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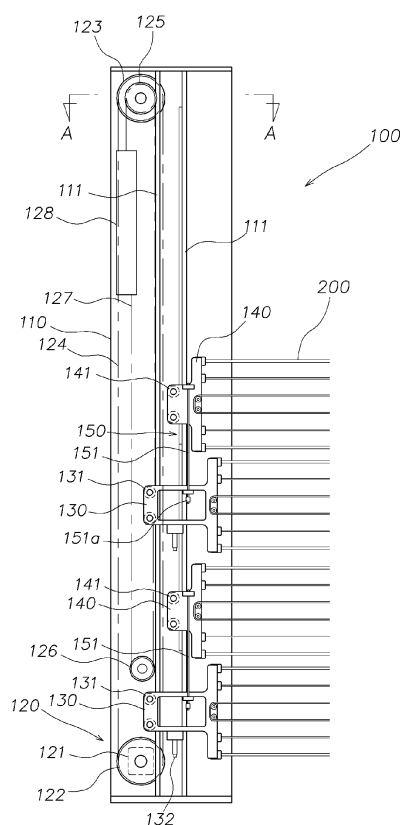
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(54) **SAFETY EQUIPMENT FOR TRAIN PLATFORM**

(57) The present invention provides safety equipment for a train platform, the safety equipment comprising: a plurality of multi-stage blocks (140) that can move up and down along a main body (110), ropes (200) being horizontally connected to one side of each multi-stage block; and an inducing member (150) that induces a block (130) to overlap with the multi-stage block (140) while being raised when moving up and to alternate with the multi-stage block (140) while being lowered when moving down. Accordingly, the ropes (200) for blocking passengers are sequentially moved upward to enable the passengers to enter or exit a train, and when the train departs, the ropes (200) are moved downward to effectively block passengers waiting on a platform.

FIG. 3



Description

Technical Field

[0001] The present invention relates to a safety door system used at a platform of a train station and, more particularly, to a rope screen door (RSD) system used at a platform of a train station, in which a plurality of blocks, to which ropes are connected, are made smaller and raising blocks are provided to sequentially overlap with each other, allowing installation height of a lifting mechanism to be minimized.

Background Art

[0002] Generally, as shown in FIG. 1, rope type platform screen (or safety) door systems are configured such that ropes 200 are moved up and down by lifting mechanisms 100 installed at selected places from an inlet to an outlet of a platform beside rail tracks to open and close safety doors, thereby allowing passengers to board trains or alight from trains in a safe manner.

[0003] However, since door units of a conventional rope type platform screen door system respectively require driving members for moving up and down a plurality of blocks to which ropes are connected, a problem arises in that a great amount of volume and height is required, causing reduced operation efficiency.

[0004] In the meantime, according to the conventional rope type platform screen door system, as shown in FIG. 2, as blocks 130 to which ropes 200 are connected have an increased size, blocks require higher lifting height (B), resulting in the lifting mechanisms 100 each having increased entire height and size.

[0005] Further, another problem arises in that the conventional rope type platform screen door system could not be installed at platforms having narrow installation space and low height.

[0006] The conventional rope type platform screen doors are disclosed in Korean Patent Nos. 10-0601112 (published on July 19, 2006), and 10-0789706 (published on January 28, 2008), 10-1195652 (published on October 30, 2012), 10-1344995 (published on December 24, 2013), and 10-1345027 (published on December 26, 2013), and Korean Patent Application Publication No. 10-2012-0099566 (published on September 11, 2012).

Disclosure

Technical Problem

[0007] An object of the present invention is to provide a safety door system installed at a platform of a train station, in which blocks and multi-stage blocks, to which ropes are connected, are made smaller, thereby minimizing installation height and operation space.

[0008] Another object of the present invention is to provide a safety door system installed at a platform of a train

station, in which blocks are moved up and down to move up and down the multi-stage blocks, allowing both blocks and multi-stage blocks to overlap with each other and to be separated from each other, respectively.

Technical Solution

[0009] In an aspect of the present invention, proposed is a safety door system provided at a platform of a train station, the safety door system including a plurality of lifting mechanisms 100 each having: a main body 110 provided at selected positions from an inlet to an outlet of the platform; a driving unit (driving means) 120 provided at an inside or an outside of the main body 110; a second rotor 123 rotating in response to an operation of the driving unit 120; a third rotor 125 connected to one side of the second rotor 123 and a diameter of which is larger or smaller than that of the second rotor 123; a plurality of motion blocks 130 moved up and down along the main body 110 in response to the operation of the driving unit 120 so as to overlap with and be separated from each other, respectively; a plurality of ropes 200 horizontally connecting the motion blocks 130 to allow a safety door to be opened or closed; a plurality of multi-stage blocks 140 to which the ropes 200 are horizontally connected so that the multi-stage blocks are moved up and down along the main body 110; and an interworking unit 150 configured to, when the motion blocks 130 are moved up and down, enable the multi-stage blocks 140 to be moved up and down, thereby overlapping with and being separated from the blocks 130, respectively.

[0010] Here, a rail 111 may be provided in the main body 110 in a vertical direction so as to guide a motion of the motion blocks 130 and the multi-stage blocks 140.

[0011] The rail 111 may be integrally provided with first support sections 111a and second support sections 111b on opposite sides of a middle part and a front part of the rail as viewed in a plan view to guide the motion blocks 130 and the multi-stage blocks 140, respectively.

[0012] The driving unit 120 may include a drive motor 121, wherein a first rotor 122 is provided on one side of the drive motor 121 and a fourth rotor 126 is provided on one side of the main body 110, and wherein first and second connectors 124 and 127 are provided and circulated between the first and second rotors 122 and 123 and between the third and fourth rotors 125 and 126 so as to connect one motion block 130 and another motion block 130, respectively.

[0013] The second connector 127 may be provided with a weight 128 on one side thereof.

[0014] The interworking unit 150 may include an interworking section 151 fixed to one side of each of the multi-stage blocks 140 so as to vertically pass through one side of each of the motion blocks 130, and having engaging steps 151a on a lower portion thereof.

[0015] The interworking unit 150 may include: a pair of rollers 152 provided on upper and lower parts of one multi-stage block 140; a belt 153 circulated between the

rollers 152; a first connection part 154 connecting one side of the belt 153 and upper portions of the motion blocks 130; a support part 155 provided on a lower portion of another multi-stage block 140 adjacent to the multi-stage block 140; a support roller 156 provided on a lower portion of the support part 155; a support rope 157 connected between the upper portion of the multi-stage block 140 and one side of an upper portion of the main body 110 along the support roller 156; and a second connection part 158 connecting one side of the belt 153 and another motion block 130 adjacent to the motion block 130.

Advantageous Effects

[0016] According to the present invention, ropes are sequentially moved up and down so as to open and close safety doors of the platform door system such that passengers are able to safely board and alight from a train.

[0017] Particularly, the plurality of blocks may be sequentially moved up and down using a single driving unit, thereby improving operation efficiency.

[0018] Further, the plurality of blocks are sequentially overlapped with each other while being moved up, thereby minimizing the entire installation height, allowing easy application to a platform having lower height.

[0019] Further, the platform door system has a simple structure and allows ease of maintenance, thereby improving operation efficiency.

Description of Drawings

[0020]

FIG. 1 is a front view schematically illustrating a structure of a conventional safety platform door system;

FIG. 2 is a front view schematically illustrating a motion of ropes in the conventional safety platform door system;

FIG. 3 is a front view illustrating a structure of a safety platform door system according to the present invention;

FIG. 4 is a cross-sectional view taken along line A-A of FIG. 3;

FIG. 5 is a front view illustrating a moving-up motion of ropes in the safety platform door system of the present invention;

FIGS. 6 and 7 are side views illustrating an operation of an interworking unit of the safety platform door system; and

FIG. 8 is a front view schematically illustrating a moving-up motion or a moving-down motion of ropes in the safety platform door system.

Best Mode

[0021] A preferred embodiment of the present invention

will now be described with reference to the accompanying drawings.

[0022] FIG. 3 is a front view illustrating a structure of a safety platform door system according to the present invention, FIG. 4 is a cross-sectional view taken along line A-A of FIG. 3, FIG. 5 is a front view illustrating a moving-up motion of ropes in the safety platform door system of the present invention, FIGS. 6 and 7 are side views illustrating an operation of an interworking unit of the safety platform door system, and FIG. 8 is a front view schematically illustrating a moving-up motion or a moving-down motion of ropes in the safety platform door system.

[0023] A safety door system according to the present invention is provided at a platform of a train station. The safety door system includes a plurality of lifting mechanisms 100 each having: a main body 110 provided at selected positions from an inlet to an outlet of the platform; a driving unit 120 provided on one side of the main body 110; a second rotor 123 rotating in response to an operation of the driving unit 120; a third rotor 125 connected to one side of the second rotor 123 and a diameter of which is larger or smaller than that of the second rotor 123; a plurality of motion blocks 130 connected to the second and third rotors 123 and 125; respectively, so as to be moved up and down in response to the operation of the driving unit 120, being overlapped with and separated from each other, respectively; a plurality of ropes 200 horizontally connecting the motion blocks 130 to allow a safety door to be opened or closed; a plurality of multi-stage blocks 140 to which the ropes 200 are horizontally connected so that the multi-stage blocks are moved up and down along the main body 110; and an interworking unit 150 configured to, when the motion blocks 130 are moved up and down, enable the multi-stage blocks 140 to be moved up and down, thereby overlapping with and being separated from the blocks 130, respectively.

[0024] The lifting mechanism 100 is installed on a safety line on a platform of a train where passengers can board or alight from a train. When a train arrives and stops at a boarding position of the platform, the lifting mechanism is activated to move up the motion blocks 130 and the ropes 200 to allow a safety door to be opened so that passengers can board the train. On the contrary, when passengers have boarded the train, the lifting mechanism 100 is activated to move down the motion blocks 130 and the ropes 200 to allow the safety door to be closed so that passengers cannot board the train, thereby ensuring passenger safety.

[0025] Here, main bodies 110 of the lifting mechanisms are vertically firmly installed at fixed positions at regular intervals along a platform.

[0026] Particularly, a rail 111 is vertically installed on one side so as to guide a motion of the motion blocks 130 and multi-stage blocks 140, and rollers 131 and 141 are provided on one side of each of the multi-stage blocks 140 to allow the multi-stage blocks to be easily moved

along the rail 111.

[0027] Here, as shown in FIG. 4, the rail 111 may be integrally provided with first support sections 111a and second support sections 111b on opposite sides of a middle part and a front part of the rail as viewed in a plan view to guide the motion blocks 130 and the multi-stage blocks 140, respectively, thereby enabling easy moving up and down of the motion blocks 130 and the multi-stage blocks 140 along a single rail 111, and therefore minimizing deformation that may occur due to load generated during the moving-up and down motion.

[0028] An engaging member (not shown) may be provided on one side of a lower or middle portion of the rail 111 in order to engage and stop the multi-stage blocks 140.

[0029] Specifically, while the motion block 130 can be stopped while being moved up and down by the operation of the driving unit 120, the multi-stage block 140 cannot be stopped at specified positions such that the multi-stage block 140 is moved up during a moving-up motion of the motion block 130 and the multi-stage block 140 is not overlapped with an upper portion of the motion block 130 in order to close the safety door and prevent passengers boarding during a moving-down motion of the motion block 130. Thus, a stopper member 112 may be provided to engage and stop the multi-stage block 140.

[0030] The engaging member may have a variety of configurations and shapes, such as a shock absorber, a bolt or the like, and may be provided at a specified position of the rail 111 or the main body 110 in order to engage and stop the multi-stage block 140.

[0031] In the meantime, the driving unit 120 is an element that may be provided on one side of an inside or an outside of the main body 110 according to installation space and operation efficiency so as to move up and down the motion blocks 130.

[0032] The driving unit 120 includes a first rotor 123 that is provided on one side of an upper portion of the main body 110 so as to be connected to the motion block 130, the second rotor 125 having a larger or smaller diameter than that of the first rotor 123 and which is provided on one side of the first rotor 123 so as to be connected to another motion block 130 adjacent to the motion block 130, and a drive motor 121 for rotating the first or second rotors 123 or 125.

[0033] Particularly, since the first and second rotors 123 and 125 have different diameters, so the multi-stage blocks 140 as well as the motion blocks 130, connected by the rotors, are not overlapped with, but separated from each other during a moving-up or down motion, safety doors can be opened or closed with the action of the ropes 200.

[0034] Here, diameters of the first and second rotors 123 and 125 may vary according to a moving-up or down position and a height of the motion block 130 and multi-stage block 140.

[0035] A driving rotating body 122 and a third rotor 126 are provided on one sides of the drive motor 121 and the

main body 110, respectively, and a first connector 124 is provided so as to be moved between the driving rotating body 122 and the first rotor 123 and connected to one motion block 130, and a second connector 127 is provided so as to be moved between the second rotor 125 and the third rotor 126 and connected to another block 130 adjacent to the motion block 130.

[0036] Here, the drive motor 121 may include a reduction gear or a brake so as to perform a constant-speed rotation under the control of a controller.

[0037] Thus, the drive motor 121 enables both the rotation of the driving rotating body 122 and the first rotor 123 to move up and down the motion block 130 and the rotation of the second and third rotors 125 and 126 to move up and down adjacent motion block 130 at the same time.

[0038] Particularly, the driving rotating body 122, the first rotor 123, the second rotor 125, and the third rotor 126 may employ an element such as a sprocket, a pulley or the like, and the first and second connectors 124 and 127 may employ a chain, a belt or the like at the same time.

[0039] A weight 128 may be provided on one side of the second connector 127 in order to move down the second connector due to its self-load upon events such as emergency situations, a breakout, or a failure of the driving unit 120 so as to forcibly move up the motion blocks 130, the multi-stage blocks 140, and ropes 200 so that safety doors can be opened.

[0040] Further, a shock-absorber 132 may be provided on a lower portion of the motion block 130 to minimize a shock occurring during a moving up and down motion.

[0041] Further, the interworking unit 150 may be provided between the motion block 130 and the multi-stage block to enable the multi-stage block 140 to be moved up and down during moving up and down motions of the motion block 130, respectively.

[0042] Here, the interworking unit 150 may include an interworking section 151 fixed to one side of each of the multi-stage blocks 140 so as to vertically pass through one side of each of the motion blocks 130, and having engaging steps 151a on a lower portion thereof.

[0043] The interworking section 151 may have a shape like a rod, a rail, or the like that serves to assist moving-up of the multi-stage block 140 during a moving-up motion of the motion block 130 and to assist self moving-down of the multi-stage block 140 during a moving-down motion of the multi-stage block 140 in a state of the engaging step 151a being engaged.

[0044] According to the present invention, the interworking unit 150 serves to sequentially move up or down the motion blocks 130 and the multi-stage blocks 140.

[0045] In an embodiment shown in FIG. 6, the interworking unit includes: a pair of rollers 152 provided on upper and lower parts of one multi-stage block 140; a belt 153 circulated between the rollers 152; a first connection part 154 connecting one side of the belt 153 and upper portions of the motion blocks 130; a support part

155 provided on a lower portion of another multi-stage block 140 adjacent to the multi-stage block 140; a support roller 156 provided on a lower portion of the support part 155; a support rope 157 connected between the upper portion of the multi-stage block 140 and one side of an upper portion of the main body 110 along the support roller 156; and a second connection part 158 connecting one side of the belt 153 and another motion block 130 adjacent to the motion block 130.

[0046] Particularly, the roller 152 serves to allow the belt 153 to be smoothly moved and, when the belt 153 is moved up with a moving-up motion of the motion block 130 and cannot be moved further, the belt 153 is in a stage of being moved up while moving up the multi-stage block 140 in a overlapped manner.

[0047] Further, the support part 155 and the support roller 156 serve to naturally move up another multi-stage block 140 adjacent to the multi-stage block 140 when the multi-stage block 140 is moved up.

[0048] That is, when the multi-stage block 140 is moved up, both a moving-up of the support rope 157 and engagement of the support roller 156 occur at the same time, thereby moving up another multi-stage block 140 adjacent to the multi-stage block 140.

[0049] Particularly, the support part 155 may preferably have a length extending such that, when moved down, the motion block 130 and the multi-stage block 140 are not overlapped with each other as viewed from a front side.

[0050] In the conventional technique, the motion blocks 130 should be connected to the driving unit 120 via ropes 200 to activate a safety door, so the height of the motion block 130 is increased and an operating mechanism of the driving unit 120 becomes complex.

[0051] Unlike the conventional technique, the multi-stage blocks 140 according to the present invention can solve the problem relevant to the height of the motion block 130, efficiently prevent passengers from boarding, and can be freely moved in a vertical direction because the multi-stage block 140 is not connected to the driving unit 120.

[0052] That is, the multi-stage block 140 may preferably be provided by plurality of blocks such that they are sequentially moved up and down during moving-up and down motions of the motion blocks 130 by the operation of the driving unit 120, being overlapped with and separated from the motion blocks 130, respectively.

[0053] Further, the rope 200 is an essential element to prevent passengers from boarding, and may be formed from a metallic core covered with a rubber or synthetic resinous material in order to both prevent corrosion thereof and protect a passenger from a safety accident such as a collision.

[0054] Thus, according to the present invention, as illustrated in FIG. 8, with the operation of the driving unit 120, the multi-stage blocks 140 are moved up and overlapped with the motion blocks during the moving-up of the motion blocks 130, thereby securing height (A) for

which a passenger can pass through and minimizing a moved-up height (B) and an installation height of the lifting mechanism 100, and the multi-stage blocks 140 are sequentially moved down during the moving-down of the motion blocks 130, being separated from the motion blocks 130, thereby preventing passengers from boarding.

[0055] With the configuration in which the motion block 130 and the multi-stage block 140 have a small size and they are overlapped with each other during a moving-up motion thereof, a conventional problem in which the installation height (B) is relatively increased due to a larger size of the motion block 130 can be resolved.

[0056] While the present invention has been described with reference to the embodiments, the scope of present invention is not limited thereto. Of course, the disclosed embodiments and equivalents thereof are included in the scope of the present invention.

Claims

1. A safety door system provided at a platform of a train station, the safety door system comprising a plurality of lifting mechanisms (100) each including:

a main body (110) provided at selected positions from an inlet to an outlet of the platform;
a driving unit (120) provided at an inside or an outside of the main body (110);
a second rotor (123) rotating in response to an operation of the driving unit (120);
a third rotor (125) connected to one side of the second rotor (123) and a diameter of which is larger or smaller than that of the second rotor (123);
a plurality of motion blocks (130) moved up and down along the main body (110) in response to the operation of the driving unit (120) so as to overlap with and be separated from each other, respectively;
a plurality of ropes (200) horizontally connecting the motion blocks (130) to allow a safety door to be opened or closed;
a plurality of multi-stage blocks (140) to which the ropes (200) are horizontally connected so that the multi-stage blocks are moved up and down along the main body (110); and
an interworking unit (150) configured to, when the motion blocks (130) are moved up and down, enable the multi-stage blocks (140) to be moved up and down, thereby overlapping with and being separated from the blocks (130), respectively.

2. The safety door system according to claim 1, wherein a rail (111) is provided in the main body (110) in a vertical direction so as to guide a motion of the motion

blocks (130) and the multi-stage blocks (140).

3. The safety door system according to claim 2, wherein the rail (111) is integrally provided with first support sections (111a) and second support sections (111b) on opposite sides of a middle part and a front part of the rail as viewed in a plan view to guide the motion blocks (130) and the multi-stage blocks (140), respectively.

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4. The safety door system according to claim 1, wherein the driving unit (120) includes a drive motor (121), wherein a first rotor (122) is provided on one side of the drive motor (121) and a fourth rotor (126) is provided on one side of the main body (110), and wherein first and second connectors (124 and 127) are provided and circulated between the first and second rotors (122 and 123) and between the third and fourth rotors (125 and 126) so as to connect one motion block (130) and another motion block (130), respectively.

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5. The safety door system according to claim 4, wherein the second connector (127) is provided with a weight (128) on one side thereof.

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6. The safety door system according to claim 1, wherein the interworking unit (150) includes an interworking section (151) fixed to one side of each of the multi-stage blocks (140) so as to vertically pass through one side of each of the motion blocks (130), and having engaging steps (151a) on a lower portion thereof.

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7. The safety door system according to claim 1, wherein the interworking unit (150) includes:

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a pair of rollers (152) provided on upper and lower parts of one multi-stage block (140);

a belt (153) circulated between the rollers (152);

a first connection part (154) connecting one side of the belt (153) and upper portions of the motion blocks (130);

a support part (155) provided on a lower portion of another multi-stage block (140) adjacent to the multi-stage block (140);

a support roller (156) provided on a lower portion of the support part (155);

a support rope (157) connected between the upper portion of the multi-stage block (140) and one side of an upper portion of the main body (110) along the support roller (156); and

a second connection part (158) connecting one side of the belt (153) and another motion block (130) adjacent to the motion block (130).

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FIG. 1

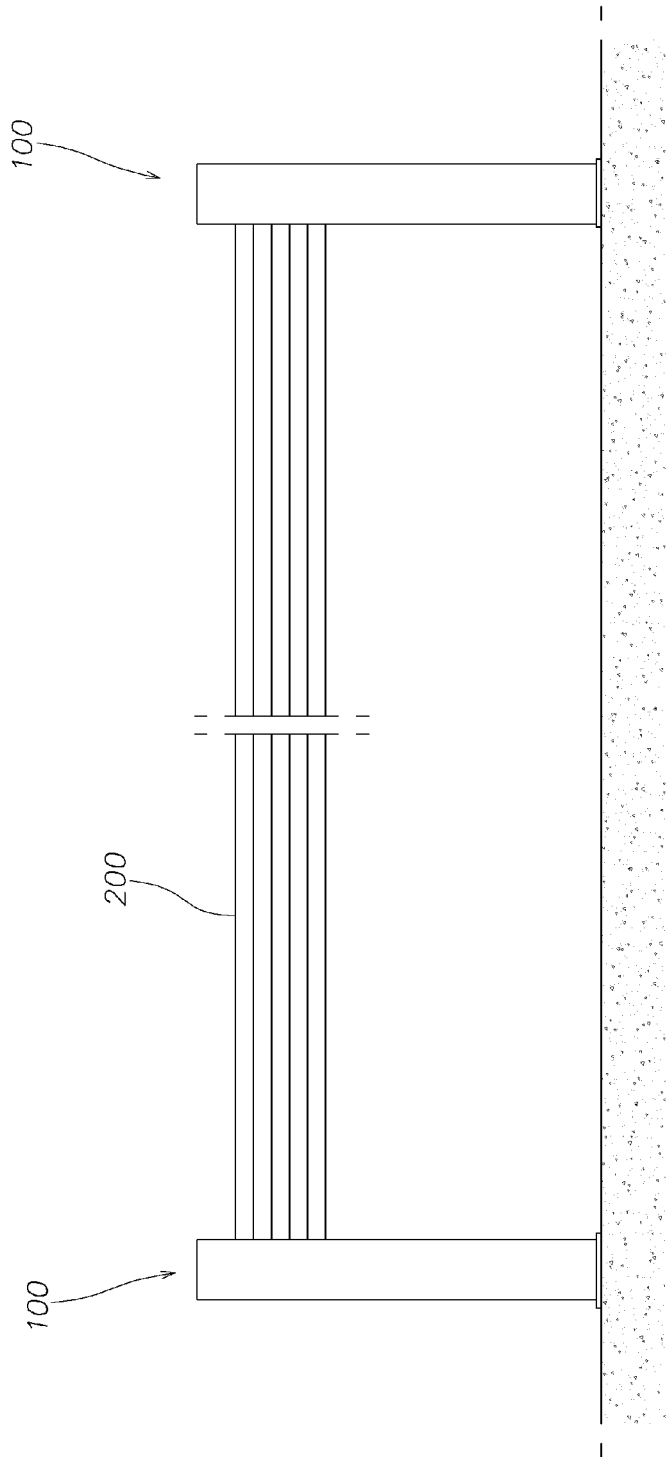


FIG. 2

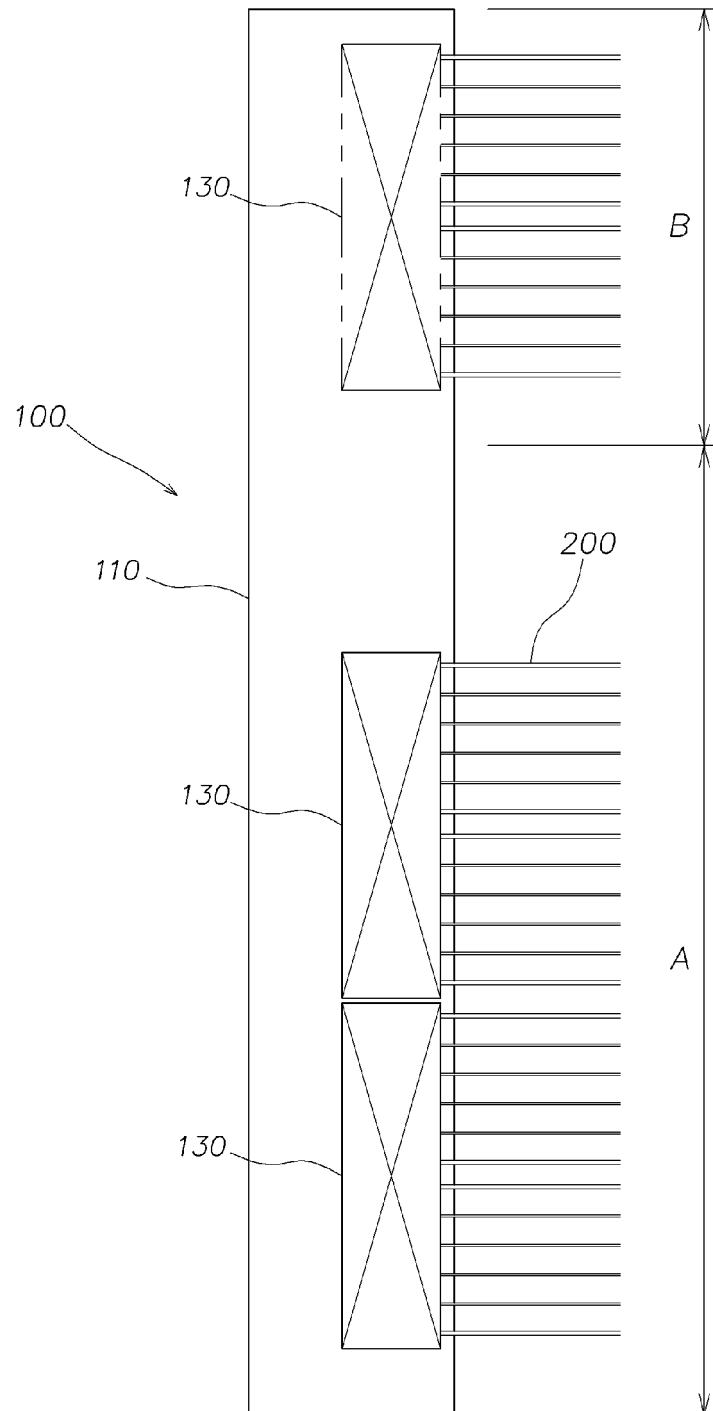


FIG. 3

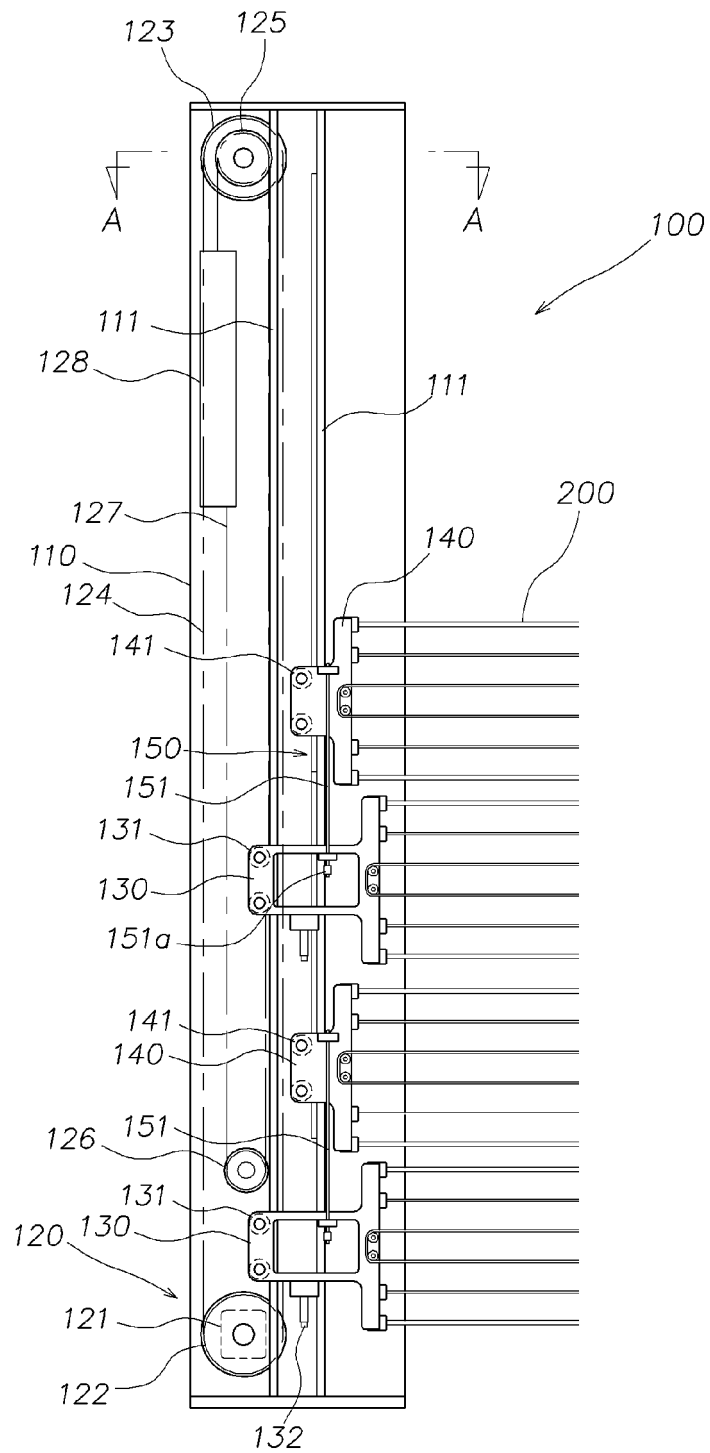


FIG. 4

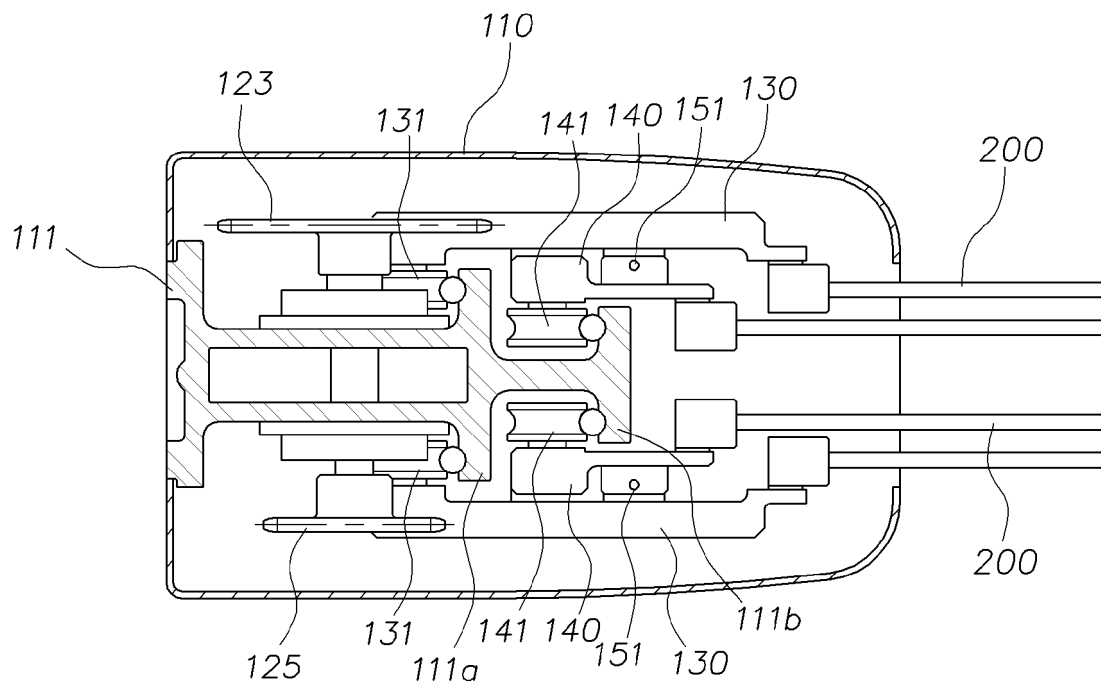


FIG. 5

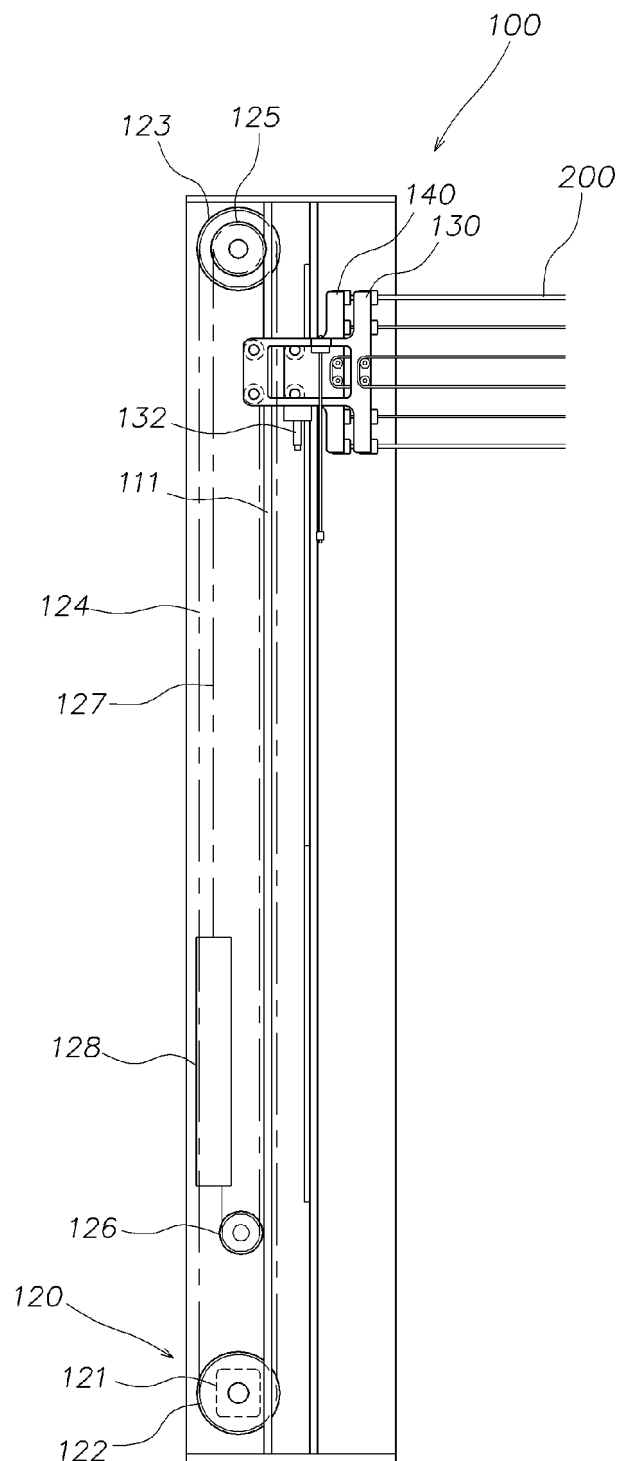


FIG. 6

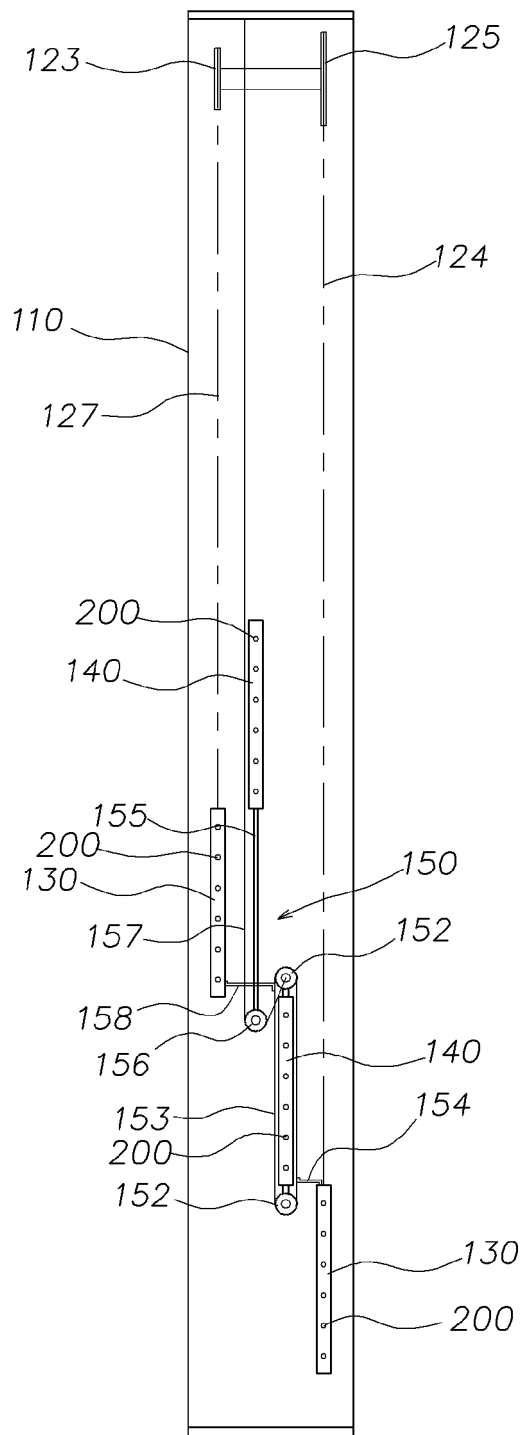


FIG. 7

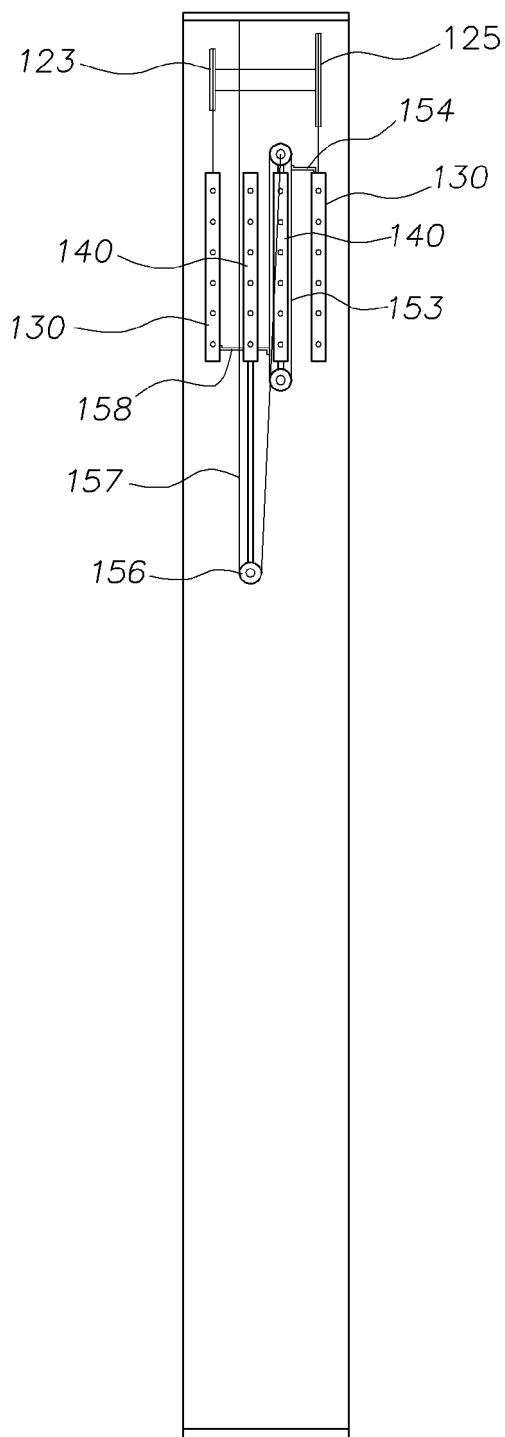
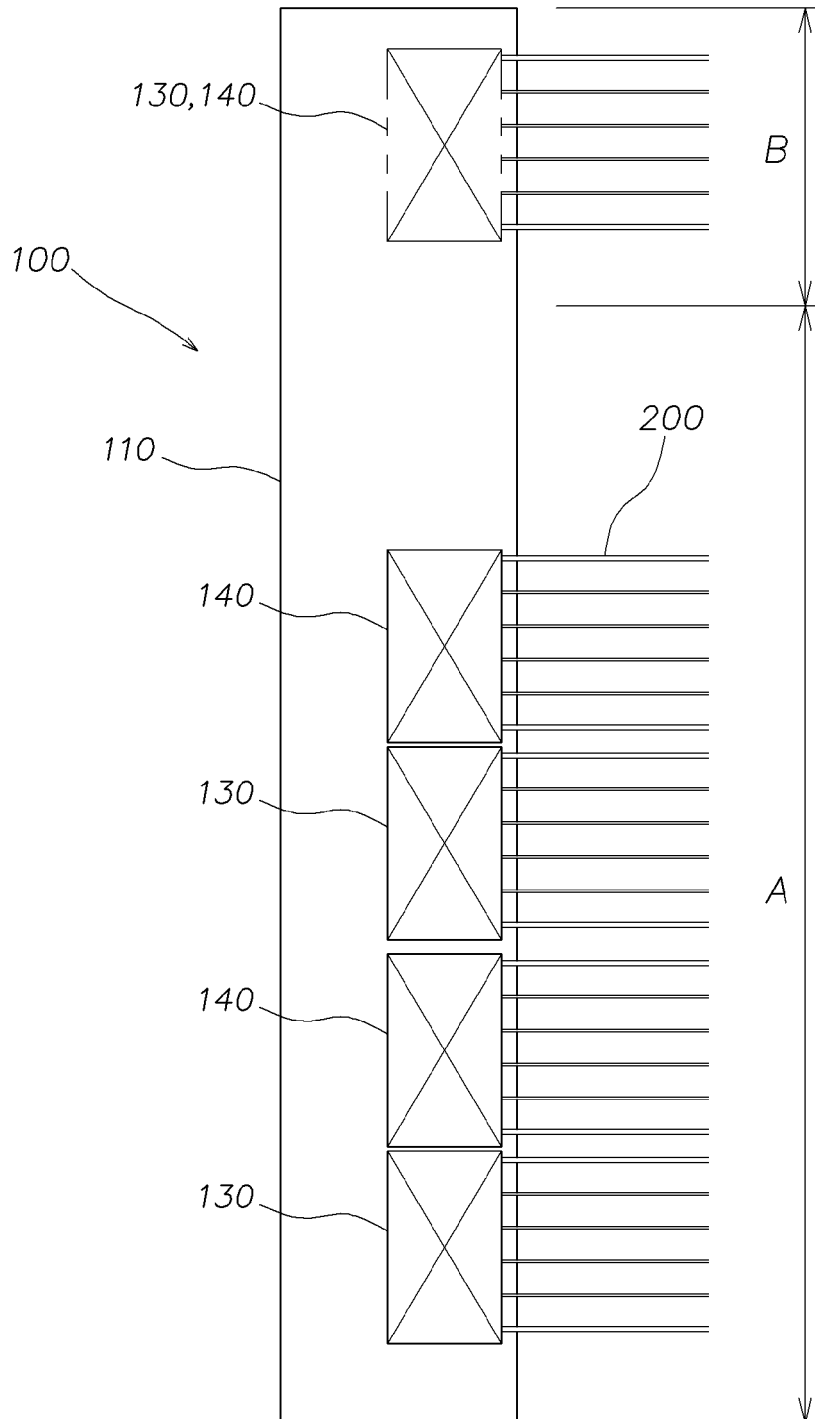


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2014/011879

A. CLASSIFICATION OF SUBJECT MATTER

B61B 1/02(2006.01)i, E01F 1/00(2006.01)i, E01F 13/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B61B 1/02; E01F 15/06; E01F 1/00; E01F 13/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models: IPC as above

Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: going up and down, falling, overlapped, multi-stage, rope

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2013-0101698 A (THE KOREA TRANSPORT INSTITUTE) 16 September 2013 See paragraphs [0034]-[0057] and figures 2, 3, 5	1-2
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A		3-7
X	KR 10-1306648 B1 (THE KOREA TRANSPORT INSTITUTE) 26 September 2013 See paragraphs [0030], [0034] and figure 3	1-2
A		3-7

☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

12 MARCH 2015 (12.03.2015)

Date of mailing of the international search report

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Name and mailing address of the ISA/KR


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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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