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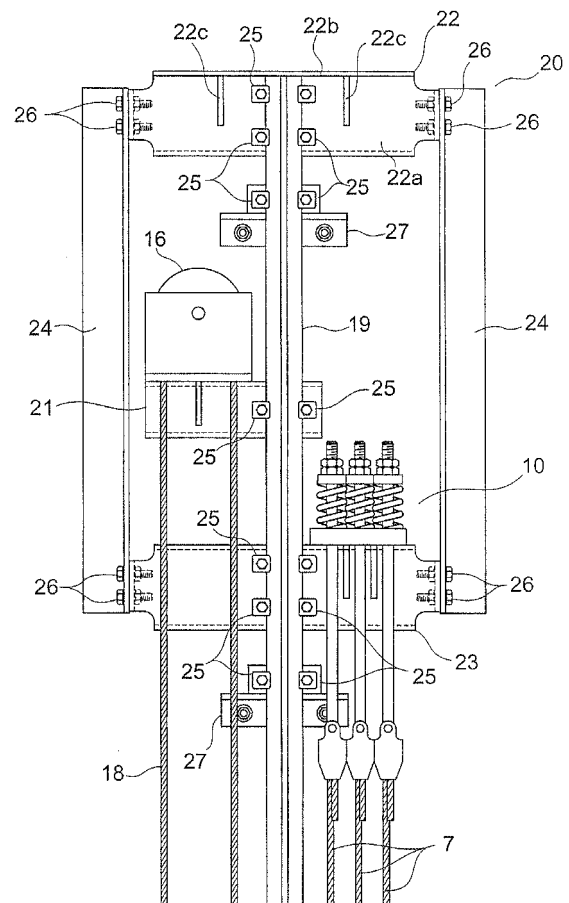
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(54) **SUSPENSION BODY SUPPORTING DEVICE FOR ELEVATOR**

(57) Provided is a suspension-body supporting device for an elevator configured in such a manner that a plurality of lateral members provided vertically at a distance from each other are mounted to a guide rail for guiding a body to be raised and lowered. Longitudinal members are attached between the plurality of lateral members. At least one of a suspension body for suspending the body to be raised and lowered and a suspension body suspended in a hoistway is supported by at least one of the plurality of lateral members.

FIG. 2



Description

Technical Field

[0001] The present invention relates to a suspension-body supporting device for an elevator, for supporting a suspension body for suspending a body to be raised and lowered (for example, a car, a counterweight, or the like).

Background Art

[0002] Conventionally, a rope supporting device for an elevator, in which columnar bodies are mounted to upper end portions of guide rails, and rope supporting members for supporting ropes for suspending at least any one of a car and a counterweight are fixed to the columnar bodies, has been proposed. The columnar bodies are placed on rear surfaces of the guide rails in a superimposed manner along a length direction of the guide rails. In this manner, in a conventional elevator, a bending moment, to which the guide rails are subjected, is reduced (see Patent Literature 1).

[0003] Moreover, conventionally, in order to facilitate the installation of a governor, an elevator, in which a car-side rope stop member for supporting a rope for suspending a car is mounted to a rear surface of an upper portion of a guide rail, and the governor is installed onto the car-side rope stopmember, has also been proposed (see Patent Literature 2).

Citation List

Patent Literature

[0004]

[PTL 1]: JP 4114957 B

[PTL 2]: WO 03/018458 A1

Summary of Invention

Technical Problem

[0005] In the case of the conventional rope supporting device for the elevator, which is described in Patent Literature 1, however, the columnar bodies are superimposed on the rear surfaces of the guide rails. Therefore, a rail bracket for supporting the guide rails and a device-mounting member for supporting an in-hoistway device (for example, a governor, a car-position switch, or the like) cannot be mounted to a portion of the guide rails on which the columnar bodies are superimposed. Therefore, the degree of freedom for a position at which the rail bracket or the device-mounting member is mounted is lowered. Moreover, the range in which the columnar bodies are superimposed on the guide rails is set large with respect to the length direction of the guide rails so as to reduce the bending moment to which the guide rails

are subjected. Therefore, the degree of freedom for the position at which the rail bracket or the device-mounting member is mounted is further lowered.

[0006] In the case of the conventional elevator described in Patent Literature 2, the governor is installed onto the car-side rope stop member mounted to the guide rail. Therefore, it is necessary to newly design an installation member dedicated to install the governor to the car-side rope stop member, resulting in an increase in the installation cost of the governor. Moreover, in the case of the conventional elevator described in Patent Literature 2, the car-side rope stop member is required to have sufficient strength to support the rope. Therefore, a width size of the car-side rope stop member is larger than a width size of the guide rail. Thus, it becomes difficult to provide the governor close to the guide rail. As a result, the degree of freedom for the position at which the governor is mounted is lowered.

[0007] The present invention has been made to solve the problems described above, and therefore has an object to provide a suspension-body supporting device for an elevator, which is capable of improving the degree of freedom for a position at which a device is mounted while suppressing an increase in bending moment to which a guide rail is subjected.

Solution to Problem

[0008] According to the present invention, there is provided a suspension-body supporting device for an elevator, including: a plurality of lateral members mounted to a guide rail for guiding a body to be raised and lowered; and longitudinal members mounted between the plurality of lateral members, in which: at least any one of a suspension body for suspending the body to be raised and lowered and a suspension body suspended in a hoistway is supported by at least any one of the plurality of lateral members.

Advantageous Effects of Invention

[0009] In the suspension-body supporting device for the elevator according to the present invention, the plurality of lateral members provided vertically at a distance from each other are mounted to the guide rail, whereas the longitudinal members are mounted between the lateral members. Therefore, a load imposed from the suspension body can be distributed to the lateral members. Therefore, an increase in bending moment exerted on the guide rail can be suppressed. Moreover, a portion of the guide rail, which is located between the lateral members, can be exposed. Therefore, a device to be directly mounted to the guide rail can be placed in a space between the lateral members. In this manner, the degree of freedom for a position at which the device is mounted can be improved.

Brief Description of Drawings

[0010]

[FIG. 1] A configuration diagram illustrating an elevator according to a first embodiment of the present invention.

[FIG. 2] A front view illustrating a first rope stop device and a governor illustrated in FIG. 1.

[FIG. 3] A front view illustrating a suspension-body supporting device for an elevator according to a second embodiment of the present invention.

[FIG. 4] A front view illustrating a suspension-body supporting device for an elevator according to a third embodiment of the present invention.

[FIG. 5] A front view illustrating a suspension-body supporting device for an elevator according to a fourth embodiment of the present invention.

Description of Embodiments

[0011] Hereinafter, preferred embodiments of the present invention are described referring to the drawings.

First Embodiment

[0012] FIG. 1 is a configuration diagram illustrating an elevator according to a first embodiment of the present invention. In the figure, a car (body to be raised and lowered) 2 and a counterweight (body to be raised and lowered) 3 are provided in a hoistway 1 so as to be able to be raised and lowered. In a bottom portion (pit portion) of the hoistway 1, a hoisting machine (driving device) 4 for generating a driving force for moving the car 2 and the counterweight 3 is provided. The car 2 and the counterweight 3 are raised and lowered in the hoistway 1 by the driving force of the hoisting machine while being guided by a plurality of guide rails provided in the hoistway 1.

[0013] The hoisting machine 4 includes a hoisting-machine main body 5 including a motor, and a driving sheave 6 to be rotated by the hoisting-machine main body 5. The car 2 and the counterweight 3 are suspended inside the hoistway 1 by a plurality of suspension bodies 7 looped around the driving sheave 6. As the suspension bodies 7, ropes, belts, or the like are used, for example.

[0014] In an upper part of the hoistway 1, a car-side return pulley 8, a counterweight-side return pulley 9, a first rope stop device 10, and a second rope stop device 11 are provided. A pair of car-suspending pulleys 12 are provided to a lower part of the car 2. On the top of the counterweight 3, a counterweight-suspending pulley 13 is provided.

[0015] One end portion of each of the suspension bodies 7 is connected to the first rope stop device 10, whereas the other end portion of each of the suspension bodies 7 is connected to the second rope stop device 11. The suspension bodies 7 extending from the first rope stop device 10 are looped around each of the car-suspending

pulleys 12, the car-side return pulley 8, the driving sheave 6, the counterweight-side return pulley 9, and the counterweight-suspending pulley 13 in the stated order to reach the second rope stop device 11. The car 2 and the counterweight 3 are raised and lowered in the hoistway 1 by the rotation of the driving sheave 6.

[0016] An emergency stop device 14 is provided to the lower part of the car 2. The emergency stop device 14 is provided with an operation arm 15. The emergency stop device 14 grips the guide rail for guiding the car 2 by the operation of the operation arm 15. The fall of the car 2 can be prevented by the grip of the guide rail by the emergency stop device 14.

[0017] A governor (in-hoistway device) 16 is provided in the upper part of the hoistway 1, whereas a tension sheave 17 is provided in the lower part of the hoistway 1. A governor rope 18 is looped around a sheave of the governor 16 and the tension sheave 17 so as to be provided therebetween. The governor rope 18 is connected to the operation arm 15 and is stretched in a loop shape inside the hoistway 1. In this manner, the governor rope 18 moves in accordance with the movement of the car 2. The sheave of the governor 16 and the tension sheave 17 are rotated in accordance with the movement of the governor rope 18.

[0018] The governor 16 grips the governor rope 18 when an abnormality occurs in a speed of the car 8. The movement of the governor rope 18 is stopped by the grip of the governor rope 18 by the governor 16. The car 2, which moves vertically, is displaced with respect to the governor rope 18 by the stop of the movement of the governor rope 18. The operation arm 15 is operated by the displacement of the car 2 with respect to the governor rope 18.

[0019] FIG. 2 is a front view illustrating the first rope stop device 10 and the governor 16 illustrated in FIG. 1. In the figure, a suspension-body supporting device 20 for supporting the first rope stop device 10 and a governor mounting member (in-hoistway-device mounting member) 21 for supporting the governor 16 are mounted to an upper part of the guide rail 19 which guides the car 2.

[0020] The suspension-body supporting device 20 includes a plurality of (two in this example) lateral members 22 and 23 provided vertically at a distance from each other and a pair of longitudinal members 24 mounted between the lateral members 22 and 23.

[0021] The lateral members 22 and 23 are mounted to the guide rail 19 by rail clips 25. A size of each of the lateral members 22 and 23 in the horizontal direction is larger than a size of each of the lateral members 22 and 23 in the vertical direction (length direction of the guide rail 19).

[0022] Of the lateral members 22 and 23, one lateral member 22, which is provided at the highest position, is an upper-end lateral member to be mounted to the upper end portion of the guide rail 19. The upper-end lateral member 22 includes a lateral-member main body 22a to be brought into abutment against a rear surface of the

guide rail 19, a plate-like engagement portion 22b horizontally projecting from an upper end portion of the lateral-member main body 22a to be placed on an upper surface of the guide rail 19, and a plurality of reinforcing ribs 22c connected between the lateral-member main body 22a and the engagement portion 22b, for reinforcing the upper-end lateral member 22.

[0023] The upper-end lateral member 22 is mounted to the guide rail 19 by the rail clips 25 in a state in which a horizontal middle portion of the lateral-member main body 22a is held in contact with the rear surface of the guide rail 19 and the engagement portion 22b is placed on the upper surface of the guide rail 19. The rail clips 25 are provided to the lateral-member main body 22a.

[0024] The other lateral member 23 located below the upper-end lateral member 22 is an intermediate lateral member mounted to the guide rail 19 so as to avoid the upper end portion of the guide rail 19. The intermediate lateral member 23 is mounted to the guide rail 19 by the rail clips 25 in a state in which a horizontal middle portion thereof is held in contact with the rear surface of the guide rail 19.

[0025] One of the longitudinal members 24 is mounted between one horizontal end portion of the upper-end lateral member 22 and one horizontal end portion of the intermediate lateral member 23, whereas the other one of the longitudinal members 24 is mounted between the other horizontal end portion of the upper-end lateral member 22 and the other horizontal end portion of the intermediate lateral member 23. The longitudinal members 24 are mounted to the upper-end lateral member 22 and the intermediate lateral member 23 by a plurality of bolts 26. The longitudinal members 24 are provided at a distance from the guide rail 19 in the horizontal direction. Moreover, the longitudinal members 24 are provided on the right and left sides of the guide rail 19, respectively.

[0026] The first rope stop device 10 is mounted to the intermediate lateral member 23. Specifically, the suspension bodies 7 are connected to the intermediate lateral member 23 through an intermediation of the first rope stop device 10. In this manner, one end portion of each of the suspension bodies 7 is supported by the intermediate lateral member 23.

[0027] The governor mounting member 21 is mounted to the guide rail 19 by the rail clips 25 in a state in which a horizontal end portion thereof is held in contact with the rear surface of the guide rail 19. Moreover, the governor mounting member 21 is provided in a space between the upper-end lateral member 22 and the intermediate lateral member 23 (space between the lateral members 22 and 23) so as to avoid the upper-end lateral member 22 and the intermediate lateral member 23. The governor 16 supported by the governor mounting member 21 is located at a position closer to the guide rail 19 than one of the longitudinal members 24.

[0028] The guide rail 19 is fixed inside the hoistway 1 by a plurality of rail brackets 27 provided vertically at in-

tervals. The guide rail 19 is mounted to each of the rail brackets 27 by the rail clips 25. Each of the rail brackets 27 is provided so as to avoid the upper-end lateral member 22 and the intermediate lateral member 23. Moreover, among the rail brackets 27, at least one rail bracket 27 is provided in the space between the upper-end lateral member 22 and the intermediate lateral member 23 (space between the lateral members 22 and 23).

[0029] The second rope stop device 11 is supported by a suspension-body supporting device mounted to an upper part of the guide rail which guides the counterweight 3. The suspension-body supporting device which supports the second rope stop device 11 has the same configuration as that of the suspension-body supporting device 20 which supports the first rope stop device 10.

[0030] In the suspension-body supporting device for the elevator as described above, the plurality of lateral members 22 and 23 provided vertically at a distance from each other are mounted to the guide rail 19, whereas the lateral members 24 are mounted between the lateral members 22 and 23. Therefore, a load exerted from the suspension bodies 7 can be distributed to the lateral members 22 and 23. Therefore, an increase in bending moment exerted on the guide rail 19 can be suppressed. Moreover, a portion of the guide rail 19, which is located between the lateral members 22 and 23, can be exposed. Therefore, devices to be directly mounted to the guide rail 19 (for example, the rail brackets 27 for securing the guide rail 19, the governor mounting member 21 for supporting the governor 16, and the like) can be provided in the space between the lateral members 22 and 23. In this manner, the degree of freedom for the position at which the device is mounted can be improved to enable the mounting of the device in the hoistway with high efficiency.

[0031] Moreover, of the lateral members 22 and 23, the lateral member 22, which is provided at the highest position, includes the engagement portion 22b to be placed on the upper surface of the guide rail 19. Therefore, by the engagement of the engagement portion 22b with the guide rail 19, the suspension-body supporting device 20 can be prevented from shifting downward with respect to the guide rail 19.

[0032] Although the first rope stop device 10 is mounted to the intermediate lateral member 23 in the example described above, the first rope stop device 10 may be mounted to the upper-end lateral member 22. Specifically, the suspension bodies 7 may be connected to the upper-end lateral member 22 through an intermediation of the first rope stop device 10.

Second Embodiment

[0033] FIG. 3 is a front view illustrating a suspension-body supporting device for an elevator according to a second embodiment of the present invention. In the figure, a plurality of (three in this example) lateral members 31, 32, and 33 provided vertically at a distance from each

other are mounted to a guide rail 19 by rail clips 25, respectively. Each of the lateral members 31, 32, and 33 is mounted to the guide rail 19 in a state in which a horizontal middle portion thereof is held in contact with a rear surface of the guide rail 19. One longitudinal member 24 is mounted to one horizontal end portion of each of the lateral members 31, 32, and 33, whereas the other longitudinal member 24 is mounted to the other horizontal end portion of each of the lateral members 31, 32, and 33.

[0034] In this example, among the lateral members 31, 32, and 33, the lateral member 31 is provided at the highest position, the lateral member 33 is provided at the lowest position, and the lateral member 32 is provided at a height position between the lateral members 31 and 33 (intermediate position). The lateral member 31 provided at the highest position of the lateral members 31, 32, and 33 is mounted to the guide rail 19 also by a pair of bolts 34 penetrating through the guide rail 19. The bolts 34 penetrate through the guide rail 19 horizontally so as to be engaged with the guide rail 19 vertically. A pair of bolt holes (not shown) into which the bolts 34 are screwed are provided to the lateral member 31. The bolt holes are provided only to the lateral member 31 which is provided at the highest position of the lateral members 31, 32, and 33. A shape of each of the lateral members 31, 32, and 33 is the same as that of the intermediate lateral member 23 of the first embodiment except that the bolt holes are provided to the lateral member 31.

[0035] A first rope stop device 10 and a governor 16 are mounted to the common lateral member 32 provided at the intermediate position. Specifically, suspension bodies 7 are connected to the lateral member 32 through an intermediation of the first rope stop device 10, while the governor 16 is supported by the lateral member 32.

[0036] In an upper part of a hoistway 1, a detection plate 35 for detecting the arrival of a car 2 at the top floor, and a plurality of terminal slowdown switches 36 for detecting the arrival of the car 2 at an upper end portion of the hoistway 1 are provided. A detection-plate mounting member 37 for supporting the detection plate 35, and a switch mounting member 38 for supporting each of the terminal slowdown switches 36 are mounted to the upper part of the guide rail 19 by the rail clips 25. The detection plate 35 and each of the terminal slowdown switches 36 are provided at the positions further away from the guide rail 19 than one of the longitudinal members 24.

[0037] The car 2 is provided with a landing sensor (not shown) for detecting the detection plate 35 when the car 2 arrives at the top floor and a cam (not shown) for operating the terminal slowdown switches 36 when the car 2 reaches the upper end portion of the hoistway 1. The arrival of the car 2 at the top floor is detected by the detection of the detection plate 35 by the landing sensor. Moreover, the arrival of the car 2 at the upper end portion of the hoistway 1 is detected by the operation of the terminal slowdown switches 36 performed by the cam.

[0038] The detection-plate mounting member 37 is mounted to a portion of the guide rail 19, which is located

between the lateral members 31 and 32. The switch mounting member 38 includes a pair of mounting arms 38a mounted to the guide rail 19. One of the mounting arms 38a is mounted to a portion of the guide rail 19, which is located between the lateral members 32 and 33, whereas the other mounting arm 38a is mounted to a portion of the guide rail 19, which is located lower than the lateral member 33. The remaining configuration is the same as that of the first embodiment.

[0039] In the suspension-body supporting device for the elevator as described above, the lateral member 31, which is provided at the highest position of the lateral members 31, 32, and 33, is mounted to the guide rail 19 by the bolts 34 penetrating through the guide rail 19. Therefore, by the engagement of the bolts 34 with the guide rail 19, the suspension-body supporting device 20 can be prevented from shifting downward with respect to the guide rail 19. The same shape can be used for each of the lateral members 31, 32, and 33 except that the bolt holes are provided to the lateral member 31. Therefore, fabrication cost of the lateral members 31, 32, and 33 can be reduced.

[0040] Besides the lateral member 32 to which the first rope stop device 10 is mounted, the plurality of lateral members 31 and 33 are mounted to the guide rail 19. Therefore, a load exerted from the suspension bodies 7 can be distributed not only to the lateral member 32 but also to the plurality of lateral members 31 and 33. Therefore, an increase in bending moment exerted on the guide rail 19 can be further suppressed.

[0041] Although only the lateral member 31 provided at the highest position of the lateral members 31, 32, and 33 is mounted to the guide rail 19 by the bolts 34 penetrating through the guide rail 19 in the example described above, only the lateral member 32 may be mounted to the guide rail 19 by the bolts 34, or only the lateral member 33 may be mounted to the guide rail 19 by the bolts 34. Moreover, two or more lateral members of the lateral members 31, 32, and 33 may be mounted to the guide rail 19 by the bolts 34.

[0042] Moreover, although the first rope stop device 10 is mounted to the lateral member 32 provided at the intermediate position in the example described above, the first rope stop device 10 may be mounted to any one of the lateral members 31 and 33 other than the lateral member 32.

[0043] Further, although the governor 16 is mounted to the lateral member 32 provided at the intermediate position in the example described above, the governor 16 may be mounted to any one of the lateral members 31 and 33 and each of the longitudinal members 24 other than the lateral member 32.

Third Embodiment

[0044] FIG. 4 is a front view illustrating a suspension-body supporting device for an elevator according to a third embodiment of the present invention. In the figure,

a plurality of (two in this example) lateral members 41 and 42 provided vertically at a distance from each other are mounted to a guide rail 19 by rail clips 25, respectively. Each of the lateral members 41 and 42 is mounted to the guide rail 19 in a state in which a horizontal middle portion thereof is held in contact with a rear surface of the guide rail 19. One longitudinal member 24 is mounted to one horizontal end portion of each of the lateral members 41 and 42, whereas the other longitudinal member 24 is mounted to the other horizontal end portion of each of the lateral members 41 and 42.

[0045] In this example, of the lateral members 41 and 42, the lateral member 41 is provided at the highest position, whereas the lateral member 42 is provided at the lowest position. The lateral member 42, which is located at the lowest position of the lateral members 41 and 42, is supported by a support base (receiving member) 43 for receiving a bottom surface of the lateral member 42.

[0046] The support base 43 is mounted to the guide rail 19 in a state in which the support base is held in contact with the rear surface of the guide rail 19 by a plurality of bolts 44 penetrating through the guide rail 19. Each of the bolts 44 horizontally penetrates through the guide rail 19 so as to be engaged with the guide rail 19 vertically. A plurality of bolt holes (not shown) into which the bolts 44 are screwed are provided to the support base 43. The lateral member 42 is fixed to the support base 43 by bolts 45.

[0047] A first rope stop device 10 is mounted to the lateral member 42 which is provided at the lowest position of the lateral members 41 and 42. Therefore, suspension bodies 7 are connected to the lateral member 42 through an intermediation of the first rope stop device 10.

[0048] A casing (in-hoistway device) 46 for an electric device (for example, a controller, a battery, a regeneration resistor, or the like) relating to the operation of the elevator is mounted between the lateral members 41 and 42 by bolts 47. The casing 46 is located at a position closer to the guide rail 19 than one longitudinal member 24.

[0049] Between the electric device in the casing 46 and a car 2, a traveling cable (not shown) suspended in a hoistway 1 is connected as a suspension body. The traveling cable includes, for example, a control wire, a power line, and the like, for transmitting a control signal and power between the electric device in the casing 46 and the car 2. The traveling cable is supported by each of the lateral members 41 and 42 through an intermediation of the casing 46. The remaining configuration is the same as that of the first embodiment.

[0050] In the suspension-body supporting device for the elevator as described above, the lateral member 42 is supported by the support base 43 mounted to the guide rail 19. Therefore, the suspension-body supporting device 20 can be prevented from shifting downward with respect to the guide rail 19. In addition, the same shape can be used for the lateral members 41 and 42. Therefore, fabrication cost of the lateral members 41 and 42 can be

further reduced.

[0051] Although only the lateral member 42 provided at the lowest position of the lateral members 41 and 42 is supported by the support base 43 in the example described above, only the lateral member 41 provided at the highest position may be supported by the support base 43. Further, a plurality of the support bases 43 for individually supporting the lateral members 41 and 42 may be mounted to the guide rail 19.

[0052] Although the first rope stop device 10 is mounted to the lateral member 42 provided at the lowest position of the lateral members 41 and 42 in the example described above, the first rope stop device 10 may be mounted to the lateral member 41 provided at the highest position.

[0053] Further, although the casing 46 is mounted between the lateral members 41 and 42 in the example described above, the casing 46 may be mounted to the longitudinal members 24.

[0054] Further, although the traveling cable as the suspension body suspended in the hoistway 1 is supported by the lateral members 41 and 42 and the suspension bodies 7 for suspending the car 2 and the counterweight 3 are supported by the lateral member 42 in the example described above, only the traveling cable may be supported by the lateral members 41 and 42.

Fourth Embodiment

[0055] FIG. 5 is a front view illustrating a suspension-body supporting device for an elevator according to a fourth embodiment of the present invention. In the figure, a guide rail 19 includes a plurality of unit rails 19a arranged in a length direction of the guide rail 19. On a rear surface of the guide rail 19, a butt strap 51 for connecting the unit rails 19a adjacent to each other is mounted.

[0056] The butt strap 51 is superimposed on a rear surface of each of the unit rails 19a over a boundary between the unit rails 19a adjacent to each other. The butt strap 51 is mounted to the guide rail 19 by a plurality of bolts 52 individually penetrating through the unit rails 19a adjacent to each other.

[0057] Each of the bolts 52 horizontally penetrates through the guide rail 19 so as to be engaged with the guide rail 19 vertically. The butt strap 51 is provided with a plurality of bolt holes (not shown) into which the bolts 52 are screwed.

[0058] A plurality of (three in this example) lateral members 53, 54, and 55 provided vertically at a distance from each other are mounted to the guide rail 19 by rail clips 25. Each of the lateral members 53, 54, and 55 is mounted to the guide rail 19 in a state in which a horizontal middle portion thereof is held in contact with the rear surface of the guide rail 19. One longitudinal member 24 is mounted to one horizontal end portion of each of the lateral members 53, 54, and 55, whereas the other longitudinal member 24 is mounted to the other horizontal end portion of each of the lateral members 53, 54, and 55.

[0059] In this example, among the lateral members 53, 54, and 55, the lateral member 53 is provided at the highest position, the lateral member 55 is provided at the lowest position, and the lateral member 54 is provided at a height position between the lateral members 53 and 55 (at an intermediate position). A shape of each of the lateral members 53, 54, and 55 is the same as that of the intermediate lateral member 23 of the first embodiment.

[0060] Among the lateral members 53, 54, and 55, only the lateral member 54 provided at the intermediate position is supported by the butt strap 51. The butt strap 51 supports the lateral member 54 in a state in which the butt strap 51 receives a lower surface of the lateral member 54.

[0061] A first rope stop device 10 and a governor 16 are mounted to the lateral member 54 provided at the intermediate position. Therefore, suspension bodies 7 are connected to the lateral member 54 through an intermediation of the first rope stop device 10. The remaining configuration is the same as that of the first embodiment.

[0062] In the suspension-body supporting device for the elevator as described above, the lateral member 54 is supported by the butt strap 51 which connects the unit rails 19a adjacent to each other adjacent. Therefore, the suspension-body supporting device 20 can be prevented from shifting downward with respect to the guide rail 19. In addition, the same shape can be used for the lateral members 53, 54, and 55. Moreover, the butt strap 51 can also be used as a member for preventing a downward shift of the suspension-body supporting device 20. Thus, the number of components can be reduced.

[0063] Although only the lateral member 54 of the lateral members 53, 54, and 55, which is located at the intermediate position, is supported by the butt strap 51 in the example described above, any one of the lateral members 53 and 55 may be supported by the butt strap 51.

[0064] Moreover, although the first rope stop device 10 is mounted to the lateral member 54 provided at the intermediate position in the example described above, the first rope stop device 10 may be mounted to any one of the lateral members 53 and 55 other than the lateral member 54.

[0065] Moreover, although the governor 16 is mounted to the lateral member 54 provided at the intermediate position in the example described above, the governor 16 may be mounted to any one of the lateral members 53 and 55 other than the lateral member 54.

[0066] Although the present invention is applied to the elevator in which the hoisting machine 4 is provided in the bottom portion of the hoistway 1 in each of the embodiments described above, the present invention may be applied to an elevator in which the hoisting machine 4 is provided in the upper portion of the hoistway 1.

Reference Signs List

[0067] 2 car (body to be raised and lowered), 3 counterweight (body to be raised and lowered), 7 suspension body, 16 governor (in-hoistway device), 19 guide rail, 20 suspension-body supporting device, 22, 23, 31, 32, 33, 41, 42, 53, 54, 55 lateral member, 22b engagement portion, 24 longitudinal member, 34 bolt, 43 support base (receiving member), 46 casing (in-hoistway device), 51 butt strap.

Claims

1. A suspension-body supporting device for an elevator, comprising:

a plurality of lateral members mounted to a guide rail for guiding a body to be raised and lowered, the plurality of lateral members being provided vertically at a distance from each other; and longitudinal members mounted between the plurality of lateral members, wherein:

at least any one of a suspension body for suspending the body to be raised and lowered and a suspension body suspended in a hoistway is supported by at least any one of the plurality of lateral members.

2. A suspension-body supporting device for an elevator according to claim 1, wherein the lateral member provided at a highest position of the plurality of lateral members includes an engagement portion to be placed on an upper surface of the guide rail.

3. A suspension-body supporting device for an elevator according to claim 1, further comprising a receiving member mounted to a rear surface of the guide rail, for supporting at least any one of the plurality of lateral members.

4. A suspension-body supporting device for an elevator according to claim 1, wherein:

the guide rail includes a plurality of unit rails arranged in a length direction of the guide rail; the unit rails adjacent to each other are connected to each other by a butt strap; and at least any one of the plurality of lateral members is supported by the butt strap.

5. A suspension-body supporting device for an elevator according to claim 1, wherein at least any one of the plurality of lateral members is mounted to the guide rail by a bolt penetrating through the guide rail.

6. A suspension-body supporting device for an elevator

according to claim 1, wherein an in-hoistway device
to be provided in the hoistway is mounted to the sus-
pension-body supporting device.

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FIG. 1

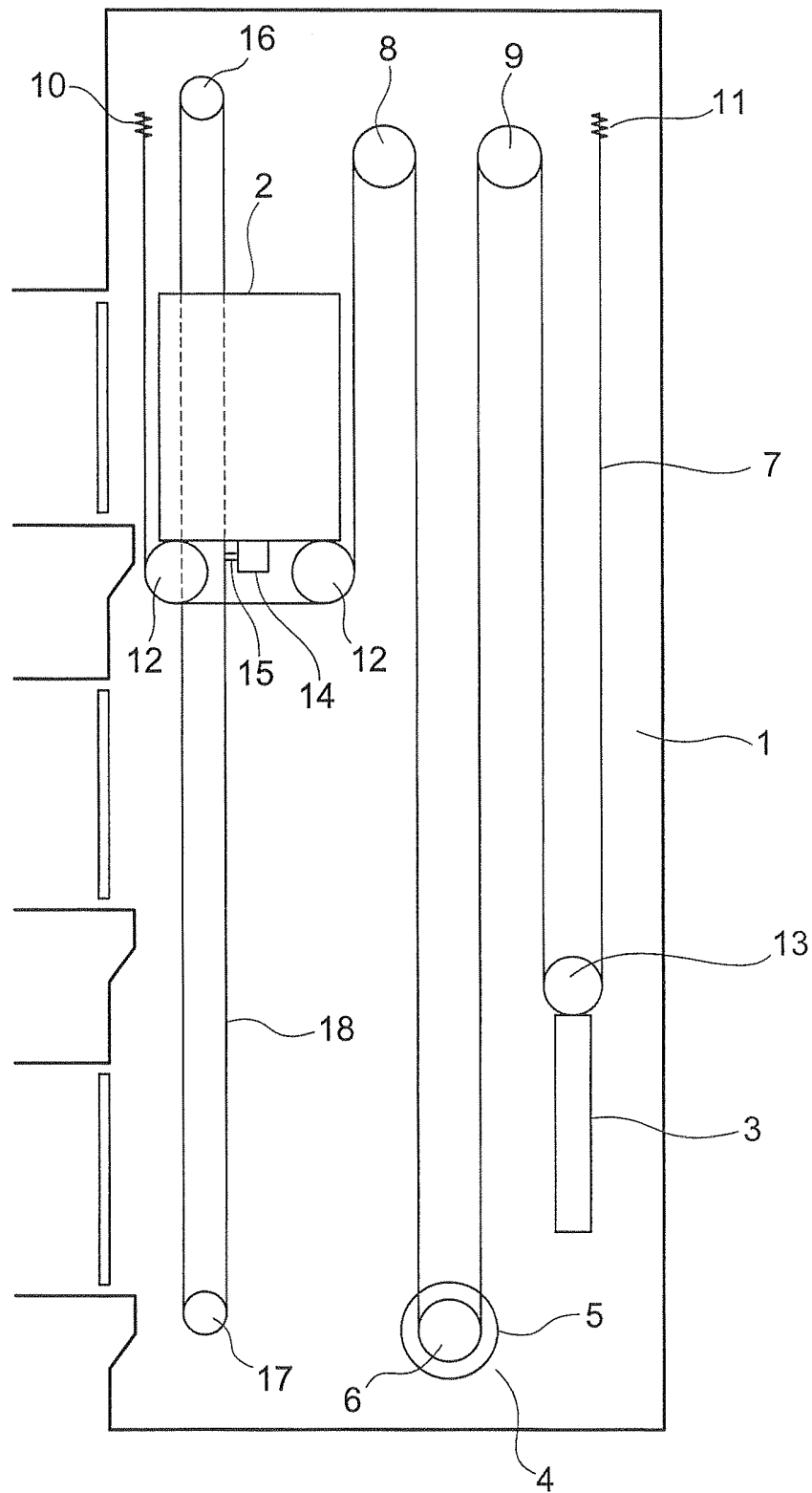


FIG. 2

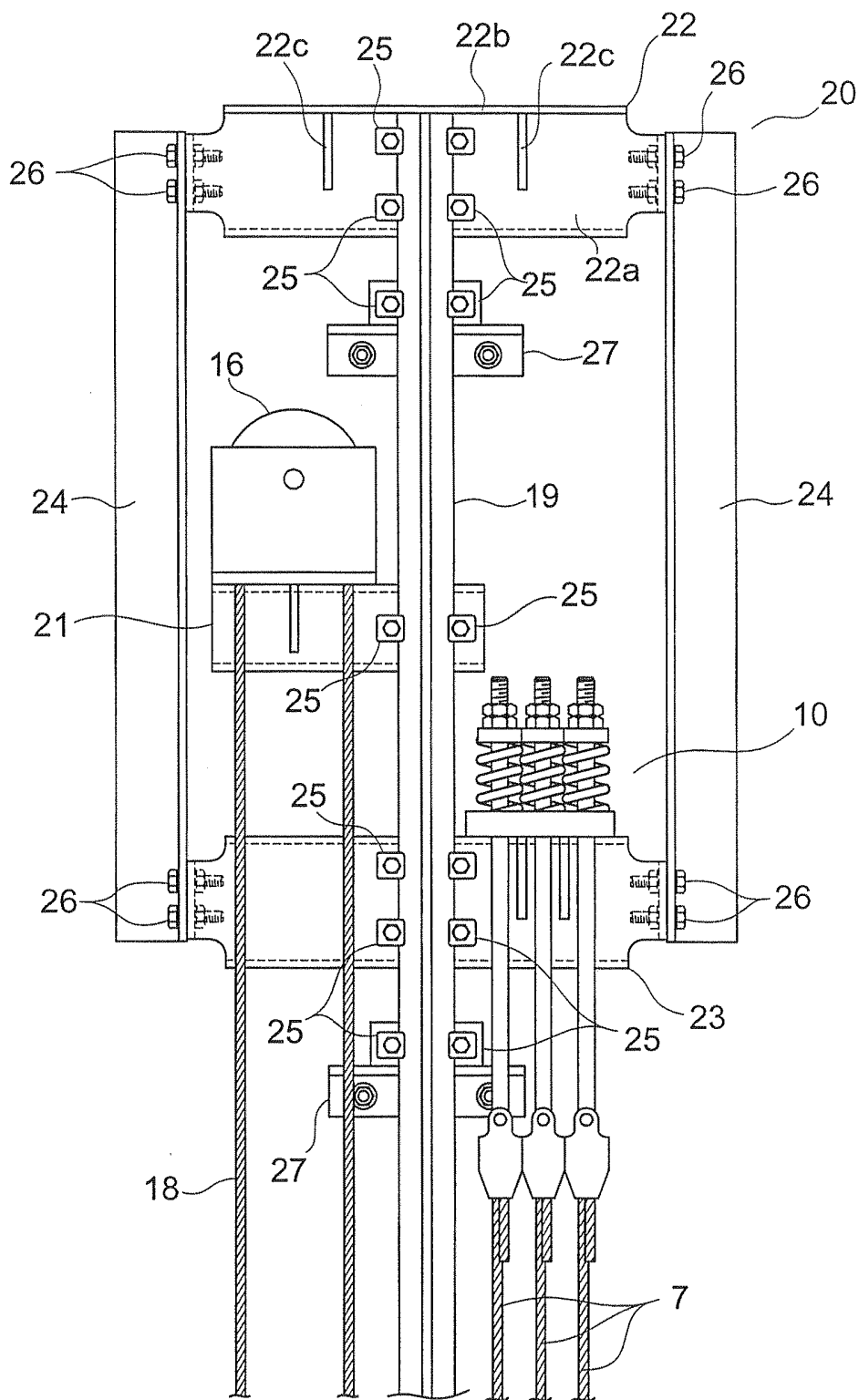


FIG. 3

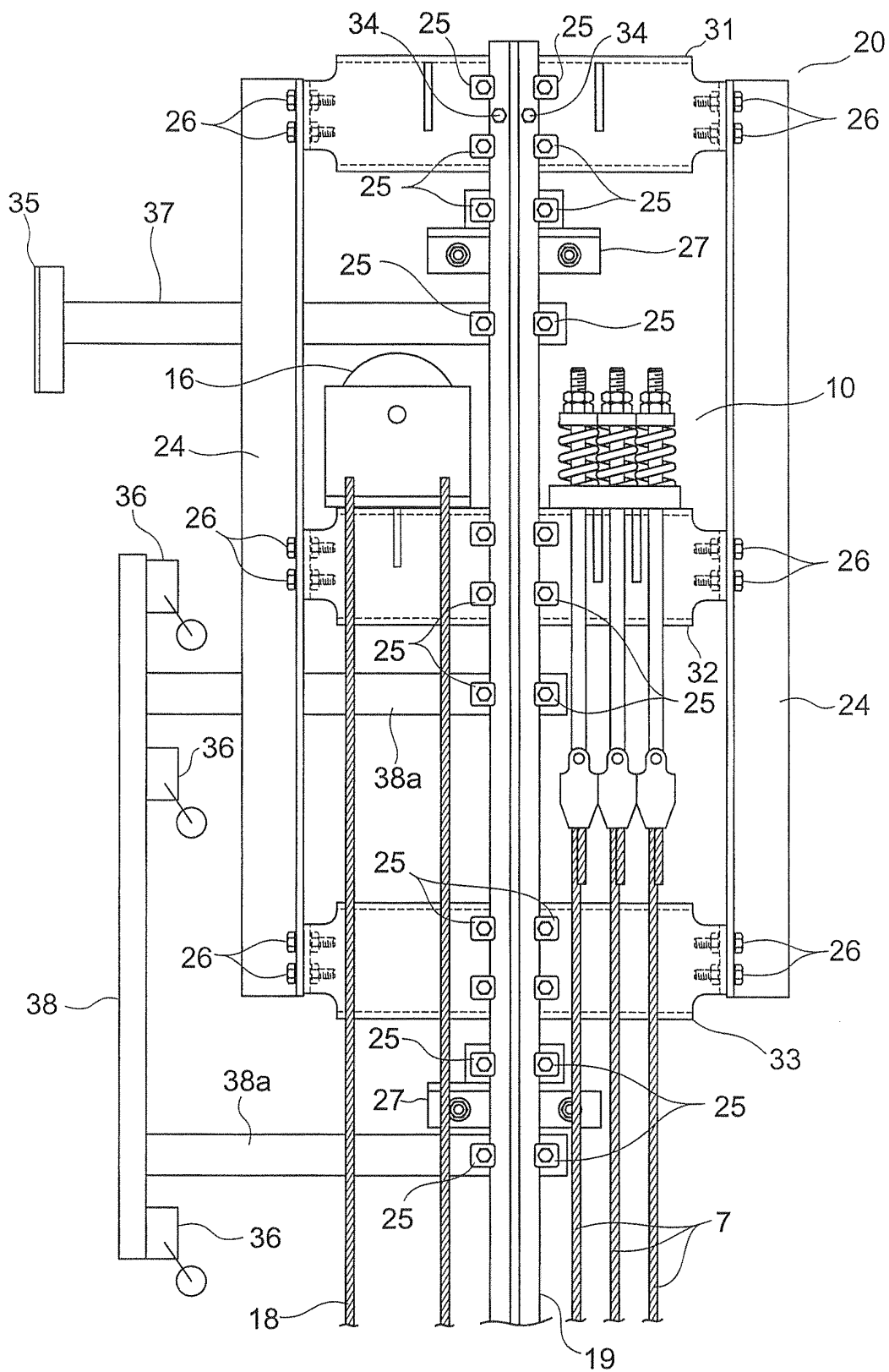


FIG. 4

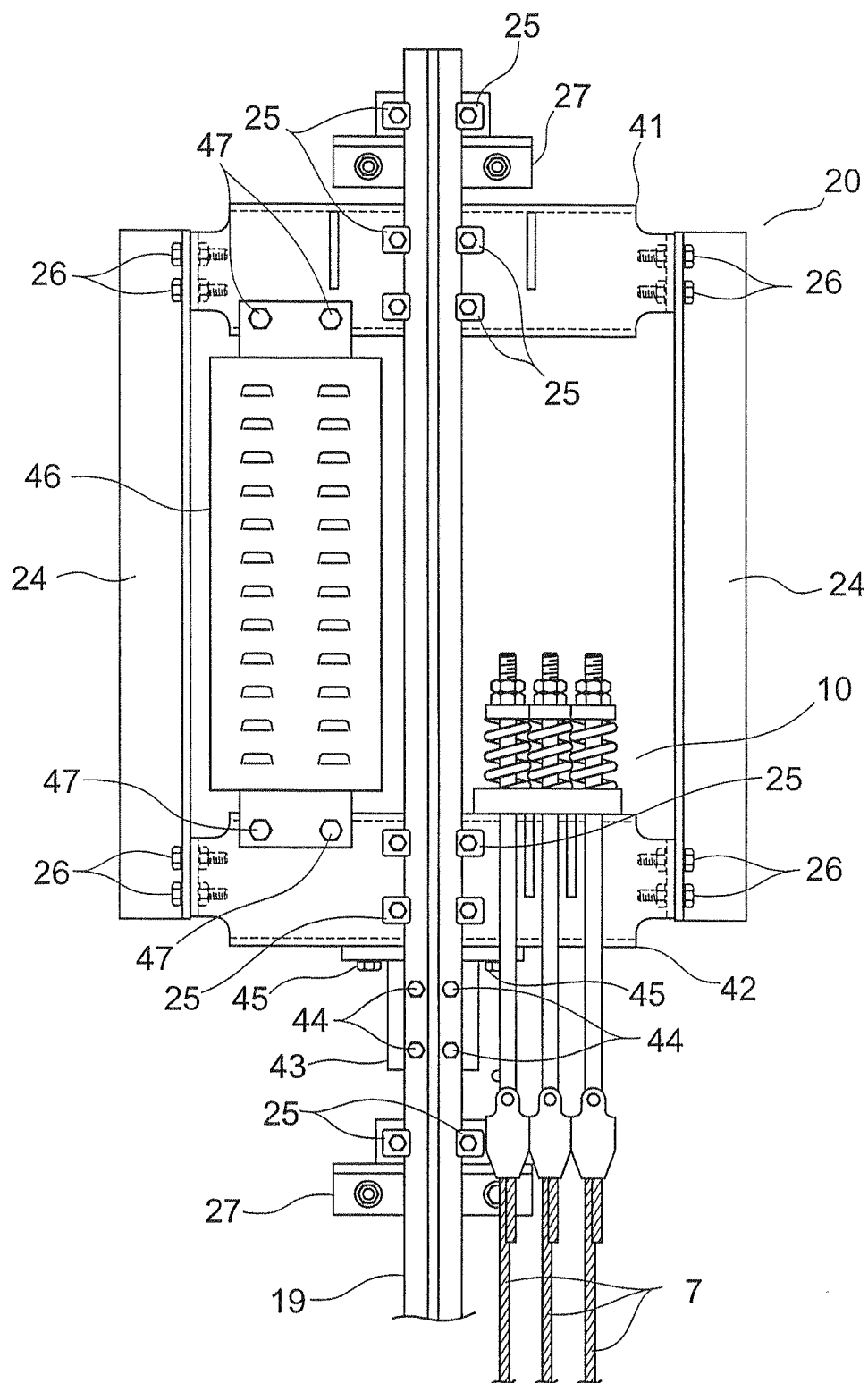
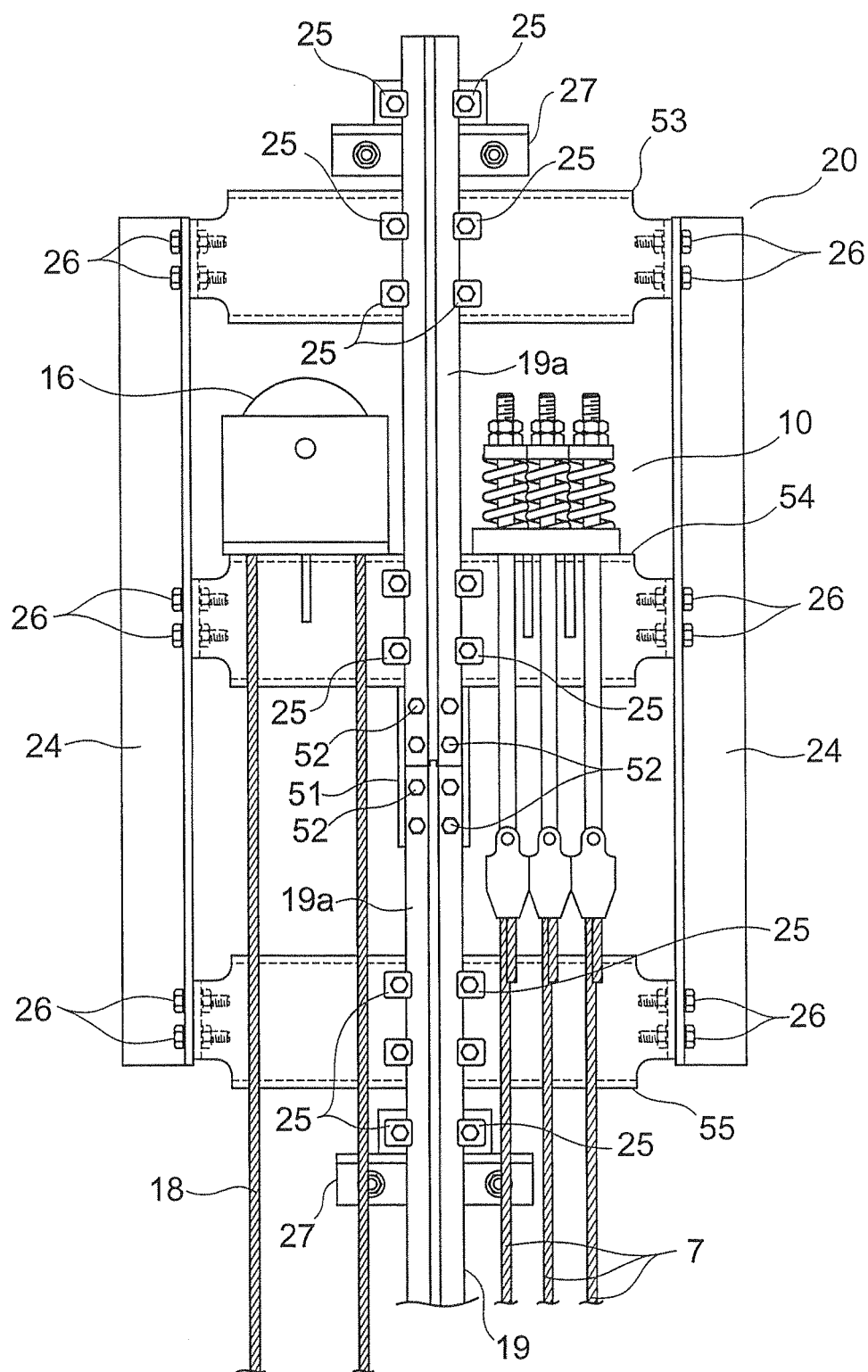


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/054234

A. CLASSIFICATION OF SUBJECT MATTER

B66B7/08(2006.01)i, B66B7/02(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)

B66B7/08, 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 1996-2010

Kokai Jitsuyo Shinan Koho 1971-2010 Toroku Jitsuyo Shinan Koho 1994-2010

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.
X Y	JP 2001-335258 A (Fujitec Co., Ltd.), 04 December 2001 (04.12.2001), paragraphs [0008] to [0009]; fig. 1 (Family: none)	1-2, 5 3-4, 6
Y	WO 99/48789 A1 (Mitsubishi Electric Corp.), 30 September 1999 (30.09.1999), description, page 6, lines 1 to 21; fig. 5 & EP 995712 A1 & EP 2145851 A & CN 1255104 A	3-4
Y	WO 03/18458 A1 (Mitsubishi Electric Corp.), 06 March 2003 (06.03.2003), description, page 5, lines 8 to 12; fig. 1 & EP 1419987 A1 & CN 1471491 A	6

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

* Special categories of cited documents:

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

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

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

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

14 May, 2010 (14.05.10)

Date of mailing of the international search report

25 May, 2010 (25.05.10)

Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/054234

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

The invention in claim 1 cannot be considered to have a special technical feature, since the invention does not make contribution over the prior art in the light of the contents disclosed in JP 2001-335258 A.

Consequently, any same or corresponding special technical feature cannot be found between the invention in claim 1 and the inventions in claims 2 - 6.

Consequently, the invention in claim 1 and the inventions in claims 2 - 6 are not relevant to a group of inventions that satisfy the requirement of unity of invention.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 4114957 B [0004]
- WO 03018458 A1 [0004]