



(11) **EP 4 269 312 A1**

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

(43) Date of publication:  
**01.11.2023 Bulletin 2023/44**

(51) International Patent Classification (IPC):  
**B66B 13/30 (2006.01)**

(21) Application number: **20967052.0**

(52) Cooperative Patent Classification (CPC):  
**B66B 13/30**

(22) Date of filing: **25.12.2020**

(86) International application number:  
**PCT/JP2020/048960**

(87) International publication number:  
**WO 2022/137567 (30.06.2022 Gazette 2022/26)**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**  
Designated Extension States:  
**BA ME**  
Designated Validation States:  
**KH MA MD TN**

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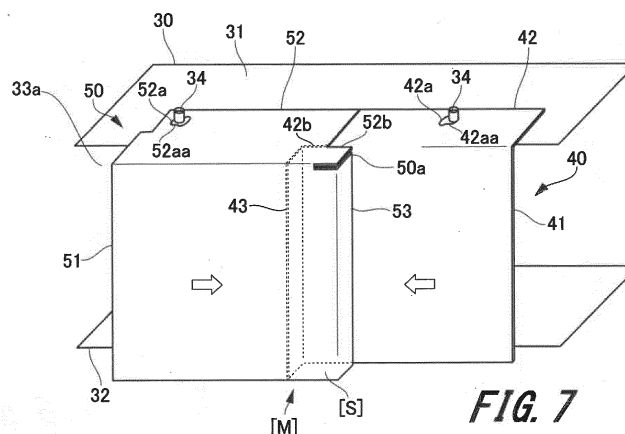
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(54) **ELEVATOR**

(57) The present invention is an elevator including: a hall device that includes an opening/closing mechanism for a hall door; a housing that accommodates the hall device; and a door structure that closes an opening provided in a front surface of the housing. The door structure includes a right door that closes the right side of the opening, and a left door that is provided with a meeting stile between the left door and the right door and that closes the left side of the opening. The right door and the

left door include: front panels disposed facing the opening; support parts defined by bending upper edges of the front panels toward a top surface of the housing; and engagement parts defined by bending edges in a side on the meeting stile on the front panels in opposite directions from one another. The meeting stile between the right door and the left door has a space sandwiched between the engagement part of the right door and the engagement part of the left door.



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## Description

### Technical Field

**[0001]** The present invention relates to an elevator with a drip-proof structure.

### Background Art

**[0002]** As a drip-proof structure for protecting apparatuses from rain or the like, there is a technique disclosed in Patent Literature 1 below. Patent Literature 1 discloses that "Provided is a drip-proof mating structure for a cover covering a housing, the drip-proof mating structure including: an elastic body provided along a distal end of an outer edge of the housing and having a groove-shaped cross-sectional structure; and a projection provided along a distal end of an outer edge of the cover and come into contact with the elastic body at a plurality of positions".

### Citation List

#### Patent Literature

**[0003]** Patent Literature 1: JP 09-089115 A

### Summary of Invention

#### Technical Problem

**[0004]** However, such a drip-proof mating structure requires a delicate operation of engaging the projection provided along the distal end of the outer edge of the cover with the groove shape provided along the distal end of the outer edge of the housing. Therefore, it is difficult to apply such a drip-proof mating structure to a housing unit of a large device such as a hall device of an elevator.

**[0005]** Therefore, an object of the present invention is to provide an elevator having a drip-proof structure capable of effectively preventing entry of droplets into a hall device.

#### Solution to Problem

**[0006]** In order to solve the above problem, for example, the configuration described in the claims is adopted.

**[0007]** The present application includes a plurality of means for solving the above problem, and an example thereof includes an elevator including: a hall device that includes an opening/closing mechanism for a hall door; a housing that accommodates the hall device; and a door structure that closes an opening provided in a front surface of the housing. The door structure includes a right door that closes the right side of the opening, and a left door that is provided with a meeting stile between the left door and the right door and that closes the left side of

the opening. The right door and the left door include: front panels disposed facing the opening; support parts defined by bending upper edges of the front panels toward a top surface of the housing; and engagement parts defined by bending edges in a side on the meeting stile on the front panels in opposite directions from one another. The meeting stile between the right door and the left door has a space sandwiched between the engagement part of the right door and the engagement part of the left door.

#### Advantageous Effects of Invention

**[0008]** With the present invention, it is possible to provide an elevator with a drip-proof structure capable of effectively preventing entry of droplets into a hall device.

#### Brief Description of Drawings

##### [0009]

Fig. 1 is a configuration diagram illustrating a main part of an elevator according to an embodiment.

Fig. 2 is a configuration diagram of a right door of a housing accommodating a hall device of the elevator according to the embodiment.

Fig. 3 is a perspective view for explaining the right door of the housing accommodating the hall device of the elevator according to the embodiment.

Fig. 4 is a configuration diagram of a left door of the housing accommodating the hall device of the elevator according to the embodiment.

Fig. 5 is a perspective view for explaining the left door of the housing accommodating the hall device of the elevator according to the embodiment.

Fig. 6 is a diagram (I) for explaining a closing procedure of the housing accommodating the hall device of the elevator according to the embodiment.

Fig. 7 is a diagram (II) for explaining the closing procedure of the housing accommodating the hall device of the elevator according to the embodiment.

#### Description of Embodiments

**[0010]** Hereinafter, an embodiment of an elevator to which the present invention is applied will be described in detail with reference to the drawings.

**[0011]** Fig. 1 is a configuration diagram illustrating a main part of an elevator 1 according to an embodiment, including a front view 1A illustrating a hall door 10 of the elevator 1 and a configuration of the upper part and a top view 1B corresponding to the front view 1A. As illustrated in these drawings, the elevator 1 includes the hall door 10, a hall device 20, and a housing 30 that accommodates the hall device 20, and further includes a right door 40 and a left door 50 that close the housing 30. These components are configured as follows.

<<Hall Door 10>>

**[0012]** The hall door 10 is provided, on a traveling path through which an elevator car (not illustrated) of the elevator 1 travels, corresponding to each hall to the elevator car. Each hall door 10 is engaged with a car door of the elevator car that has arrived at each hall, and opens and closes following the driving of the car door.

<<Hall Device 20>>

**[0013]** The hall device 20 is provided to hang from an upper part of the hall door 10 to both sides, and includes an opening/closing mechanism configured to open and close the hall door 10 in a state where the hall door 10 is engaged with the car door described above.

<<Housing 30>>

**[0014]** The housing 30 is provided in a state of being fixed, from the upper part to both sides of the hall door 10, on inner walls of the traveling path, and houses the hall device 20. The housing 30 above has a box shape, and has an opening 33a on a front surface 33 directed toward the traveling path between a top surface 31 and a bottom surface 32. The opening 33a is provided for maintenance management of the hall device 20, and is located, for example, in the upper part of the hall door 10.

**[0015]** The top surface 31 of the housing 30 has a plurality of screw holes 31a to which a plurality of bolts 34 are to be fastened, along an edge in a side on the front surface 33 on the top surface 31. Here, a state in which the four bolts 34 are fastened in the side on the front surface 33 on the top surface 31 is illustrated, but the number of bolts may be five or more. Among these bolts 34, at least two bolts 34r disposed on the right side as viewed from the front are used for fixing the right door 40. In addition, at least the other two bolts 34l disposed on the left side as viewed from the front are used for fixing the left door 50.

<<Right Door 40>>

**[0016]** The right door 40, together with the left door 50 described next, constitutes a door structure for closing the opening 33a of the housing 30, the right door 40 closing a right side portion of the opening 33a. Next, a detailed configuration of the right door 40 above will be described.

**[0017]** Fig. 2 is a configuration diagram of the right door 40 of the housing accommodating the hall device of the elevator according to the embodiment, including the front view 1A, the top view 1B corresponding to the front view 1A, a side view 1C, and a main part enlarged view 1D of the right door 40. The front view 1A corresponds to a diagram of the right door 40 viewed from the traveling path, and the main part enlarged view 1D corresponds to an enlarged view of a part D in the top view 1B. Fig. 3 is a perspective view for explaining the right door 40 of

the housing accommodating the hall device of the elevator according to the embodiment and is an enlarged perspective view of a part E in Fig. 2. In this perspective view, a part of the housing 30 is also illustrated for the sake of explanation. As illustrated in Figs. 2 and 3, the right door 40 is a plate-like member including a right front panel 41, a right support part 42, and a right engagement part 43. Each of these parts will be described below.

10 <Right Front Panel 41>

**[0018]** The right front panel 41 is a portion disposed to close the opening 33a between the top surface 31 and the bottom surface 32 of the housing 30, and is a plate-like portion having a substantially rectangular shape. A height [H1] of the right front panel 41 is a height exceeding the opening width of the opening 33a in the height direction, and is a size that does not overlap the hall door 10 (refer to Fig. 1) in a state where the opening 33a is closed by the right door 40.

**[0019]** The left edge of the right front panel 41 is disposed so as to overlap the left door 50 described later, and forms the meeting stile of the door structure including the right door 40 and the left door 50. A width [W1] of the right front panel 41 above may be smaller than the width of the opening 33a.

<Right Support Part 42>

**[0020]** The right support part 42 is a portion that is disposed to overlap the top surface 31 of the housing 30 and by which the right door 40 is supported on the housing 30. The right support part 42 above is a plate-like portion provided by bending the upper end of the right front panel 41 in the height direction in one direction, and has at least two keyholes 42a for fixing the right door 40 to the housing 30. These keyholes 42a are provided at positions corresponding to screw holes provided in the top surface 31 of the housing 30. The keyholes 42a above each have a configuration in which a long diameter portion 42aa is arranged in a state of extending along a boundary direction between the right front panel 41 and the right support part 42, and a large diameter portion 42ab is arranged on the left side (the side on the meeting stile) of the long diameter portion 42aa.

**[0021]** In addition, a protrusion length [D1] of the right support part 42 from the right front panel 41 is a size that enables the right support part 42 overlapped on the top surface 31 of the housing 30 to support the entire portion of the right door 40 including the right support part 42 and is sufficient to provide the keyholes 42a.

**[0022]** Note that the right support part 42 is also a roof part that covers the opening 33a of the housing 30, and may be provided continuously above the opening 33a, and does not need to have the protrusion length [D1] in all the continuous portions. In particular, the right door 40 has, at its left end, a right notch 42b in which the right support part 42 is not provided, and in the right notch

42b, the right front panel 41 protrudes to the left end than the right support part 42 does. The right notch 42b serves as a fitting part to the left door 50 (refer to Fig. 1) described next. A width [C1] of the right notch 42b above is not particularly limited, but is a size that enables a space sufficient to retain liquid water to be formed between the right notch and the left door 50 described next. This space will be described later.

<Right Engagement Part 43>

**[0023]** The right engagement part 43 is a portion that becomes a connection part with respect to the left door 50 (refer to Fig. 1) described next, with a space described later. The right engagement part 43 above is a plate-like portion provided by being bent from the left edge of the right front panel 41 toward the side opposite to the right support part 42, protruding from the right front panel 41 by a predetermined protrusion length [L1].

<<Left Door 50>>

**[0024]** Return to Fig. 1, the left door 50, together with the right door 40 described above, constitutes the door structure for closing the opening 33a of the housing 30, the left door 50 closing a left side portion of the opening 33a. Next, a detailed configuration of the left door 50 above will be described.

**[0025]** Fig. 4 is a configuration diagram of the left door 50 of the housing accommodating the hall device of the elevator according to the embodiment, including the front view 1A, the top view 1B corresponding to the front view 1A, the side view 1C, and the main part enlarged view 1D of the left door 50. The front view 1A corresponds to a diagram of the left door 50 viewed from the traveling path, and the main part enlarged view 1D corresponds to the enlarged view of the part D in the top view 1B. Fig. 5 is a perspective view for explaining the left door 50 of the housing accommodating the hall device of the elevator according to the embodiment and is an enlarged perspective view of a part E in Fig. 4. In this perspective view, a part of the housing 30 is also illustrated for the sake of explanation. As illustrated in Figs. 4 and 5, the left door 50 is a plate-like member including a left front panel 51, a left support part 52, and a left engagement part 53. Each of these parts will be described below.

<Left Front Panel 51>

**[0026]** The left front panel 51 is a portion disposed to close the opening 33a between the top surface 31 and the bottom surface 32 of the housing 30, and is a plate-like portion having a substantially rectangular shape. A height [H2] of the left front panel 51 is a height exceeding the opening width of the opening 33a in the height direction, and is a size that does not overlap the hall door 10 (refer to Fig. 1) in a state where the opening 33a is closed by the left door 50.

**[0027]** The right edge of the left front panel 51 is disposed so as to overlap the left edge of the right front panel 41 of the right door 40 described above (refer to Fig. 2), and forms the meeting stile of the door structure including the right door 40 and the left door 50. Therefore, a width [W2] of the left front panel 51 is a size that the opening 33a of the housing 30 is closed by the right front panel 41 of the right door 40 and the left front panel 51 that are provided with the meeting stile and disposed.

<Left Support Part 52>

**[0028]** The left support part 52 is a portion that is disposed to overlap the top surface 31 of the housing 30 and by which the left door 50 is supported on the housing 30. The left support part 52 above is a plate-like portion provided by bending the upper end of the left front panel 51 in the height direction in one direction, and has at least two keyholes 52a for fixing the left door 50 to the housing 30. These keyholes 52a are provided at positions corresponding to screw holes provided in the top surface 31 of the housing 30. The keyholes 52a above have a configuration in which a long diameter portion 52aa is arranged in a state of extending along a boundary direction between the left front panel 51 and the left support part 52, and a large diameter portion 52ab is arranged on the right side (the side on the meeting stile) of the long diameter portion 52aa.

**[0029]** In addition, a protrusion length [D2] of the left support part 52 from the left front panel 51 is a size that enables the left support part 52 overlapped on the top surface 31 of the housing 30 to support the entire portion of the left door 50 including the left support part 52 and is sufficient to provide the keyholes 52a. However, the protrusion length [D2] of the left support part 52 from the left front panel 51 is longer than the protrusion length [D1] (refer to Figs. 2 and 3) of the right support part 42 of the right door 40 described above by a protrusion length [L2] of the left engagement part 53 described next.

**[0030]** Note that the left support part 52 is also a roof part that covers the opening 33a of the housing 30, and may be provided continuously above the opening 33a, and does not need to have the protrusion length [D2] in all the continuous portions. In particular, the left door 50 has, at its right end, a left notch 52b in which the left support part 52 is not provided, and in the left notch 52b, the left front panel 51 protrudes to the right end than the left support part 52 does. The left notch 52b serves as a fitting part to the right door 40 described above with reference to Figs. 2 and 3. A width [C2] of the left notch 52b above is not particularly limited, but is a size that enables a space sufficient to retain liquid water to be formed between the left notch and the left door 50 described next.

<Left Engagement Part 53>

**[0031]** The left engagement part 53 is a portion that becomes a connection part with respect to the right door

40 (refer to Fig. 1) described above, with the space described later. The left engagement part 53 above is a plate-like portion provided by being bent from the right edge of the left front panel 51 toward the same side as the left support part 52, having a predetermined protrusion length [L2] from the left front panel 51. The protrusion length [L2] is substantially the same as the protrusion length [L1] of the right engagement part 43 of the right door 40, and this configuration makes the space formed by the right door 40 and the left door 50 a closed space.

**[0032]** Here, the left engagement part 53 is a plate-like portion provided by bending the right edge of the left front panel 51 toward the same side as the left support part 52. Therefore, in manufacturing the left door 50, a gap 50a is generated, being formed between an upper part of the left engagement part 53 to the left front panel 51 and the left support part 52. The gap 50a is generated corresponding to the width [C2] of the left notch 52b of the left support part 52 at an end of the left front panel 51.

<<Closing Procedure of Housing and Door Structure>>

**[0033]** Next, a closing procedure of the housing 30 by the right door 40 and the left door 50, which have already been described with reference to Figs. 2 to 5, and a door structure will be described. Figs. 7 and 6 are the diagrams (I) and (II) for explaining the closing procedure of the housing accommodating the hall device of the elevator according to the embodiment. Hereinafter, the closing procedure of the housing accommodating the hall device of the elevator and the door structure will be described with reference to Fig. 3 above and Figs. 6 and 7.

**[0034]** First, as illustrated in Fig. 3, the right side portion of the opening 33a of the housing 30 is closed by the right door 40. At this time, the right support part 42 of the right door 40 is disposed so as to be overlapped on the top surface 31 of the housing 30. Then, among the bolts 34 fastened to the top surface 31 of the housing 30, the two bolts 34r disposed on the right side as viewed from the front are fit to the two keyholes 42a (only two are illustrated in Fig. 3) provided in the right support part 42 of the right door 40. Thus, in a state where the right door 40 is supported on the housing 30 by the right support part 42 overlapped on the top surface 31 of the housing 30, the right side portion of the opening 33a of the housing 30 is closed by the right front panel 41.

**[0035]** Next, as illustrated in Fig. 6, the left side portion of the opening 33a of the housing 30 is closed by the left door 50. At this time, the left support part 52 of the left door 50 is overlapped on the top surface 31 of the housing 30, and the left door 50 is disposed so that the right engagement part 43 of the right door 40 is covered with the left front panel 51 and the left engagement part 53 of the left door 50. Then, among the bolts 34 fastened to the top surface 31 of the housing 30, the two bolts 34l disposed on the left side as viewed from the front are fit to the two keyholes 52a (only two are illustrated in Fig. 6) provided in the left support part 52 of the left door 50.

Thus, in a state where the left door 50 is supported on the housing 30 by the left support part 52 overlapped on the top surface 31 of the housing 30, the left side portion of the opening 33a of the housing 30 is closed by the left front panel 51. In addition, the right engagement part 43 of the right door 40 and the left engagement part 53 of the left door 50 are disposed facing each other through a space [S].

**[0036]** Thereafter, as illustrated in Fig. 7, the right door 40 is slid to the left along the keyholes 42a, the left door 50 is slid to the right along the keyholes 52a, and an edge of the right support part 42 of the right door 40 and an edge of the left support part 52 of the left door 50 are come into contact with each other. Thus, entry of liquid water from the gap between the right support part 42 and the left support part 52 is restrained. In this state, at the long diameter portions 42aa of the keyholes 42a of the right door 40, the right support part 42 of the right door 40 is fastened to the top surface 31 of the housing 30 by the bolts 34. In addition, in this state, at the long diameter portions 52aa of the keyholes 52a of the left door 50, the left support part 52 of the left door 50 is fastened to the top surface 31 of the housing 30 by the bolts 34.

**[0037]** As stated above, the opening 33a of the housing 30 is closed by the right door 40 and the left door 50. The door structure above including the right door 40 and the left door 50 forms a meeting stile [M] in which the left edge of the right front panel 41 of the right door 40 and the right edge of the left front panel 51 of the left door 50 are disposed at positions overlapping each other in the front-rear direction with the space [S].

**[0038]** In addition, the right engagement part 43 of the right door 40 and the left engagement part 53 of the left door 50 form connection parts overlapping each other in the right and left direction with the space [S], so that the space [S] is surrounded from four directions. Moreover, this door structure has a configuration in which an upper part of the space [S] in the meeting stile [M] is closed by the left support part 52 of the left door 50.

**[0039]** Furthermore, the gap 50a between the upper part from the left engagement part 53 to the left front panel 51 and the left support part 52 is provided facing the space [S].

<<Effects of Embodiments>>

**[0040]** With the embodiment described above, the meeting stile [M] configured to close the opening 33a of the housing 30, in which the right door 40 and the left door 50 overlap each other, has a meeting stile structure with the space [S] that is closed from four directions and the top surface of which is closed. As a result, a water droplet from above is less likely to enter the meeting stile [M] between the right door 40 and the left door 50, and even if the water droplet enters the meeting stile [M], the water droplet is held in the space [S], and it is possible to effectively prevent the water droplet from entering the hall device 20 in the housing 30. Therefore, it is possible

to prevent deterioration of the hall device 20 in the housing 30 due to liquid water.

**[0041]** In addition, the right door 40 and the left door 50 can be easily aligned by fitting the bolts 35 to the keyholes 42a and 52a. Moreover, because of the configuration in which the right door 40 is supported on and fixed to the housing 30 in the right support part 42 and the left door 50 is supported on and fixed to the housing 30 in the left support part 52, the housing 30 can be closed without requiring a delicate operation.

**[0042]** Note that the present invention is not limited to the above-described embodiment and modifications, and further includes various modifications. For example, the above-described embodiment is described in detail in order to describe the present invention in an easy-to-understand manner, and is not necessarily limited to those having all the described configurations. In addition, a part of configurations of an embodiment can be replaced with a configuration of another embodiment, and a configuration of another embodiment can be added to a configuration of a certain embodiment. In addition, it is also possible to add, delete, and replace other configurations for a part of a configuration of each embodiment.

Reference Signs List

**[0043]**

1	Elevator
10	Hall door
20	Hall device
30	Housing
31	Top surface
31a	Screw hole
32	Bottom surface
33	Front surface
33a	Opening
34, 34l, 34r	Bolt
40	Right door
41	Right front panel
42	Right support part
42a	Keyhole
42aa	Long diameter portion
42ab	Large diameter portion
42b	Right notch
43	Right engagement part
50	Left door
50a	Gap
51	Left front panel
52	Left support part
52a	Keyhole
52aa	Long diameter portion
52ab	Large diameter portion
52b	Left notch
53	Left engagement part
[H1], [H2]	Height of front panel
[L1], [L2]	Protrusion length (engagement part)
[M]	Meeting stile

[S] Space

**Claims**

5 **1.** An elevator comprising: a hall device that includes an opening/closing mechanism for a hall door; a housing that accommodates the hall device; and a door structure that closes an opening provided in a front surface of the housing, wherein

10 the door structure includes a right door that closes the right side of the opening, and a left door that is provided with a meeting stile between the left door and the right door and that closes the left side of the opening,  
15 the right door and the left door include: front panels disposed facing the opening; support parts defined by bending upper edges of the front panels toward a top surface of the housing; and engagement parts defined by bending edges in a side on the meeting stile on the front panels in opposite directions from one another, and  
20 the meeting stile between the right door and the left door has a space sandwiched between the engagement part of the right door and the engagement part of the left door.

25 **2.** The elevator according to claim 1, wherein among the support parts of the left door and the right door, the support part provided by being bent in the same direction as the engagement part has a shape covering an upper part of the space.

30 **3.** The elevator according to claim 2, wherein a gap is provided between the support part provided by being bent in the same direction as the engagement part and an upper edge of the engagement part.

35 **4.** The elevator according to claim 1, wherein the engagement parts of the left door and the right door have substantially equal protrusion lengths from the front panels.

40 **5.** The elevator according to claim 1, wherein the right door and the left door are fixed to the housing by fixing the support parts in a state of being overlapped on the top surface of the housing.

45 **6.** The elevator according to claim 5, wherein  
50 the support parts of the left door and the right door have keyholes with large diameter portions in the side on the meeting stile, and  
55 the right door and the left door are fixed to the top surface of the housing by bolts fitted to long diameter portions of the keyholes.

7. The elevator according to claim 1, wherein, in a state where the right door and the left door are fixed to the housing, edges in the side on the meeting stile on the support parts are come into contact with each other. 5

8. The elevator according to claim 7, wherein, the support parts of the right door and the left door have notches defined by thrusting the front panels from the support parts, in the side on the meeting stile. 10

9. The elevator according to claim 1, wherein a height of each of the front panels of the right door and the left door is larger than an opening width of the opening of the housing in a height direction. 15

10. The elevator according to claim 9, further comprising an elevator car; and a traveling path for the elevator car, having a wall part provided with a hall door, wherein 20

the housing accommodating the hall device is disposed above the hall door in a side on the traveling path, and

the height of each of the front panels of the right door and the left door has a dimension that does not overlap the hall door in a state where the opening of the housing is closed by the right door and the left door. 25

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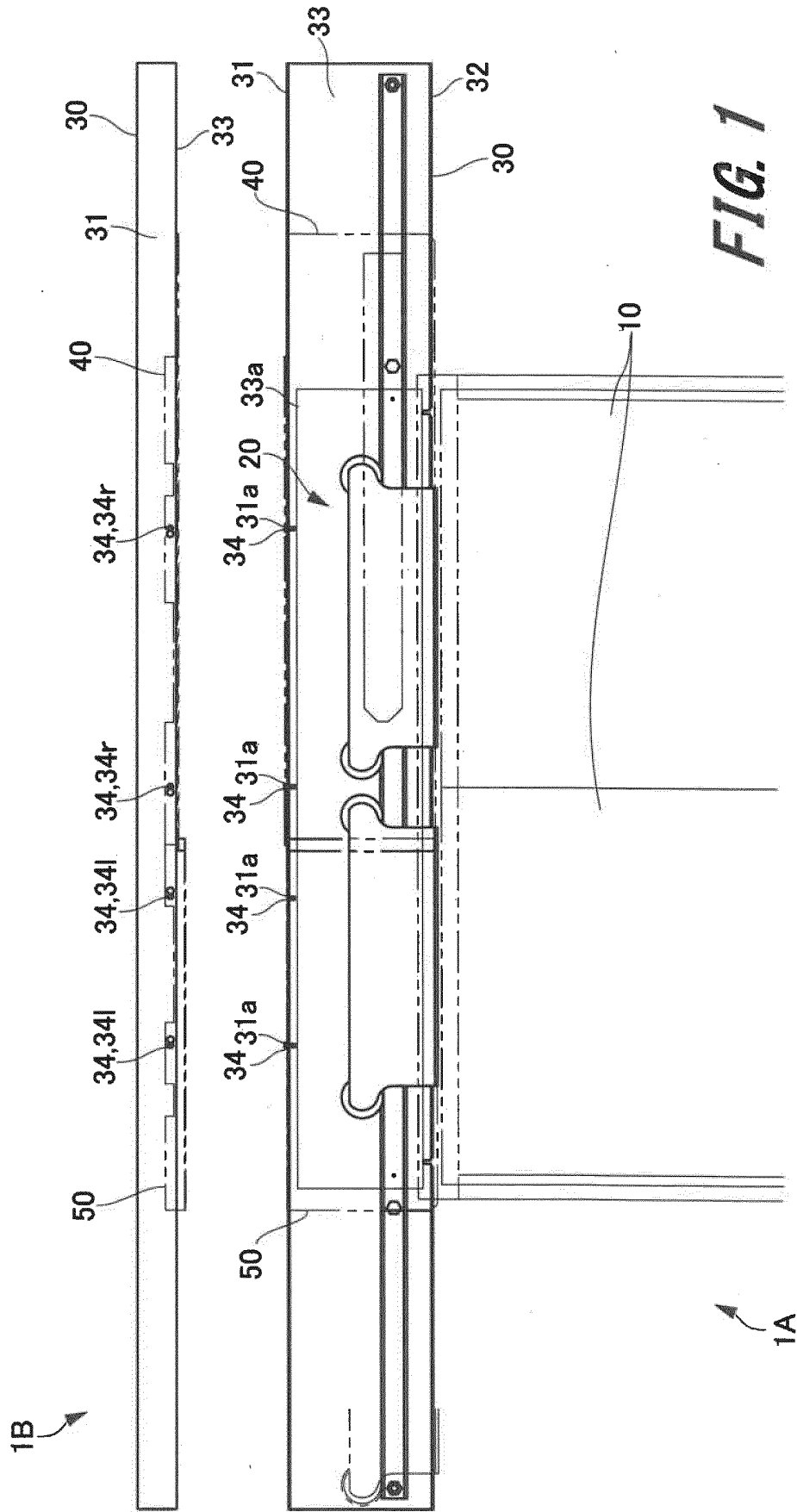
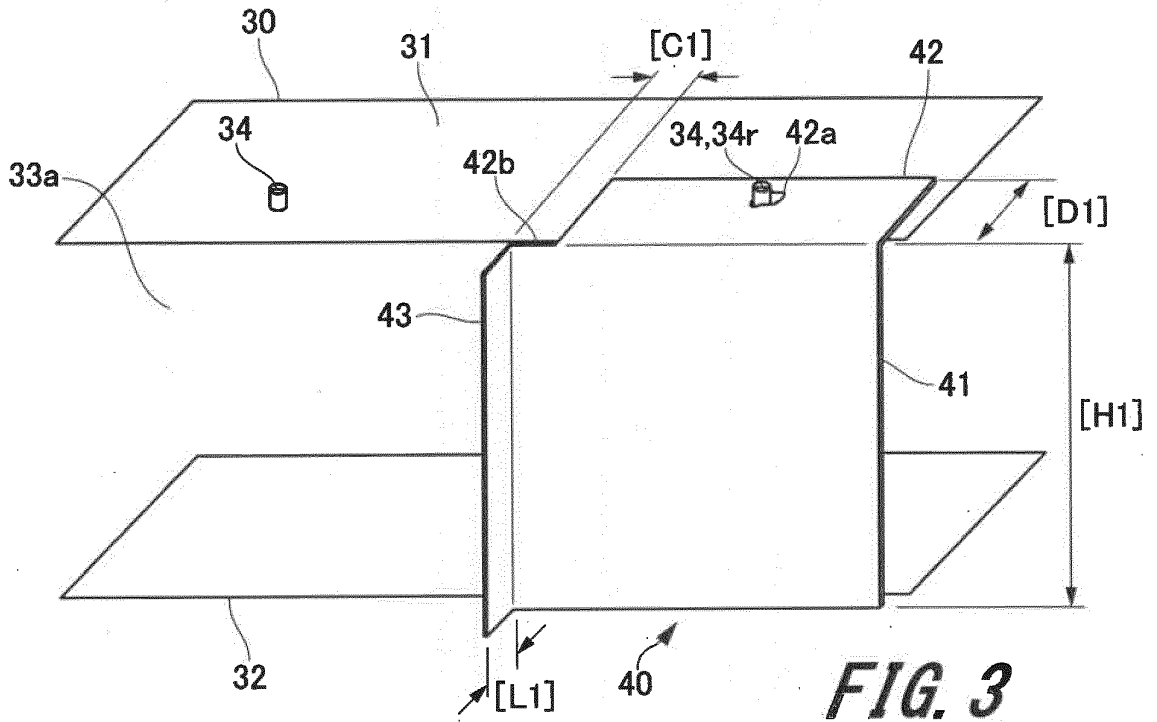
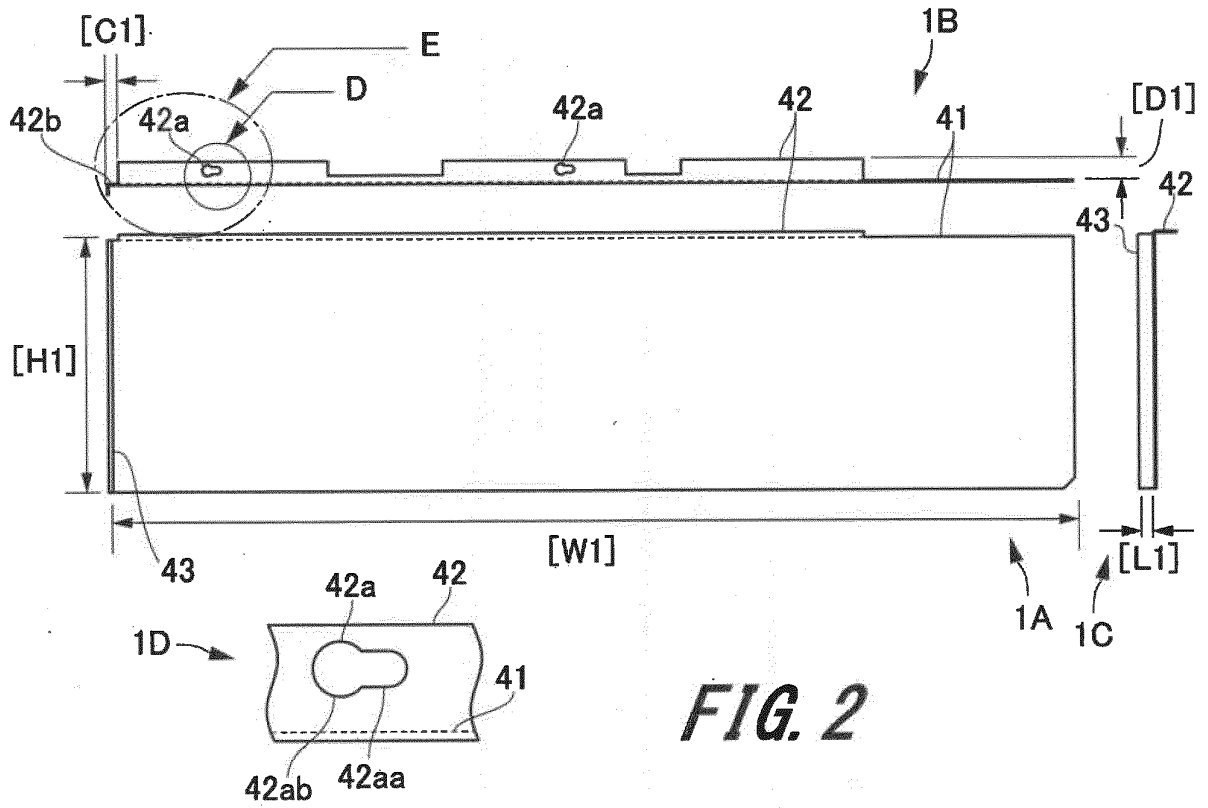
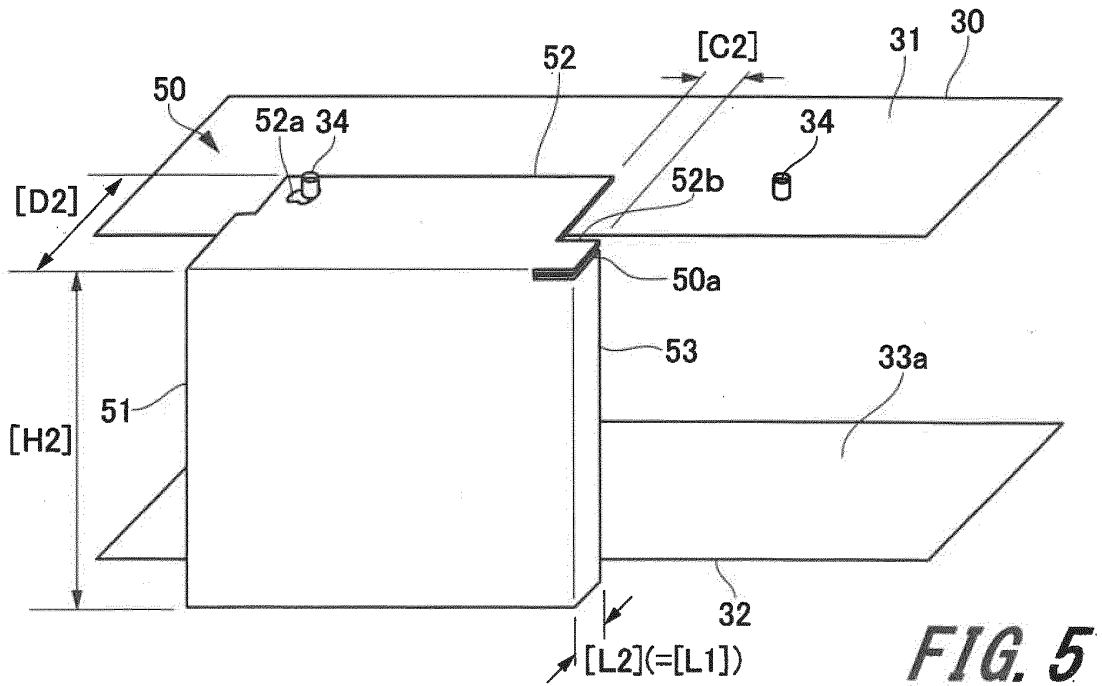
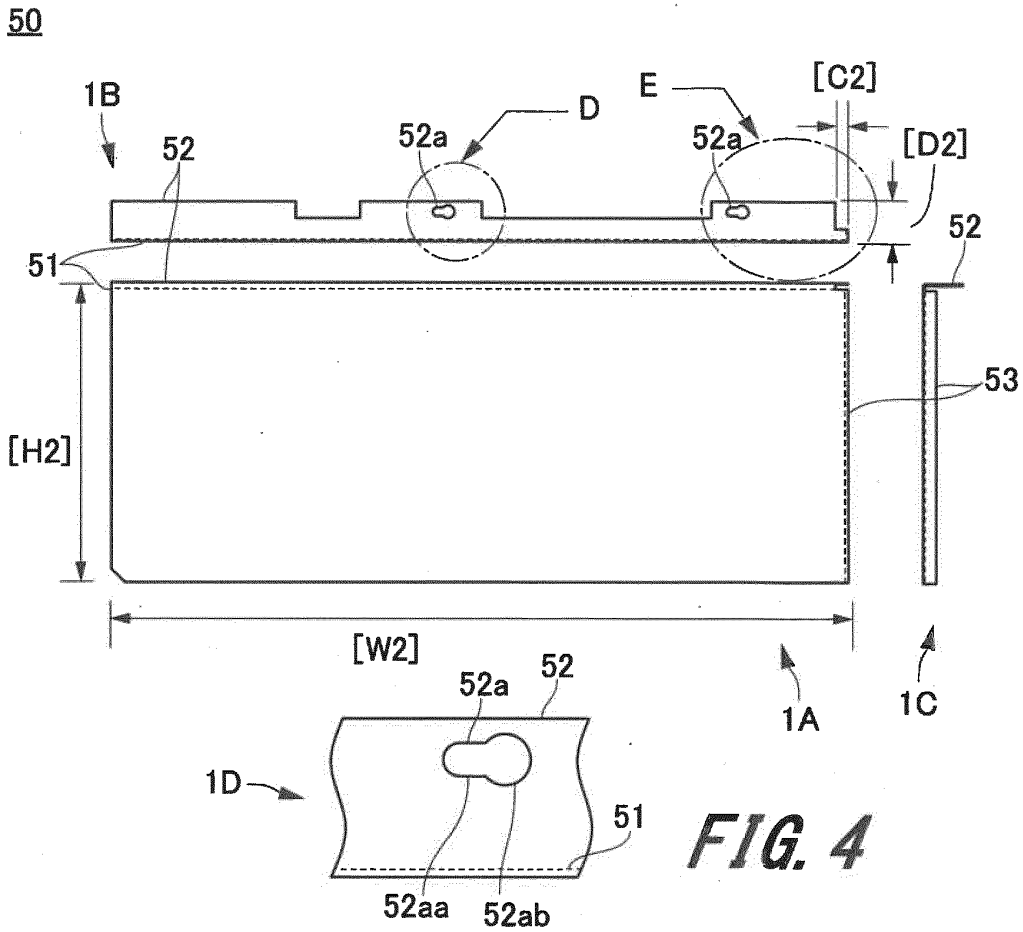


FIG. 1

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2020/048960

## A. CLASSIFICATION OF SUBJECT MATTER

B66B 13/30 (2006.01) i

FI: B66B13/30 P

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)

B66B13/30

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2021

Registered utility model specifications of Japan 1996-2021

Published registered utility model applications of Japan 1994-2021

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.
A	JP 2-310288 A (MITSUBISHI ELECTRIC CORP.) 26 December 1990 (1990-12-26) publication gazette, page 2, upper right column, lines 3-11, fig. 1-3	1-10
A	JP 2007-197211 A (TOSHIBA ELEVATOR AND BUILDING SYSTEMS CORPORATION) 09 August 2007 (2007-08-09) entire text, all drawings	1-10



Further documents are listed in the continuation of Box C.



See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search  
09 February 2021 (09.02.2021)Date of mailing of the international search report  
22 February 2021 (22.02.2021)Name and mailing address of the ISA/  
Japan Patent Office  
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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
PCT/JP2020/048960

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