moving said

door panel (20, 220) along said guiding rail (10, 210) from a closed position to an open position, and an actuator (40, 42, 240) connectable to said driving means (36, 38, 236) and configured to activate said driving means (36, 38, 236) when the door panel (20, 220), in its closed position, is exposed to a pressing force in a direction perpendicular to the moving direction of said door panel (20, 220).

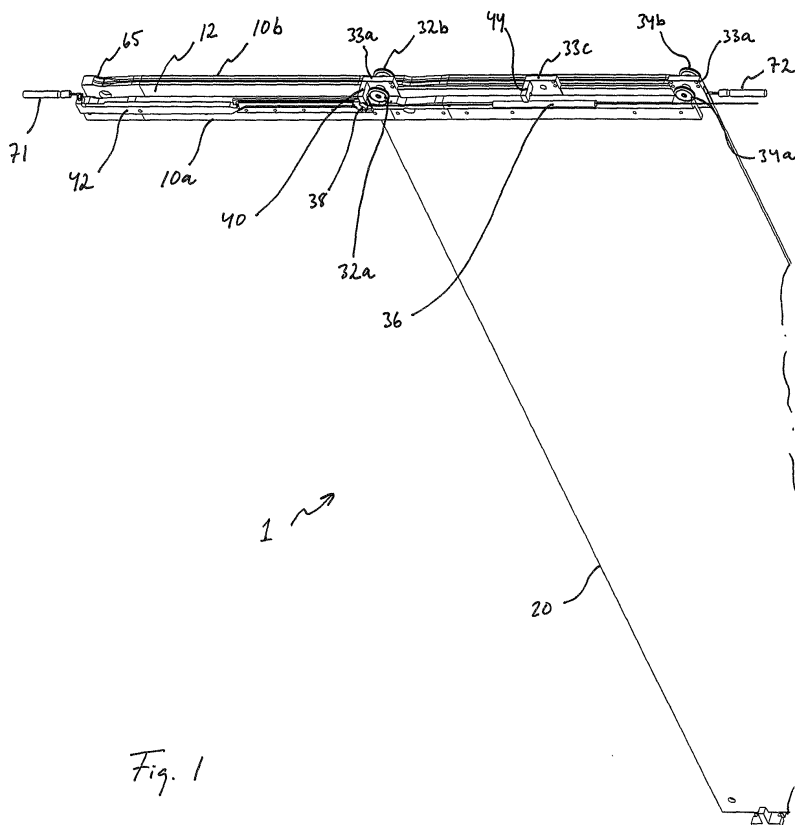


Fig. 1

Description

SLIDING DOOR ASSEMBLY

FIELD OF THE INVENTION

[0001] The present invention relates to a sliding door assembly, comprising a guiding rail, a door panel, and a guiding mechanism connecting said door panel to said guiding rail such that the door panel is slidable in a moving direction along said guiding rail.

PRIOR ART

[0002] Sliding doors are common in a variety of applications. The use of such sliding doors are advantageous in areas where a pivoting door would occupy too much space, e.g. in office facilities and shower rooms.

[0003] In prior art sliding door assemblies, a guiding rail is mounted on a ceiling or a wall to define a path along which a door panel is slidable. A guiding mechanism, normally including a pair of rollers, is arranged on the upper part of the door panel and connects the door panel to the guiding rail.

[0004] The guiding rail, which may be substantially longer than the width of the door panel, allows the door panel to be slidably moveable between an open position and a closed position. Such movement is caused when a user pulls or pushes the door panel in the direction of the guiding rail. A handle on each side of the door panel may facilitate such operation. When the door panel is in the open position, the door panel is preferably hidden behind a wall portion.

[0005] Sliding door assemblies are space saving, since the door is moveable only adjacent to the area to be enclosed by the door. This means that any object that is located in the proximity of the door will not be hit by the door during opening or closing. Further, a sliding door can be motorized more safely than a pivoting door, thus providing more flexibility to the sliding door. A particular advantage occurs when a sliding door assembly is installed in a shower cabinet. When the sliding door assembly is opened after a shower is done, all water still remaining inside the cabinet is kept inside the cabinet, since no water is transported outside by a pivoting door.

[0006] Sliding door assemblies, as known from prior art, count a number of disadvantages. In emergency situations, the sliding door assembly must be opened quickly for avoiding people to be trapped on the inside of the door. For example, if a person is heading towards the door assembly for a fast escape through the door, he must reduce his speed significantly, get a firm grip of the handle of the door, and push the door panel to side before he can accelerate and progress through the door opening. The few seconds of delay of such process may cause severe damages to the person, in case of fire or similar dangers.

[0007] Moreover, if many persons are trapped, a situ-

ation may occur when people close to the door are pushed towards it by persons behind, eager to get out. In such situation there may be a pressure on the door panel high enough to prevent the door panel to open, even if someone is trying to push the door panel to side.

[0008] A particular problem may arise in shower cabinets being closed by a sliding door assembly. If the temperature of the shower water suddenly increases, the person standing in the shower may be burned. If the shower cabinet is small and thus not allows the person to simply take a step to the side to avoid the hot water, the person must be able to escape outside the shower cabinet rapidly.

[0009] Further disadvantages include that sliding door assemblies are often experienced as noisy, and that they are not very stable.

[0010] In DE7737705U1, a multi-panel motor driven sliding door assembly is disclosed. Upon emergency, the door panels may be pivoted and opened outwardly for allowing rapid exit of people trapped on one side of the door assembly. However, this solution is not acceptable in areas where the available space does not allow for swinging doors.

SUMMARY OF THE INVENTION

[0011] The above and other problems are solved by a sliding door assembly according to the characterizing portion of claim 1. The sliding door assembly comprises a guiding mechanism comprising a driving means for automatically moving a door panel along a guiding rail from a closed position to an open position. Further, the guiding mechanism comprises an actuator connectable to said driving means and configured to activate said driving means when the door panel, in its closed position, is exposed to a pressing force in a direction perpendicular to the moving direction of said door panel. Hence, the sliding door assembly may be opened easily only requiring a small amount of force. Further, a more secure and stable door opening procedure is provided. The sliding door assembly is further advantageous in that it provides for a clean door design, without need for handles. Moreover, the sliding door assembly gives possibilities for easy implementation of further developments, such as motorized closing.

[0012] The driving means may comprise a spring. This is advantageous in that an automatic opening of the door panel is implemented without any electrical parts, thus reducing the costs associated with components and installation.

[0013] In another embodiment, the driving means may comprise a weight. Although the advantages of the spring is still applicable, the sliding door assembly may be implemented for curved guiding rails, which increases the flexibility of the sliding door assembly.

[0014] The door panel may, when it in its closed position is exposed to a pressing force in a direction perpendicular to the moving direction of said door panel, move

in the same direction as the pressing force for activating said driving means. Hence, the actuator may be directly connected to the door panel which further improves the safety of the sliding door assembly.

[0015] The guiding mechanism may further comprise a groove extending along the guiding rail, and a hook being moveable in said groove between a first end wherein the hook is engageable with a loading catch connected to the door panel and a second end wherein the hook is engageable with a driving catch connected to the door panel. Hence, the hook will always be in place for loading or driving the sliding door panel thus increasing the reliability in operation.

[0016] The hook may be connected to the groove by two joints, and wherein the groove is forming a U-shape for allowing the hook to pivot when one joint is entering a leg of the U-shaped groove. This is advantageous in that the hook may be locked at the second end, thus preserving the energy stored in the driving means. Hence, the pivotable hook is engageable with the driving means upon activation of the actuator for providing an automatic opening of the door assembly, while still allowing sliding of the door between the open position and the closed position if a user chooses not to activate the automatic opening of the door assembly.

[0017] The actuator may comprise a cantilever pivotable around a joint, and wherein one end of the cantilever is engageable with the hook when it is positioned at the second end of the groove. The automatic closing of the door panel is thus activated simply by pivoting the cantilever, allowing a simple and cost-effective construction.

[0018] Further, a second end of the cantilever may be engageable with the loading catch such that the cantilever is pivoting when the door panel is exposed to a pressing force in a direction perpendicular to the moving direction of said door panel for releasing the hook from the second end of the groove. Hence, a transverse relocation of the door panel will directly induce a sliding movement of the door panel back to its open position by means of a simple construction.

[0019] The guiding rail may comprise at least one recess having a tapered profile, which is advantageous in that once the door panel reaches the recess, it will follow the tapered profile by means of gravity without any external force.

[0020] The sliding door assembly may further comprise at least one damper arranged to engage with the door panel. Hence, any impact during opening or closing of the door panel will be damped. Except for a more smooth operation, the risk for squeezing the fingers of a user is avoided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] Hereinafter, the invention will be described with reference to the appended drawings, wherein:

Fig. 1 is a perspective view of a sliding door assembly,

wherein a door panel is in an open position.

Fig. 2 is a perspective view of the sliding door assembly of Fig. 1, wherein the door panel is in a closed position.

Fig. 3a is a side view of the sliding door assembly of Fig. 1, wherein the door panel is in the open position.

Fig. 3b is a side view of the sliding door assembly of Fig. 1, wherein the door panel is in a position located between the closed and the open position.

Fig. 3c is a side view of the sliding door assembly of Fig. 1, wherein the door panel is in the closed position.

Fig. 4a is an end view of the sliding door assembly, wherein the door panel is pushed from the inside.

Fig. 4b is an end view of the sliding door assembly, wherein the door panel is pushed from the outside.

Fig. 5a is a side view of the sliding door assembly of Fig. 1, when an automatic opening movement is initiated.

Fig. 5b is a side view of the sliding door assembly of Fig. 1, when the door panel is automatically moving from the closed position towards the open position. Fig. 5c is a top view of the sliding door assembly, when the door panel is pushed from the inside.

Fig. 6 is a perspective view of the sliding door assembly of Fig. 1, when the door panel is automatically moving from the closed position towards the open position.

Fig. 7a-c are side views of a sliding door assembly.

Fig. 8a-c are side views of an embodiment of a sliding door assembly.

Fig. 9a-c are side views of the sliding door assembly shown in Fig. 8a-c.

Fig. 9d is a perspective view of the sliding door assembly shown in Fig. 9a-c.

DESCRIPTION OF EMBODIMENTS

[0022] With reference to Fig. 1 and Fig. 2, a first embodiment of a sliding door assembly 1 is shown. Two guiding tracks 10a, 10b are arranged parallel to each other to form a guiding rail 10.

[0023] A door panel 20 is arranged in a gap 12 between the guiding tracks 10a, 10b and extends downwards from the guiding rail 10. The door panel 20 is connected to the guiding rail 10 by means of a guiding mechanism that enables the door panel 20 to be slidably moved along the guiding rail 10.

[0024] The guiding mechanism includes two pairs of rollers 32a, 32b, and 34a, 34b, respectively. The pairs of rollers 32a, 32b, and 34a, 34b are arranged at the upper end of the door panel 20, i.e. the end of the door panel 20 facing the guiding rail 10, by means of two brick members 33a, 33b connected to the upper end of the door panel 20. The brick members 33a, 33b are spaced apart by a distance equal to or less than the width of door panel 20. Each pair of rollers 32a, 32b, and 34a, 34b, respectively, are mounted on the corresponding brick members

33a, 33b such that the rollers 32a, 32b, and 34a, 34b are mounted in parallel on each side of the brick members 33a, 33b.

[0025] The rollers 32a, 32b, and 34a, 34b, respectively, are arranged on common rotational axes that extend through their corresponding brick members 33a, 33b.

[0026] The distance between the rollers 32a, 32b, and 34a, 34b is slightly greater than the width of the gap 12 formed by the guiding tracks 10a, 10b. Thus, the rollers 32a, 34a are resting on the guiding track 10a, and the rollers 32b, 34b are resting on the guiding track 10b to enable the door panel 20 to be slidably moveable along the guiding rail 10 from an open position, as shown in Fig. 1, to a closed position as shown in Fig. 2.

[0027] With reference to Figs. 3a, 3b, and 3c, the guiding mechanism also includes means for automatically moving the door panel 20 from a closed position to an open position. Such means include an energy storing device 36 connected to a hook 38, a loading catch 40 mounted on the brick member 33a and engageable with the hook 38, a cantilever 42, and a driving catch 44 mounted on a third brick member 33c arranged between the brick members 33a, 33b at the upper end of the door panel 20. The energy storing device 36 and the hook 38 is defining a driving means, while the cantilever 42 and the driving catch 40 is defining an actuator.

[0028] In a first embodiment of the means for automatically moving the door panel 20, the energy storing device 36 is a tension spring whose first end is connected to a fixing point (not shown) located at the guiding rail 10. The tension spring 36 extends along the guiding track 10a, and is connected to the hook 38 at its second end.

[0029] The hook 38 is moveably arranged in a groove 46 that is formed within the guiding track 10a. Consequently, the groove 46 extends horizontally along the guiding track 10a. Further, at each end of the groove 46, the groove 46 features a turn of 90° downwards, such that the groove 46 is defining an upside down U-shape. The hook 38 is made moveable within the groove 46 by means of two joints fixedly attached to the hook 38, and slidably connected to the groove 38. Further, when the hook 38 reaches one of the ends of the groove 46 and moves downwards into a leg of the U-shape, the joint facing the leg will move downwards into the leg, and thus the hook 38 will pivot to allow and disallow, respectively, engagement of the driving catch 40 and the loading catch 44.

[0030] When the hook 38 is situated in the leg of the U-shaped groove 46 facing away from the spring 36, the hook 38 is resting on a first end of the cantilever 42 that extends towards the end of the guiding track 10a. The cantilever 42 is pivotable around a joint 49 that is fixedly attached to the guiding track 10a.

[0031] At a second end of the cantilever 42, i.e. the end that is facing away from the hook 38, a roller 50 is arranged. The roller 50 has a rotational axis perpendicular to the rotational axis of the rollers 32a, 32b, 34a, 34b. The roller 50 is adapted to move in a V-shaped re-

cess 52 of the loading catch 40 as shown in Figs. 4a, 4b, for forcing the cantilever 42 to pivot when the door panel 20, including the loading catch 40, is pressed in a direction perpendicular to the rotational axis of the roller 50, i.e. the direction of the tracks 10a, 10b.

[0032] With reference to Figs. 3 to 5, the procedure of opening and closing the sliding door assembly will be described.

[0033] Starting with Fig. 3a, the door panel 20 is in the open position. The spring 36 is retracted, thus carrying no or very little load. The hook 38 is thereby located in its retracted position, i.e. one of the pivoting joints of the hook 38 is located in the rightmost leg of the U-shaped groove 46. While being in this position, the hook 38 is engageable by the loading catch 40.

[0034] As shown in Fig. 3b, when a user pushes the door panel 20 in the direction A, the loading catch 40 engages with the hook 38. The hook 38 is thus forced to move in the direction A by following the shape of the groove 46. Upon such movement, the spring 36 is tensioned.

[0035] When the door panel 20 is moved to a position where the hook 38 reaches the leftmost leg of the U-shaped groove 46, the hook 38 will follow the groove 46 and move downwardly. During this movement, the hook 38 will also pivot such that the loading catch 40 will release the hook 38. The hook 38, which is locked in this position by means of the two pivoting joints and the 90° turn of the groove 46, is positioned such that the loading catch 40 can move freely above the hook 38 without engaging the hook 38. At this position, the spring 36 is tensioned and prevented from retracting. Moreover, the hook 38 presses the rightmost end of the cantilever 42 in a downwards direction, meaning that the cantilever 42 is pivoted around the joint 49. Consequently, the other end, i.e. the leftmost end as indicated in Figs. 3a, 3b, and 3c, is moved in an upward direction.

[0036] When the user continues to slide the door panel 20 towards the closed position as indicated in Fig. 3c, the loading catch 40 will move above the hook 38 without interacting with the hook 38. Following this, the loading catch 40 will pass above the cantilever 42 and finally stop when the door panel 20 reaches the end of the guiding rail 10. At this position, as indicated in Fig. 3c, the loading catch 40 is located above the roller 50 of the cantilever 42. Moreover, the distance between the loading catch 40 and the driving catch 44 corresponds to the distance between the roller 50 of the cantilever 42 and the hook 38 such that the driving catch 44 is positioned adjacent to the hook 38.

[0037] When the door panel 20 is in the closed position as indicated in Fig. 3c, the user can choose to manually slide the door panel 20 back to its open position, or to activate the automatic opening function of the sliding door assembly.

[0038] If the door panel 20 is moved manually back to the open position, the loading catch 40 will move freely above the cantilever 42, the hook 38 and the groove 46

without interacting with any of these members. Consequently, the spring 36 will remain loaded until it is released at a later stage by the automatic opening procedure, which will be described from hereon.

[0039] As shown in Fig. 4a and 4b, two different scenarios are possible for activating the automatic opening of the door panel 20. When the door panel 20 is closed, the roller 50 of the guiding mechanism is aligned in the center (not shown) of the V-shaped groove 52 of the loading catch 40.

[0040] If the user is located on the inside of the door panel 20, automatic opening is activated by pushing the door panel 20 in a direction outwards, i.e. perpendicular to the moving direction A as indicated in Fig. 3a. Upon this, the door panel 20 and the parts attached to it will move outwards, as shown in Fig. 4a. Since the roller 50 of the cantilever 42 is positioned within the V-shaped recess of the loading catch 42, this end of the cantilever 42 will be pressed downwards, thus inducing an upward movement of the opposite end of the cantilever 42.

[0041] On the other hand, if the user is located on the outside of the door panel 20, automatic opening is activated by pushing the door panel 20 in a direction inwards. Upon this, the door panel 20 and the parts attached to it will move inwards, thus causing the cantilever to pivot.

[0042] When the door panel 20 is pushed inwards or outwards, the pivoting cantilever will press the hook 38 in an upward direction, as shown in Fig. 5a. The hook 38 will then be released from the leftmost leg of the U-shaped groove 46, and is allowed to move horizontally in said groove 46 by means of the tensioned spring 36.

[0043] However, as shown in Fig. 5b, when the hook 38 is pressed upwards it will engage with the driving catch 44 of the guiding mechanism and, consequently, push the door panel 20 towards the open position.

[0044] As can be seen in Fig. 5c, at least one of the guiding tracks 10a, 10b comprises a V-shaped profile 65 at their leftmost edge. Hence, when the door panel 20 has been pushed inwards or outwards and starts to move back towards its open position, the rollers 32a, 32b will follow the V-shaped profile 65 to align the door panel 20 to the center of the guiding rail 10.

[0045] When the hook 38 reaches the rightmost leg of the U-shaped groove 46 it will pivot and follow the 90° turn downwards. As the loading catch 40 reaches the hook 38, which occur when the opening movement of the door panel 20 is almost finished, the loading catch 40 will hit the hook 38 and press it further downwards in order to pass the hook 38. The hook 38, which is preferably made of plastic material, has intrinsic elastic properties which provide for the loading catch 40 to press the hook 38 downwards. This means that, when the sliding door assembly is opened, the loading catch 40 must pass the hook 38 in order to enable reloading of the energy storing device 36.

[0046] In a further embodiment, a spring (not shown) may be arranged to return the hook 38 when the loading catch 40 has passed the hook 38.

[0047] In a further embodiment, the power storing device 36 may be a weight that is freely moveable in a vertical module (not shown) attached to a wall. A wire connects the weight with the hook 38, such that the hook always will be subject to a force corresponding to the gravity acting on the weight. The guiding rail 10 is preferably connected to the vertical module such that the wire is completely enclosed. The mass of the weight is further adapted to the force required to drag the door panel 20 from the closed position to the open position.

[0048] In another embodiment, the guiding tracks 10a, 10b are provided with recesses 61a, 61b, 62a, 62b, 63a, 63b, 64a, 64b on the surface against which the rollers 32a, 32b, 34a, 34b are moving. This arrangement can be seen from Fig. 6. The recesses 61a, 61b, 63a, 63b, including tapered profiles, allow the door panel 20 to slide against the guiding tracks 10a, 10b by means of gravity. When the user has pushed the door panel 20 far enough for the rollers 32a, 32b, 34a, 34b to reach the recesses, the downward tapering will ensure that no more effort by the user is required, since the rollers 32a, 32b, 34a, 34b will automatically roll into the recesses by means of gravity. Moreover, the recesses 62a, 62b, 64a, 64b, including tapered profiles, allow the door panel 20 to slide the last part without any force caused by the energy storing device 36 or by a user, during automatic opening or user-assisted sliding, respectively. In certain embodiments, the length of the recesses 61a, 61b, 62a, 62b, 63a, 63b, 64a, and 64b is between 0,05 and 0,2 meters. When the driving means 36 has pulled the door panel 20 far enough for the rollers 32a, 32b, 34a, 34b to reach the recesses, the downward tapering will ensure that no more effort by the driving means 36 is required, since the rollers 32a, 32b, 34a, 34b will automatically fall into the recesses.

[0049] As can be seen in Fig. 6 and Fig. 5c, the recess 61b includes the V-shaped profile 65 for aligning the door panel 20 to the center of the guiding rail 10 when the door panel 20 is moving from its closed position towards its open position.

[0050] In a yet further embodiment, the sliding door assembly includes dampers 71, 72 arranged to interact with the door panel 20, or with any other component previously described to be attached to the door panel 20.

[0051] As shown in Fig. 1, a first damper 71 is arranged at the end of the guiding rail 10 to damp the closing movement of the door panel 20. A second damper 72 is provided at the opposite end of the guiding rail to damp the opening movement of the door panel 20. The dampers may be any damper available on the market, such as hydraulic, pneumatic, magnetic or similar.

[0052] In a further embodiment, the sliding door assembly comprises a damper 171 that is integrally formed with any of the guiding tracks 10a, 10b. As is shown in Fig. 7a, the damper 171 is formed at the end of a recess 161. The recess 161 includes a tapered profile, for allowing the door panel 120 to slide along the recess 161 by means of gravity. Thus, the door panel 120 is moving along the recess 161 without any force applied by the

energy storing device or a user.

[0053] The damper 171 comprises a tapered profile forming an uphill slope from the bottom of the recess 161. Hence, the recess 161 and the damper 171 form a smooth curvature on which the door panel 120 may slide.

[0054] Starting with Fig. 7a, the door panel is travelling in the direction towards the wall, as indicated by the arrow B. When the door panel 120 reaches the recess 161, it will start to slide into the recess 161 by means of gravity. As the door panel 120 moves further down into the recess 161, the door panel will accelerate and eventually, as is shown in Fig. 7b, the door panel 120 will reach the tapered profile of the damper 171. The uphill curvature of the damper 171 will drastically reduce the speed of the door panel 120, such that the door panel 120 will lose all its speed by means of the damper 171. Being located somewhere on the uphill curvature of the damper 171, and now with reference to Fig. 7c, the door panel 120 will change its direction and return to the bottom of the integrally formed recess/damper, i.e. at the end of the recess 161 by means of gravity.

[0055] To further improve the damping, the door panel 120 may comprise a sealing 122 arranged along the side of the door panel 120. The sealing 122 may be made of any suitable material, such as rubber. Preferably, the sealing 122 is a hollow tubular body extending along the complete side of the door panel 120.

[0056] When the door panel 120 is engaging with the damper 171, the sealing 122 will engage with the wall or wall module 180. During engagement, the sealing 122 will be deformed and contribute to the damping of the door panel 120 movement.

[0057] The dimensions of the sealing 122 are adapted such that the sealing 122 is in contact with the wall or wall module 180 when the door panel is positioned at the end of the recess 161, i.e. at the bottom of the integrally formed recess/damper. In this embodiment, when the door assembly 100 is installed in a shower cabinet, the sealing 122 will prevent any water to leak out outside the shower cabinet.

[0058] The dimensions of the recess 161 and the damper 171 are adapted to fit the weight of the door panel 120 in order to provide a smooth movement of the door panel 120. That is, a light door panel 120 requires a smaller recess 161 and a bigger damper 171 than a heavy door panel 120. The terms smaller and bigger may refer to both the length and the angle of tapering of the recess 161 and/or the damper 171.

[0059] The damper 171, which is integrally formed with a recess 161, may be arranged on different positions of the guiding rail 110 to provide a smooth opening and/or closing of the door panel 120. In a particular embodiment, with reference to Fig. 6, all recesses 61a, 61b, 62a, 62b, 63a, 63b, 64a, and 64b may be connected to a damper 171 according to what has previously been described.

[0060] With reference to Fig. 8a, 8b, 8c, and Fig. 9a, 9b, 9c, and 9d, a further embodiment of a sliding door assembly will be described. A sliding door assembly 201

comprises a door panel 220 and a guiding rail 210 on which the door panel 220 is slidably moveable by means of at least one pair of rollers 232 attached to the door panel 220. Further, a guiding mechanism is provided, connecting the door panel 220 to the guiding rail 210. The guiding mechanism includes a spring 236 of which one end is connected to the guiding rail 210. A pivot 240 is arranged at an upper corner of the door panel 220, being located at the side of the door panel 220 that is facing the wall towards which a closing movement of the door panel 220 is directed. Since the door panel 220 extends somewhat above the guiding rail 210, the pivot 240 is correspondingly arranged above the guiding rail 210. The pivot 240 is connected to the door panel 220 by means of a pivoting joint 222. Further, the door panel 220 comprises an upside down V-shaped recess 224, having the pivoting joint 222 at its vertex. Due to the recess 224, the pivot 240 is only pivotable by an angle defined by the angle of the V-shaped recess 224. While the upper portion of the pivot 240 is connected to the door panel 220 by means of the pivoting joint 222, the lower portion of the pivot 240 is connected to a free end of the spring 236. Further, the pivot 240 comprises a roller 242 arranged between the upper joint 222 and the lower spring fastening joint. The roller 242 is adapted to roll against the guiding rail 210 during opening and closing of the door panel 220. Further, the pivot 240 is pivotable in the transverse direction of the guiding rail 210.

[0061] The guiding rail 210 extends between two ends, of which a first end is adjacent to the door panel 220 when it is open, and a second end is adjacent to the door panel 220 when it is closed. The first end of the guiding rail 210 comprises a recess 261, and a damper 271. The damper 271 comprises a tapered profile forming an uphill slope from the bottom of the recess 261. Hence, the recess 261 and the damper 271 form a smooth curvature on which the roller 242 of the pivot 240 may slide. The widths of the recess 261 and the damper 271 are less than the width of the guiding rail 210, thus leaving a flat surface on the guiding rail 210 next to the recess 261 and the damper 271.

[0062] The second end of the guiding rail 210, i.e. the end facing the door panel 220 when the door panel 220 is in its closed position, is cut off forming a tapered end surface. Further, the second end of the guiding rail is also defining a tapered surface towards the centre of the guiding rail 210. Hence, the second end of the guiding rail 210 is defining an inverse pyramid shape 280.

[0063] Starting with Fig. 8a, b, and c, a closing operation will be described. When the door panel 220 is in the open position, the spring 236 is retracted thus carrying no or very little load. The pivot 240 is angled such that the lower portion of the pivot 240 is facing the same direction as closing movement of the door panel 220. The door panel 220 is resting on the rollers 232, and is slidably moveable along the guiding rail 210. As the roller 242 of the pivot 240 also rests on the guiding rail 210, the pivot 240 will remain at the same angle during closing since a

pivoting movement of the pivot 240 during closing would require that the door panel 220 is lifted up from the guiding rail 210. Hence, when a user pushes or pulls the door panel 220 towards the closed position, the spring 236 will be expanded. When the pivot 240 reaches the tapered surface of the second end of the guiding rail 210, the roller 242 will be able to move into the pyramid shape 280. When the roller 242 is positioned in the pyramid shape 280, it will be secured. Hence, the spring 236 will pull the pivot 240 such that it will pivot towards the other end of the V-shaped recess 224 of the door panel 220. During this action, the pivot 240 will force the door panel 220 to move the last part towards its end position without any assistance by a user.

[0064] Now referring to Fig. 9a, b, c, and d, opening of the door panel 220 will be described. When the door panel 220 is closed, the roller 242 of the pivot 240 is positioned in the pyramid shape 280, and the door panel 220 is thus locked in the closed position. A user can choose either to manually pull the door panel in the same direction as the opening movement, or to push the door panel 220 in a direction perpendicular to the direction of the opening movement.

[0065] If the user pulls the door in the direction of opening, e.g. by using a handle attached to the door panel 220, the pulling force will exceed the locking force of the roller 242 that is engaged with the pyramid shape 280. Hence, the roller 242 will return to the flat surface of the guiding rail 210, and the spring 236 is thus allowed to pull the door panel 220 back towards the open position.

[0066] On the other hand, if the user pushes the door either inwards or outwards, the door panel 220 will be moved in the same direction. The roller 242 of the pivot 240 will then slide up on the side of the pyramid shape 280, until it reaches the flat surface of the guiding rail 210. Upon this, the roller 242 of the pivot 240 will not be locked, and the spring will pull the door panel 220 back towards the open position.

[0067] When the door panel 220 is moving from the closed position towards the end position, the pivot 240 will be angled such that the lower portion of the pivot 242 is facing the same direction as the opening movement.

[0068] When the door panel approaches the open end position, the roller 242 of the pivot 240 will reach the recess 261 of the guiding rail 210. Since the recess 261 is located off-centre of the guiding rail 210, the pivot 240 will be pivoted in a direction transverse to the closing direction of the door panel 220. Hence, the roller 242 will follow the recess 261, and the door panel 220 will gain some speed. When the roller 242 eventually reaches the uphill tapering of the damper 271, it will follow the uphill path until the roller 242 is prevented from moving further up by means of the weight of the door panel 220. Since the door panel 220 still holds a certain amount of momentum, it will continue to move towards the open end position without any assistance by the spring 236. Hence, the pivot 240 will be forced to pivot such that the lower portion of the pivot 240 is facing the opposite direction.

During the pivoting, the door panel 220 moves the last part of the opening movement without any assistance by either the spring 236 or a user. When the door panel 220 reaches its open end position, the roller 242 of the pivot 240 is allowed to move up from the damper 271, and pivots transversely back to the flat surface at the centre of the guiding rail 210.

[0069] The door panel 220 is thus in its open position, and the pivot 240 is angled properly for allowing a reclosing/reopening maneuver.

[0070] In another embodiment, the spring 236 may be replaced by any suitable driving means. For example, the spring 236 may be replaced by a weight connected to a wire that is connected to the pivot 240. The wire extends along the guiding rail 210, and further into a wall module in which the weight is hanging free.

[0071] It should be understood that all references to up/down and left/right are made only for illustrative purposes. Hence, the sliding door assembly could be turned, rotated or mirrored without departing from the claimed invention, such as it is defined by the appended claims.

Claims

1. A sliding door assembly (1, 201), comprising a guiding rail (10, 210), a door panel (20, 220), and a guiding mechanism connecting said door panel (20, 220) to said guiding rail (10, 210) such that the door panel (20, 220) is slidable in a moving direction along said guiding rail (10, 210),
characterized in that said guiding mechanism comprises a driving means (36, 38, 236) for automatically moving said door panel (20, 220) along said guiding rail (10, 210) from a closed position to an open position, and an actuator (40, 42, 240) connectable to said driving means (36, 38, 240) and configured to activate said driving means (36, 38, 240) when the door panel (20, 220), in its closed position, is exposed to a pressing force in a direction perpendicular to the moving direction of said door panel (20, 220).
2. The sliding door assembly according to claim 1, wherein the driving means (36, 38, 236) comprises a spring.
3. The sliding door assembly according to claim 1, wherein the driving means (36, 38, 236) comprises a weight.
4. The sliding door assembly according to any one of claims 1 to 3, wherein the door panel (20, 220), when in its closed position, is exposed to a pressing force in a direction perpendicular to the moving direction of said door panel (20, 220), is moved in the same direction as the pressing force for activating said driv-

ing means.

5. The sliding door assembly according to any one of claims 2 to 4, wherein the guiding mechanism further comprises a groove (46), extending along the guiding rail (10), and a hook (38) being moveable in said groove (46) between a first end wherein the hook (38) is engageable with a loading catch (40) connected to the door panel (20) and a second end wherein the hook (38) is engageable with a driving catch (44) connected to the door panel (20). 5
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6. The sliding door assembly according to claim 5, wherein the hook (38) is connected to the groove (46) by two joints, and wherein the groove (46) is forming a U-shape for allowing the hook (38) to pivot when one joint is entering a leg of the U-shaped groove (46). 15

7. The sliding door assembly according to claim 5 or 6, wherein the actuator (40, 42) comprises a cantilever (42) pivotable around a joint (49), and wherein one end of the cantilever is engageable with the hook (38) when it is positioned at the second end of the groove (46). 20
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8. The sliding door assembly according to claim 7, wherein a second end of the cantilever (42) is engageable with the loading catch (40) such that the cantilever (42) is pivoting when the door panel (20) is exposed to a pressing force in a direction perpendicular to the moving direction of said door panel (20) for releasing the hook (38) from the second end of the groove (46). 30
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9. The sliding door assembly according to any of claims 1 to 8, wherein the guiding rail (10, 210) comprises at least one recess (61, 261) having a tapered profile.

10. The sliding door assembly according to any one of claims 1 to 9, further comprising at least one damper (71, 271) arranged to engage with the door panel (20, 220). 40

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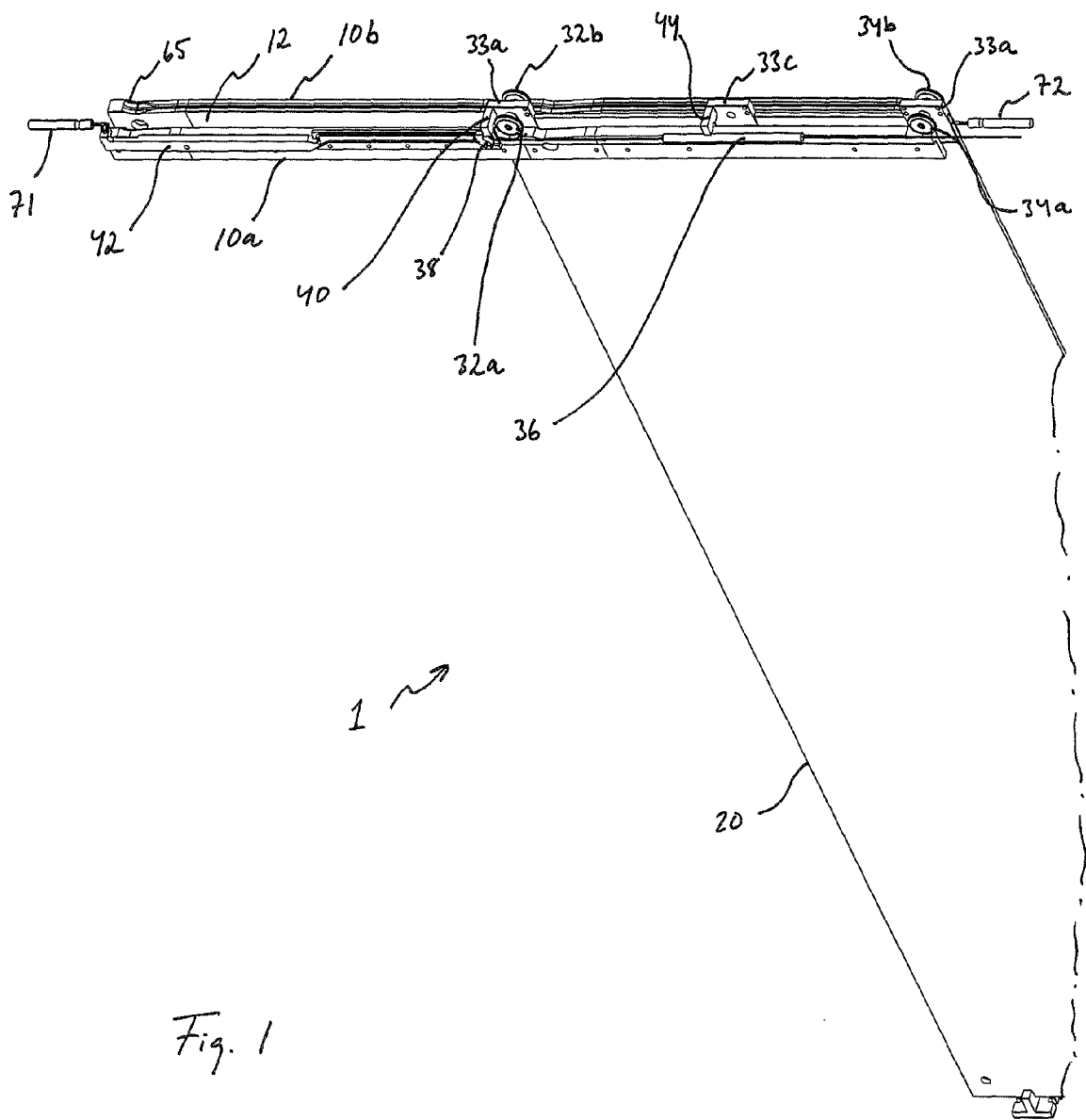


Fig. 1

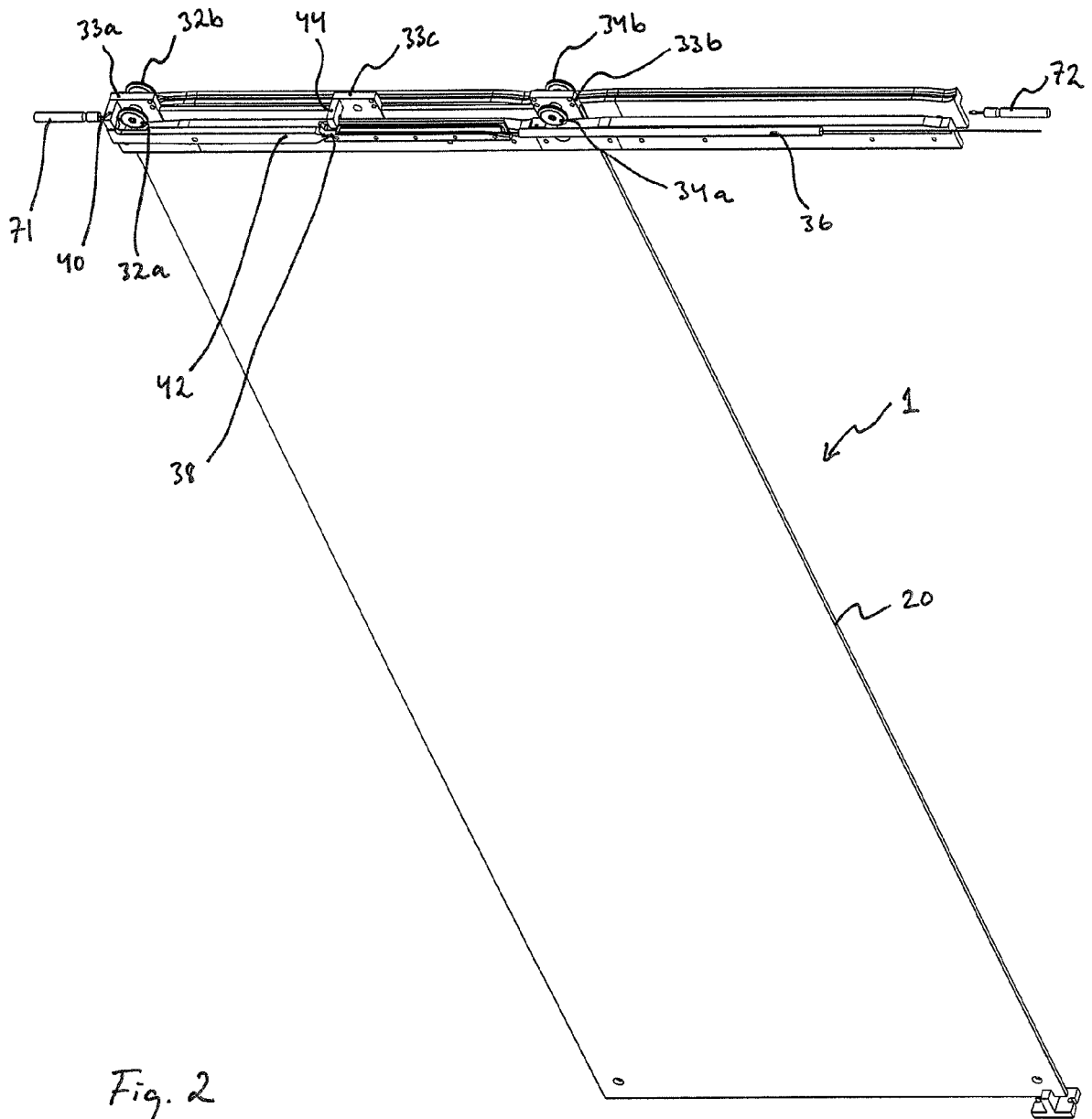
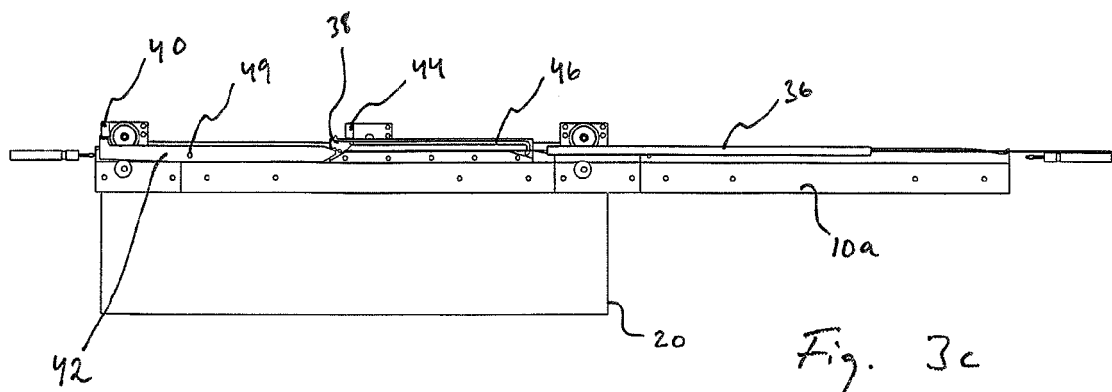
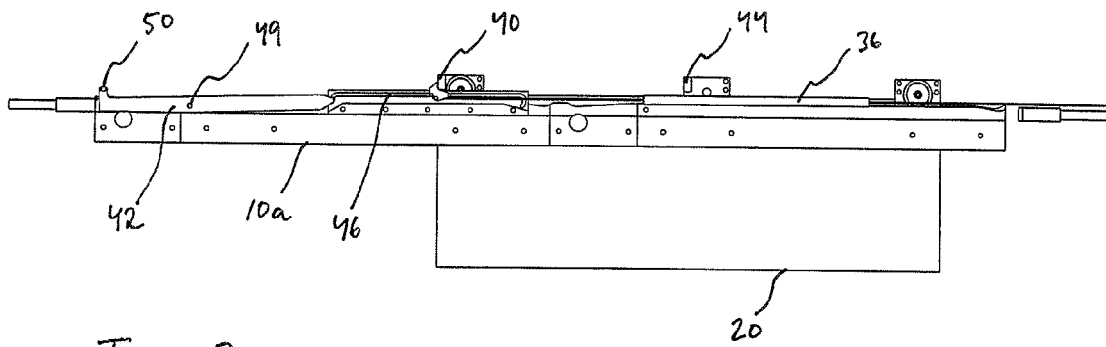
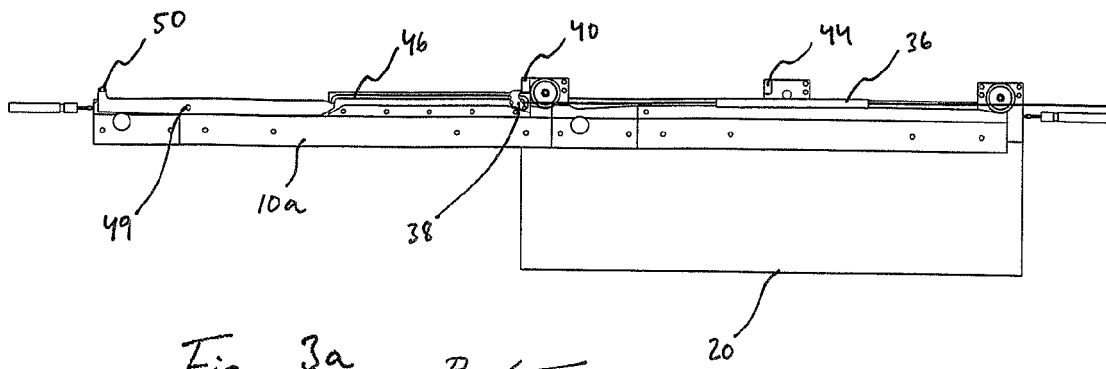


Fig. 2



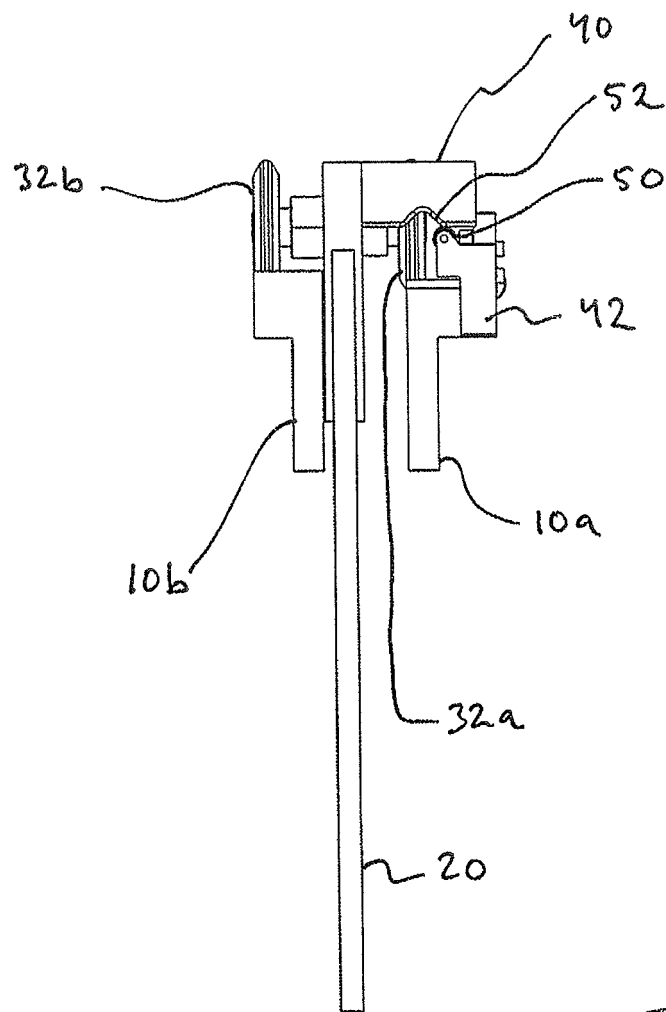


Fig. 4a

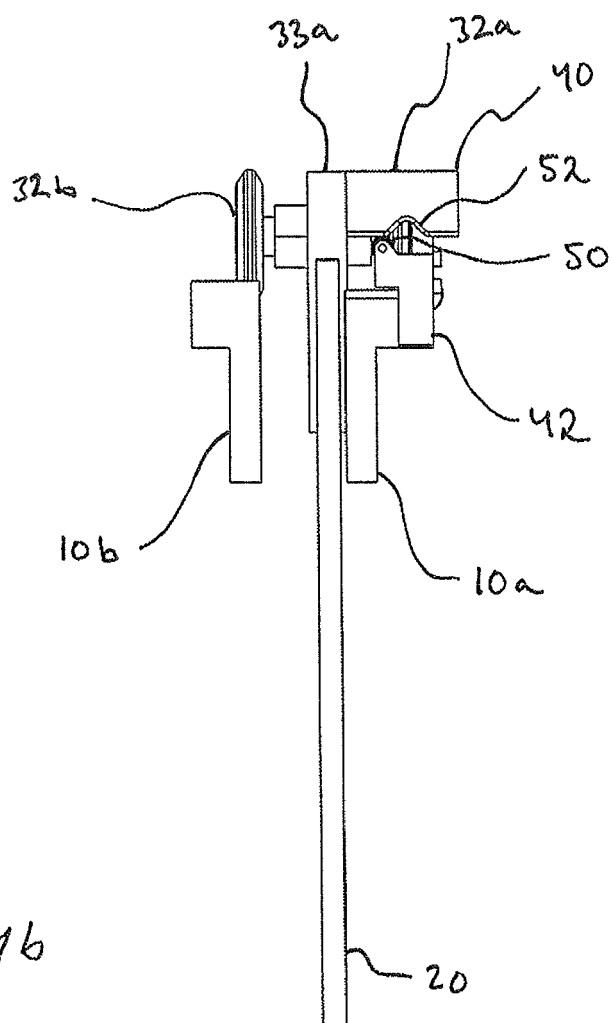
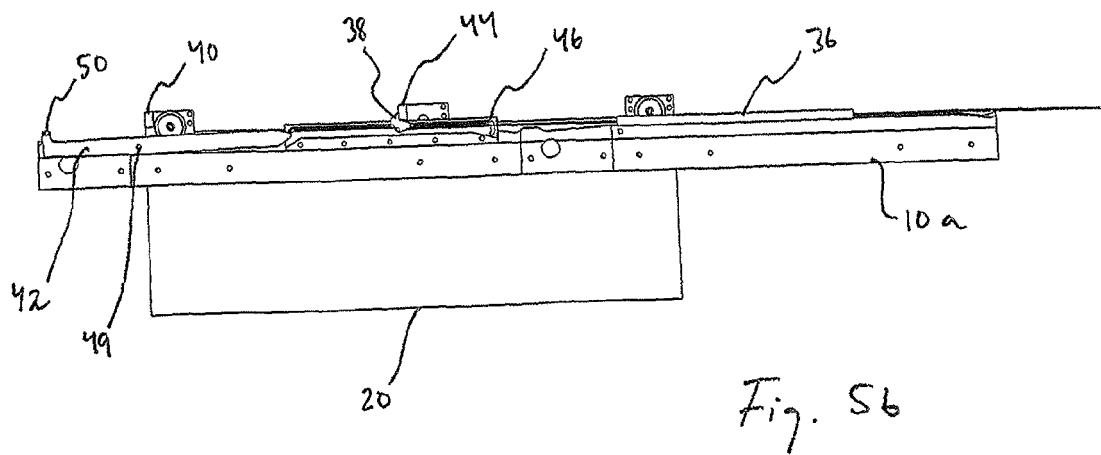
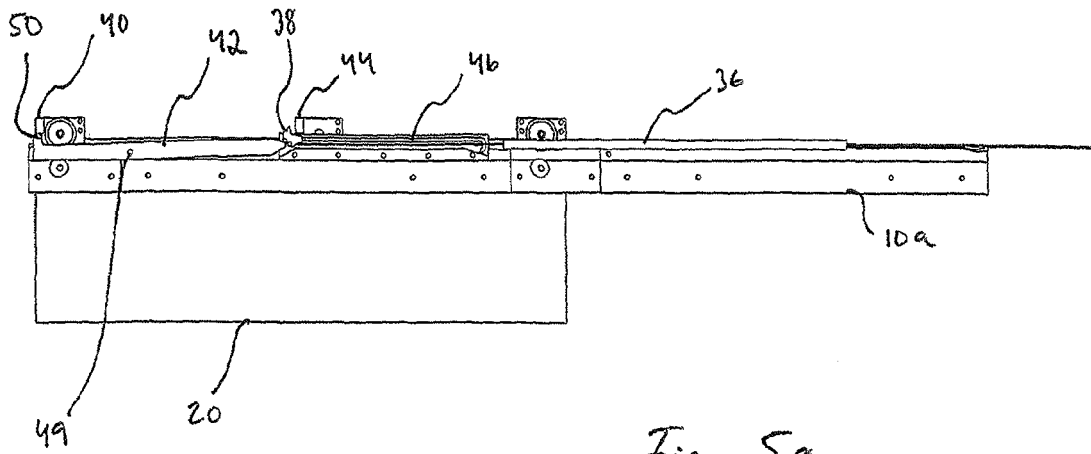


Fig. 4b



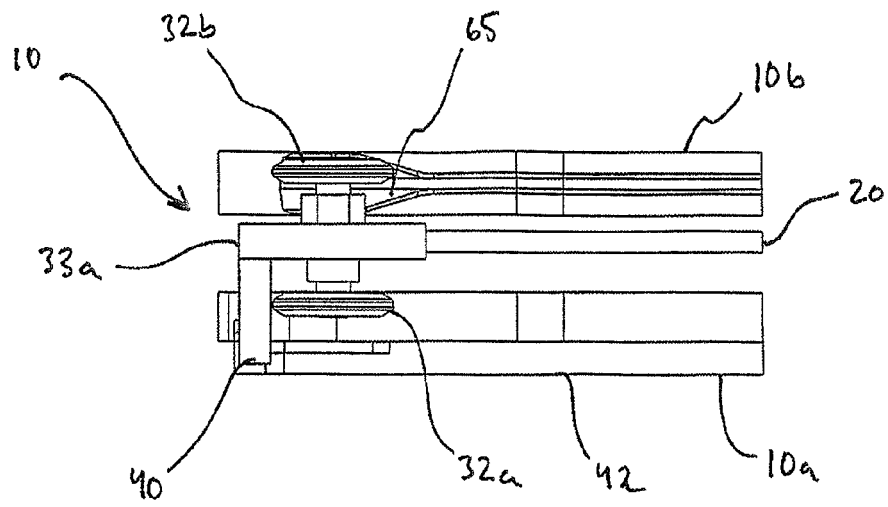


Fig. 5c

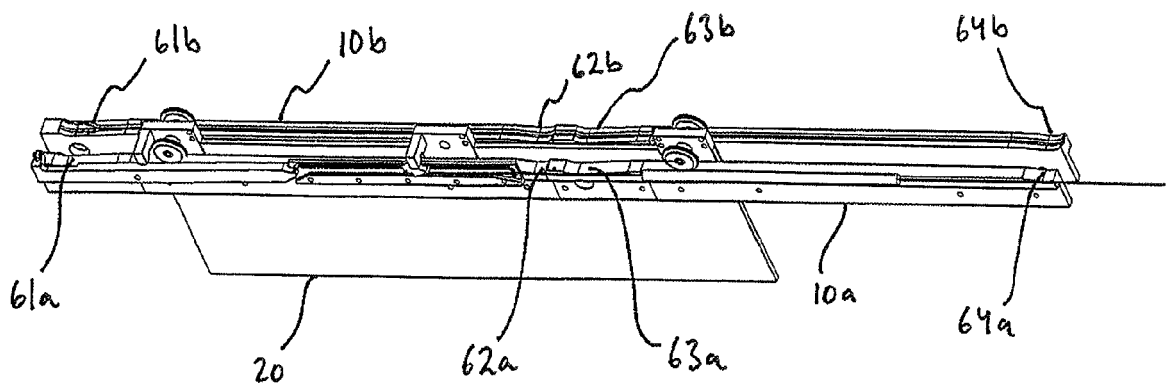


Fig. 6

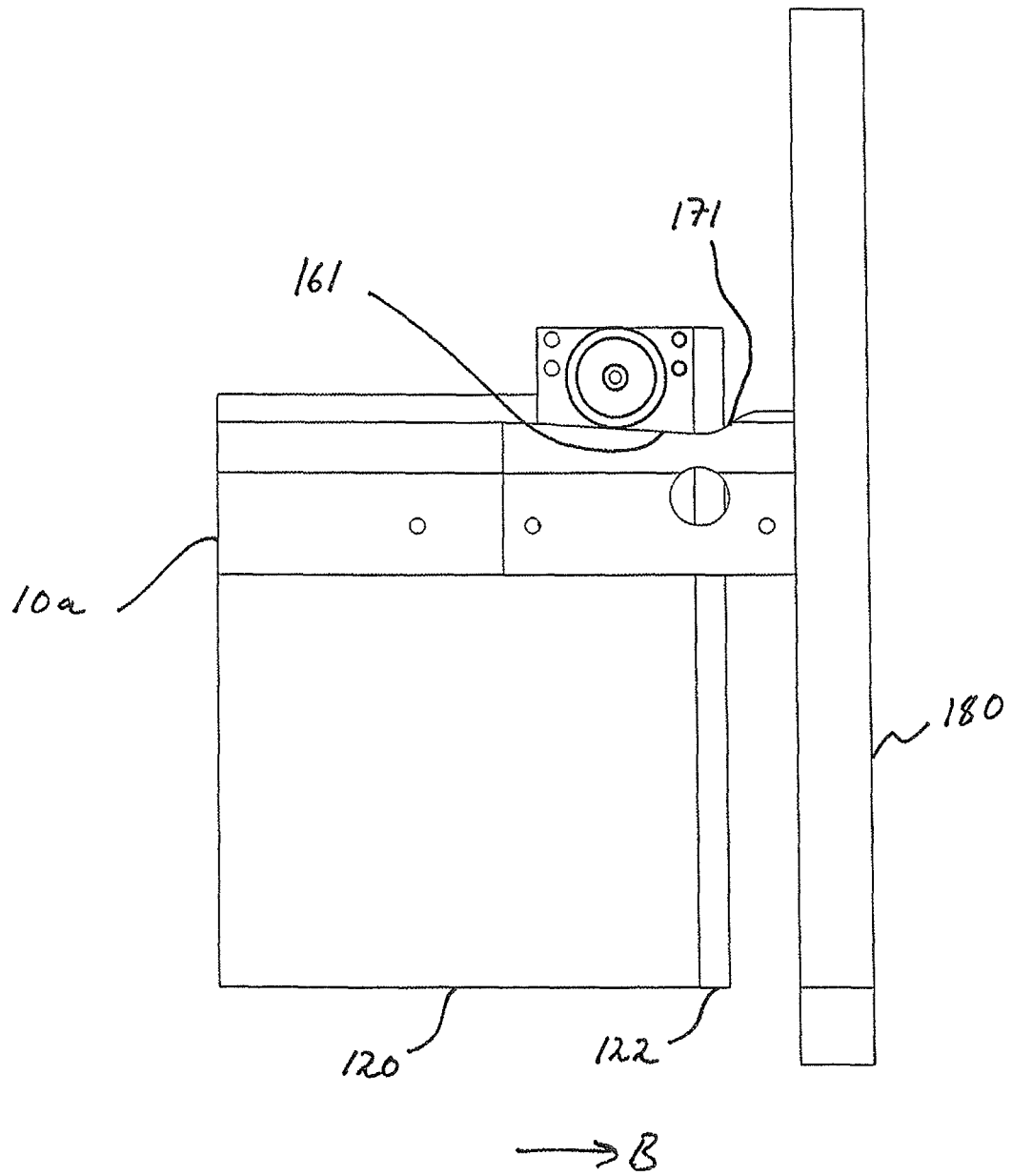


Fig. 7a

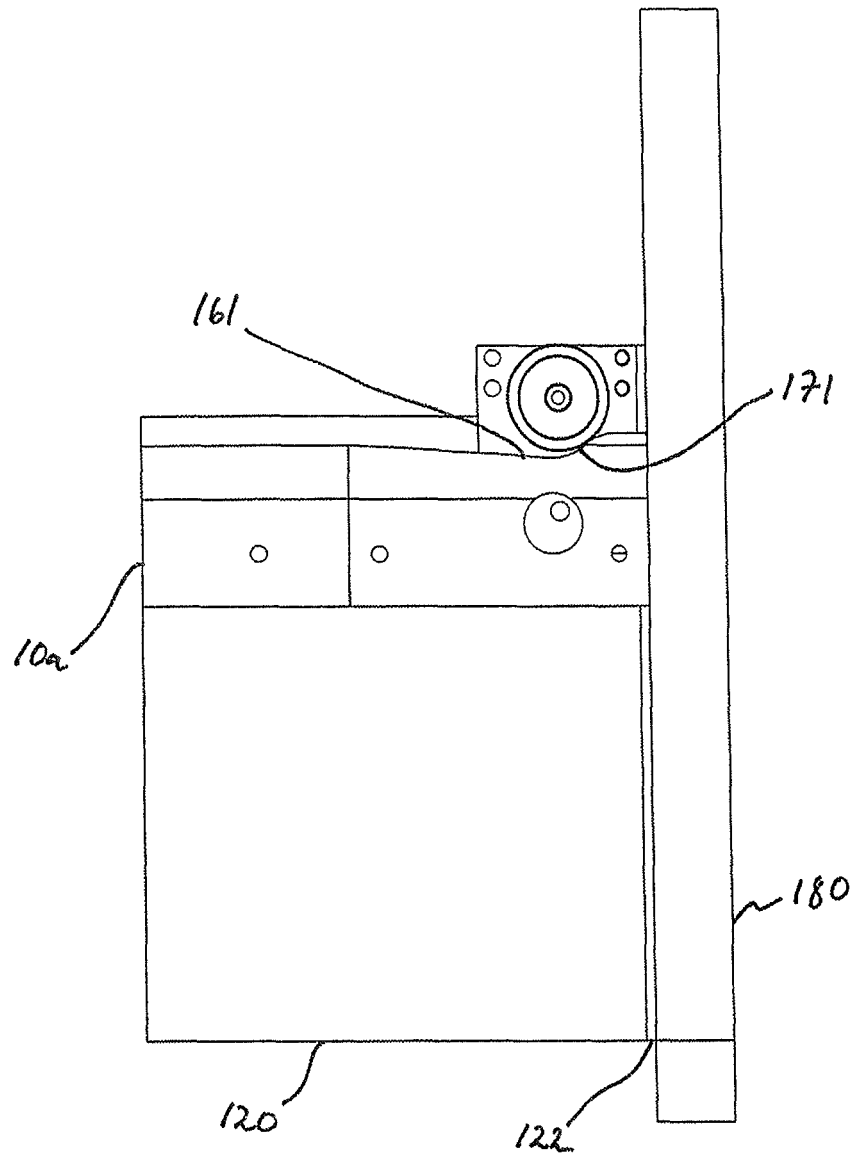


Fig. 7b

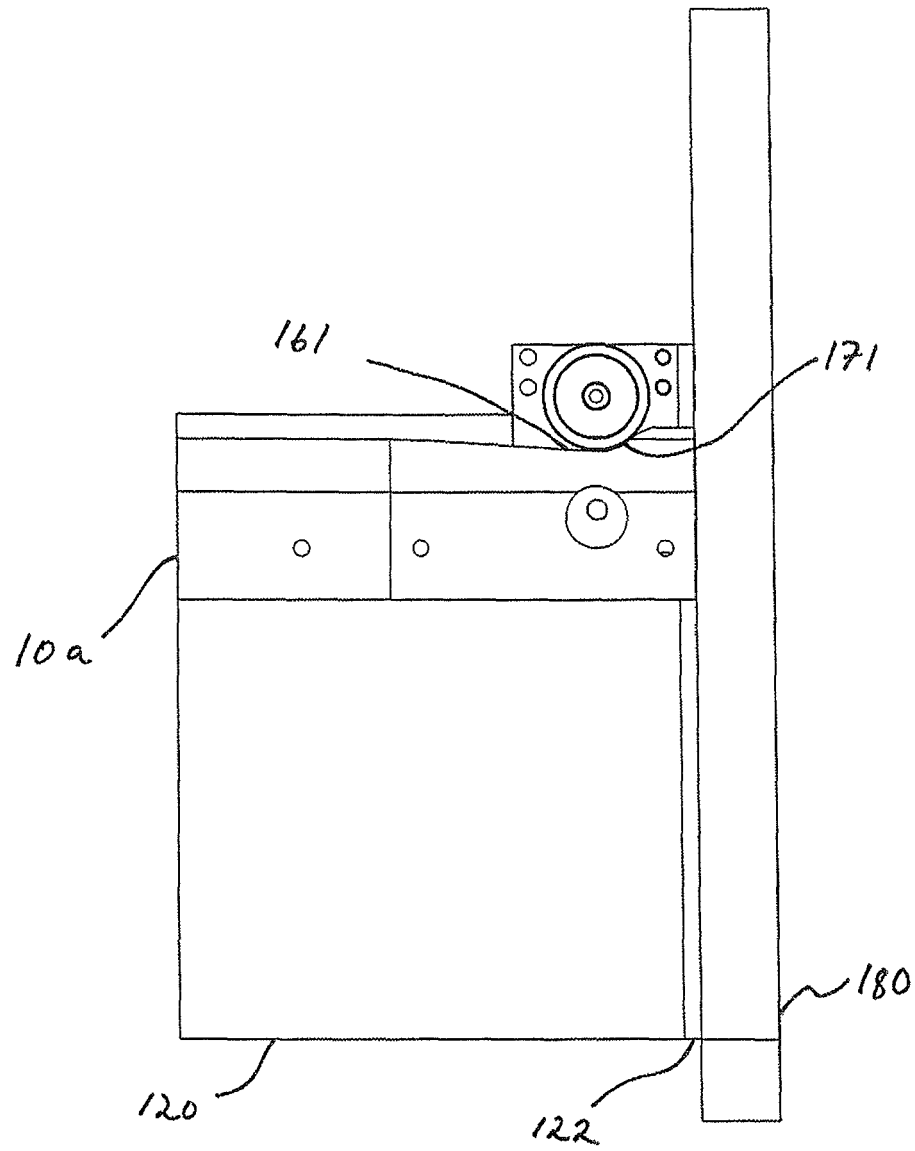
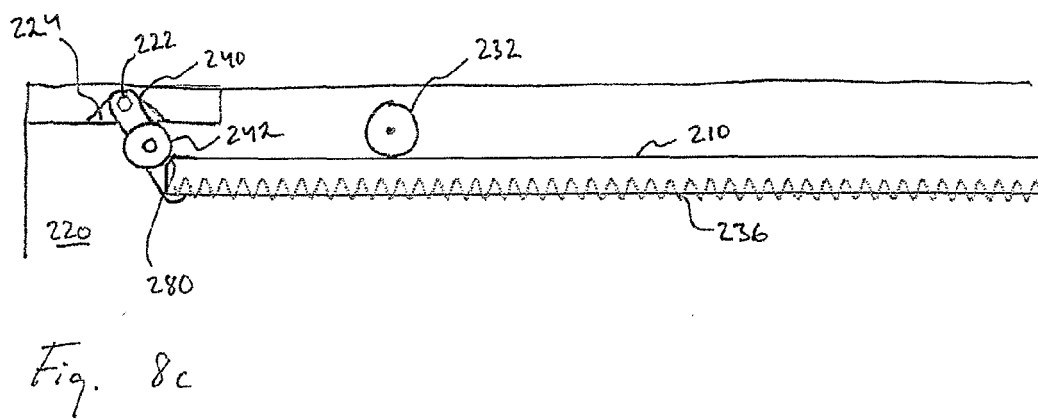
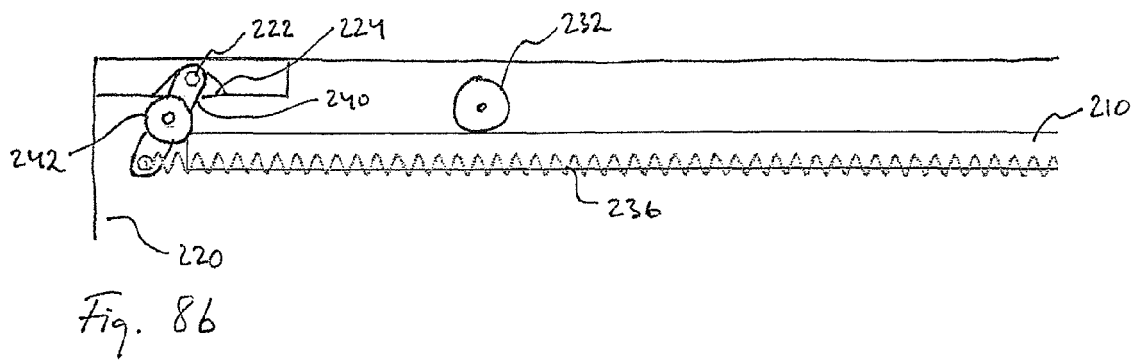
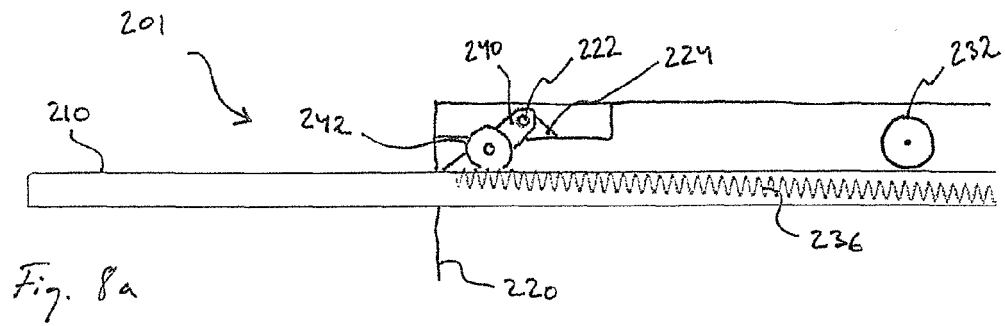
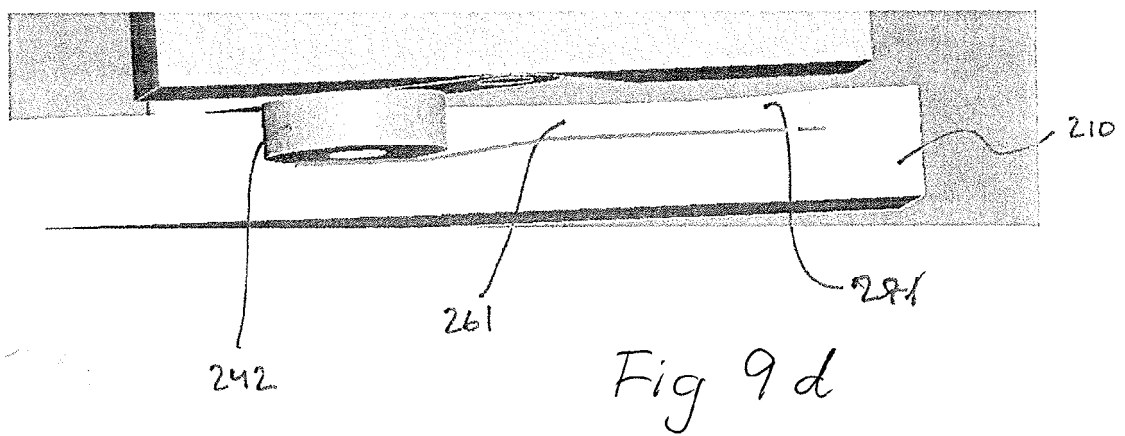
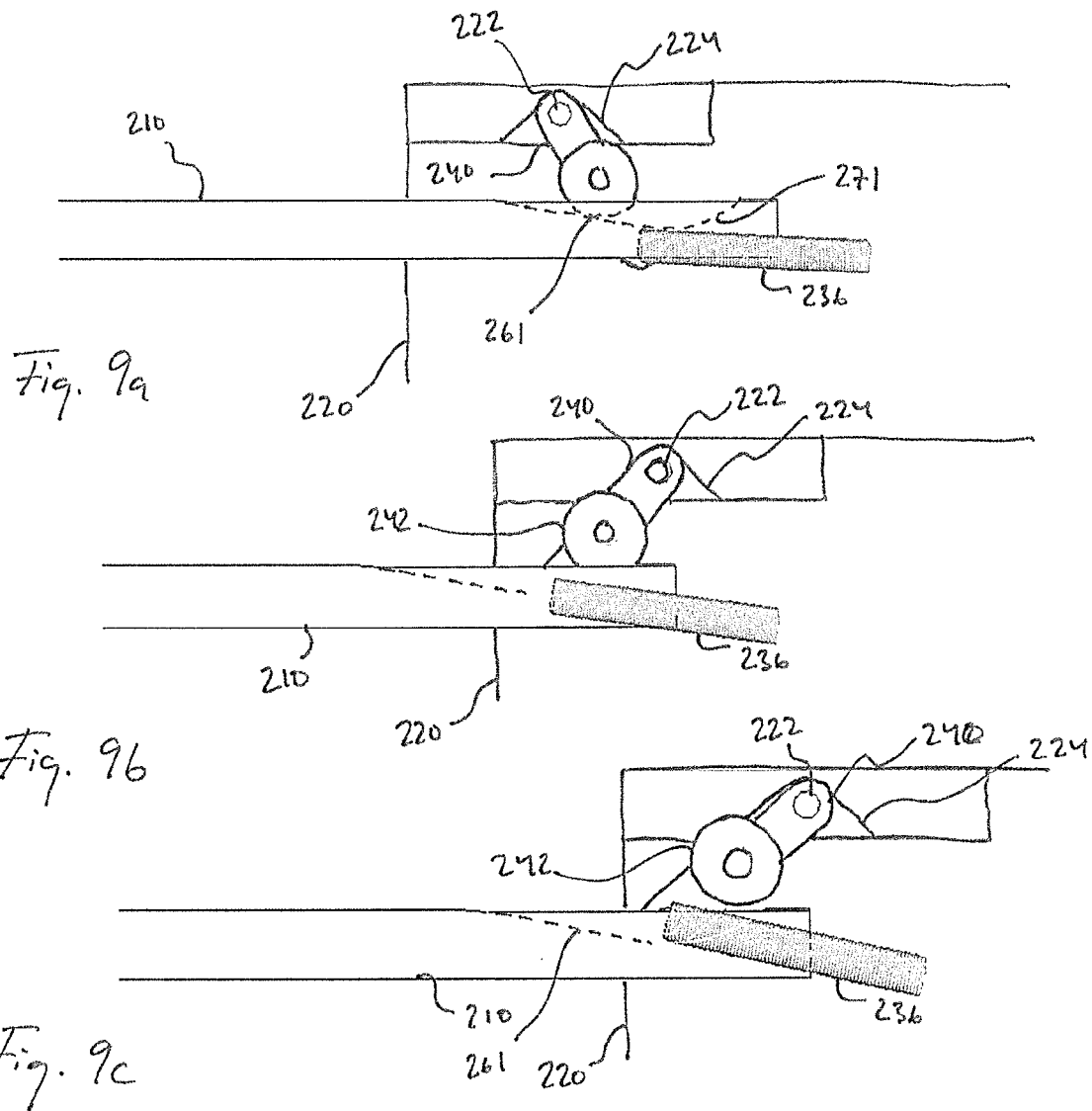


Fig. 7c





REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 7737705 U1 [0010]