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(54) **A fastening, in particular a door, with a plurality of panels hinged to each other**

(57) A fastening (10), in particular a door (10), comprising a partition (11), supported by a supporting structure (12), and an electromechanical movement device (13) of said partition (11). The partition (11) comprises a plurality of panels (110*, 110**, 110***, 110****) hinged to each other. When the partition (11) takes on a configuration of "opening" of a passage (PS) the panels (110*,

110**, 110***, 110****) are packed up so as to be essentially horizontal and therefore essentially parallel to a treading surface of reference (SC). The fastening also comprises an innovative guidance system (600) for the panels (110*, 110**, 110***, 110****).

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Description

[0001] The present invention relates to a fastening, in particular, to a door with a plurality of panels hinged to each other.

[0002] In particular, the present invention is advantageously, but not exclusively, applied to manual or automatic doors of garages, cellars, etc., to which the following description explicitly refers, but should not be considered a limitation to its general use.

[0003] As is known, in garages, for example, sectional doors are used or single panel overhead doors which, due to the effect of external action, move from an "initial closed position" in which the partition is essentially vertical, to a "final open position" in which the partition is in an essentially horizontal position.

[0004] However, this solution has several drawbacks, such as, for example, that of having to arrange vertical guides on the walls and horizontal guides on the ceiling on which the entire weight of the partition is supported.

[0005] Therefore, the main purpose of this invention is to produce a fastening, in particular a door, which overcomes the drawbacks described above and, at the same time, is simple and cost-effective to produce.

[0006] A fastening, in particular, a door, is therefore produced according to the present invention as set forth in the appended claims.

[0007] The present invention will now be described with reference to the attached drawings, illustrating a nonlimiting embodiment thereof, in which:

- Figure 1 illustrates a fastening according to the present invention in a first configuration of "closure" of a passage;
- Figure 2 shows the same fastening of figure 1 in a second configuration of "opening" of a passage;
- Figure 3 illustrates some of the details of the electromechanical movement device of the fastening in a first configuration;
- Figure 4 illustrates the same details shown in figure 3 in a second configuration; and
- Figure 4BIS represents an enlargement of some details present in Figure 4.

[0008] In figure 1, with number 10, a fastening, in particular a door, according to the present invention, is indicated as a whole.

[0009] The fastening 10 includes, in general, a partition 11, supported by a support structure 12, and an electromechanical device 13 for moving said partition 11 between a first configuration of "closure" of a passage (PS), represented in figure 1, and a second configuration of "opening" of a passage (PS) illustrated in figure 2.

[0010] The passage (PS) is essentially defined by the support structure 12.

[0011] Moreover, as shown in the appended figures, the partition 11 comprises panels 110*, 110**, 110***, 110**** of an essentially rectangular shape.

[0012] Each panel 110*, 110**, 110***, 110**** is hinged to the previous and/or to the following one by a pair of hinges 111 visible in more detail in figures 3 and 4.

[0013] When the door 10 is found in its "closed" configuration (figure 1), that is, in other words, when the partition 11 is essentially closing the entire passage (PS) the lower edge BB1 of the partition 11 (and therefore of the lower panel 110*) is arranged in a position essentially parallel to that of an essentially horizontal treading surface of reference (SC).

[0014] In this configuration the disposition planes PN1, PN2, PN3, PN4 of the various panels 110*, 110**, 110***, 110**** all lie on a single plane PN* (practically the plane of the sheet).

[0015] As will be better explained later, in the position of "opening" shown in figure 2, the panels 110*, 110**, 110***, 110**** of the partition 11 are packed up so that their disposition planes (PN1), (PN2), (PN3), (PN4) are essentially horizontal, and are therefore essentially parallel to the above-mentioned treading surface of reference (SC) (see below).

[0016] The support structure 12 is essentially of a "portal-type" form and therefore presents two vertical uprights 130 united by a cross-piece 140.

[0017] Moreover, the lower panel 110* is provided with two first hinge pins 112 placed at the lower edge (BB1) and placed by opposing bands so as to each be facing towards a respective upright 130 (in figures 3 and 4 only a first hinge pin is visible).

[0018] In fact the two first hinge pins 112 are part of the above-mentioned electromechanical movement device 13.

[0019] Each first hinge pin 112 is inserted (possibly by use of a first roller (RL1) placed at its outer extremity 112a) in a first essentially rectilinear and vertical section 113a of a guide 113 integral with the respective upright 130.

[0020] Therefore, the first hinge pin 112 can slide up and down in a direction and two opposite courses defined by a double-pointed arrow (DR).

[0021] Fitted to each first hinge pin 112, is a cable 114, preferably made of steel, contained in the first section 113a of the guide 113 and wrapped around a pulley 115a, whose axis of rotation 116 is fixed to the cross-piece 140.

[0022] A toothed wheel 117 is integral to the pulley 115a and is therefore also suited to turn about the axis of rotation 116 through the action of a pinion 118 (engaged with the toothed wheel 117 for this purpose).

[0023] As shown in figure 4, the pinion 118 is fitted at the end of a shaft 119, supported by a support element 120 fastened to the cross-piece 140, said shaft 119 being made to rotate (following the command of an operator) by an electric motor 121, also integral with the cross-piece 140.

[0024] In other words, at the command of the operator (not shown in the appended figures) the shaft 119 is made to rotate by an electric motor 121 following the two opposite courses defined by a double-pointed arrow (RT),

in order to achieve the desired movement (lifting or lowering) of the outer extremity 112a of the first hinge pin 112 in the first section 113a of the guide 113 following the courses shown by the double-pointed arrow (DR).

[0025] For this reason, the lifting (or the lowering) of the first hinge pin 112 also involves the lifting (or the lowering) of the edge (BB1) and the panels 110* and 110** hinged to each other through the hinges 111.

[0026] Similarly, a pair of second hinge pins 212 is provided between the panels 110** and 110*** (in figures 3 and 4 only one hinge pin 212 is visible).

[0027] Each second hinge pin 212 is inserted (possibly by use of a second roller (RL2) placed at its outer extremity 212a) in a first section 113a of the guide 113.

[0028] Therefore, the second hinge pin 212 can also slide up and down in a direction and following the two opposite courses defined by a double-pointed arrow (DR).

[0029] Fitted to each second hinge pin 212, is a cable 214, preferably made of steel, contained in the first section 113a of the guide 113 and also wrapped around a pulley 115b, similar to what we stated for the first hinge pin 112.

[0030] Incidentally, as only shown in figure 4BIS, the cable 114 has a first counterweight (CP1) on the end opposite to the hinge pin 112.

[0031] Similarly, a second counterweight (CP2) is integral to the cable 214 from the end opposite to the hinge pin 212.

[0032] The counterweights (CP1) and (CP2) are required by the current workplace safety regulations and "help" the electric motor 121 in the stage of lifting the fastening 10.

[0033] The lifting (or the lowering) of the second hinge pin 212 also results in the lifting (or the lowering) of the panels 110*** and 110**** connected to each other by the hinges 111.

[0034] Note that the two rollers (RL1) and (RL2) are housed in the same first vertical and rectilinear section 113a of the guide 113, as are the respective cables 114 and 214.

[0035] In summary, one can say that the electromechanical movement device 13 comprises the two cited hinge pins 112, 212, and also the two cables 114, 214, the pulleys 115a, 115b, the toothed wheel 117, the pinion 118 and the electric motor 121.

[0036] To ensure that the panels 110*, 110**, 110***, 110**** are correctly packed up, the panels 110** and 110**** have been fitted with a respective guidance device 312 and, respectively, 412.

[0037] In particular, the guidance device 312 comprises a bracket 313 attached through known means to a lateral edge (LT1) of the panel 110**. A pallet 314 is integral with the bracket 313.

[0038] In use, the free end of the pallet 314 is engaged with a shaped groove 315 obtained on a guidance element 316 attached in turn to the upright 130.

[0039] The shaped groove 315 comprises, in turn, a

first stretch 315a that is essentially rectilinear (and essentially vertical) and a second curvilinear stretch 315b with concave side facing the partition 11.

[0040] Clearly, the trajectory of the pallet 314, during its lifting and lowering, must be such as to perfectly follow the form of the shaped groove 315.

[0041] Similarly, the guidance device 412 comprises a bracket 413 attached through known means to a lateral edge (LT2) of the panel 110****. A pallet 414 is integral with the bracket 413.

[0042] In use, the free end of the pallet 414 is engaged with a shaped groove 415 obtained on a guidance element 416 attached in turn to the upright 130.

[0043] The shaped groove 415 comprises a first stretch 415a that is essentially rectilinear (and essentially vertical), a second curvilinear stretch 415b with concave side facing the partition 11, and a third stretch 415c that is also curvilinear and whose concave side also faces the partition 11. The stretches 415a, 415b and 415c present gradually increasing lengths.

[0044] Clearly, also in this case, the trajectory of the pallet 414, during its lifting and lowering must be such as to perfectly follow the form of the shaped groove 415.

[0045] In other words, the two guidance devices 312, 412 actually form cam systems to guide the path of the pair of panels 110*, 110**, and, respectively, the path of the pair of panels 110*** and 110****.

[0046] Moreover, as shown in figure 3, the upper edge (BB2) of the upper panel 110**** is fitted with a third hinge pin 512 inserted (possibly by use of a third roller (RL3) placed at its outer extremity 512a) in a second section 113b of the guide 113. This second section 113b is no longer vertical and rectilinear (as, it may be recalled, was the first section 113a) but takes on an essentially "V" shape (with the concave side facing the partition 11).

[0047] In summary, the two guidance devices 312, 412 (with their respective pallets 314, 414), the three rollers (RL1), (RL2), (RL3) and the guide 113 together constitute a guidance system 600 of the panels 110*, 110**, 110***, 110**** that form the partition 11.

[0048] In use, during the lifting led by the rotation of the pulleys 115a, 115b around the axis 116 (rotation led by the electric motor 121 through the shaft 119 and the pinion 118 that engages with the toothed wheel 117 integral with the pulleys 115a, 115b) the following phenomena occur:

- the hinge pins 112 and 212 (or rather the respective rollers (RL1) and (RL2)) slide upwards in the first vertical and rectilinear section 113a of the guide 113, said hinge pins 112, 212 being pulled by the respective cables 114, 214 contained in said section 113a;
- the hinge pin 512 slides in the second section 113b of the guide 113 and moves to a stopping position (FR); and
- the pallet 314 slides in the shaped groove 315, while the pallet 414 slides in the shaped groove 415.

[0049] Clearly, in the lowering of the panels 110*, 110**, 110***, 110**** the hinge pins 112, 212 and 512 and the pallets 314 and 414 follow a reverse route.

[0050] Moreover, that stated with reference to an upright 130 of the support structure 12 is clearly also valid for the other upright 130.

[0051] The main advantage of the fastening 10 according to the present invention is the fact that, having completed the phase of opening the passage (PS), the panels 110*, 110**, 110***, 110**** are positioned so that their disposition planes (PN1), (PN2), (PN3), (PN4) are essentially horizontal and therefore essentially parallel to the treading surface of reference (SC), also essentially horizontal. In this way adequate free space is ensured for the transit of vehicles, persons, etc.

LIST OF REFERENCES

[0052]

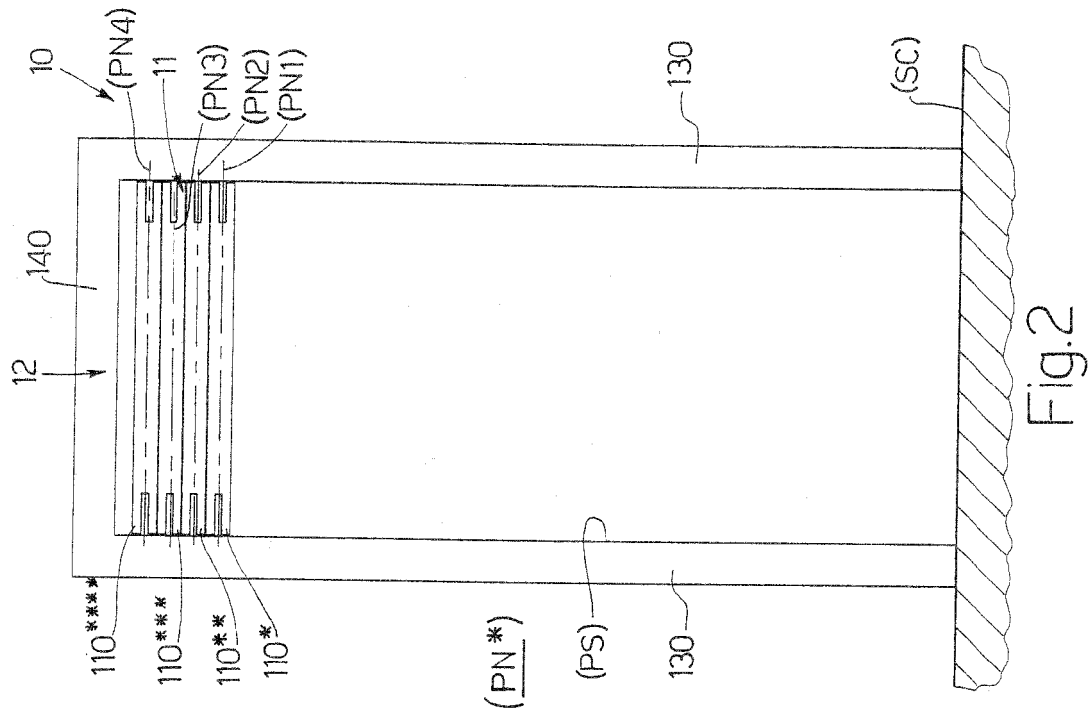
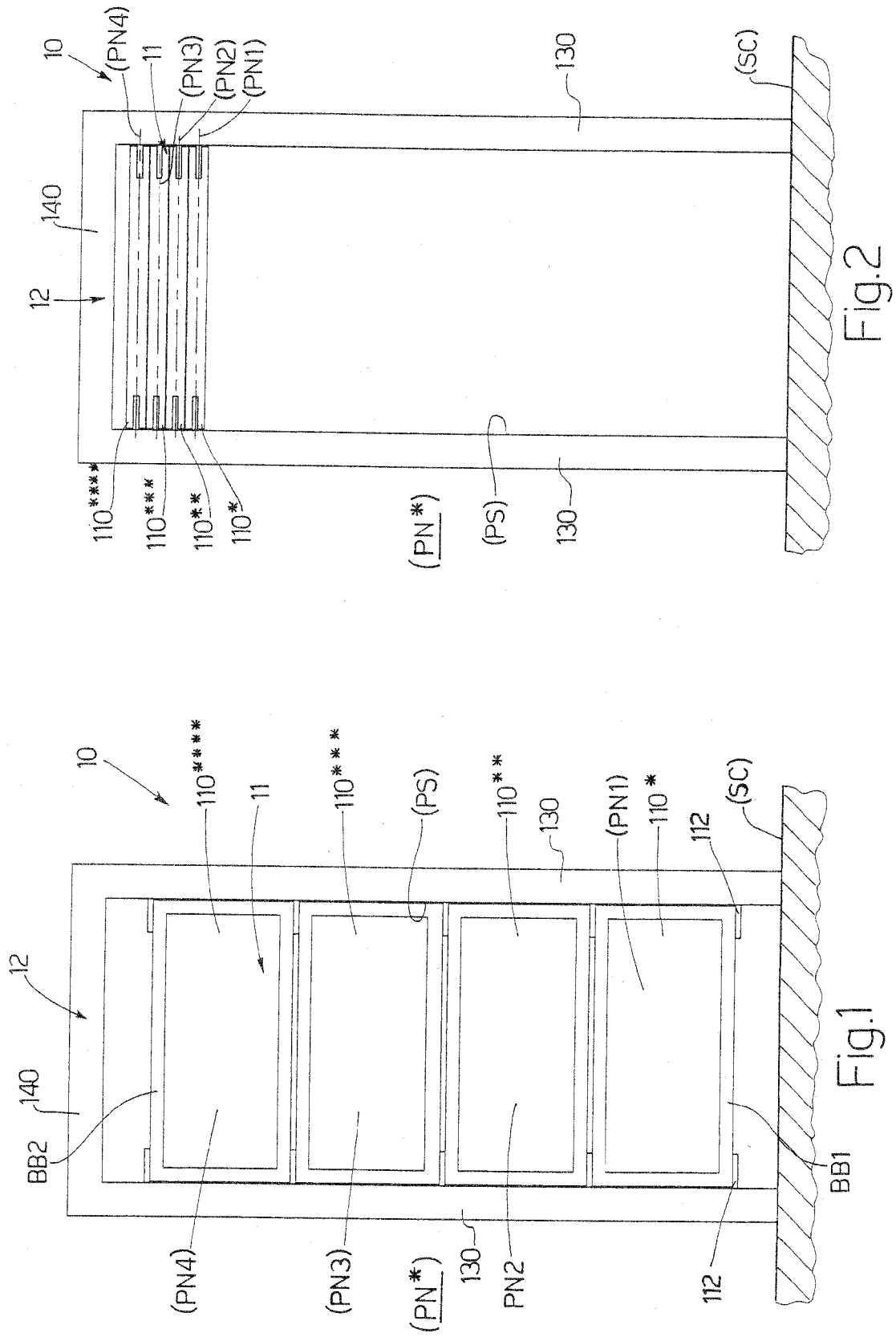
10. Fastening
11. Partition
12. Support structure
13. Electromechanical movement device (of the partition 11)
110*. Lower panel
110**. Panel
110***. Panel
110****. Upper panel
111. Hinge
112. Hinge pin
113. Guide
113a. First section (of the guide 113)
113b. Second section (of the guide 113)
114. Cable
115a. Pulley
115b. Pulley
116. Axis of rotation (of the pulleys 115a, 115b)
117. Toothed wheel
118. Pinion
119. Shaft
120. Support element
121. Electric motor
130. Vertical upright (of the support structure 12)
140. Cross-piece (of the support structure 12)
212. Hinge pin
212a. Outer extremity (of the hinge pin 212)
214. Cable
312. Guidance device
313. Bracket
314. Pallet
315. Shaped groove
315a. First stretch (of the shaped groove 315)
315b. Second stretch (of the shaped groove 315)
316. Guidance element
412. Guidance device
413. Bracket
414. Pallet

415. Shaped groove
415a. First stretch (of the shaped groove 415)
415b. Second stretch (of the shaped groove 415)
415c. Third stretch (of the shaped groove 415)
416. Guidance element
512. Hinge pin
512a. Outer extremity (of the hinge pin 512)
600. Guidance system
(BB1). Lower edge (of the partition 11)
(BB2). Upper edge (of the partition 11)
(CP1). First counterweight
(CP2). Second counterweight
(DR). Double-pointed arrow
(FR). Stopping position (on the guide 113)
(LT1). Lateral edge (of the panel 110*)
(LT2). Lateral edge (of the panel 110****)
(PN1). Disposition plane (of the lower panel 110*)
(PN2). Disposition plane (of the panel 110**)
(PN3). Disposition plane (of the panel 110***)
(PN4). Disposition plane (of the upper panel 110****)
(PN*). Plane (of the sheet)
(PS). Passage
(RL1). First roller
(RL2). Second roller
(RL3). Third roller
(RT). Double-pointed arrow
(SC). Essentially horizontal treading surface of reference

Claims

1. Fastening (10), in particular a door (10), comprising a partition (11), supported by a support structure (12), and means of movement of said partition (11) between a first configuration of "closure" of a passage (PS), and a second configuration of "opening" of said passage (PS), said partition (11) comprising a plurality of panels (110*, 110**, 110***, 110****) hinged to each other; fastening (10) **characterized by** the fact that, when the partition (11) takes on the second configuration of "opening" of the passage (PS), said plurality of panels (110*, 110**, 110***, 110****) are packed up so that the disposition planes (PN1, PN2, PN3, PN4) of said panels (110*, 110**, 110***, 110****) are essentially horizontal and therefore essentially parallel to a treading surface of reference (SC) which is also essentially horizontal.
2. Fastening (10), as claimed in claim 1, **characterized by** the fact that said means of movement of the partition (11) comprise an electromechanical movement device (13).
3. Fastening (10), as claimed in claim 1, **characterized by** the fact that said means of movement of the partition (11) comprise manual means of movement.

4. Fastening (10), as claimed in claim 2,
characterized by the fact that said electromechanical movement device (13) comprises at least one hinge pin (112, 212) secured to said panels (110*, 110**, 110***, 110****) and at least one cable (114, 214) to pull said at least one hinge pin (112, 211), and a transmission assembly (115a, 15b, 117, 118) activated by a means of movement (121). 5
5. Fastening (10), as claimed in claim 1,
characterized by the fact of also comprising a guidance system (600) of said panels (110*, 110**, 110***, 110****). 10
6. Fastening (10), as claimed in claim 5,
characterized by the fact that said guidance system (600) comprises at least a guidance device (312, 412) comprising in turn a pallet (314, 414) secured to said panels (110*, 110**, 110***, 110****) suited to engage in a shaped groove (315, 415) in order to form a cam mechanism. 15 20
7. Fastening (10), as claimed in claim 6,
characterized by the fact that said panels (110*, 110**, 110***, 110****) are of an even number and each pair of panels (110*, 110**; 110***, 110****) is provided with a respective guidance device (312, 412). 25
8. Fastening (10), as claimed in claim 7,
characterized by the fact that the shaped groove (315) belonging to the guidance device (312) joined to a pair of lower panels (110*, 110**) comprises a first stretch that is essentially rectilinear (315a) and a second curvilinear stretch (315b) with concave side facing the partition (11). 30 35
9. - Fastening (10), as claimed in claim 7,
characterized by the fact that the shaped groove (415) belonging to the guidance device (412) joined to a pair of upper panels (110***, 110****) comprises a first stretch that is essentially rectilinear (415a), a second curvilinear stretch (415b) and a third curvilinear stretch (415c), said curvilinear stretches (415b, 415c) having a respective concave side facing towards the partition (11). 40 45
10. - Fastening (10), as claimed in claim 5,
characterized by the fact that said guidance system (600) also comprises at least one extremity (112a, 212a, 512a) of at least a hinge pin (112, 212, 512) inserted in a guide (113). 50
11. - Fastening (10), as claimed in claim 10,
characterized by the fact that said at least one extremity (112a, 212a, 512a) is fitted with at least a respective roller (RL1, RL2, RL3). 55
12. - Fastening (10), as claimed in claim 10,
characterized by the fact that said guide (113) comprises a first section (113a) essentially rectilinear and a second essentially "V"-shaped section (113b) with concave side facing the partition (11).
13. - Fastening (10), as claimed in claim 12,
characterized by the fact that said second section (113b) presents a stopping position (FR) of a hinge pin (512).



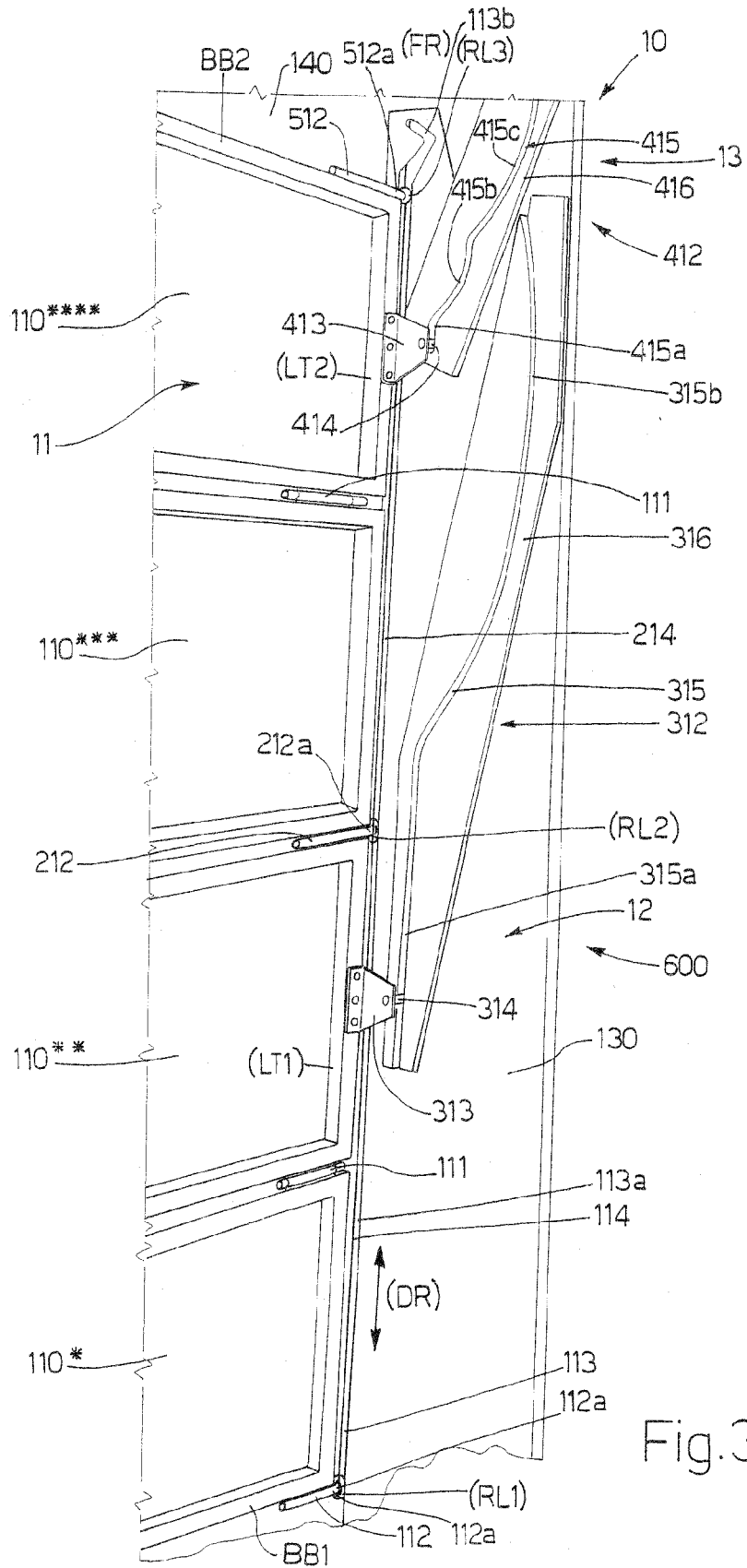


Fig.3

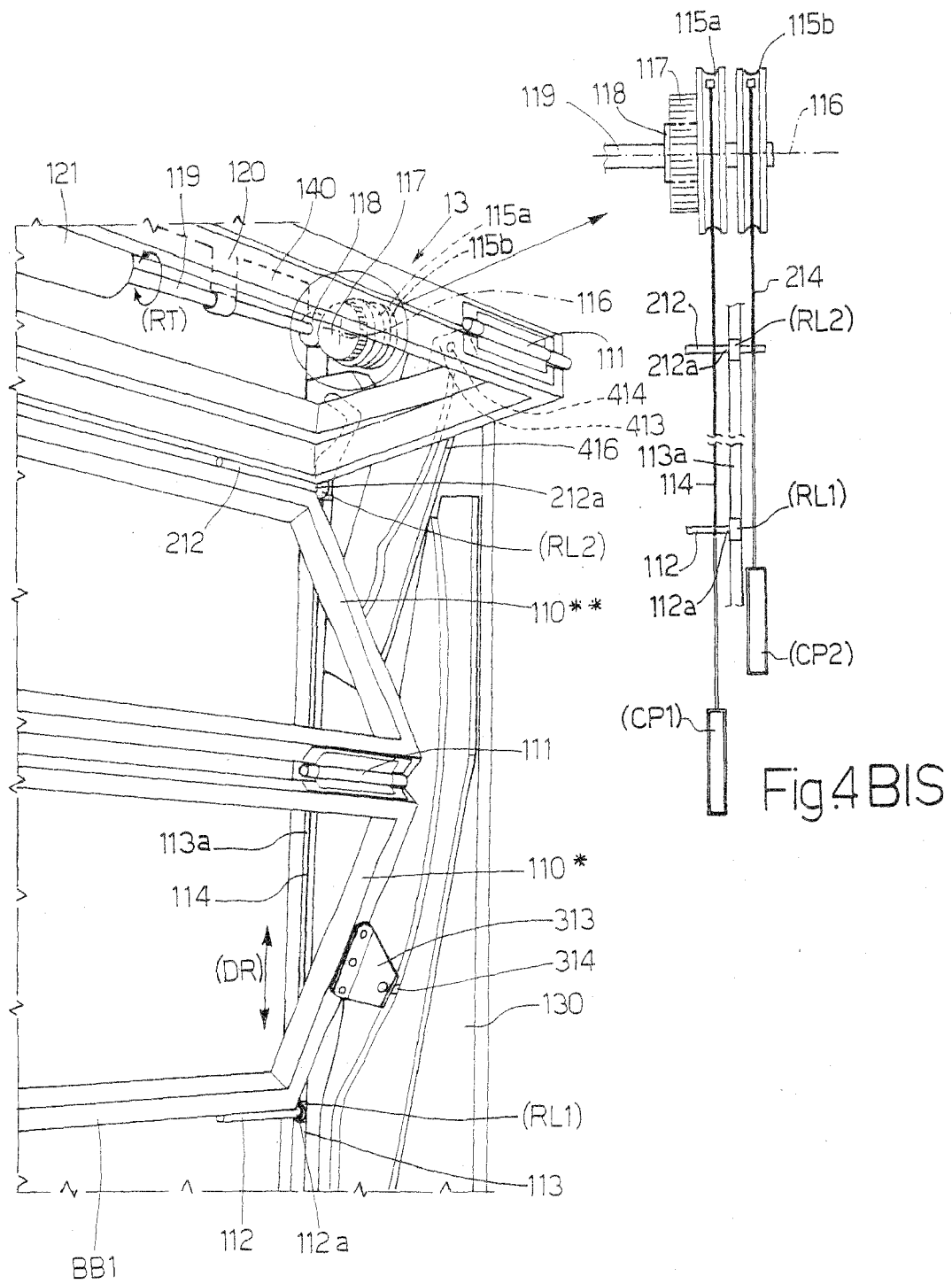


Fig.4