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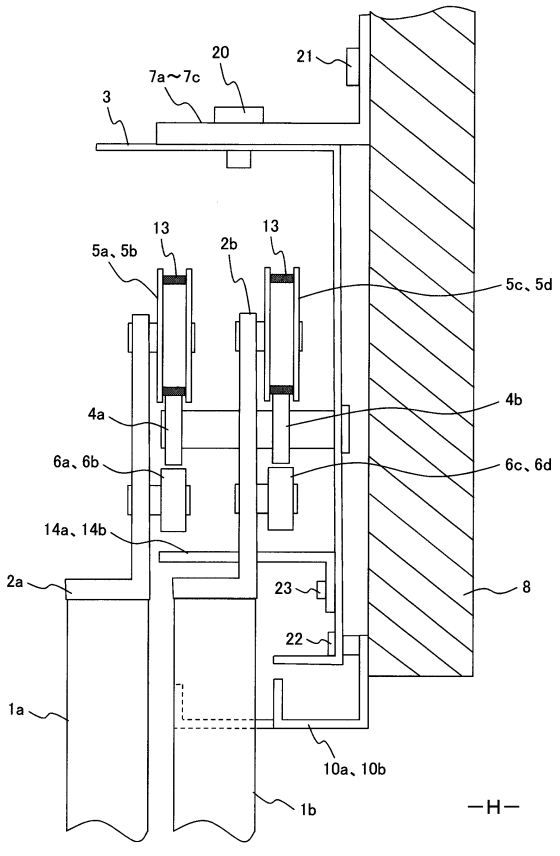
(54) ELEVATOR APPARATUS

(57) The present invention provides an elevator apparatus having novel opening and closing doors (1a, 1b) excellent in fire-resistance performance by inhibiting a melting buffer material (13) from dropping over gateway upper frames (10a, 10b) that come to be high temperatures. Buffer material receiving members (14a, 14b-1, 14b-2) extending in the directions of shifting hanger rollers (5a, 5b, 5c, 5d) are arranged between the upper parts of the gateway upper frames (10a, 10b) and the hanger rollers (5a, 5b, 5c, 5d), the melting buffer material (13) is received by the buffer material receiving members (14a, 14b-1, 14b-2), and the melting buffer material (13) is inhibited from dropping over the gateway upper frames (10a, 10b) of high temperatures. As a result, the danger of generating fire in a hoistway (8) reduces and an excellent fire-resistance performance is obtained.

FIG. 1



EP 3 210 927 A1

Description

Technical Field

[0001] The present invention relates: to an elevator apparatus to carry a passenger or a package; and in particular to an elevator apparatus having an opening and closing door for platform installed at an elevator platform.

Background Art

[0002] An opening and closing door for platform (hereunder described merely as an opening and closing door) through which a passenger comes in and out is installed at a gateway of an elevator apparatus at an elevator platform. In general, the opening and closing door is configured by: installing two doors so as to overlap; and closing a gateway by shifting one door until it touches an end surface of the gateway on the closing side and shifting the other door up to a halfway position when the opening and closing door is closed. Then when the opening and closing door is opened, the gateway is fully opened by: shifting the one door and the other door up to the end surface of the gateway on the opening side; and overlapping the one door and the other door to each other in the state. Such an opening and closing door is called an opening and closing door of a two-leaved single-swing type.

[0003] Further as another case, there is a case where, in the state of closing two opening and closing doors, side end surfaces of them face and touch each other in the center. When the opening and closing doors open therefore, the two opening and closing doors open by shifting in the manner of separating in the right and left directions from the center. As a result, the two opening and closing doors do not overlap each other when they open unlike the opening and closing door of the two-leaved single-swing type stated earlier. Such an opening and closing door is called an opening and closing door of a two-leaved center-swing type.

[0004] Meanwhile, opening and closing doors are configured so as to fully close in order to prevent flames and hot air from intruding into a hoistway when a fire breaks out in a building but flames and hot air may sometimes intrude into a hoistway through gaps between a building and opening and closing doors. Then the intruding flames and hot air may sometimes reach hanger rails and hanger rollers installed in order to suspend opening and closing doors and shift the opening and closing doors smoothly.

[0005] The hanger rails extend in the directions in which the opening and closing doors shift and are fixed to the upper part of the hoistway above the platform gateway in the building with bolts or the like. Then the hanger rollers installed in door hangers fixed to the opening and closing doors roll over rails formed at the upper parts of the hanger rails and shift the opening and closing doors smoothly. Then a buffer material comprising a synthetic resin such as an urethane resin or a nylon resin is installed over the rolling surfaces of the hanger rollers and the configuration is arranged so as to: alleviate impact between the hanger rollers and the rail surfaces of the hanger rails; and inhibit sifting sounds and vibrations accompanying the shift of the opening and closing doors.

[0006] The buffer material may sometimes melt by flames or hot air, however, because it comprises a synthetic resin and the melting buffer material drops directly into a hoistway. On this occasion, if a passenger cage is located on the lower side, the melting buffer material may drop onto the passenger cage and get fire undesirably. Otherwise, even when a passenger cage does not exist, a fire may break out in a hoistway sometimes. For the reason, a measure of inhibiting a melting buffer material from dropping into a hoistway is desired.

[0007] In order to meet such request, for example, Japanese Patent Application Laid-Open No. 2002-220181 (PTL 1) proposes to install a gutter-shaped member to receive a melting buffer material and drain the melting buffer material toward the platform side under a hanger rail so that the melting buffer material may not drop into a hoistway. According to PTL 1, in an opening and closing door having a hanger rail to suspend the opening and closing door, a pocket to fix the hanger rail, a door hanger to be fixed to the upper part of the opening and closing door and suspend the opening and closing door to the hanger rail, a hanger roller to be rotatably installed in the door hanger and roll over the hanger rail, and a buffer material installed over the rolling surface of the hanger roller, in order to prevent the melting buffer material of the hanger roller from dropping onto the side of a hoistway, a gutter-shaped member to receive and drain the melting buffer material toward the center of the opening and closing door is installed under the hanger roller. By receiving the melting buffer material and draining the melting buffer material toward the center of the opening and closing door by the gutter-shaped member, the melting buffer material can be prevented from dropping into a hoistway.

Citation List

Patent Literature

[0008] PTL 1: Japanese Patent Application Laid-Open No. 2002-220181

Summary of Invention

Technical Problem

[0009] An opening and closing door proposed in PTL 1, however, is configured so that a melting buffer material of a hanger roller may be received by a gutter-shaped member, accumulated in the center of the opening and closing door, and drained toward the side of a platform and hence the melting buffer material may sometimes drop over a gateway upper frame constituting a platform gateway in a building. Since the gateway upper frame is located above the platform gateway, the temperature tends to rise by flames and hot air and sometimes rises to a high temperature exceeding the ignition point of a buffer material.

[0010] In consequence of this, a dropped buffer material is ignited at a gateway upper frame sometimes and there is the danger of getting fire in a hoistway caused by the ignition at the gateway upper frame. Consequently, improvement in fire-resistance performance by inhibiting a melting buffer material from dropping over a gateway upper frame that comes to be a high temperature is desired.

[0011] An object of the present invention is to provide an elevator apparatus having a novel opening and closing door excellent in fire-resistance performance.

Solution to Problem

[0012] A feature of the present invention is to inhibit a melting buffer material from dropping over a gateway upper frame of a high temperature by: arranging a buffer material receiving member that extends in the directions of shifting a hanger roller and receives the melting buffer material between the upper part of the gateway upper frame and the hanger roller; and receiving the melting buffer material with the buffer material receiving member.

Advantageous Effects of Invention

[0013] The present invention makes it possible to: receive a melting buffer material with a buffer material receiving member; and inhibit the melting buffer material from dropping over a gateway upper frame of a high temperature. As a result, the danger of igniting a melting buffer material in a hoistway reduces and an opening and closing door excellent in fire-resistance performance can be provided.

Brief Description of Drawings

[0014]

Fig. 1 is a schematic configuration diagram of an elevator apparatus according to a first embodiment of the present invention viewed from a side.
Fig. 2 is a rear elevation view of the elevator apparatus shown in Fig. 1 viewed from a hoistway side.
Fig. 3 is a sectional view of the elevator apparatus taken on line A-A in Fig. 2.
Fig. 4 is a sectional view of the elevator apparatus taken on line B-B in Fig. 2.
Fig. 5 is a sectional view of an elevator apparatus according to a second embodiment of the present invention taken on line A-A similarly to Fig. 3.
Fig. 6 is a sectional view of the elevator apparatus according to the second embodiment of the present invention taken on line B-B similarly to Fig. 4.
Fig. 7 is a sectional view of an elevator apparatus according to a third embodiment of the present invention taken on line A-A similarly to Fig. 3.
Fig. 8 is a sectional view of the elevator apparatus according to the third embodiment of the present invention taken on line B-B similarly to Fig. 4.

Description of Embodiments

[0015] Embodiments according to the present invention are hereunder explained in detail in reference to drawings. The present invention, however, is not limited to the following embodiments and various modified examples and application examples in the technological concept of the present invention are also included in the scope of the present invention.

First Embodiment

[0016] Fig. 1 is a view of the upper part of a two-leaved single-swing opening and closing door according to a first embodiment of the present invention viewed from a side, Fig. 2 is a view of the opening and closing door shown in Fig. 1 viewed from a hoistway side, Fig. 3 is a sectional view taken on line A-A in Fig. 2, and Fig. 4 is a sectional view taken on line B-B in Fig. 2.

[0017] In Figs. 1 to 4, a first opening and closing door 1a and a second opening and closing door 1b installed at a platform gateway: shift to fully closed positions respectively and close the platform gateway in a closing state; and shift to fully open positions respectively and overlap each other in an opening state. Here, in the present embodiment, the first opening and closing door 1a and the second opening and closing door 1b are: opened toward the right side shown with the arrow O in Fig. 2; and closed toward the left side shown with the arrow C in Fig. 2. Consequently, the second opening and closing door 1b is located on the closer side than the first opening and closing door 1a (on the platform side). Then in such an arrangement state, door hangers 2a and 2b are fixed to the top ends of the first opening and closing door 1a and the second opening and closing door 1b by a method of bolting or welding.

[0018] As shown in Figs. 1 and 2, the door hangers 2a and 2b are suspended over hanger rails 4a and 4b extending in the directions of shifting the opening and closing doors 1a and 1b on the inner side of a hoistway 8. The hanger rails 4a and 4b are fixed to a pocket 3 fixedly arranged on the side of the hoistway 8. The hanger rails 4a and 4b: have different distances from the wall surface of the hoistway 8 respectively in response to the positional relationship between the first opening and closing door 1a and the second opening and closing door 1b; and are located in conformity with hanger rollers that will be described later.

[0019] The pocket 3 is fixed to brackets 7a, 7b, and 7c with bolts 20 and the brackets 7a, 7b, and 7c are fixed to the inner wall surface of the hoistway 8 with bolts 21. A door closing side vertical frame 11 and a door opening side vertical frame 12 and gateway upper frames 10a and 10b connecting them, those constituting a platform gateway, are installed at a platform H and the gateway upper frames 10a and 10b are connected at the lower part of the pocket 3 and fixed to the inner wall surface of the hoistway 8 with bolts 22. The gateway upper frame 10a extends to the vicinity of the first opening and closing door 1a and likewise the gateway upper frame 10b extends to the vicinity of the second opening and closing door 1b. Here, the surfaces of the gateway upper frame 10a and the gateway upper frame 10b on the side of the platform are adjusted so as to have an identical plane (single plane) and look good. Further, the gateway upper frame 10a and the gateway upper frame 10b may also be formed integrally.

[0020] The first opening and closing door 1a is configured so as to: roll over the hanger rail 4a through two hanger rollers 5a and 5b arranged at the door hanger 2a; be inhibited from shifting upward by swing stopping rollers 6a and 6b; and avoid derailing. That is, the hanger rollers 5a and 5b are located between the door hanger 2a and the inner wall surface of the hoistway 8 and right above the hanger rail 4a. Further, the swing stopping rollers 6a and 6b are located between the door hanger 2a and the inner wall surface of the hoistway 8 and right below the hanger rail 4a. The configuration therefore is arranged so as to interpose the hanger rail 4a between the hanger rollers 5a and 5b and the swing stopping rollers 6a and 6b.

[0021] Such a configuration is similarly applied to the second opening and closing door 1b and the second opening and closing door 1b is configured so as to: roll over the hanger rail 4b through two hanger rollers 5c and 5d arranged at the door hanger 2b; be inhibited from shifting upward by swing stopping rollers 6c and 6d; and avoid derailing. The hanger rollers 5c and 5d are located between the door hanger 2b and the inner wall surface of the hoistway 8 and right above the hanger rail 4b. Further, the swing stopping rollers 6c and 6d are located between the door hanger 2b and the inner wall surface of the hoistway 8 and right below the hanger rail 4b. The configuration therefore is arranged so as to interpose the hanger rail 4b between the hanger rollers 5c and 5d and the swing stopping rollers 6c and 6d.

[0022] A buffer material 13 comprising a synthetic resin such as an urethane rubber is installed over the outer peripheries of the hanger rollers 5a, 5b, 5c, and 5d and the configuration is arranged so as to: alleviate impact between the hanger rollers 5a, 5b, 5c, and 5d and the rail surfaces of the hanger rails 4a and 4b; and inhibit sifting sounds and vibrations accompanying the shift of the first opening and closing door 1a and the second opening and closing door 1b.

[0023] In the opening and closing doors 1a and 1b of such configurations, when the platform H gets fire, the first opening and closing door 1a, the second opening and closing door 1b, the gateway upper frames 10, the door closing side vertical frame 11, and the door opening side vertical frame 12 are exposed to flames and hot air of the fire and moreover heat is transferred by radiation. Then at the upper parts of the first opening and closing door 1a and the second opening and closing door 1b, heated air: flows in as hot air through gaps between the gateway upper frames 10a and 10b and the first opening and closing door 1a and the second opening and closing door 1b; and raises the temperatures of the opening and closing mechanism members of the opening and closing doors 1a and 1b.

[0024] The constituent members and the opening and closing mechanism members of the opening and closing doors 1a and 1b are not ignited and do not burn by hot air because they mostly comprise metal materials such as steel plates but the buffer material 13 applied to the hanger rollers 5a, 5b, 5c, and 5d: comprises a synthetic resin; hence has a relatively low melting point; and has the feature of melting, being ignited, and burning. When flames and hot air flowing

in through the gaps between the gateway upper frames 10a and 10b and the first opening and closing door 1a and the second opening and closing door 1b raise the temperatures of the hanger rollers 5a, 5b, 5c, and 5d therefore, the buffer material 13 melts and drops over the gateway upper frames 10.

[0025] Since the gateway upper frames 10a and 10b are arranged above a platform gateway, the possibility of being exposed to flames and high temperature air tends to increase and the temperatures of the gateway upper frames 10a and 10b tend to be higher than the temperatures of the other constituent members and opening and closing mechanism members of the opening and closing doors 1a and 1b. When the gateway upper frames 10 receive heat by fire from the platform H and the temperatures rise to temperatures exceeding the ignition point of the buffer material 13 therefore, there is the danger that the melting and dropping buffer material 13: touches the gateway upper frames 10a and 10b of high temperatures; ignites by itself; starts combustion; and induces fire in a hoistway.

[0026] In consideration of the above situation, in the present embodiment, a buffer material receiving member 14a and a buffer material receiving member 14b-1 extending in the directions of shifting the hanger rollers 5a, 5b, 5c, and 5d between the gateway upper frames 10a and 10b and the hanger rollers 5a, 5b, 5c, and 5d are fixed to the pocket 3 so that the melting buffer material 13 may not drop over the gateway upper frames 10a and 10b heated to high temperatures. Here, although the buffer material receiving member 14a and the buffer material receiving member 14b-1 are fixed to the pocket 3 in the present embodiment, otherwise they may be fixed directly to the inner wall surface of the hoistway 8. On this occasion, the bottom end surface of the pocket 3 is fixed to the inner wall surface of the hoistway 8 above the buffer material receiving member 14a and the buffer material receiving member 14b-1.

[0027] As shown in Figs. 1 to 4, the buffer material receiving members 14a and 14b-1 are fixed to the pocket 3 with bolts 23 and installed so as to extend in the directions of shifting the hanger rollers 5a, 5b, 5c, and 5d between the upper parts of the gateway upper frames 10a and 10b and the hanger rollers 5a, 5b, 5c, and 5d or desirably the swing stopping rollers 6a, 6b, 6c, and 6d. Meanwhile, when the swing stopping rollers 6a, 6b, 6c, and 6d are not installed, the buffer material receiving members 14a and 14b-1 are arranged between the upper parts of the gateway upper frames 10a and 10b and the hanger rails 4a and 4b. In any of the cases, the buffer material receiving members 14a and 14b-1 are arranged between the upper parts of the gateway upper frames 10a and 10b and the hanger rollers 5a, 5b, 5c, and 5d.

[0028] As shown in Fig. 3, the buffer material receiving member 14a corresponding to the first opening and closing door 1a (first opening and closing door buffer material receiving member): has a top surface of a planar shape; extends from the pocket 3 to the vicinity of the door hanger 2a; and has such a shape that at least projected parts of the hanger rollers 5a and 5b obtained when they are projected vertically over the top surface may fall within the top surface. Further, in the present embodiment, the length of the buffer material receiving member 14a is decided so that the tip of the buffer material receiving member 14a may nearly coincide with or exceed the tip of the gateway upper frame 10a. Furthermore, the buffer material receiving member 14a is arranged so as to extend to the parts where the hanger rollers 5a and 5b are located in the state of closing the first opening and closing door 1a. The fundamental function of the buffer material receiving member 14a is at least to inhibit the melting buffer material 13 from dropping over the gateway upper frame 10a when the buffer material 13 of the hanger rollers 5a and 5b melts and drops.

[0029] Meanwhile, as shown in Fig. 4, the buffer material receiving member 14b-1 corresponding to the second opening and closing door 1b (second opening and closing door buffer material receiving member): has a top surface of a planar shape; extends from the pocket 3 to the vicinity of the door hanger 2b; and has such a shape that at least projected parts of the hanger rollers 5c and 5d obtained when they are projected vertically over the top surface may fall within the top surface. Further, in the present embodiment, the length of the buffer material receiving member 14b-1 is decided so that the tip of the buffer material receiving member 14b-1 may nearly coincide with or exceed the tip of the gateway upper frame 10b. Furthermore, the buffer material receiving member 14b-1 is arranged so as to extend to the parts where the hanger rollers 5c and 5d are located in the state of closing the first opening and closing door 1b. Likewise, the fundamental function of the buffer material receiving member 14b-1 is at least to inhibit the melting buffer material 13 from dropping over the gateway upper frame 10b when the buffer material 13 of the hanger rollers 5c and 5d melts and drops.

[0030] Meanwhile, as shown in Fig. 2, the first opening and closing door 1a and the second opening and closing door 1b are opened in the arrow direction O (the right direction in the figure) and closed in the arrow direction C (the left direction in the figure). Consequently, the danger that an end surface of the second opening and closing door 1b collides with the buffer material receiving member 14a when the second opening and closing door 1b shifts toward the closing side is avoided.

[0031] Meanwhile, as shown in the figures, it is also possible to form a buffer material receiving member 14b-2 by bending the lowermost end of the pocket 3 toward the side of the second opening and closing door 1b. On this occasion too, similarly to the buffer material receiving member 14b-1, the buffer material receiving member 14b-2: has a top surface of a planar shape; extends to the vicinity of the position where the door hanger 2b is located; and has such a shape that at least projected parts of the hanger rollers 5c and 5d obtained when they are projected vertically over the top surface may fall within the top surface. Further, the length of the buffer material receiving member 14b-2 is decided so that the tip of the buffer material receiving member 14b-2 may nearly coincide with or exceed the tip of the gateway

upper frame 10b. Furthermore, the buffer material receiving member 14b-2 is arranged so as to extend to the parts where the hanger rollers 5c and 5d are located in the state of closing the first opening and closing door 1b.

[0032] By installing the buffer material receiving member 14b-2 in this way, it is possible to omit the buffer material receiving member 14b-1 and obtain the functions and effects of facilitating operations during attaching and being able to save material costs. Further, it is also possible to improve the stiffness of the pocket 3 by bending the bottom end of the pocket 3 and forming the buffer material receiving member 14b-2. The buffer material receiving member 14b-2 therefore has the function of receiving the melting buffer material 13 and the function of improving the stiffness of the pocket 3.

[0033] Meanwhile, in the present embodiment, both the buffer material receiving member 14b-1 and the buffer material receiving member 14b-2 are installed and the configuration is arranged so that the buffer material receiving member 14b-2 may make hot air and heat by radiation hardly ill-affect the buffer material receiving member 14b-1 and the hanger rolls 5c and 5d.

[0034] In such a configuration, when a fire breaks out, flames and hot air flow into the platform H. The flames and hot air heat the first opening and closing door 1a, the second opening and closing door 1b, the gateway upper frames 10, the door closing side vertical frame 11, and the door opening side vertical frame 12. At the upper parts of the first opening and closing door 1a and the second opening and closing door 1b in particular, heated air flows in as hot air through the gaps between the gateway upper frames 10a and 10b and the first opening and closing door 1a and the second opening and closing door 1b. As a result, the phenomenon of raising the temperatures of the hanger rollers 5a, 5b, 5c, and 5d, melting the buffer material 13, and dropping the buffer material 13 by the gravity is generated.

[0035] In the present embodiment, however, since the melting buffer material 13 can be received at least by the buffer material receiving members 14a and 14b-1 installed below the hanger rollers 5a, 5b, 5c, and 5d, the melting buffer material 13 is prevented from dropping over the gateway upper frames 10a and 10b of high temperatures. Here, when the buffer material receiving member 14b-1 is omitted and the buffer material receiving member 14b-2 is installed instead, the melting buffer material 13 is received by the buffer material receiving member 14b-2.

[0036] Here, in the present embodiment, since the buffer material receiving members 14a and 14b-1 are blocked by the gateway upper frames 10a and 10b and the buffer material receiving member 14b-2 formed by bending the bottom end of the pocket 3, hot air does not act directly and radiant heat is also blocked and hence the temperature rise can be kept low in comparison with the gateway upper frames 10a and 10b.

[0037] Although a metal material such as a steel plate of a high thermal resistance is used for the buffer material receiving members 14a and 14b-1 in the present embodiment, if they are configured by a material having a low heat-transfer coefficient, for example a porcelain material such as ceramics, it is possible to: reduce the temperature rise of the buffer material receiving members 14a and 14b-1; and further reduce the danger of igniting the buffer material 13 melting over the upper surfaces of the buffer material receiving members 14a and 14b-1. Further, it is also possible to: install a porcelain material around the outer periphery of a metal material; and obtain buffer material receiving members 14a and 14b-1 having a low strength and a low heat-transfer coefficient.

[0038] As stated above, in the present embodiment, since the melting buffer material 13 is received by the buffer material receiving member 14a and the buffer material receiving member 14b-1 or the buffer material receiving member 14b-2, the melting buffer material 13 is prevented from dropping over the gateway upper frames 10a and 10b of high temperatures. Moreover, if the quantity of the melting buffer material 13 is small, the buffer material 13 stays over the top surfaces of the buffer material receiving member 14a and the buffer material receiving member 14b-1 or the buffer material receiving member 14b-2 and the danger of dropping over the gateway upper frames 10a and 10b of high temperatures is small.

[0039] Further, as shown in Fig. 2, since the buffer material receiving members 14a and 14b-1 extend up to the door closing side vertical frame 11 and the door opening side vertical frame 12, the danger of, if the quantity of the melting buffer material 13 is large, draining the buffer material 13 having dropped over the top surfaces of the buffer material receiving members 14a and 14b-1 toward the door closing side vertical frame 11 and the door opening side vertical frame 12 and dropping over the gateway upper frames 10a and 10b of high temperatures is small. Since the temperatures of the door closing side vertical frame 11 and the door opening side vertical frame 12 are lower than the temperatures of the gateway upper frames 10a and 10b, the danger of generating fire is small. In addition to that, it is also possible to drain the melting buffer material 13 aggressively toward the door closing side vertical frame 11 and the door opening side vertical frame 12 by extending the buffer material receiving members 14a and 14b-1 toward the door closing side vertical frame 11 and the door opening side vertical frame 12 obliquely to the gravity direction.

[0040] Further, it is possible to prevent the melting buffer material 13 from flowing out toward the opening and closing doors 1a and 1b by bending the tip of the buffer material receiving member 14a (tip on the first opening and closing door side) and tips of the buffer material receiving members 14b-1 and 14b-2 (tips on the second opening and closing door side) upward and forming uplifted parts. It is thereby possible to further reduce the danger of dropping the melting buffer material 13 over the gateway upper frames 10a and 10b of high temperatures.

[0041] As stated above, according to the present embodiment, the configuration is arranged so as to: arrange buffer

material receiving members extending in the directions of shifting hanger rollers and receiving a melting buffer material between the upper parts of gateway upper frames of a platform gateway and the hanger rollers; and receive the melting buffer material by the buffer material receiving members. It is possible thereby to receive the melting buffer material by the buffer material receiving members and inhibit the melting buffer material from dropping over the gateway upper frames of high temperatures and hence the danger of generating fire in a hoistway is reduced and an opening and closing door excellent in fire-resistance performance is obtained.

Second Embodiment

[0042] A second embodiment according to the present invention is explained hereunder. A reference numeral identical to the first embodiment represents an identical constituent component or a constituent component having a similar function. The second embodiment is the case of mounting and fixing a heat insulating material over and to the top surfaces of buffer material receiving members 14a, 14b-1, and 14b-2.

[0043] In Fig. 5 showing the side of a first opening and closing door 1a, a heat insulating material 15a is mounted over and fixed to the top surface of a buffer material receiving member 14a. Further, a heat insulating material 15b-2 is also mounted over and fixed to the top surface of a buffer material receiving member 14b-2 formed in a pocket 3.

[0044] Further, in Fig. 6 showing the side of a second opening and closing door 1b, a heat insulating material 15b-1 is mounted over and fixed to the top surface of a buffer material receiving member 14b-1. Further, a heat insulating material 15b-2 is also mounted over and fixed to the top surface of a buffer material receiving member 14b-2 formed in a pocket 3.

[0045] Various kinds of materials can be used as a heat insulating material but an inorganic material is desirably used. For example, calcium silicate, ceramics, alumina, or the like can be used by being molded and processed into an appropriate shape. Then such an inorganic material is melted and processed to a fibrous form and subjected to thermocompression bonding and thus a heat insulating material is produced. Otherwise, a heat insulating material can be produced by processing into a porous form. By this method, a heat insulating material itself can absorb a melting buffer material 13 and the melting buffer material 13 can be fixed to the surfaces of the heat insulating materials 15a, 15b-1, and 15b-2.

[0046] Then the buffer material receiving members 14a, 14b-1, and 14b-2 comprise a ferrous material (stainless steel for example) and the heat insulating materials 15a, 15b-1, and 15b-2 are assembled and fixed to the top surfaces of them.

[0047] The temperature rise of the heat insulating materials 15a, 15b-1, and 15b-2 therefore can be smaller than the temperature rise of the buffer material receiving members 14a, 14b-1, and 14b-2 comprising a metal. As a result, even if a melting buffer material 13 drops over any one of the heat insulating materials, the temperature rise is kept low and hence the danger of igniting the buffer material 13 more reduces than the first embodiment. Further, since the temperature of the heat insulating material 15b-2 of the buffer material receiving member 14b-2 located on the side lower than the buffer material receiving members 14a and 14b-1 is kept low, the heat radiation of them can be kept low and the temperature rise of the buffer material receiving member 14b-1 can be inhibited.

[0048] Here, although a heat insulating material is mounted over and fixed to buffer material receiving members 14a, 14b-1, and 14b-2 in the present embodiment, it is possible to: install a heat insulating material at least over the top surfaces of the buffer material receiving members 14a and 14b-1; and if necessary install a heat insulating material over the top surface of the buffer material receiving member 14b-2. As stated also in the first embodiment, however, when the buffer material receiving member 14b-1 is omitted, since the buffer material receiving member 14b-2 plays the role of the buffer material receiving member 14b-1, a heat insulating material 15b-2 has to be installed over the buffer material receiving member 14b-2.

[0049] In this way, in the present embodiment, in addition to the functions and effects described in the first embodiment, since a heat insulating material is mounted over and fixed to at least the top surfaces of the buffer material receiving members 14a and 14b-1 and if necessary the top surface of the buffer material receiving member 14b-2, it is possible to: keep the surface temperatures of the respective heat insulating materials low; and further reduce the danger of igniting a melting buffer material.

Third Embodiment

[0050] A third embodiment according to the present invention is explained hereunder. A reference numeral identical to the first embodiment and the second embodiment represents an identical constituent component or a constituent component having a similar function. The third embodiment is the case of fixing a radiation inhibiting material to the bottom surfaces of buffer material receiving members 14a, 14b-1, and 14b-2 and the bottom inner surfaces of gateway upper frames 10a and 10b.

[0051] In Fig. 7 showing the side of a first opening and closing door 1a, a radiation inhibiting material 16a is fixed to the bottom surface of a buffer material receiving member 14a. Further, a radiation inhibiting material 16b-2 is also

mounted over and fixed to the bottom surface of a buffer material receiving member 14b-2 formed in a pocket 3. The radiation inhibiting materials 16a, 16b-1, and 16b-2 have the function of reflecting radiant heat. Further, likewise, a radiation inhibiting material 16c-1 is fixed also to the bottom inner surface of a gateway upper frame 10a and the radiation inhibiting material 16c-1 has the function of inhibiting radiant heat from radiating.

[0052] Further, in Fig. 8 showing the side of a second opening and closing door 1b, a radiation inhibiting material 16b-1 is fixed to the bottom surface of a buffer material receiving member 14b-1. Further, a radiation inhibiting material 16b-2 is also mounted over and fixed to the bottom surface of a buffer material receiving member 14b-2 formed in a pocket 3. The radiation inhibiting materials 16a, 16b-1, and 16b-2 have the function of reflecting radiant heat. Further, likewise, a radiation inhibiting material 16c-2 is fixed also to the bottom inner surface of a gateway upper frame 10b and the radiation inhibiting material 16c-2 has the function of inhibiting radiant heat from radiating.

[0053] Various kinds of materials can be used as a radiation inhibiting material but a metal material excellent in thermal resistance is used desirably. For example, aluminum, aluminum alloy, and the like formed into a tabular shape or a tape shape can be used. A good configuration is that: the buffer material receiving members 14a, 14b-1, and 14b-2 and the gateway upper frames 10a and 10b comprise a ferrous material (stainless steel, for example); and the radiation inhibiting materials 16a, 16b-1, 16b-2, 16c-1, and 16c-2 are assembled and fixed to the bottom surfaces of the buffer material receiving members 14a, 14b-1, and 14b-2 and the bottom inner surfaces of the gateway upper frames 10a and 10b.

[0054] It is therefore possible to reduce the temperature rise by the radiation inhibiting materials 16a, 16b-1, 16b-2, 16c-1, and 16c-2 in comparison with the temperature rise in the case of only the buffer material receiving members 14a, 14b-1, and 14b-2 comprising a metal shown in Fig. 1. As a result, even when a melting buffer material 13 drops over any one of the radiation inhibiting materials, the temperature rise is inhibited and hence the danger of igniting a buffer material 13 reduces. Further, the radiation of radiant heat is inhibited by the radiation inhibiting materials 16c-1 and 16c-2 of the gateway upper frames 10a and 10b and hence the temperature rise of the buffer material receiving members 14a, 14b-1, and 14b-2 can be inhibited.

[0055] Here, although the radiation inhibiting materials are fixed to the buffer material receiving members 14a, 14b-1, and 14b-2 and the gateway upper frames 10a and 10b in the present embodiment, it is possible to: install a radiation inhibiting material at least over the bottom surfaces of the buffer material receiving members 14a and 14b-1; and if necessary install a radiation inhibiting material over the bottom surface of the buffer material receiving member 14b-2 and the bottom inner surfaces of the gateway upper frames 10a and 10b. As stated also in the first embodiment, however, when the buffer material receiving member 14b-1 is omitted, since the buffer material receiving member 14b-2 plays the role of the buffer material receiving member 14b-1, a heat radiation inhibiting material 16b-2 has to be installed over the buffer material receiving member 14b-2.

[0056] Here, although the case of being combined with the second embodiment is shown in the present embodiment, it is also possible to be combined with the first embodiment and, in this case, a heat insulating material is not installed, radiation inhibiting materials 16a, 16b-1, and 16b-2 are fixed to the bottom surfaces of buffer material receiving members 14a, 14b-1, and 14b-2, and radiation inhibiting materials 16b-1 and 16b-2 are fixed to the bottom inner surfaces of gateway upper frames 10a and 10b.

Fourth Embodiment

[0057] Although the above explanations have been made on the basis of the case of an opening and closing door of a two-leaved single-swing type in the first to third embodiments, it is also possible to apply the present invention to an opening and closing door of a two-leaved center-swing type. In the case of the opening and closing door of a two-leaved center-swing type, in the state of closing a first opening and closing door 1a and a second opening and closing door 1b as shown in Fig. 2, side end surfaces of them face and touch each other in the center. When the opening and closing door opens therefore, the first opening and closing door 1a and the second opening and closing door 1b open by shifting in the manner of separating in the right and left opposite directions from the center. As a result, the opening and closing doors 1a and 1b do not overlap each other when the opening and closing doors 1a and 1b open unlike the first to third embodiments.

[0058] If you try to apply the present invention to such an opening and closing door of a two-leaved center-swing type, you may adopt the same structure as shown in Figs. 4, 6, or 8 to both a first opening and closing door 1a and a second opening and closing door 1b. That is, a buffer material receiving member 14b-1 is installed in each of the opening and closing doors 1a and 1b individually. Also by such a structure, it is possible to receive a melting buffer material 13 by a buffer material receiving member 14b-1 and inhibit the melting buffer material 13 from dropping over gateway upper frames 10a and 10b of high temperatures and hence the danger of generating fire in a hoistway reduces and an opening and closing door excellent in fire-resistance performance is obtained. Here, the buffer material receiving member 14b-1 is not required to be separated unlike a buffer material receiving member 14a in the first to third embodiments and may be a buffer material receiving member 14b-1 of a continuous shape.

[0059] Further, in an opening and closing door of a two-leaved center-swing type, it is advantageous to: omit a buffer

material receiving member 14b-1; and form only a buffer material receiving member 14b-2 by bending the lowermost end of a pocket 3 toward the side of opening and closing doors 1a and 1b. It is possible thereby to form the buffer material receiving member 14b-2 integrally and continuously over the two opening and closing doors 1a and 1b. As a result, the functions and effects of: being able to omit the buffer material receiving member 14b-1; facilitating operations during attaching; and being able to save material costs can be obtained.

[0060] As stated above, in the present invention, a configuration of: arranging a buffer material receiving member extending in the directions of shifting a hanger roller between the upper part of a gateway upper frame of a platform gateway and the hanger roller; and receiving a melting buffer material by the buffer material receiving member is adopted. It is possible thereby to receive the melting buffer material by the buffer material receiving member and inhibit the melting buffer material from dropping over the gateway upper frame of a high temperature and hence the danger of generating fire in a hoistway reduces and the fire-resistance performance comes to be excellent.

[0061] Here, the present invention is not limited to the embodiments stated above and includes various modified examples. For example, the above embodiments are explained in detail in order to make the present invention easy to understand and the present invention is not necessarily limited to the cases having all the configurations explained above. Further, it is possible to replace a part of a configuration of an embodiment with a configuration of another embodiment and add a configuration of an embodiment to a configuration of another embodiment. Furthermore, it is possible to add, delete, or replace another configuration to, from, or with a part of a configuration of an embodiment.

Reference Signs List

[0062]

1a	First opening and closing door
1b	Second opening and closing door
2a, 2b	Door hanger
3	Pocket
4a, 4b	Hanger rail
5a to 5d	Hanger roller
6a to 6d	Swing stopping roller
7a to 7c	Bracket
8	Hoistway
10	Gateway upper frame
11	Door closing side vertical frame
12	Door opening side vertical frame
13	Buffer material
14a, 14b-1, 14b-2	Buffer material receiving member
15a to 15c	Heat insulating material
16a to 16	Radiation inhibiting material
21 to 23	Bolt
H	Platform

Claims

1. An elevator apparatus comprising a door opening side vertical frame, a door closing side vertical frame, a gateway upper frame connecting the upper parts of both the vertical frames, those constituting a platform gateway at an elevator platform, and an opening and closing door to open and close the platform gateway and being configured so that a door hanger suspended on a hanger rail fixed to a hoistway is installed at the upper part of the opening and closing door and a hanger roller rolling over the hanger rail and having a buffer material comprising a synthetic resin over a rolling surface is installed at the door hanger, wherein a buffer material receiving member extending in the sifting directions of the hanger roller, receiving the buffer material of a melting state, and inhibiting the buffer material from dropping over the gateway upper frame is arranged between the upper part of the gateway upper frame and the hanger roller.

2. An elevator apparatus according to Claim 1, wherein:

   the opening and closing door comprises a first opening and closing door and a second opening and closing door; and

in the state of closing the first opening and closing door and the second opening and closing door, the buffer material receiving member comprises a first opening and closing door buffer material receiving member extending in the range where the hanger roller of the first opening and closing door is located and a second opening and closing door buffer material receiving member extending in the range where the hanger roller of the second opening and closing door is located.

3. An elevator apparatus according to Claim 2, wherein:

the opening and closing door is an opening and closing door of a two-leaved single-swing type that is configured so that the first opening and closing door and the second opening and closing door open in an identical direction and close in another identical direction and moreover the first opening and closing door and the second opening and closing door overlap each other in an opening state; and
in the state of closing the first opening and closing door and the second opening and closing door, the buffer material receiving member comprises a first opening and closing door buffer material receiving member extending in the range where the hanger roller of the first opening and closing door is located and a second opening and closing door buffer material receiving member being separated from the first opening and closing door buffer material receiving member and extending in the range where the hanger roller of the second opening and closing door is located.

4. An elevator apparatus according to Claim 3, wherein: a pocket to which the hanger rail is fixed is fixed to the inner wall surface of the hoistway; and the first opening and closing door buffer material receiving member and the second opening and closing door buffer material receiving member are fixed to the pocket.

5. An elevator apparatus according to Claim 4, wherein either of the first opening and closing door buffer material receiving member and the second opening and closing door buffer material receiving member is formed at a part where the bottom end of the pocket is bent.

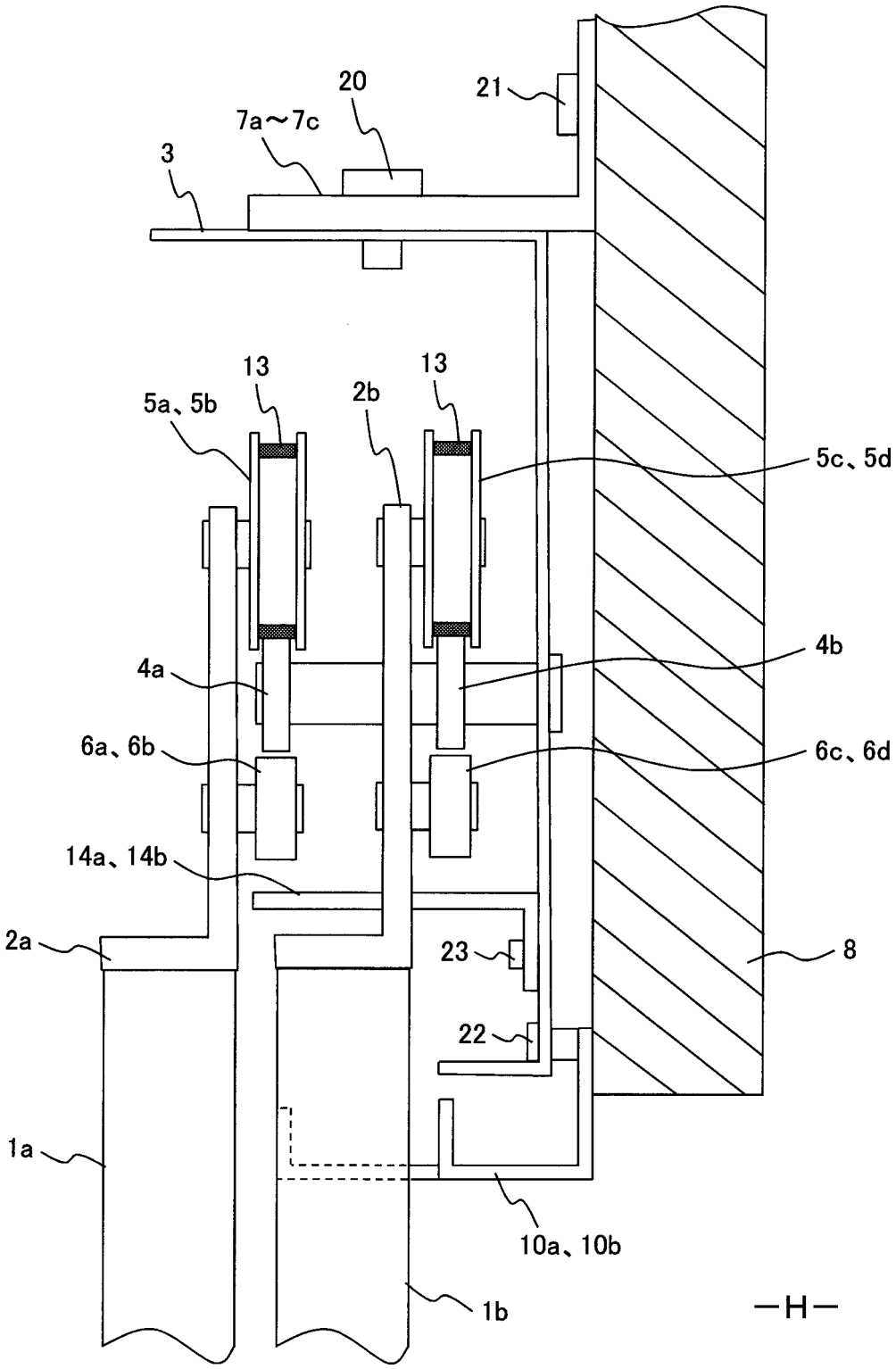
6. An elevator apparatus according to Claim 5, wherein: a heat insulating material is installed over the top surfaces of the first opening and closing door buffer material receiving member and the second opening and closing door buffer material receiving member; a heat radiation inhibiting material is installed over the bottom surfaces of the first opening and closing door buffer material receiving member and the second opening and closing door buffer material receiving member; or a heat insulating material is installed over the top surfaces and a heat radiation inhibiting material is installed over the bottom surfaces of the first opening and closing door buffer material receiving member and the second opening and closing door buffer material receiving member.

7. An elevator apparatus according to Claim 2, wherein;
the opening and closing door is an opening and closing door of a two-leaved center-swing type that is configured so that the first opening and closing door and the second opening and closing door open and close in opposite directions; and
in the state of closing the first opening and closing door and the second opening and closing door, the buffer material receiving member either is installed separately in the range where the hanger roller of the first opening and closing door is located and in the range where the hanger roller of the second opening and closing door is located or extends integrally and continuously over the range where the hanger roller of the first opening and closing door is located and over the range where the hanger roller of the second opening and closing door is located.

8. An elevator apparatus according to Claim 7, wherein: a pocket to which the hanger rail is fixed is fixed to the inner wall surface of the hoistway; and the buffer material receiving member is formed at a part where the bottom end of the pocket is bent.

9. An elevator apparatus according to Claim 7, wherein: a heat insulating material is installed over the top surface of the buffer material receiving member; a heat radiation inhibiting material is installed over the bottom surface of the buffer material receiving member; or a heat insulating material is installed over the top surface and a heat radiation inhibiting material is installed over the bottom surface of the buffer material receiving member.

FIG. 1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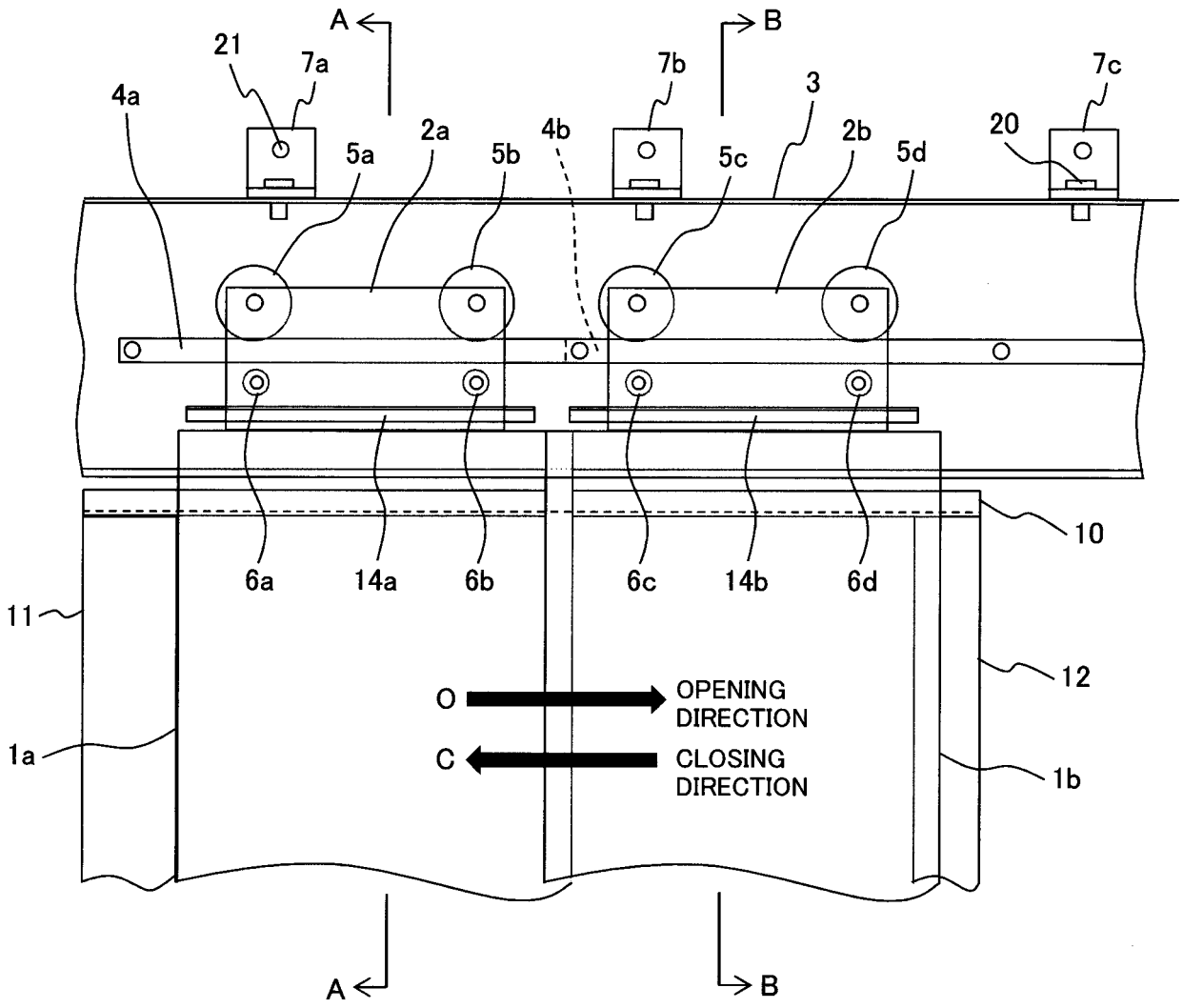
22
1a
10a、10b
1b
—H—

FIG. 2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5d
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6a
14a
6b
6c
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6d
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12
O
OPENING DIRECTION
C
CLOSING DIRECTION
1a
1b
A
B

FIG. 3

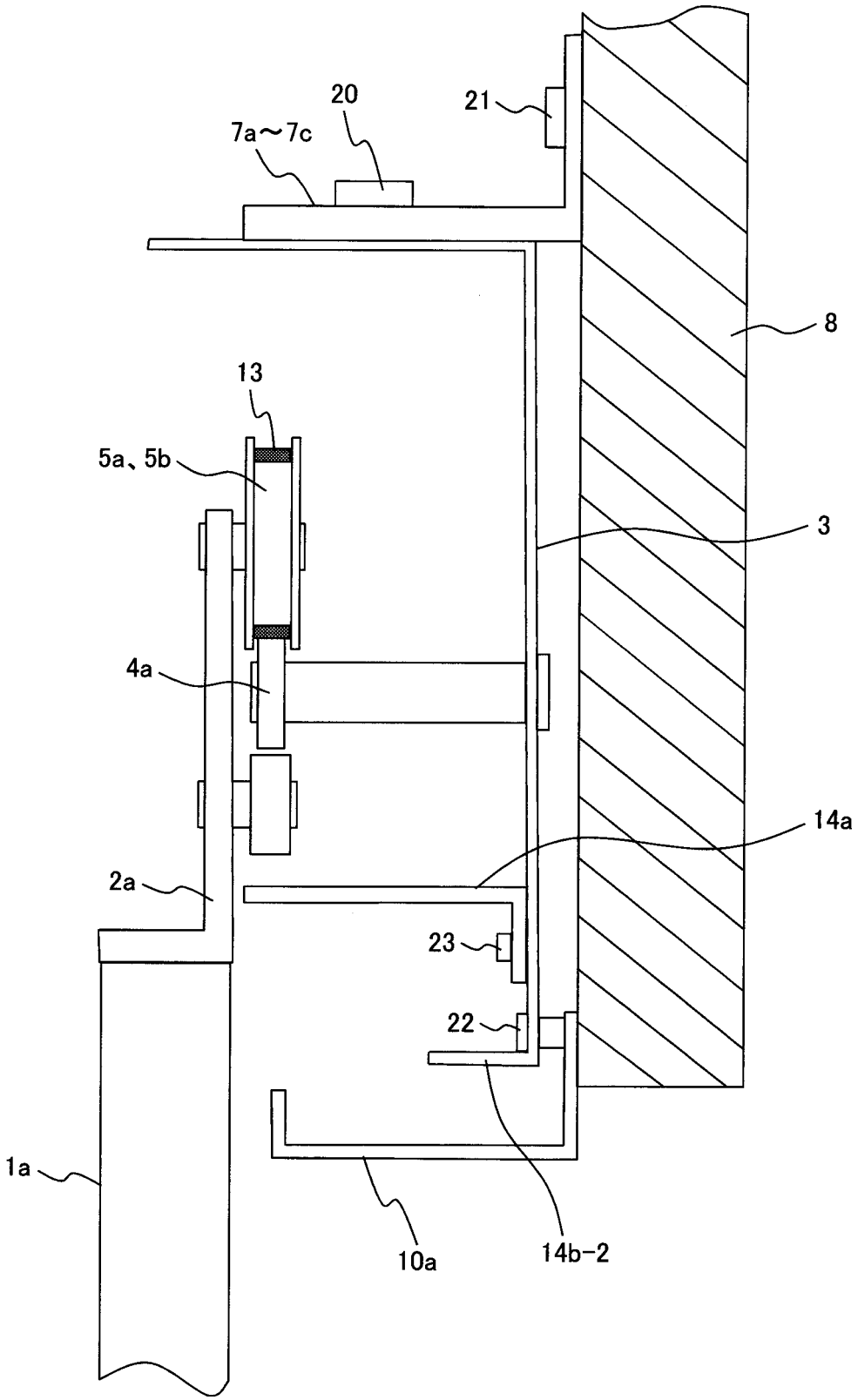

FIG. 4

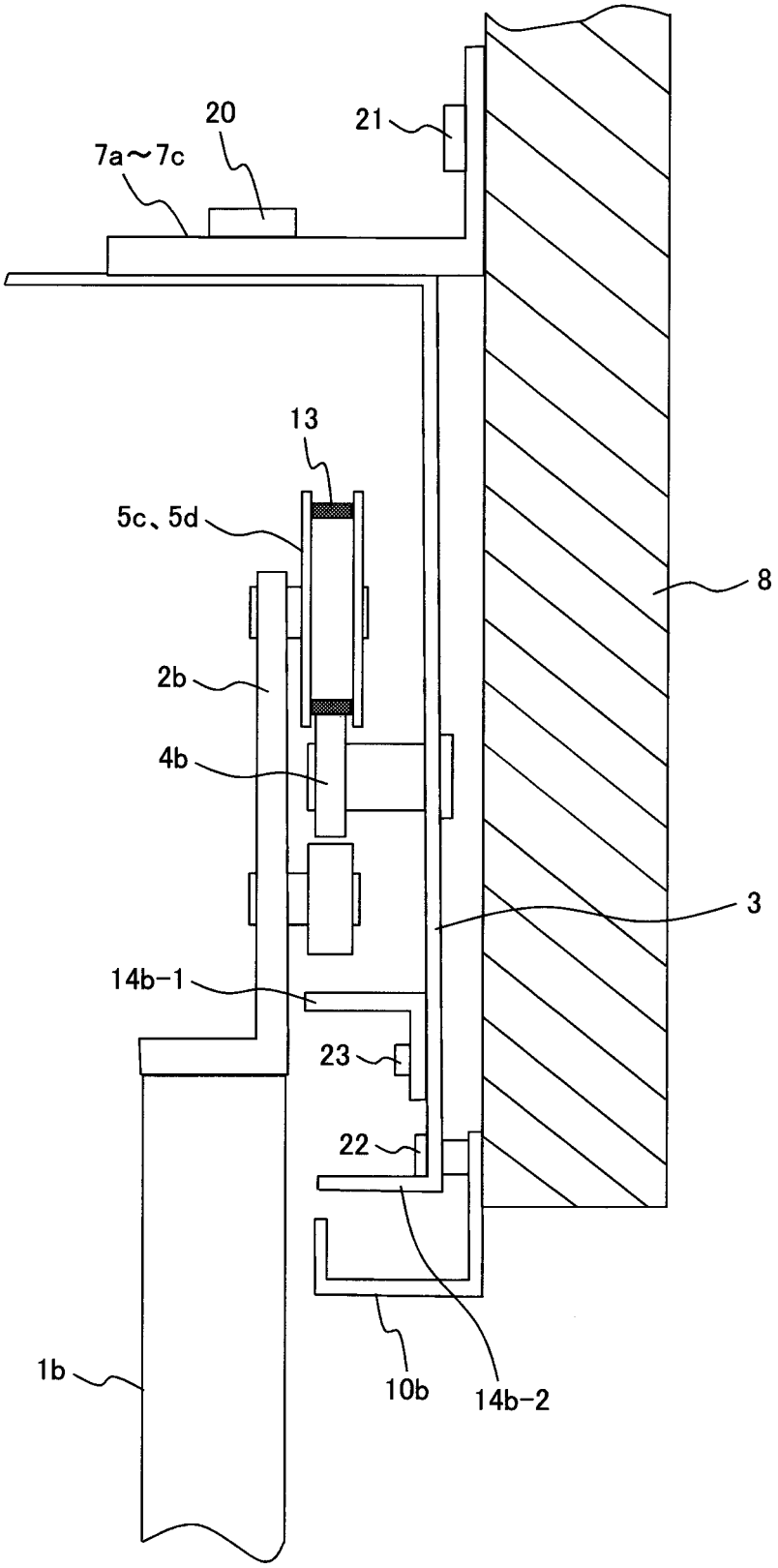

FIG. 5

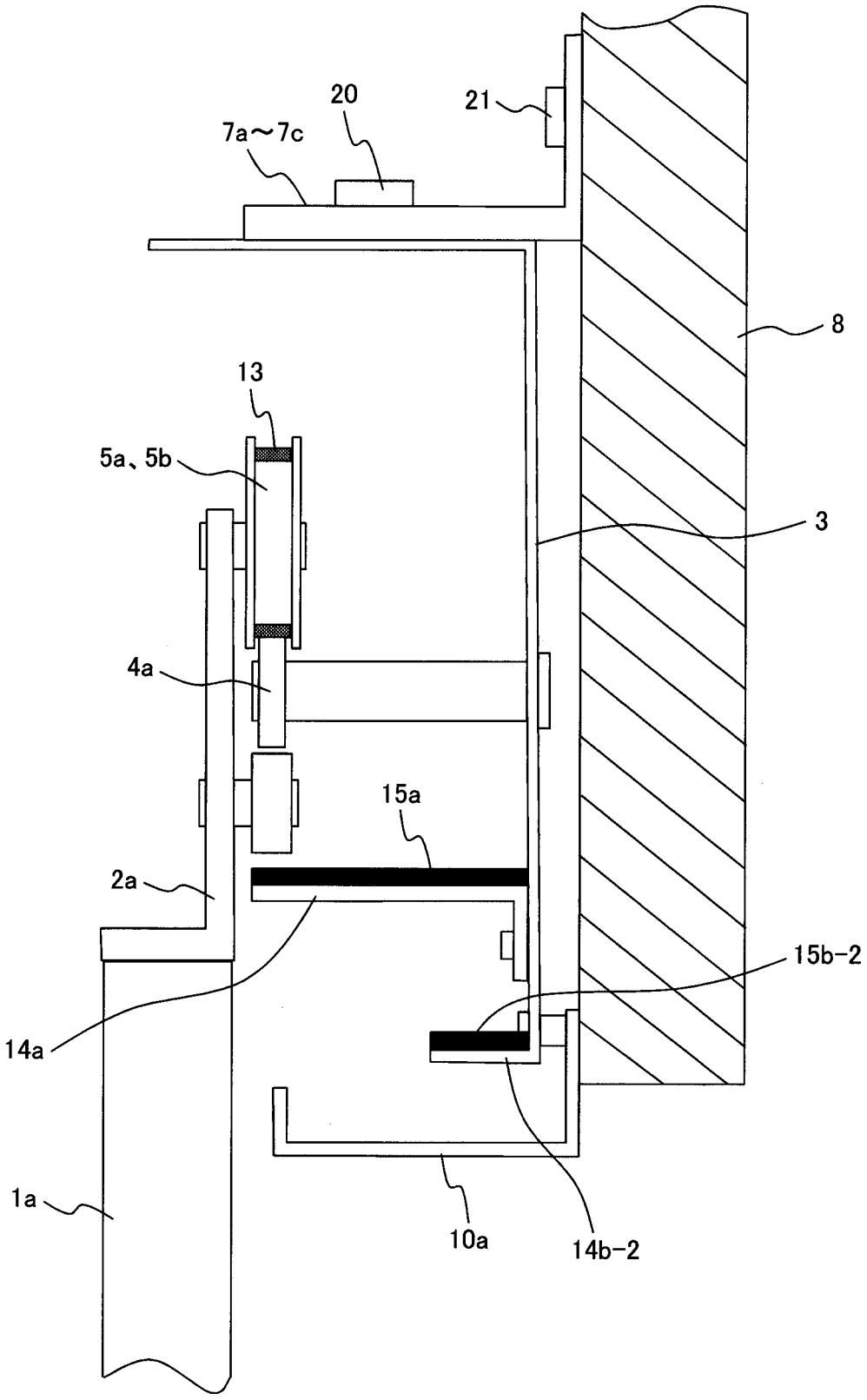

FIG. 6

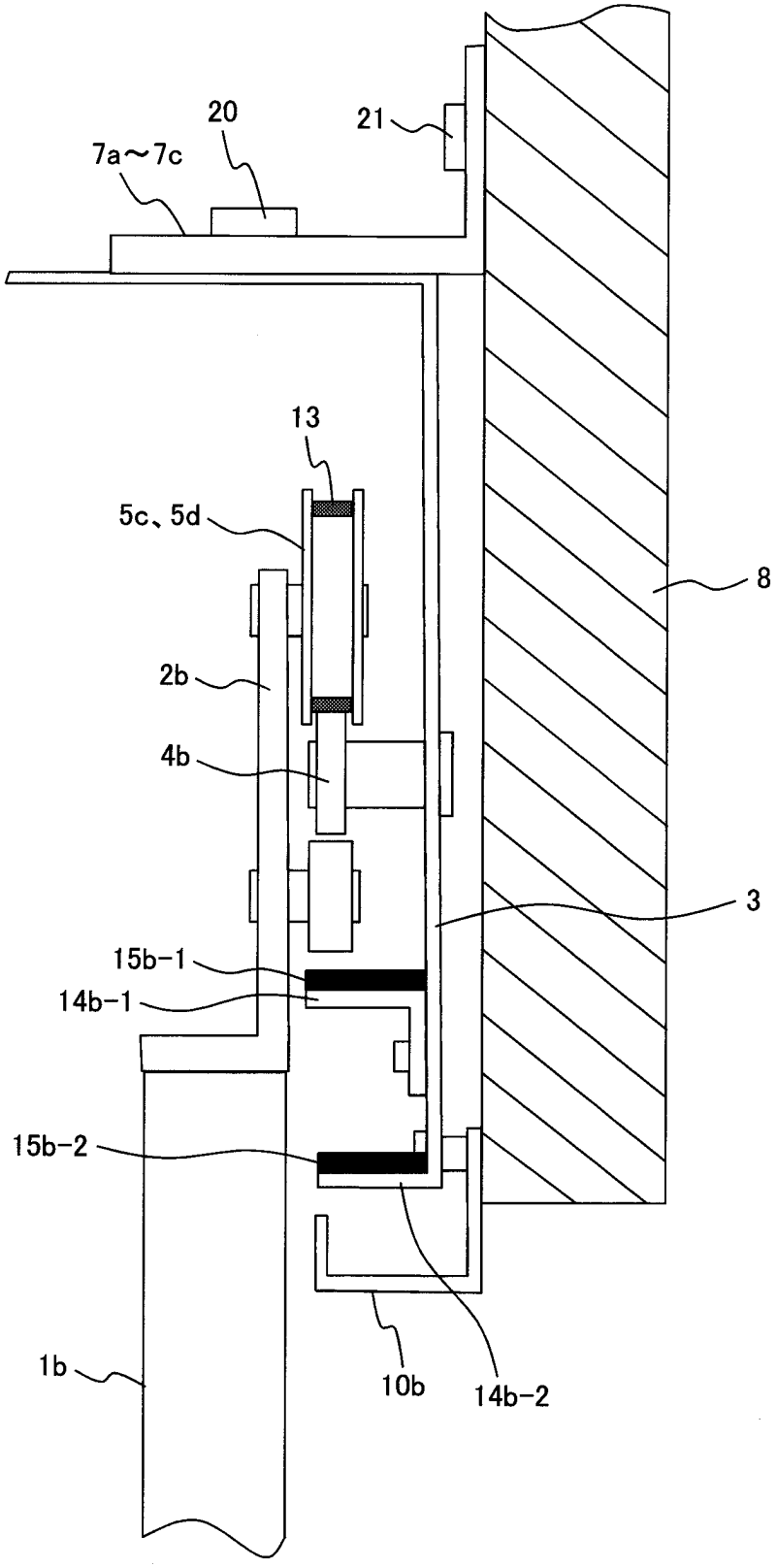

FIG. 7

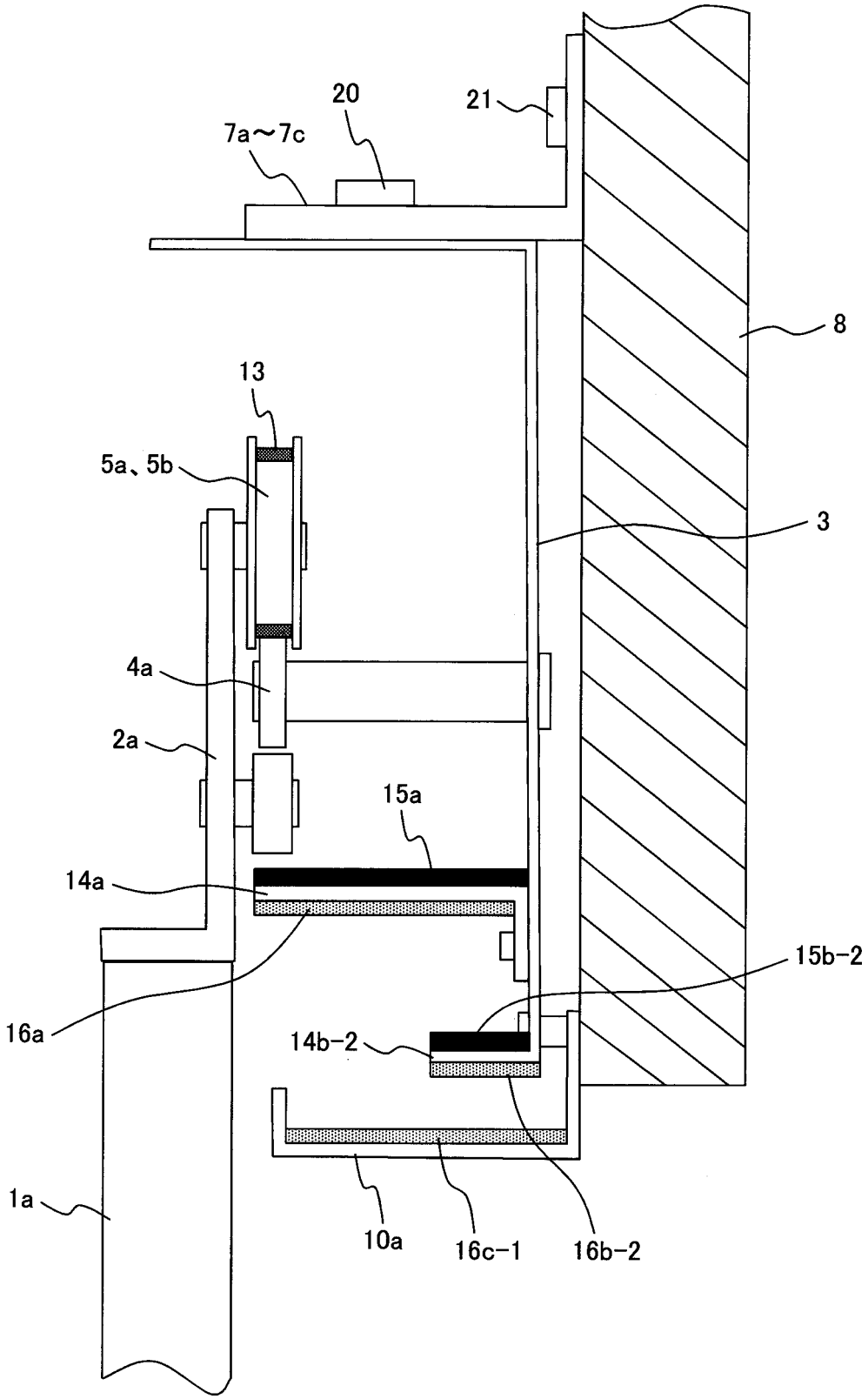
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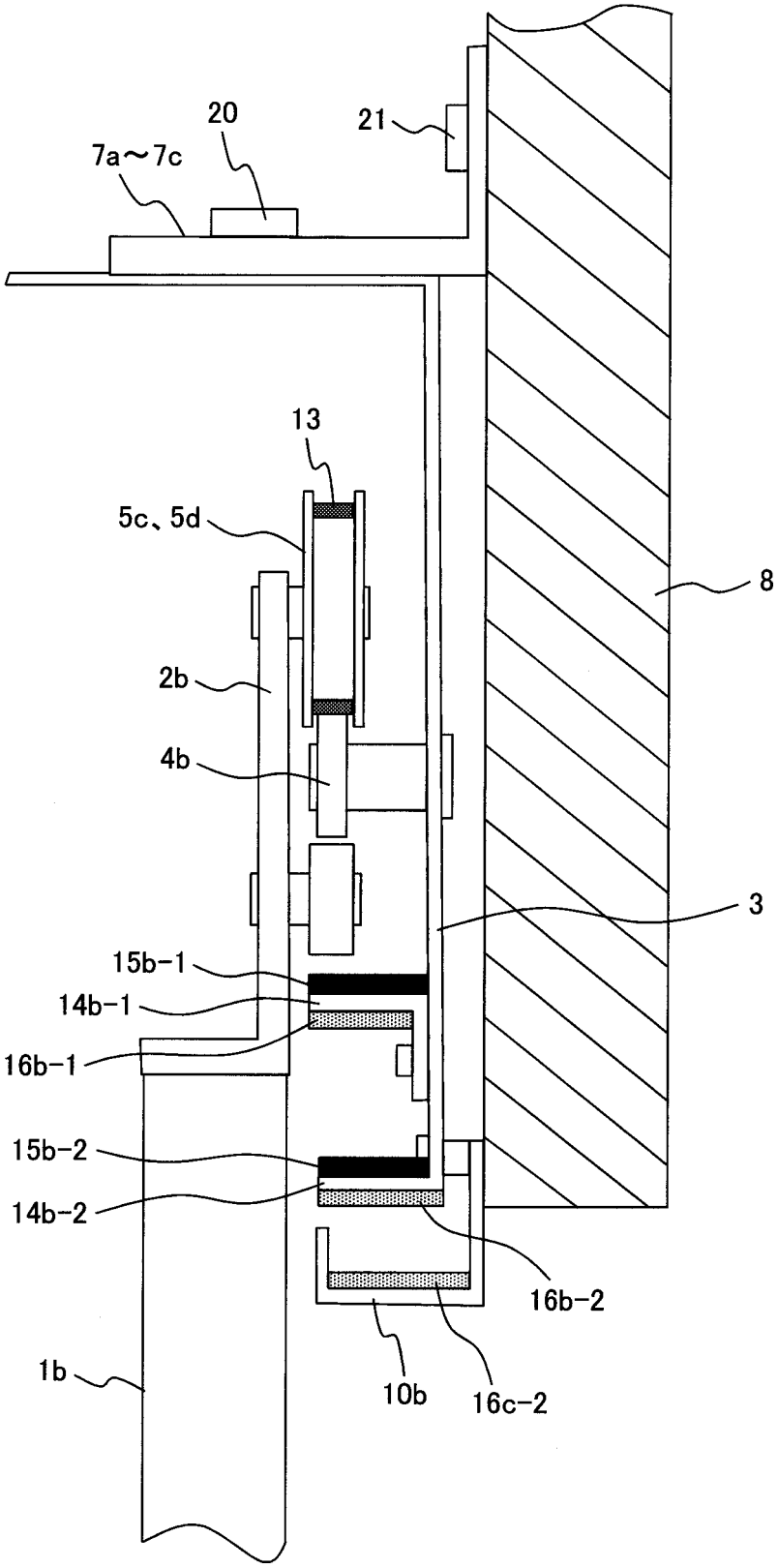
FIG. 8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1b
10b
16c-2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/077857

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)
B66B13/30

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 1996-2014
Kokai Jitsuyo Shinan Koho 1971-2014 Toroku Jitsuyo Shinan Koho 1994-2014

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	US 2011/0147131 A1 (OTIS ELEVATOR CO.), 23 June 2011 (23.06.2011), paragraphs [0025] to [0047]; fig. 1 to 8B & JP 2012-504536 A & EP 2346769 A & WO 2010/042098 A1 & KR 10-2011-0067151 A & CN 102171127 A	1-9
A	WO 2009/072202 A1 (Mitsubishi Electric Corp.), 11 June 2009 (11.06.2009), paragraphs [0017] to [0057]; fig. 1 to 7 & EP 2239223 A1 & KR 10-2010-0063138 A & CN 101878177 A & HK 1148722 A	1-9

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 December 2014 (25.12.14)	13 January 2015 (13.01.15)
Name and mailing address of the ISA/ Japan Patent Office	Authorized officer
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/077857

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 2002-220181 A (Toshiba Elevator and Building Systems Corp.), 06 August 2002 (06.08.2002), paragraphs [0045] to [0048]; fig. 1, 4 & US 2002/0139621 A1 & US 2006/0075708 A1 & KR 10-2004-0096632 A & CN 101200262 A	1-9
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 068406/1987(Laid-open No. 178284/1988) (Mitsubishi Electric Corp.), 18 November 1988 (18.11.1988), page 6, line 1 to page 9, line 1; fig. 1 to 3 (Family: none)	1-9

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- JP 2002220181 A **[0007] [0008]**