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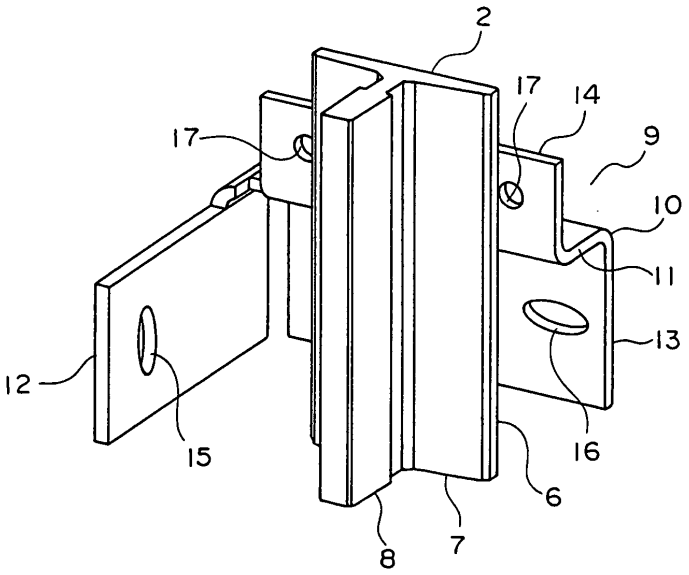
(54) **RAIL FIXING DEVICE OF ELEVATOR**

(57) In an elevator, guide rails for respectively guiding a car and a counterweight are arranged in a hoistway by means of a rail mounting device. A part of the hoistway is formed by a first inner wall surface and a second inner wall surface that is perpendicular to the first inner wall surface. The rail mounting device has a first wall-fixing portion and a second wall-fixing portion that are fixed to the first and second inner wall surfaces, respectively, and a mounting portion which is provided to at least one of the first and second wall-fixing portions and to which each guide rail is mounted. The first wall-fixing portion, the second wall-fixing portion, and the mounting portion are formed integrally with one another.

FIG. 2



EP 1 726 555 A1

Description

Technical Field

[0001] The present invention relates to a rail mounting device for an elevator which is used to mount a guide rail for guiding a member to be raised and lowered by the elevator onto an inner wall surface of a hoistway.

Background Art

[0002] In conventional elevators, a plurality of guide rails are often installed in a hoistway to guide a car and a counterweight. Each guide rail is fixed in place in the hoistway by means of a fixing bracket. Japanese Utility Model Application Laid-open No. Hei 4-56179 discloses a reinforcing member arranged in the hoistway separately from the fixing bracket in order to reinforce the fixation of the guide rail. With respect to one inner wall surface to which the fixing bracket is fixed, the reinforcing member is fixed to the other inner wall surface perpendicular to the one inner wall surface. Further, the reinforcing member is arranged offset in the height direction with respect to the fixing bracket.

[0003] Further, Japanese Utility Model Application Laid-open No. Sho 55-11994 discloses a guide rail fitting that can be adjusted in its position with respect to the horizontal direction of the guide rail. The guide rail fixing fitting has a wall-side fitting fixed to an inner wall surface of the hoistway, and a rail-side fitting that is mounted to the wall-side fitting and can be adjusted in its position with respect to the wall-side fitting. The rail-side fitting has a vertical portion arranged in parallel to the inner wall surface of the hoistway, and a horizontal portion extending from a lower edge portion of the vertical portion toward the hoistway inner wall surface side (rear surface side of the vertical portion). The horizontal portion is provided with an elongated hole through which a mounting bolt for mounting the rail-side fitting to the wall-side fitting is passed. The positional adjustment of the rail-side fitting with respect to the wall-side fitting can be effected through the positional adjustment of the mounting bolt with respect to the elongated hole.

[0004] In the conventional elevator disclosed in Japanese Utility Model Application Laid-open No. Hei 4-56179, the reinforcing member is formed separately from the fixing bracket, so it is necessary to mount the fixing bracket and the reinforcing member one by one to the inner wall surface of the hoistway, making the installation of the guide rail in the hoistway rather troublesome.

[0005] Further, in the conventional elevator disclosed in Japanese Utility Model Application Laid-open No. Sho 55-11994, the horizontal portion of the rail-side fitting is arranged on the rear surface side of the vertical portion. Accordingly, the inner wall surface of the hoistway and the vertical portion interfere with the mounting of the rail-side fitting to the wall-side fitting with the mounting bolt, making the fastening of the mounting bolt rather troublesome.

Disclosure of the Invention

[0006] The present invention has been made with a view to solving the above-mentioned problems, and it is therefore an object of the invention to provide a rail mounting device for an elevator which is capable of reducing the time and trouble required for installing a guide rail in a hoistway.

[0007] A rail mounting device for an elevator, for mounting a guide rail for guiding a member to be raised and lowered by the elevator onto a first inner wall surface and a second inner wall surface of a hoistway, which are adjacent to each other, according to the present invention includes a bracket member having: a first wall-fixing portion fixed to the first inner wall surface; a second wall-fixing portion fixed to the second inner wall surface; and a mounting portion to which the guide rail is mounted, the first wall-fixing portion, the second wall-fixing portion, and the mounting portion being integrated with one another.

Brief Description of the Drawings

[0008]

Fig. 1 is a horizontal sectional view showing a part of an elevator according to Embodiment 1 of the present invention;
Fig. 2 is a perspective view showing the rail mounting device for an elevator shown in Fig. 1;
Fig. 3 is a horizontal sectional view showing a part of an elevator according to Embodiment 2 of the present invention;
Fig. 4 is a perspective view showing a rail mounting device of the elevator shown in Fig. 3;
Fig. 5 is a horizontal sectional view showing a part of an elevator according to Embodiment 3 of the present invention;
Fig. 6 is a perspective view showing the rail mounting device for the elevator shown in Fig. 5.

Best Mode for carrying out the Invention

[0009] Hereinbelow, preferred embodiments of the present invention will be described with reference to the drawings.

Embodiment 1

[0010] Fig. 1 is a horizontal sectional view showing a part of an elevator according to Embodiment 1 of the present invention. Referring to Fig. 1, a pair of car guide rails (not shown) and a pair of counterweight guide rails 2 are installed in a hoistway 1. A car (not shown) as a member to be raised and lowered is arranged between the car guide rails. A counterweight 3 as a member to be

raised and lowered is arranged between the counterweight guide rails 2. The car is raised and lowered in the hoistway 1 while being guided by the car guide rails, and the counterweight 3 is raised and lowered in the hoistway 1 while being guided by the counterweight guide rails 2.

[0011] A part of the hoistway 1 is formed by a first inner wall surface 4 to which the counterweight 3 is opposed, and a pair of second inner walls 5 adjacent to the first inner wall surface 4 and extending perpendicular to the first inner wall surface 4. As seen in the vertical projection plane of the hoistway 1, the first inner wall surface 4 is in parallel to the line connecting between the counterweight guide rails 2. Further, as seen in the vertical projection plane of the hoistway 1, the counterweight 3 and the pair of counterweight guide rails 2 are arranged between the second inner wall surfaces 5.

[0012] Each counterweight guide rail 2 has a rail main body 7 including a rear surface 6 opposed to the second inner wall surface 5, and a guide portion 8 protruding toward the counterweight 3 from the rail main body 7 and serving to guide the counterweight 3. Further, each counterweight guide rail 2 is mounted to the first and second inner wall surfaces 4, 5 through the intermediation of a rail mounting device for an elevator (hereinafter, simply referred to as the "rail mounting device") 9.

[0013] Fig. 2 is a perspective view showing the rail mounting device 9 for an elevator shown in Fig. 1. Referring to Fig. 2, the rail mounting device 9 has a bracket member 10 which is fixed to each of the first and second inner walls 4, 5 and to which the counterweight guide rail 2 is mounted.

[0014] The bracket member 10 has: a horizontal portion (proximal portion) 11 arranged horizontally between the counterweight guide rail 2 and the second inner wall surface 5; a first wall-fixing portion 12 extending along the first inner wall surface 4 from the first inner wall surface 4 side end portion of the horizontal portion 11 and fixed to the first inner wall surface 4; a second wall-fixing portion 13 extending along the second inner wall surface 5 from the second inner wall surface 5 side end portion of the horizontal portion 11 and fixed to the second inner wall surface 5; and a mounting portion 14 which extends upward along the rear surface 6 from the counterweight guide rail 2 side end portion of the horizontal portion 12 and to which the counterweight guide rail 2 is mounted.

[0015] Further, the bracket member 10 is prepared by bending a single metal plate. That is, the horizontal portion 11, the first wall-fixing portion 12, the second wall-fixing portion 13, and the mounting portion 14 are formed integrally by the same member.

[0016] The first wall-fixing portion 12 is provided with a vertically extending elongated hole 15, and the second wall-fixing portion 13 is provided with a horizontally extending elongated hole 16. Further, the mounting portion 14 is provided with a pair of bolt passage holes 17 that are arranged at a spacing larger than the width of the rail main body 7.

[0017] An anchor bolt (not shown) for fixing the first wall-fixing portion 12 to the first inner wall surface 4 is passed through the elongated hole 15. Further, an anchor bolt (not shown) for fixing the second wall-fixing portion 13 to the second inner wall surface 5 is passed through the elongated hole 16. Further, passed through each of the bolt passage holes 17 is a bolt (not shown) for fixing a pair of rail clips (not shown), which abut the both side portions of the rail main body 7, to the mounting portion 14. The counterweight guide rail 2 is mounted to the mounting portion 14 through the fixation of the rail clips to the mounting portion 14.

[0018] Next, the procedure for mounting the counterweight guide rail 2 to the interior of the hoistway 1 will be described.

[0019] First, a plurality of the bracket members 10 are arranged in the hoistway 1 at a spacing from one another in the height direction, and each first wall-fixing portion 12 and each second wall-fixing portion 13 are fixed to the first inner wall surface 4 and the second inner wall surface 5, respectively, with the anchor bolts.

[0020] Thereafter, the rear surface 6 of the counterweight guide rail 2 is brought into abutment with each mounting portion 14, and the counterweight guide rail 2 is mounted to the mounting portion 14 with the rail clips. In this way, each counterweight guide rail 2 is installed in the hoistway 1.

[0021] In the rail mounting device 9 as described above, the first wall-fixing portion 12, the second wall-fixing portion 13, and the mounting portion 14 are integrated with one other. Accordingly, the positioning of the bracket member 10 with respect to the first inner wall surface 4 and the second inner wall surface 5, which are different from each other, can be performed at the same time, whereby the installation of the rail mounting device 9 in the hoistway 1 can be performed in a short time and with ease. Therefore, it is possible to reduce the time and trouble required for the installation of the counterweight guide rail 2 in the hoistway 1. Further, the first wall-fixing portion 12, the second wall-fixing portion 13, and the mounting portion 14 are integrated with one other, whereby the number of parts can be reduced to achieve a reduction in the manufacturing cost of the rail mounting device 9. Furthermore, the integrated construction of the first wall-fixing portion 12, second wall-fixing portion 13, and mounting portion 14 enables compactness of the rail mounting device 9, whereby the first and second inner wall surfaces 4, 5 can be arranged close to the counterweight guide rail 2 to thereby achieve a reduction in the space required inside the hoistway 1.

[0022] While in the above-described example the bracket member 10 is prepared by bending a single metal plate, the bracket member 10 may be prepared by bonding a plurality of plates together by, for example, welding.

[0023] Further, while in the above-described example the horizontal portion 12 intervenes between the mounting portion 14 and the second wall-fixing portion 13, the mounting portion 14 may be provided directly on the second inner-wall fixing portion 13. With this arrangement,

the second inner wall surface 5 can be brought even closer to the counterweight guide rail 2, thereby enabling a further reduction in the space required inside the hoistway 1. In this case, the first wall-fixing portion 12 is provided to the first inner wall surface 4 side end portion of the second wall-fixing portion 13. Further, the second inner wall surface 5 is provided with a dent for preventing the bolt passed through each bolt passage hole 17 from interfering with the second inner wall surface 5.

Embodiment 2

[0024] Fig. 3 is a horizontal sectional view showing a part of an elevator according to Embodiment 2 of the present invention, and Fig. 4 is a perspective view showing a rail mounting device of the elevator shown in Fig. 3. Referring to the figures, a counterweight guide rail 2 is installed in a hoistway 1 by means of a plurality of rail mounting devices 21 that are arranged at a spacing from one another in the height direction. Each rail mounting device 21 has a base member 22 fixed to the first and second inner wall surfaces 4, 5, and a rail mounting member 23 which is arranged on the base member 22 and to which the counterweight guide rail 2 is mounted.

[0025] The base member 22 has: a horizontal portion 24 arranged horizontally so as to be in contact with both the first and second inner wall surfaces 4, 5; a first wall-fixing portion 25 extending downwardly along the first inner wall surface 4 from the first inner wall 4 side end portion of the horizontal portion 24; and a second wall-fixing portion 26 extending downwardly along the second inner wall surface 5 from the second inner wall 5 side end portion of the horizontal portion 24. Further, the base member 22 is prepared by bending a single metal plate. That is, the horizontal portion 24, the first wall-fixing portion 25, and the second wall-fixing portion 26 are formed integrally by the same member.

[0026] The first wall-fixing portion 25 is provided with a vertically extending elongated hole 15, and the second wall-fixing portion 26 is provided with a horizontally extending elongated hole 16. An anchor bolt (not shown) for fixing the first wall-fixing portion 25 to the first inner wall surface 4 is passed through the elongated hole 15. Further, an anchor bolt (not shown) for fixing the second wall-fixing portion 26 to the second inner wall surface 5 is passed through the elongated hole 16.

[0027] The rail mounting member 23 has: a bonding portion 27 that is bonded onto the horizontal portion 24 by welding upon completion of the positioning of the counterweight guide rail 2 with respect to the first and second inner wall surfaces 4, 5; and a mounting portion 28 to which the counterweight guide rail 2 is mounted and which extends vertically upward from the counterweight guide rail 2 side end portion of the bonding portion 27.

[0028] The bonding portion 27 is arranged horizontally along the horizontal portion 24. The mounting portion 28 is provided with a pair of bolt passage holes 17 that are arranged at a spacing larger than the width of a rail main body 7. A bolt (not shown) for fixing a pair of rail clips (not shown) to the mounting portion 28 is passed through each of the bolt passage holes 17. The counterweight guide rail 2 is mounted to the rail mounting member 23 through the fixation of the rail clips to the mounting portion 28. Otherwise, Embodiment 2 is of the same construction as Embodiment 1.

[0029] Next, the procedure for mounting the counterweight guide rail 2 to the interior of the hoistway 1 will be described.

[0030] First, a plurality of the base members 22 are arranged in the hoistway 1 at a spacing from one another in the height direction, and each first wall-fixing portion 25 and each second wall-fixing portion 26 are fixed to the first inner wall surface 4 and the second inner wall surface 5, respectively, with the anchor bolts.

[0031] Thereafter, the plurality of rail mounting members 23 are fixed to the counterweight guide rail 2 with the rail clips. At this time, the bottom surface of each bonding portion 27 is held in abutment on the horizontal portion 24 of each base member 22. Thereafter, the horizontal position of the counterweight guide rail 2 with respect to the first and second inner wall surfaces 4, 5 is adjusted, and each bonding portion 27 is bonded to each horizontal portion 24 by welding. In this way, each counterweight guide rail 2 is installed in the hoistway 1.

[0032] In the rail mounting device 21 as described above, the first wall-fixing portion 25 and the second wall-fixing portion 26 are integrated with each other. Accordingly, the positioning of the base member 22 with respect to the first inner wall surface 4 and the second inner wall surface 5, which are different from each other, can be performed at the same time, whereby the installation of the base member 22 in the hoistway 1 can be carried out in a short time and with ease. Therefore, it is possible to reduce the time and trouble required for the installation of the counterweight guide rail 2 in the hoistway 1. Further, the number of parts is reduced, thereby achieving a reduction in the manufacturing cost of the rail mounting device 21. Furthermore, the integrated construction of the first wall-fixing portion 25 and second wall-fixing portion 26 enables compactness of the base member 22, whereby the first and second inner wall surfaces 4, 5 can be arranged close to the counterweight guide rail 2 to thereby achieve a reduction in the space required inside the hoistway 1.

[0033] Further, the rail mounting member 23 has the bonding portion 27 to be bonded to the base member 22, so the rail mounting member 23 can be bonded to the base member 22 by, for example, welding after adjusting the position of the rail mounting member 23 with respect to the base member 22. Accordingly, the position of the counterweight guide rail 2 with respect to the first and second inner wall surfaces 4, 5 can be adjusted at the time of installing the counterweight guide rail 2 in the hoistway 1.

[0034] While in the above-described example the rail

mounting member 23 is bonded to the base member 22 by welding, the rail mounting member 23 may be bonded to the base member 22 by fastening with a bolt and a nut. In this case, one of the horizontal portion 24 and the bonding portion 27 is provided with an elongated bolt-passage hole extending parallel to the first inner wall surface 4, and the other of the horizontal portion 24 and the bonding portion 27 is provided with an elongated bolt-passage hole extending parallel to the second inner wall surface 5.

[0035] Further, while in Embodiments 1, 2 the counterweight guide rail 2 is mounted to the interior of the hoistway 1 by means of the rail mounting device, the rail mounting device may be used to mount a car guide rail to the interior of the hoistway 1.

Embodiment 3

[0036] Fig. 5 is a horizontal sectional view showing a part of an elevator according to Embodiment 3 of the present invention. Referring to the figure, a pair of car guide rails 31 and a pair of counterweight guide rails (not shown) are installed in a hoistway 1. A car 32 as a member to be raised and lowered is arranged between the car guide rails 31, and a counterweight (not shown) as a member to be raised and lowered is arranged between the counterweight guide rails.

[0037] As seen in the vertical projection plate of the hoistway 1, a part of the hoistway 1 is formed by a pair of inner wall surfaces 33 perpendicular to the line connecting the car guide rails 31 with each other. As seen in the vertical projection plane of the hoistway 1, the car 32 and the pair of car guide rails 31 are arranged between the inner wall surfaces 33.

[0038] Each car guide rail 31 has a rail main body 35 including a rear surface 34 opposed to the inner wall surface 33, and a guide portion 36 extending from the rail main body 35 toward the car 32 and serving to guide the car 32. Further, the car guide rails 31 are mounted to the respective inner wall surfaces 33 through the intermediation of a plurality of rail mounting devices 37.

[0039] Fig. 6 is a perspective view showing the rail mounting device for the elevator shown in Fig. 5. Referring to the figure, the rail mounting device 37 has a base member 38 fixed to the inner wall surface 33, and a rail mounting member 39 which is arranged on the base member 38 and to which the car guide rail 31 is mounted.

[0040] The base member 38 has a plate-like wall fixing portion 40 fixed to the inner wall surface 33, and a pair of extending portions 41 extending horizontally toward the inner portion of hoistway 1 from a part of the upper edge portion of the wall fixing portion 40. Further, the base member 38 is prepared by bending a single metal plate. That is, the wall fixing portion 40 and the pair of extending portions 41 are formed integrally by the same member.

[0041] The wall fixing portion 40 is provided with a vertically extending elongated hole 42 and a horizontally extending elongated hole 43. The elongated hole 42 and the elongated hole 43 are arranged at a spacing from each other with respect to the horizontal direction. An anchor bolt (not shown) for fixing the wall fixing portion 40 to the inner wall surface 33 is passed through the elongated hole 42, 43. Further, the extending portions 41 are arranged at a spacing from each other with respect to the horizontal direction.

[0042] The rail mounting member 39 has: a pair of bonding portions 44 that are bonded onto the respective extending portions 41 by welding upon completion of the positioning of the car guide rail 31 with respect to the inner wall surface 33; and a mounting portion 45 which is provided to each of the bonding portions 44 and to which the car guide rail 31 is mounted.

[0043] The mounting portion 45 is arranged perpendicular to the bonding portions 44. Further, as seen in the vertical projection plane of the hoistway 1, the mounting portion 45 is arranged between the bonding portions 44. That is, as seen in the vertical projection plane of the hoistway 1, the bonding portions 44 and the mounting portion 45 are situated adjacent to each other in the direction along the inner wall surface 33. Further, the rail mounting member 39 is prepared by notching and then bending a single metal plate. That is, the bonding portions 44 and the mounting portion 45 are formed integrally by the same member.

[0044] The mounting portion 45 is provided with a pair of bolt passage holes 17 that are arranged at a spacing larger than the width of the rail main body 35. A bolt (not shown) for fixing a pair of rail clips (not shown) to the mounting portion 45 is passed through each of the bolt passage holes 17. The car guide rail 31 is mounted to the rail mounting member 39 through the fixation of the rail clips to the mounting portion 45. Otherwise, Embodiment 3 is of the same construction as Embodiment 1.

[0045] Next, the procedure for mounting the car guide rail 31 to the interior of the hoistway 1 will be described.

[0046] First, a plurality of the base members 38 are arranged in the hoistway 1 at a spacing from one another in the height direction, and each wall-fixing portion 40 is fixed to the inner wall surface 33 with the anchor bolt.

[0047] Thereafter, a plurality of the rail mounting members 39 are fixed to the car guide rail 31 with the rail clips. At this time, the bottom surface of each bonding portion 44 is held in abutment on each extending portion 41. Thereafter, the horizontal position of the car guide rail 31 with respect to the inner wall surface 33 is adjusted, and each bonding portion 44 is bonded to each extending portion 41 by welding. In this way, each car guide rail 31 is installed in the hoistway 1.

[0048] In the rail mounting device 37 as described above, the rail mounting member 39 has the bonding portion 44 to be bonded to the base member 38, and the mounting portion 45 to which the car guide rail 31 is mounted, and as seen in the vertical projection plane of the hoistway 1, the bonding portion 44 and the mounting portion 45 are situated adjacent to each other in the di-

rection along the inner wall surface 33. Therefore, at the time of installing the car guide rail 31 in the hoistway 1, the position of the car guide rail 31 with respect to the inner wall surface 33 can be adjusted, and furthermore the bonding of the bonding portion 4 4 and the extending portion 41 with each other can be performed with ease in the inner side of the hoistway 1 without the mounting portion 45 interfering with the bonding operation. Accordingly, it is possible to reduce the time and trouble required for the installation of the car guide rail 31 in the hoistway 1. Further, the bonding portion 44 is not present between the mounting portion 45 and the inner wall surface 33, and thus a distance D (Fig. 5) between the mounting portion 45 and the inner wall surface 33 can be reduced, thereby making it possible to arrange the inner wall surface 33 close to the car guide rail 31. Therefore, it is possible to achieve a reduction in the space required inside the hoistway 1.

[0049] Further, the pair of extending portions 41, to each of which the bonding portion 44 is bonded, are arranged at a spacing from each other in the horizontal direction, and as seen in the vertical projectionplane of the hoistway 1, the mounting portion 45 is arranged between the bonding portions 44, thereby achieving a reduction in the space required inside the hoistway 1 and, at the same time, an increase in the strength with which the car guide rail 31 is mounted to the inner wall surface 33.

[0050] While in the above-described example the rail mounting member 39 is bonded to the base member 38 by welding, the rail mounting member 39 may be bonded to the base member 38 by fastening with a bolt and a nut. In this case, one of the extending portion 41 and the bonding portion 44 is provided with an elongated bolt-passage hole extending parallel to the inner wall surface 33, and the other of the extending portion 41 and the bonding portion 44 is provided with an elongated bolt-passage hole extending perpendicular to the inner wall surface 33.

[0051] Further, while in the above example the car guide rail 31 is mounted to the interior of the hoistway 1 by means of the rail mounting device 37, the rail mounting device 37 may be used to mount a car guide rail to the interior of the hoistway 1.

Claims

1. A rail mounting device for an elevator, for mounting a guide rail for guiding a member to be raised and lowered by the elevator onto a first inner wall surface and a second inner wall surface of a hoistway, which are adjacent to each other, **characterized by** comprising a bracket member having: a first wall-fixing portion fixed to the first inner wall surface; a second wall-fixing portion fixed to the second inner wall surface; and a mounting portion to which the guide rail is mounted, the first wall-fixing portion, the second wall-fixing portion, and the mounting portion being integrated with one another.

2. A rail mounting device for an elevator, for mounting a guide rail for guiding a member to be raised and lowered by the elevator onto a first inner wall surface and a second inner wall surface of a hoistway, which are adjacent to each other, **characterized by** comprising:

   a base member having a first wall-fixing portion fixed to the first inner wall surface, and a second wall-fixing portion fixed to the second inner wall surface, the first inner wall-fixing portion and the second inner-wall fixing portion being integrated with each other; and
   a rail mounting member to which the guide rail is mounted, the rail mounting member having a bonding portion to be bonded to the base member.

3. A rail mounting device for an elevator, for mounting a guide rail for guiding a member to be raised and lowered by the elevator onto an inner wall of a hoistway, **characterized by** comprising:

   a base member having a wall fixing portion fixed to the inner wall surface, and a pair of extending portions extending from the wall fixing portion toward an inner portion of the hoistway and arranged at a spacing from each other in a horizontal direction; and
   a rail mounting member having a pair of bonding portions each bonded to each of the extending portions, and a mounting portion to which the guide rail is mounted, the mounting portion being provided to each of the bonding portions and arranged between the bonding portions as seen in a vertical projection plane of the hoistway.

FIG. 1

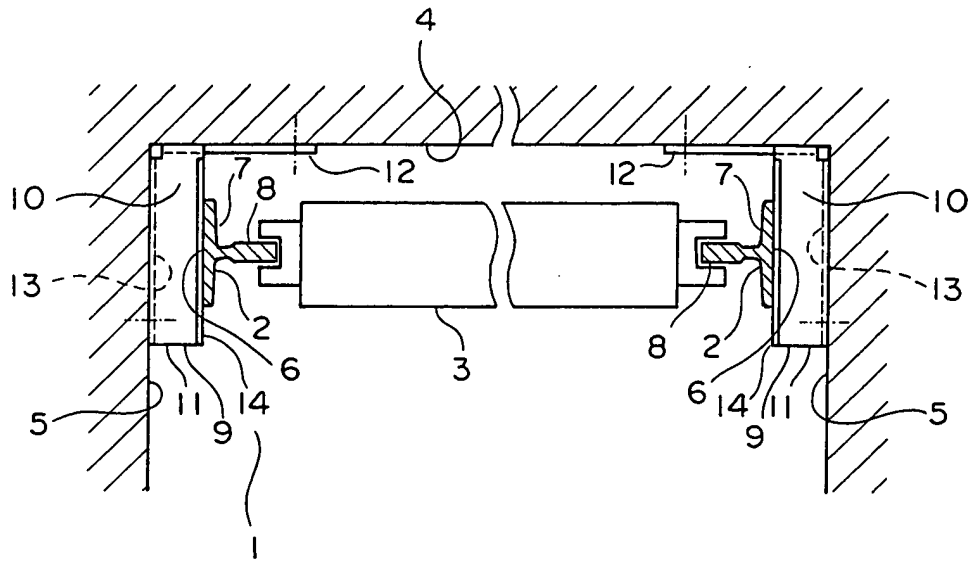

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FIG. 2

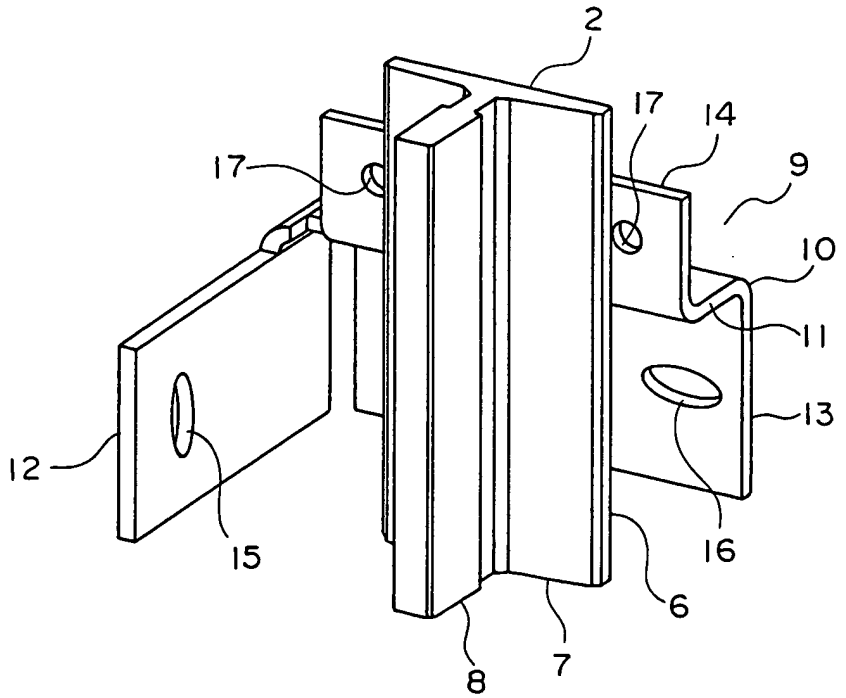
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FIG. 3

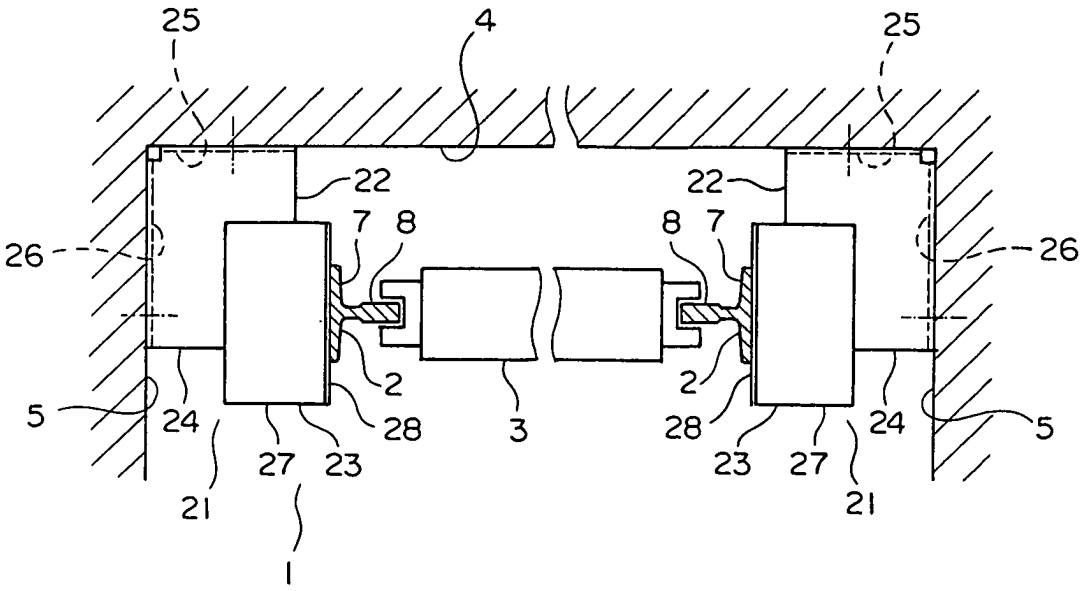
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FIG. 4

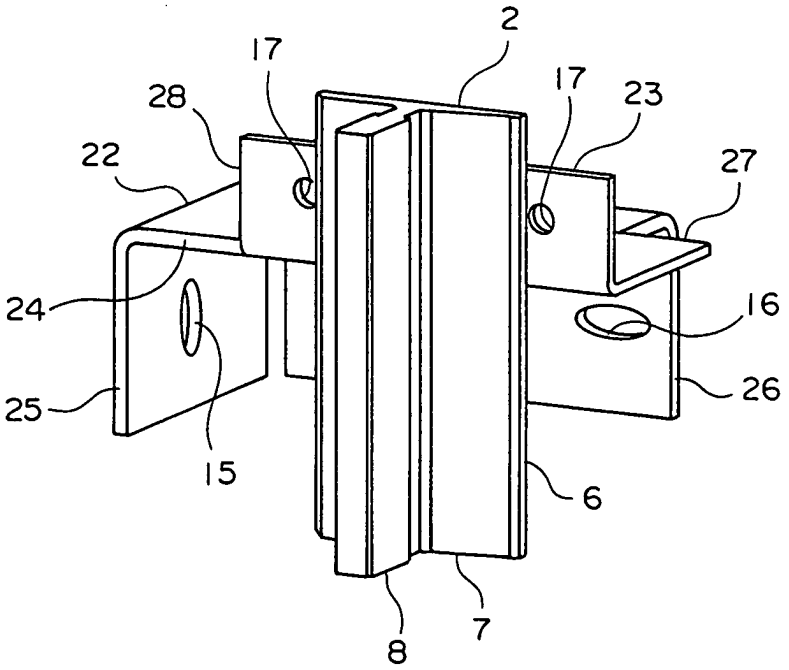
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FIG. 5

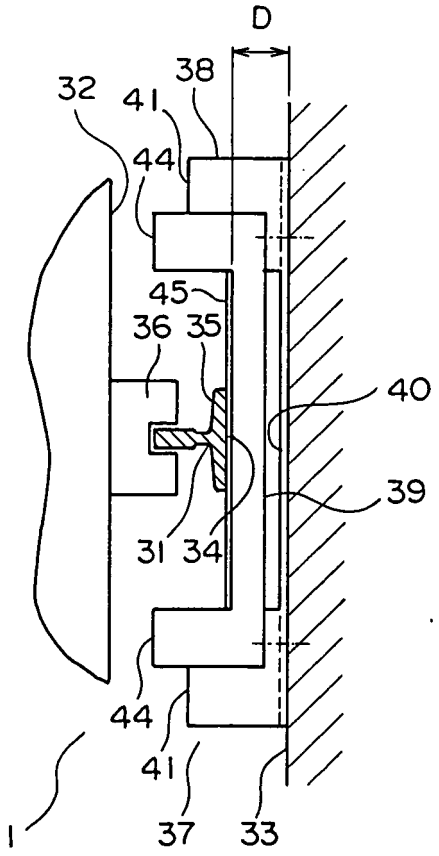
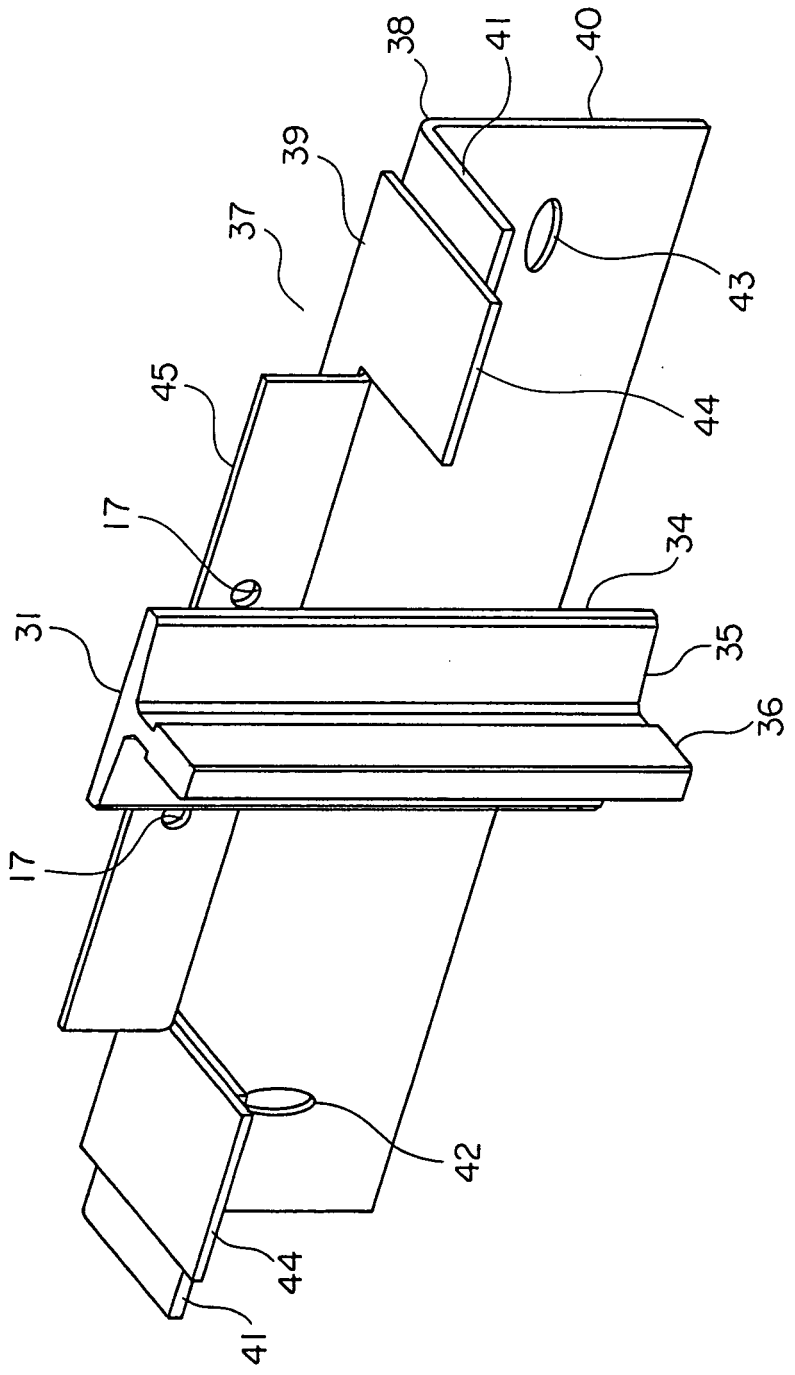


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2004/003641

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] B66B7/02

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[7] B66B7/02

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	1996-2004
Kokai Jitsuyo Shinan Koho	1971-2004	Toroku Jitsuyo Shinan Koho	1994-2004

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 98497/1990(Laid-open No. 56179/1992) (Hitachi, Ltd.), 14 May, 1992 (14.05.92), Pay attention to description, page 5, line 16 to page 7, line 17; Fig. 1 (Family: none)	1-2
Y	JP 11-180657 A (Hitachi, Ltd.), 06 July, 1999 (06.07.99), Pay attention to Par. Nos. [0009] to [0012]; Figs. 1 to 2, 8 to 9 (Family: none)	1-2

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

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Date of the actual completion of the international search 10 December, 2004 (10.12.04)	Date of mailing of the international search report 28 December, 2004 (28.12.04)
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2004/003641

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 32162/1978(Laid-open No. 11994/1980) (Hitachi, Ltd.), 25 January, 1980 (25.01.80), Pay attention to Claims (Family: none)	2
X	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 122194/1988(Laid-open No. 43885/1990) (Toshiba Corp.), 27 March, 1990 (27.03.90), Pay attention to description, page 8, line 6 to page 10, line 8; Figs. 1 to 4 (Family: none)	3
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 340/1990(Laid-open No. 91471/1991) (Hitachi Elevator Service Kabushiki Kaisha), 18 September, 1991 (18.09.91), Pay attention to description, page 5, line 17 to page 6, line 8; Fig. 1 (Family: none)	1
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 37937/1989(Laid-open No. 129375/1990) (Hitachi Elevator Service Kabushiki Kaisha), 25 October, 1990 (25.10.90), Pay attention to description, page 4, lines 5 to 18; Figs. 1 to 2 (Family: none)	1

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP HEI456179 A **[0002] [0004]**
- JP SHO5511994 A **[0003] [0005]**