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(54) Cover for refrigerator cabinets

(57) An embodiment of the invention discloses a screening device (100) for refrigerator cabinets comprising a winding roller (105) able to rotate on itself about a central axis (X) thereof, a flexible screen (240) having a free and an opposite end fixed to the winding roller (105), two transmission belts (120, 125), each of which is wound about at least a first pulley (130, 155) and a second pulley (135, 160) in such a way as to develop in a closed pathway which comprises a straight operating portion (140, 165) which is parallel to an operating portion of the other transmission belt, a draw bar (200) fixed to the free end of the flexible screen (240) and having ends thereof fixed to the two transmission belts (120, 125) at respective operating portions (140, 165), and activating means (245) for simultaneously rotating the pulleys of both the transmission belts (120, 125).

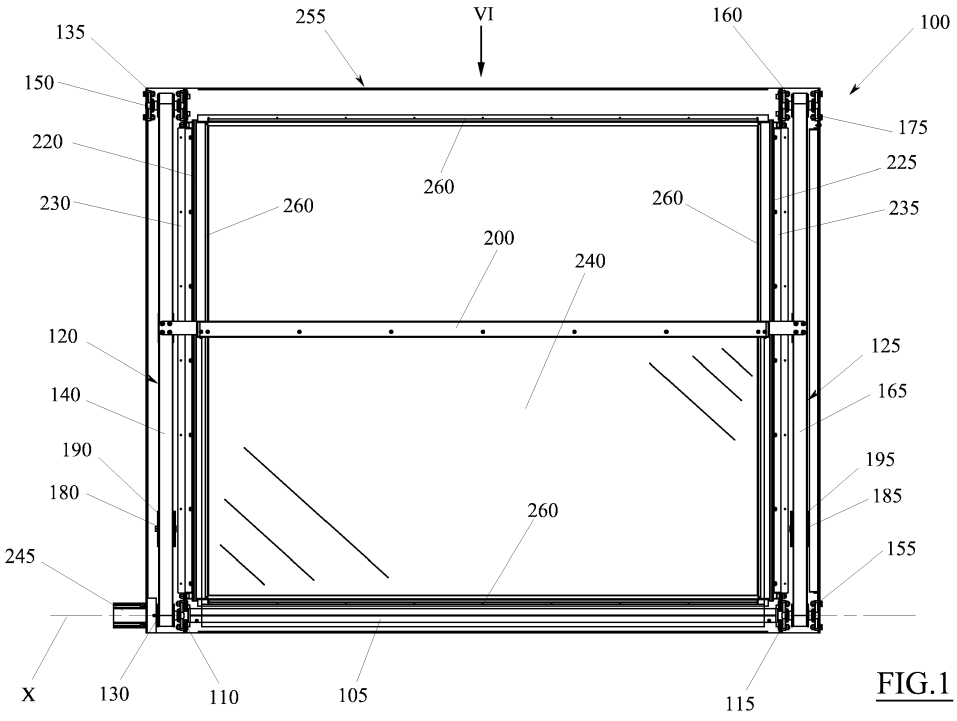

FIG.1

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Description

[0001] The present invention relates to a screening device for refrigerator cabinets, in particular for refrigerator cabinets commonly used for displaying and conserving perishable goods internally of supermarkets or other commercial enterprises.

[0002] As is known, a refrigerator cabinet generally comprises an external casing, substantially conformed as a tub, which is rested on a floor surface and delimits internally thereof a refrigerator compartment able to contain the products to be conserved.

[0003] The top of this external casing is provided with a large opening having a horizontal lie, through which the potential buyers can see and collect the products from the refrigerator compartment.

[0004] This opening is typically not provided with any closing element and is therefore the cause of a high thermal exchange between the refrigerator compartment and the external environment, which leads to a high energy cost for lowering and maintaining the temperature of the refrigerator compartment to the levels required for conserving the products.

[0005] With the aim of reducing energy consumption, an urgent requirement of refrigerator cabinets today is to equip the cabinets with a screening device which enables separating the refrigerator compartment from the surrounding environment, but which at the same time can be opened in a simple and rapid way.

[0006] One way of responding to this request is to use rigid closing panels, preferably made of a transparent material which can slide on one another in such a way as to enable a partial opening of the various zones of the refrigerator cabinet.

[0007] This solution is however not entirely satisfactory as it never enables complete opening of the refrigerator cabinet, thus significantly limiting accessibility thereof and its usability, especially by more than one person at the same time.

[0008] A further possibility for enabling closure of a refrigerator cabinet is using a rollable heat-insulating screen, similar to those already used in some vertically-opening refrigerator cabinets.

[0009] In these vertically-opening cabinets, the heat-insulating screen is in fact a flexible cloth which generally exhibits an end edge fixed to a winding roller and an opposite free edge fixed to a bar-handle. The winding roller is installed horizontally above the opening to be screen where it can be made to rotate about the central axis thereof, manually or motorized, causing the unwinding or the re-winding of the heat-insulating screen. Thanks to the weight of the bar-handle, the insulating screen is maintained vertical at all times and can therefore be lowered so as to screen the opening or raised to make it newly accessible.

[0010] This simple solution cannot however be applied to a refrigerator cabinet, as the heat-insulating screen must be able to slide in a substantially horizontal plane.

[0011] An aim of the present invention is therefore to provide a movement system which enables unwinding and re-winding a flexible screen from/onto a winding roller, even in a case in which it is to be used for screening horizontally-lying openings.

[0012] A further aim of the present invention is to attain the above-mentioned objective with a solution that is simple, rational and as inexpensive as possible.

[0013] These and other aims are attained by the characteristics of the invention as recited in the independent claim. The dependent claims delineate preferred aspects and/or particularly advantageous aspects of the invention.

[0014] In particular, an embodiment of the present invention discloses a screening device for refrigerator cabinets comprising a winding roller able to rotate on itself about a central axis thereof and a flexible screen having a free and an opposite end fixed to the winding roller, two transmission belts, each of which is wound about at least a first pulley and a second pulley in such a way as to develop in a closed pathway which comprises a straight operating portion which is parallel to an operating portion of the other transmission belt, a draw bar fixed to the free end of the flexible screen and having ends thereof fixed to the two transmission belts at respective operating portions, and activating means for simultaneously rotating the pulleys of both the transmission belts.

[0015] With this solution, the draw bar located at the free end of the flexible screen is not engaged to slide by gravitational effect like the chain-bars of the prior art, but is engaged to slide actively by the transmission belts.

[0016] This active movement of the draw bar can therefore guide the flexible screen to slide on any predetermined plane, even on a horizontal plane of a refrigerator cabinet.

[0017] In an aspect of the invention, the activating means of the pulleys can be manual or motorized.

[0018] The activating means can preferably comprise at least an electric motor.

[0019] In this way, the movement of the draw bar can advantageously occur entirely automatically.

[0020] The electric motor can preferably be connected to and commanded by a proximity sensor, in such a way that the system is completely automatic with no need for buttons.

[0021] In a further aspect of the present invention, the first and the second pulleys of the transmission belts are coaxial to one another.

[0022] With this solution a compact system is obtained which occupies little space and can be actuated in a very rational way.

[0023] For this purpose, in an aspect of the invention the first pulleys of the transmission belts are kinematically connected by a transmission shaft.

[0024] In this way one motor only can advantageously be used for both the transmission belts.

[0025] In a preferred aspect of the invention, the transmission shaft is the winding roller.

[0026] In this way, the activating of the transmission belts causes not only the translation of the draw bar but also the activation in rotation of the winding roller, i.e. the unwinding or winding of the flexible screen.

[0027] In a particular aspect of the invention, the first pulleys of the transmission belts can be coaxially splined directly on opposite ends of the winding roller.

[0028] This solution has the advantage of considerably simplifying the kinematics of the system and containing dimensions and costs to a minimum.

[0029] In a further aspect of the invention, the free end of the screen is fixed to the draw bar by means of a second winding roller, which second winding roller is rotatably coupled to the draw bar and is associated to spring means able to rotate the second winding roller about a central axis thereof.

[0030] This second winding roller has the advantage of maintaining the flexible screen constantly stretched, thus compensating for any small differences between the linear displacement of the draw bar and the linear quantity of flexible screen which unwinds or rewinds from/onto the first winding roller.

[0031] In a further aspect of the invention, the device can further comprise two straight guides that are parallel to the operating portions of the transmission belts, a skate being slidably coupled to each transmission belt, which skate is fixed to the draw bar.

[0032] In this way the draw bar is more rigid and stabler along the whole translating run thereof.

[0033] Alternatively, the skates might be replaced by carriages provided with wheels able to run on the guides.

[0034] In a further aspect of the invention, the device can further comprise a covering frame conformed substantially as a border, which is able to cover the transmission belts and the winding roller, defining an opening in which the draw bar and the flexible screen slide.

[0035] In this way, the covering frame can be applied on the external side of the refrigerator cabinet or any other refrigerator compartment to be screened, hiding the mechanism of the device and thus improving both the aesthetic appeal and the safety of the whole system.

[0036] In a further aspect of the invention, the flexible screen can be a perforated screen made of a plastic material.

[0037] In this way the flexible screen can represent an effective thermal barrier between the refrigerator compartment and the external environment, and can further guarantee a certain ventilation which prevents formation of condensation.

[0038] Further characteristics and advantages of the invention will emerge from a reading of the description that follows, provided by way of non-limiting example, with the aid of the figures of the accompanying tables.

Figure 1 is a rear view of a screening device according to the invention.

Figure 2 is the left side of the device of figure 1 shown in larger scale.

Figure 3 is a schematic view along section line III-III of figure 2.

Figure 4 is the right side of the device of figure 1, shown in larger scale.

Figure 5 is a schematic view along section line V-V of figure 4.

Figure 6 is the view denoted by VI in figure 1.

Figure 7 is the same view as figure 6 shown in a partial view and in a larger scale.

Figure 8 is a larger scale detail of figure 1 shown in a partial view and in larger scale, and where a broken line indicates a winding roller contained in the draw bar.

[0039] The figures illustrate a screening device 100 conceived to be applied to a refrigerator cabinet (not illustrated), but which might be advantageously applied also to other refrigerator compartments, among which for example vertically-opening refrigerator cabinets or also to some masonry refrigerator cells in which a temperature to be maintained is not excessively low (for example comprised between 0°C and 7°C).

[0040] This screening device 100 comprises a winding roller 105 the opposite ends of which are rotatably coupled to respective supports 110 and 115, such that the winding roller 105 can rotate on itself about the central axis X thereof.

[0041] The screening device 100 further comprises two transmission belts 120 and 125, which are positioned on opposite sides with respect to the winding roller 105.

[0042] The transmission belt 120 is wound about a first pulley 130 and a second pulley 135, such as to develop in a closed pathway which substantially comprises two straight portions, of which a rear portion 140 and a front portion 145 (figures 2 and 3).

[0043] The pulley 130 is coaxially splined directly to an end of the winding roller 105, while the pulley 135 is rotatably coupled to a distal support 150, which is positioned in such a way that the pulley 135 is aligned to the first pulley 130 along a substantially perpendicular direction to the central axis X of the winding roller 105.

[0044] Likewise, the transmission belt 125 is wound about a first pulley 155 and a second pulley 160, so as to develop in a closed pathway which substantially comprises two straight portions, of which a rear portion 165 and a front portion 170 (see figures 4 and 5).

[0045] The pulley 155 is coaxially splined directly to the end of the winding roller 105, opposite with respect to the pulley 130, while the pulley 160 is rotatably coupled to a distal support 175, which is positioned in such a way that the pulley 160 is coaxial to the pulley 135 and perfectly aligned to the pulley 155 along a substantially perpendicular direction to the central axis X of the winding roller 105.

[0046] The pulleys 130, 135, 155 and 160 all have the same diameter, so that the rear portions 140 and 165 of the two transmission belts 120 and 125 are perfectly parallel and coplanar to one another.

[0047] In other embodiments, the same result might be obtained using pulleys 135 and 160 with an equal diameter to one another but different to the diameter of the pulleys 130 and 155.

[0048] In order to maintain the transmission belts 120 and 135 tensed, the screening device 100 can also comprise two belt-presser wheels 180 and 185, which are rotatably mounted idle on respective supports 190 and 195, and are able to rotate while pressing in contact respectively with the front portion 145 of the belt 120 and the front portion 170 of the belt 125.

[0049] The screening device 100 further comprises a draw bar 200, which is orientated parallel to the winding roller 105 and exhibits the opposite ends solidly fixed with respect to the rear portion 140 of the transmission belt 120 and the rear portion 165 of the transmission belt 125.

[0050] The fixing of each of the ends can be obtained by vice-clamping the lower portion of the respective transmission belt between two metal straps, of which a first metal strap is fixed to the draw bar 200 while the second metal strap is fixed to the first metal strap for example by means of screws.

[0051] As illustrated in figure 7, two skates 210 and 215 are also fixed to the opposite ends of the draw bar 200, each of which skates 210 and 215 is slidably housed in a respective straight guide 220 and 225 with which it substantially realises a sliding coupling with a single degree of freedom.

[0052] The straight guides 220 and 225 are borne by respective support brackets 230 and 235, in such a way as to be substantially parallel to the rear portions 140 and 16 of the transmission belts 120 and 125.

[0053] Alternatively, the skates 210 and 215 might be replaced by carriages provided with wheels able to roll along the straight guides 220 and 225.

[0054] The screening device 100 further comprises a flexible screen 240, which is able to function as a heat-insulating barrier between the refrigerated compartment of the refrigerator cabinet and the external environment.

[0055] The flexible screen 240 is substantially conformed as a rectangular canvas having two pairs of opposite edges, of which a pair of lateral edges which, in the illustrated example, correspond to the longer sides of the canvas, and a pair of end edges which, once more in the illustrated example, correspond to the shorter sides.

[0056] A first of these end edges of the flexible screen 240 is fixed in a longitudinal direction to the draw bar 200 while the second opposite edge is fixed longitudinally to the winding roller 105, in such a way that the flexible screen 240 can be wound and unwound onto/from the winding roller 105 following the rotation thereof about the central axis X thereof in a direction or in the opposite direction.

[0057] The flexible screen 240 can be made of a plastic material, for example PVC, can be transparent and can further be perforated, so as to enable an adequate ventilation able to prevent formation of condensation.

[0058] The screening device 100 lastly comprises an electric motor 245, for example a step motor, the drive shaft whereof is coaxial to and directly splined on an end of the winding roller 105.

[0059] The electric motor can be connected to and commanded by a proximity sensor, so that it is not necessary to include any type of activating button, making the system completely automatic.

[0060] On activating the electric motor 245, the winding roller 105 can be set in rotation in the unwinding direction of the flexible screen 240. As the pulleys 130 and 155 are directly splined to the winding roller 105, the activation also sets the transmission belts 120 and 125 in movement, which engage the draw bar 200 to translate parallel to itself distancingly from the winding roller 105, also guided by the skates 210 and 215 which slide in the straight guides 220 and 225. In this way, the flexible screen 240 which unwinds from the winding roller 105 is progressively stretched along the translation plane of the draw bar 200.

[0061] On inverting the functioning of the electric motor 245, the winding roller 105 can be set in rotation in the winding direction of the flexible screen 240. This activation also inverts the movement of the transmission belts 120 and 125, which engage the draw bar 200 to translate parallel to itself nearingly from the winding roller 105, still guided also by the skates 210 and 215 which slide in the straight guides 220 and 225. In this way, the flexible screen 240 retreats on the translation plane of the draw bar 200 and winds progressively on the winding roller 105.

[0062] It is observed that during the steps of winding and unwinding, the flexible screen 240 preferably remains always stretched on the translation plane of the draw bar 200.

[0063] To obtain this effect, the diameter of the pulleys 130 and 155 is chosen to be substantially identical to the diameter of the winding roller 105, in such a way that the linear velocity of the transmission belts 120 and 125, i.e. of the draw bar 200, is substantially identical to the winding or unwinding velocity of the flexible screen 240.

[0064] Since in any case the winding or unwinding velocity of the flexible screen 240 slightly varies during functioning (as a function of the number of screen windings which are still rolled about the winding roller), it might be necessary to compensate for the small differences which thus are created between the linear displacement of the draw bar 200 and the linear quantity of flexible screen 240 which unwinds or re-winds from/onto the first winding roller 105.

[0065] In order to compensate for these differences and maintain the flexible screen 240 always stretched, the draw bar 200 might be equipped with a second winding roller 250 and first end of the flexible screen 240 might be directly fixed longitudinally to the second winding roller 250 (see figure 8).

[0066] This second winding roller 250 is parallel to the first winding roller 105 and is rotatably mounted on the

draw bar 200, so as to be constrained to translate solidly therewith following the movement of the transmission belts 120 and 125 but also to be able to rotate freely about the central axis thereof.

[0067] The second winding roller 250 is further provided with appropriate pre-loaded spring means (not illustrated as of known type to the expert in the sector), which tend to rotate the second winding roller 250 in a predetermined direction and therefore wind the flexible screen 240 thereon.

[0068] The screening device 100 can lastly be provided with a covering frame, denoted in its entirety by 255, which is destined to be always positioned on the external side of the refrigerating cabinet, so as to hide the mechanical parts of the device.

[0069] The covering frame 255 can for example be realised by means of four profiled sheet steel elements, which are fixed to one another in such a way as to realize a substantially rectangular frame, which covers the winding roller 105, the transmission belts 120 and 125 with the relative pulleys, as well as the straight guides 220 and 225.

[0070] In this way, the covering frame 255 also defines a central opening in which the draw bar 200 slides and which is thus opened and closed by the flexible screen 240.

[0071] Perimeter brushes 260 can also be fixed to the covering frame 255, which brushes 260 are arranged along the sides of the central opening, so as to be able to remain substantially in contact with the flexible screen 240 in the closed position, mainly so as to protect the various mechanical parts from dust.

[0072] In the illustrated example, the covering frame 255 also functions as a support structure to which all the single supports for the winding roller 105, the pulleys of the transmission belts 120 and 125 and the straight guides 220 and 225 are also fixed.

[0073] Obviously a technical expert in the sector might make numerous modifications of a technical-applicational nature to the screening device 100 as described above, without its forsaking the scope of the invention as claimed in the following.

Claims

1. A screening device (100) for refrigerator cabinets comprising a winding roller (105) able to rotate on itself about a central axis (X) thereof and a flexible screen (240) having a free and an opposite end fixed to the winding roller (105), two transmission belts (120, 125), each of which is wound about at least a first pulley (130, 155) and a second pulley (135, 160) in such a way as to develop in a closed pathway which comprises a straight operating portion (140, 165) which is parallel to an operating portion of the other transmission belt, a draw bar (200) fixed to the free end of the flexible screen (240) and having ends thereof fixed to the two transmission belts (120, 125) at respective operating portions (140, 165), and activating means (245) for simultaneously rotating the pulleys of both the transmission belts (120, 125), **characterised in that** the first pulleys (130, 155) of the transmission belts (120, 125) are kinematically connected by the winding roller (105) and that the free end of the flexible screen (240) is fixed to the draw bar (200) by means of a second winding roller (250), which second winding roller (250) is rotatably coupled to the draw bar (200) and is associated to spring means able to rotate the second winding roller (250) about a central axis thereof.

2. The device (100) of claim 1, **characterised in that** the activating means comprise at least an electric motor (245).

3. The device (100) of claim 1 or 2, **characterised in that** the first (130, 155) and the second pulleys (135, 160) of the transmission belts (120, 125) are coaxial to one another.

4. The device (100) of any one of the preceding claims, **characterised in that** the first pulleys (130, 155) of the transmission belts (120, 125) are coaxially splined directly on opposite ends of the winding roller (105).

5. The device (100) of any one of the preceding claims, **characterised in that** it comprises two straight guides (220, 225) that are parallel to the operating portions (140, 165) of the transmission belts (120, 125), a skate (210, 215) being slidably coupled to each transmission belt (120, 125), which skate (210, 215) is fixed to the draw bar (200).

6. The device (100) of any one of the preceding claims, **characterised in that** it comprises a frame (255) conformed substantially as a border, which is able to cover the transmission belts (120, 125) and the winding roller (105), defining an opening in which the draw bar (200) and the flexible screen (240) slide.

7. The device (100) of any one of the preceding claims, **characterised in that** the flexible screen (240) is a perforated screen made of a plastic material.

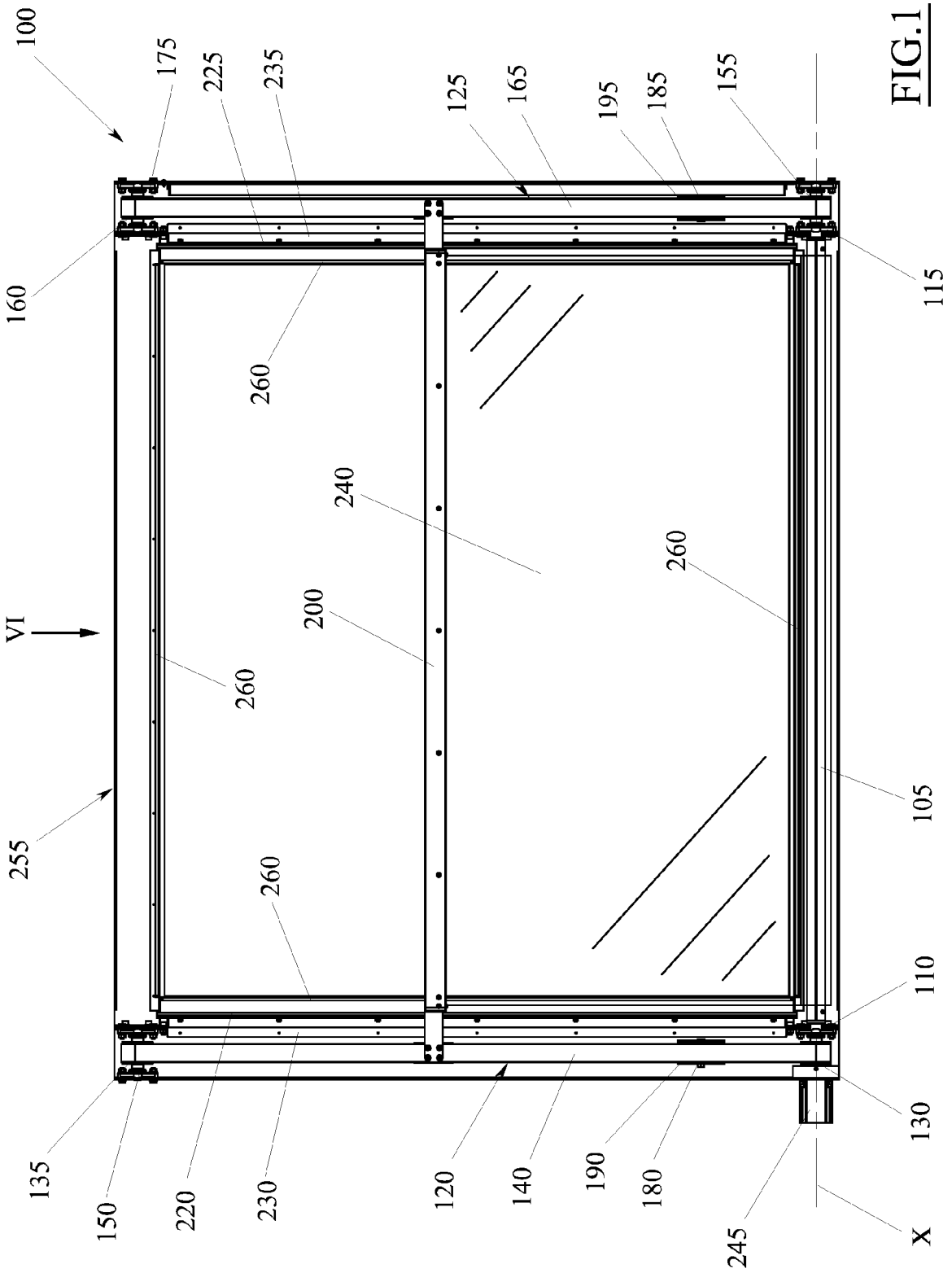

100
175
225
235
125
165
195
185
155
160
115
260
240
260
200
VI
260
255
105
260
110
130
135
150
220
230
120
140
190
180
245
X

FIG.1

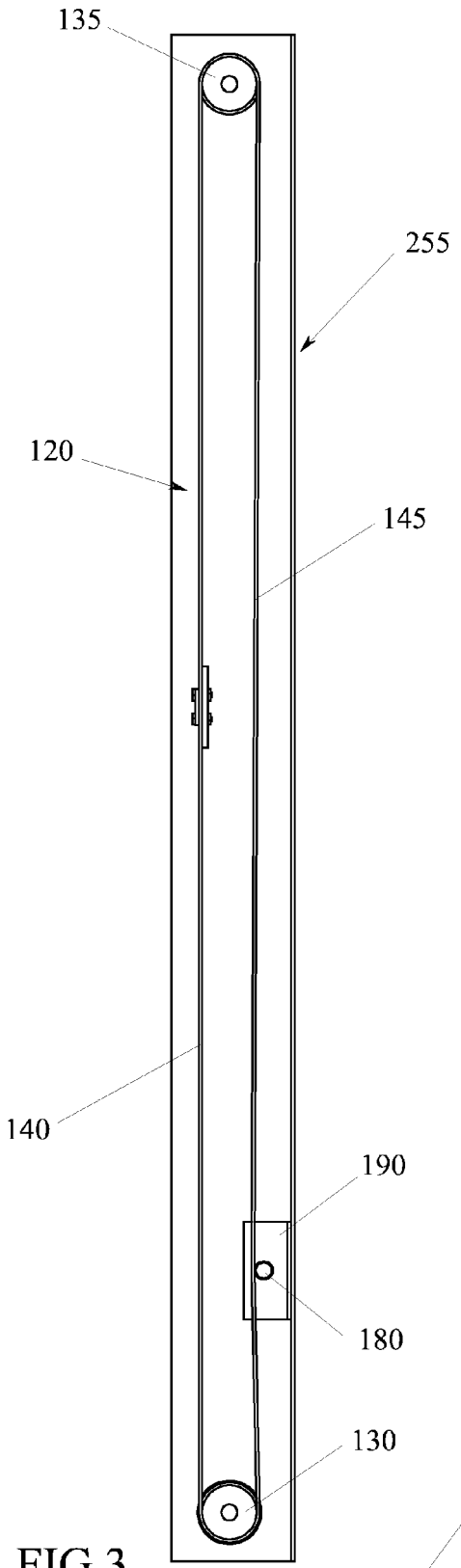

135
255
120
145
140
190
180
130

FIG.3

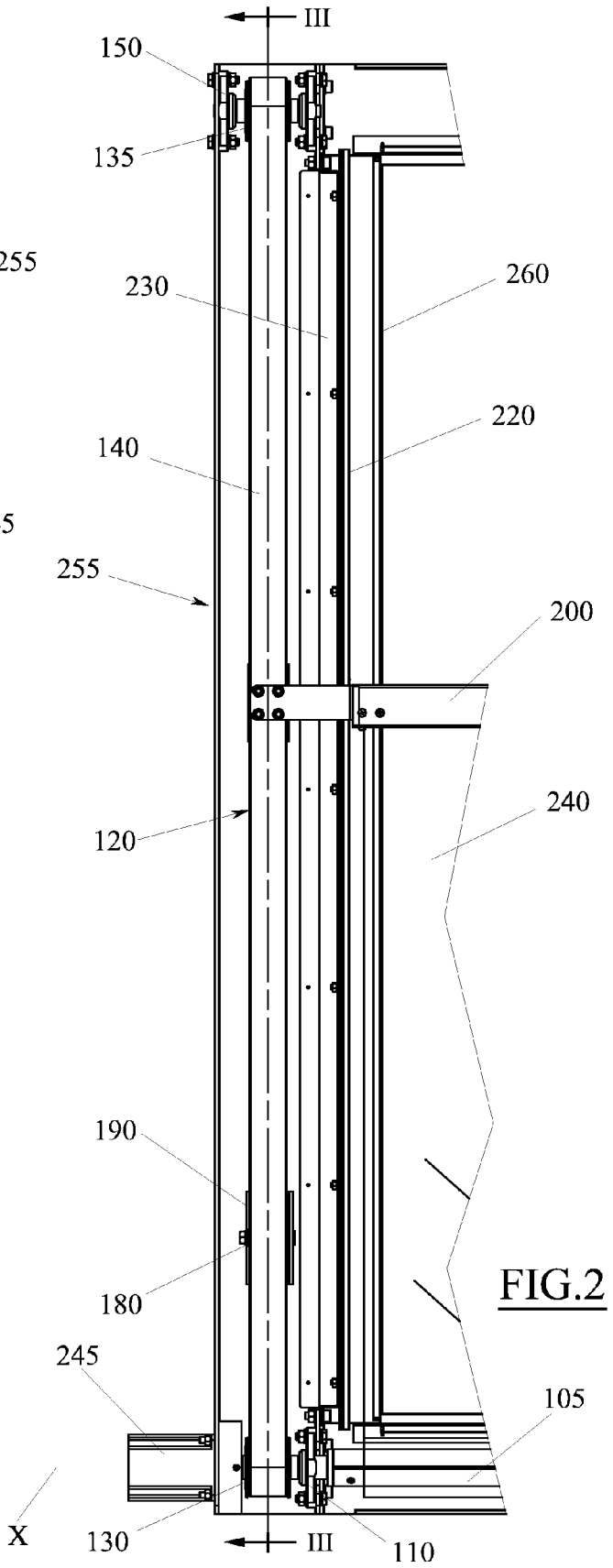

III
150
135
230
260
220
140
255
200
240
120
190
180
245
105
X
130
III
110

FIG.2

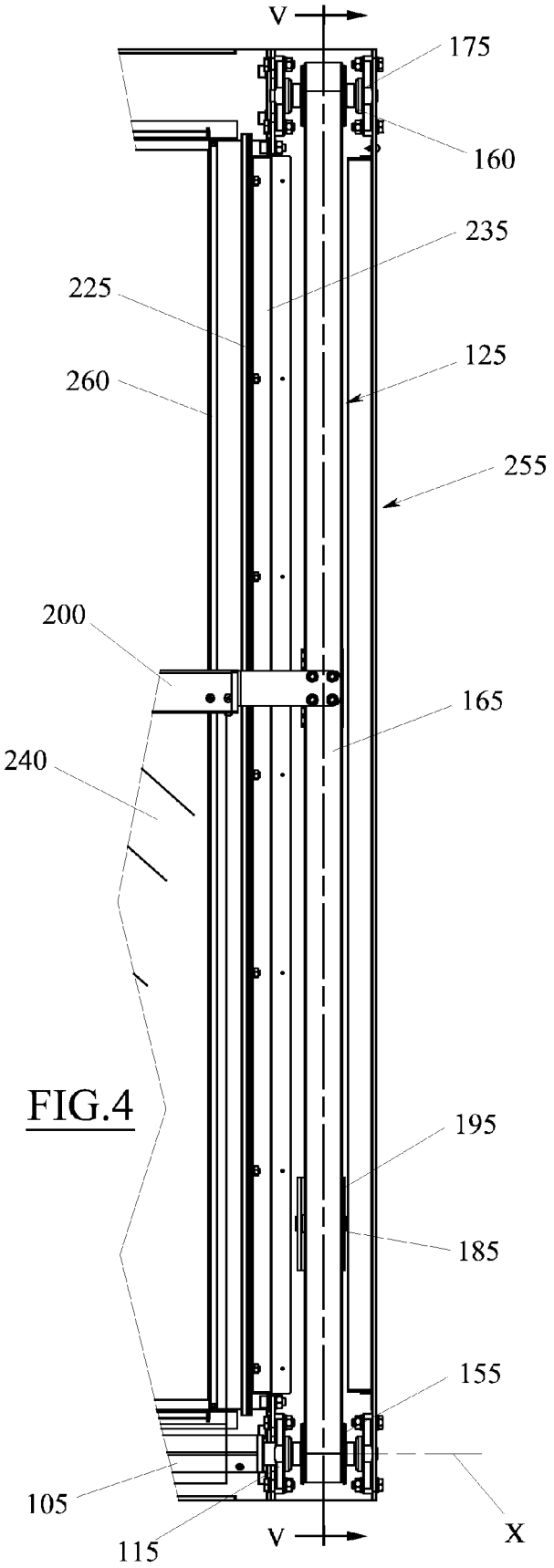

V
175
160
235
225
125
260
255
200
165
240
195
185
155
105
115
V
X

FIG.4

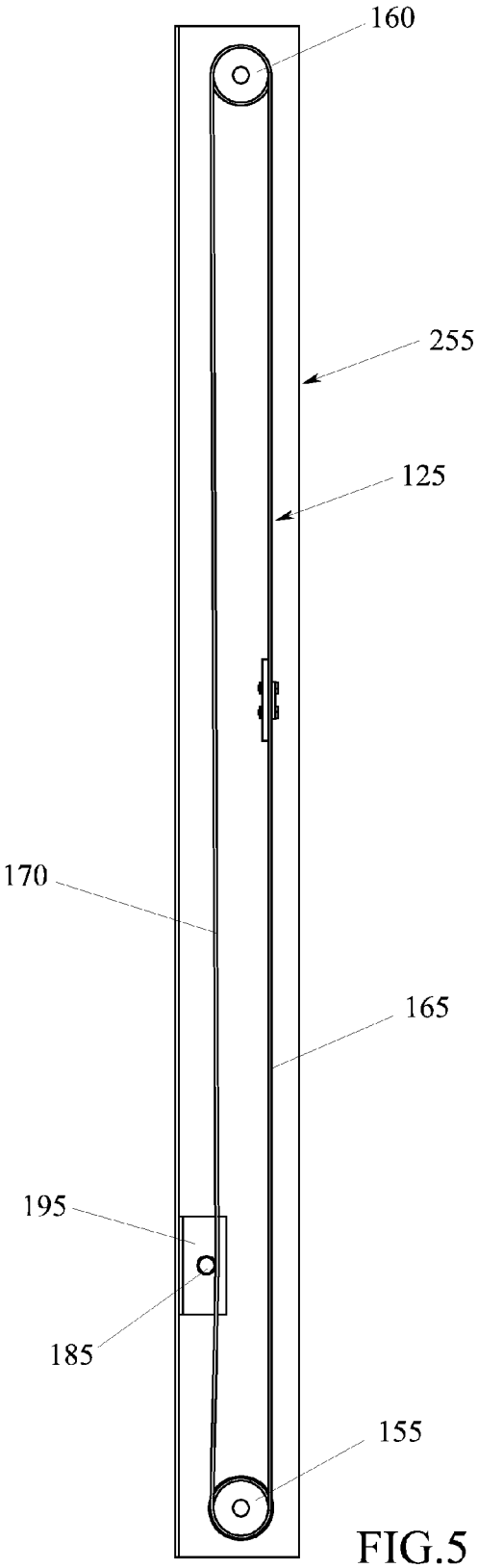

160
255
125
170
165
195
185
155

FIG.5

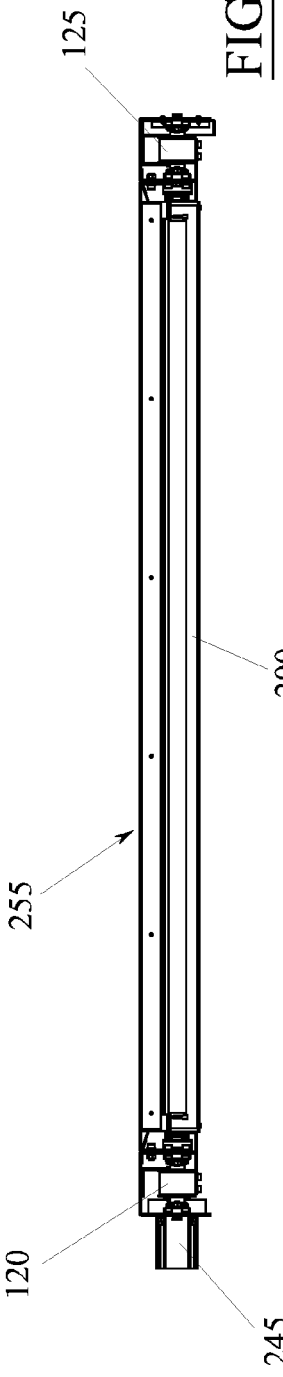
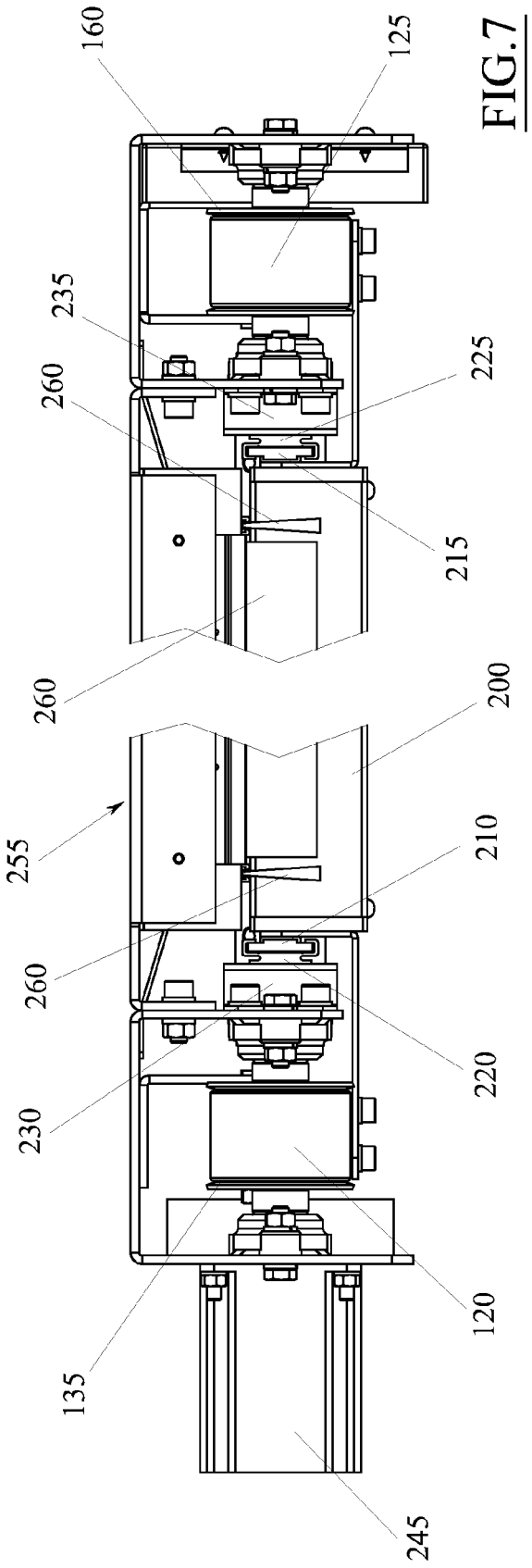

125
200
255
120
245

FIG.6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125
235
225
260
215
260
200
255
210
260
220
230
120
135
245

FIG.7

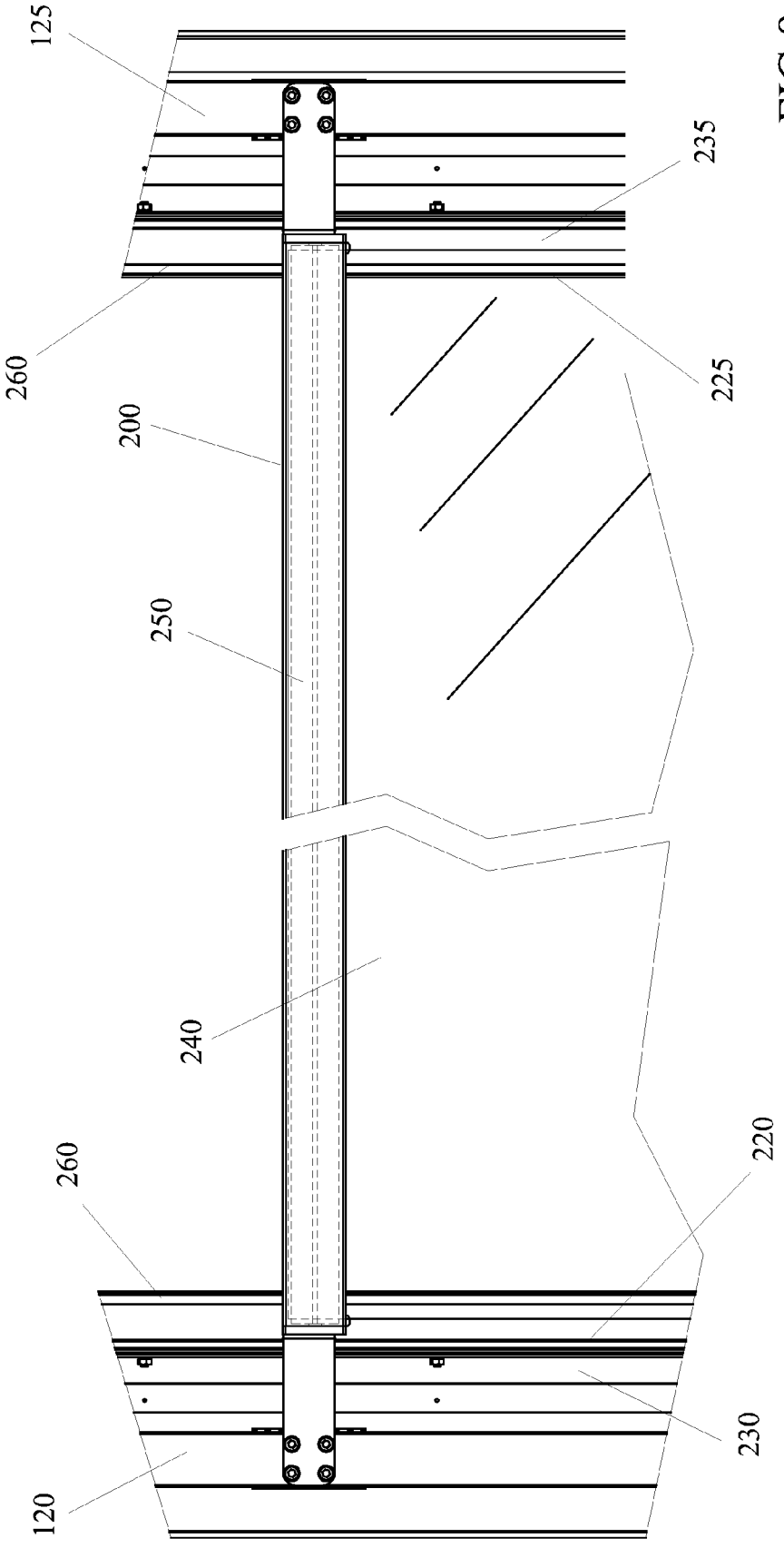

FIG.8