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(54) **GUIDE RAIL SUPPORT STRUCTURE AND ELEVATOR**

(57) A support structure for a guide rail includes a rail clip having elasticity, and a fixing bracket. The rail clip holds a flange portion of the guide rail. To the fixing bracket is fixed the rail clip, and the fixing bracket is disposed

on a back surface of the flange portion. A step portion configured to adjust an amount of flexure of the rail clip is provided between the rail clip and the fixing bracket or between the fixing bracket and the flange portion.

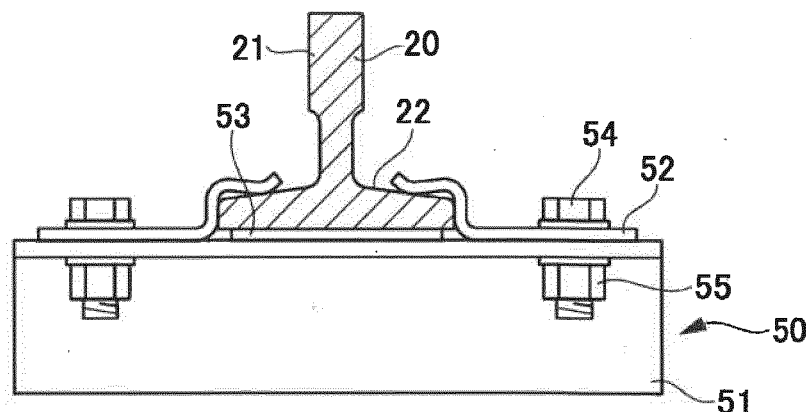


FIG. 3

Description

Technical Field

5 **[0001]** The present invention relates to a support structure for a guide rail of an elevator, and the elevator.

Background Art

10 **[0002]** In general, a guide rail configured to movably support a car or a counterweight is installed inside a hoistway of an elevator. The guide rail is supported by a support structure installed in the hoistway of a building structure. The support structure has a rail clip configured to hold the guide rail, and a fixing bracket fixed to a wall surface of the hoistway.

[0003] On the other hand, a high-rise building structure contracts due to a weight of the building structure itself. When a holding force of the rail clip holding the guide rail is set to be strong, the guide rail is pulled through the rail clip of the support structure due to contraction of the building structure, and a compressive stress acts on the guide rail. In order to prevent the guide rail from being buckled or bent due to the compressive stress, it is required to adjust the holding force of the rail clip so that the rail clip slides with respect to the guide rail.

15 **[0004]** As a technique for adjusting the force for holding the guide rail, for example, there is a technique as described in PTL 1. PTL 1 describes a technique in which a guide rail is held by two or more types of rail clips having different holding forces.

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Citation List

Patent Literature

25 **[0005]** PTL 1: JP 2017-197347 A

Summary of Invention

Technical Problem

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[0006] However, in the technique described in PTL 1, it is necessary to prepare the two or more types of rail clips having the different holding forces. Therefore, not only a number of types of rail clips increases, but also an operator needs to properly use the two or more types of rail clips, and installation work of the guide rail becomes very complicated.

35 **[0007]** In consideration of the above problems, an object of the present invention is to provide a support structure for a guide rail of an elevator and the elevator capable of easily performing installation work of the guide rail without increasing a number of types of rail clips to be used.

Solution to Problem

40 **[0008]** In order to solve the above problem and achieve the object, a support structure for a guide rail includes a rail clip having elasticity, and a fixing bracket. The rail clip holds a flange portion of the guide rail erected inside a hoistway. To the fixing bracket is fixed the rail clip, and the fixing bracket is disposed on a back surface of the flange portion. A step portion configured to adjust an amount of flexure of the rail clip is provided between the rail clip and the fixing bracket or between the fixing bracket and the flange portion.

45 **[0009]** In addition, an elevator includes a guide rail erected inside a hoistway, and a support structure configured to support the guide rail. As the support structure, the support structure described above is applied.

Advantageous Effects of Invention

50 **[0010]** According to the support structure for a guide rail and the elevator having the above configurations, the installation work of the guide rail can be easily performed without increasing the number of the types of the rail clips to be used.

Brief Description of Drawings

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[0011]

[FIG. 1] FIG. 1 is a schematic configuration view illustrating an elevator provided with support structures for a guide rail according to a first embodiment.

[FIG. 2] FIG. 2 is a plan view illustrating the elevator provided with the support structures for a guide rail according to the first embodiment.

[FIG. 3] FIG. 3 is a cross-sectional view illustrating the support structure for a guide rail according to the first embodiment.

[FIG. 4] FIG. 4 is a cross-sectional view illustrating a conventional support structure for a guide rail.

[FIG. 5] FIG. 5 is a plan view illustrating a rail bracket in the support structure for a guide rail according to the first embodiment.

[FIG. 6] FIG. 6 is a front view illustrating the rail bracket in the support structure for a guide rail according to the first embodiment.

[FIG. 7] FIG. 7 is a plan view illustrating the conventional support structure for a guide rail.

[FIG. 8] FIG. 8 is a front view illustrating the conventional support structure for a guide rail.

[FIG. 9] FIG. 9 is a cross-sectional view illustrating a support structure for a guide rail according to a second embodiment.

[FIG. 10] FIG. 10 is a plan view illustrating a rail bracket in the support structure for a guide rail according to the second embodiment.

[FIG. 11] FIG. 11 is a front view illustrating the rail bracket in the support structure for a guide rail according to the second embodiment.

[FIG. 12] FIG. 12 is a cross-sectional view illustrating a support structure for a guide rail according to a third embodiment.

[FIG. 13] FIG. 13 is a front view illustrating a liner in the support structure for a guide rail according to the third embodiment.

[FIG. 14] FIG. 14 is a front view illustrating a fixing plate in the support structure for a guide rail according to the third embodiment.

[FIG. 15] FIG. 15 illustrates a rail bracket in a support structure for a guide rail according to a fourth embodiment, in which FIG. 15A is a plan view, FIG. 15B is a front view, and FIG. 15C is a side view.

Description of Embodiments

[0012] Hereinafter, a support structure for a guide rail and an elevator according to embodiments will be described with reference to FIGS. 1 to 15. Note that in the drawings, the same members are denoted by the same reference signs.

1. First Embodiment

1-1. Configuration example of elevator

[0013] First, an elevator provided with a support structure for a guide rail according to a first embodiment (hereinafter, referred to as "the present embodiment") will be described with reference to FIGS. 1 and 2.

[0014] FIG. 1 is a schematic configuration view illustrating the elevator. FIG. 2 is a plan view diagram illustrating the elevator.

[0015] As illustrated in FIG. 1, an elevator 1 of the present embodiment is provided inside a hoistway 101 formed inside a building structure 100. As illustrated in FIGS. 1 and 2, the elevator 1 includes a car 10 configured to move up and down inside the hoistway 101 and load a person or a cargo, a hoisting machine 11, a control panel 12, a main rope 13, a compensation pulley 14, and a counterweight 15. In addition, the elevator 1 includes car-side guide rails 20 configured to movably support the car 10 and weight-side guide rails 30 configured to movably support the counterweight 15. A machine chamber 102 is provided at a top of the hoistway 101.

[0016] The hoisting machine 11 is disposed in the machine chamber 102 and raises and lowers the car 10 by winding the main rope 13. In the machine chamber 102, the control panel 12 configured to control the entire elevator 1 is installed.

[0017] The main rope 13 is connected to the car 10 and the counterweight 15. The car 10 is connected to the counterweight 15 through the main rope 13. In addition, the car 10 is provided with sliders 16 configured to slide on the car-side guide rails 20.

[0018] When the hoisting machine 11 is driven, the car 10 moves up and down inside the hoistway 101 along the car-side guide rails 20, and the counterweight 15 moves up and down inside the hoistway 101 along the weight-side guide rails 30. A direction in which the car 10 and the counterweight 15 move up and down is defined as an up-down direction. The up-down direction is parallel to a vertical direction.

[0019] The car 10 and the counterweight 15 are connected by a compensation rope 17. The compensation rope 17 is wound around the compensation pulley 14, disposed at a lowermost portion of the hoistway 101. The compensation pulley 14 is rotatably disposed at the lowermost portion of the hoistway 101.

[0020] The car-side guide rails 20 are supported by support structures 50 and are erected inside the hoistway 101.

Similarly, the weight-side guide rails 30 are also supported by support structures 50 and are erected inside the hoistway 101. The support structures 50 are fixed to wall surfaces 103 of the hoistway 101, and the plurality of support structures are provided along the up-down direction of the hoistway 101. Since the support structures 50 supporting the car-side guide rails 20 and the support structures 50 supporting the weight-side guide rails 30 have the same configuration, each of the support structures 50 supporting the car-side guide rails 20 will be described below. Hereinafter, the car-side guide rails 20 and the weight-side guide rails 30 are simply referred to as a guide rail 20.

1-2. Configuration example of support structure

[0021] Next, a configuration of each of the support structures 50 will be described with reference to FIGS. 3 to 8.

[0022] FIG. 3 is a cross-sectional view illustrating the support structure 50 of the present embodiment, and FIG. 4 is a cross-sectional view illustrating a conventional support structure 50A.

[0023] As illustrated in FIG. 3, the guide rail 20 has a sliding surface portion 21 on which the slider 16 (see FIG. 1) slides, and a flange portion 22. The flange portion 22 faces a fixing bracket 51 of the support structure 50 described later. The sliding surface portion 21 protrudes substantially vertically from the flange portion 22.

[0024] The support structure 50 has the fixing bracket 51 fixed to the wall surface 103 of the hoistway 101, two rail clips 52, two fixing bolts 54, 54, and two fixing nuts 55, 55. The rail clip 52 is configured of a member having a predetermined elastic force. The rail clip 52 is fastened and fixed to the fixing bracket 51 through a fixing bolt 54 and the fixing nut 55. The rail clip 52 holds each of both ends of the flange portion 22 of the guide rail 20.

[0025] FIG. 5 is a plan view illustrating the fixing bracket 51, and FIG. 6 is a front view illustrating the fixing bracket 51.

[0026] As illustrated in FIGS. 5 and 6, the fixing bracket 51 is formed in a substantially L shape. The fixing bracket 51 has a fixed surface portion 51a, a facing surface portion 51b, and a step portion 53. The fixed surface portion 51a is fixed to a fixing portion protruding from the wall surface 103 of the hoistway 101 by welding or fastening and fixing with a fixing bolt. The facing surface portion 51b is substantially vertically continuous from one end portion of the fixed surface portion 51a in a short direction.

[0027] The facing surface portion 51b is formed in a substantially flat plate shape having a substantially rectangular shape. Fixing holes 51c are formed at both end portions in a longitudinal direction of the facing surface portion 51b. A fixing bolt 54 for fixing the rail clip 52 is inserted into each of the fixing holes 51c.

[0028] In addition, the facing surface portion 51b is disposed so as to face a back surface of the flange portion 22 on an opposite side of one surface from which the sliding surface portion 21 protrudes. The step portion 53 is formed on the facing surface portion 51b. The step portion 53 is formed between the two fixing holes 51c, 51c. The step portion 53 protrudes toward the flange portion 22 from one surface of the facing surface portion 51b, which faces the flange portion 22 of the guide rail 20. The step portion 53 is a substantially rectangular protruding portion having a flat surface. The step portion 53 is interposed between the flange portion 22 of the guide rail 20, and the facing surface portion 51b, and is in surface contact with the back surface of the flange portion 22.

[0029] FIGS. 4, 7, and 8 illustrate the conventional support structure 50A.

[0030] As illustrated in FIG. 4, the conventional support structure 50A has a fixing bracket 51A, two rail clips 52, two fixing bolts 54, 54, and two fixing nuts 55, 55. Since the rail clip 52, the fixing bolt 54, and the fixing nut 55 are the same as those of the support structure 50 of the present embodiment illustrated in FIG. 3, description thereof will be omitted.

[0031] As illustrated in FIGS. 7 and 8, the fixing bracket 51A is formed in a substantially L shape, and includes a fixed surface portion 51a and a facing surface portion 51b. The facing surface portion 51b is substantially vertically continuous from one end portion of the fixed surface portion 51a. Two fixing holes 51c in which the fixing bolts 54 are inserted are formed in the facing surface portion 51b. In this conventional support structure 50A, the back surface of the flange portion 22 of the guide rail 20 comes into surface contact with the facing surface portion 51b of the fixing bracket 51A.

[0032] Comparing the conventional support structure 50A with the support structure 50 of the present embodiment, in the support structure 50 of the present embodiment, the guide rail 20 is disposed in a direction away from the facing surface portion 51b with respect to the conventional support structure 50A illustrated in FIG. 4 due to the step portion 53 provided in the fixing bracket 51. Therefore, the rail clip 52 of the support structure 50 of the present embodiment is flexed more than the rail clip 52 of the conventional support structure 50A. As a result, according to the support structure 50 of the present embodiment, the holding force of the guide rail 20 by the rail clip 52 can be enhanced as compared with the conventional support structure 50A.

[0033] When the elevator 1 is designed, a height of the step portion 53 is designed in advance so that the holding force of the rail clip 52 becomes an optimum holding force required. This allows only one type of rail clip 52 to be used when the elevator 1 is installed. As a result, the installation work of the guide rail 20 can be easily performed, and workability can be improved.

[0034] Furthermore, the same type of rail clips 52 can be used for elevators installed in different building structures 100 having the same type of guide rails 20. In this way, it is possible to share the rail clip 52, and it is not necessary to

design the rail clip 52 for each elevator.

[0035] Note that all of the plurality of support structures do not need to be the support structures 50 each provided with the step portion 53 illustrated in FIG. 3. For example, the support structures 50 of the present embodiment illustrated in FIG. 3 may be applied to some of the plurality of support structures, and the remaining support structures may be the conventional support structures 50A illustrated in FIG. 4. Among the plurality of support structures, a number of the support structures to which the support structures 50 of the present embodiment are applied is appropriately set according to a weight of the guide rail 20.

2. Second Embodiment

[0036] Next, a support structure for a guide rail according to a second embodiment will be described with reference to FIGS. 9 to 11.

[0037] FIG. 9 is a cross-sectional view illustrating the support structure, FIG. 10 is a plan view illustrating a fixing bracket in the support structure, and FIG. 11 is a front view illustrating the fixing bracket in the support structure.

[0038] A support structure 50B according to the second embodiment is different from the support structure 50 according to the first embodiment in a configuration of the fixing bracket. Therefore, the fixing bracket will be described here, and the same reference signs will be given to portions common to the support structure 50 according to the first embodiment, and redundant description will be omitted.

[0039] As illustrated in FIG. 9, the support structure 50B has a fixing bracket 51B, two rail clips 52, 52, two fixing bolts 54, 54, and two fixing nuts 55, 55. As illustrated in FIGS. 10 and 11, the fixing bracket 51B has a fixed surface portion 51a, a facing surface portion 51b, and two step portions 57, 57. Two fixing holes 51c are formed in the facing surface portion 51b.

[0040] The step portion 57 is provided on one surface of the facing surface portion 51b, which faces the guide rail 20, at a position where the rail clip 52 is attached. The step portion 57 is a protruding portion that protrudes in a substantially rectangular shape from one surface of the facing surface portion 51b toward the rail clip 52.

[0041] The two fixing holes 51c, 51c are formed in the facing surface portion 51b. The fixing hole 51c is formed at a position where the step portion 57 is provided in the facing surface portion 51b, and penetrates the step portion 57 and the facing surface portion 51b. The fixing bolt 54 is inserted into the fixing hole 51c. When the rail clip 52 is attached to the fixing bracket 51B, the step portion 57 is interposed between the rail clip 52 and the facing surface portion 51b and comes into contact with the rail clip 52. In addition, the back surface of the flange portion 22 of the guide rail 20 is in contact with the facing surface portion 51b.

[0042] According to this support structure 50B according to the second embodiment, as illustrated in FIG. 9, since the step portion 57 is interposed between the rail clip 52 and the facing surface portion 51b, an amount of flexure of the rail clip 52 can be made smaller than that of the conventional support structure 50A illustrated in FIG. 4. As a result, according to the support structure 50B of the second embodiment, a holding force of the guide rail 20 by the rail clip 52 can be reduced as compared with the conventional support structure 50A.

[0043] Since other configurations are similar to those of the support structure 50 according to the first embodiment, description thereof will be omitted. The support structure 50B according to the second embodiment can also obtain similar operational effects to those of the support structure 50 according to the first embodiment described above.

[0044] Note that by selecting the fixing bracket 51 according to the first embodiment or the fixing bracket 51B according to the second embodiment in advance, the amount of flexure of the rail clip 52 can be adjusted for each elevator. As a result, the holding force of the rail clip 52 can be made an optimum holding force, and an increase in the number of types of the rail clips 52 to be used can be prevented.

3. Third Embodiment

[0045] Next, a support structure for a guide rail according to a third embodiment will be described with reference to FIGS. 12 to 14.

[0046] FIG. 12 is a cross-sectional view illustrating the support structure, FIG. 13 is a front view illustrating a liner in the support structure, and FIG. 14 is a front view illustrating a fixing plate in the support structure,

[0047] A support structure 60 according to the third embodiment is different from the support structure 50 according to the first embodiment in that the liner and the fixing plate are provided. Therefore, the same reference signs are given to portions common to the support structure 50 according to the first embodiment and the conventional support structure 50A, and redundant description will be omitted.

[0048] As illustrated in FIG. 12, the support structure 60 has a fixing bracket 51A, two rail clips 52, 52, and two fixing bolts 54, 54. Since a configuration of the fixing bracket 51A is similar to that of the fixing bracket 51A of the conventional support structure 50A illustrated in FIG. 4, description thereof will be omitted. In addition, the support structure 60 has a liner 61 and a fixing plate 64.

[0049] The liner 61 is interposed between a facing surface portion 51b of the fixing bracket 51A, and the flange portion 22 of the guide rail 20 and the rail clip 52. As illustrated in FIG. 13, the liner 61 is formed in a rectangular flat plate shape. Insertion ports 61a, 61a are formed at both end portions in a longitudinal direction of the liner 61. The insertion port 61a is a cutout continuous from one end portion to a center of the liner 61 in a short direction. When the liner 61 is disposed

on the facing surface portion 51b, the fixing bolt 54 is inserted into the insertion port 61a.
[0050] In addition, the liner 61 is provided with a step portion 63. The step portion 63 is formed between the two insertion ports 61a, 61a. The step portion 63 protrudes toward the flange portion 22 from one surface of the liner 61 facing the flange portion 22 of the guide rail 20. The step portion 63 is a substantially rectangular protruding portion. The step portion 63 is interposed between the flange portion 22 of the guide rail 20 and the facing surface portion 51b, and is in surface contact with the back surface of the flange portion 22.

[0051] By inserting the liner 61 between the guide rail 20 and the fixing bracket 51A, the guide rail 20 can be separated from the facing surface portion 51b of the fixing bracket 51A, and the amount of flexure of the rail clip 52 can be increased.

[0052] The fixing plate 64 is disposed on a surface of the facing surface portion 51b on a side on an opposite side of the surface facing the guide rail 20. As illustrated in FIG. 14, the fixing plate 64 is formed in a substantially flat plate shape, and is formed longer than an interval between the two fixing bolts 54, 54 attached to the fixing bracket, 51A. Nuts 65 are fixed to both end portions of the fixing plate 64 in a longitudinal direction by welding. As a result, it is not necessary to manually support the nut 65 when tightening the fixing bolt 54, and workability is improved.

[0053] This fixing plate 64 may also be applied to the support structure 50 according to the first embodiment and the support structure 50B according to the second embodiment described above.

[0054] Since other configurations are similar to those of the support structure 50 according to the first embodiment, description thereof will be omitted. This support structure 60 according to the third embodiment can also obtain similar operational effects to those of the support structure 50 according, to the first embodiment described above.

[0055] Note that according to the support structure 60 according to the third embodiment, it is possible to form the step portion by sandwiching the liner 61 between the guide rail 20 and the fixing bracket 51A without processing the fixing bracket 51A, the guide rail 20, and the like. As a result, the amount of flexure of the rail clip 52 can be adjusted even for an existing support structure for a guide rail, and the holding force of the rail clip 52 can be easily adjusted to an optimum holding force.

4. Fourth Embodiment

[0056] Next, a support structure for a guide rail according to a fourth embodiment will be described with reference to FIGS. 15A to 15C.

[0057] FIG. 15A is a plan view illustrating a fixing bracket in the support structure, FIG. 15B is a front view, and FIG. 15C is a side view.

[0058] This support structure according to the fourth embodiment is different from the support structure 50 according to the first embodiment in a structure of a step portion of the fixing bracket. Therefore, the fixing bracket will be described here, and the same reference signs will be given to portions common to the support structure 50 according to the first embodiment, and redundant description will be omitted.

[0059] As illustrated in FIGS. 15A to 15C, a fixing bracket 51C has a fixed surface portion 51a and a facing surface portion 51b. The facing surface portion 51b is formed with a step portion 53 and two fixing holes 51c. Chamfering 53a is provided at an upper end-side corner portion and a lower end-side corner portion of the step portion 53 in an up-down direction. As a result, when the flange portion 22 and the step portion 53 slide due to the contraction of the building structure 100, it is possible to prevent the step portion 53 and the flange portion 22 from being stuck due to a minute step, a coating pool, or the like formed on the back surface of the flange portion 22.

[0060] Note that chamfering the corner portions of the step portion 53 may also be applied to the step portion 57 of the fixing bracket 51B according to the second embodiment described above and the step portion 63 of the liner 61 according to the third embodiment.

[0061] Since other configurations are similar to those of the support structure 50 according to the first embodiment, description thereof will be omitted. This support structure having the fixing bracket 51C according to the fourth embodiment can also obtain similar operational effects to those of the support structure 50 according to the first embodiment described above.

[0062] Note that the present invention is not limited to the embodiments described above and illustrated in the drawings, and various modifications can be made without departing from the gist of the invention described in the claims.

[0063] While in the above-described embodiments, the example in which the step portion is provided on the rail bracket side has been described, the present invention is not limited thereto, and the step portion may be provided on the surface of the flange portion 22 of the guide rail 20 facing the fixing bracket. In addition, while the example in which the step portion is a protruding portion has been described, the step portion may be a recessed portion recessed from the facing surface portion of the fixing bracket or one surface of the liner.

[0064] Furthermore, while in the above-described embodiment, the example has been described in which the step portion is a protruding portion having a flat surface in surface contact with the flange portion 22 of the guide rail 20 or the rail clip 52, the present invention is not limited thereto. As a shape of the step portion, for example, the step portion may be formed in various shapes such as a protrusion and a ridge.

[0065] In the present specification, words such as "parallel" and "orthogonal" are used, but, these do not strictly mean only "parallel" and "orthogonal", and may be in a state of "substantially parallel" or "substantially orthogonal" including "parallel" and "orthogonal" and in a range in which the function can be exhibited.

Reference Signs List

[0066]

1	elevator
10	car
11	hoisting machine
13	main rope
15	counterweight
16	slider
20	car-side guide rail
21	sliding surface portion
22	flange portion
25	reinforcing member
30	weight-side guide rail
50, 50A, 50B	support structure
51, 51A, 51B, 51C, 60	fixing bracket
51a	fixed surface portion
51b	facing surface portion
51c	fixing hole
52	rail clip
53, 57, 63	step portion
53a	chamfering
54	fixing bolt
55	fixing nut
61	liner
61a	insertion port
64	fixing plate
65	nut
100	building structure
101	hoistway
103	wall surface

Claims

1. A support structure for a guide rail, comprising:

a rail clip having elasticity and configured to hold a flange portion of a guide rail erected inside a hoistway; and a fixing bracket to which the rail clip is fixed, the fixing bracket being disposed on a back surface of the flange portion,

wherein a step portion configured to adjust an amount of flexure of the rail clip is provided between the rail clip and the fixing bracket or between the fixing bracket and the flange portion.

2. The support structure for a guide rail according to claim 1, wherein the step portion is a protruding portion protruding toward the guide rail from a facing surface portion of the fixing bracket facing the back surface of the flange portion.

3. The support structure for a guide rail according to claim 2, wherein the step portion is in contact with the back surface of the flange portion.

4. The support structure for a guide rail according to claim 2, wherein

the step portion is formed at a portion of the facing surface portion to which the rail clip is fixed, and comes into contact with the rail clip, and
the back surface of the flange portion is in contact with the facing surface portion.

5. The support structure for a guide rail according to claim 1, wherein

a liner interposed between the fixing bracket and the guide rail is provided, and
the step portion is a protruding portion formed on the liner.

6. The support structure for a guide rail according to claim 5, wherein

the rail clip is fixed to the fixing bracket by a fixing bolt, and
a cutout into which the fixing bolt can be inserted is formed in the liner.

7. The support structure for a guide rail according to claim 2 or claim 5, wherein a corner portion of the step portion is chamfered.

8. An elevator, comprising:

a guide rail erected inside a hoistway; and
a support structure configured to support the guide rail,
wherein the support structure includes:

a rail clip having elasticity and configured to hold a flange portion of the guide rail; and
a fixing bracket to which the rail clip is fixed, the fixing bracket being disposed on a back surface of the flange portion, and
a step portion configured to adjust an amount of flexure of the rail clip is provided between the rail clip and the fixing bracket or between the fixing bracket and the flange portion.

FIG. 1

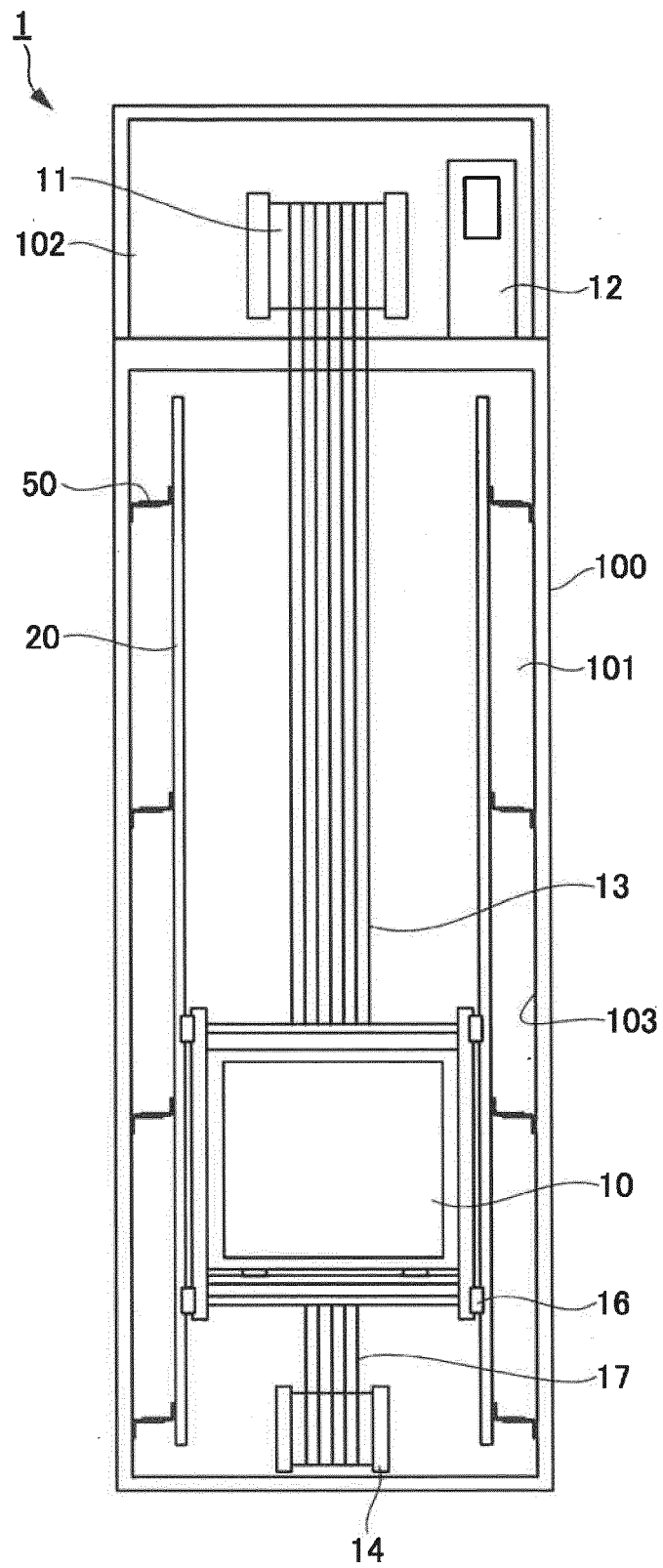
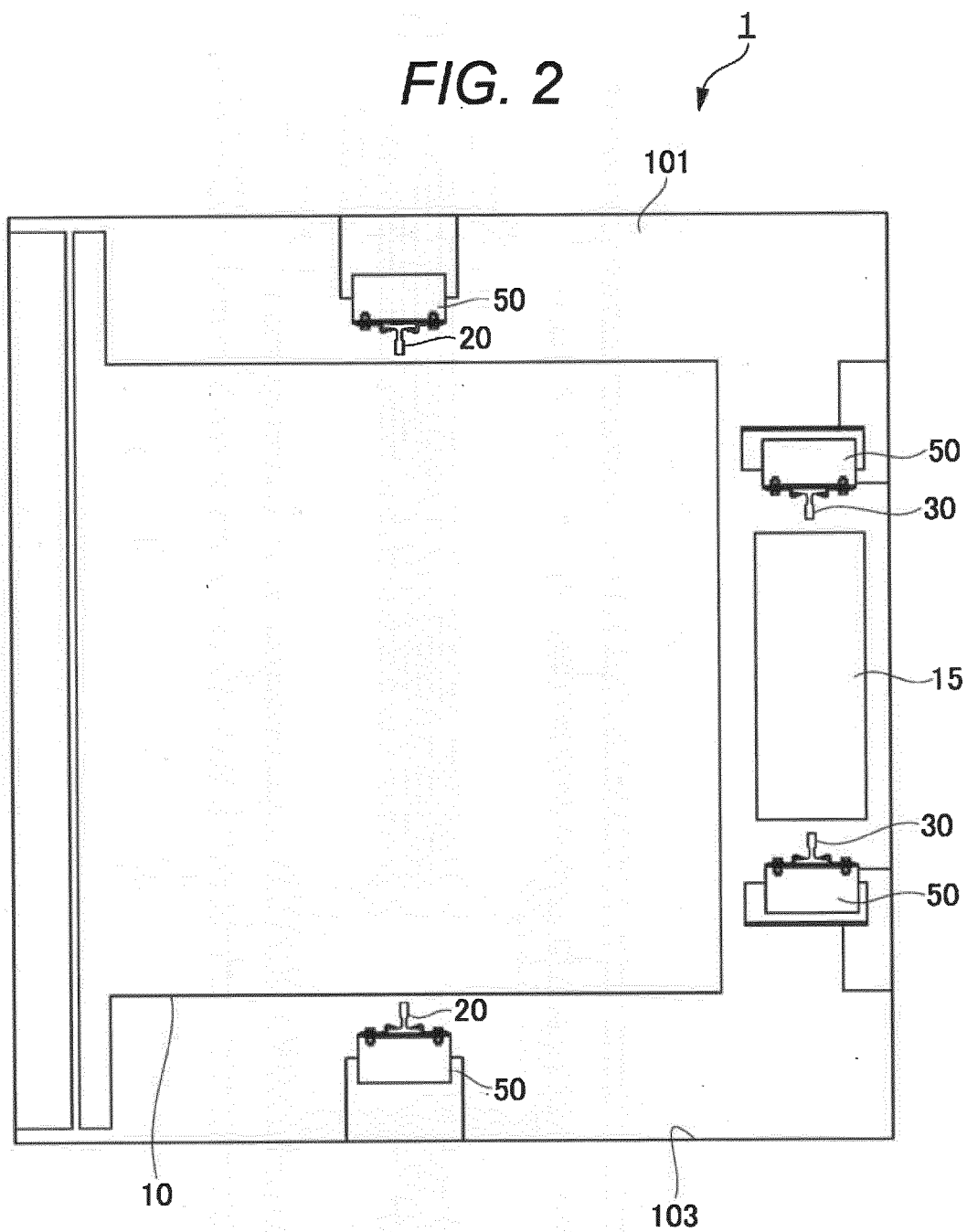


FIG. 2



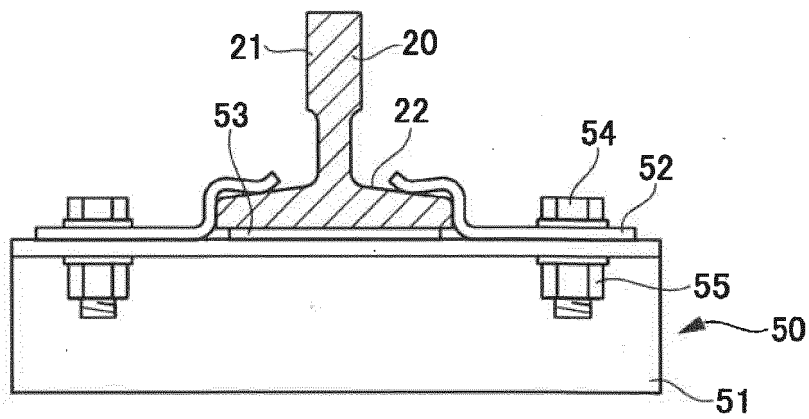


FIG. 3

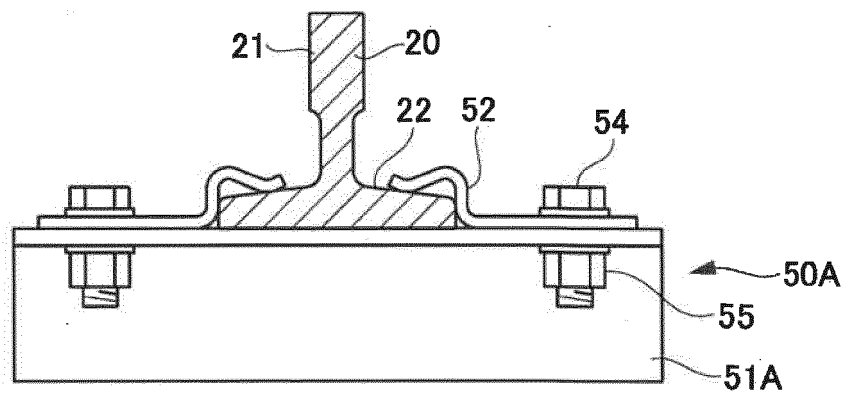


FIG. 4

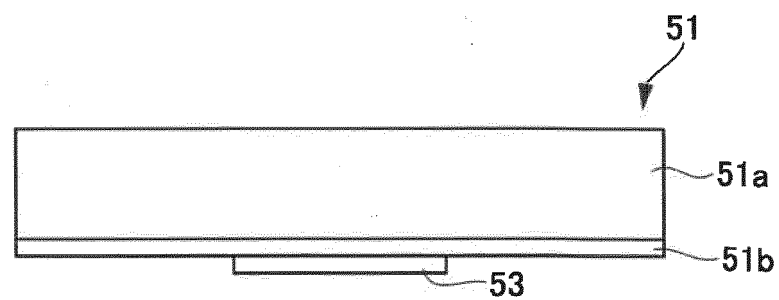


FIG. 5

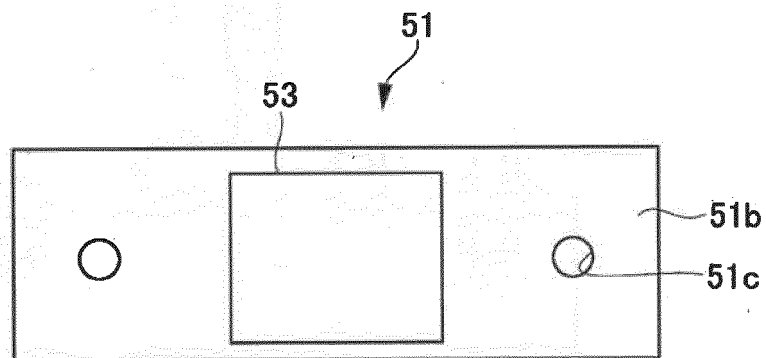


FIG. 6

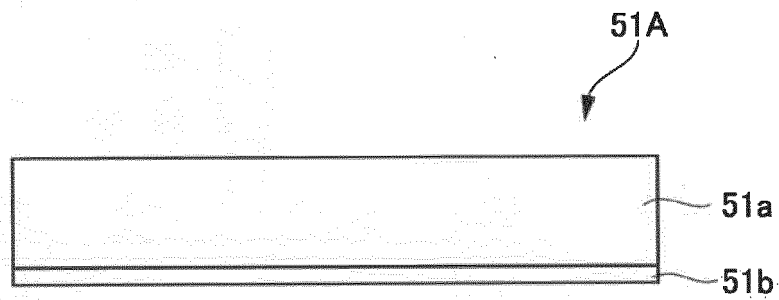


FIG. 7

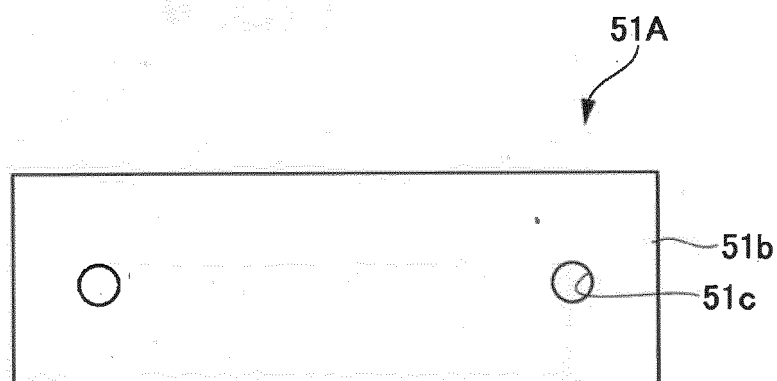


FIG. 8

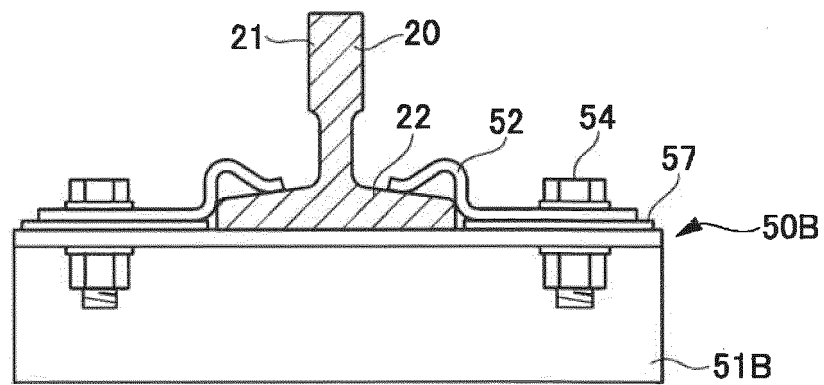


FIG. 9

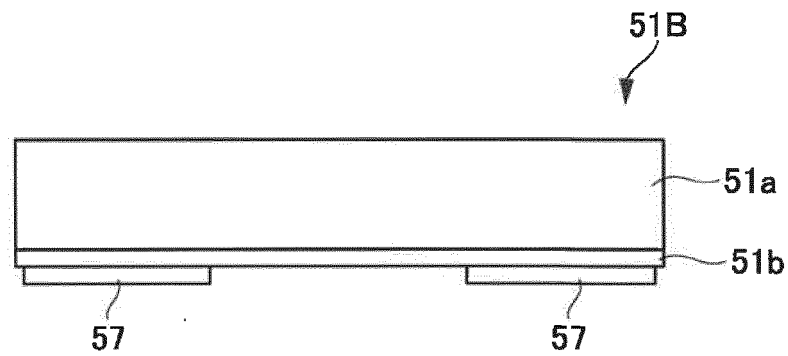


FIG. 10

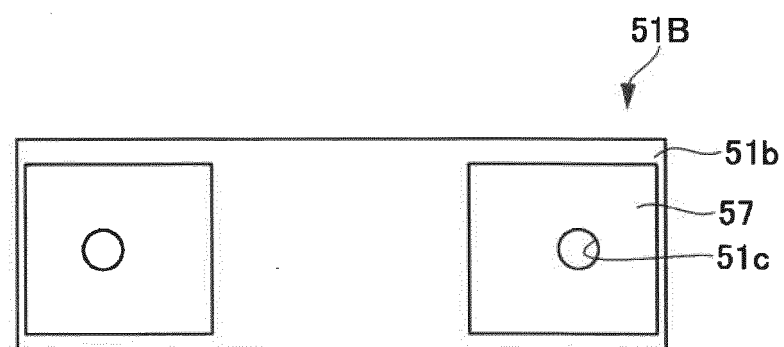


FIG. 11

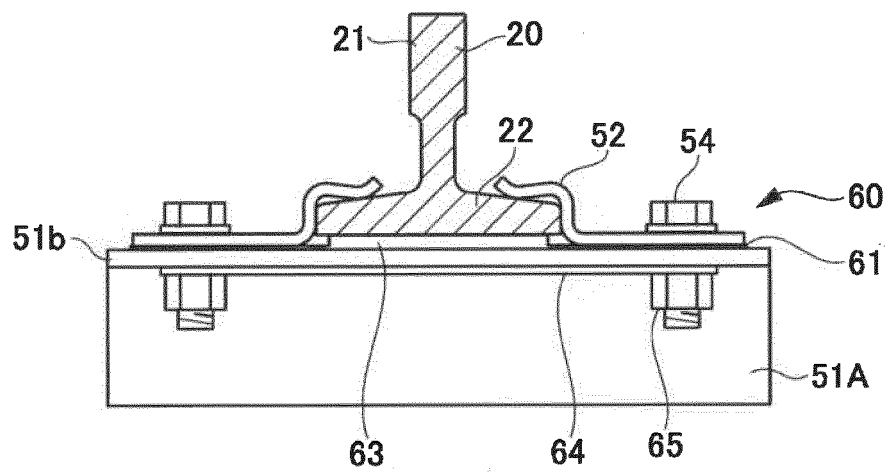


FIG. 12

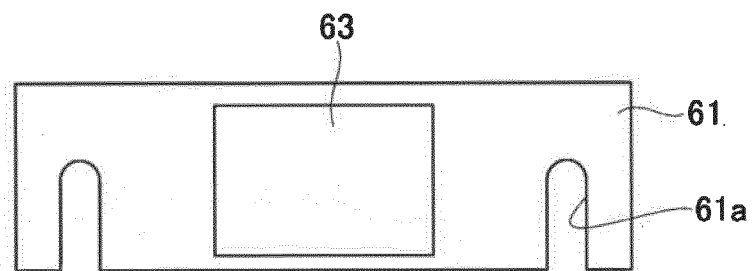


FIG. 13

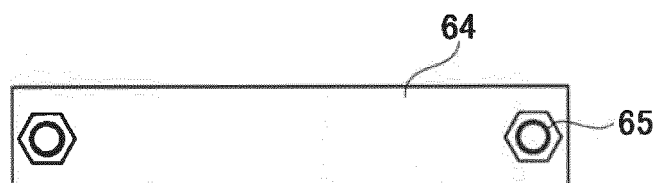


FIG. 14

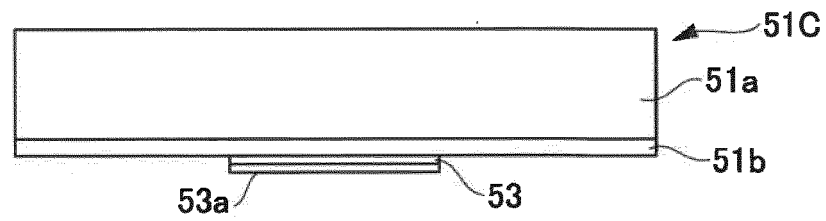


FIG. 15A

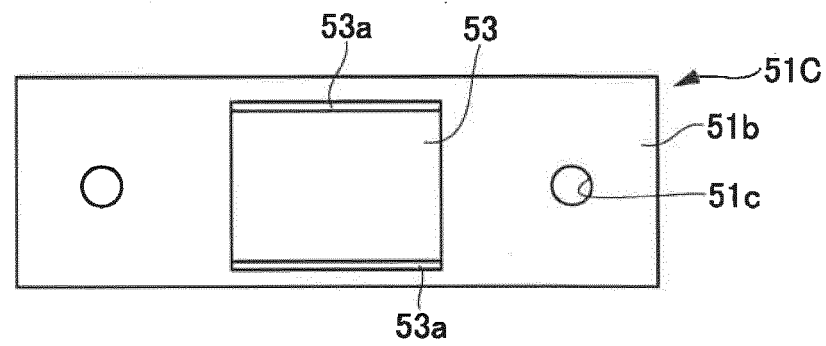


FIG. 15B

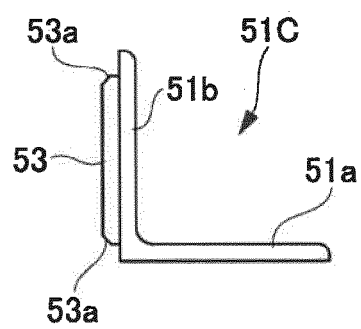


FIG. 15C

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2020/043319

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. B66B7/02 (2006.01) i
FI: B66B7/02 C

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)
Int. Cl. B66B7/02-7/04, 7/12

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 2018-30687 A (FUJITEC KK) 01 March 2018 (2018-03-01), paragraphs [0069]-[0096], fig. 3-5	1-8
A	JP 2013-112443 A (TOSHIBA ELEVATOR AND BUILDING SYSTEMS CORP.) 10 June 2013 (2013-06-10), paragraphs [0012]-[0016], fig. 1-5	1-8
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 68031/1976 (Laid-open No. 159555/1977) (SASAHARA, Shizuo) 03 December 1977 (1977-12-03), description, p. 3, line 5 to p. 5, line 15, fig. 1, 2	1-8

☒ 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
06.01.2021

Date of mailing of the international search report
19.01.2021

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INTERNATIONAL SEARCH REPORT

International application No. PCT/JP2020/043319
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 3575259 A1 (KONE CORPORATION) 04 December 2019 (2019-12-04), paragraphs [0035]-[0056], fig. 2-9	1-8
A	WO 2008/023406 A1 (MITSUBISHI ELECTRIC CORP.) 28 February 2008 (2008-02-28), paragraphs [0034]-[0043], fig. 4-9	1-8
A	JP 2016-78998 A (MITSUBISHI ELECTRIC CORP.) 16 May 2016 (2016-05-16), paragraphs [0020], [0030]-[0034], fig. 9-16	1-8

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/JP2020/043319

Patent Documents referred to in the Report	Publication Date	Patent Family	Publication Date
JP 2018-30687 A	01.03.2018	(Family: none)	
JP 2013-112443 A	10.06.2013	(Family: none)	
JP 52-159555 U1	03.12.1977	(Family: none)	
EP 3575259 A1	04.12.2019	US 2019/0367327 A1 CN 110540123 A	
WO 2008/023406 A1	28.02.2008	(Family: none)	
JP 2016-78998 A	16.05.2016	(Family: none)	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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