(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 932 796 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
18.06.2008 Bulletin 2008/25

(21) Application number: **05790456.7**

(22) Date of filing: **05.10.2005**

(51) Int Cl.:
B66B 13/26 *(2006.01)*

(86) International application number:
PCT/JP2005/018462

(87) International publication number:
WO 2007/039931 (12.04.2007 Gazette 2007/15)

(84) Designated Contracting States:
DE

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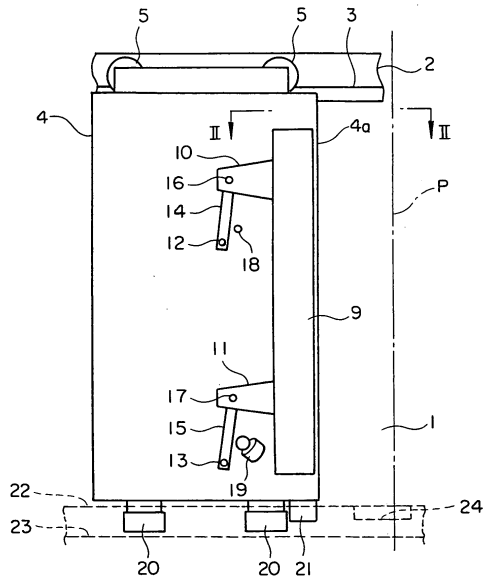
(54) DOOR DEVICE FOR ELEVATOR

(57) A car doorway is opened/closed by a car door. An actuating strip, displaceable between a protrusion position at which the actuating strip protrudes from a lower end of the car door and a retraction position located above the protrusion position, is provided at an end of the car door on a door-closing side thereof. The actuating strip is displaced to the protrusion position through full closure of the car doorway by the car door, and to the retraction position through a movement of the car door in a door-opening direction thereof. A car sill provided with a sill hole passing therethrough is provided at a lower portion of the car doorway. The actuating strip is inserted, through displacement thereof to the protrusion position due to a movement of the car door, into the sill hole. The actuating strip is released, through displacement thereof to the retraction position, from a state of being inserted in the sill hole. A detection switch detects whether or not the actuating strip has been displaced to the protrusion position. A door control device controls the movement of the car door based on information from the detection switch.

FIG. 1



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Description

Technical Field

[0001] The present invention relates to a door device for an elevator for opening/closing a doorway through which an interior of a car of the elevator communicates with a landing.

Background Art

[0002] In a conventional door device for an elevator, with a view to detecting that a foreign object has been sandwiched between a pair of doors, an actuating strip displaceable with respect to each of the doors is provided at an end of the door on a door-closing side thereof. The actuating strip moves together with the door while protruding from the end of the door on the door-closing side thereof. A sill extending in a moving direction of the door is provided therebelow. The sill is provided with a guide groove in which a lower end of the actuating strip is inserted. When the actuating strip comes into contact with the foreign obj ect and then is displaced with respect to the door, the moving direction of the door is inverted from a door-closing direction thereof to a door-opening direction thereof (see Patent Document 1).

[0003] Patent Document 1: JP 05-301692 A

Disclosure of the Invention

Problems to be solved by the Invention

[0004] However, in the conventional door device for the elevator constructed as described above, the actuating strip remains protruding from the door during the movement thereof and hence is liable to be hit by, for example, a wagon and damaged. Thus, the actuating strip increases in rigidity and weight so as to be prevented from being damaged. Accordingly, in a case where the foreign object is a flexible and light thing such as a string, the actuating strip is unlikely to be displaced with respect to the door even when the foreign object comes into contact with the actuating strip. As a result, detection of the foreign object may become impossible.

[0005] Further, the door is moved with the actuating strip inserted in the guide groove, so the sill must be provided with the guide groove over an entire moving range of the door. In consequence, an attempt to make an improvement in design is obstructed.

[0006] The present invention has been made to solve the above-mentionedproblems, and it is therefore an obj ect of the present invention to obtain a door device for an elevator which makes it possible to detect a foreign object more reliably and achieve an improvement in design.

Means for solving the Problem

[0007] A door device for an elevator according to the present invention includes: a car door for opening and closing a car doorway; an actuating strip, provided at an end of the car door on a door-closing side of the car door and designed to be displaceable between a protrusion position at which the actuating strip protrudes from a lower end of the car door and a retraction position located above the protrusion position, the actuating strip being displaced to the protrusion position through full closure of the car doorway by the car door and to the retraction position through a movement of the car door in a door-opening direction of the car door; a car sill provided with a sill hole in which the actuating strip displaced to the protrusion position due to a movement of the car door is inserted and from which the actuating strip is released through displacement of the actuating strip to the retraction position, the car sill being provided at a lower portion of the car doorway; a detection switch for detecting whether or not the actuating strip has been displaced to the protrusion position; and a door control device for controlling the movement of the car door based on information from the detection switch.

Brief Description of the Drawings

[0008]

Fig. 1 is a partially front view showing a door device for an elevator according to Embodiment 1 of the present invention.
Fig. 2 is a sectional view taken along the line II-II of Fig. 1.
Fig. 3 is a partially front view showing the door device for the elevator with a car doorway of Fig. 1 fully closed.
Fig. 4 is a sectional view taken along the line IV-IV of Fig. 3.
Fig. 5 is an enlarged sectional view taken along the line V-V of Fig. 4.
Fig. 6 is a front view showing a state in which a string as a foreign object is located on the landing sill and the car sill extending thereacross.
Fig. 7 is a sectional view taken along the line VII-VII of Fig. 6.
Fig. 8 is an enlarged sectional view taken along the line VIII-VIII of Fig. 7.
Fig. 9 is a partially sectional view showing a door device for an elevator according to Embodiment 2 of the present invention.
Fig. 10 is an enlarged sectional view taken along the line X-X of Fig. 9.

Best Modes for carrying out the Invention

[0009] Preferred embodiments of the present invention will be described hereinafter with reference to the

drawings.

Embodiment 1

[0010] Fig. 1 is a partially front view showing a door device for an elevator according to Embodiment 1 of the present invention. Fig. 2 is a sectional view taken along the line II-II of Fig. 1. Fig. 3 is a partially front view showing the door device for the elevator with a car doorway 1 of Fig. 1 fully closed. Fig. 4 is a sectional view taken along the line IV-IV of Fig. 3. It should be noted that the car doorway 1 is half open in Fig. 1. Referring to Figs. 1 to 4, a car of the elevator is provided with the car doorway 1. A car-side hanger case 2 fixed to the car is provided at an upper portion of the car doorway 1. The car-side hanger case 2 is provided with a car-side door rail 3 extending in the direction of a frontage of the car doorway 1. A pair of car doors 4 for opening/closing the car doorway 1 are suspended from the car-side door rail 3.

[0011] A plurality of (two in this example) hanger rollers 5 laid on the car-side door rail 3 are provided at an upper portion of each of the car doors 4. Each of the car doors 4 is moved along the car-side door rail 3 due to a driving force of a door driving device (not shown) mounted on the car. The respective hanger rollers 5 are rolled on the car-side door rail 3 as the car door 4 is moved.

[0012] A landing doorway 6 (Figs. 2 and 4) is provided at a landing of each floor. The car doorway 1 is opposed to the landing doorway 6 when the car is stopped at each floor. A landing-side hanger case (not shown) fixed to a wall surface on a landing side is provided at an upper portion of the landing doorway 6. The landing-side hanger case is provided with a landing-side door rail (not shown) extending in the direction of a frontage of the landing doorway 6. A pair of landing doors 7 (Figs. 2 and 4) for opening/closing the landing doorway 6 are suspended from the landing-side door rail.

[0013] The respective landing doors 7 are movable along the landing-side door rail. Each of the landing doors 7 is moved together with a corresponding one of the car doors 4 while being engaged therewith through an engagement device (not shown) when the car is stopped at each floor. The landing doorway 6 is opened/closed as the respective landing doors 7 are moved.

[0014] Door abutment faces 4a, which abut on each other when the respective car doors 4 fully close the car doorway 1, are provided at ends of the car doors 4 on door-closing sides thereof, respectively. Door abutment faces 7a, which abut on each other when the respective landing doors 7 fully close the landing doorway 6, are provided at ends of the landing doors 7 on door-closing sides thereof, respectively. A position at which the respective door abutment faces 4a abut on each other and a position at which the respective door abutment faces 7a abut on each other are located on a door abutment reference plane P extending perpendicularly to the direction of the frontages of the car doorway 1 and the landing doorway 6. The door abutment reference plane P is located at the centers of the car doorway 1 and the landing doorway 6.

[0015] Each of safety shoes 8 (Figs. 2 and 4) and each of detection plates (actuating strip) 9, which are displaceable with respect to a corresponding one of the car doors 4, are provided at the end of the car door 4 on the door-closing side thereof. The safety shoe 8 and the detection plate 9 are disposed between the car door 4 and the landing door 7. The detection plate 9 is disposed between the safety shoe 8 and the car door 4. The detection plate 9 is lighter in weight than the safety shoe 8.

[0016] The safety shoe 8 and the detection plate 9 are displaced as the car door 4 is moved. That is, a displacement device (not shown) for displacing the safety shoe 8 and the detection plate 9 independently of each other in accordance with the movement of the car door 4 is provided between the car door 4 and the landing door 7. The displacement device may be designed, for example, to displace the safety shoe 8 and the detection plate 9 in accordance with the position of the car door 4 with respect to the car, or to displace the safety shoe 8 and the detection plate 9 in accordance with the position of the car door 4 with respect to the landing door 7.

[0017] The safety shoe 8 is moved together with the car door 4 while protruding from the end of the car door 4 on the door-closing side thereof toward the door-closing side. When the car doors 4 fully close the car doorway 1, each of the safety shoes 8 is accommodated between a corresponding one of the car doors 4 and a corresponding one of the landing doors 7. When each of the safety shoes 8 is displaced with respect to a corresponding one of the car doors 4 owing to, for example, contact of an obstacle with the safety shoe 8 during a movement of the car door 4 in a door-closing direction thereof, the moving direction of the car door 4 is inverted from the door-closing direction to a door-opening direction thereof through the control performed by a door control device (not shown).

[0018] The detection plate 9 is displaceable between a protrusion position at which the detection plate 9 protrudes downward from a lower end of the car door 4 and a retraction position located above the protrusion position. The detection plate 9 protrudes from the end of the car door 4 on the door-closing side thereof in the door-closing direction as well when being located at the protrusion position. The detection plate 9 is accommodated between the car door 4 and the landing door 7 when being located at the retraction position.

[0019] The detection plate 9 is displaced toward the protrusion position as the car door 4 is moved in the door-closing direction, and toward the retraction position as the car door 4 is moved in the door-opening direction. Each of the detection plates 9 reaches the protrusion position when the car doors 4 fully close the car doorway 1. In this example, the displacement of each of the detection plates 9 from the retraction position to the protrusion position is started when the car doors 4 reach predetermined positions respectively immediately before

fully closing the car doorway 1, and is completed when the car doors 4 fully close the car doorway 1. The displacement of each of the detection plates 9 from the protrusion position to the retraction position is started when the movement of a corresponding one of the car doors 4 in the door-opening direction is started, and is completed when the car door 4 reaches the above-mentioned predetermined position.

[0020] An upper mounting portion 10 is provided on an upper portion of the detection plate 9, and a lower mounting portion 11 is provided on a lower portion of the detection plate 9. The upper mounting portion 10 and the lower mounting portion 11 protrude respectively from the detection plate 9 toward a door-opening side.

[0021] The car door 4 is provided with an upper turning shaft 12 and a lower turning shaft 13, which are disposed apart from each other in a height direction of the car door 4. The detection plate 9 is supported by the car door 4 via an upper turning link 14 turnable around the upper turning shaft 12 and a lower turning link 15 turnable around the lower turning shaft 13. The upper mounting portion 10 is turnably mounted at a tip of the upper turning link 14 by means of a pin 16, and the lower mounting portion 11 is turnably mounted at a tip of the lower turning link 15 by means of a pin 17. The detection plate 9 is displaced between the protrusion position and the retraction position through the turning of the upper turning link 14 and the turning of the lower turning link 15. The car door 4 is provided with a stopper 18 for holding the detection plate 9 at the protrusion position through abutment on the upper turning link 14.

[0022] The car door 4 is provided with a micro switch (detection switch) 19 for detecting whether or not the detection plate 9 has been displaced to the protrusion position. In this example, the micro switch 19 detects whether or not the detection plate 9 has been displaced to the protrusion position, depending on a state of establishment of contact with the lower turning link 15. The car doorway 1 is provided with a full closure detecting sensor (not shown) for detecting whether or not the car doorway 1 has been fully closed by the car doors 4.

[0023] Information from the full closure detecting sensor and the micro switch 19 is transmitted to the door control device. The door control device controls the movements of the car doors 4 based on the information from the full closure detecting switch and the micro switch 19. That is, the door control device inverts the moving direction of each of the car doors 4 from the door-closing direction to the door-opening direction when the car doors 4 fully close the car doorway 1 and each of the detection plates 9 is off the protrusion position. The door control device allows the car to be moved when the car doors 4 fully close the car doorway 1 and each of the detection plates 9 is at the protrusion position.

[0024] A plurality of door legs 20 are provided at the lower end of the car door 4. A protective strip (sweeper) 21 is provided at the lower .end of the car door 4 on the door-closing side thereof. The respective door legs 20 and the protective strip 21 protrude downward from the lower end of the car door 4. The protective strip 21 protrudes downward by a shorter length than the respective door legs 20.

[0025] A car sill 22 fixed to the car is provided at a lower portion of the car doorway 1. The car sill 22 is provided with a car sill groove 23 extending in the direction of the frontage of the car doorway 1, and a sill hole (detection hole) 24 arranged at such a position as to intersect with the door abutment reference plane P.

[0026] The respective door legs 20 and the protective strip 21 are inserted in the car sill groove 23. While remaining inserted in the car sill groove 23, the respective door legs 20 and the protective strip 21 are moved along the car sill groove 23 together with the car door 4.

[0027] The sill hole 24 is a long hole arranged parallel to the direction of the frontage of the car doorway 1 and the direction of the frontage of the landing doorway 6. The sill hole 24 is also a through-hole penetrating the car sill 22 vertically.

[0028] A landing sill 25 (Figs. 2 and 4) fixed to the landing is provided at a lower portion of the landing doorway 6. The landing sill 25 is provided with a landing sill groove 26 extending in the direction of the frontage of the landing doorway 6. A plurality of door legs (not shown) provided at a lower end of each of the landing doors 7 are inserted in the landing sill groove 26. While remaining inserted in the landing sill groove 26, the respective door legs are moved along the landing sill groove 26 together with the landing door 7.

[0029] Fig. 5 is an enlarged sectional view taken along the line V-V of Fig. 4. As shown in Fig. 5 as well, a lower portion of each of the detection plates 9 is inserted in the sill hole 24 when the car doors 4 fully close the car doorway 1 and each of the detection plates 9 is displaced to the protrusion position. The lower portion of the detection plate 9 is released from the sill hole 24 as the detection plate 9 is displaced toward the retraction position.

[0030] Fig. 6 is a front view showing a state in which a string as a foreign object is located on the landing sill 25 and the car sill 22 extending thereacross. Fig. 7 is a sectional view taken along the line VII-VII of Fig. 6. Further, Fig. 8 is an enlarged sectional view taken along the line VIII-VIII of Fig. 7. Referring to Figs. 6 to 8, a string (foreign object) 27 is pushed, when being on the car sill 22 extending thereacross, by the protective strip 21 to be conveyed to a position above the sill hole 24 due to the movement of the car door 4 in the door-closing direction.

[0031] The detection plate 9 gets stuck with the string 27 and hence is prevented from being displaced to the protrusion position when the string 27 is above the sill hole 24. In this example, a dimension D (Fig. 8) of the sill hole 24 in a width direction thereof is adjusted such that a tensile force for supporting the detection plate 9 is applied to the string 27 when the detection plate 9 gets stuck with the string 27.

[0032] Next, an operation will be described. The lower

portion of the detection plate 9 is inserted in the sill hole 24 when the car doorway 1 and the landing doorway 6 are fully closed. In this state, the door control device has detected that the lower turning link 15 is in contact with the micro switch 19 and that the detection plate 9 is at the protrusion position.

[0033] When the car is stopped at a destination floor, each of the car doors 4 is moved in the door-opening direction, so the detection plate 9 is displaced from the protrusion position to the retraction position. Thus, the lower portion of the detection plate 9 is released from the state of being inserted in the sill hole 24, so the lower turning link 15 moves away from the micro switch 19. After that, the car doors 4 are moved while being engaged with the landing doors 7 respectively, so the car doorway 1 and the landing doorway 6 are fully opened.

[0034] After that, each of the car doors 4 is moved in the door-closing direction, so the car doorway 1 is fully closed. In this case, the detection plate 9 is displaced from the retraction position to the protrusion position as the car door 4 is moved, so the lower portion of the detection plate 9 is inserted into the sill hole 24. At this moment, the door control device detects that the lower turning link 15 is in contact with the micro switch 19 and that the detection plate 9 has reached the protrusion position. When the door control device detects that the car doors 4 fully close the car doorway 1 and that each of the detection plates 9 has reached the protrusion position, the car is thereby allowed to be moved.

[0035] Next, it will be described how the door device operates when an elongated foreign object such as the string 27 is on the car sill 22 and the landing sill 25 extending thereacross. When the car door 4 is moved in the door-closing direction, the string 27 is moved in the door-closing direction together with the car door 4 while being pushed by the protective strip 21. Thus, the string 27 is conveyed to such a position as to extend above and across the sill hole 24 when the car doors 4 fully close the car doorway 1.

[0036] On the other hand, each of the detection plates 9 is displaced from the retraction position toward the protrusion position immediately before the car doors 4 fully close the car doorway 1. At this moment, the string 27 is above the sill hole 24 extending thereacross, so the lower end of the detection plate 9 gets stuck with the string 27. Thus, the detection plate 9 is prevented from being displaced to the protrusion position by the string 27. After that, each of the car doors 4 is further moved in the door-closing direction with the detection plate 9 remaining stuck with the string 27, so the car doorway 1 is fully closed. That is, the car doorway 1 is fully closed with the lower turning link 15 remaining apart from the micro switch 19.

[0037] Thus, the presence of the foreign object is detected by the door control device, so the moving direction of each of the car doors 4 is inverted from the door-closing direction to the door-opening direction.

[0038] In the door device for the elevator constructed as described above, the car door 4 is provided with the detection plate 9 displaceable between the protrusion position at which the detection plate 9 protrudes from the lower end of the car door 4 and the retraction position located above the protrusion position, and the car sill 22 is provided with the sill hole 24 into which the lower portion of the detection plate 9 is inserted through displacement of the detection plate 9 to the protrusion position. Therefore, even in a case where an elongated and flexible foreign object such as a string is on the car sill 22 extending thereacross, a tensile force can be applied to the string through interposition thereof between the detection plate 9 and the sill hole 24, so the detection plate 9 can be prevented more reliably frombeing displaced to the protrusion position. Thus, the presence of the string can be detected more reliably. Each of the detection plates 9 reaches the protrusion position only when the car doors 4 fully close the car doorway 1. It is therefore sufficient to provide the sill hole 24 only in a part of the car sill 22, and there is no need to provide a groove in the car sill 22 over the entire moving range of the car door 4. Accordingly, the door device can be improved in design.

[0039] The protective strip 21, which is moved together with the car door 4 to move the string to such a position that the detection plate 9 is prevented from being displaced to the protrusion position, is provided at the lower end of the car door 4. Therefore, the string can be conveyed more reliably to such a position as to extend above and across the sill hole 24, so the presence of the string can be detected more reliably.

[0040] The sill hole 24 passes through the car sill 22, so the foreign object can be prevented from staying within the sill hole 24. As a result, erroneous detection of the presence of the foreign object can be prevented.

[0041] The detection plate 9 protrudes toward the door-closing side from the end of the car door 4 on the door-closing side thereof as well when being at the protrusion position. Therefore, even in a case where the string 27 extends across a position located apart upward from the car sill 22, the string 27 can come into contact with the detection plate 9 when the car doorway 1 is fully closed. Thus, the detection plate 9 can be displaced with respect to the car door 4, so the string 27 can be detected more reliably.

[0042] In the foregoing example, the dedicated protective strip 21 is provided at the lower end of the car door 4 to convey the string 27 to the position above the sill hole 24. However, the door legs 20 may be designed to serve as the protective strip 21 as well. This construction makes it possible to dispense with the dedicated protective strip 21 and hence reduce the cost of manufacturing.

Embodiment 2

[0043] Fig. 9 is a partially sectional view showing a door device for an elevator according to Embodiment 2 of the present invention.

Fig. 10 is an enlarged sectional view taken along the line

X-X of Fig. 9. Referring to Figs . 9 and 10, the lower portion of the detection plate 9 is inserted into a gap between the car sill 22 and the landing sill 25 through displacement of the detection plate 9 to the protrusion position, and is released from the gap between the car sill 22 and the landing sill 25 through displacement of the detection plate 9 to the retraction position.

[0044] A plurality of door legs 31 are provided at the lower end of the landing door 7. A protective strip 32 for moving the string (foreign object) 27 to such a position that the detection plate 9 is prevented from being displaced to the protrusion position is provided at the lower end of the landing door 7 on the door-closing side thereof. Embodiment 2 of the present invention is identical to Embodiment 1 of the present invention in other constructional details.

[0045] Next, an operation will be described. The string 27, which extends across from a position on the landing sill 25 to a position on the car sill 22, is moved while being pushed by the protective strips 21 and 32 as the car door 4 and the landing door 7 are moved in the door-closing direction. In this case, the string 27 is moved in a state of extending above and across the gap between the car sill 22 and the landing sill 25. At this moment, the string 27 is located at such a position that the detection plate 9 is prevented from being displaced to the protrusion position.

[0046] Immediately before the car doors 4 fully close the car doorway 1, the displacement of each of the detection plates 9 from the retraction position to the protrusion position is started. After that, since the string 27 extends above and across the gap between the car sill 22 and the landing sill 25, the detection plate 9 gets stuck with the string 27 and is thereby prevented frombeing displaced to the protrusion position. The subsequent operation is the same as in Embodiment 1 of the present invention.

[0047] In the door device for the elevator constructed as described above, the lower portion of the detection-plate 9 is inserted into the gap between the car sill 22 and the landing sill 25 when the detection plate 9 is displaced to the protrusion position, so there is no need to provide the car sill 22 with a sill hole into which the detection plate 9 is inserted. As a result, the door device can be simplified in structure.

[0048] In the foregoing respective embodiments of the present invention, the present invention is applied to a biparting door device designed such that the car doors 4 and the landing doors 7 separate respectively from each other at the center of the door device to open toward both sides. However, the present invention may also be applied to a single swing door device designed such that the car door 4 and the landing door 7 open respectively only in one direction.

Claims

1. A door device for an elevator, **characterized by** comprising:

a car door for opening and closing a car doorway;
an actuating strip, provided at an end of the car door on a door-closing side of the car door and designed to be displaceable between a protrusion position at which the actuating strip protrudes from a lower end of the car door and a retraction position located above the protrusion position, the actuating strip being displaced to the protrusion position through full closure of the car doorway by the car door and to the retraction position through a movement of the car door in a door-opening direction of the car door;
a car sill provided with a sill hole in which the actuating strip displaced to the protrusion position due to a movement of the car door is inserted and from which the actuating strip is released through displacement of the actuating strip to the retraction position, the car sill being provided at a lower portion of the car doorway;
a detection switch for detecting whether or not the actuating strip has been displaced to the protrusion position; and
a door control device for controlling the movement of the car door based on information from the detection switch.

2. A door device for an elevator, **characterized by** comprising:

a car door for opening and closing a car doorway;
a landing door opposed to the car door, for opening and closing a landing doorway while being engaged with the car door;
an actuating strip, provided at an end of the car door on a door-closing side of the car door and designed to be displaceable between a protrusion position at which the actuating strip protrudes from a lower end of the car door and a retraction position located above the protrusion position, the actuating strip being displaced to the protrusion position through full closure of the car doorway by the car door and to the retraction position through a movement of the car door in a door-opening direction of the car door;
a detection switch for detecting whether or not the actuating strip has been displaced to the protrusion position; and
a door control device for controlling the movement of the car door based on information from the detection switch, and

characterized in that:

the actuating strip is inserted, through displacement thereof to the protrusion position, into a gap between a car sill provided at a lower portion of the car doorway and a landing sill provided at a lower portion of the landing doorway; and
the actuating strip is released, through displacement thereof to the retraction position, from a state of being inserted in the gap.

3. A door device for an elevator according to Claim 1 or 2,
characterized in that the lower end of the car door is provided with a protective strip designed to be moved together with the car door to move a foreign object to such a position that the actuating strip is prevented from being displaced to the protrusion position.

4. A door device for an elevator according to Claim 1 or 2, **characterized in that** the actuating strip protrudes toward the door-closing side from the end of the car door on the door-closing side of the car door as well when being located at the protrusion position.

FIG. 1

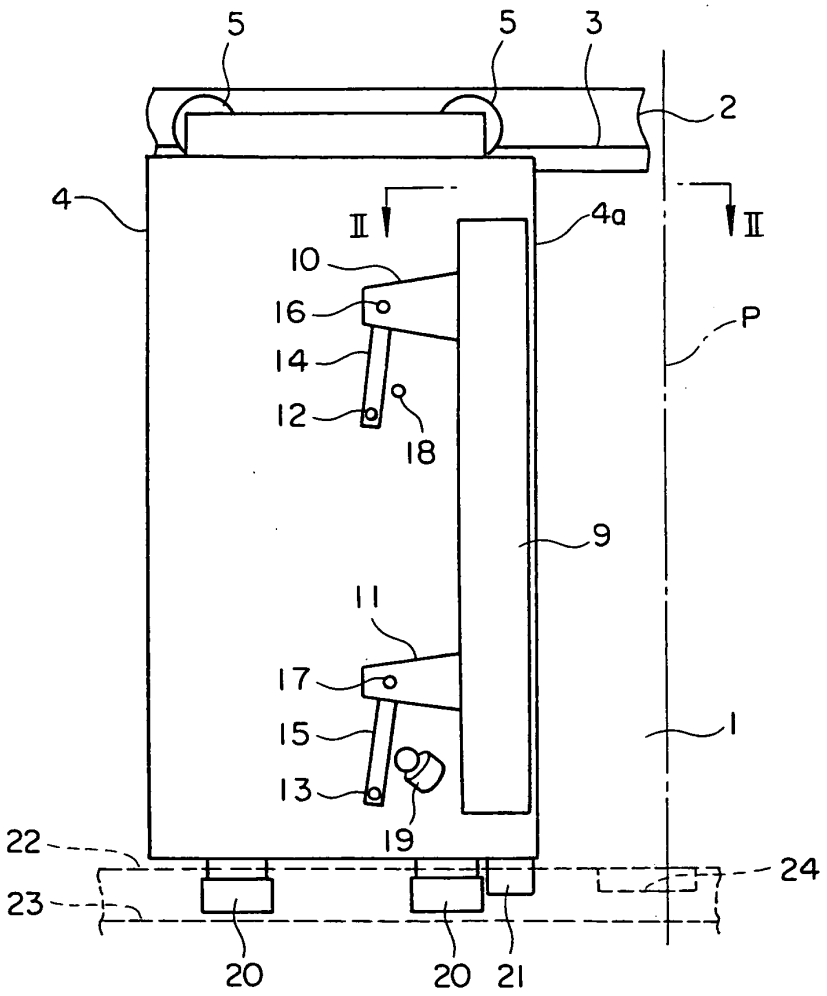
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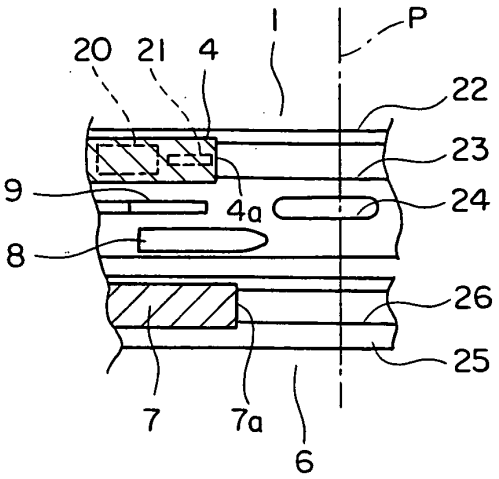
FIG. 2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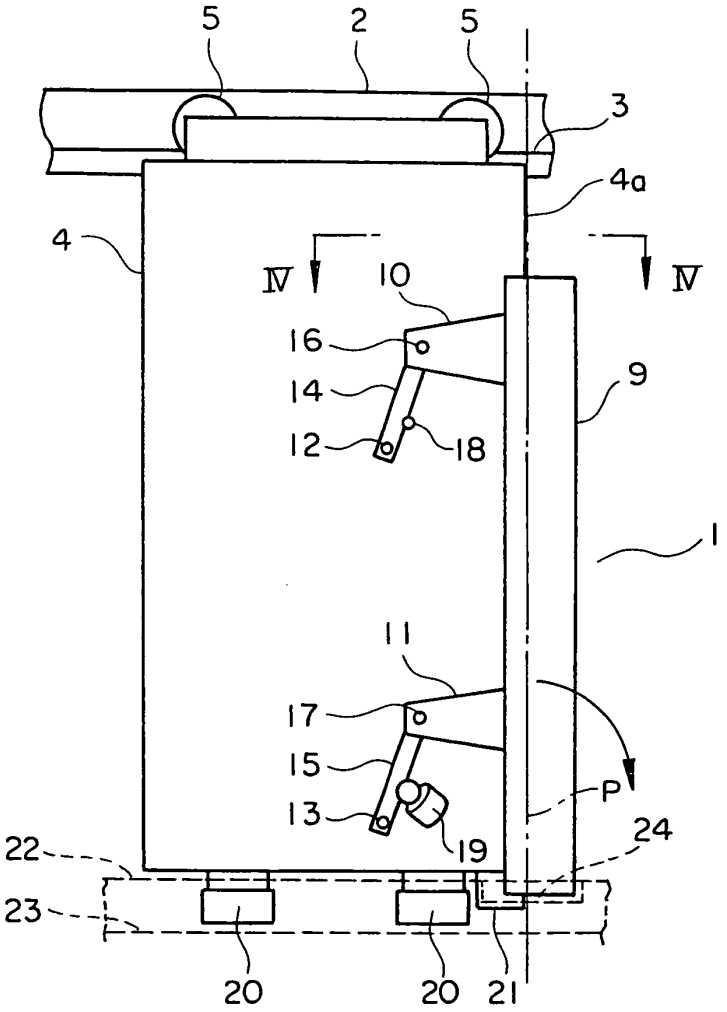
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FIG. 4

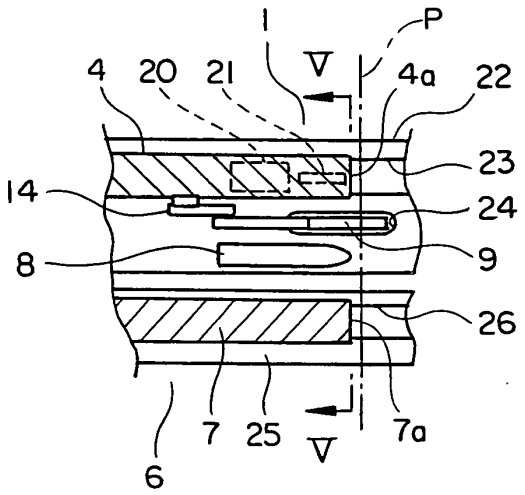
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FIG. 5

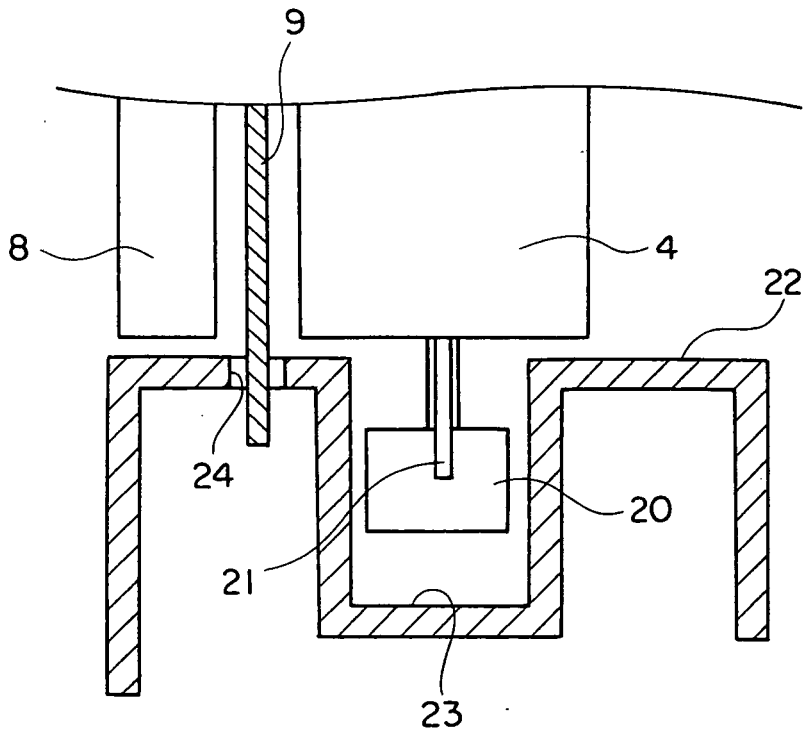
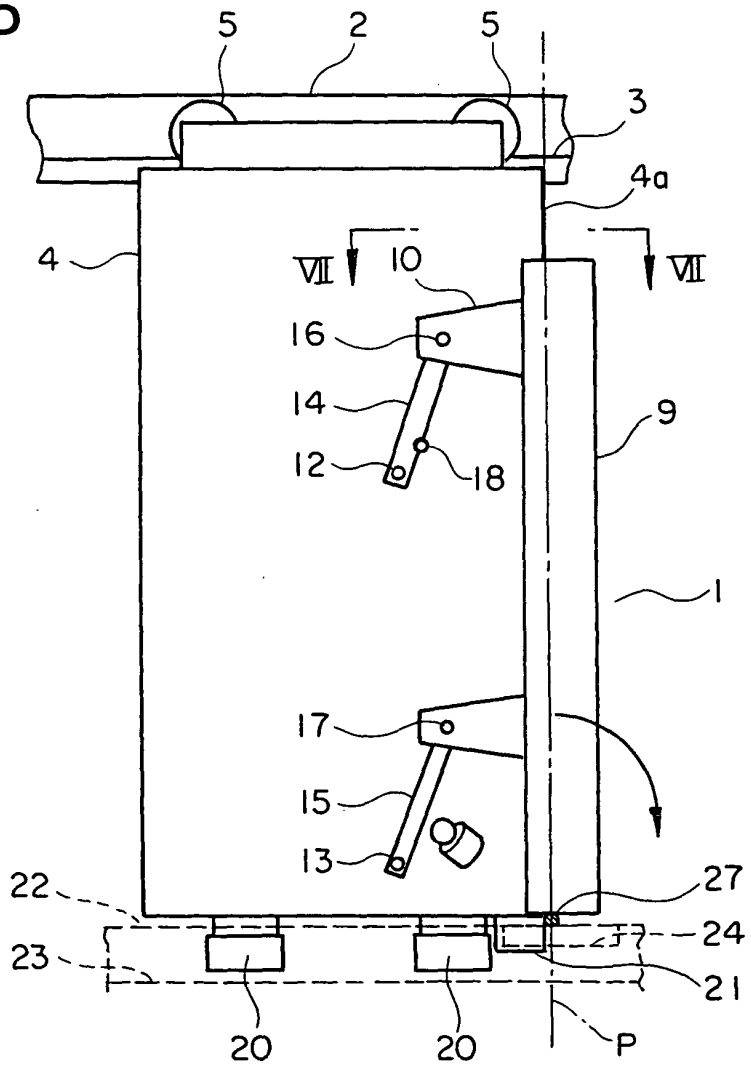


FIG. 6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4
VII
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VII
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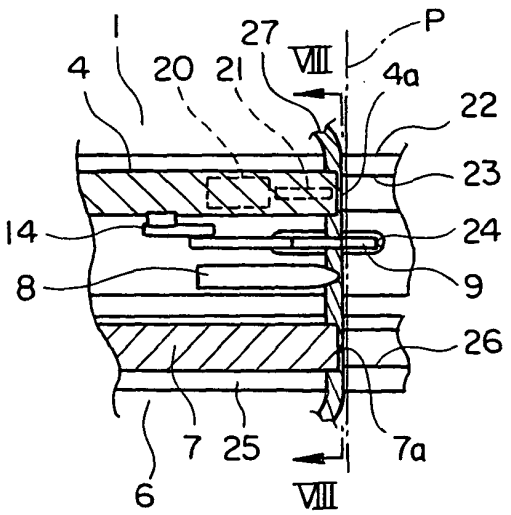
P

FIG. 7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25
7a
6
VIII

FIG. 8

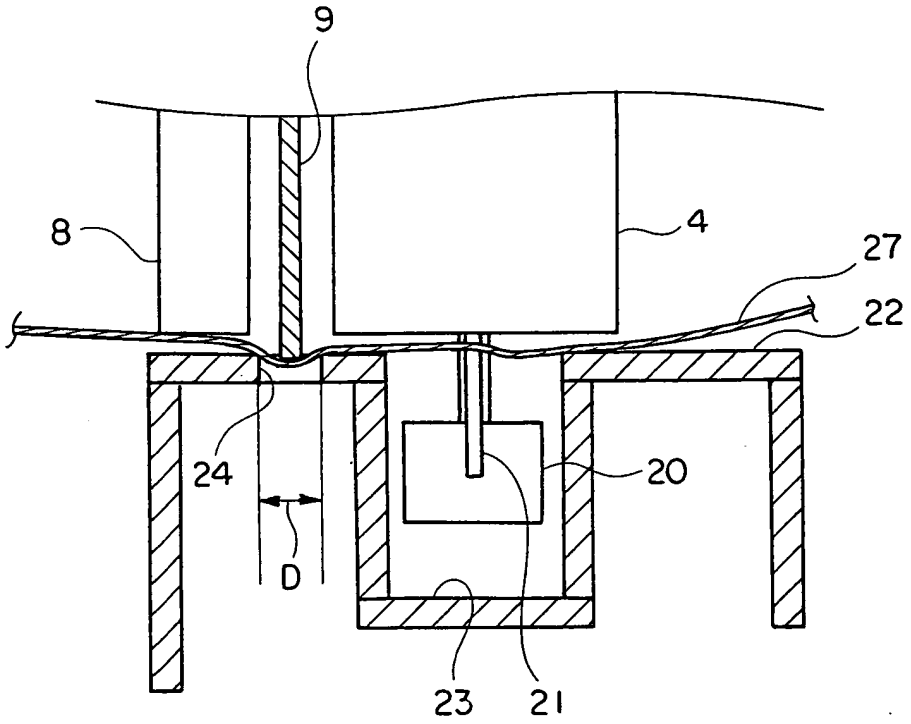


FIG. 9

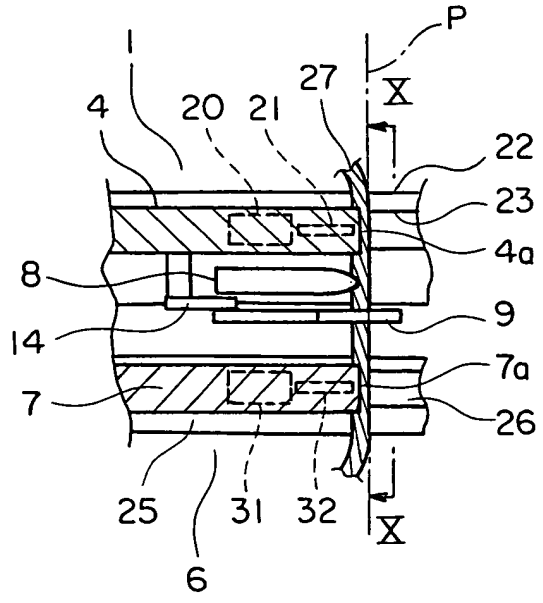
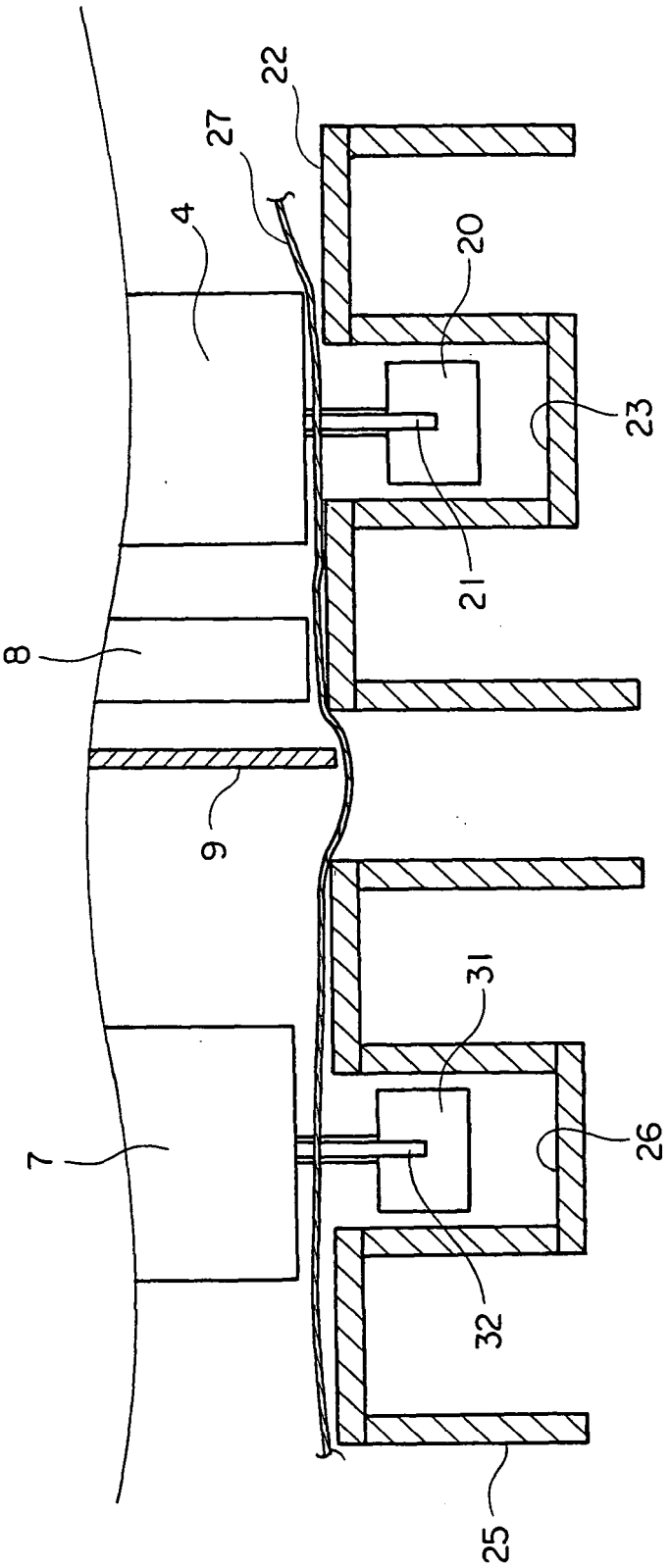


FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2005/018462

A. CLASSIFICATION OF SUBJECT MATTER
B66B13/26(2006.01)

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)
B66B13/00(2006.01)-***B66B13/30***(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2006
Kokai Jitsuyo Shinan Koho 1971-2006 Toroku Jitsuyo Shinan Koho 1994-2006

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 03-288787 A (Hitachi Elevator Service Kabushiki Kaisha), 18 December, 1991 (18.12.91), Page 2, upper right column; Figs. 1 to 2 (Family: none)	2-4 1
Y A	JP 2005-008383 A (Hitachi, Ltd.), 13 January, 2005 (13.01.05), Abstract; Fig. 1 (Family: none)	2-4 1
Y	JP 09-012254 A (Toshiba Corp.), 14 January, 1997 (14.01.97), Claim 1; Figs. 1 to 2 (Family: none)	3

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
04 July, 2006 (04.07.06)	11 July, 2006 (11.07.06)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2005/018462

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 107047/1987(Laid-open No. 012069/1989) (Hitachi Elevator Service Kabushiki Kaisha), 23 January, 1989 (23.01.89), Claim 1; Fig. 1 (Family: none)	4

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 5301692 A **[0003]**