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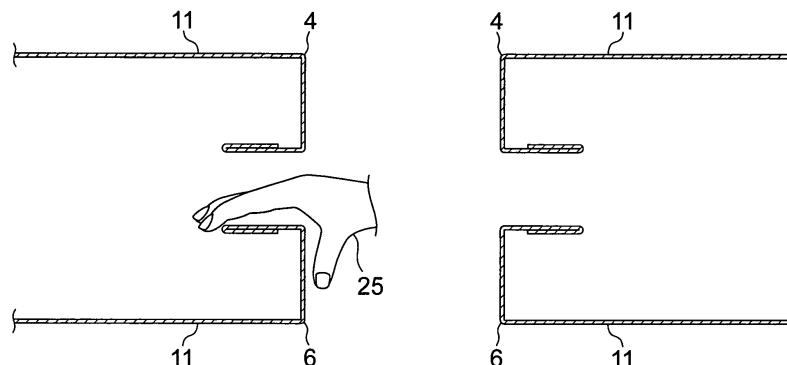
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(54) **ELEVATOR DOOR**

(57) A doorway of an elevator is opened/closed by a door for the elevator. The door for the elevator has a panel member and a back member provided on a back side of the panel member. The panel member and the back member are continuous with each other at each end of a door panel in a width direction thereof. The panel member and the back member are continuous with each other in a region that is formed by bending a board. The back member has a back-side superposition portion su-

perposed on a back surface of the panel member. Thus, the door panel can be manufactured with ease simply by bending the board. A strength of the door panel can be ensured as well through reinforcement resulting from the bending of the board and reinforcement due to the back member. In addition, even in a case where, for example, one hand of a passenger is inserted into a back side of the door panel, the passenger can be prevented from having this hand cut by the door panel.

FIG. 4



Description

Technical Field

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

Background Art

[0002] Conventionally, with a view to ensuring a desired strength, there is proposed a board body for an elevator with a plurality of reinforcing protrusion strips provided on a back surface of a panel. The reinforcing protrusion strips are integrated with the panel by injection molding or the like. A thin board made of a noncombustible material, which covers the back surface of the panel, is fitted on protrusion ends of the reinforcing protrusion strips (see Patent Document 1).

[0003] Patent Document 1: JP 06-321463 A

Disclosure of the Invention

Problem to be solved by the Invention

[0004] However, in the conventional board body for the elevator constructed as described above, the panel in a complicated shape needs to be manufactured by the injection molding, or the like, unless otherwise the cost of manufacturing cannot be reduced with ease.

[0005] The present invention has been made to solve the above-mentioned problem, and it is therefore an object of the present invention to provide a door for an elevator which makes it possible to reduce the manufacturing costs.

Means for solving the Problems

[0006] A door for an elevator according to the present invention is equipped with a door panel having a panel member and a back member provided on a back side of the panel member, and has a structure in which the panel member and the back member are continuous with each other at each end of the door panel in a width direction thereof. In the door for an elevator, the panel member and the back member are continuous with each other in a region that is formed by bending a board, and the back member has a back-side superposition portion superposed on a back surface of the panel member.

Brief Description of the Drawings

[0007]

Fig. 1 is a horizontal sectional view showing an elevator according to Embodiment 1 of the present invention.

Fig. 2 is a front view showing a landing doorway as viewed from a hoistway side of Fig. 1.

Fig. 3 is a horizontal sectional view showing one of door panels of Fig. 2.

Fig. 4 is a horizontal sectional view showing a state in which one hand of a passenger is inserted between one of car doors of Fig. 1 and a corresponding one of landing doors of Fig. 1.

Fig. 5 is a horizontal sectional view showing an essential part of another example of a door panel according to Embodiment 1 of the present invention.

Fig. 6 is a horizontal sectional view showing a door panel according to Embodiment 2 of the present invention.

Best Modes for carrying out the Invention

[0008] Preferred embodiments of the present invention will be described hereinafter with reference to the drawings.

Embodiment 1

[0009] Fig. 1 is a horizontal sectional view showing an elevator according to Embodiment 1 of the present invention. Referring to Fig. 1, a car 2, which is raised/lowered within a hoistway 1, is provided with a car doorway 3 and a pair of car doors 4 for opening/closing the car doorway 3. The car doors 4 are moved in a reciprocating manner in the direction of a frontage of the car doorway 3 due to a driving force of a door driving device (not shown) mounted on the car 2. Thus, the car doorway 3 is opened/closed.

[0010] A landing at each floor is provided with a landing doorway 5 and a pair of landing doors 6 for opening/closing the landing doorway 5. The car doorway 3 is opposed to the landing doorway 5 when the car 2 is stopped at each floor. Each of the landing doors 6 is moved in a reciprocating manner in the direction of a frontage of the landing doorway 5 while being engaged with a corresponding one of the car doors 4 through an engagement device (not shown). Thus, the landing doorway 5 is opened/closed.

[0011] A doorway of the elevator is constituted by the car doorway 3 and the landing doorway 5. A door for the elevator is constituted by the car doors 4 and the landing doors 6.

[0012] Fig. 2 is a front view showing the landing doorway 5 as viewed from the hoistway 1 side of Fig. 1. Referring to Fig. 2, a landing-side hanger case 7 is provided in an upper portion of the landing doorway 5. The landing-side hanger case 7 is provided with a landing-side door rail 8 extending in the direction of the frontage of the landing doorway 5. The landing doors 6 are suspended by the landing-side door rail 8. The landing doors 6 are moved along the landing-side door rail 8. A landing sill 9 is provided on a lower portion of the landing doorway 5. The landing sill 9 is provided with a sill groove 10 extend-

ing in the direction of the frontage of the landing doorway 5.

[0013] Each of the landing doors 6 has a corresponding one of door panels 11, a corresponding one of door hangers 12, and corresponding ones of a plurality of door legs 13. Each of the door hangers 12 is provided on an upper portion of a corresponding one of the door panels 11. Each of the door legs 13 is provided on a lower portion of a corresponding one of the door panels 11. The door hangers 12 are hung on the landing-side door rail 8. The respective door legs 13 are inserted in the sill groove 10 of the landing sill 9.

[0014] A car-side hanger case (not shown) is provided in an upper portion of the car doorway 3. The car-side hanger case is provided with a car-side door rail (not shown) extending in the direction of the frontage of the car doorway 3. The car doors 4 are suspended by the car-side door rail. The car doors 4 are moved along the car-side door rail. A car sill (not shown) is provided on a lower portion of the car doorway 3. The car sill is provided with a sill groove (not shown) extending in the direction of the frontage of the car doorway 3.

[0015] The car doors 4 are constructed in the same manner as the landing doors 6. Door hangers of the car doors 4 are hung on the car-side door rail. In addition, door legs of the car doors 4 are inserted in the sill groove of the car sill.

[0016] Fig. 3 is a horizontal sectional view showing one of the door panels 11 of Fig. 2. Referring to Fig. 3, the door panel 11 has a panel member 14 and a back member 15 provided on a back side of the panel member 14. The panel member 14 and the back member 15 are continuous with each other at each end of the door panel 11 in a width direction thereof. The door panel 11 is formed by bending a single board (e.g., steel plate).

[0017] The panel member 14 has a panel front board 16 forming a designed surface, and a pair of opposed portions 17 and 18 provided at both ends, respectively, of the panel front board 16 in a width direction thereof and opposed to each other on a back side of the panel front board 16. One of the opposed portions 17 is provided at a door-closing side end (door abutment side end) of the door panel 11, and the other opposed portion 18 is provided at a door-opening side end (door pocket side end) of the door panel 11.

[0018] The opposed portion 17 has a panel perpendicular portion 17a extending from a door-closing side end of the panel front board 16 in a thickness direction of the door panel 11, and a panel parallel portion 17b extending from a tip of the panel perpendicular portion 17a (distal end of panel perpendicular portion 17a with respect to panel front board 16) toward a center of the door panel 11. The opposed portion 18 has a panel perpendicular portion 18a extending from a door-opening side end of the panel front board 16 in the thickness direction of the door panel 11, and a panel parallel portion 18b extending from a tip of the panel perpendicular portion 18a (distal end of panel perpendicular portion 18a with respect to

panel front board 16) toward the center of the door panel 11.

[0019] The back member 15 is constituted by a first back member 19 continuous with the panel member 14 at the door-closing side end of the door panel 11, and a second back member 20 continuous with the panel member 14 at the door-opening side end of the door panel 11. A region where the first back member 19 and the panel member 14 are continuous with each other and a region where the second back member 20 and the panel member 14 are continuous with each other are formed by hemming, namely, folding back a board approximately at 180°.

[0020] The first back member 19 is a back-side superposition portion superposed entirely on a back surface of the panel member 14. In this example, the first back member 19 is superposed only on the panel parallel portion 17b.

[0021] The second back member 20 has a back-side superposition portion 21 superposed on the back surface of the panel member 14, and a back-side open-away portion 22 provided on the back-side superposition portion 21 and opened away from the panel member 14.

[0022] The back-side superposition portion 21 has a superposition parallel portion 21a extending from an end of the opposed portion 18 toward the panel perpendicular portion 18a along the panel parallel portion 18b, a superposition perpendicular portion 21b extending from a tip of the superposition parallel portion 21a (proximal end of superposition parallel portion 21a with respect to panel perpendicular portion 18a) toward the panel front board 16 along the panel perpendicular portion 18a, and a superposition front board portion 21c extending from a tip of the superposition perpendicular portion 21b (proximal end of superposition perpendicular portion 21b with respect to panel front board 16) toward the center of the door panel 11 along the panel front board 16. The superposition front board portion 21c has a predetermined horizontal dimension that is smaller than a horizontal dimension of the panel front board 16.

[0023] The back-side open-away portion 22 has an open-away perpendicular portion 22a extending from a tip of the superposition front board portion 21c (proximal end of superposition front board portion 21c with respect to the door-closing side end of door panel 11) in the thickness direction of the door panel 11, and an open-away parallel portion 22b extending from a tip of the open-away perpendicular portion 22a (distal end of open-away perpendicular portion 22a with respect to panel front board 16) toward the door-closing side.

[0024] The door panel 11 is manufactured by forming the door-closing side end thereof and the door-opening side end thereof in the following manner.

[0025] That is, one end of a single steel plate is folded back by hemming, and the folded-back portion of the steel plate is used as the first back member 19. After that, the steel plate is bent in a region thereof on which the first backmember 19 is not superposed, so the opposed por-

tion 17 is formed. In this manner, the door-closing side end of the door panel 11 is formed.

[0026] The other end of the steel plate is bent to form the back-side open-away portion 22, and that region of the steel plate which includes the back-side open-away portion 22 is then folded back by hemming. After that, superposed regions obtained by folding back the steel plate are bent together to form the opposed portion 18 and the back-side superposition portion 21. In this manner, the door-opening side end of the door panel 11 is formed.

[0027] That is, the door-closing side end of the door panel 11 has a single bending structure obtained by bending the single panel member 14, and the door-opening side end of the door panel 11 has a superposition bending structure obtained by bending the panel member 14 and the back-side superposition portion 21 together.

[0028] In the superposition bending structure, the panel member 14 and the back-side superposition portion 21 are bent together, so the panel member 14 is bent more gently than the back-side superposition portion 21. Accordingly, adoption of the superposition bending structure leads to a deterioration in the design of the door panel 11. For this reason, the superposition bending structure is preferably applied only to the door-opening side end of the door panel 11, which is constantly concealed in a lateral portion of the doorway of the elevator.

[0029] In the door for the elevator constructed as described above, the panel member 14 and the back member 15 are continuous with each other at each end of the door panel 11 in the width direction thereof, the region where the panel member 14 and the back member 15 are continuous with each other is formed by bending the steel plate, and the back member 15 has the back-side superposition portion superposed on the back surface of the panel member 14. Therefore, the door panel 11 can be manufactured with ease simply by bending the steel plate, so the cost of manufacturing can be reduced. The strength of the door panel 11 can be ensured as well through reinforcement resulting from the bending of the steel plate and reinforcement due to the back member 15.

[0030] In addition, each end of the door panel 11 in the width direction thereof is formed by bending the steel plate, so the back side of the door panel 11 can be made free from any edged region. Accordingly, even in the case where one hand of a passenger or the like is inserted into the back side of the door panel 11, the passenger can be prevented from having this hand cut by the door panel 11.

[0031] That is, Fig. 4 is a horizontal sectional view showing a state in which one hand of the passenger is inserted between one of the car doors 4 of Fig. 1 and a corresponding one of the landing doors 6 of Fig. 1. As shown in Fig. 4, when a hand 25 of the passenger is inserted between one of the car doors 4 and a corresponding one of the landing doors 6, the back surface of the door panel 11 may contact the hand 25 of the passenger. In this case, that region of the door panel 11

which is in contact with the hand 25 of the passenger has a gently curved surface obtained by bending, so the passenger can be prevented from having the hand 25 cut by the door panel 11.

[0032] The region where the panel member 14 and the back member 15 are continuous with each other is formed by hemming, so the door panel 11 can be manufactured with more ease.

[0033] The door-opening side end of the door panel 11 has the superposition bending structure obtained by bending the panel member 14 and the back-side superposition portion 21 together, so the strength of the door panel 11 can further be enhanced.

[0034] Only the door-opening side end of the door panel 11 has the superposition bending structure, so region of the door panel 11 which deteriorates in design can be concealed by the lateral portion of the doorway of the elevator. Consequently, the design of the door for the elevator can be improved.

[0035] In the foregoing example, only the door-opening side end of the door panel 11 has the superposition bending structure. However, the door-closing side end of the door panel 11 may also have the superposition bending structure as long as a deterioration in the design of the door panel 11 can be tolerated. In this manner, the strength of the door panel 11 can further be enhanced.

[0036] In the foregoing example, only the panel member 14 and the back member 15 ensure the strength of the door panel 11. However, a reinforcing member separate from the door panel 11 may be mounted, for example, between the back-side open-away portion 22 and the opposed portion 17. In this case, the reinforcing member is mounted on each of the back-side open-away portion 22 and the opposed portion 17 by means of screws, for example. In this manner, the strength of the door panel 11 can further be enhanced. Further, the reinforcing member can be mounted on the door panel 11 by a method other than welding, so the door panel 11 can be restrained from being deformed.

[0037] In the foregoing example, the open-away parallel portion 22b is formed so as to extend from the tip of the open-away perpendicular portion 22a toward the door-closing side. However, as shown in Fig. 5, the open-away parallel portion 22b may be formed so as to extend from the tip of the open-away perpendicular portion 22a toward the door-opening side.

Embodiment 2

[0038] Fig. 6 is a horizontal sectional view showing a door panel 31 according to Embodiment 2 of the present invention. Referring to Fig. 6, the door panel 31 has the panel member 14 constructed in the same manner as in Embodiment 1 of the present invention, and a back member 32 provided on the back side of the panel member 14. The panel member 14 and the back member 32 are continuous with each other at each end of the door panel 31 in a width direction thereof. The door panel 31 is

formed by bending a single board (e.g., steel plate).

[0039] The back member 32 is constituted by a first back member 33 continuous with the panel member 14 at a door-closing side end of the door panel 31, and a second back member 34 continuous with the panel member 14 at a door-opening side end of the door panel 31. A region where the first back member 33 and the panel member 14 are continuous with each other is formed through bending, more specifically, by bending a board at an obtuse angle. A region where the second back member 34 and the panel member 14 are continuous with each other is formed by hemming, namely, by folding back the board approximately at 180°.

[0040] The first back member 33 has a back-side open-away portion 33a extending from the end of the opposed portion 17 toward the panel front board 16, and a back-side superposition portion 33b extending from a tip of the back-side open-away portion 33a (proximal end of back-side open-away portion 33a with respect to panel front board 16) toward a center of the door panel 31. The back-side superposition portion 33b is superposed on the back surface of the panel front board 16.

[0041] The second back member 34 has the back-side superposition portion 21 constructed in the same manner as in Embodiment 1 of the present invention, and a back-side open-away portion 35 provided on the back-side superposition portion 21 and opened away from the panel member 14. The back-side open-away portion 35 extends from the tip of the superposition front board portion 21c of the back-side superposition portion 21 in a thickness direction of the door panel 31. That is, only that one of the boards which is disposed perpendicularly to the panel front board 16 serves as the back-side open-away portion 35. Embodiment 2 of the present invention is identical to Embodiment 1 of the present invention in other constructional details.

[0042] In this manner as well, the door panel 31 can be manufactured with ease simply by bending the steel plate, so the cost of manufacturing can be reduced. The strength of the door panel 31 can be ensured as well through reinforcement resulting from the bending of the steel plate and reinforcement due to the back member 32. In addition, even in the case where, for example, one hand of a passenger or the like is inserted into the back side of the door panel 31, the passenger can be prevented from having this hand cut by the door panel 31.

[0043] The region where the panel member 14 and the back member 32 are continuous with each other is formed by being bent at the obtuse angle, so the door panel 31 can be manufactured with more ease.

[0044] Only that one of the boards which is disposed perpendicularly to the panel front board 16 serves as the back-side open-away portion 35, so the door panel 31 can be manufactured with a smaller amount of material than in Embodiment 1 of the present invention. As a result, the cost of the material for the door panel 31 can be reduced.

[0045] The structure of either the first back member 33

or the second back member 34 according to Embodiment 2 of the present invention may be applied to the door panels 11 according to Embodiment 1 of the present invention.

Claims

1. A door for an elevator equipped with a door panel having a panel member and a back member provided on a back side of the panel member, and has a structure in which the panel member and the back member are continuous with each other at each end of the door panel in a width direction thereof, wherein:

the panel member and the back member are continuous with each other in a region that is formed by bending a board; and
the back member has a back-side superposition portion superposed on a back surface of the panel member.

2. A door for an elevator according to Claim 1, wherein the board is bent in such a manner as to be folded back through hemming.

3. A door for an elevator according to Claim 2, wherein the end of the door panel in the width direction thereof has a superposition bending structure obtained by bending the panel member and the back-side superposition portion together.

4. A door for an elevator according to Claim 3, wherein the door panel has the superposition bending structure only at a door-opening side end thereof.

FIG. 1

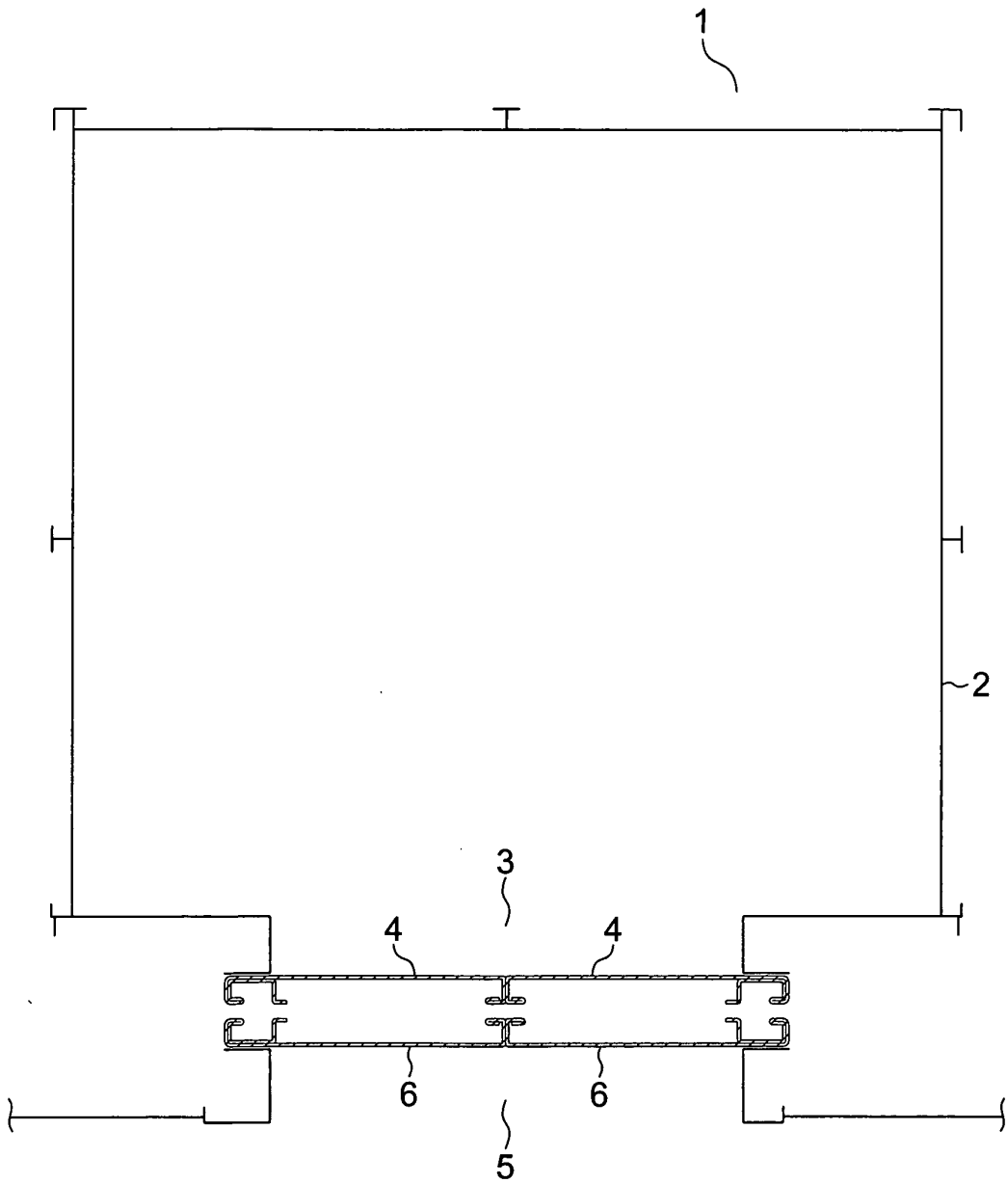
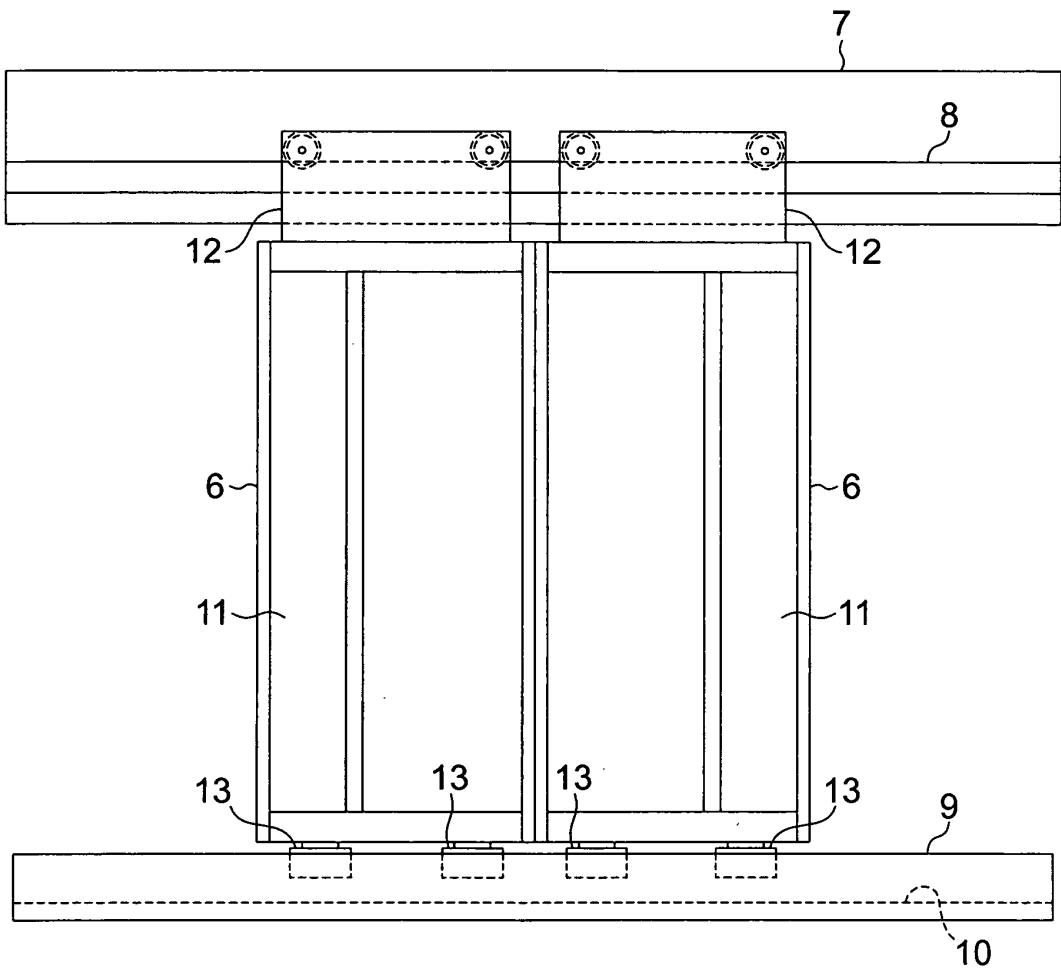


FIG. 2



3. G/F

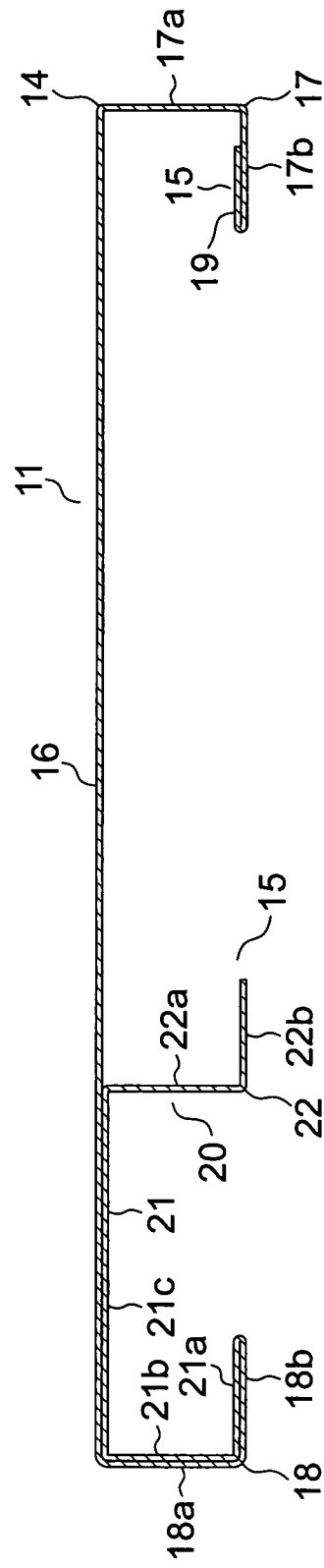


FIG. 4

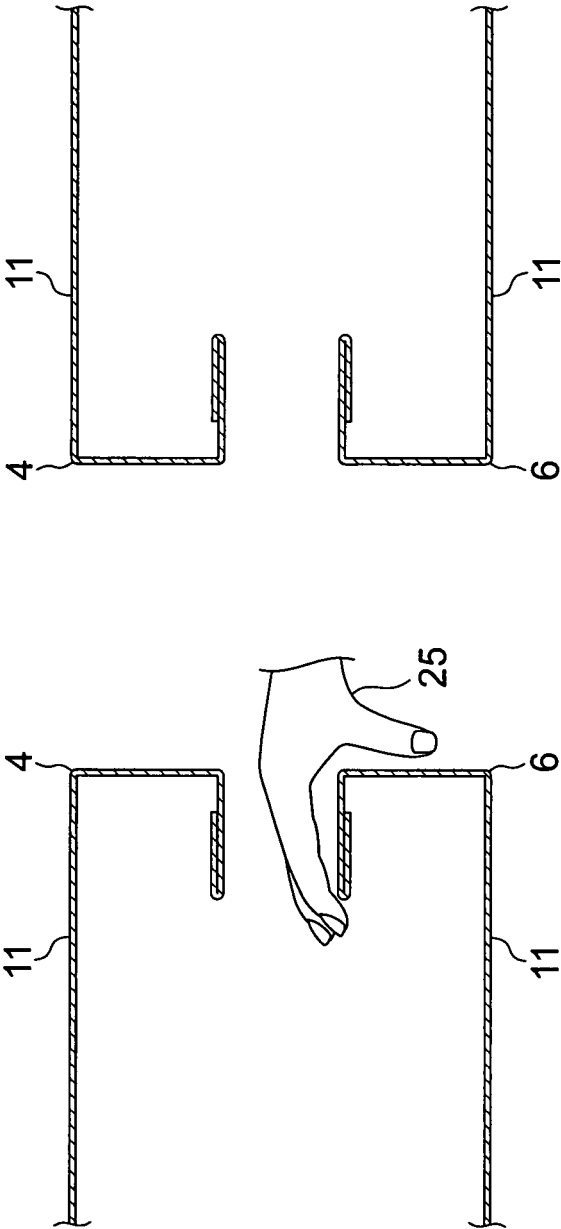


FIG. 5

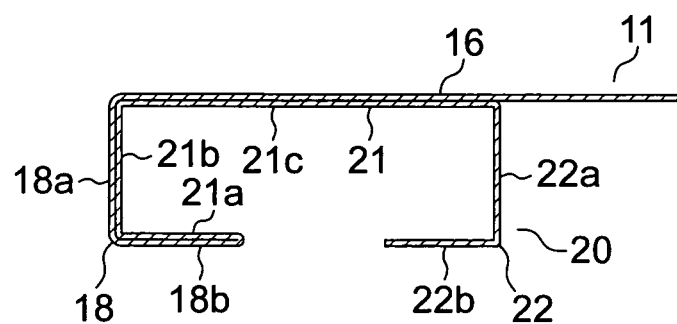
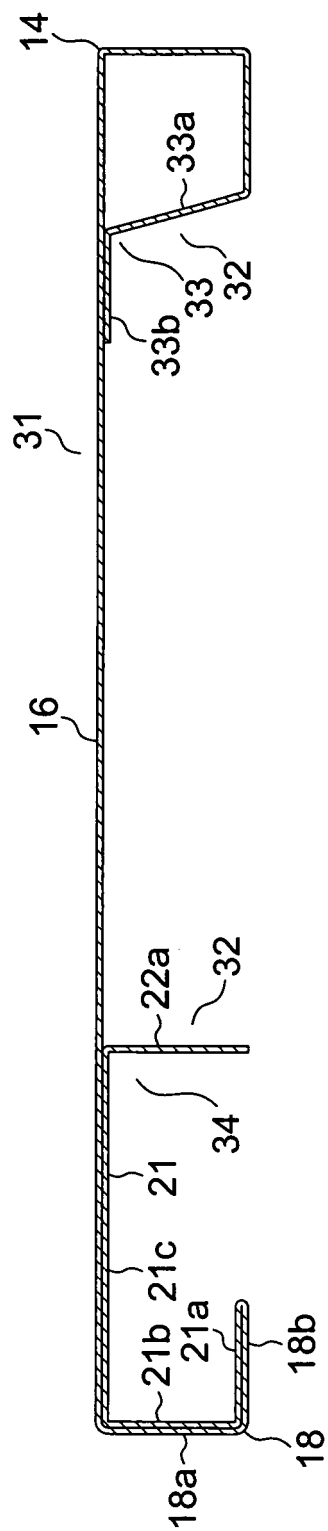


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/308308

A. CLASSIFICATION OF SUBJECT MATTER

B66B13/30 (2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B66B13/00-13/30

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 38-007818 Y1 (Mitsubishi Electric Corp.), 30 April, 1963 (30.04.63), Page 1, right column; Fig. 3 (Family: none)	1-2 3-4
Y	JP 2000-273822 A (Kanesou Kabushiki Kaisha), 03 October, 2000 (03.10.00), Par. Nos. [0011] to [0013]; Fig. 3 (Family: none)	1-2
Y	JP 2005-066635 A (Kobayashi Kinzoku Kogyo Kabushiki Kaisha), 17 March, 2005 (17.03.05), Par. Nos. [0013], [0018] to [0021]; Figs. 1, 4 to 7 (Family: none)	1-2

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

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Date of the actual completion of the international search
20 December, 2006 (20.12.06)Date of mailing of the international search report
09 January, 2007 (09.01.07)Name and mailing address of the ISA/
Japanese Patent Office

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/308308

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2001-199660 A (Mitsubishi Electric Corp.), 24 July, 2001 (24.07.01), Par. Nos. [0014] to [0015]; Fig. 1 (Family: none)	3-4

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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