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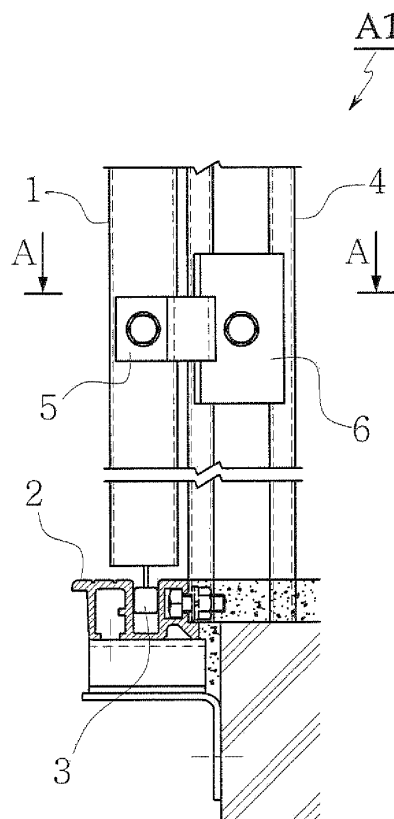
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(54) **ELEVATOR HOISTWAY DOOR SEPARATION PREVENTIVE STRUCTURE**

(57) An elevator hoistway door separation preventive structure is provided, which includes a first bracket formed on one end of a hoistway door arranged on a door frame, and a second bracket formed on one end of the door frame to correspond to the first bracket, wherein an end portion of the first bracket is bent toward the door frame to form a first stopper, and an end portion of the second bracket is bent to face the first stopper to form a second stopper, and the first and second stoppers are mutually engaged with each other when the hoistway door is closed.

FIG. 3



Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is based on and claims priority from Korean Patent Application No. 2008-0035954, filed on April 18, 2008, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by preference.

BACKGROUND OF THE INVENTION

Field of the invention

[0002] The present invention relates to an elevator hoistway door separation preventive structure, and more particularly to an elevator hoistway door separation preventive structure, which prevents opening of hoistway doors by an external force and accidents caused by such opening of the hoistway doors through reinforcement of a door closure force when the hoistway doors are in a closed state.

Description of the Prior Art

[0003] In general, elevator hoistway doors are installed in places where passengers can make direct contact with the doors rather than any other place of an elevator, and are exposed to passenger's mischief and accidents.

[0004] With reference to FIG. 1, hoistway doors LD and RD are installed in a hoistway portion of an elevator, and upper portions of the hoistway doors LD and RD are connected to connection plates 400 of a hoistway door device.

[0005] Also, the hoistway doors LD and RD have lower portions with respective shoes 100, and a sill 200, in which the shoes 100 are inserted and guided, is installed in the lower portions of the hoistway portion.

[0006] Accordingly, when the hoistway doors LD and RD are opened or closed by the driving of the hoistway door device, the door opening or closing operation is performed by operation of the connection plate 400 and guide operation of the shoes 100 and the sill 200.

[0007] That is, the hoistway door device may have a structure in which the hoistway doors are connected together through a wire 300 or the like in the hoistway door device and if one door (e.g. LD) is moved, the other door (e.g. RD), which receives force transferred through the wire 300, is opened or closed, or a structure in which the respective connection plates are driven to operate. When the hoistway doors are closed, the upper portions of the doors are fixed to the connection plates 400 which are connected together through the wire 300. However, according to this structure, the doors interlock with each other only when the doors move in the left or right direction, but on the rigidity or mass which supports the doors against pushing and lifting forces that occur when an impact is applied to a lower front surface of one door (e.g.

LD), the other door (e.g. RD) exerts no effect.

[0008] Accordingly, as illustrated in FIG. 2, if the door does not have sufficient rigidity when an abnormal impact is applied to the hoistway door LD or RD (as indicated by an arrow in FIG. 2) due to an unavoidable accident or the like, the bending of the door occurs greatly, and thus the shoe 100, which serves to guide the lower portion of the door, may be separated from a groove 210 of the sill 200.

SUMMARY OF THE INVENTION

[0009] Accordingly, the present invention has been made to solve the above-mentioned problems occurring in the related art while advantages achieved by the related art are maintained intact.

[0010] One subject to be achieved by the present invention is to provide an elevator hoistway door separation preventive structure, which prevents separation of hoistway doors by additionally installing an attachment on a side surface of a door, sill, a door frame and making the door locked onto the sill or door frame by the attachment when the hoistway door is bent and a shoe is to be separated from a groove of the sill or the hoistway door is pushed backward.

[0011] In one aspect of the present invention, there is provided an elevator hoistway door separation preventive structure, which includes a first bracket formed on one end of a hoistway door arranged on a door frame; and a second bracket formed on one end of the door frame to correspond to the first bracket; wherein an end portion of the first bracket is bent toward the door frame to form a first stopper, and an end portion of the second bracket is bent to face the first stopper to form a second stopper, and the first and second stoppers are mutually engaged with each other when the hoistway door is closed.

[0012] The second stopper may have a groove formed thereon to make the first stopper inserted therein.

[0013] In another aspect of the present invention, there is provided an elevator hoistway door separation preventive structure, which includes a third bracket formed on one end of a hoistway door arranged on a door frame; and a third stopper formed on an end portion of the third bracket to be bent toward the door frame; wherein the door frame has a groove formed thereon to receive the third stopper inserted into the groove.

[0014] In still another aspect of the present invention, there is provided an elevator hoistway door separation preventive structure, which includes a fourth bracket formed on one end of a hoistway door arranged on a door frame; and a fifth bracket formed on one end of the door frame to correspond to an upper portion that is upper than the fourth bracket; wherein a projection piece, which has a predetermined length and is positioned at a lower end of the fifth bracket, is formed at the front end of the fourth bracket.

[0015] In still another aspect of the present invention,

there is provided an elevator hoistway door separation preventive structure, including hoistway doors having lower portions on which shoes are installed, respectively, a sill formed on the lower portion of the door and having a groove formed thereon to guide the shoe, and an upper door frame formed on an upper portion of the door, which includes a sixth bracket installed on a side surface of the lower portion of the hoistway door and having a bent portion formed at the front end thereof; and a plate installed on a side surface of the sill so that the bent portion of the sixth bracket is locked onto the plate.

[0016] The bent portion may be in "U" shape seen from the above.

[0017] In still another aspect of the present invention, there is provided an elevator hoistway door separation preventive structure, including hoistway doors having lower portions on which shoes are installed, respectively, and a sill having a groove formed thereon to guide the shoe, which includes a seventh bracket installed on a side surface of the lower portion of the hoistway door and having a bent portion formed at the front end thereof; wherein an elongated groove is formed on a side surface of the sill so that the bent portion of the seventh bracket is locked in the groove.

[0018] The bent portion may be in "⌋" shape seen from the side.

[0019] In still another aspect of the present invention, there is provided an elevator hoistway door separation preventive structure, including hoistway doors having lower portions on which shoes are installed, respectively, and a sill having a groove formed thereon to guide the shoe, which includes an eighth bracket attached to a lower portion of the sill and having a front end portion supported on an outer surface of the lower portion of the hoistway door.

[0020] The eighth bracket may include a horizontal portion fastened to the lower surface of the sill by a bolt, a vertical portion connecting with the horizontal portion and being in contact with the side surface of the sill, and the front end portion formed to be bent from a front end of the vertical portion.

[0021] With the above-described construction, the elevator hoistway door separation preventing structure according to the present invention adopts an attachment for preventing the separation of the hoistway door in the sill even if a strong impact or force is applied to the hoistway door, and thus can prevent a user or a resident from falling into the shaft.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The above and other objects, features and advantages of the present invention will be more apparent from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a front view illustrating the structure of a general elevator;

FIG. 2 is a view illustrating hoistway door separating process of an elevator in the related art;

FIGS. 3 and 4 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a first embodiment of the present invention;

FIGS. 5 and 6 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a modification of the first embodiment of the present invention;

FIGS. 7 and 8 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a second embodiment of the present invention;

FIGS. 9 and 10 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a third embodiment of the present invention;

FIGS. 11 and 12 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a fourth embodiment of the present invention;

FIGS. 13 and 14 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a fifth embodiment of the present invention;

FIGS. 15 and 16 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a sixth embodiment of the present invention;

FIG. 17 is a front view illustrating an elevator hoistway door separation preventive structure according to a seventh embodiment of the present invention;

FIG. 18 is a side view illustrating an elevator hoistway door separation preventive structure according to a seventh embodiment of the present invention;

FIG. 19 is a side view and a plan view illustrating an elevator hoistway door separation preventive structure according to a seventh embodiment of the present invention;

FIG. 20 is a front view illustrating an elevator hoistway door separation preventive structure according to an eighth embodiment of the present invention;

FIG. 21 is a side view illustrating an elevator hoistway door separation preventive structure according to an eighth embodiment of the present invention; and

FIG. 22 is a side view illustrating an elevator hoistway door separation preventive structure according to an eighth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0023] Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings.

[0024] FIGS. 3 and 4 are a front view and a plan view illustrating an elevator hoistway door separation preven-

tive structure according to a first embodiment of the present invention.

[0025] As illustrated in FIGS. 3 and 4, an elevator hoistway door separation preventive structure according to a first embodiment A1 of the present invention includes a first bracket 5 formed on one end of a hoistway door 1 arranged on a door frame 4, and a second bracket 6 formed on one end of the door frame 4 to correspond to the first bracket 5. An end portion of the first bracket 5 is bent toward the door frame 4 to form a first stopper 51, an end portion of the second bracket 6 is bent to face the first stopper 51 to form a second stopper 62, and thus the first and second stoppers 51 and 62 are mutually engaged with each other when the hoistway door 1 is closed.

[0026] Accordingly, when the hoistway door 1 is to be bent and pushed by an impact that is applied thereto, the bending and the pushing of the hoistway door 1 are suppressed by the locking between the first and second brackets 5 and 6 attached to the side surfaces of the hoistway door 1 and the door frame 4, and thus the shoe 3 is not separated from the sill 2.

[0027] FIGS. 5 and 6 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a modification of the first embodiment of the present invention.

[0028] As illustrated in FIGS. 5 and 6, an elevator hoistway door separation preventive structure according to a modification A1' of the first embodiment A1 of the present invention includes a first bracket 5 formed on one end of a hoistway door 1 arranged on a door frame 4, and a second bracket 6 formed on one end of the door frame 4 to correspond to the first bracket 5. An end portion of the first bracket 5 is bent toward the door frame 4 to form a first stopper 51, an end portion of the second bracket 6 is bent to face the first stopper 51 to form a second stopper 62, and a groove 80 for inserting the first stopper 51 therein is further formed on the second stopper 62.

[0029] Accordingly, when the hoistway door 1 is to be bent and pushed by an impact that is applied thereto, the bending and the pushing of the hoistway door 1 are suppressed by the locking between the second brackets 6 attached to the side surfaces of the hoistway door 1 and the door frame 4, and thus the shoe 3 is not separated from the sill 2.

[0030] FIGS. 7 and 8 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a second embodiment of the present invention.

[0031] As illustrated in FIGS. 7 and 8, an elevator hoistway door separation preventive structure according to a second embodiment A2 of the present invention includes a third bracket 9 formed on one end of a hoistway door 1 arranged on a door frame 4 and a third stopper 93 formed on an end portion of the third bracket 9 to be bent toward the door frame 4. The door frame 4 has a groove 40 formed thereon to receive the third stopper 93 inserted into the groove.

[0032] Accordingly, when the hoistway door 1 is closed, the third stopper 93 is locked in the groove 40. Accordingly, when the hoistway door 1 is to be bent and pushed by an impact that is applied thereto, the bending, the pushing, and the lifting of the hoistway door 1 are suppressed by the locking between the third bracket 93 installed on the side surface of the hoistway door 1 and the groove 40 formed on the side surface of the door frame 4, and thus the shoe 3 is not separated from the sill 2.

[0033] FIGS. 9 and 10 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a third embodiment of the present invention.

[0034] As illustrated in FIGS. 9 and 10, an elevator hoistway door separation preventive structure according to a third embodiment A3 of the present invention includes a fourth bracket 10 formed on one end of a hoistway door 1 arranged on a door frame 4, and a fifth bracket 11 formed on one end of the door frame 4 to correspond to an upper portion that is upper than the fourth bracket 10. A projection piece 101, which has a predetermined length and is positioned at a lower end of the fifth bracket 11, is formed at the front end of the fourth bracket 4.

[0035] Accordingly, when the hoistway door 1 is bent by an impact and the shoe 3 in the lower end of the hoistway door 1 is to be separated from the sill 2 and to move upward, the lifting of the hoistway door 1 is suppressed by the locking between the fourth and fifth brackets 10 and 11 installed on the side surfaces of the hoistway door 1 and the door frame 4, and thus the shoe 3 is not separated from the sill 2.

[0036] FIGS. 11 and 12 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a fourth embodiment of the present invention.

[0037] As illustrated in FIGS. 11 and 12, an elevator hoistway door separation preventive structure according to a fourth embodiment A4 of the present invention includes hoistway doors 1 having lower portions on which shoes 3 are installed, respectively, a sill 2 formed on the lower portion of the door 1 and having a groove formed thereon to guide the shoe 3, an upper door frame 20 formed on an upper portion of the door, a sixth bracket 12 installed on a side surface of the lower portion of the hoistway door 1 and having a bent portion 122 formed at the front end thereof, and a plate 13 installed on a side surface of the sill 2 so that the bent portion 122 of the sixth bracket 12 is locked onto the plate 13.

[0038] The bent portion 122 may be in "U" shape seen from the above.

[0039] Also, on the upper door frame 20, the (5-1)th bracket 30 is installed, which projects downward and supports an outer surface of the upper portion of the hoistway door 1.

[0040] The (6-1)th bracket 30 is fastened to the outer surface of the upper door frame 20 by a bolt, has a front end portion 33 having a bent lower end and being in con-

tact with the outer surface of the hoistway door 1.

[0041] Accordingly, when the hoistway door 1 is to be bent and pushed by an impact, the pushing of the hoistway door 1 is suppressed by the locking between the sixth bracket 12 installed on the side surface of the door 1 and the plate 13 on the side surface of the sill 2, and the support of the front end portion 33 of the (6-1)th bracket 30 onto the upper surface of the door 1, thus the shoe 3 is not separated from the sill 2.

[0042] FIGS. 13 and 14 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a fifth embodiment of the present invention.

[0043] As illustrated in FIGS. 13 and 14, an elevator hoistway door separation preventive structure according to a fifth embodiment A5 of the present invention includes hoistway doors 1 having lower portions on which shoes 3 are installed, respectively, a sill 2 having a groove formed thereon to guide the shoe 3, and a seventh bracket 14 installed on a side surface of the lower portion of the hoistway door 1 and having a bent portion 142 formed at the front end thereof, wherein an elongated groove 28 is formed on a side surface of the sill 2 so that the bent portion 142 of the seventh bracket 14 is locked in the groove.

[0044] The bent portion is in "⊃" shape seen from the side.

[0045] Accordingly, when the hoistway door 1 is to be bent and pushed by an impact, the pushing and the lifting of the hoistway door 1 are suppressed by the locking between the seventh brackets 14 installed on the side surface of the hoistway door 1 and the elongated groove 28 on the side surface of the sill 2, and thus the shoe 3 is not separated from the sill 2.

[0046] FIGS. 15 and 16 are a front view and a plan view illustrating an elevator hoistway door separation preventive structure according to a sixth embodiment of the present invention.

[0047] As illustrated in FIGS. 15 and 16, an elevator hoistway door separation preventive structure according to a sixth embodiment A6 of the present invention includes hoistway doors 1 having lower portions on which shoes 3 are installed, respectively, a sill 2 having a groove formed thereon to guide the shoe 3, and an eighth bracket 15 attached to a lower portion of the sill 2 and having a front end portion 154 supported on an outer surface of the lower portion of the hoistway door 1.

[0048] The eighth bracket 15 includes a horizontal portion 152 fastened to the lower surface of the sill 2 by a bolt, a vertical portion 153 connecting with the horizontal portion 152 and being in contact with the side surface of the sill 2, and the front end portion 154 formed to be bent from a front end of the vertical portion 153.

[0049] Accordingly, when the hoistway door 1 is to be pushed by an impact, the shoe 3 is not separated from the sill 2 by the locking between the eighth bracket 15 installed on the side surface of the sill 2 and the hoistway door 1.

[0050] FIG. 17 is a front view illustrating an elevator hoistway door separation preventive structure according to a seventh embodiment of the present invention, FIG. 18 is a side view illustrating an elevator hoistway door separation preventive structure according to a seventh embodiment of the present invention, and FIG. 19 is a side view and a plan view illustrating an elevator hoistway door separation preventive structure according to a seventh embodiment of the present invention.

[0051] AS illustrated in FIGS. 17 to 19, an elevator hoistway door separation preventive structure according to a seventh embodiment A7 of the present invention includes hoistway doors 1 having lower portions on which shoes 3 are installed, respectively, a sill 2 having a groove formed thereon to guide the shoe 3, a ninth bracket 16 installed on the side surface of the lower portion of the hoistway door 1 and having a "J"-shaped stopper 160 formed on the front end thereof, and a stopper bracket 17 attached to the side surface of the sill 2 and having a groove 170 formed thereon to lock the stopper 17 of the ninth bracket 16.

[0052] Accordingly, when the hoistway door 1 is closed, the stopper 160 of the ninth bracket 16 is inserted into the groove 170 of the stopper bracket 17 to be in a locked state.

[0053] FIG. 20 is a front view illustrating an elevator hoistway door separation preventive structure according to an eighth embodiment of the present invention, FIG. 21 is a side view illustrating an elevator hoistway door separation preventive structure according to an eighth embodiment of the present invention, and FIG. 22 is a side view illustrating an elevator hoistway door separation preventive structure according to an eighth embodiment of the present invention.

[0054] AS illustrated in FIGS. 20 to 22, an elevator hoistway door separation preventive structure according to an eighth embodiment A8 of the present invention includes hoistway doors 1, an upper door frame 20 for guiding the hoistway doors 1, an eleventh stopper bracket 19 formed on the side surface of the upper portion of the hoistway door 1 and having a stepped portion 191 formed at the front end thereof, and a tenth bracket 21 installed on the upper door frame 20 and having a "I"-shaped vertical end portion 212 formed at the front end thereof to lock in the eleventh stopper bracket 19.

[0055] Accordingly, when the hoistway door 1 is closed, the stepped portion 191 formed at the front end of the eleventh stopper bracket 19 is inserted into the vertical end portion 212 of the tenth bracket 21 to be in a locked state.

[0056] Although preferred embodiments of the present invention have been described for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

1. An elevator hoistway door separation preventive structure, comprising:

a first bracket formed on one end of a hoistway door arranged on a door frame; and
 a second bracket formed on one end of the door frame to correspond to the first bracket;
 wherein an end portion of the first bracket is bent toward the door frame to form a first stopper, and an end portion of the second bracket is bent to face the first stopper to form a second stopper, and
 the first and second stoppers are mutually engaged with each other when the hoistway door is closed.

2. The hoistway door separation preventing structure according to claim 1, wherein the second stopper has a groove formed thereon to make the first stopper inserted therein.

3. An elevator hoistway door separation preventive structure, comprising:

a third bracket formed on one end of a hoistway door arranged on a door frame; and
 a third stopper formed on an end portion of the third bracket to be bent toward the door frame;
 wherein the door frame has a groove formed thereon to receive the third stopper inserted into the groove.

4. An elevator hoistway door separation preventive structure, comprising:

a fourth bracket formed on one end of a hoistway door arranged on a door frame; and
 a fifth bracket formed on one end of the door frame to correspond to an upper portion that is upper than the fourth bracket;
 wherein a projection piece, which has a predetermined length and is positioned at a lower end of the fifth bracket, is formed at the front end of the fourth bracket.

5. An elevator hoistway door separation preventive structure including hoistway doors having lower portions on which shoes are installed, respectively, a sill formed on the lower portion of the door and having a groove formed thereon to guide the shoe, and an upper door frame formed on an upper portion of the door, comprising:

a sixth bracket installed on a side surface of the lower portion of the hoistway door and having a bent portion formed at the front end thereof; and

a plate installed on a side surface of the sill so that the bent portion of the sixth bracket is locked onto the plate.

6. The hoistway door separation preventing structure according to claim 5, wherein the bent portion is in "U" shape seen from the above.

7. The hoistway door separation preventing structure according to claim 5, further comprising a (6-1)th bracket which is installed on the upper door frame, projects downward, and supports an outer surface of the upper portion of the hoistway door; wherein the (6-1)th bracket is fastened to the outer surface of the upper door frame, and has a front end portion having a bent lower end and being in contact with the outer surface of the hoistway door.

8. An elevator hoistway door separation preventive structure including hoistway doors having lower portions on which shoes are installed, respectively, and a sill having a groove formed thereon to guide the shoe, comprising:

a seventh bracket installed on a side surface of the lower portion of the hoistway door and having a bent portion formed at the front end thereof; wherein an elongated groove is formed on a side surface of the sill so that the bent portion of the seventh bracket is locked in the groove.

9. The hoistway door separation preventing structure according to claim 8, wherein the bent portion is in "⌋" shape seen from the side.

10. An elevator hoistway door separation preventive structure including hoistway doors having lower portions on which shoes are installed, respectively, and a sill having a groove formed thereon to guide the shoe, comprising:

an eighth bracket attached to a lower portion of the sill and having a front end portion supported on an outer surface of the lower portion of the hoistway door.

11. The hoistway door separation preventing structure according to claim 10, wherein the eighth bracket comprises a horizontal portion fastened to the lower surface of the sill by a bolt, a vertical portion connecting with the horizontal portion and being in contact with the side surface of the sill, and the front end portion formed to be bent from a front end of the vertical portion.

12. An elevator hoistway door separation preventive structure including hoistway doors having lower portions on which shoes are installed, respectively, and

a sill having a groove formed thereon to guide the shoe, comprising:

a ninth bracket installed on the side surface of the lower portion of the hoistway door and having a "J"-shaped stopper formed on the front end thereof; and
a stopper bracket attached to the side surface of the sill and having a groove formed thereon to lock the stopper of the ninth bracket;
wherein when the hoistway door is closed, the stopper of the ninth bracket is inserted into the groove of the stopper bracket to be in a locked state.

13. An elevator hoistway door separation preventive structure including hoistway doors, and an upper door frame for guiding the hoistway doors, comprising:

an eleventh stopper bracket formed on the side surface of the upper portion of the hoistway door and having a stepped portion formed at the front end thereof; and
a tenth bracket installed on the upper door frame and having a "T"-shaped vertical end portion formed at the front end thereof to lock in the eleventh stopper bracket;
wherein when the hoistway door is closed, the stepped portion formed at the front end of the eleventh stopper bracket is inserted into the vertical end portion of the tenth bracket to be in a locked state.

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FIG. 1

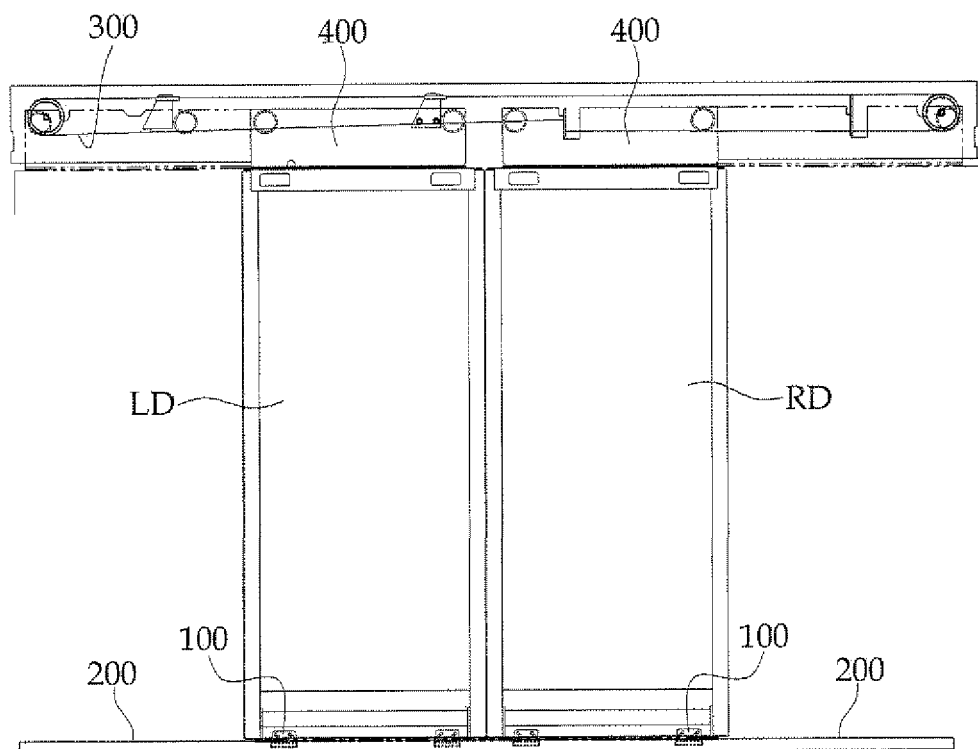


FIG. 2

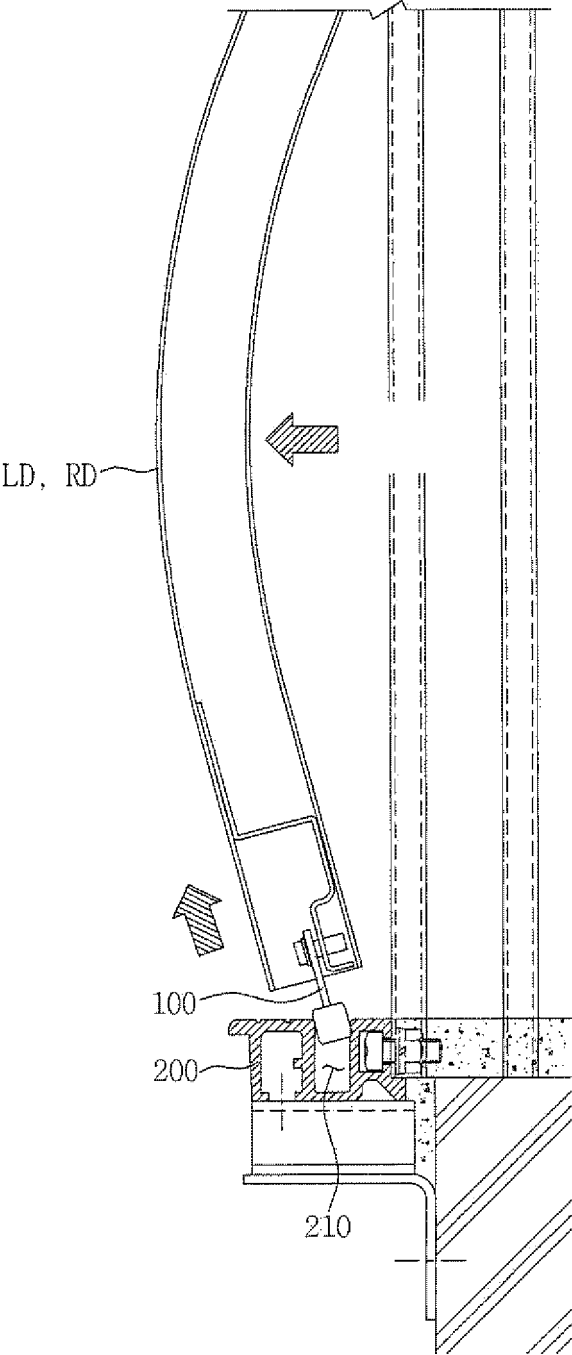


FIG. 3

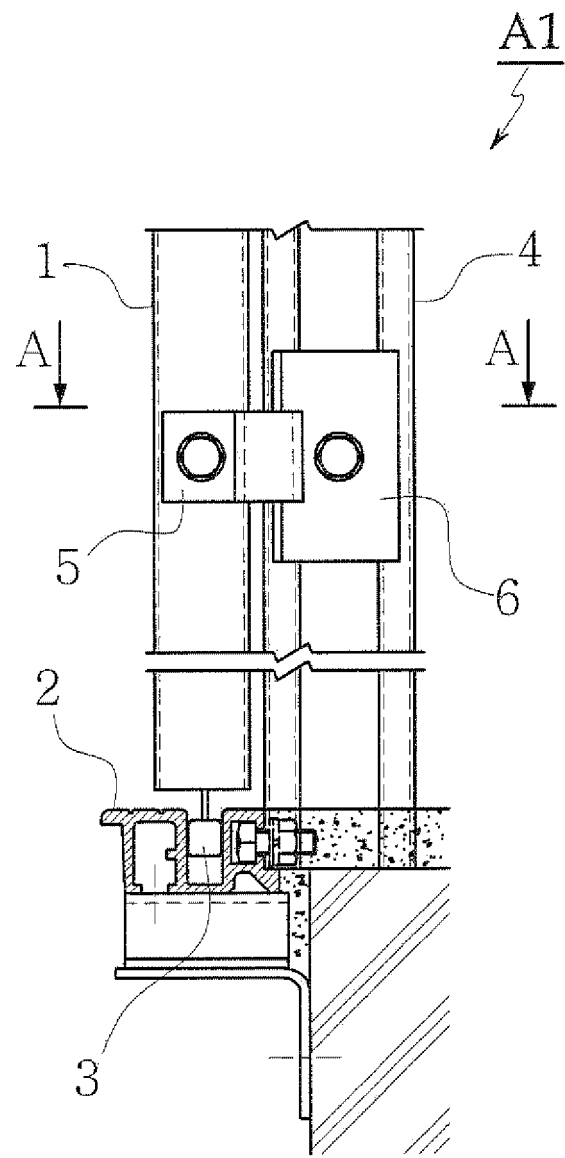


FIG. 4

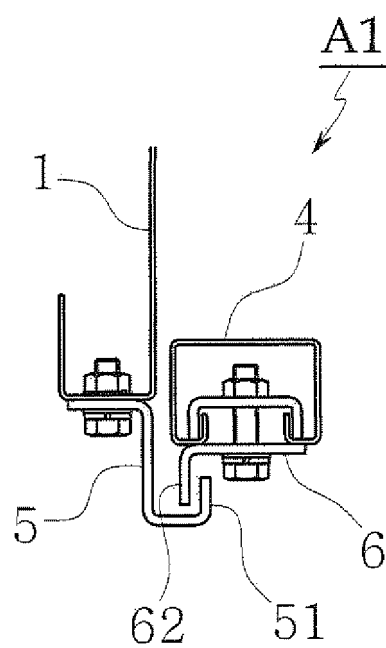


FIG. 5

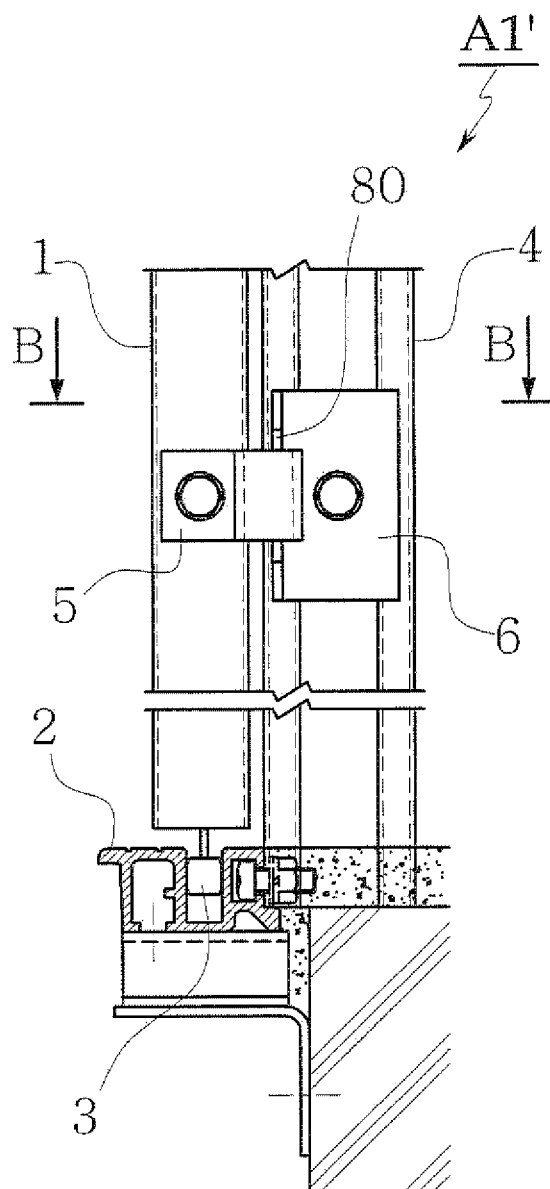


FIG. 6

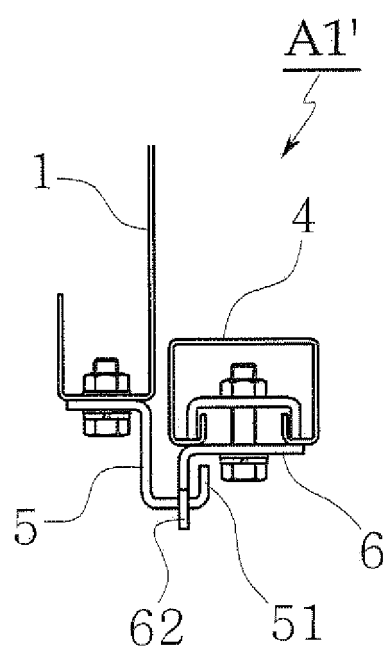


FIG. 7

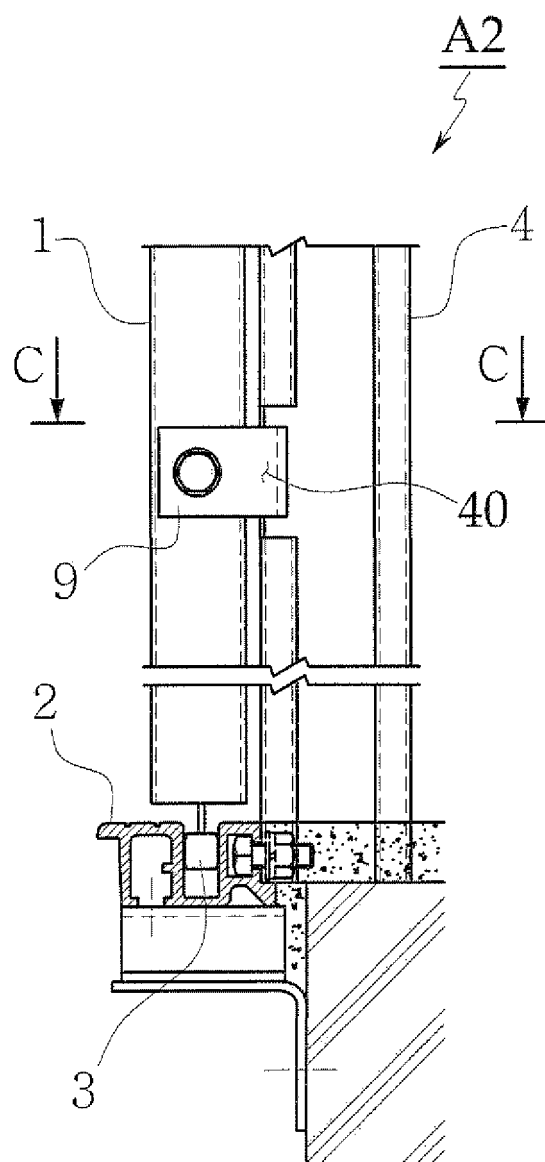


FIG. 8

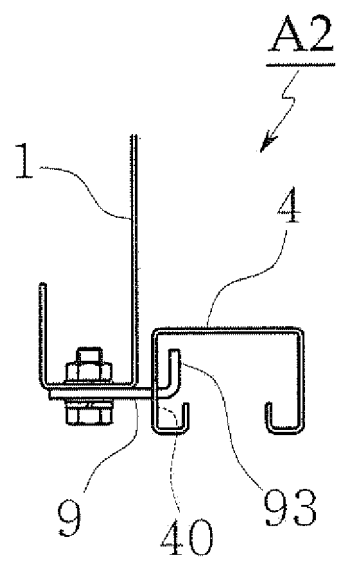


FIG. 9

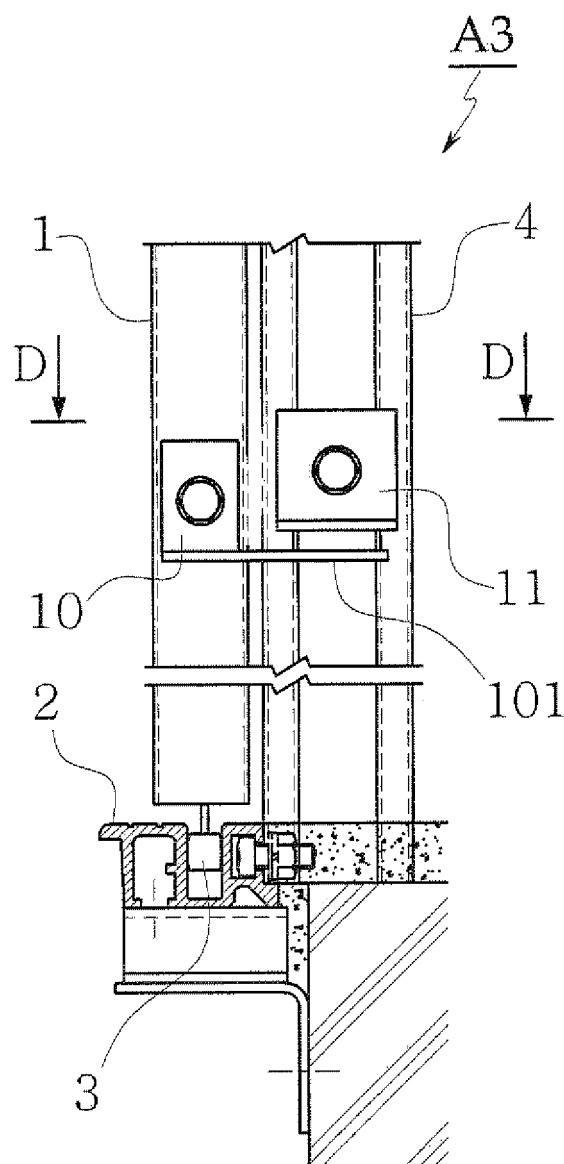


FIG. 10

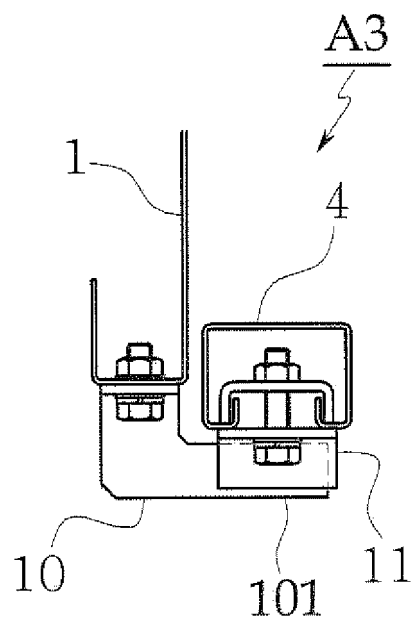


FIG. 11

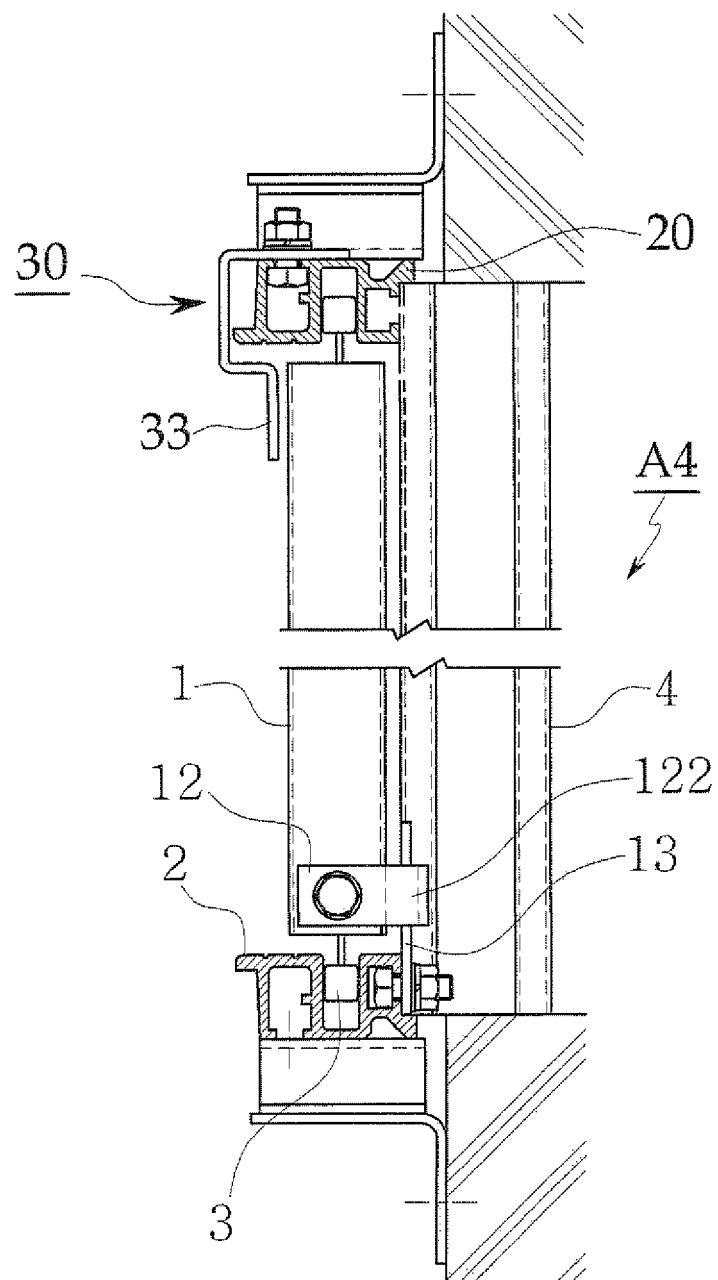


FIG. 12

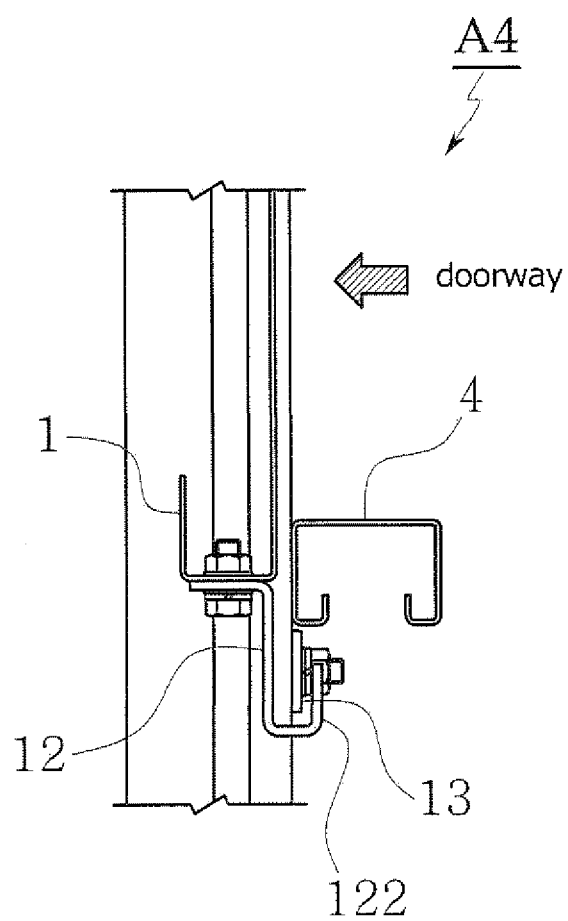


FIG. 13

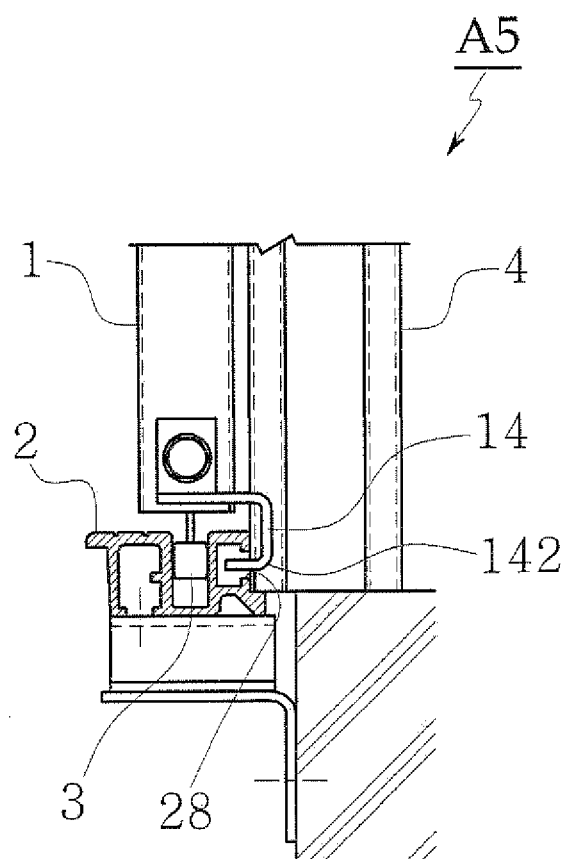


FIG. 14

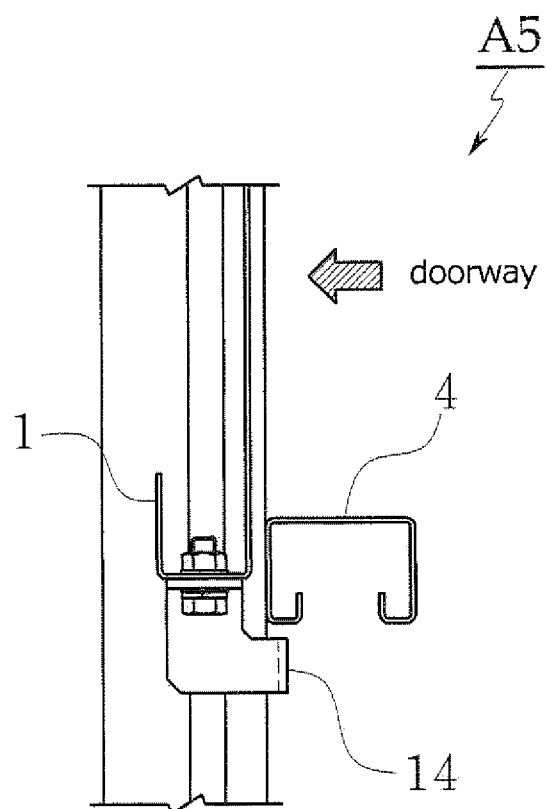


FIG. 15

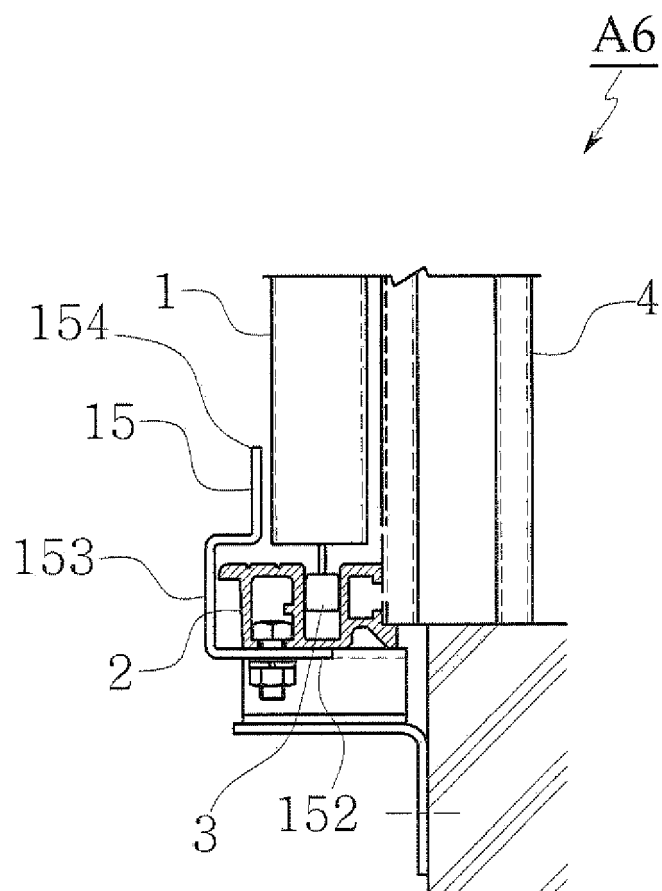


FIG. 16

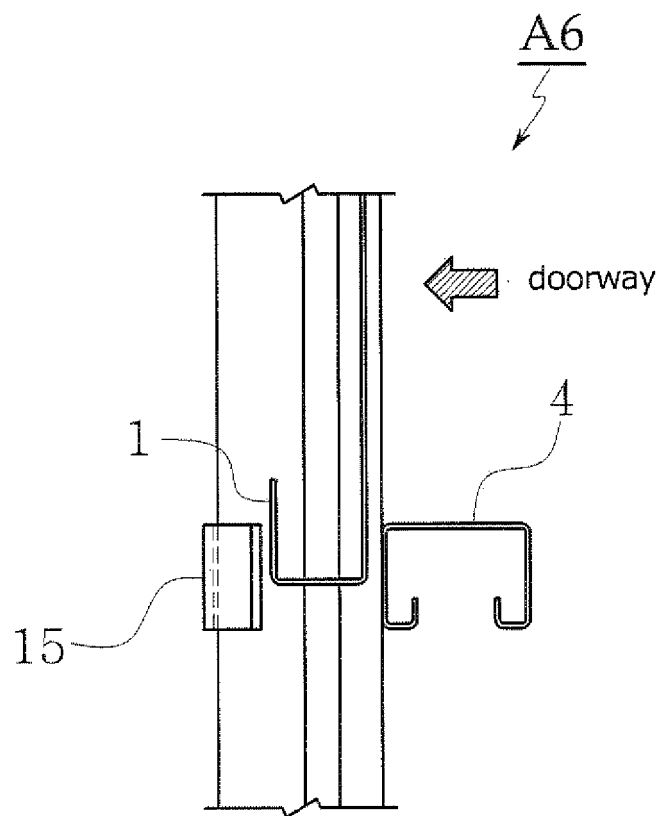


FIG. 17

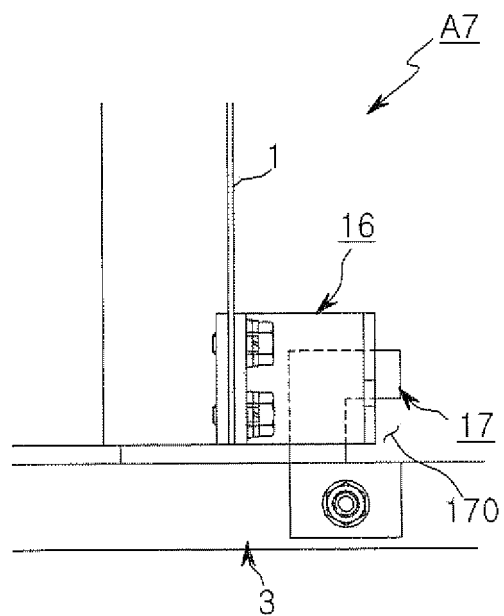


FIG. 18

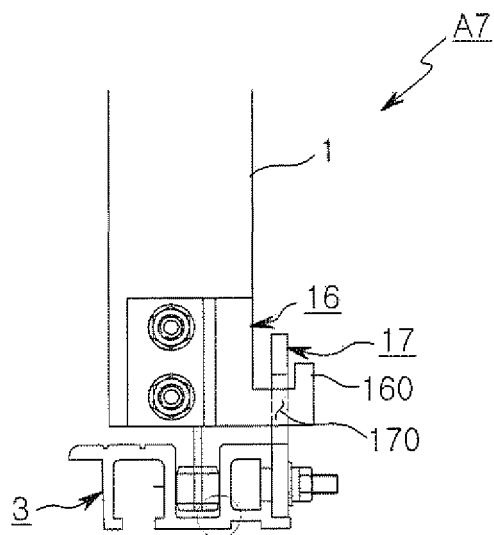


FIG. 19

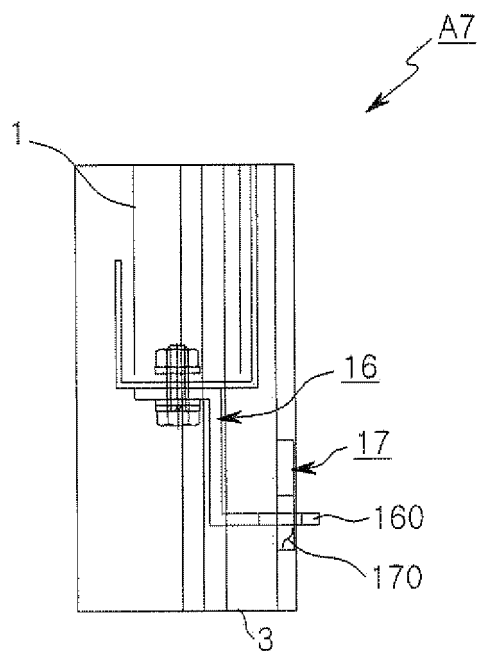


FIG. 20

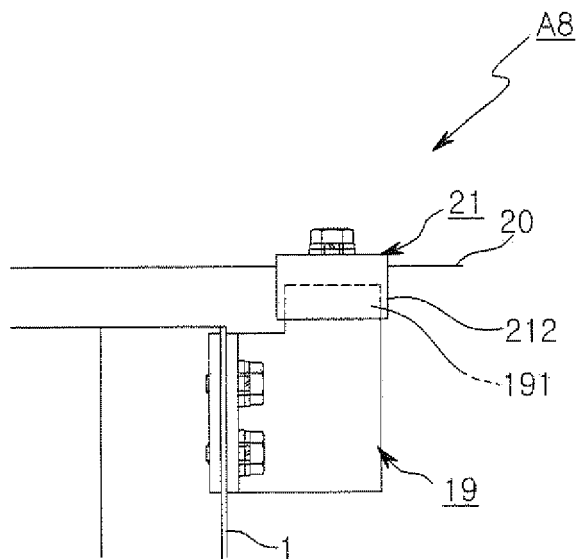


FIG. 21

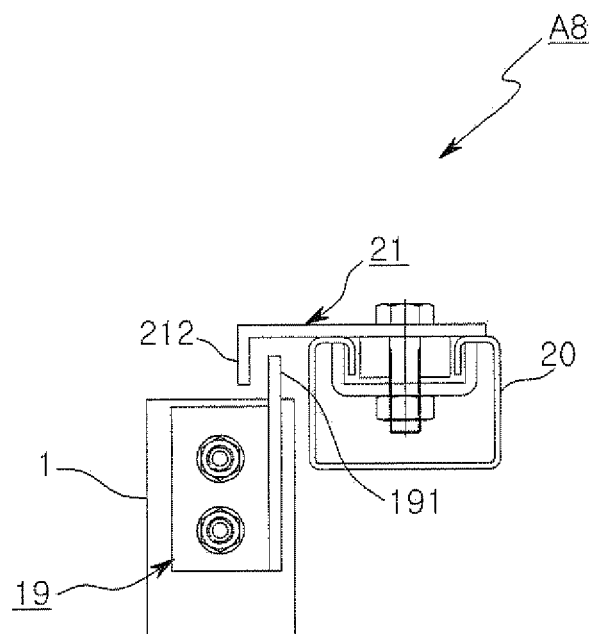
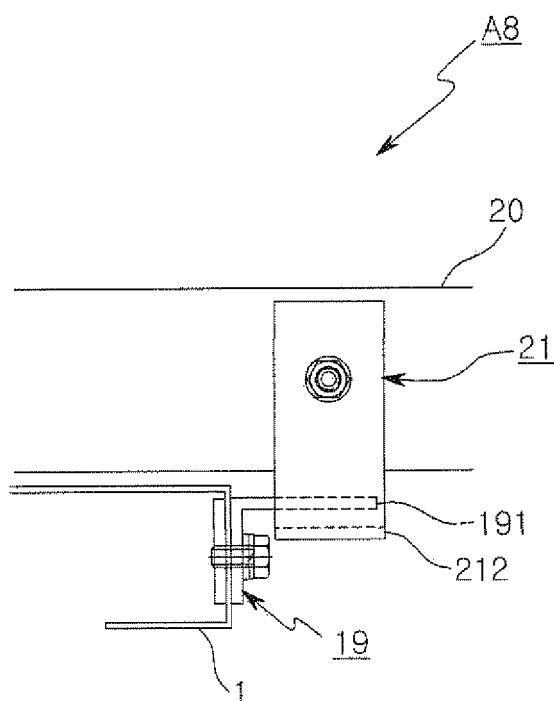


FIG. 22



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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