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(54) **Automatic auto-sensing flood protection roller shutter with auto-locating reinforced column**

(57) The invention provides an automatic auto-sensing flood protection roller shutter with auto-locating reinforced column, including a door plate, which is composed of a plurality of door panels, which may be disposed in between two frames or contained in a storage device; a casing, which is provided on the top of the door plate and the interior thereof is provided with a motor, a hydraulic pump, an automatic controller, an uninterruptible power system, a storage device, a downward-pressing hydraulic cylinder and a driving device; two frames mounted on two sides of the door plate to dispose a plurality of said door panels; a storage device; a downward-pressing hydraulic cylinder; a sideward-pressing hydraulic cylinder; a water level detector; a reinforced column, which is provided behind the door plate, and a vertical motor provided at the upper end thereof and another horizontal motor provided in the driving device being provided to drive for transverse movement, and the inner chamber at the lower end of the reinforced column being provided with a bolt and a vertical motor; and a driving device.

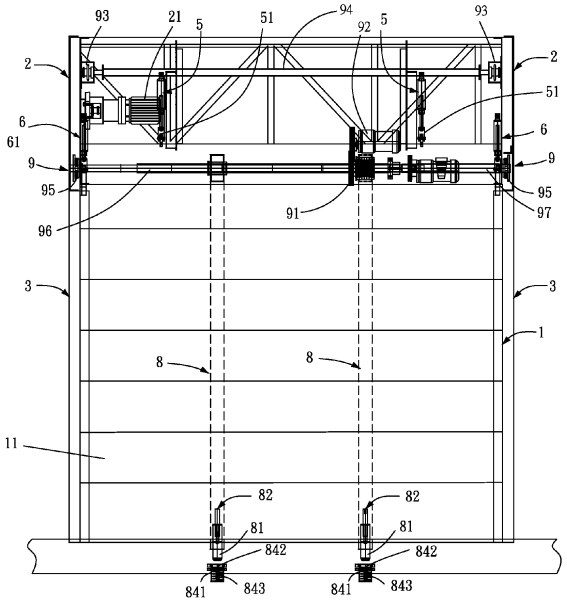

Fig. 1A

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The invention relates to a flood protection roller shutter, particularly to an automatic auto-sensing flood protection roller shutter with a plurality of waterproof door panels, a downward-pressing hydraulic cylinder, a sideward-pressing hydraulic cylinder, at least an auto-locating reinforced column, a water level detector and an infrared detector.

Descriptions of the Related Art

[0002] In the prior art, such as the Taiwan patent titled by "Iron rolling door with escape structure" with patent number 483478, as shown in figure 10, the iron rolling door with escape structure has a rolling door (1), which is formed by spicing multiple rolling door panels (11); two side columns (2), which are provided on both sides of the rolling door (1); characterized in that: said rolling door (1) has one lower rolling panel (11') designed in separation/combination form, assembled by a coupling mechanism (not shown), which controls the separation/combination status, through an upper door panel spicing the upper portion thereof and a lower door panel splicing the lower portion thereof; and the side column (2) is divided by the height of the separation/combination form rolling door panels (11'), the upper section is set as a fixation side column (2) fixed to a wall, the lower section sets pivotally an outer bottom to the ground surface as an active side column (2b), and a coupling piece (not shown) is used to control the combination status of the active column (2b) and the fixation column (2a). However, the iron rolling door of prior art is a design without safe operation protection, is not waterproof, and needs to open and close the iron rolling door manually such that it is incompliant with an facilitate to use criterion, and cannot meet the requirement of an automatic auto-sensing flood protection roller shutter.

[0003] In another prior art, such as the U.S.A. patent titled by "Movable Barrier Operator Having Passive Infrared Detector" with patent number 6737968B1, as shown in figure 11, a ceiling (14) in the garage (12) is mounted with a garage door controller (10), said garage door operator (10) may operate a multipanel garage door (16), said multipanel garage door (16) is provided with multiple rollers (18) on both sides thereof, said rollers (18) roll in tracks (20) on both sides of the garage door (16), said garage door operator (10) contains one head unit (24), one rail assembly (26), one trolley (28) and one arm (30), wherein said arm (30) has one end thereof fixed to an upper portion (32) and the other end thereof fixed to said trolley (28), said trolley (28) slides in said rail assembly (26), said head unit (24) drives said trolley (28) and induces open and close of said multipanel garage door (16). Said iron rolling door of prior art also does not have a safe operating protection device, nor have a design with waterproof and automatic auto-sensing functions.

[0004] Thus, it is what the invention intends to disclose how to create an automatically auto-sensing flood protection roller shutter with auto-locating reinforced column, such that said roller shutter may achieve advantages of safe operation for waterproof and flood protection, enhancement of door panel strength, stable movement of door panel and equipment damage prevention, airtight and waterproof, easy containment, facilitate to use, protection of door panel structure and increase of door panel life, stable movement guiding from reinforced column, waterproof and dustproof of retaining base, automatic closing of cover plate as not used, operation of automatic auto-sensing flood protection roller shutter, auto-locating or manual-locating of reinforced column and strength improvement of water proof structure and flood protection.

SUMMARY OF THE INVENTION

[0005] The major purpose of the invention is to provide an automatic auto-sensing flood protection roller shutter with auto-locating reinforced column such that said roller shutter may achieve the advantages of safe operation for waterproof and flood protection, enhancement of door panel strength, stable movement of door panel and equipment damage prevention, airtight and waterproof, easy containment, facilitate to use, protection of door panel structure and increase of door panel life, stable movement guiding from reinforced column, waterproof and dustproof of retaining base, automatic closing of cover plate as not used, operation of automatic auto-sensing flood protection roller shutter, auto-locating of reinforced column and strength improvement of water proof structure and flood protection.

[0006] To achieve the purpose mentioned above, the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention includes a door plate, which is composed of a plurality of door panels, which may be disposed in between two frames or contained in a storage device; a casing, which is provided on the top of the door plate and the interior thereof is provided with a motor, a hydraulic pump, an automatic controller, an uninterruptible power system, a storage device, a downward-pressing hydraulic cylinder and a driving device; two frames mounted on two sides of the door plate to dispose a plurality of said door panels; a storage device, wherein on each of the left and right walls of which is provided respectively with an overhead rail in a horizontal direction and a guide rail in a vertical direction, each of the guide rails being bonded with a connecting branch rail respectively, and a gear being provided at the shortest distance between each of the overhead rails and each of the guide rails, a chain being engaged with each of the gears, each of the chains may move along with each of the overhead rails and each

of the guide rails; a downward-pressing hydraulic cylinder, which is provided in said casing or frame, a downward-pressing plate being provided at the lower end thereof to press the door plate; a sideward-pressing hydraulic cylinder, which is provided in said frames, a push lever being connected to the lower end thereof; a water level detector, which is provided in underground space as a waterproof system to be turned on automatically once a certain water level is detected; a reinforced column, which is provided behind the door plate, and a vertical motor provided at the upper end thereof and a horizontal motor provided in the driving device being provided to drive for transverse movement, and the inner chamber at the lower end of the reinforced column being provided with a bolt and a vertical motor; and a driving device, which is provided at the lower portion in the casing, a fixation joint and a bearing set being provided at each of the two inner walls thereof, the two ends of a guiding rod being fixed respectively in said two fixation joints, one end of with the guiding screw and one end with the transmission shaft being fixed in each of said two bearing sets, wherein the other end of said guiding screw and the other end of said transmission shaft are butted mutually, and the vertical motor being provided at the upper end of the reinforced column, and the horizontal motor being provided in the driving device.

[0007] In a preferred embodiment of the invention, a hand clamping prevention block piece , a V-shaped groove and a door plate fixation hole are provided at the upper ends of the two lateral surfaces of a plurality of said door panels of the door plate, respectively, a hand clamping prevention block piece, an inverted V-shaped salient angle and two guide wheel anchor blocks are provided at the lower ends of the two lateral surfaces of a plurality of said door panels, respectively, multiple diaphragms are provided in the inner chamber of a plurality of said door panels to form multiple chambers, wherein a surface of said V-shaped groove, a surface of said inverted V-shaped salient angle and a surface between said door panel and said frame can be stuck respectively with a waterproof glue strip, and a surface of the V-shaped groove pressed by said downward-pressing plate of the downward-pressing hydraulic cylinder can also be stuck with a sealing gasket.

[0008] In a preferred embodiment of the invention, the door plate fixation hole of a plurality of said door panels is inserted with a axis shaft drilling at said chain, the guide wheel anchor blocks of a plurality of said door panels are locked up with a guide wheel fixation plate, wherein one end of said axis shaft is sheathed with a bearing set, said guide wheel fixation plate is provided with a sheathed with a guide wheel.

[0009] In a preferred embodiment of the invention, an infrared detector is provided in the frames to detect an abnormal situation as the door plate approaches to the ground surface; or an infrared detector is mounted at the exterior of the roller shutter to detect an abnormal situation as any person, vehicle or object passes.

[0010] In a preferred embodiment of the invention, two stoppers are provided in the storage device to stop a plurality of said door panels, and an opening of said branch rail is provided with a guiding opening expanding outwards, and a fixation board and a chain guard board being installed above the overhead rail of the storage device, wherein the upper edge and the lower edge of the overhead rail are provided with a folding portion.

[0011] In a preferred embodiment of the invention, the downward-pressing hydraulic cylinder or the sideward-pressing hydraulic cylinder may be provided with one or more downward-pressing hydraulic cylinders, and/or provided with one or more sideward-pressing hydraulic cylinders as need.

[0012] In a preferred embodiment of the invention, the top of the reinforced column is provided movable across said guiding rod and guiding screw of the driving device, the bolt thereof may be driven by said vertical motor to be inserted into and fixed to a retaining base, which is provided at a track, and a ball is provided at the bottom thereof to stabilize the transverse movement of said reinforced column on the track, wherein said retaining base is provided with a cover plate and a spring.

[0013] In a preferred embodiment of the invention, said water level detector and said infrared detector perform sensing and detection by sending a signal to said automatic controller, said automatic controller may control open, close or movement of said flood protection roller shutter, downward-pressing hydraulic cylinder, sideward-pressing hydraulic cylinder and reinforced column according to said signal.

[0014] In another preferred embodiment of the invention, an automatically auto-sensing flood protection roller shutter with auto-locating reinforced column is provided, wherein the flood protection roller shutter includes a door plate, which is composed of a plurality of door panels, which may be disposed in between two frames or contained in one storage device; a casing, which is provided at the top of the door plate and is provided with a motor, a hydraulic pump, an automatic controller, an uninterruptible power system and a storage device in the interior thereof; two frames mounted on two sides of the door plate oppositely to dispose a plurality of said door panels; and a storage device, wherein at the left and right inner walls of which are provided respectively with one overhead rail in a horizontal direction thereof, one guide rail in a vertical direction, one end of each guide rail being bonded with one connecting branch rail, and a gear being provided at the shortest distance between each of the overhead rails and each of the guide rails, a chain being engaged with each of the gears, each of the chains may move along with each of the overhead rails and each of the guide rails.

[0015] In a further preferred embodiment of the invention, an automatically auto-sensing flood protection roller shutter with auto-locating reinforced column is provided, wherein the auto-locating reinforced column includes a reinforced column, which is provided behind a door plate

to be driven for transverse movement by a vertical motor provided on the upper end thereon and a horizontal motor provided in the driving device, and said reinforced column having a bolt and a vertical motor provided in an inner chamber at the lower end thereof; and a driving device, which is provided at the lower portion in a casing, a fixation joint and a bearing set being provided at the two inner walls thereof, respectively, two ends of a guiding rod being fixed in said two fixation joints, respectively, one end of a guiding screw and one end of a transmission shaft being fixed in said two bearing sets, respectively, wherein the other end of said guiding screw and the other end of said transmission shaft are butted mutually, and the vertical motor is provided at the upper end of the reinforced column, and the horizontal motor is provided in the driving device; thereby, once a flooding occurs, the automatically auto-sensing flood protection roller shutter may operate the water level detector activating the alarm value over the water level to transmit the signal to the automatic controller, the automatic controller activates the motors, vertical motors and horizontal motors to lower a plurality of the door panels one by one for the flood protection shutter to be self-packed, and moves transversely the reinforced column to the retaining base, the bolt of the reinforced column is pushed automatically into the retaining base to enhance the flood protection strength of the shutter, further, downward pressure and sideward pressure forces of the downward-pressing hydraulic cylinder and the sideward-pressing hydraulic cylinder are applied to secure a plurality of door panels, the ground surface and the reinforced column closely to achieve airtight waterproof, such that the functions and advantages of the automatically auto-sensing flood protection without manual operation may be accomplished.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Figure 1A is a front sectional view showing the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 1B is a lateral sectional view showing the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 2A is a top sectional view showing the driving device of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 2B is an enlarged sectional lateral view of figure 1B according to the invention.

Figure 3 is a solid schematic view showing the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 4 is a lateral sectional view of the door panel of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 5A is a solid appearance view showing the automatic auto-sensing flood protection roller shutter with the auto-locating reinforced column according to the invention.

Figure 5B is a solid appearance decomposition view showing the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 5C is a flat frontal view showing the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 6A is a solid appearance view showing door plate of the automatic auto-sensing flood protection roller shutter with the auto-locating reinforced column according to the invention.

Figure 6B is a solid combination schematic view showing the door plate of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 6C is a solid combination schematic view from another lateral viewing angle showing the door plate of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 6D is a flat combination schematic view from the top viewing angle showing the door plate of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 7A is a first lateral operation view showing access of a plurality of door panels of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column to a casing according to the invention.

Figure 7B is a second lateral operation view showing access of a plurality of door panels of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column to a casing according to the invention.

Figure 7C is a third lateral operation view showing access of a plurality of door panels of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column to a casing according to the invention.

Figure 7D is a fourth lateral operation view showing access of a plurality of door panels of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column to a casing according to the invention.

Figure 7E-1 is a schematic view showing the appearance of a fixation board of a storage device for the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 7E-2 is a schematic view showing an enlarged appearance of figure 7E-1 according to the invention.

Figure 7F-1 is a schematic view showing the appearance of a chain guard board of a storage device for the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 7F-2 is a schematic view showing an enlarged appearance of figure 7F-1 according to the invention.

Figure 7G-1 is a schematic view showing the appearance of a folding portion of an overhead rail of a storage device for the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 7G-2 is a schematic view showing the appearance of figure 7G-1 from another angle.

Figure 8 is a lateral operation view showing a downward-pressing hydraulic cylinder of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 9 is a lateral operation view showing a sideward-pressing hydraulic cylinder of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention.

Figure 10 is an overall structural view showing an iron rolling door with escape structure of a prior art.

Figure 11 is a solid perspective view showing the prior art, Movable Barrier Operator Having Passive Infrared Detector.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0017] For understanding comprehensively the purposes, features and advantages of the invention, the following embodiments in connection with appended drawings are described in detail below.

[0018] Refer to figures 1A and 1B, which are a front sectional view and a lateral sectional view showing an automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to a preferred embodiment of the invention. As shown in the figures, the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention include a door plate 1, which is composed of a plurality of door panels 11, which may be disposed in between two frames 3 or contained in a storage device 4; a casing 2, which is provided on the top of the door plate 1 and the interior thereof is provided with a motor 21, a hydraulic pump 22(as shown in figure 5A), an automatic controller 23(as shown in figure 5A), an uninterruptible power system 24(as shown in figure 5A), a storage device 4, a downward-pressing hydraulic cylinder 5 and a driving device 9; two frames 3 mounted on two sides of the door plate 1 to dispose plurality of said door panels 11; a storage device 4, wherein on each of the left and right walls of which is provided respectively with an overhead rail 41 in a horizontal direction and a guide rail 42 in a vertical direction, each of the guide rails 42 being bonded with a connecting branch rail 43 respectively, and a gear 45 being provided at the shortest distance between each of the overhead rails 41 and each of the guide rails 42, a chain 46 being engaged with each of the gears 45, each of the chains 46 may move along with each of the overhead rails 41 and each of the guide rails 42; a downward-pressing hydraulic cylinder 5, which is provided in said casing 2 or frame 3, a downward-pressing plate 51 being provided at the lower end thereof to press the door plate 1; a sideward-pressing hydraulic cylinder 6, which is provided in said frames 3, a push lever 61 being connected to the lower end thereof; a water level detector 7 (as shown in figure 5A), which is provided in underground space for a waterproof system to be turned on automatically once a certain water level is detected; a reinforced column 8, which is provided behind the door plate 1, and a vertical motor 91 provided at the upper end thereof and a horizontal motor 92 provided in the driving device 9 being provided or manual operation without installation of motor to drive for transverse movement, and the inner chamber at the lower end of the reinforced column 8 being provided with a bolt 81 and a vertical motor 82; and a driving device 9, which is provided at the lower portion in the casing 2, a fixation joint 93 and a bearing set 95 being provided at each of the two inner walls thereof, the two ends of a guiding rod 94 being fixed respectively in said two fixation joints 93 (as shown in figure 2A-1, 2A-2), one end of a guiding screw 96 and one end of a transmission shaft 97 being fixed in

each of said two bearing sets 95, wherein the other end of said guiding screw 96 and the other end of said transmission shaft 97 are butted mutually, and the vertical motor 91 being provided at the upper end of the reinforced column 8, and the horizontal motor 92 being provided in the driving device 9. Moreover, one or more downward-pressing hydraulic cylinders 5 may be arranged in a casing 2 or frame 3 symmetrically or asymmetrically.

[0019] Refer to figure 2A, which is a top sectional view showing an automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to a preferred embodiment of the invention. As shown in the figure, the top of the reinforced column 8 is provided movable across said guiding rod 94 and guiding screw 96 of the driving device 9, and the two inner walls of the driving device 9 are provided respectively with a fixation joint 93 and a bearing set 95, the two ends of a guiding rod 94 are fixed in said two fixation joints 93, respectively, one end of a guiding screw 96 and one end of a transmission shaft 97 are fixed in said two bearing sets 95, wherein the other end of said guiding screw 96 and the other end of said transmission shaft 97 are butted mutually.

[0020] Refer to figure 2B, which an enlarged sectional lateral view of figure 1B showing the driving device of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention. As shown in the figure, the bolt 81 of the reinforced column 8 may be driven by said vertical motor 82 to be inserted into and fixed to a retaining base 841 of reinforced column 8, which is provided at a track 84, and a ball 83 is provided at the bottom thereof to stabilize the transverse movement of said reinforced column 8 on the track 84, wherein said retaining base 841 is provided with a cover plate 842 and a spring 843, after the bolt 81 of said reinforced column 8 is driven by said vertical motor 82, said bolt 81 abuts against the cover plate 842 of said retaining base 841 at first, followed by pushing the cover plate 842 further to the bottom of the retaining base 841 and compressing the spring 843 to finish the insertion and fixation of the bolt 81 of the reinforced column 8 into the retaining base 841; on the contrary, the vertical motor 82 is provided to retract said bolt 81 back in the reinforced column 8, the external force compressing the spring 843 is diminished, the resilience force of the spring 843 pushes the cover plate 842 back to the original covering position to complete the closing action of the retaining base 841 automatically. Therefore, the advantages for waterproof and dustproof of the retaining base 841, automatic closing as said cover plate 842 is not used, and strength enhancement of flood protection may be achieved by the design of the cover plate 842 and the spring 843 of the retaining base 841, the inverted L-shape of the reinforced column 8 and the design of the insertion and fixation of the bolt 81 of the reinforced column 8 into the retaining base 841.

[0021] Refer to figure 3, which is a solid schematic view showing the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention. As shown in the figure, said reinforced column 8 is provided behind the door plate 1, an user may dispose one or multiple reinforced columns 8 behind the door plate 1 to meet a special width requirement of the roller shutter, further, said reinforced column 8 is an inverted L shape, and the top thereof is drilled by the guiding rod 94 and the guiding screw 96 and the bottom thereof is provided with a ball 83 on the track 84(as shown in figure 2B), such that the reinforced column 8 is stabilized with respect to transverse movement behind the door plate 1 and the rocking resulting from the transverse movement of the reinforced column 8 is reduced to achieve the advantage for movement guiding stabilization of said reinforced column 8. Further, the reinforce column 8 also facilitates to reduce the deformation of a plurality of door panels 11 due to flood or water pressure such that the advantage for enhancement of waterproof and flood protection capabilities may be achieved.

[0022] Refer to figure 4, which is a lateral sectional view showing a plurality of door panels of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention. As shown in the figure, a hand clamping prevention block piece 111, a V-shaped groove 112 and a door plate fixation hole 113 are provided at the upper ends of the two lateral surfaces of a plurality of said door panels 11 of the door plate 1(as shown in figure 1A), respectively, a hand clamping prevention block piece 111, an inverted V-shaped salient angle 116 and at least one guide wheel anchor block 115 are provided at the lower ends of the two lateral surfaces of a plurality of said door panels 11, respectively, multiple diaphragms 114 are provided in the inner chamber of a plurality of said door panels to form multiple chambers 1141, wherein the surfaces of said V-shaped groove 112 and said inverted V-shaped salient angle 116 are stuck with waterproof glue strips 1171(as shown in figure 6B) separately, the surfaces between a plurality of said door panels 11 and said frames 3(as shown in figure 1A) are stuck with waterproof glue strips 1172(as shown in figure 7A), and the surface of the V-shaped groove 112 pressed by the downward-pressing plate 51 of the downward-pressing hydraulic cylinder 5 may also be stuck with a sealing gasket 118 (as shown in figure 7A), wherein the advantage for strength enhancement of a plurality of door panels 11 may be achieved by the design of the diaphragms 114 of a plurality of door panels 11.

[0023] Refer to figures 5A, 5B, 5C, which are solid appearance views of figure 1B showing the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to a preferred embodiment of the invention. As shown in the figure, an infrared detector 10 is provided at side-frames 3 to detect abnormal situation as the door plate 1 approaches to the ground surface, the downward-pressing hydraulic cylinder 5 or the sideward-pressing hydraulic cylinder 6 may be pro-

vided with one or more downward-pressing hydraulic cylinders 5, and/or provided with one or more sideward-pressing hydraulic cylinders 6, said water level detector 7 and said infrared detector 10 perform sensing and detection by sending a signal to said automatic controller 23, said automatic controller 23 may control open, close or movement of said flood protection roller shutter, downward-pressing hydraulic cylinder 5, sideward-pressing hydraulic cylinder 6 and reinforced column 8 according to said signal; or an infrared detector 10 is mounted at the exterior of the roller shutter to detect abnormal situations as any person, vehicle or object passes, as the infrared detector 10 detects an abnormal situation, said signal is sent to the automatic controller 23 synchronously, said automatic controller 23 stops lowering said flood protection roller shutter immediately to form a safety protection mechanism.

[0024] Further, after flooding, said water level detector 7 detecting a certain water level sends the signal to the automatic controller 23, the automatic controller 23 activates said motor 21, vertical motor 91 and horizontal motor 92, and moreover, the ball 83 for the reinforced column 8 to slide on the track 84 is provided to guide the transverse movement of the reinforced column 8 to the retaining base 841, the vertical motor 82 of the reinforced column 8 is activated to push the bolt 81 into the retaining base 841 for fixation, a plurality of door panels 11 are further lowered and pushed horizontally for layers to be aligned and fit for the downward-pressing hydraulic cylinder 5 to press downwards and make the downward-pressing plate 51 to press a plurality of door panels 11 with sealing gasket 118 disposed between each panel downwards to be waterproof, subsequently, the sideward-pressing hydraulic cylinder 6 presses downwards to drive the push lever 61 to induce the stop lever 62 to lower, as the stop lever 62 is lowered to a horizontal angle, the pressing plate 63 is stopped to push a plurality of door panels 11 horizontally for the waterproof glue strip 1172 to get more tight and fit therewith such that the advantage of improving airtight and waterproof and disaster prevention may be achieved.

[0025] In continuation, after the automatic controller 23 activates said motor 21, vertical motor 91 and horizontal motor 92, a plurality of door panels 11 of the door plate 1 can also be lowered at first and pushed horizontally for the layers to be aligned and fit, for the downward-pressing hydraulic cylinder 5 to press downwards for the downward-pressing plate 51 to press a plurality of door panels 11 downwards to get waterproof, subsequently, the sideward-pressing hydraulic cylinder 6 presses downwards to drive the push lever 61 to induce the stop lever 62 to lower, as the stop lever 62 is lowered to a horizontal angle, the pressing plate 63 is stopped to push a plurality of door panels 11 horizontally, followed by providing the ball 83 of said reinforced column 8 sliding on the track 84 to guide the reinforced column 8 to move transversely to the retaining base 841, the vertical motor 82 of the reinforced column 8 is activated to push the bolt 81 into the retaining base 841 for fixation to complete the procedure of waterproof and flood protection.

[0026] On the contrary, after the flooding alert is released, said water level detector 7 sends again the signal to the automatic controller 23, the automatic controller 23 may provide at first the vertical motor 82 of the reinforced column 8 to retract the bolt 81 from the retaining base 841, after that, the ball 83 thereof sliding on the track 84 is provided to guide the reinforced column 8 to move transversely back to the original position, followed by recover the positions of the downward-pressing hydraulic cylinder 5 and the sideward-pressing hydraulic cylinder 6, a plurality of door panels 11 are withdrawn in the storage device 4; or, the automatic controller 23 recovers the positions of the downward-pressing hydraulic cylinder 5 and the sideward-pressing hydraulic cylinder 6, a plurality of door panels 11 are withdrawn in the storage device 4, followed by providing the vertical motor 82 of the reinforced column 8 to withdraw the bolt 81 from the retaining base 841, after that, the ball 83 thereof sliding on the track 84 is adapted to guide the reinforced column 8 move transversely back to the original position to complete the recovery procedure of the automatically auto-sensing flood protection roller shutter with auto-locating reinforced column 8. Therefore, with the sensing and detection of the above water level detector 7 and the infrared detector 10 and the signal control of the automatic controller 23, the advantage for operation of the automatic auto-sensing flood protection roller shutter and auto-locating of the reinforced column 8 is achieved.

[0027] Refer to figures 6A, 6B, 6C and 6D, which are a solid appearance view, a solid combination schematic view, a solid combination schematic view from another lateral viewing angle and a plan combination schematic view from the top viewing angle showing the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to a preferred embodiment of the invention. As shown in the figures, a door plate fixation hole 113 of said door panels 11 (as shown in figure 4) is inserted with one end of a first axis shaft 12, the other end of which drills said chain 46 and sheathes a bearing set 13; the guide wheel anchor block 115 of said door panels 11 is locked up with a guide wheel fixation plate 14, which is sheathed with a guide wheel 15.

[0028] Refer to figures 7A, 7B, 7C and 7D, which are a first, a second, a third and a fourth lateral operation views showing access of a plurality of door panels of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column to a casing. As shown in the figures, the opening of said branch rail 43 is provided with a guiding opening 44 expanding outwards, as a plurality of door panels 11 desired to be overlapped in a line to form a waterproof shutter are folded in the storage device 4 of the casing 2, the gear 45 may be driven by the motor 21 to rotate at first for the chain 46 to move towards the storage device 4 under the driving of the gear 45, such that a plurality of door panels 11 overlapped originally may move along with the guide rail

42 sequentially towards the storage device 4 as the chain 46 contained in the guide rail 42 moves, while at the same time the bearing set 13 of one end of a plurality of door panels 11 connected pivotally to the chain 46 moves as the chain 46 moves, as one end, having the guide wheel 15, of a plurality of door panels 11 moves to the intersection formed by connecting the branch rail 43 and the guide rail 42, it may be diverged by a projection at the intersection to move along with the branch rail 43 towards the storage device 4, such that a plurality of said door panels 11 may be separated actually as the gear 45 moves towards the overhead rail 41, and the inclination of the overhead rail 41 may be used for the bearing set 13 to moves towards the overhead rail 41 smoothly and suspended on the overhead rail 41 to complete that the storage device 4 disposes and folds a plurality of door panels 11 automatically to achieve the advantages of convenient containment and facilitate to use.

[0029] On the contrary, as a plurality of door panels 11 in the casing 2 are desired to move external to the storage device 4, the motor 21 may be used to drive the gear 45 to rotate at first for the chain 46 to move sequentially from the overhead rail 41 to the guide rail 42 under the driving of the gear 45, such that a plurality of door panels 11 aligned together originally moves external to the storage device 4 sequentially along with the guide rail 42 as the chain 46 in the guide rail 42 moves, while at the same time the bearing set 13 of a plurality of said door panels 11 moves as the chain 46, the guiding of the guide wheel 15 at the guiding opening 44 is adapted further to move downwards in the branch rail 43, for a plurality of said door panels to be in an overlapping shape under the driving of the guide rail 42 and the chain 46, such that a plurality of door panels 11 are disposed in the frames 3 to form a waterproof shutter. Therefore, with the design of above bearing set 13, guide rail 42 and branch rail 43, the rocking and inclined movement may be avoided as a plurality of door panels are raised and lowered to achieve the advantages for stable movement and reduction of equipment damage.

[0030] Moreover, two stoppers 47 are provided in the storage device 4 to stop a plurality of said door panels 11. With the design of stoppers 47, the occurrence of damage of a plurality of door panels caused by collision may be reduced to achieve the advantages for protection of door panel 11 structure and increase of door panel 11 life. Besides, because a certain gap exists wherever the chain 46 is connected pivotally with each of a plurality of door panels 11, as a plurality of said door panels 11 moves inwards to or outwards from the casing 2 along with the chain 46, a plurality of said door panels 11 may overlap mutually by the hand clamping prevention block piece 111 (as shown in figure 4) provided therewith. Therefore, there is no separation between a plurality of door panels 11 to achieve the advantage for safe operation of waterproof and flood protection. Also, as shown in figures 7E-1, 7E-2, 7F-1 and 7F-2, which show a schematic view of an appearance for a fixation board of a storage device in a preferred embodiment of the invention, a schematic view of an enlarged appearance of figure 7E-1, a schematic view of an appearance for a chain guard board of the storage device and a schematic view of an enlarged view of figure 7F-1, wherein the overhead rail 41 of the storage device 4 is provided with a fixation board 481 and a chain guard board 482 thereon, the fixation board 481 allows the overhead rail 41 to form a fixed space, such that the bearing set 13 and the door panel 11 may move along with the overhead rail 41 more stably and freely without deflection from the overhead rail 41. Further, the chain guard board 482 may prevent links of the chain 46 from getting constricted and stuck tightly as the door panel 11 is shut, closed such that the door panel 11 is not raised, lowered smoothly. Hence, the additional installment of the chain guard board 482 achieves the advantage that the chain 46 is forced to be spread as the door panel 11 is lowered for the door panels 11 to be raised, lowered more smoothly. Besides, As shown in figures 7G-1 and 7G-2, which are schematic views showing the appearance for two of the folding portions of the overhead rail of the storage device, wherein the upper edge and the lower edge of the overhead rail 41 of the storage device 4 are disposed with a folding portion 411, respectively, an internal space formed by the overhead rail 41 and the two folding portions 411 contains the flange 131 of the bearing set 13. With the installment of the folding portion 411 and the flange 131, the bearing set 13 may slide within the overhead rail 41 more stably to achieve the advantage that the bearing set 13 is kept from being detached and that the bearing set 13 is contained within the overhead rail 41.

[0031] Refer to figure 8, which is a lateral operation view showing a downward-pressing hydraulic cylinder of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to a preferred embodiment of the invention. As shown in the figure, after a plurality of door panels 11 are lowered and pushed horizontally for layers to be aligned and fit, the downward-pressing hydraulic cylinder 5 is pressed downwards for the downward-pressing plate 51 to press a plurality of door panels 11 with sealing gasket 118 disposed between each panel downwards to be waterproof to achieve the advantages for increase of airtight and waterproof and disaster prevention.

[0032] Refer to figure 9, which is a lateral operation view showing a sideward-pressing hydraulic cylinder of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to a preferred embodiment of the invention. As shown in the figure, after a plurality of door panels 11 are lowered and pushed horizontally for layers to be aligned and fit, the downward-pressing hydraulic cylinder 5 is pressed downwards for the downward-pressing plate 51 to press a plurality of door panels 11 with sealing gasket 118 disposed between each panel downwards to be waterproof (as shown in figure 8), subsequently, the sideward-pressing hydraulic cylinder 6 presses downwards to drive the

push lever 61 to induce the stop lever 62 to lower, as the stop lever 62 is lowered to a horizontal angle, the pressing plate 63 is stopped to push horizontally a plurality of door panels 11 for the waterproof glue strip 1172 to be more tight and fit therewith, such that the advantages for increase of airtight and waterproof and disaster prevention are achieved.

[0033] What mentioned above is one preferred embodiment of the invention. Besides, a second embodiment and a third embodiment of the automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention are described as below.

[0034] Refer to figures 1A and 1B, which are a second embodiment for an automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention, wherein the flood protection roller shutter includes a door plate 1, which is composed of a plurality of door panels 11, which may be disposed in between two frames 3 or contained in one storage device 4; a casing 2, which is provided at the top of the door plate 1 and is provided with a motor 21, a hydraulic pump 22(as shown in figure 5A), an automatic controller 23(as shown in figure 5A), an uninterruptible power system 24(as shown in figure 5A) and a storage device 4 in the interior thereof; two frames 3 mounted on two sides of the door plate 1 oppositely to dispose a plurality of said door panels 11; and a storage device 4, wherein at the left and right inner walls of which are provided respectively with one overhead rail 41 in a horizontal direction thereof, one guide rail 42 in a vertical direction, one end of each guide rail 42 being bonded with one connecting branch rail 43, and a gear 45 being provided at the shortest distance between each of the overhead rails 41 and each of the guide rails 42, a chain 46 being engaged with each of the gears 45, each of the chains 46 may move along with each of the overhead rails 41 and each of the guide rails 42.

[0035] Refer to figures 1A and 1B, which are a third embodiment for an automatic auto-sensing flood protection roller shutter with auto-locating reinforced column according to the invention, wherein the auto-locating reinforced column includes a reinforced column 8, which is provided behind a door plate 1 to be driven for transverse movement by a vertical motor 91 provided on the upper end thereon and a horizontal motor 92 provided in the driving device 9, and said reinforced column 8 having a bolt 81 and a vertical motor 82 provided in an inner chamber at the lower end thereof; and a driving device 9, which is provided at the lower portion in a casing 2, a fixation joint 93 and a bearing set 95 being provided at the two inner walls thereof, respectively, two ends of a guiding rod 94 being fixed in said two fixation joints 93, respectively (as shown in figure 2A-1, 2A-2), one end of a guiding screw 96 and one end of a transmission shaft 97 being fixed in said two bearing sets 95, respectively, wherein the other end of said guiding screw 96 and the other end of said transmission shaft 97 are butted mutually, and the vertical motor 91 is provided at the upper end of the reinforced column 8, and the horizontal motor 92 is provided in the driving device 9.

[0036] In summary, from the content disclosed above, the invention does be capable of achieving the expected creation purpose. By said automatic auto-sensing flood protection roller shutter with auto-locating reinforced column, said roller shutter achieves the advantages of safe operation for waterproof and flood protection, strength enhancement for a plurality of door panels, stable movement for a plurality of door panels and equipment protection from damage, being airtight with waterproof, convenient containment, easy to use, protection of door panel structure and increase of door panel life, guidance of stable movement of reinforced column, waterproof and dustproof of retaining base, automatic closing of cover plate as not used, operation of automatic auto-sensing flood protection roller shutter, auto-locating of reinforced column and strength enhancement of waterproof and flood protection; thereby, as the flooding occurs, the automatically auto-sensing flood protection roller shutter of the invention may provide the water level detector activating the alarm value over the water level to transmit the signal to the automatic controller, the automatic controller activates the motors, vertical motors and horizontal motors to lower a plurality of door panels one by one for the flood protection shutter to be self-packed, and moves transversely the reinforced column to the retaining base, the bolt of the reinforced column is pushed automatically into the retaining base to enhance the flood protection strength of the shutter, further, downward pressure and sideward pressure forces of the downward-pressing hydraulic cylinder and the sideward-pressing hydraulic cylinder are applied to secure a plurality of door panels, the ground surface and the reinforced column closely and form airtight and waterproof, such that the functions and advantages of automatically auto-sensing flood protection without manual operation may be accomplished.

REFERENCE NUMERALS IN DRAWINGS

Reference numerals used herein are as follows:

[0037]

1	door plate
11	door panel
111	hand clamping prevention block piece
112	V-shaped groove
113	door plate fixation hole
114	diaphragm
1141	chamber
115	guide wheel anchor block
116	inverted V-shaped salient angle
1171	waterproof glue strip
1172	waterproof glue strip
118	sealing gasket
12	axis shaft

13	bearing set
131	flange
14	guide wheel fixation plate
15	guide wheel
10	infrared detector
2	casing
21	motor
22	hydraulic pump
23	automatic controller
24	uninterruptible power system
3	frame
4	storage device
41	overhead rail
411	folding portion
42	guide rail
43	branch rail
44	guiding opening
45	gear
46	chain
47	stopper
481	fixation board
482	chain guard board
5	downward-pressing hydraulic cylinder
51	downward-pressing plate
6	sideward-pressing hydraulic cylinder
61	push lever
62	stop lever
63	pressing plate
7	water level detector
8	reinforced column
81	bolt
82	vertical motor
83	ball
84	track
841	retaining base
842	cover plate
843	spring
9	driving device
91	vertical motor
92	horizontal motor
93	fixation joint
94	guiding rod
95	bearing set
96	guiding screw
97	transmission shaft

Claims

1. An automatically auto-sensing flood protection roller shutter with auto-locating reinforced column, including:

a door plate, which is composed of a plurality of door panels, which can be disposed in between two frames or contained in a storage device;
a casing, which is provided above the door plate and is provided with a motor, a hydraulic pump, an automatic controller, an uninterruptible power system, a storage device, a downward-pressing hydraulic cylinder and a driving device in the interior thereof;
two frames mounted on two sides of the door plate oppositely to dispose a plurality of said door panels;
a storage device, wherein at left and right inner walls of which are provided respectively with an overhead rail in a horizontal direction, a guide rail in a vertical direction, one end of each of the guide rails being bonded respectively with a connecting branch rail, and a gear being provided respectively at the shortest distance between each of the overhead rails and each of the guide rails, a chain being engaged with each of the gears, each of the chains can move along with each of the overhead rails and each of the guide rails;
a downward-pressing hydraulic cylinder, which is provided in said casing or frame, a downward-pressing plate being provided at the lower end thereof to press the door plate;
a sideward-pressing hydraulic cylinder, which is provided in said frames, a push lever being connected to the lower end thereof;
a water level detector, which is provided in underground space for a waterproof system to be turned on automatically once a certain water level is detected;
a reinforced column, which is provided behind the door plate, and a vertical motor provided at the upper end thereof and a horizontal motor provided in the driving device being provided or manual operation to drive for transverse movement, and the inner chamber at the lower end of the reinforced column being provided with a bolt and a vertical motor; and
a driving device, which is provided at the lower portion in the casing, a fixation joint and a bearing set being provided at each of the two inner walls thereof, the two ends of a guiding rod being fixed respectively in said two fixation joints, one end of a guiding screw and one end of a transmission shaft being fixed in said two bearing sets, wherein the other end of said guiding screw and the other end of said transmission shaft are butted mutually, and the vertical motor being provided at the upper end of the reinforced column, and the horizontal motor being provided in the driving device.

2. The automatically auto-sensing flood protection roller shutter with auto-locating reinforced column of claim 1, wherein, a hand clamping prevention block piece, a V-shaped groove and a door plate fixation hole are provided at the upper ends of the two lateral surfaces of a plurality of said door panels of the door

plate, respectively, a hand clamping prevention block piece, an inverted V-shaped salient angle and two guide wheel anchor blocks are provided at the lower ends of the two lateral surfaces of a plurality of said door panels, respectively, multiple diaphragms are provided in the inner chamber of a plurality of said door panels to form multiple chambers, wherein a surface of said V-shaped groove, a surface of said inverted V-shaped salient angle and a surface between said door panel and said frame can be stuck respectively with a waterproof glue strip, and a surface of the V-shaped groove pressed by said downward-pressing plate of the downward-pressing hydraulic cylinder can also be stuck with a sealing gasket.

3. The automatically auto-sensing flood protection roller shutter with auto-locating reinforced column of claim 2, wherein, a door plate fixation hole of a plurality of said door panels is inserted with one end of a axis shaft, the other end of which drills said chain and sheathes a bearing set; the anchor blocks of a plurality of said door panels are locked up with a guide wheel fixation plate, which is sheathed with a guide wheel.

4. The automatically auto-sensing flood protection roller shutter with auto-locating reinforced column of claim 1, wherein, an infrared detector is provided at the side frames to detect an abnormal situation as the door plate approaches to the ground surface; or an infrared detector is mounted at the exterior of the roller shutter to detect an abnormal situation as any person, vehicle or object passes.

5. The automatically auto-sensing flood protection roller shutter with auto-locating reinforced column of claim 1, wherein, two stoppers are provided in the storage device to stop a plurality of said door panels, and an opening of said branch rail is provided with a guiding opening expanding outwards, and a fixation board and a chain guard board being installed above the overhead rail of the storage device, wherein the upper edge and the lower edge of the overhead rail are provided with a folding portion.

6. The automatically auto-sensing flood protection roller shutter with auto-locating reinforced column of claim 1, wherein, the downward-pressing hydraulic cylinder or the sideward-pressing hydraulic cylinder may be provided with one or more downward-pressing hydraulic cylinders, and/or provided with one or more sideward-pressing hydraulic cylinders as need.

7. The automatically auto-sensing flood protection roller shutter with auto-locating reinforced column of claim 1, wherein, the top of the reinforced column is provided movable across said guiding rod and guiding screw of the driving device, the bolt thereof may be driven by said vertical motor to be inserted into and fixed to a retaining base, which is provided at a track, and a ball is provided at the bottom thereof to stabilize the transverse movement of said reinforced column on the track, wherein said retaining base is provided with a cover plate and a spring.

8. The automatically auto-sensing flood protection roller shutter with auto-locating reinforced column of claim 1, wherein, said water level detector and an infrared detector perform sensing and detection and send a signal to said automatic controller, said automatic controller may control open, close or movement of said flood protection roller shutter, downward-pressing hydraulic cylinder, sideward-pressing hydraulic cylinder and reinforced column according to said signal.

9. An automatically auto-sensing flood protection roller shutter with auto-locating reinforced column, wherein the flood protection roller shutter includes:

a door plate, which is composed of a plurality of door panels, which may be disposed in between two frames or contained in one storage device;
a casing, which is provided at the top of the door plate and is provided with a motor, a hydraulic pump, an automatic controller, an uninterruptible power system and a storage device in the interior thereof;
two frames mounted on two sides of the door plate oppositely to dispose a plurality of said door panels; and
a storage device, wherein at the left and right inner walls of which are provided respectively with one overhead rail in a horizontal direction thereof, one guide rail in a vertical direction, one end of each guide rail being bonded with one connecting branch rail, and a gear being provided at the shortest distance between each of the overhead rails and each of the guide rails, a chain being engaged with each of the gears, each of the chains may move along with each of the overhead rails and each of the guide rails.

10. An automatically auto-sensing flood protection roller shutter with auto-locating reinforced column, wherein the auto-locating reinforced column includes:

a reinforced column, which is provided behind a door plate to be driven for transverse movement by a vertical motor provided on the upper end thereon and a horizontal motor provided in the driving device, and said reinforced column having a bolt and a vertical motor provided in an inner chamber at the lower end thereof; and

a driving device, which is provided at the lower portion in a casing, a fixation joint and a bearing set being provided at the two inner walls thereof, respectively, two ends of a guiding rod being fixed in said two fixation joints, respectively, one end of a guiding screw and one end of a transmission shaft being fixed in said two bearing sets, respectively, wherein the other end of said guiding screw and the other end of said transmission shaft are butted mutually, and the vertical motor is provided at the upper end of the reinforced column, and the horizontal motor is provided in the driving device.

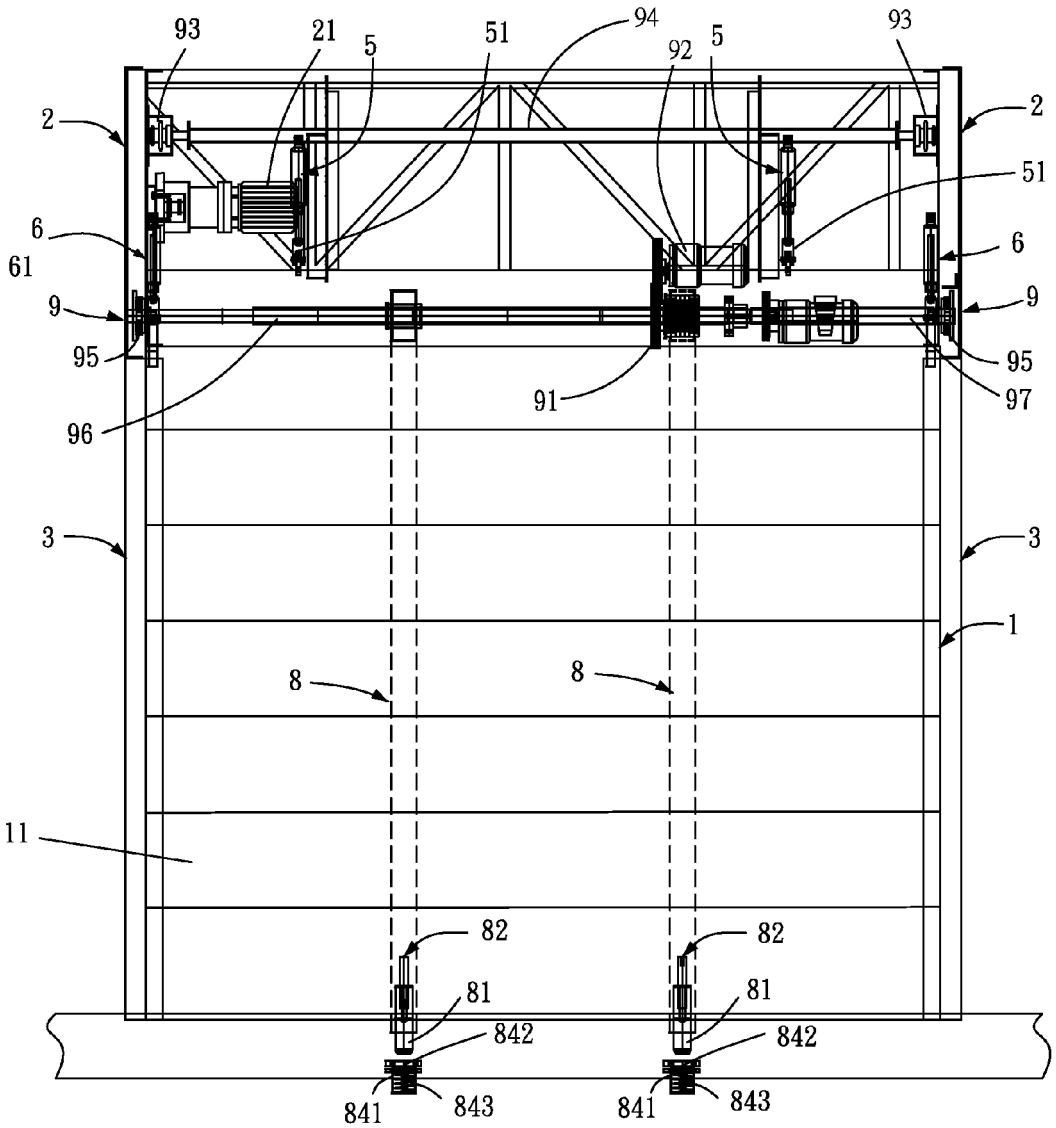
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Fig. 1A

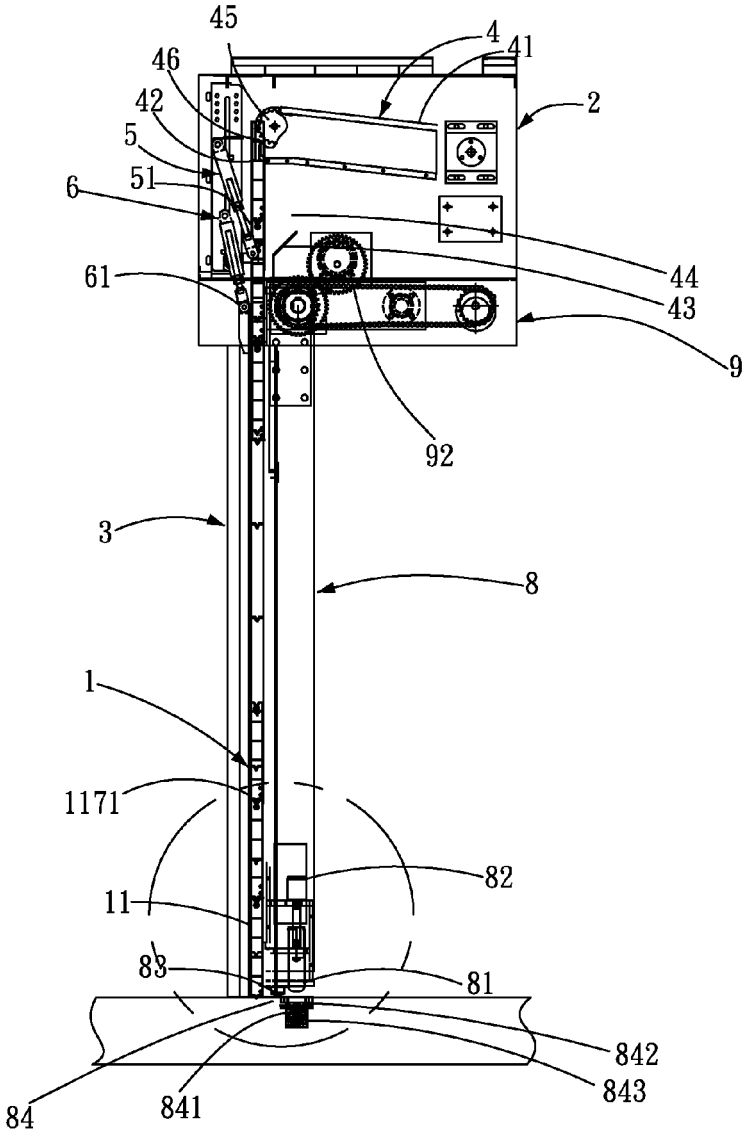

Fig. 1B

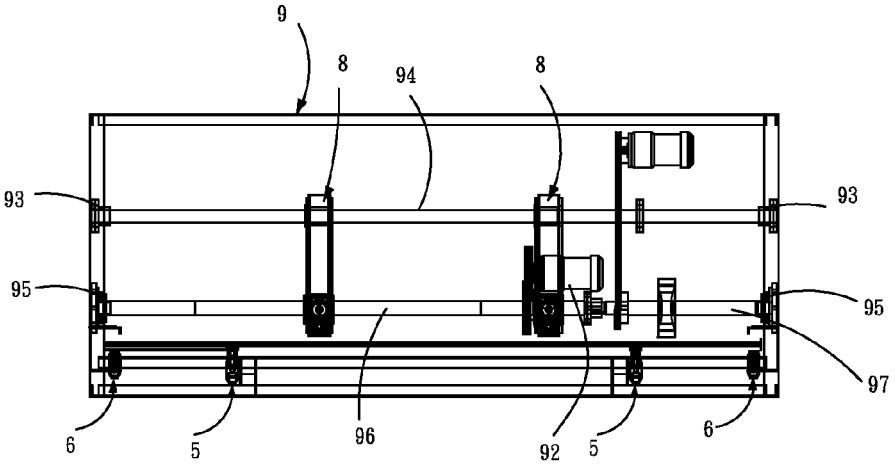

Fig. 2A-1

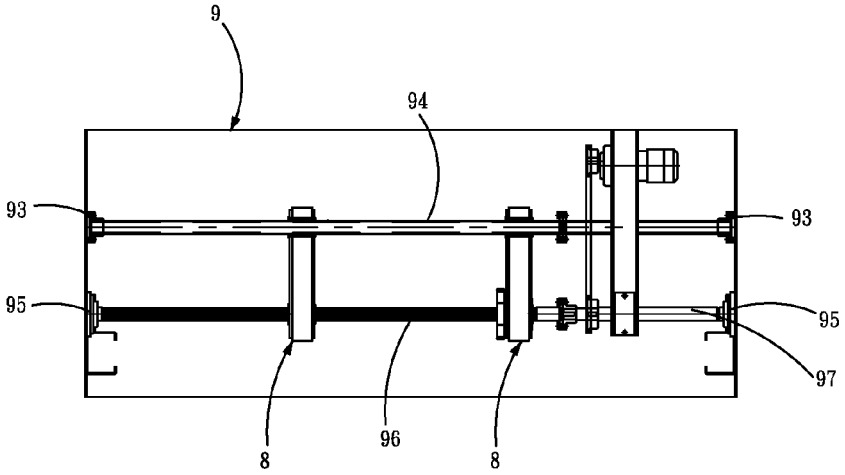

Fig. 2A-2

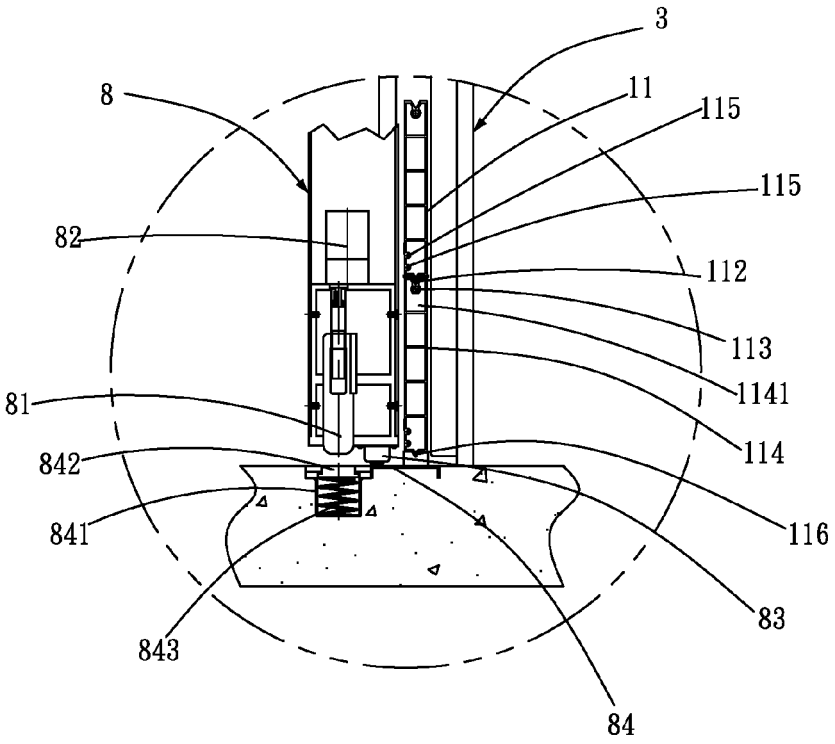

Fig. 2B

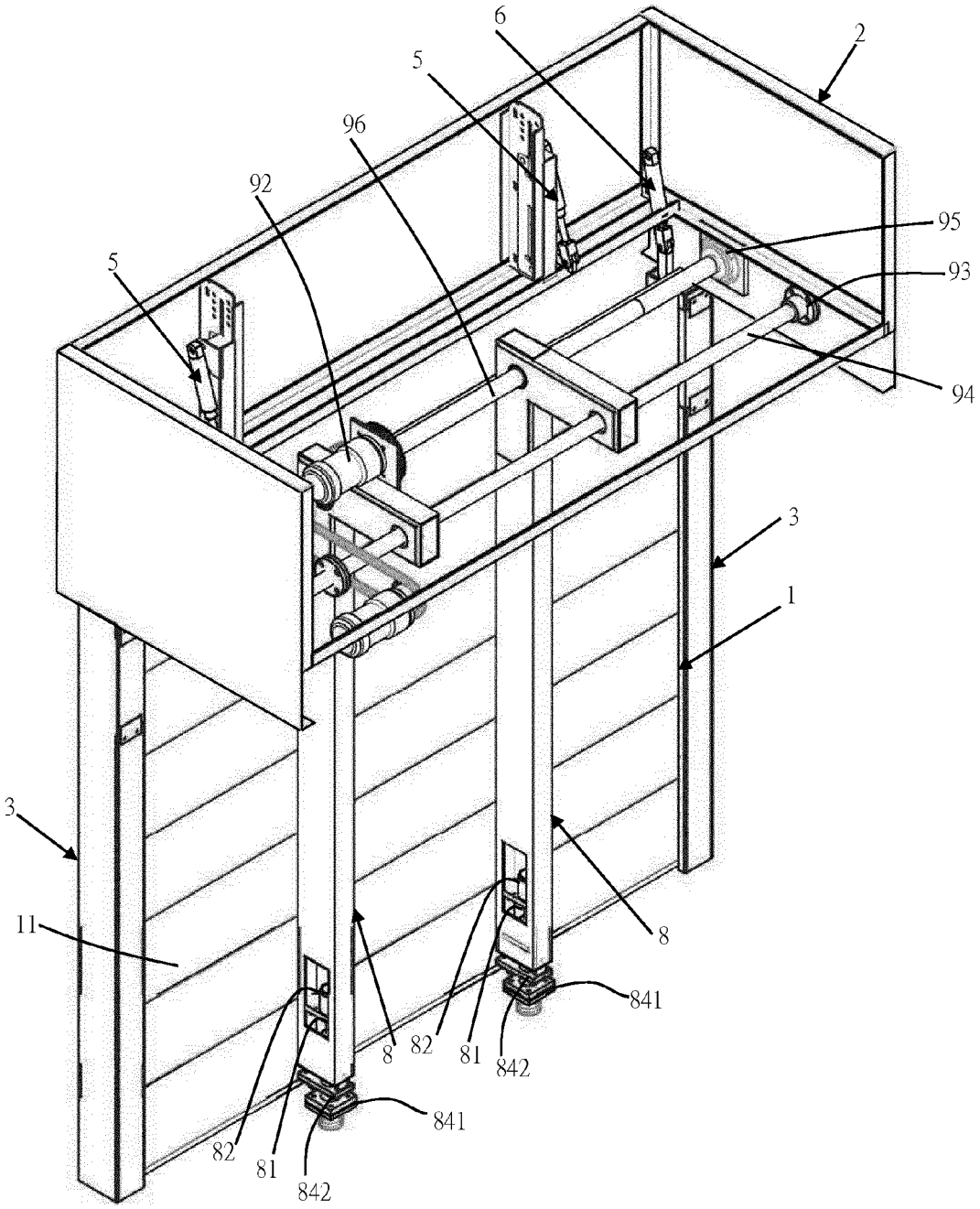

Fig. 3

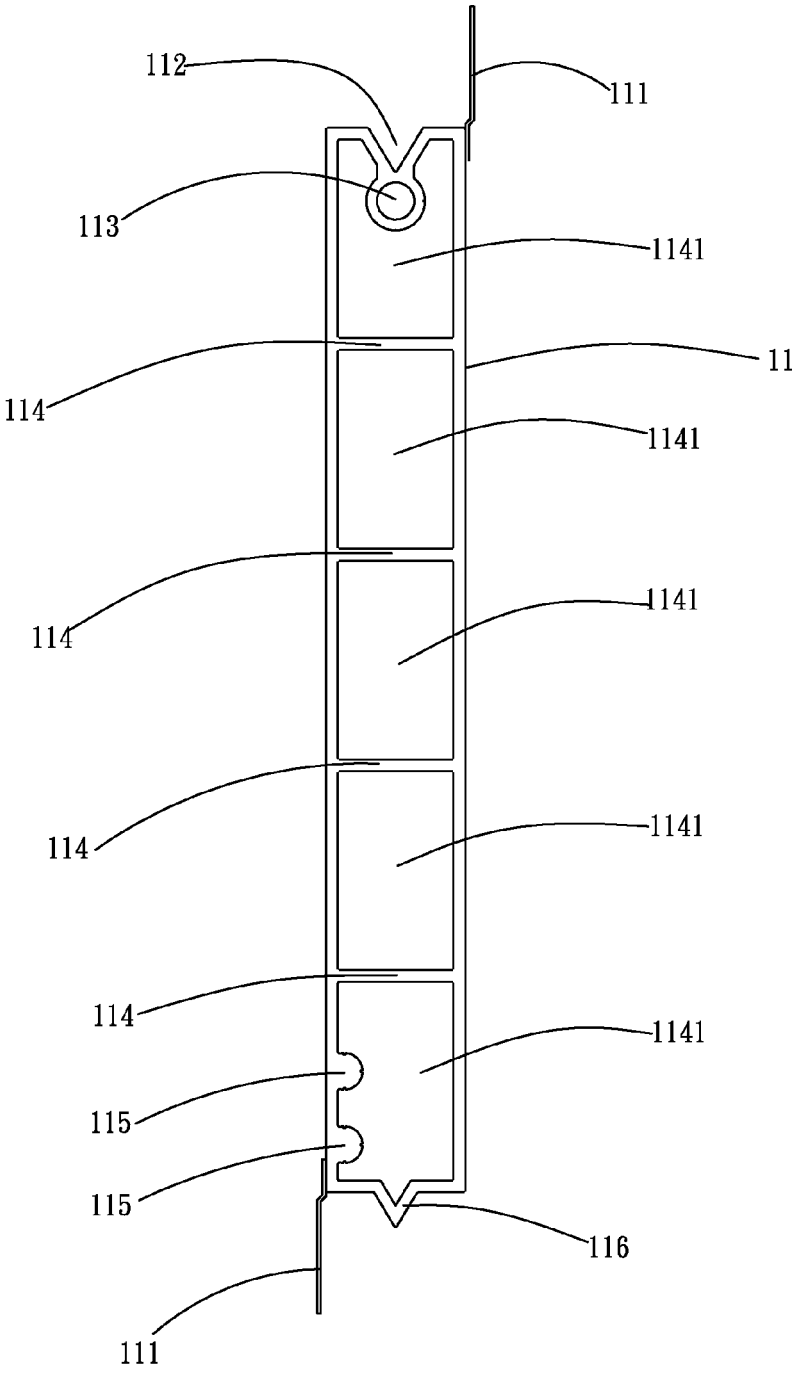
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Fig. 4

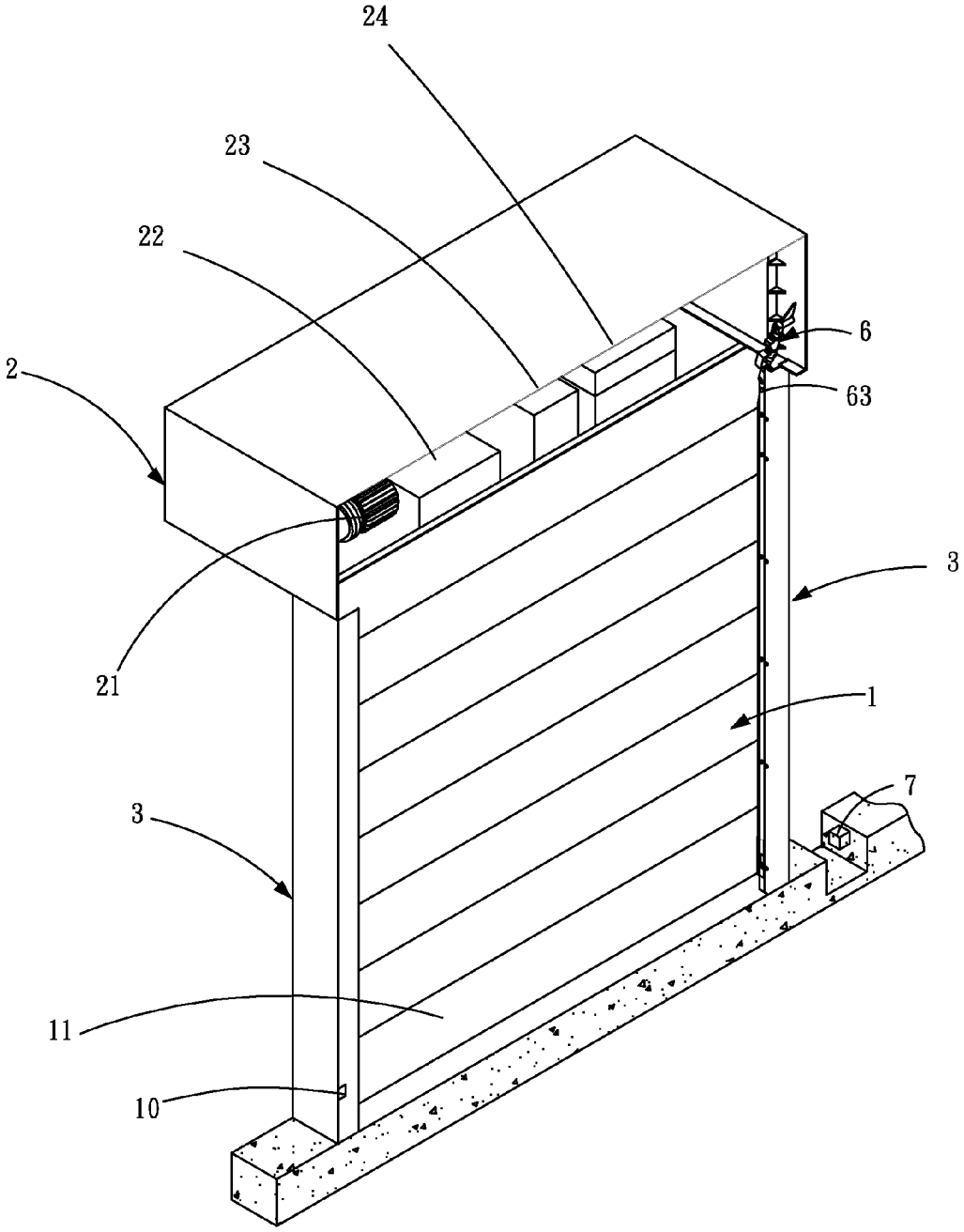

Fig. 5A

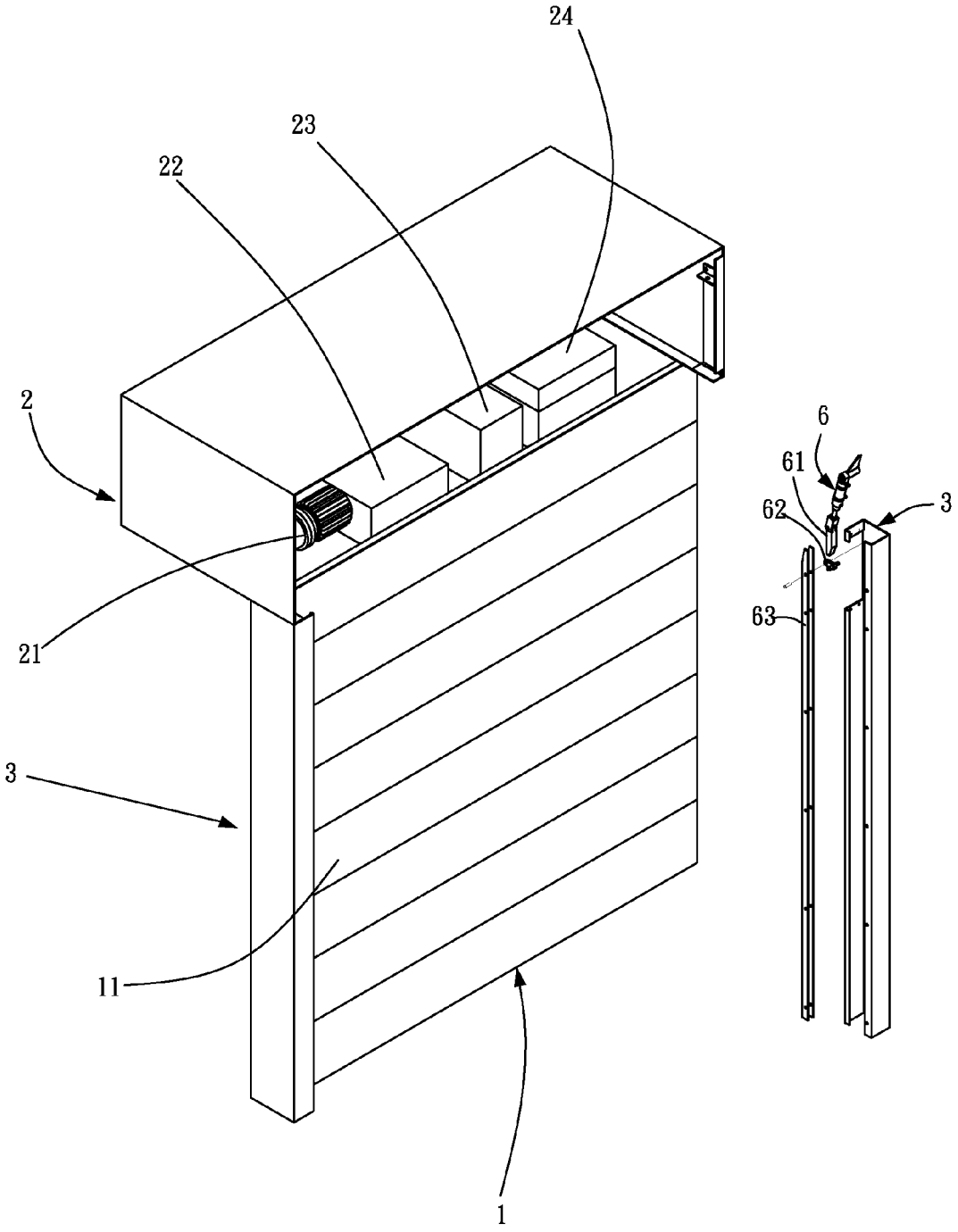

Fig. 5B

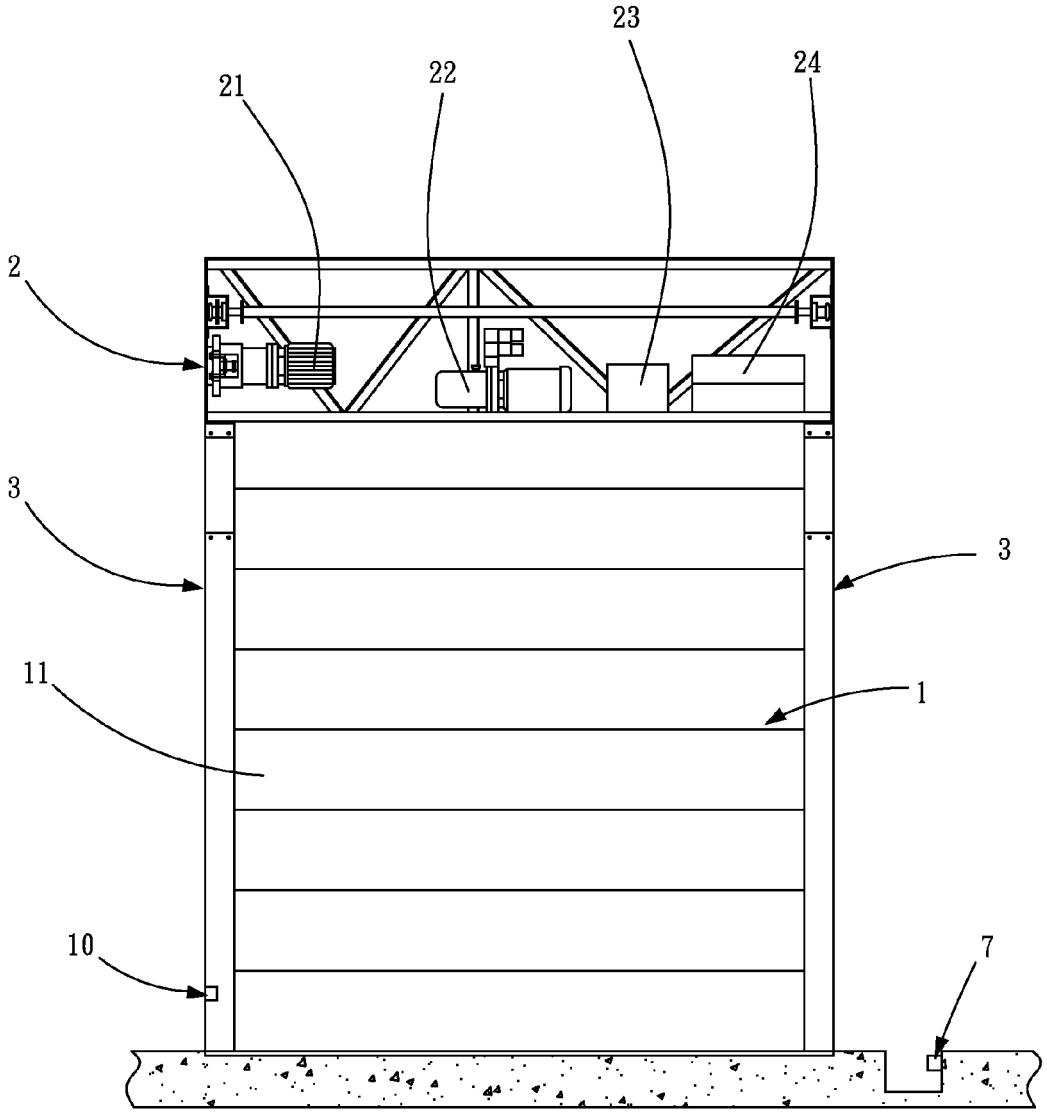

Fig. 5C

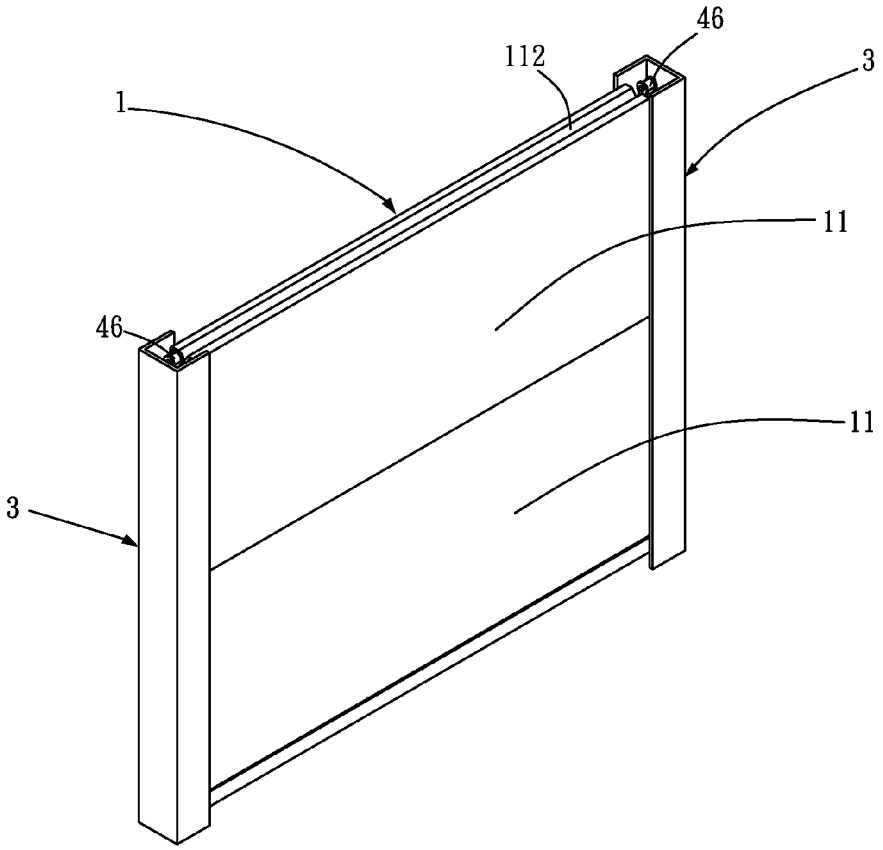

Fig. 6A

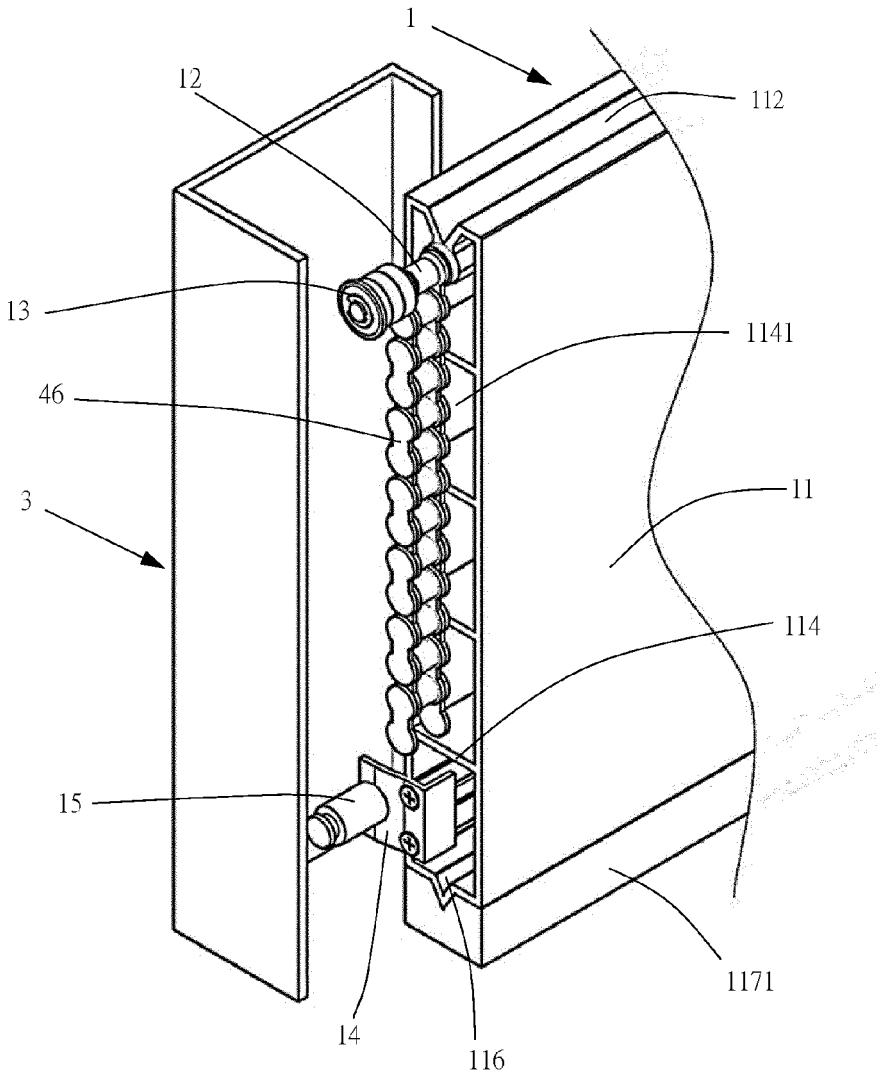

Fig. 6B

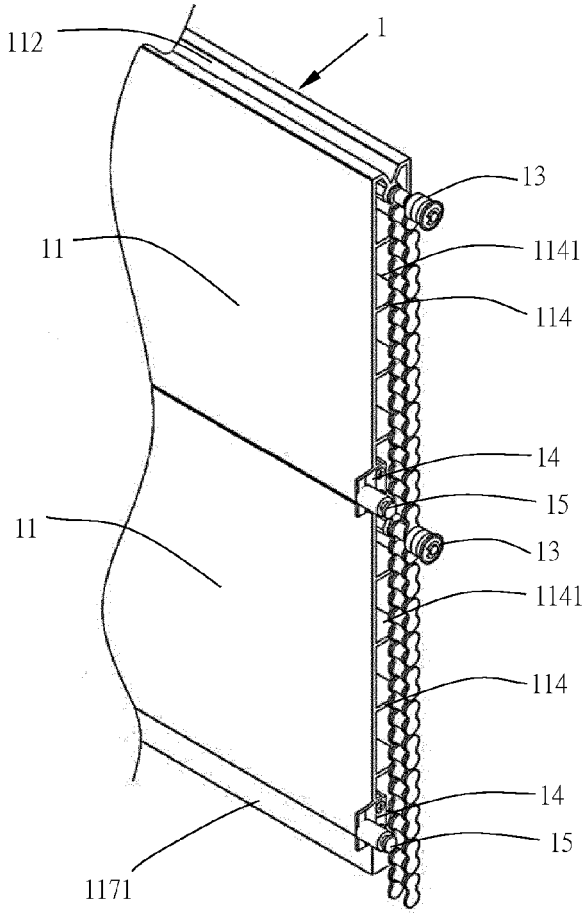

Fig. 6C

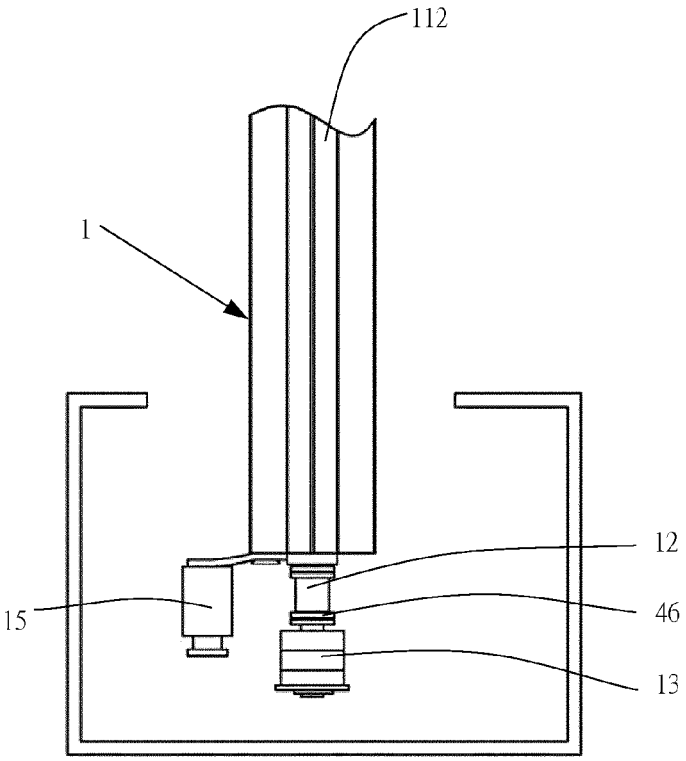

Fig. 6D

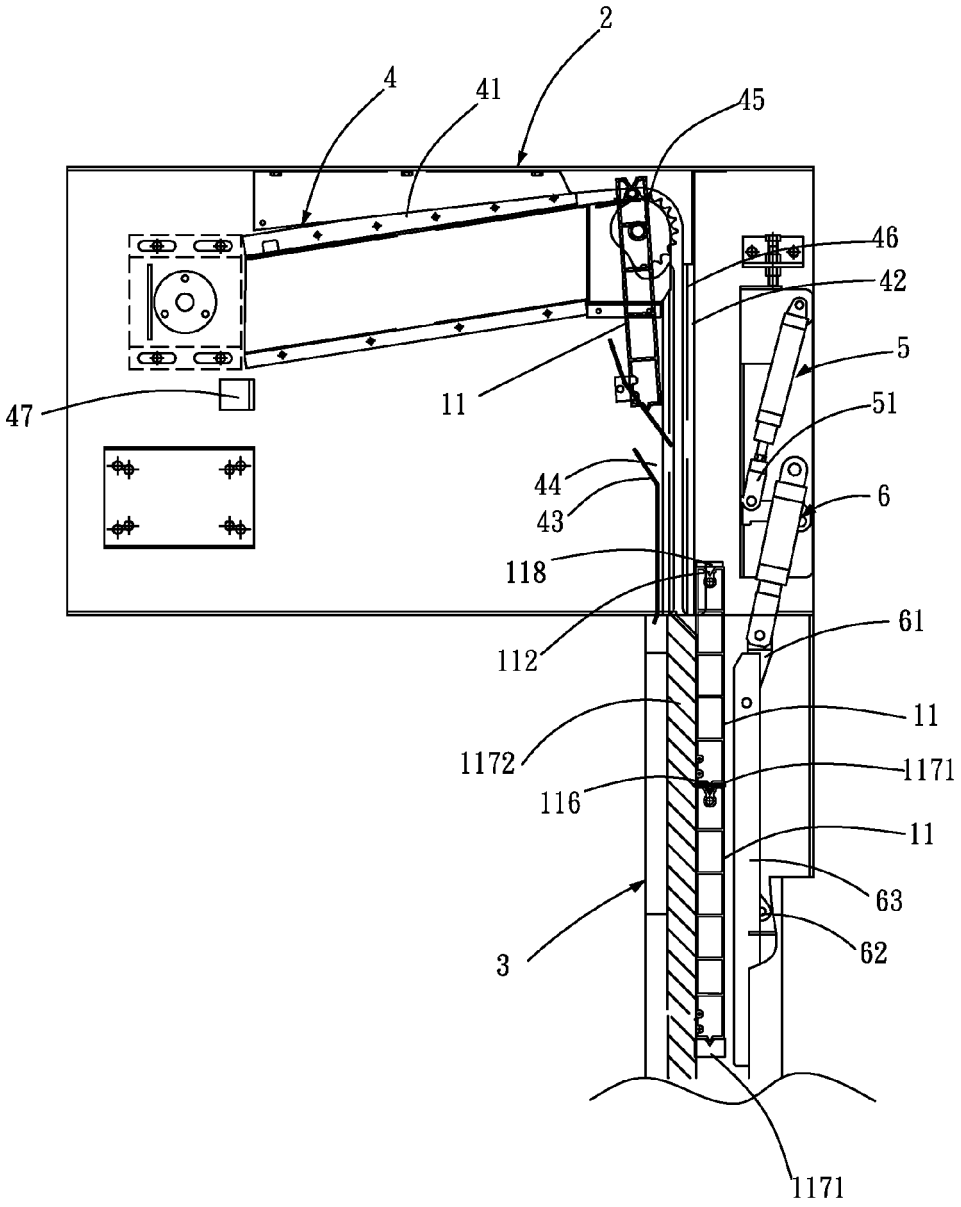
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Fig. 7A

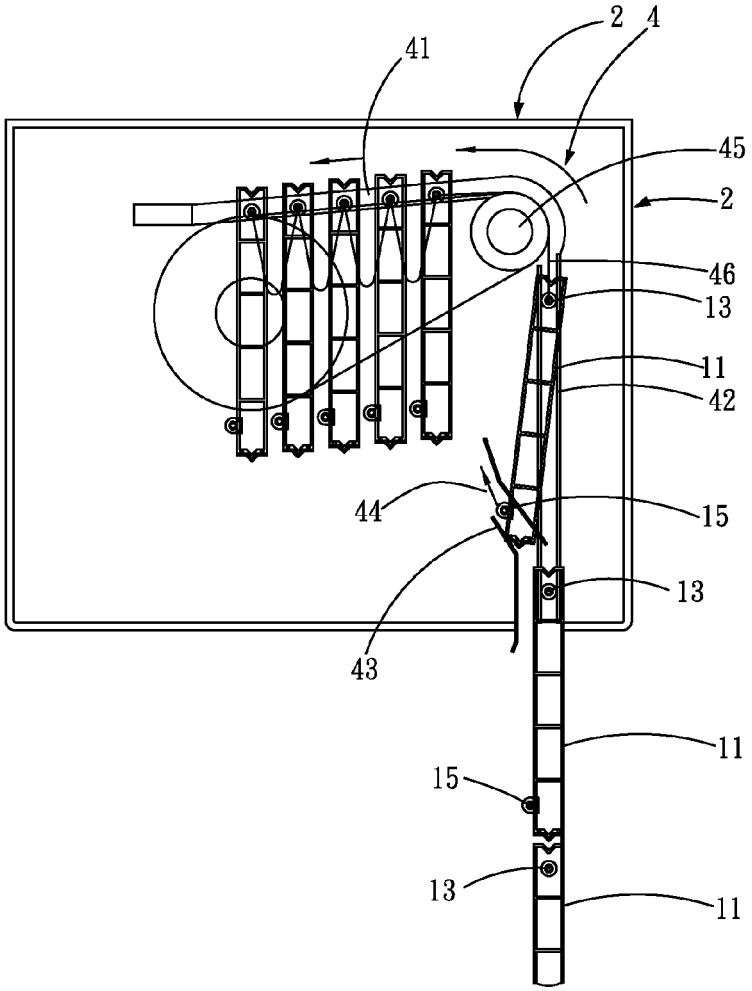

Fig. 7B

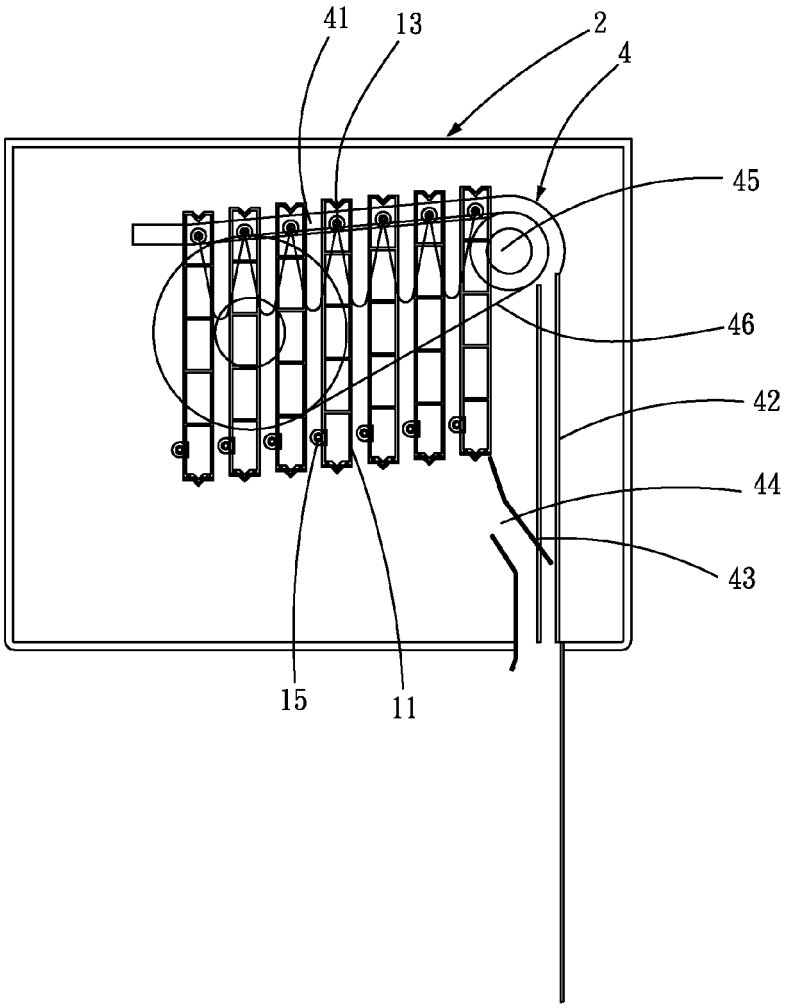

Fig. 7C

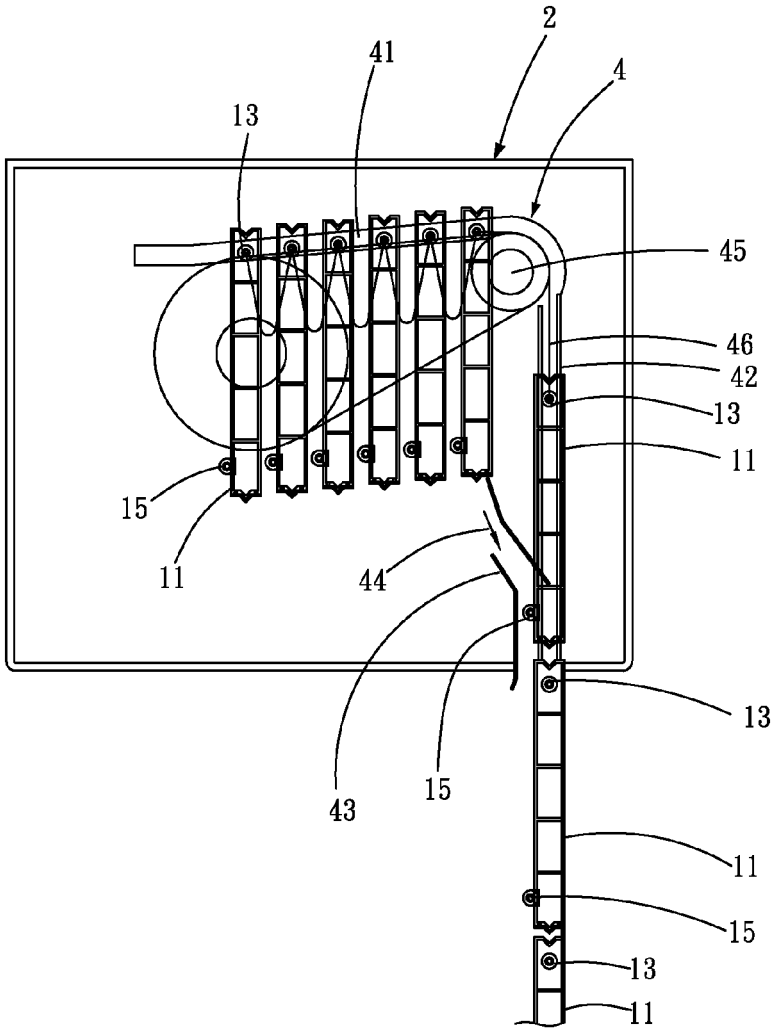

Fig. 7D

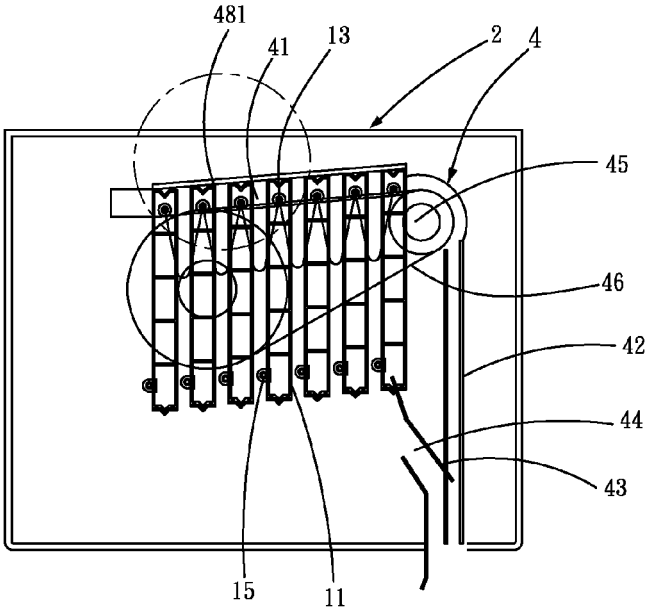

Fig. 7E-1

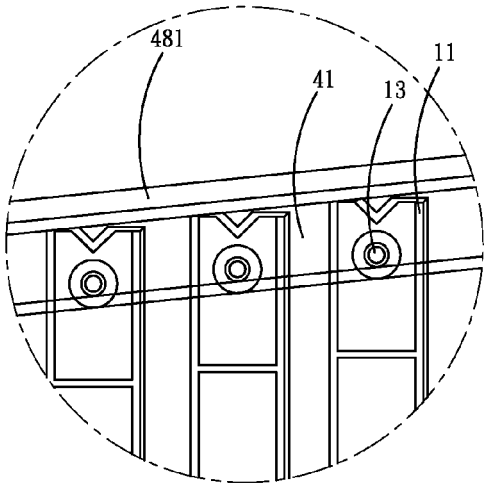

Fig. 7E-2

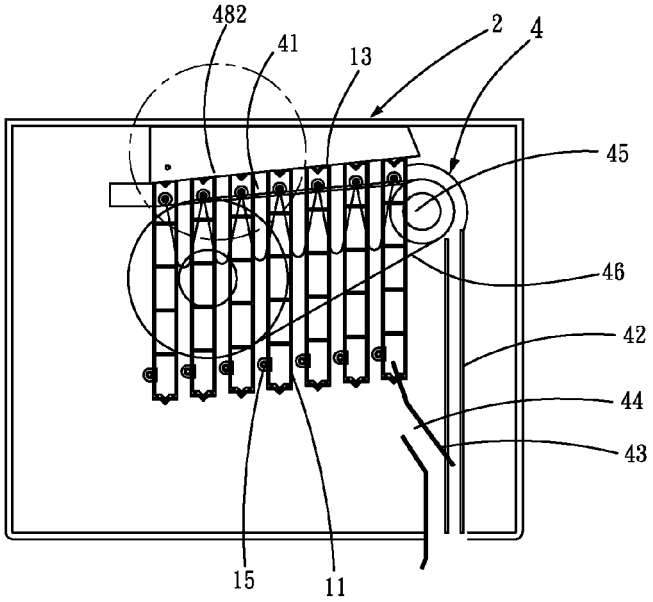

Fig. 7F-1

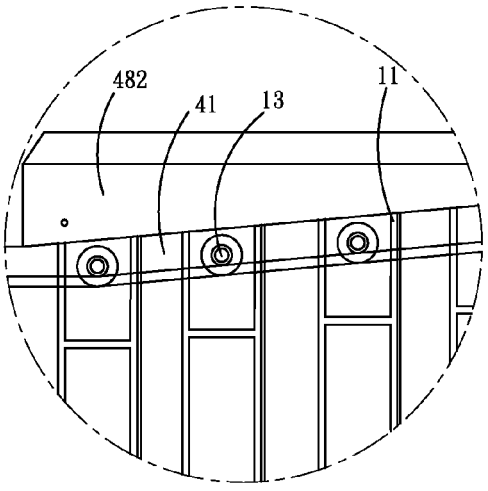

Fig. 7F-2

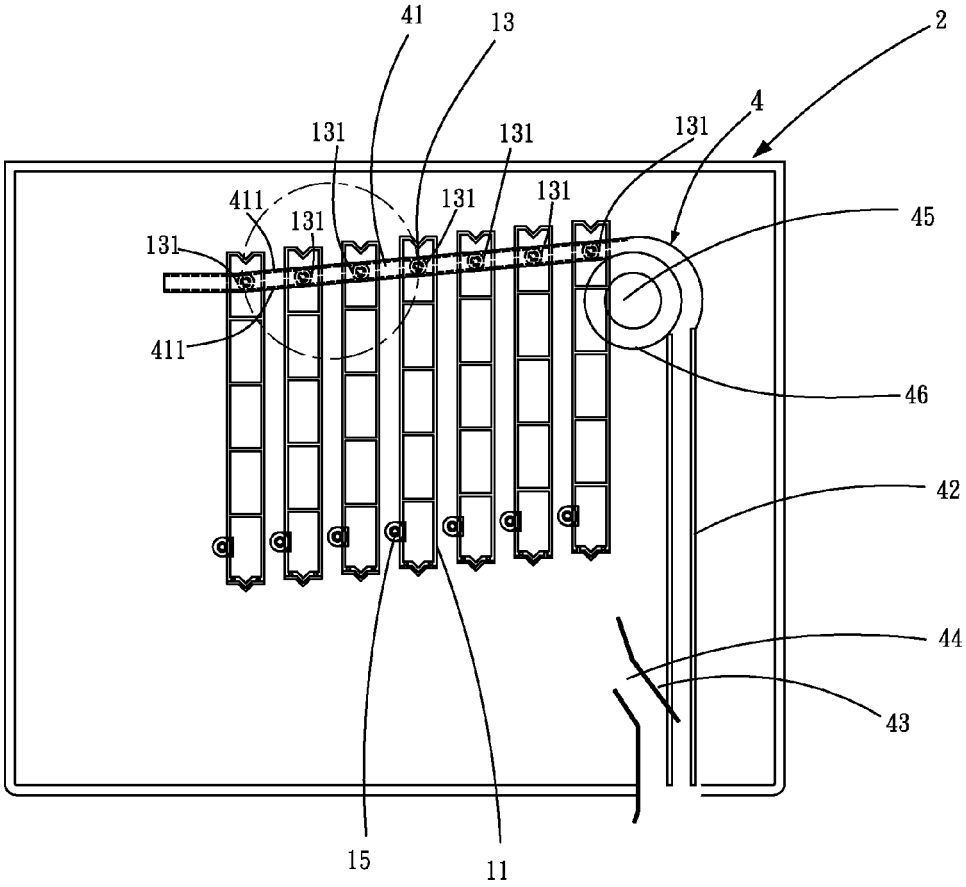

Fig. 7G-1

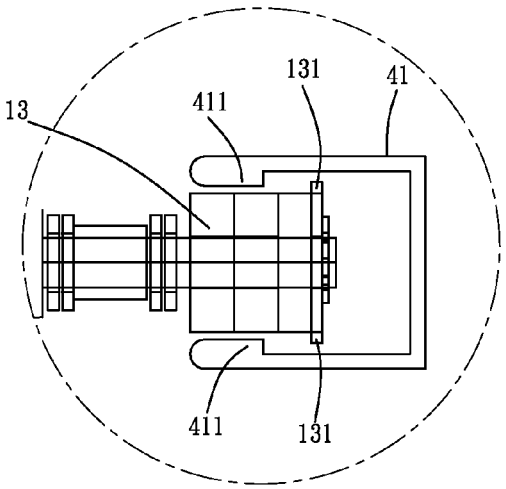

Fig. 7G-2

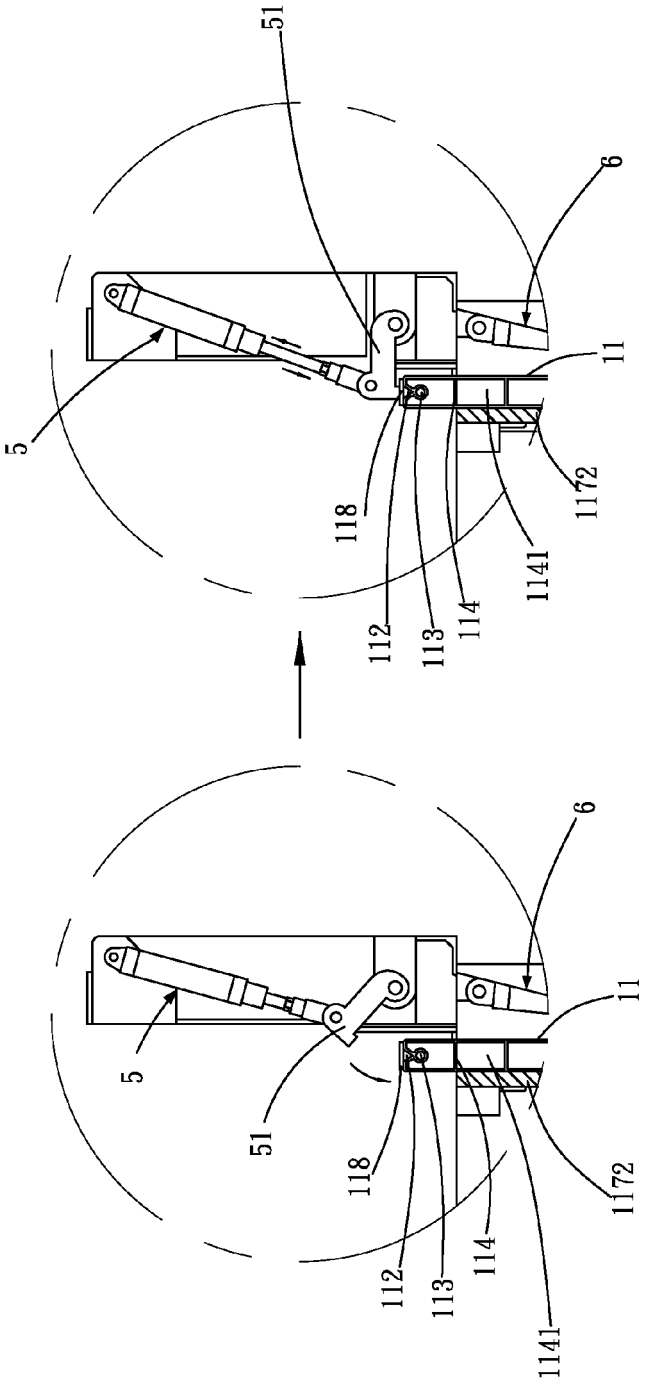
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Fig. 8

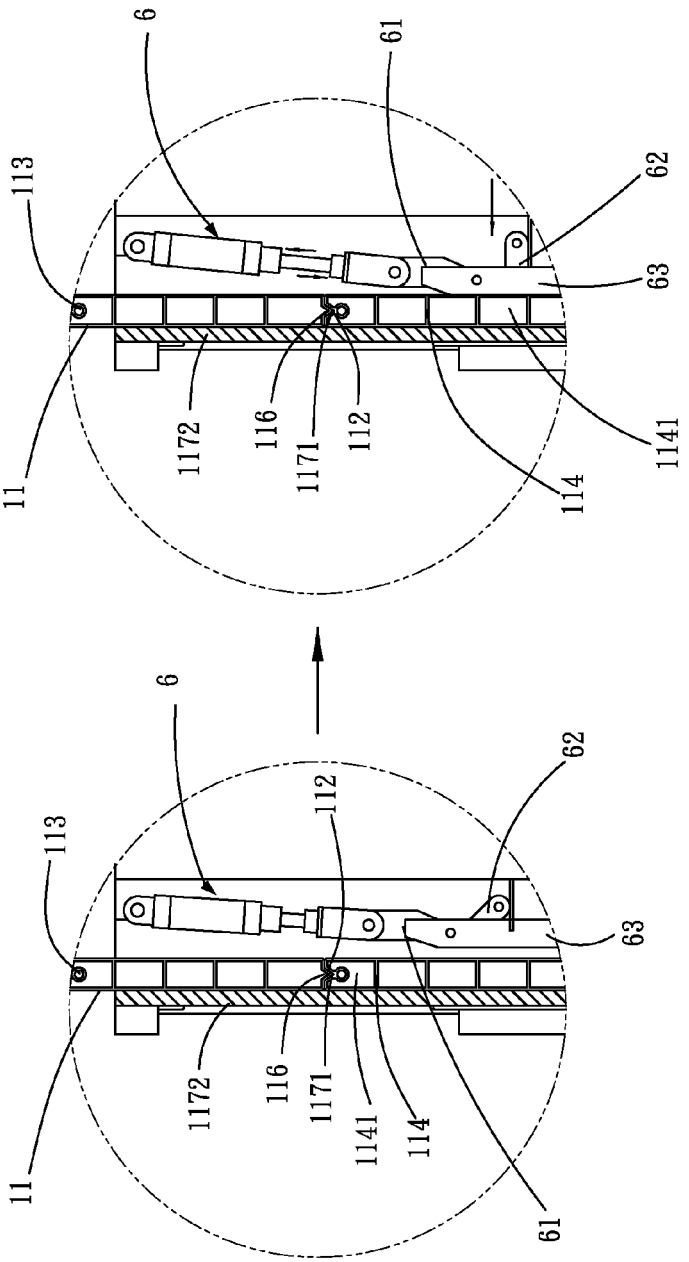
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Fig. 9

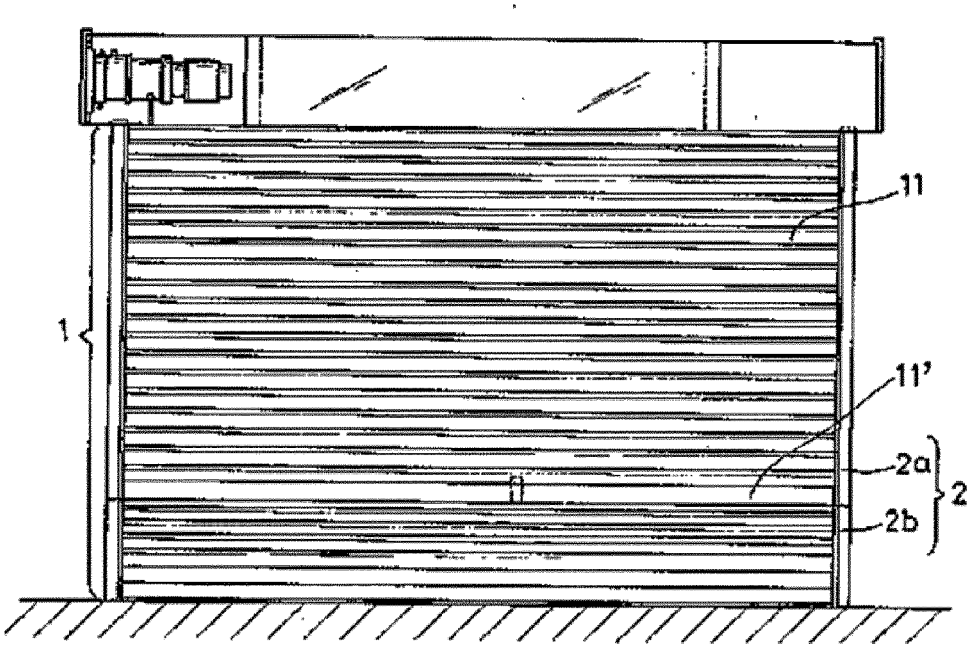

Fig. 10

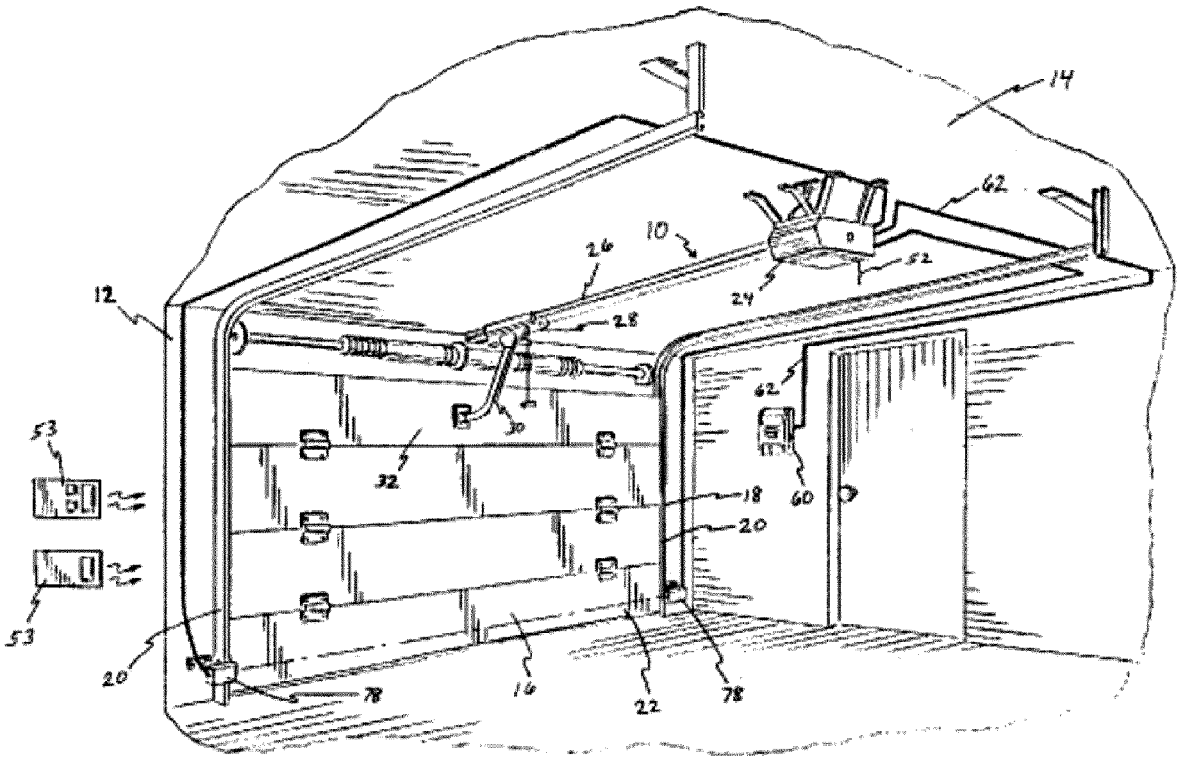

Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 13 19 5382

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 October 2014	Weißbach, Mark

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