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(54) **LIFTING DEVICE FOR ELEVATOR, ELEVATOR CAR FRAME, AND LIFTING METHOD FOR ELEVATOR**

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Description

TECHNICAL FIELD

5 [0001] The present invention relates to an elevator lifting device for lifting a weight in a hoistway of elevator and an elevator lifting method.

BACKGROUND ART

10 [0002] Upon installation of an elevator device, a hoistway size needs be determined by contemplating the space requirements for accommodating the device after the installation and for performing an installation operation during a process of the installation. Especially, a carry-in route must be secured in order to carry the elevator device into the hoistway to be lifted up to a predetermined height, and a space for handling and a space for lifting margin must be secured within the hoistway. Herein, a term "lifting margin" means a height of the lifting machine, however, more accurately, it means an installation space including the height of the lifting machine.

15 [0003] For example, when lifting the device using a chain block, in order to lift a device mass ranging from 500kg to 1000kg, one or two chain blocks having a height ranging from 400 to 500 mm for a manual type and 700 to 800mm for an electronic type are used. In order to directly suspend the device, a suspension portion normally is provided at a higher position than a position of the center of gravity of a device targeted for lifting for preventing the device from overturning at lifting. Also, the suspension portion, also in a plane direction, approaches extremely close to the center of gravity. Based on this, the device targeted for lifting is lifted in a stable state. At an upper portion of a final height where the device targeted for lifting is attached as a product, "a space required for lifting" (the lifting margin) needs be secured. Accordingly, a minimum position of the hoistway top portion (a required height of ceiling) needs be examined in views of "the space required for lifting" and "a required overhead dimension" which is determined from car jump or counter weight jump. Hereinafter, a dimension from an uppermost floor face to a hoistway top portion is referred to as "an overhead dimension OH" (may be referred simply as OH).

(Calculation of OH₁ (car jump))

30 [0004] Fig. 22 illustrates a conventional example for describing the calculation of OH for the car jump. The overhead dimension OH₁ for the car jump will be described with reference to Fig. 22. A configuration of Fig.22 will be simply described. Fig. 22 illustrates an elevator provided in the hoistway 5. The case illustrates the car 4 positioned at the uppermost floor. The car 4 and the counter weight 15 (may be referred to as a weight) go up and down by a hoisting machine M winding up a wire 18. The overhead dimension OH₁ is a distance between the uppermost floor face 20 and the hoistway top portion 5a. Hereinbelow, the overhead dimension OH₁ will be described in detail. A weight-side shock absorber 16 and a car-side shock absorber 17 are installed at a lower portion of the hoistway 5. The weight-side shock absorber 16 and the car-side shock absorber 17 provide coil springs 16a and 17a. Further, a use of the coil spring is only one example. The weight-side shock absorber 16 and the car-side shock absorber 17 may absorb shocks of the counter weight 15 and the car 4 by means of oil buffer and other methods. For example, domestically within Japan, the overhead dimension (hereinbelow, referred to as OH₁ (car jump)) for jumping of the car 4 is calculated by the following equation (equation 1a). Note that the meaning of the symbols for the equation 1a follows below.

$$\text{OH}_1 \text{ (car jump)} = \text{CH} + \text{CRB} + \text{BST} + \text{KJP} + \text{C} \text{ (equation 1a)}$$

45 CH: a dimension from a car floor to a car TOP
 CRB: a weight-side runby amount (a vertical distance from the counter weight when the car stops at the uppermost floor to a receiving face of the weight-side shock absorber 16 (an uppermost portion of the coil spring 16a))
 BST: a stroke of the weight-side shock absorber 16 (a deflection amount of the coil spring 16a)
 50 KJP: a jump amount of the car 4 (overrun due to an inertia)
 C: a spacing from the TOP of the car (4) at jumping of the car 4 (the uppermost portion of the car 4) to the hoistway top portion 5a, and not operated above the car.

Further, "an amount of the overrun by the car H" of Fig. 22 is expressed as

55

$$H = \text{CRB} + \text{BST} + \text{KJP}$$

Fig. 24 illustrates a relation of OH_1 and CH , H , and C , for Figs. 22 and 23. H_4 and H_5 will be used in the later explanation.

(Calculation of OH_1 (weight jump))

5 **[0005]** Fig. 23 is a drawing for describing the calculation of OH for the weight jump. The overhead dimension OH_1 (hereinafter, referred to as QH_1 (weight jump)) for the weight jump will be described with reference to Fig. 23. The same calculation as in the equation 1a is performed also for jumping of the counter weight 15. In case of jumping of the counter weight 15, as can be seen in Fig. 23, the OH_1 (weight jump) is as follows (equation 1b).

10
$$OH_1 \text{ (weight jump)} = CH + CRB + BST + OJP + C \text{ (equation 1b)}$$

In equation 1b, the runby amount CRB and the shock absorber stroke BST are the car side, and the jump amount OJP indicates the jump amount of the weight side. Also, CH is a distance from the uppermost floor face 20 to an uppermost portion of the counter weight 15.

15 **[0006]** Fig. 24 is a drawing showing a relation of OH_1 , with CH , H , and C , for Figs. 22 and 23. H_4 and H_5 will be used in the later explanation.

(In case that the device is on a car projection plane: for both of the car jump and the weight jump)

20 **[0007]** Further, in case of arranging a device (for example, the hoisting machine) on the car projection plane, considering the pre-described lifting margin H_2 , the required overhead dimension OH_2 is as indicated in the equation 2a below. The OH_2 (the device is present) indicated below means a dimension in which case the device having the lifting margin H_2 is present above the car 4. Fig. 25 is a drawing that represents graphically the equation 2a below.

25 In case of the car jump,

30
$$OH_2 \text{ (the device is present)} = OH_1 \text{ (the car jump)} + H_1 + H_2 \text{ (equation 2a) .}$$

Also, in case of the weight jump, it is expressed as the following equation 2b.

35
$$OH_2 \text{ (the device is present/weight)} = OH_1 \text{ (the weight jump)} + H_1 + H_2 \text{ (equation 2b) .}$$

40 The meaning of the symbols is as follows:

H_1 : a height of the device

H_2 : the lifting margin

45 Further, OH_3 is used in the later description.

(In case that the device is not present on the car projection plane)

50 **[0008]** Fig. 26 is a drawing for describing the case in which the device is not present on the car projection plane. When the device is not present on the car projection plane, provided the installation height H_3 of the device (a distance from the uppermost floor face 20 to a lower face of the device), an OH_0 dimension of the calculation equation (equation 3) below is $OH_0 > OH_1$ (the car jump) and $OH_0 > OH_1$ (the weight jump),
55 then OH_0 becomes the required overhead dimension.

$$OH_0 = H_3 + H_1 + H_2 \text{ (equation 3)}$$

Further, H_0 is used in the later explanation.

[0009] After a latter half of 1990s, the machine room less elevator (hereinafter abbreviated as MRL) has rapidly spread not only domestically in Japan but also throughout the world. The system in which all of the elevator devices are installed in the hoistway has become the mainstream. Further, a reduction of the hoistway size (a plane dimension, an overhead dimension, a pit depth) has promoted, and as for the required hoistway size, other than accommodation space of the device, an arrangement design of the device that foresees the installation factor must be carried out.

[0010] In order to reduce the overhead dimension, one can consider that a specialized lifting platform is used as a tool in order to lift the device such as the hoisting machine (for example, patent documents 1 and 2). However, when the specialized lifting platform is being used, an assemblage of the lifting platform and dismantling after the lifting will be required, taking too much labor for installation and increasing the cost.

Patent document 1: JP2000-34072A

Patent document 2: EP 1405812 A1

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0011] The present invention aims to supply a lifting device and a lifting method, in case of lifting the elevator device such as the hoisting machine, that do not accompany the increase in installation time and cost, and without having to extend the hoistway size.

MEANS TO SOLVE THE PROBLEMS

[0012] An elevator lifting device for lifting a weight to a vicinity of a top portion of a hoistway of elevator, comprising:

- a guide rail that is arranged from a lower portion to the top portion of the hoistway;
- a car frame of elevator that is capable of going up and down, guided by the guide rail, by providing a guide shoe engaging with the guide rail, and that is used as a platform placing the weight for lifting to the vicinity of the top portion of the hoistway; and
- a lifting machine that lifts the car frame placing the weight to the top portion, guided by the guide rail.

[0013] The elevator lifting device according to claim 1 wherein the guide rail at its intermediate portion between the vicinity of the top portion and a vicinity of the lower portion is not fixed with a rail bracket.

[0014] The elevator lifting device, wherein the lifting machine includes a linear body attached to the car frame at one end, and a main body, arranged at the top portion, that lifts the car frame by winding up the linear body; wherein the main body, at least at its portion, is arranged to get under a portion lower than an upper portion of the car frame, when the car frame is lifted to the top portion by winding up the linear body; and wherein the car frame provides a car frame-side end attachment unit for attaching the one end of the linear body.

[0015] The elevator lifting device, wherein the car frame provides a placement member placing the weight at the upper portion; and

wherein the weight, which is placed on the placement member, and which is placed on a position not interfering with the main body of the lifting machine when lifted up to the vicinity of the top portion by winding up the linear body by the main body of the lifting machine.

[0016] The elevator lifting device, wherein the car frame-side end attachment unit is arranged at a higher position than a position of center of gravity determined by regarding the weight placed on the placement member and the car frame as one rigid body.

[0017] The elevator lifting device, wherein the lifting machine includes a linear body attached to a fixing unit fixed to the top portion at one end; and

a main body attached to the car frame to get under a position lower than the upper portion of the car frame, at least at one portion, and that lifts the car frame to the top portion by winding up the linear body; and

wherein the car frame provides a car frame-side main body attachment unit for attaching the main body of the lifting machine.

[0018] The elevator lifting device, wherein the car frame provides a placement member placing the weight at the upper

portion; and

wherein the weight is placed on the placement member, which is placed on a position not interfering with the lifting machine.

[0019] The elevator lifting device, wherein the car frame-side main body attachment unit is arranged at a higher position than a position of center of gravity determined by regarding the weight to be placed on the placement member and the car frame as one rigid body.

[0020] The elevator lifting device, wherein the guide shoe provides a magnetic body that attracts the guide rail with a magnetic force.

[0021] An elevator lifting method for lifting a weight to a vicinity of a top portion of a hoistway of elevator, for lifting a car frame, which is used as a platform for placing the weight to be lifted to the vicinity of the top portion of the hoistway, that is capable of going up and down along the guide rail by providing a guide shoe being engaged with the guide rail installed from a lower portion to a top portion of the hoistway, and which is guided by the guide rail and lifted by a lifting machine to the top portion while placing the weight.

EFFECTS OF THE INVENTION

[0022] The present invention is directed to provide the lifting device and lifting method, in case of lifting the elevator device such as the hoisting machine, that do not accompany the increase in installation time and cost, and without having to extend the hoistway size.

PREFERRED EMBODIMENTS FOR CARRYING OUT THE INVENTION

First Embodiment

(1. Outline of a lifting device 100)

[0023] The first embodiment describes an elevator lifting device that lifts a weight, in the hoistway of the elevator. Fig. 1 is a drawing for describing a drawback in direct lifting of a weight 1 which is targeted for lifting. Fig. 2 is a drawing for describing a configuration of the lifting device 100 according to the first embodiment. Fig. 2 illustrates after an end of the lifting.

[0024] As illustrated in Fig. 1, in order to lift the weight 1 (for example, the hoisting machine), the weight 1 is suspended by temporarily attaching a lifting machine 3 (for example, a winch) to a ceiling of the hoistway 5 (a hoistway top portion 5a). In this way, the weight 1 could not have been suspended just by the amount of height (the lifting margin H_2) of the lifting machine 3. For this reason, there were cases in which the hoistway size becomes long just by the amount of the lifting margin H_2 . The first embodiment describes the lifting device 100 in which the lifting margin H_2 is not a primary factor for determining the hoistway size. As mentioned previously, the "lifting margin H_2 " is a height of the lifting machine, more correctly, it means an installation space including the height of the lifting machine.

[0025] As illustrated in Fig. 2, the lifting device 100 provides guide rails 8, a car frame 7, and the lifting machine 3. The lifting machine 3 is comprised of a lifting machine main body 30 and a chain 3a. Examples of the lifting machine 3 include a chain block, the winch, and so forth. As the winch, the wire is used instead of the chain 3a. The main characteristics of the lifting device 100 mainly consist of (1) to (3) below.

(1) As shown in Fig. 2, guide rails 8 are respectively installed to both sides of the car frame 7. The guide rails 8, at a lower portion 81 and an upper portion 83 of the hoistway 5, are fixed with rail brackets 12. The lower portion 81 is a vicinity of a lowermost floor (pit). The upper portion 83 is a vicinity of an uppermost floor. An intermediate portion 82 between the lower portion 81 and the upper portion 83 is not fixed with a rail bracket 12. This is because a method of construction (without scaffolding) is assumed in which the lifting device 100 is used to lift the weight 1 such as the hoisting machine, and the lifted hoisting machine is used to fix the intermediate portion 82 with the rail bracket. Also, the car frame 7 is used as a lifting platform for placing the weight 1. Based on these reasons, a specialized tool for lifting the weight 1 and a dismantle labor are not required.

(2) The lifting device main body 30, when lifting the car frame 7 up to the hoistway top portion 5a, at least a portion of it is arranged to get under a position lower than a car frame upper portion 71. Based on this, as shown in Fig. 2, the weight 1 can be suspended in spite of the amount for the lifting margin H_2 , and the hoistway size can be made small.

(3) A suspension point 2 for suspending the car frame 7 is provided lower than an uppermost portion of the car frame 7, and, higher than a position of the center of gravity 4b of the combined weights determined by regarding the weight 1 and the car frame 7 as one rigid body, in the car frame 7. As illustrated in Fig. 2, the suspension point 2 is located above the position of the center of gravity just by the amount for the dimension L. That is, a position of the suspension point 2 in the car frame 7 is located above the center of gravity 4b of the combined weights of the weight 1 and the car frame 7 by the amount for the dimension L, therefore, the lifting device main body 30 can stably

lift the weight 1. In addition, the suspension point 2 shown in Fig. 2, when the weight 1 is lifted to a final lifting position, is set to a position whereby the lifting margin H_2 does not affect the lifting of the weight 1.

(4) Accordingly, the lifting device 100 uses the car frame 7 as a lifting tool for placing the weight 1, as mentioned in (1) to (3), uses the guide rails 8 as a guide, and the suspension point 2 is set to a position above the position of the center of gravity 4b of the combined weights, and a position whereby the lifting margin H_2 does not affect the lifting of the weight 1, when the weight 1 is lifted to the final lifting position.

(2. Relation of OH and lifting device)

[0026] Figs. 3 and 4 are drawings for describing the overhead dimension OH. The overhead dimension OH will be described further by referring to Figs. 3 and 4. Also, Figs. 3 and 4 illustrate the case in which the lifting margin H_2 becomes the primary factor of OH, when the car frame 7 is being used as the lifting platform.

[0027] Fig. 3 illustrates the middle of lifting.

[0028] Fig. 4 illustrates the end of lifting. As illustrated in Fig. 3, the suspension point 2 is set to the uppermost portion of the car frame 7. For this reason, as in Fig. 4 indicating the end of lifting, the lifting margin H_2 becomes the primary factor of OH. In other words, as shown in Fig. 4, a maximum height that the weight 1 can be lifted becomes a height H_0 obtained by subtracting the lifting margin H_2 of the lifting device main body 30 from the hoistway top portion 5a ($H_0 = H_1 + H_3$, when using the previously described equation in words) (refer to Fig. 26).

H_1 : a height of the device (the weight 1)

H_3 : a distance from the uppermost floor face 20 to a lower face of the device (the weight 1).

[0029] Accordingly, in case of Fig. 3, a minimum overhead dimension OH_0 required, from an installation viewpoint, is

$$OH_0 = H_0 + H_2 \text{ (equation 4) .}$$

[0030] On the other hand, when the car 4 is elevated to the most highest position (the case of weight jump is the same so that the description for the weight jump is omitted), suppose, for example, that a distance of vertical direction between a maximum attainable point when the car 4 jumps due to the counter weight 15 striking the weight-side shock absorber 16 and the uppermost floor face 20 is H_4 (refer to Fig. 24). If no other hoistway device is present on the projection plane of the car 4, a dimension that added a safety distance H_5 of the car uppermost portion at jumping and the hoistway top portion to H_4 becomes the minimum required dimension OH_1 , determined by jumping of the car 4.

[0031] That is, as shown in Fig. 24,

$$OH_1 = H_4 + H_5 \text{ (equation 5)}$$

Herein, H_4 is expressed as

$$H_4 = CH + CRB + BST + KJP \text{ (equation 6)}$$

CH: an overall height of the car

CRB: a weight runby amount

BST: a weight shock absorber stroke

KIP: a car jump amount

[0032] If the overhead dimension is determined by OH_1 (the car jump), or by OH_1 (the weight jump), the required overhead dimension becomes the minimum. In the lifting device 100 of the first embodiment, the suspension point 2, when the weight 1 is lifted to the final lifting position, is set to the position whereby the lifting margin H_2 does not affect the lifting of the weight 1, therefore, the lifting margin H_2 does not become a key factor for calculating the overhead dimension.

That is, in the lifting device 100,

$$OH_1 \geq OH_0 \text{ (equation 7) .}$$

Alternatively, in regard to an elevator system that inevitably places the device on the projection plane of the car 4, the

required overhead dimension OH_3 under such a circumstance will be

$$OH_3 = OH_1 + H_1 \text{ (equation 8) .}$$

As such, the lifting margin H_2 will not become the key factor for calculating the overhead dimension.

(3. Configuration and Operation of the lifting device)

[0033] The configuration and operation of the lifting device 100 of the first embodiment will be described specifically by referring to Figs. 5 to 12.

[0034] Fig. 5 illustrates a start of lifting of the weight 1 by the lifting device 100.

[0035] Fig. 6 illustrates a mid-stage of lifting by the lifting device 100.

[0036] Fig. 7 illustrates an end of lifting of the weight 1 by the lifting device 100.

[0037] Fig. 8 illustrates a perspective view expressing the mid-stage of lifting by the lifting device 100, and corresponds to Fig. 6.

[0038] Fig. 9 illustrates a perspective view expressing the end of lifting by the lifting device 100, and corresponds to Fig. 7.

[0039] Fig. 10 illustrates a modified example of the configuration of the car frame 7 and the arrangement of the lifting machine 3 of Fig. 8, and corresponds to Fig. 8.

[0040] Fig. 11 illustrates the end of the lifting of Fig. 10.

[0041] Fig. 12 illustrates an installation configuration of the chain 3a.

[0042] As shown in Fig. 5 or Fig. 6, the followings:

(1) A weight position

The weight 1 targeted for lifting is placed on a placement member 72 at an upper portion of the car frame 7.

(2) A position of the lifting machine

The lifting machine main body 30 is attached to the hoistway top portion 5a. The lifting machine main body 30 is directly attached to a construction side of the hoistway top portion 5a, either that or it is suspended through an installed lifting beam 6. Fig. 5 illustrates a case of using the lifting beam 6.

(3) A suspension position

As shown in Fig. 12 (a), the chain 3a having a hook 33 at its end is drawn down from the hoisting machine main body 30, and the car frame 7 is suspended at the hook 33. The lifting machine main body 30 lifts the car frame 7 by winding up the chain 3a.

(4) A position relation of the lifting machine 3 and the car frame 7

in this case, as shown in Fig. 7, a portion that suspends the car frame 7 with the chain 3a (the suspension point 2) is located at a higher position than the position of the center of gravity 4b of the combined weights, and, at a position which can secure the lifting margin H_2 of the lifting machine 3 when the weight 1 is lifted to the final target height. In other words, the suspension point 2 is set at above the position of the center of gravity 4b of the combined weights, and, the position whereby the lifting margin H_2 does not influence the lifting of the weight 1 when the weight 1 is lifted to the final lifting position. Also, the lifting machine main body 30 of the lifting machine 3, without interfering with the car frame 7, at least a portion of it is arranged to get under a portion lower than the upper portion of the car frame 7, when lifting the car frame 7 to the hoistway top portion 5a by winding up the chain 3a. (1) thru (4) are described further in detail.

(Start of lifting)

[0043] The start of lifting is described with reference to Figs. 5 and 8.

<Rail>

[0044] Two guide rails 8 are installed on the right and left of the car frame 7, from the lower portion 81 to the upper portion 83 of the hoistway 5. The guide rail 8, as described in Fig. 2, the intermediate portion 82 is not fixed with the rail bracket 12.

<Car frame>

[0045] The car frame 7, as shown in Fig. 8, is comprised of a car floor 7a, two car vertical columns 7b, and a car upper frame 7c. The car frame 7 has a guide shoe 9 each at an upper portion and a lower portion of the car vertical column 7b. The car frame 7 goes up and down in the hoistway, by the guide shoe 9 engaging with the guide rail 8. The car upper frame 7c is attached to an upper portion of the two car vertical columns 7b. The car upper frame 7c has a placement member 72 for placing the weight 1. Further, when there is no placement member 72 on the car frame 7, the placement member 72 may be attached to the upper portion of the car frame 7. When the weight 1 is suspended to the uppermost position, which will be described later in Figs. 9 and 11, it is placed on the placement member 72 so as to not to interfere with the lifting machine main body 30.

<Suspension position>

[0046] The car frame 7, as illustrated in Fig. 8, has a suspension tool 2a (an example of car frame-side end attachment unit) to which the hook 33 of the chain 3a as shown in Fig. 12 is hooked, at the respective car vertical columns 7b. The suspension tool 2a is fixed to the car vertical column 7b with a retaining tool 2b such as a bolt. Alternatively, instead of the suspension tool 2a, as illustrated in (a) of Fig. 12, an eye bolt 21 fixed to the car vertical column 7b with a nut 22 may be used as an attachment portion of the hook 33 of the chain 3a (an example of the car frame-side end attachment unit). Alternatively, as illustrated in (b) of Fig. 12, a bracket 23 formed by opening a hole on a L-shaped board may be used as an attachment portion (an example of the car frame-side end attachment unit). As shown in Fig. 5, the attachment portion of the hook 33 of the chain 3a in the car frame 7 (the suspension point 2) is arranged at a higher position than the position of the center of gravity 4b of the combined weights determined by regarding the weight 1 placed on the placement component 72 and the car frame 7 as one rigid body. That is, the suspension point 2 of the car frame 7 is located on the upper portion just by the amount for the dimension L than the above-described position of the center of gravity 4b. Based on this, the lifting machine main body 30 can stably suspend the weight 1. Further, Fig. 5 illustrates a position of the center of gravity 4a of a single car frame 7. Also, the suspension point 2 is set on the position whereby the lifting margin H_2 does not affect the lifting of the weight 1 when the weight 1 is lifted to the final lifting position (the lower position just by the amount for dimension M, from the uppermost portion of the car frame 7).

<Lifting machine>

[0047] The first embodiment uses two lifting machines 3, however this is an exception. The number of lifting machines 3 is not limited.

(Mid-stage of lifting)

[0048] Next, with reference to Figs. 6 and 8, the lifting machine main body 30 in the mid-stage of suspending the car frame 7 placing the weight 1 will be described. Fig. 6 shows the intermediate portion 82 of the guide rail 8. Therefore, the guide rail 8 is not fixed with the rail bracket 12. The car frame 7 placing the weight 1 is suspended by taking a force of the suspension point 2 as a point of application of the force. The suspension point 2, as described previously, is positioned at the upper portion by the amount for the dimension L than the position of the center of gravity 4b, therefore, the weight 1 is stably suspended. In the mid-stage of lifting, the car frame 7, while the guide shoe 9 is engaged with the guide rail 8, is lifted using the guide rail 8 as a guide. Further, during the lifting process, based on the position relation of the suspension point 2 and the center of gravity, in many cases, a momentum is generated around the suspension point 2. F_1 of Fig. 6 shows a horizontal pressing force based on the generated momentum (a force of pressing the guide rail 8 by the guide shoe 9). This pressing force F_1 will be described later in the explanation of Fig. 14.

(End of lifting)

[0049] Next, the end of lifting will be described by referring to Figs. 7 and 9. Upon lifting the weight 1 to the final lifting position, the suspension point 2 is set to a position whereby the lifting margin H_2 does not affect the lifting of the weight 1. Also, the lifting machine main body 30, by winding up the chain 3a, in case of suspending the car frame 7 to the hoistway top portion 5a, at least a portion of it is arranged to get under a position lower than an upper portion 71 of the car frame 7 (car upper frame 7c). For example, as shown in Fig. 9, the lifting machine main body 30 is arranged to a position that does not interfere with the car frame 7 under a state of being lifted to the uppermost portion. Based on these, the lifting machine main body 30, when the car frame 7 is lifted to the uppermost portion, at least in portion of it is arranged to get under the position lower than the upper portion 71 (the car upper frame 7c). Based on these, the lifting margin H_2 is no longer related to the calculation of the overhead dimension OH. Fig. 11 is a drawing showing the modified

example of the arrangement of the lifting machine 3 and the configuration of the car frame 7, for Fig. 8. The case of Fig. 11, likewise, at least a portion of the lifting machine main body 30 gets under the position lower than the upper portion 71 (the car upper frame 7c)

(4. Suspension position)

[0050] The lifting device 100 uses as a lifting platform the car frame 7 serving as a prime part, and places the weight 1 on the placement member 72 at the upper portion of the car frame 7. In this case, the suspension point 2 is arranged at the higher position than the position of the center of gravity 4b of the combined weights of the weight 1 placed on the placement member 72 and the car frame 7. Accordingly, the suspension point 2 is arranged at the higher position than the position of the center of gravity 4b of the combined weights determined by regarding the weight 1 placed on the placement member 72 and the car frame 7 as one rigid body. For this reason, an overturning of the weight 1 can be prevented. Also, a momentum generated around the suspension point 2 during lifting can be reduced from this. Therefore, at the intermediate portion 82 where the guide rail 8 is not fixed, the horizontal pressing force F_1 applied on the guide rail 8 due to the previously-described momentum can be made less than a pressing force F_2 which will be described later in Fig. 14 ($F_1 < F_2$). Thus, a derailment of the guide shoe 9 from the guide rail 8 can be prevented.

[0051] Next, the drawback in which case the car frame 7 is not diverted as the lifting platform will be described. The lifting device 100 diverts the car frame 7 as the lifting platform, however, in order to suspend the weight 1 without diverting the car frame 7, there are two choices available, namely (1) to use a specialized platform capable of acquiring likewise the previously described effect (that is, the lifting margin H_2 is not the key factor of the overhead dimension), or, (2) to suspend a lower portion of the weight 1 provided that a height of the weight 1 is not less than the lifting margin H_2 (that is, the weight 1 is directly suspended without using the platform).

[0052] At first, the drawback of using the former "(1) specialized platform" will be described with reference to Figs. 13 to 15.

[0053] Fig. 13 illustrates a start of lifting when the specialized platform is used.

[0054] Fig. 14 illustrates a mid-stage of lifting when the specialized platform is used.

[0055] Fig. 15 illustrates an end of lifting when the specialized platform is used. The former "(1) specialized platform", as shown, for example, in Figs. 13 to 15, a lifting platform will be required as a specialized tool at installation, and further, an assembly of the lifting platform and a dismantling activity after the lifting will be required, that causes an increase in the installation time. Normally, the specialized platform is not large (not heavy) to that extent. Also, in order to make the lifting machine 3 to get under an inner portion of the specialized platform 11 at the end of lifting (Fig. 15) just as in the case of using the car frame 7 as the platform, there is a need to set the position of the suspension point 2 below just by the amount for the lifting margin H_2 from the uppermost portion of the specialized platform 11. Based on these reasons, when the specialized platform 11 placing the weight 1 thereon is suspended in two points by the lifting machine 3, the position of the combined weights 11a of the weight 1 and the specialized platform 11 may become higher than the suspension point 2 in some cases. Fig. 13 illustrates such cases. The specialized platform 11, when it is lifted from the state of Fig. 13, the pressing force F_2 that presses the guide rail 8 due to a momentum generated around the suspension point 2 occurs (see Fig. 14). In case of regarding the suspension position lower in position than the position of the combined weights 11a, the lifting becomes unstable, and the generated pressing force F_2 becomes greater than the pressing force F_1 shown in Fig. 6 ($F_1 < F_2$). For this reason, since the guide rail 8 at its intermediate portion 82 is not fixed with the rail bracket 12, a danger of overturning of the weight 1 by the pressing force F_2 increases.

[0056] On the other hand, the latter "(2) direct suspension" imposes a restriction condition on the height of the weight 1 (the weight 1 has the height which is no less than the lifting margin H_2 of the lifting machine 3). Also, it lifts by setting the suspension point lower than the position of the center of gravity 1a of the weight 1. For this reason, for example, when lifting at 2-points suspension, due to restrictions such as device arrangement, when the position of the center of gravity 1a of the weight 1 does not lie on a straight line connecting the two suspension points of the 2-point suspension, there is a possibility that the weight 1 overturns (rotates). Also, in dealing with such cases, the overturning of the weight 1 may be prevented by using a guiding means, however, when the guiding means specialized for lifting is used, assembly and dismantling operation for lifting occur, which incurs the installation time. Herein, as the "guiding means", for example, it is conceivable to use the means of attaching the guide shoe to the weight 1, when a width of the weight 1 is about the same as a spacing between the two guide rails 8. Also, when the width of the weight 1 does not quite reach the spacing of the guide rails 8, it is conceivable to use the means for attaching the guide shoe via a predetermined attachment. Accordingly, when the guide rails 8 are diverted, serving as the prime part, decision on which measures to use is divided, depending on the installation

methods.

(The case of scaffolding method)

[0057] For example, as in the scaffolding method, the guide rails 8 are assembled first, and the guide rails 8 are fixed with the rail brackets 12 at respective predetermined positions, even if a momentum that attempts to overturn (rotate) the weight 1 occurs, when suspending at the lower portion of the position of the center of gravity 1a for the weight 1, the horizontal load put on the guide rails 8 via the guide shoes is supported by the rail brackets 12. For this reason, the overturning of the weight 1 will not occur.

(The case of no-scaffolding method)

[0058] However, as in "no-scaffolding method", although the guide rails 8 are assembled, the intermediate portion of the guide rail 8 is prior to the installation of the rail bracket 12, so that under the situation where the guide rails 8 can displace to a certain extent, there is a danger that the weight 1 being directly suspended overturns by the displacement of the guide rails 8 when the horizontal load is put on the guide rails 8 via the guide shoes. Accordingly, in case of using the specialized platform 11, and in case of the direct suspension, there is a danger that the weight 1 might overturn since a position lower than the position of the center of gravity is suspended. In this regard, in the lifting device 100 of the first embodiment, as described above, the suspension point 2 is arranged at the higher position than the position of the combined weights 4b determined by regarding the weight 1 placed on the placement member and the car frame 7 as one rigid body. For this reason, the intermediate portion 82 can prevent overturning of the weight 1 even before installing the rail bracket 12.

(5. The case in which the guide shoe comprises a magnetic body)

[0059] Figs. 16 and 17 are drawings for describing the case in which the guide shoe 9 comprises the magnetic body 10. Fig. 16 illustrates the case where a momentum is generated to the car frame 7 placing the weight 1. F1 of Fig. 16 indicates the pressing force of the guide shoe 9 that pushes the guide rail 8 due to the generated momentum. F3 indicates a force of the magnetic body 10 attached near the guide shoe 9 or on the guide shoe 9, for attracting the guide rail 8. Fig. 17 illustrates the guide shoe 9 comprising the magnetic body 10. Fig. 17 illustrates the case of attaching the magnetic body 10 on a rear face side of a face contacting with the guide rail 8.

[0060] As a lifting stroke becomes higher, and a length of the intermediate portion 82 where the guide rail 8 is not fixed with the rail bracket 12 becomes even longer, a possibility of the derailment is increased even if the momentum is reduced. In order to prevent the derailment, the guide rail 8 may be mechanically retained. However, the guide rail 8 is configured by piling up a lengthy object having a predetermined length (a rail component configuring the guide rail 8). For this reason, connection portions of the guide rails 8 above and below can be microscopically regarded as joints. For this reason, when the horizontal force acts on the guide rail 8, a portion where the load is received is taken as a body, thereby displacing the guide rail 8 entirely. When the lifting stroke becomes long, even if a size of the horizontal force acting is the same, compared to the case where the lifting stroke is short, a distance between 2 points supporting the entire guide rails 8 above and below gets long. For this reason, an amount of the displacement at a portion of the body where the horizontal force acts gets large. When this displacement amount becomes greater than an engagement margin between the guide shoe 9 and the guide rail 8, the guide shoe 9 is separated from the guide rail 8, which result in the derailment.

[0061] Thus, as illustrated in Fig. 17, the magnetic body 10 is installed near the guide shoe 9 or on the guide shoe 9. From this, since the guide rail 8 is attracted to the magnetic body 10 by F3, the guide shoe 9 is not separated from the guide rail 8, making it capable to going up and down along the guide rail 8 at all times.

Second Embodiment

[0062] In the first embodiment, the lifting machine main body 30 is installed at the hoistway top portion 5a. In contrast to this, the second embodiment describes the case of installing the lifting machine main body 30 to the car frame 7.

[0063] Fig. 18 illustrates the case of installing the lifting machine main body 30 at the hoistway top portion 5a (the first embodiment). In contrast to this, Fig. 19 illustrates the case of installing the lifting machine main body 30 to the car frame 7. Also, Figs. 20 and 21 are perspective views in case of installing the lifting machine main body 30 to the car frame 7. Fig. 20 corresponds to Fig. 9, and Fig. 21 corresponds to Fig. 11. As shown in Figs. 20 and 21, the lifting machine main body 30 is attached to the car vertical column 7b of the car frame 7. That is, in Figs. 20 and 21, the lifting machine main body 30 provides a chain 35a having a hook at its end (not illustrated). This hook is hooked onto the suspension tool 2a (one example of the car frame-side main body attachment unit). On the other hand, a chain 3a (one example of linear

body) is extending from the upper portion (top portion side) of the lifting machine main body 30 to the top portion, and the chain 3a is attached to the top portion as shown in Fig. 19. The lifting machine main body 30 lifts the car frame 7 by winding up the chain 3a. Further, as shown in Fig. 19, a hook 24 provided directly on the lifting machine main body 30 may be hooked to the suspension tool 2a without bypassing the chain 35a. Alternatively, the lifting machine main body 30 may be attached directly to the car vertical column 7b.

[0064] In case of attaching the lifting machine main body 30 to the car frame 7, for example, it is attached under the state of ending lifting as in the first embodiment. That is, the lifting machine main body 30 is attached to the higher position than the position of the center of gravity 4b of the combined weights, in addition to that, to the position whereby the lifting margin H_2 does not affect the lifting of the weight 1 when the weight 1 is lifted to the final lifting position. Further, more specifically, the lifting machine main body 30, at least in portion, is attached to the car frame so as to get under the position lower than the upper portion 71 of the car frame 7 (car upper frame 7c). Based on this, even for the case of attaching the lifting machine main body 30 to the car frame 7 side, the lifting margin H_2 will not be the key factor of the overhead dimension OH.

[0065] The lifting device 100 of the above embodiment has lifted the weight 1 by placing it on the upper portion of the car frame 7 of the placement member, however, the weight 1 may be lifted by placing it onto the car floor 7a.

[0066] The lifting device 100 has been described in the above embodiment, however, it is possible to understand the lifting device 100 as a lifting method. In other words, the lifting device 100, a car frame of elevator capable of going up and down along the guide rails by providing the guide shoes that engages with the guide rails, from the lower portion to the top portion of the hoistway, wherein the car frame which is used as the platform for placing the weight, for lifting to the vicinity of the top portion of the hoistway, under the state of placing the weight, which is lifted to the top portion by the lifting machine by taking the guide rails as a guide.

[0067] In the above embodiment, for the elevator that installs devices at the vicinity of the top portion of the hoistway, the lifting device that performs installation by using the car frame and the car floor of elevator as the platform at lifting is described.

[0068] In the above embodiment, the lifting device that has the magnetic body to the guide shoe and that attracts the guide rail by the magnetic body at lifting.

[0069] In the above embodiment, the lifting device in which the lifting machine positions in the middle of the platform in case of lifting the platform to the uppermost portion of the hoistway, and that sets the suspension portion at the lower position than the uppermost position of the platform, and, at the position higher than the position of the center of gravity of the entire platform placing the weight and the weight, in case of using the car frame and the car floor as the lifting platform, has been described.

BRIEF DESCRIPTION OF THE DRAWINGS

[0070]

Fig. 1 is a drawing for describing the drawback in directly lifting the target for lifting, according to the first embodiment.

Fig. 2 is a drawing for describing the lifting device 100, according to the first embodiment.

Fig. 3 is a drawing showing the middle of lifting, according to the first embodiment.

Fig. 4 is drawing showing the end of lifting, according to the first embodiment.

Fig. 5 is a drawing showing the start of lifting by the lifting device 100, according to the first embodiment.

Fig. 6 is a drawing showing the mid-stage of lifting by the lifting device 100, according to the first embodiment.

Fig. 7 is a drawing showing the end of lifting by the lifting device 100, according to the first embodiment.

Fig. 8 is a perspective view in the mid-stage of the lifting by the lifting device 100, according to the first embodiment.

Fig. 9 is a perspective view of the end of lifting by the lifting device 100, according to the first embodiment.

Fig. 10 is a modified example of Fig. 8, showing a configuration of the car frame 7 and an arrangement of the lifting machine 3, according to the first embodiment.

Fig. 11 illustrates the end of lifting of Fig. 10, according to the first embodiment.

Fig. 12 illustrates an attachment configuration of the chain 3a, according to the first embodiment.

Fig. 13 is a drawing for describing the drawback in the suspension position, according to the first embodiment.

Fig. 14 is a drawing for describing the drawback in the suspension position, according to the first embodiment.

Fig. 15 is a drawing for describing the drawback in the suspension position, according to the first embodiment.

Fig. 16 is a drawing for describing the effect of the magnetic body, according to the first embodiment.

Fig. 17 is a drawing for describing the installation position of the magnetic body, according to the first embodiment.

Fig. 18 is a drawing for describing the installation position of the lifting machine main body 30, according to the second embodiment.

Fig. 19 is a drawing for describing the installation position of the lifting machine main body 30, according to the second embodiment.

Fig. 20 is a perspective view for describing the installation position of the lifting machine main body 30, according to the second embodiment.

Fig. 21 is a perspective view for describing the installation position of the lifting machine main body 30, according to the second embodiment.

Fig. 22 illustrates the conventional art.

Fig. 23 illustrates the conventional art.

Fig. 24 illustrates a dimension relation of the conventional art.

Fig. 25 illustrates a dimension relation of the conventional art.

Fig. 26 illustrates a dimension relation of the conventional art.

REFERENCE SIGNS LIST

[0071] Weight 1; position of center of gravity 1a for weight 1; suspension tool 2a; suspension point 2; retaining tool 2b; lifting-machine 3; chain 3a; car 4; position of center of gravity for car frame 4 (sole); position of center of gravity for (car frame + weight) ; hoistway 5 ; hoistway top portion 5a; lifting beam 6; car frame 7; car floor 7a; car vertical column 7b; car upper frame 7c; guide rails 8; guide shoe 9; magnetic body 10; specialized platform 11; position of center of gravity for weight 1 + specialized platform 11 (11a); rail bracket 12 ; emergency stopper 13; counter weight 15; coil springs 16a, 17a; wire 18; uppermost floor 20; eye bolt 21; nut 22; bracket 23; hook 24; lifting machine main body 30; hook 33; chain 35a; other end port ion 31; vicinity of top portion 51; car frame upper portion 71; placement member 72; lower portion 81; intermediate portion 82; upper portion 83; lifting device 100.

Claims

1. An elevator lifting device (100) for lifting a weight (1) to a vicinity of a top portion (5a) of a hoistway (5) of an elevator, comprising:

a guide rail (8) that is arranged from a lower portion to the top portion of the hoistway;

a car frame (7) of elevator that is capable of going up and down, guided by the guide rail, by providing a guide shoe (9) engaging with the guide rail, and that is used as a platform for placing the weight (1) for lifting to the vicinity of the top portion of the hoistway; and

a lifting machine (3) that lifts the car frame placing the weight to the top portion, guided by the guide rail,

wherein the guide rail at its intermediate portion (82) between the vicinity of the top portion (83) and a vicinity of the lower portion (81) is not fixed with a rail bracket (12),

wherein the lifting machine (3) includes a linear body (3a) attached to the car frame at one end, and a main body (30), arranged at the top portion (5a), that lifts the car frame by winding up the linear body;

wherein the main body (30), at least at its portion, is arranged to get under a portion lower than an upper portion of the car frame (7), when the car frame is lifted to the top portion by winding up the linear body (3a); and

wherein the car frame (7) provides a car frame-side end attachment unit (2a) for attaching the one end of the linear body (3a).

2. The elevator lifting device (100) according to claim 1, wherein the car frame (7) provides a placement member (72) placing the weight (1) at the upper portion; and

wherein the weight (1), which is placed on the placement member (72), and which is placed on a position not interfering with the main body (30) of the lifting machine when lifted up to the vicinity of the top portion (5a) by winding up the linear body (3a) by the main body of the lifting machine.

3. The elevator lifting device (100) according to claim 2, wherein the car frame-side end attachment unit (2a) is arranged at a higher position than a position of center of gravity (4b) determined by regarding the weight (1) placed on the placement member (72) and the car frame (7) as one rigid body.

4. An elevator lifting device (100) for lifting a weight (1) to a vicinity of a top portion (5a) of a hoistway (5) of elevator, comprising:

a guide rail (8) that is arranged from a lower portion to the top portion of the hoistway;

a car frame (7) of an elevator that is capable of going up and down, guided by the guide rail, by providing a guide shoe (9) engaging with the guide rail, and that is used as a platform for placing the weight (1) for lifting to the vicinity of the top portion of the hoistway; and
 a lifting machine (3) that lifts the car frame placing the weight to the top portion, guided by the guide rail,

wherein the guide rail at its intermediate portion (82) between the vicinity of the top portion (83) and a vicinity of the lower portion (81) is not fixed with a rail bracket (12),
 wherein the lifting machine (3) includes a linear body (3a) attached to a fixing unit fixed to the top portion (5a) at one end; and

a main body (30) attached to the car frame to get under a position lower than the upper portion of the car frame, at least at one portion, and that lifts the car frame to the top portion by winding up the linear body; and
 wherein the car frame provides a car frame-side main body attachment unit (2a) for attaching the main body of the lifting machine.

5. The elevator lifting device according to claim 4, wherein the car frame provides a placement member placing the weight at the upper portion; and
 wherein the weight is placed on the placement member, which is placed on a position not interfering with the lifting machine (3).

6. The elevator lifting device according to claim 5,
 wherein the car frame-side main body attachment unit (2a) is arranged at a higher position than a position of center of gravity (4b) determined by regarding the weight to be placed on the placement member and the car frame as one rigid body.

7. The elevator lifting device according to any one of claims 1 to 6, wherein the guide shoe (9) provides a magnetic body (10) that attracts the guide rail (8) with a magnetic force.

8. An elevator lifting method for lifting a weight to a vicinity of a top portion of a hoistway of elevator, for lifting a car frame, which is used as a platform for placing the weight to be lifted to the vicinity of the top portion of the hoistway, that is capable of going up and down along the guide rail by providing a guide shoe being engaged with the guide rail installed from a lower portion to a top portion of the hoistway, and which is guided by the guide rail and lifted by a lifting machine to the top portion while placing the weight,
 wherein the guide rail at its intermediate portion (82) between the vicinity of the top portion (83) and a vicinity of the lower portion (81) is not fixed with a rail bracket (12),
 wherein the lifting machine (3) includes a linear body (3a) attached to the car frame at one end, and a main body (30), arranged at the top portion (5a), that lifts the car frame by winding up the linear body;
 wherein the main body (30), at least at its portion, is arranged to get under a portion lower than an upper portion of the car frame (7), when the car frame is lifted to the top portion by winding up the linear body (3a); and
 wherein the car frame (7) provides a car frame-side end attachment unit (2a) for attaching the one end of the linear body (3a).

9. An elevator lifting method for lifting a weight to a vicinity of a top portion of a hoistway of elevator, for lifting a car frame, which is used as a platform for placing the weight to be lifted to the vicinity of the top portion of the hoistway, that is capable of going up and down along the guide rail by providing a guide shoe being engaged with the guide rail installed from a lower portion to a top portion of the hoistway, and which is guided by the guide rail and lifted by a lifting machine to the top portion while placing the weight,
 wherein the guide rail at its intermediate portion (82) between the vicinity of the top portion (83) and a vicinity of the lower portion (81) is not fixed with a rail bracket (12),
 wherein the lifting machine (3) includes a linear body (3a) attached to a fixing unit fixed to the top portion (5a) at one end; and
 a main body (30) attached to the car frame to get under a position lower than the upper portion of the car frame, at least at one portion, and that lifts the car frame to the top portion by winding up the linear body; and
 wherein the car frame provides a car frame-side main body attachment unit (2a) for attaching the main body of the lifting machine.

Patentansprüche

1. Aufzugshebevorrichtung (100) zum Anheben eines Gewichts (1) in eine Umgebung eines oberen Abschnitts (5a) eines Aufzugsschachts (5) eines Aufzugs, mit:

einer Führungsschiene (8), die von einem unteren Abschnitt zu dem oberen Abschnitt des Aufzugsschachts angeordnet ist;
 einem Kabinenrahmen (7) eines Aufzugs, der dazu geeignet ist, sich durch die Führungsschiene geführt nach oben und nach unten zu bewegen, durch Bereitstellen einer Gleitbacke (9), die mit der Führungsschiene in Eingriff steht, und der als eine Plattform zum Platzieren des Gewichts (1) zum Anheben in die Umgebung des oberen Abschnitts des Aufzugsschachts verwendet wird; und
 einer Hebemaschine (3), welche den Kabinenrahmen, geführt durch die Führungsschiene, anhebt, wobei das Gewicht zu dem oberen Abschnitt platziert wird,
 wobei die Führungsschiene bei ihrem Zwischenabschnitt (82) zwischen der Umgebung des oberen Abschnitts (83) und einer Umgebung des unteren Abschnitts (81) nicht mit einer Schienenhalterung (12) befestigt ist, wobei die Hebemaschine (3) einen linearen Körper (3a), der bei einem Ende an dem Kabinenrahmen befestigt ist, und einen bei dem oberen Abschnitt (5a) angeordneten Hauptkörper (30) aufweist, der den Kabinenrahmen durch Aufwickeln des linearen Körpers anhebt;
 wobei der Hauptkörper (30) zumindest bei seinem Abschnitt dazu geeignet ist, unter einen Abschnitt zu gelangen, der niedriger ist als ein oberer Abschnitt des Kabinenrahmens (7), wenn der Kabinenrahmen durch Aufwickeln des linearen Körpers (3a) zu dem oberen Abschnitt angehoben wird; und
 wobei der Kabinenrahmen (7) eine Kabinenrahmen-seitige Endbefestigungseinheit (2a) zum Befestigen des einen Endes des linearen Körpers (3a) bereitstellt.

2. Aufzugshebevorrichtung (100) nach Anspruch 1, bei welcher der Kabinenrahmen (7) ein Platzierelement (72) bereitstellt, welches das Gewicht (1) bei dem oberen Abschnitt platziert; und
 wobei das Gewicht (1), das auf dem Platzierelement (72) platziert ist und das bei einer Position platziert ist, die den Hauptkörper (30) der Hebemaschine nicht stört, wenn durch Aufwickeln des linearen Körpers (3a) mittels des Hauptkörpers der Hebemaschine zu der Umgebung des oberen Abschnitts (5a) angehoben.

3. Aufzugshebevorrichtung (100) nach Anspruch 2, bei der die Kabinenrahmen-seitige Endbefestigungseinheit (2a) bei einer höheren Position als eine Position eines Schwerpunkts (4b) angeordnet ist, die ermittelt wird, indem das Gewicht (1), das auf dem Platzierelement (72) platziert ist, und der Kabinenrahmen (7) als ein Starrkörper betrachtet werden.

4. Aufzugshebevorrichtung (100) zum Anheben eines Gewichts (1) in eine Umgebung eines oberen Abschnitts (5a) eines Aufzugsschachts (5) eines Aufzugs, mit:

einer Führungsschiene (8), die von einem unteren Abschnitt zu dem oberen Abschnitt des Aufzugsschachts angeordnet ist;
 einem Kabinenrahmen (7) eines Aufzugs, der dazu geeignet ist, sich durch die Führungsschiene geführt nach oben und nach unten zu bewegen, durch Bereitstellen einer Gleitbacke (9), die mit der Führungsschiene in Eingriff steht, und der als eine Plattform zum Platzieren des Gewichts (1) zum Anheben in die Umgebung des oberen Abschnitts des Aufzugsschachts verwendet wird; und
 einer Hebemaschine (3), welche den Kabinenrahmen, geführt durch die Führungsschiene, anhebt, wobei das Gewicht zu dem oberen Abschnitt platziert wird,
 wobei die Führungsschiene bei ihrem Zwischenabschnitt (82) zwischen der Umgebung des oberen Abschnitts (83) und einer Umgebung des unteren Abschnitts (81) nicht mit einer Schienenhalterung (12) befestigt ist, wobei die Hebemaschine (3) einen linearen Körper (3a) aufweist, der an einem Ende an einer Befestigungseinheit angebracht ist, die an dem oberen Abschnitt (5a) befestigt ist; und
 einen Hauptkörper (30) aufweist, der an dem Kabinenrahmen befestigt ist, um unter eine Position zu gelangen, die niedriger ist als der obere Abschnitt des Kabinenrahmens, zumindest bei einem Abschnitt, und der den Kabinenrahmen durch Aufwickeln des linearen Körpers zu dem oberen Abschnitt anhebt; und
 wobei der Kabinenrahmen eine Kabinenrahmen-seitige Hauptkörperbefestigungseinheit (2a) zum Befestigen des Hauptkörpers der Hebemaschine bereitstellt.

5. Aufzugshebevorrichtung nach Anspruch 4, bei welcher der Kabinenrahmen ein Platzierelement bereitstellt, welches das Gewicht bei dem oberen Abschnitt platziert; und

wobei das Gewicht auf dem Platzierelement platziert ist, das bei einer Position platziert ist, welche die Hebemaschine (3) nicht stört.

6. Aufzugshebevorrichtung nach Anspruch 5, bei der die Kabinenrahmen-seitige Hauptkörperbefestigungseinheit (2a) bei einer höheren Position als eine Position eines Schwerpunkts (4b) angeordnet ist, die ermittelt wird, indem das auf dem Platzierelement zu platzierende Gewicht und der Kabinenrahmen als ein Starrkörper betrachtet werden.

7. Aufzugshebevorrichtung (100) nach einem der Ansprüche 1 bis 6, bei welcher die Gleitbacke (9) einen magnetischen Körper (10) bereitstellt, der die Führungsschiene (8) mit einer magnetischen Kraft anzieht.

8. Aufzugshebeverfahren zum Anheben eines Gewichts zu einer Umgebung eines oberen Abschnitts eines Aufzugsschachts eines Aufzugs, zum Anheben eines Kabinenrahmens, der als eine Plattform zum Platzieren des zu der Umgebung des oberen Abschnitts des Aufzugsschachts anzuhebenden Gewichts verwendet wird, welcher dazu geeignet ist, sich entlang der Führungsschiene nach oben und nach unten zu bewegen, indem eine Gleitbacke bereitgestellt wird, die mit der Führungsschiene in Eingriff steht, die von einem unteren Abschnitt zu einem oberen Abschnitt des Aufzugsschachts installiert ist, und der durch die Führungsschiene geführt und durch eine Hebemaschine zu dem oberen Abschnitt angehoben wird, während das Gewicht platziert wird, wobei die Führungsschiene bei ihrem Zwischenabschnitt (82) zwischen der Umgebung des oberen Abschnitts (83) und einer Umgebung des unteren Abschnitts (81) nicht mit einer Schienenhalterung (12) befestigt ist,

wobei die Hebemaschine (3) einen linearen Körper (3a), der bei einem Ende an dem Kabinenrahmen befestigt ist, und einen bei dem oberen Abschnitt (5a) angeordneten Hauptkörper (30) aufweist, der den Kabinenrahmen durch Aufwickeln des linearen Körpers anhebt;

wobei der Hauptkörper (30) zumindest bei seinem Abschnitt dazu geeignet ist, unter einen Abschnitt zu gelangen, der niedriger ist als ein oberer Abschnitt des Kabinenrahmens (7), wenn der Kabinenrahmen durch Aufwickeln des linearen Körpers (3a) zu dem oberen Abschnitt angehoben wird; und

wobei der Kabinenrahmen (7) eine Kabinenrahmen-seitige Endbefestigungseinheit (2a) zum Befestigen des einen Endes des linearen Körpers (3a) bereitstellt.

9. Aufzugshebeverfahren zum Anheben eines Gewichts zu einer Umgebung eines oberen Abschnitts eines Aufzugsschachts eines Aufzugs, zum Anheben eines Kabinenrahmens, der als eine Plattform zum Platzieren des zu der Umgebung des oberen Abschnitts des Aufzugsschachts anzuhebenden Gewichts verwendet wird, welcher dazu geeignet ist, sich entlang der Führungsschiene nach oben und nach unten zu bewegen, indem eine Gleitbacke bereitgestellt wird, die mit der Führungsschiene in Eingriff steht, die von einem unteren Abschnitt zu einem oberen Abschnitt des Aufzugsschachts installiert ist, und der durch die Führungsschiene geführt und durch eine Hebemaschine zu dem oberen Abschnitt angehoben wird, während das Gewicht platziert wird,

wobei die Führungsschiene bei ihrem Zwischenabschnitt (82) zwischen der Umgebung des oberen Abschnitts (83) und einer Umgebung des unteren Abschnitts (81) nicht mit einer Schienenhalterung (12) befestigt ist,

wobei die Hebemaschine (3) einen linearen Körper (3a) aufweist, der an einem Ende an einer Befestigungseinheit angebracht ist, die an dem oberen Abschnitt (5a) befestigt ist; und

einen Hauptkörper (30) aufweist, der an dem Kabinenrahmen befestigt ist, um unter eine Position zu gelangen, die niedriger ist als der obere Abschnitt des Kabinenrahmens, zumindest bei einem Abschnitt, und der den Kabinenrahmen durch Aufwickeln des linearen Körpers zu dem oberen Abschnitt anhebt; und

wobei der Kabinenrahmen eine Kabinenrahmen-seitige Hauptkörperbefestigungseinheit (2a) zum Befestigen des Hauptkörpers der Hebemaschine bereitstellt.

Revendications

1. Dispositif de levage d'ascenseur (100) pour lever un poids (1) jusqu'à un voisinage d'une portion supérieure (5a) d'une cage d'ascenseur (5) d'un ascenseur, comprenant :

un rail de guidage (8) qui est agencé depuis une portion inférieure jusqu'à la portion supérieure de la cage d'ascenseur ;

un châssis de cabine (7) d'ascenseur qui est capable d'aller vers le haut et vers le bas, guidé par le rail de guidage, en prévoyant un patin de guidage (9) mettant en prise le rail de guidage, et qui est utilisé en tant qu'une plate-forme pour placer le poids (1) pour levage jusqu'au voisinage de la portion supérieure de la cage d'ascenseur ; et

une machine de levage (3) qui lève le châssis de cabine plaçant le poids à la portion supérieure, guidé par le

rail de guidage,

dans lequel le rail de guidage au niveau de sa portion intermédiaire (82) entre le voisinage de la portion supérieure (83) et un voisinage de la portion inférieure (81) n'est pas fixé avec une patte d'attache de rail (12),

dans lequel la machine de levage (3) inclut un corps linéaire (3a) attaché au châssis de cabine au niveau d'une extrémité, et un corps principal (30), agencé au niveau de la portion supérieure (5a), qui lève le châssis de cabine en enroulant le corps linéaire ;

dans lequel le corps principal (30), au moins au niveau de sa portion, est agencé pour arriver sous une portion plus basse qu'une portion supérieure du châssis de cabine (7), lorsque le châssis de cabine est levé jusqu'à la portion supérieure en enroulant le corps linéaire (3a) ; et

dans lequel le châssis de cabine (7) prévoit une unité (2a) d'attachement d'extrémité côté châssis de cabine pour attacher l'une extrémité du corps linéaire (3a).

2. Dispositif de levage d'ascenseur (100) selon la revendication 1, dans lequel le châssis de cabine (7) prévoit un élément de placement (72) plaçant le poids (1) au niveau de la portion supérieure ; et dans lequel le poids (1), qui est placé sur l'élément de placement (72), et qui est placé sur une position n'interférant pas avec le corps principal (30) de la machine de levage lorsque levé jusqu'au voisinage de la portion supérieure (5a) en enroulant le corps linéaire (3a) par le corps principal de la machine de levage.

3. Dispositif de levage d'ascenseur (100) selon la revendication 2, dans lequel l'unité (2a) d'attachement d'extrémité côté châssis de cabine est agencée à une position plus haute qu'une position de centre de gravité (4b) déterminée en considérant le poids (1) placé sur l'élément de placement (72) et le châssis de cabine (7) comme un corps rigide.

4. Dispositif de levage d'ascenseur (100) pour lever un poids (1) jusqu'à un voisinage d'une portion supérieure (5a) d'une cage d'ascenseur (5) d'un ascenseur, comprenant :

un rail de guidage (8) qui est agencé depuis une portion inférieure jusqu'à la portion supérieure de la cage d'ascenseur ;

un châssis de cabine (7) d'ascenseur qui est capable d'aller vers le haut et vers le bas, guidé par le rail de guidage, en prévoyant un patin de guidage (9) mettant en prise le rail de guidage, et qui est utilisé en tant qu'une plate-forme pour placer le poids (1) pour levage jusqu'au voisinage de la portion supérieure de la cage d'ascenseur ; et

une machine de levage (3) qui lève le châssis de cabine plaçant le poids à la portion supérieure, guidé par le rail de guidage,

dans lequel le rail de guidage au niveau de sa portion intermédiaire (82) entre le voisinage de la portion supérieure (83) et un voisinage de la portion inférieure (81) n'est pas fixé avec une patte d'attache de rail (12),

dans lequel la machine de levage (3) inclut un corps linéaire (3a) attaché à une unité de fixation fixée à la portion supérieure (5a) au niveau d'une extrémité ; et

un corps principal (30) attaché au châssis de cabine pour arriver sous une position plus basse que la portion supérieure du châssis de cabine, au moins au niveau d'une portion, et qui lève le châssis de cabine jusqu'à la portion supérieure en enroulant le corps linéaire ; et

dans lequel le châssis de cabine prévoit une unité (2a) d'attachement de corps principal côté châssis de cabine pour attacher le corps principal de la machine de levage.

5. Dispositif de levage d'ascenseur selon la revendication 4, dans lequel le châssis de cabine prévoit un élément de placement plaçant le poids au niveau de la portion supérieure ; et dans lequel le poids est placé sur l'élément de placement, qui est placé sur une position n'interférant pas avec la machine de levage (3).

6. Dispositif de levage d'ascenseur selon la revendication 5, dans lequel l'unité (2a) d'attachement de corps principal côté châssis de cabine est agencée à une position plus haute qu'une position de centre de gravité (4b) déterminée en considérant le poids à placer sur l'élément de placement et le châssis de cabine comme un corps rigide.

7. Dispositif de levage d'ascenseur selon l'une quelconque des revendications 1 à 6, dans lequel le patin de guidage (9) prévoit un corps magnétique (10) qui attire le rail de guidage (8) avec une force magnétique.

8. Procédé de levage d'ascenseur pour lever un poids jusqu'à un voisinage d'une portion supérieure d'une cage d'ascenseur d'un ascenseur, pour lever un châssis de cabine, qui est utilisé en tant qu'une plate-forme pour placer le poids à lever jusqu'au voisinage de la portion supérieure de la cage d'ascenseur, qui est capable d'aller vers le

haut et vers le bas le long du rail de guidage en prévoyant un patin de guidage étant en prise avec le rail de guidage installé depuis une portion inférieure jusqu'à une portion supérieure de la cage d'ascenseur, et qui est guidé par le rail de guidage et levé par une machine de levage jusqu'à la portion supérieure tout en plaçant le poids, dans lequel le rail de guidage au niveau de sa portion intermédiaire (82) entre le voisinage de la portion supérieure (83) et un voisinage de la portion inférieure (81) n'est pas fixé avec une patte d'attache de rail (12), dans lequel la machine de levage (3) inclut un corps linéaire (3a) attaché au châssis de cabine au niveau d'une extrémité, et un corps principal (30), agencé au niveau de la portion supérieure (5a), qui lève le châssis de cabine en enroulant le corps linéaire ; dans lequel le corps principal (30), au moins au niveau de sa portion, est agencé pour arriver sous une portion plus basse qu'une portion supérieure du châssis de cabine (7), lorsque le châssis de cabine est levé jusqu'à la portion supérieure en enroulant le corps linéaire (3a) ; et dans lequel le châssis de cabine (7) prévoit une unité (2a) d'attachement d'extrémité côté châssis de cabine pour attacher l'une extrémité du corps linéaire (3a).

9. Procédé de levage d'ascenseur pour lever un poids jusqu'à un voisinage d'une portion supérieure d'une cage d'ascenseur d'un ascenseur, pour lever un châssis de cabine, qui est utilisé en tant qu'une plate-forme pour placer le poids à lever jusqu'au voisinage de la portion supérieure de la cage d'ascenseur, qui est capable d'aller vers le haut et vers le bas le long du rail de guidage en prévoyant un patin de guidage étant en prise avec le rail de guidage installé depuis une portion inférieure jusqu'à une portion supérieure de la cage d'ascenseur, et qui est guidé par le rail de guidage et levé par une machine de levage jusqu'à la portion supérieure tout en plaçant le poids, dans lequel le rail de guidage au niveau de sa portion intermédiaire (82) entre le voisinage de la portion supérieure (83) et un voisinage de la portion inférieure (81) n'est pas fixé avec une patte d'attache de rail (12), dans lequel la machine de levage (3) inclut un corps linéaire (3a) attaché à une unité de fixation fixée à la portion supérieure (5a) au niveau d'une extrémité ; et un corps principal (30) attaché au châssis de cabine pour arriver sous une position plus basse que la portion supérieure du châssis de cabine, au moins au niveau d'une portion, et qui lève le châssis de cabine jusqu'à la portion supérieure en enroulant le corps linéaire ; et dans lequel le châssis de cabine prévoit une unité (2a) d'attachement de corps principal côté châssis de cabine pour attacher le corps principal de la machine de levage.

FIG. 1

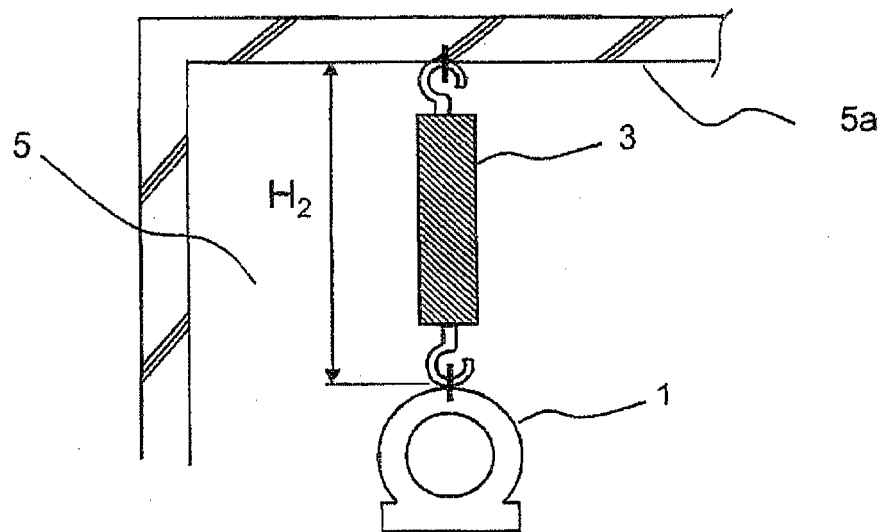


FIG. 2

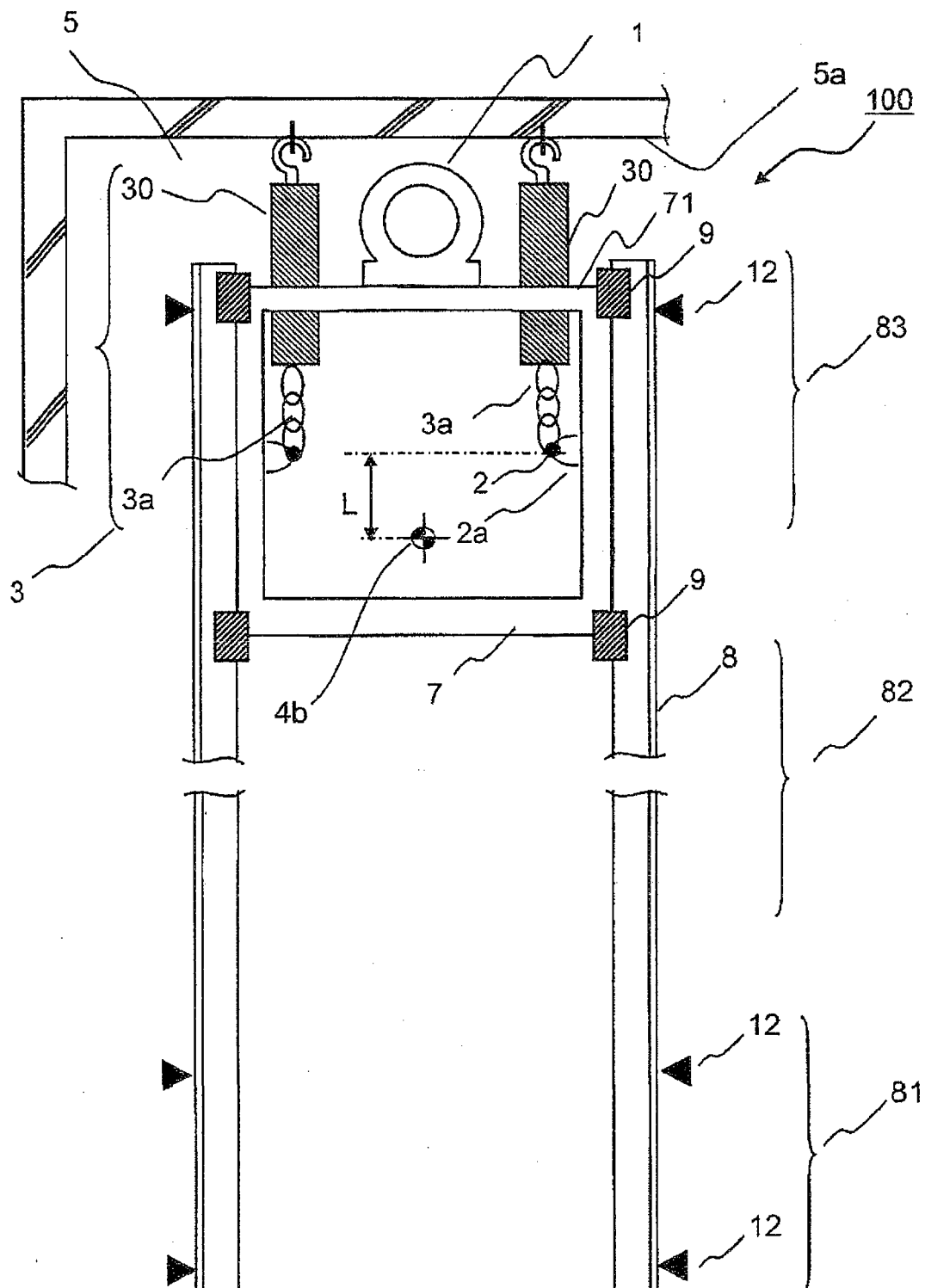


FIG. 3

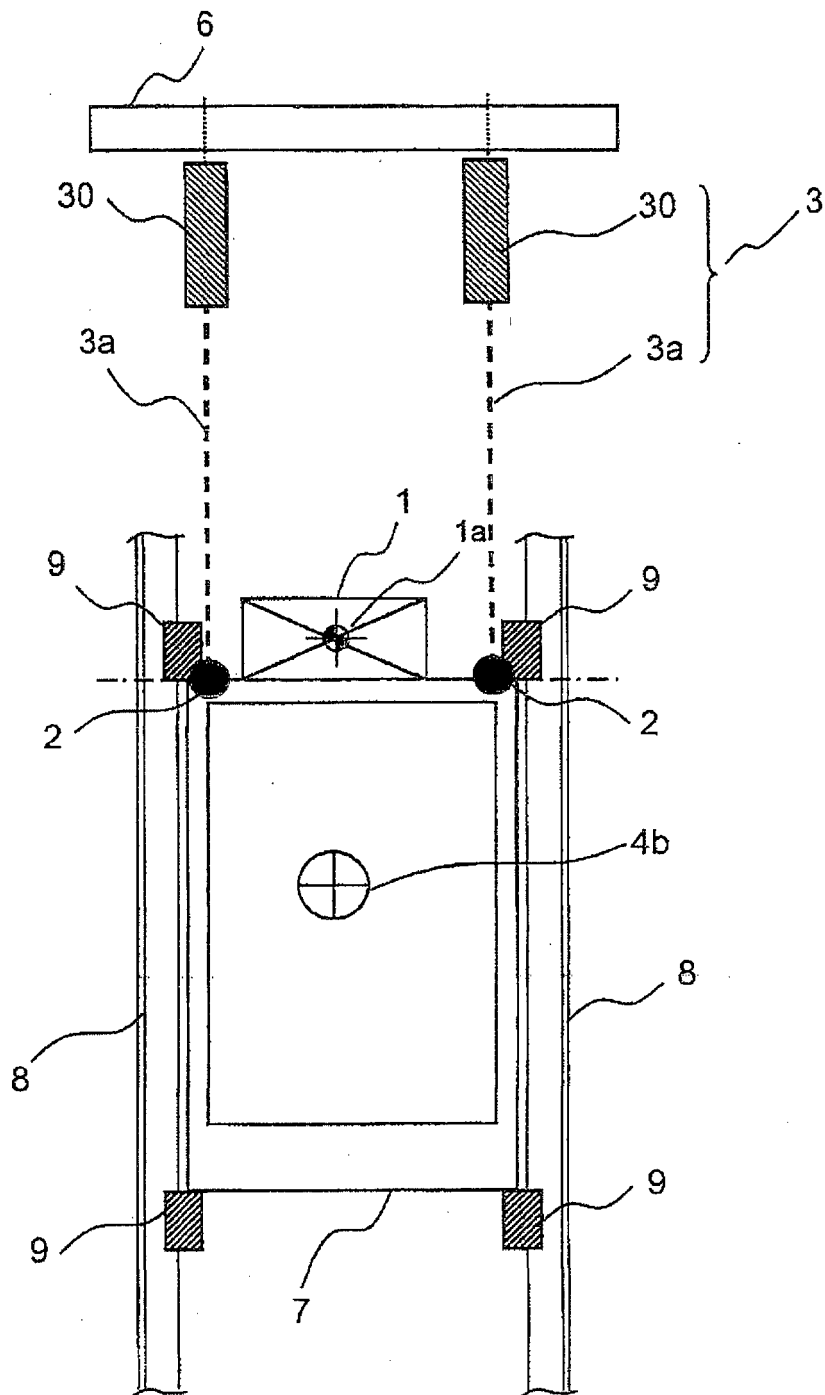


FIG. 4

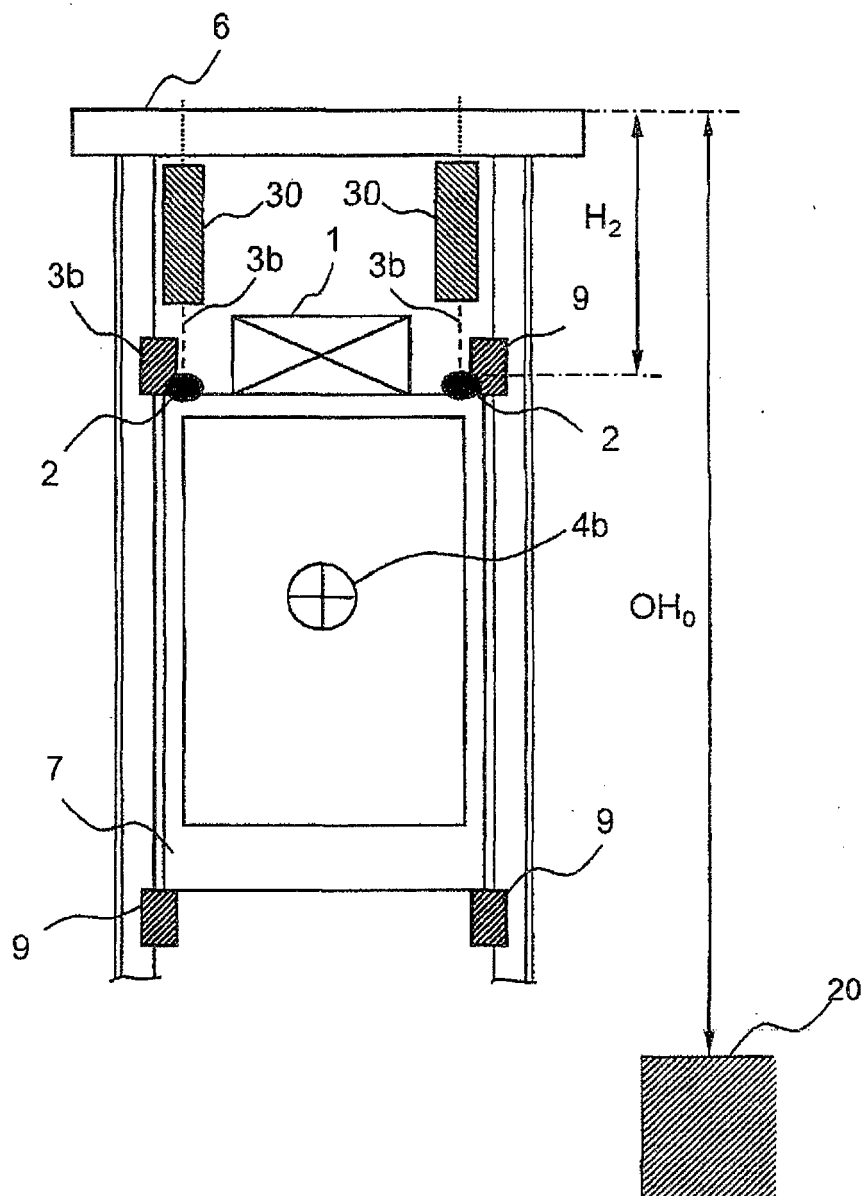


FIG. 5

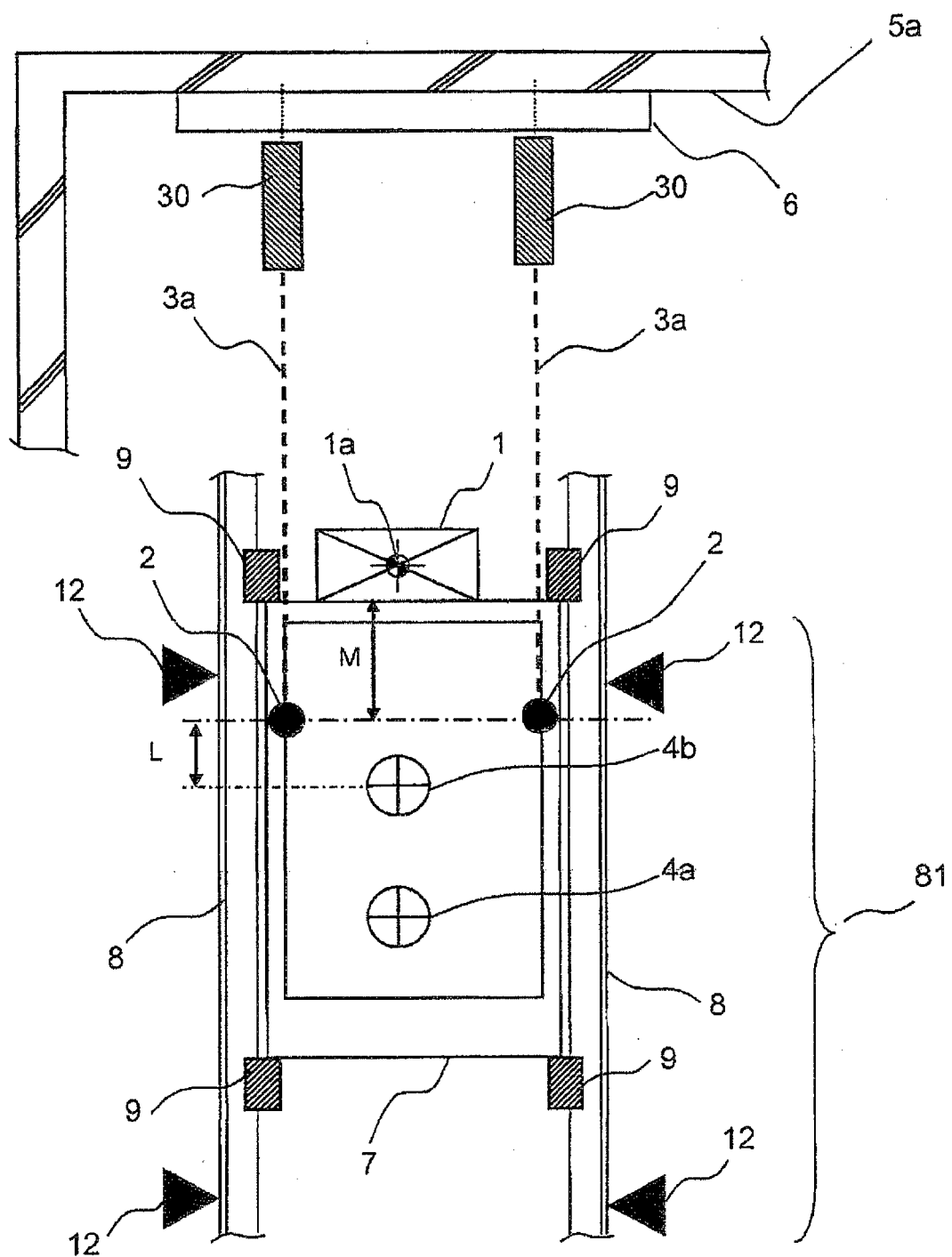


FIG. 6

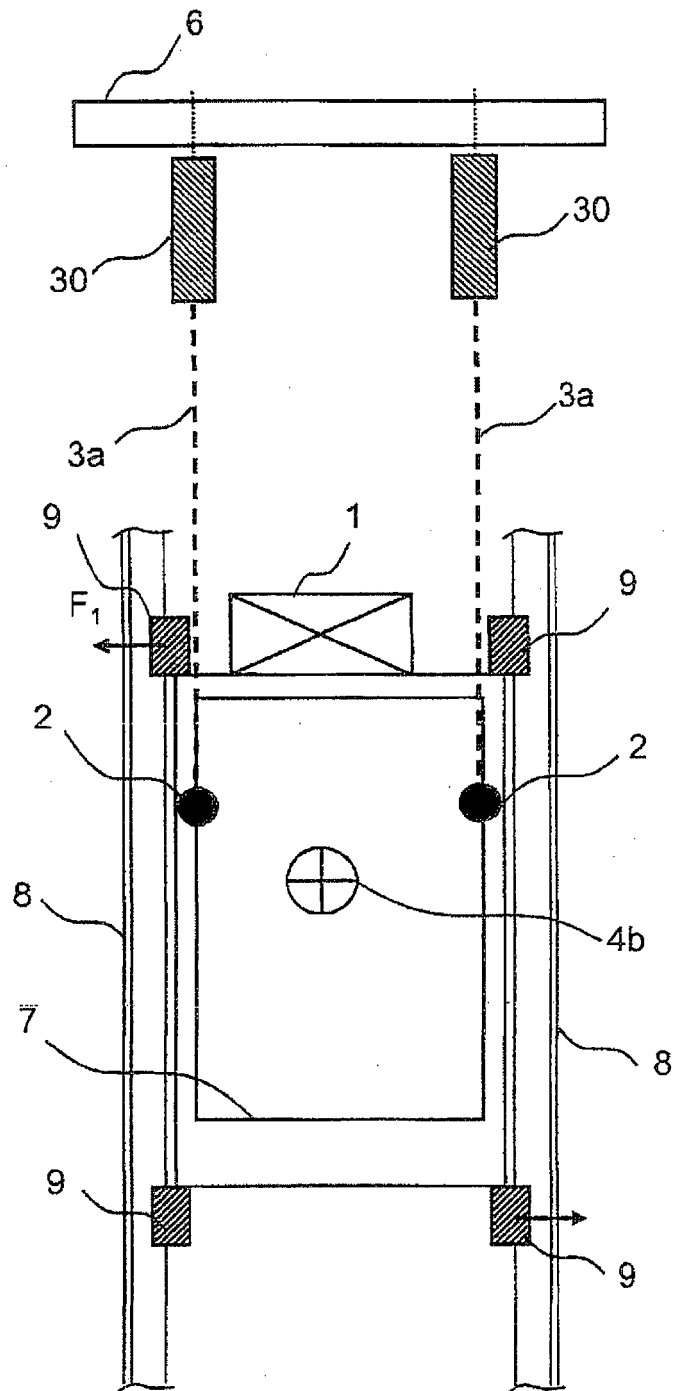


FIG. 7

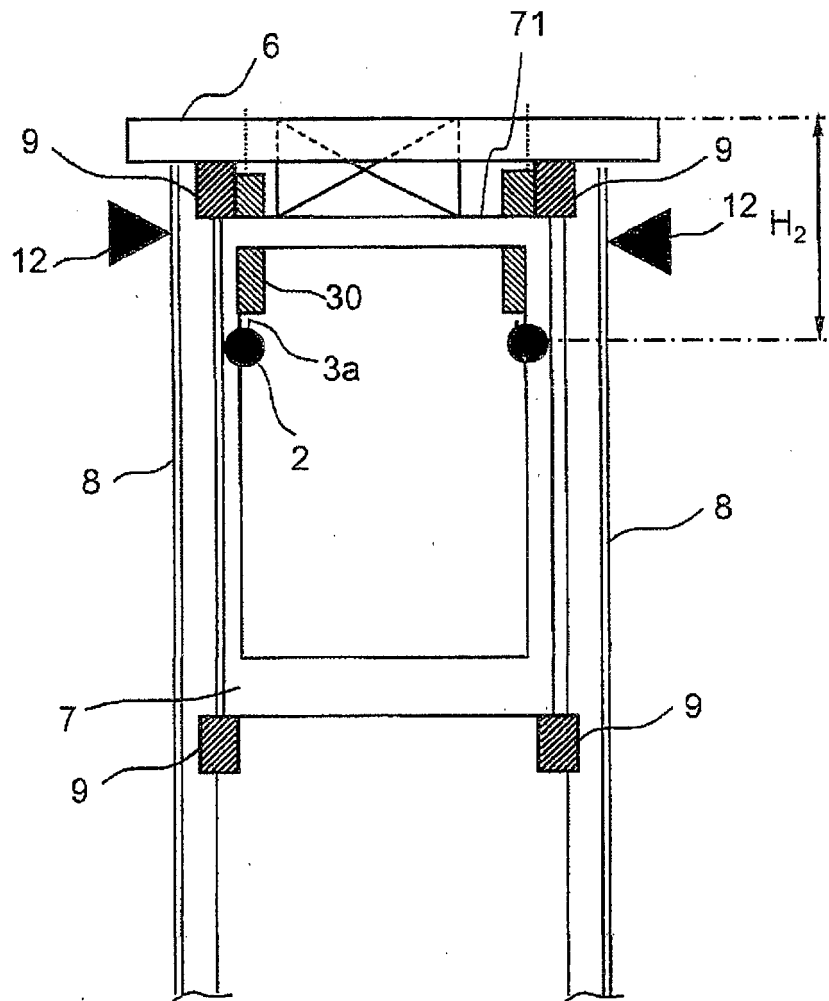


FIG. 8

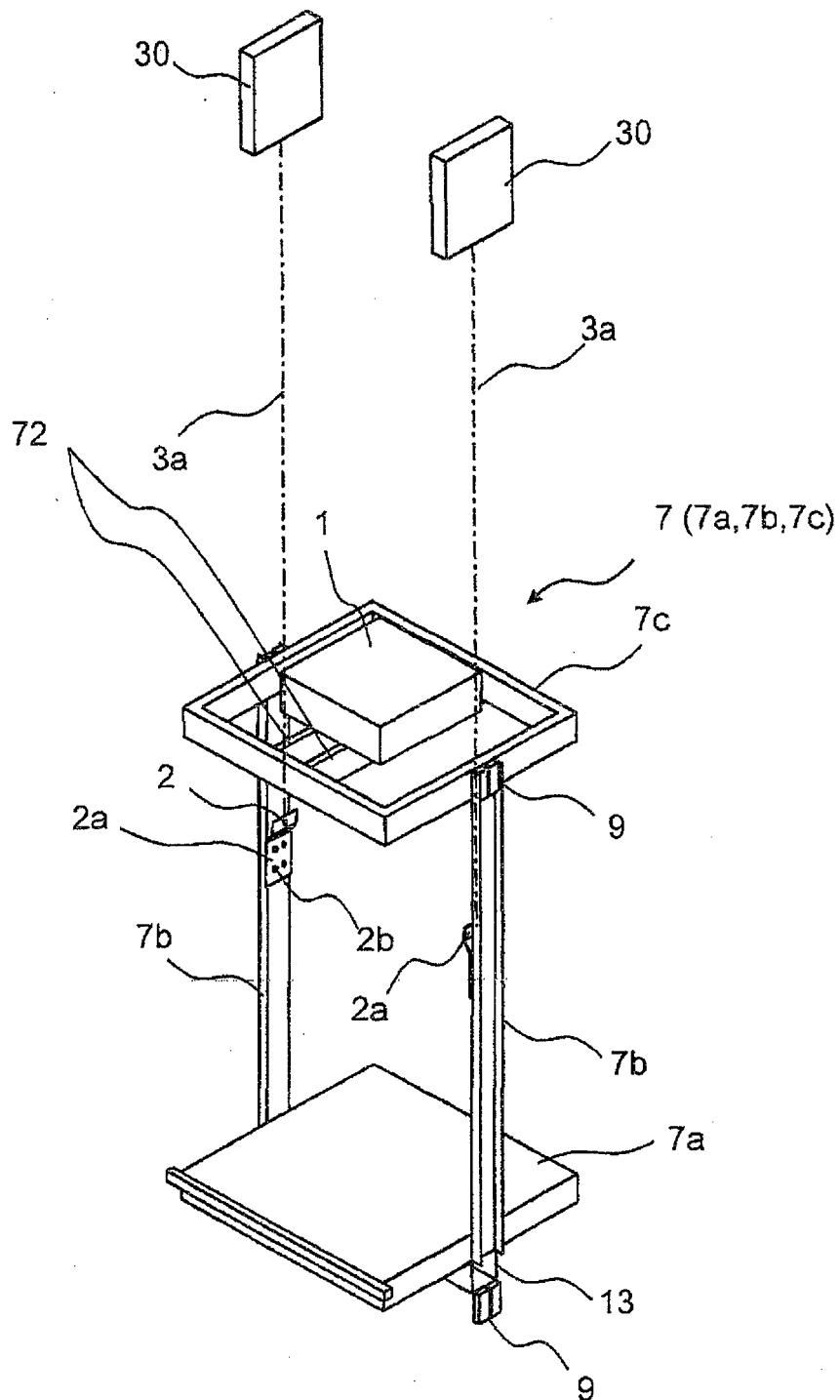


FIG. 9

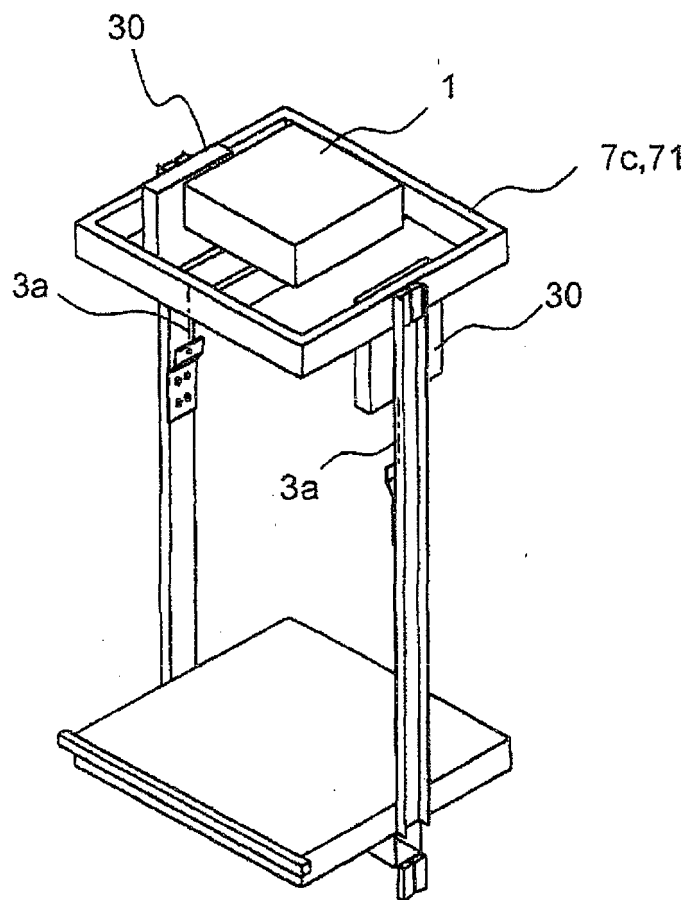


FIG. 10

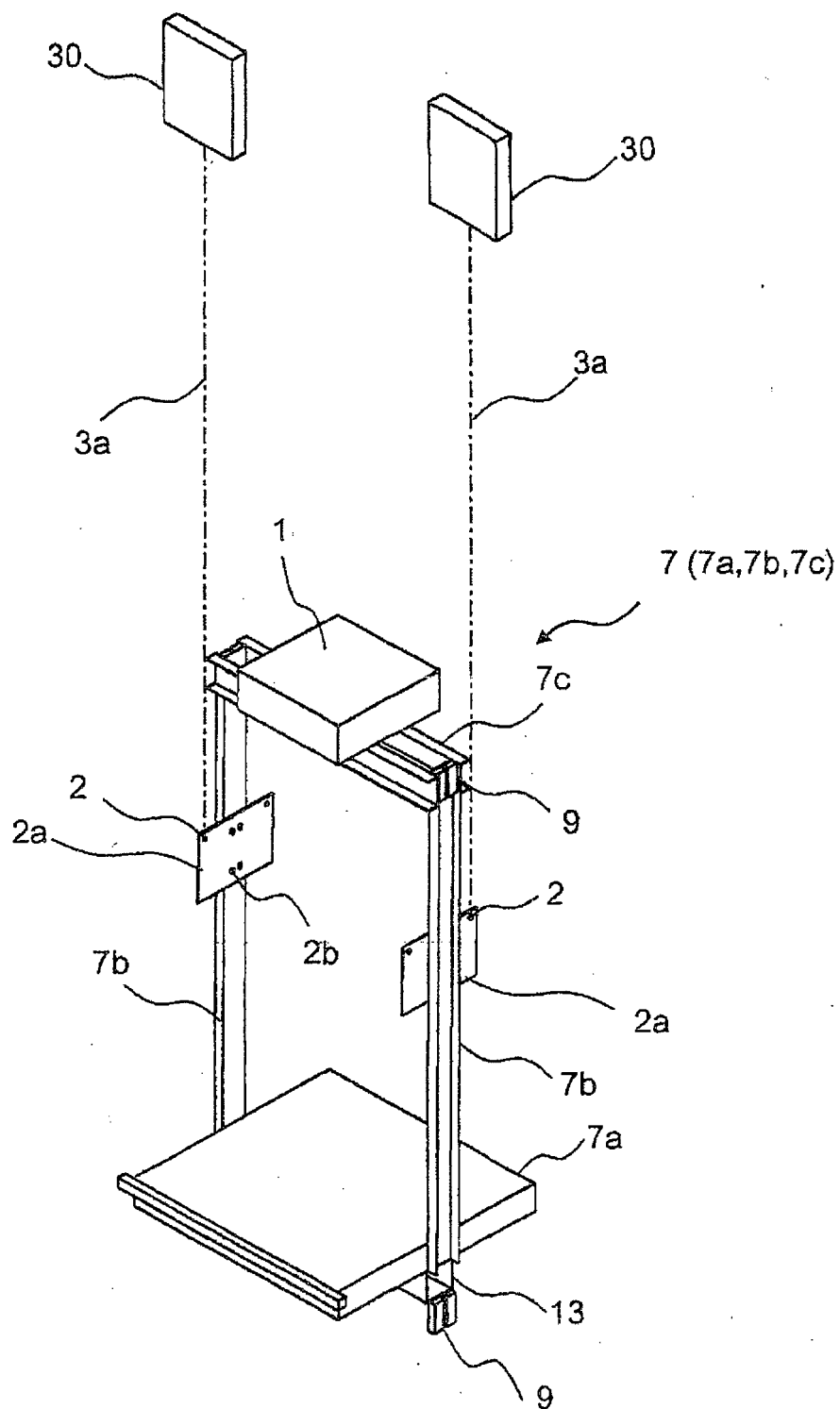


FIG. 11

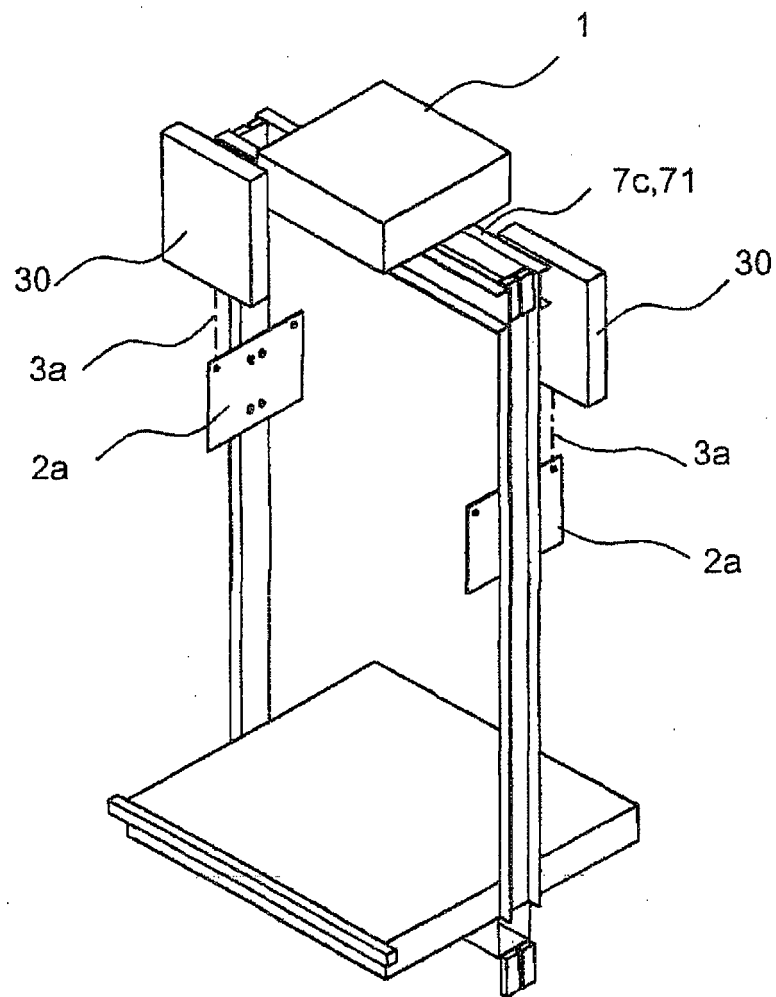


FIG. 12

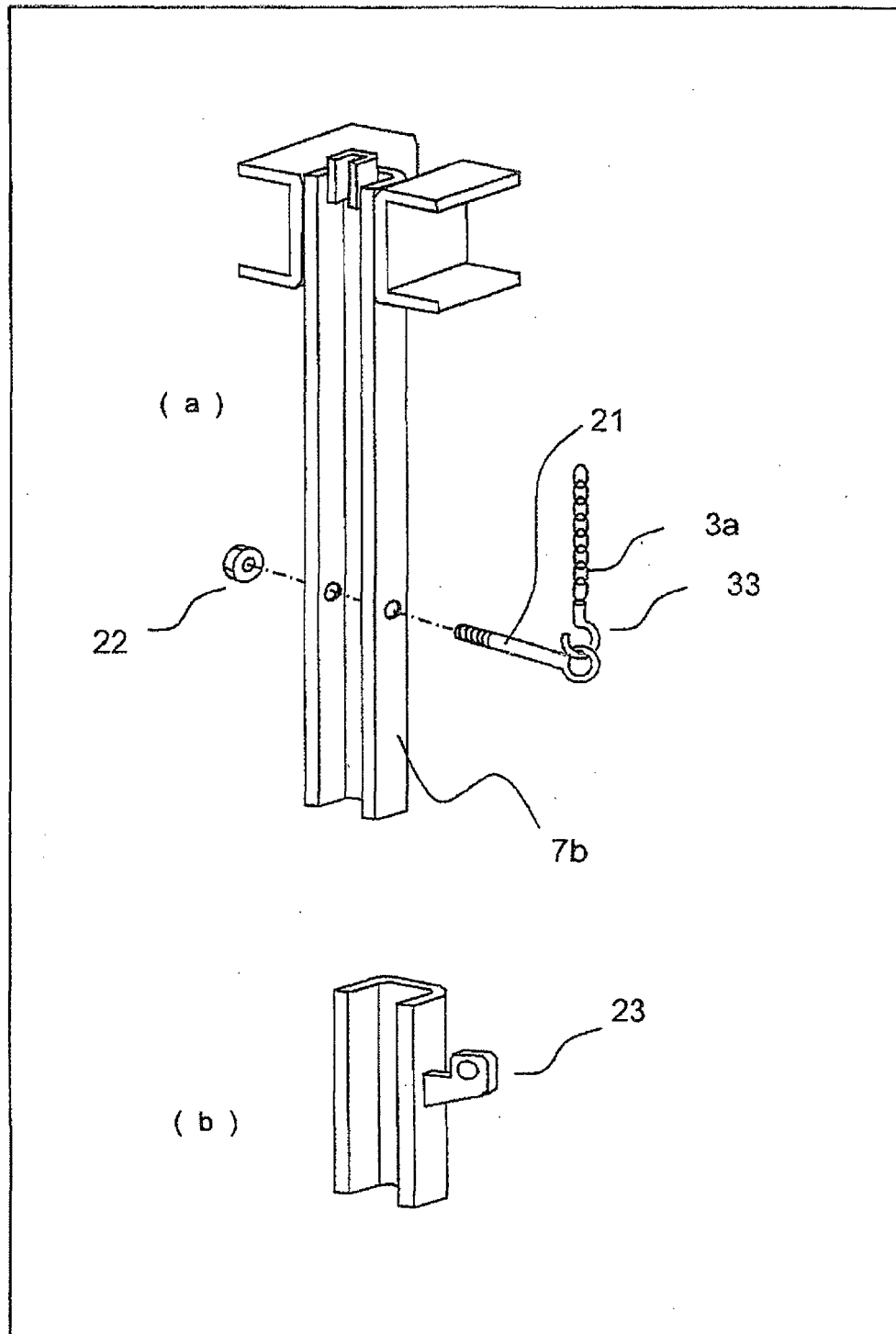


FIG. 13

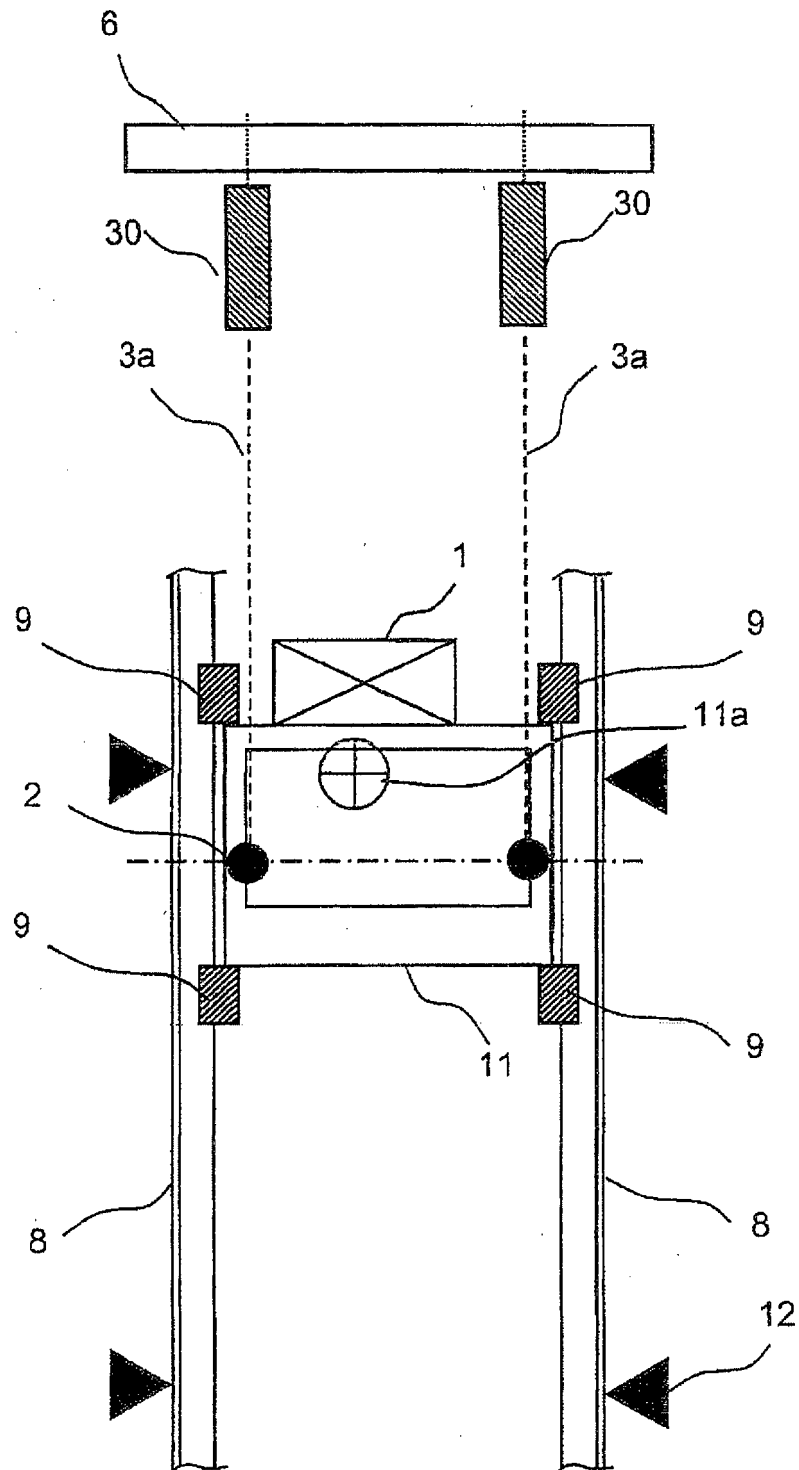


FIG. 14

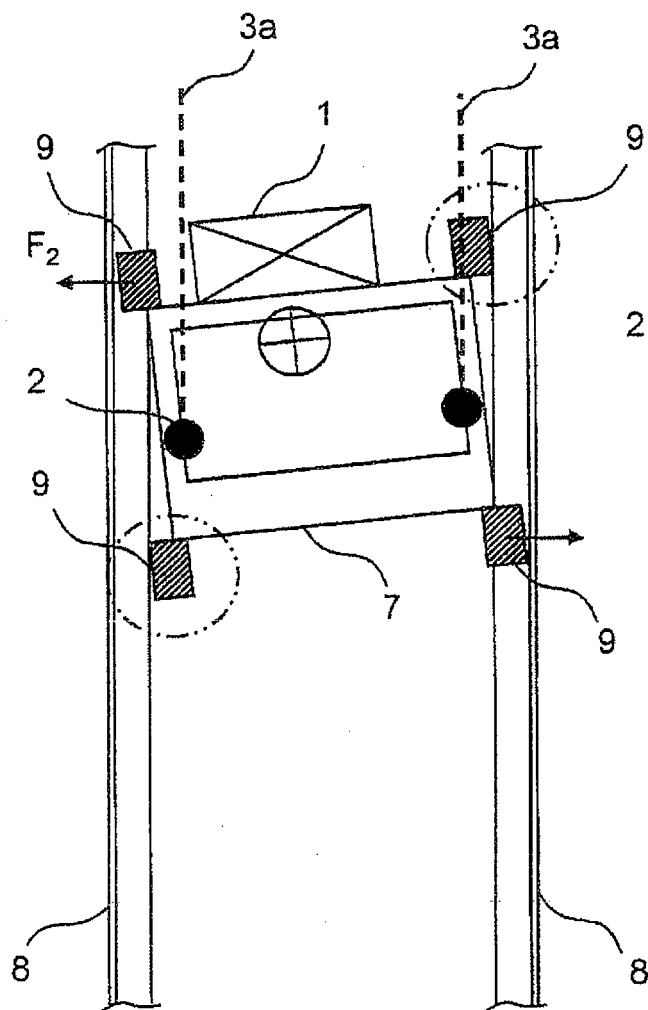


FIG. 15

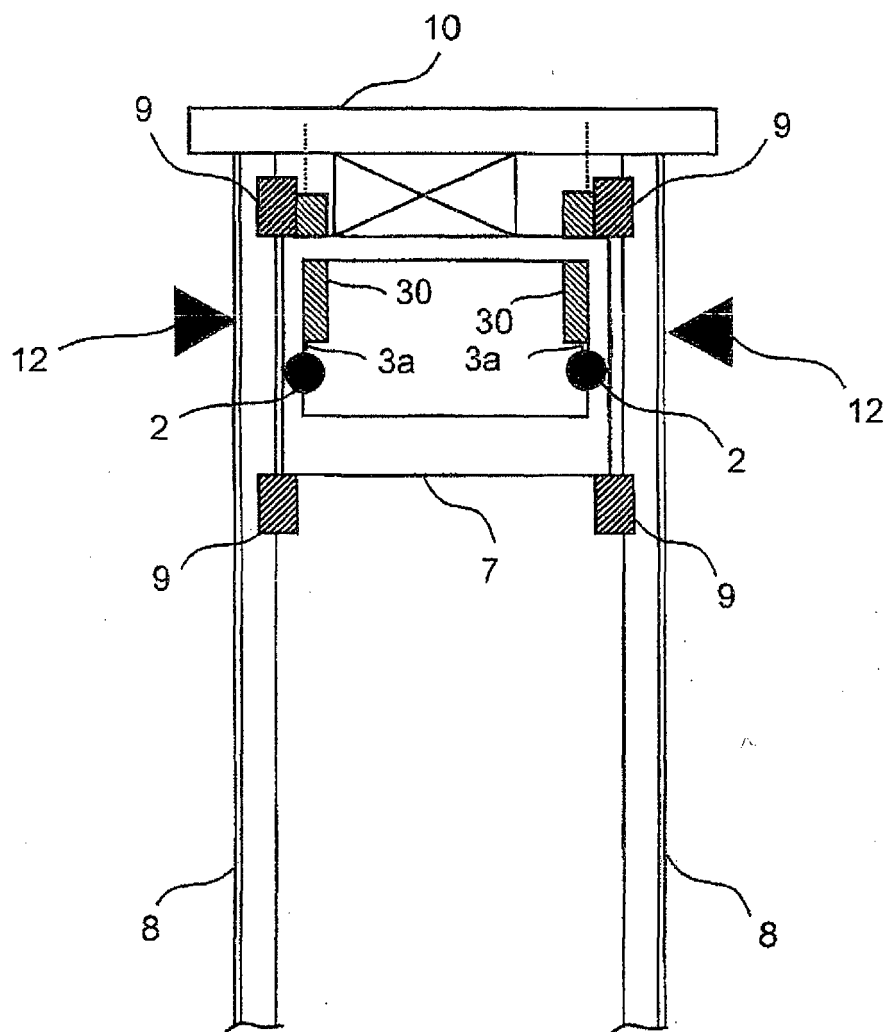


FIG. 16

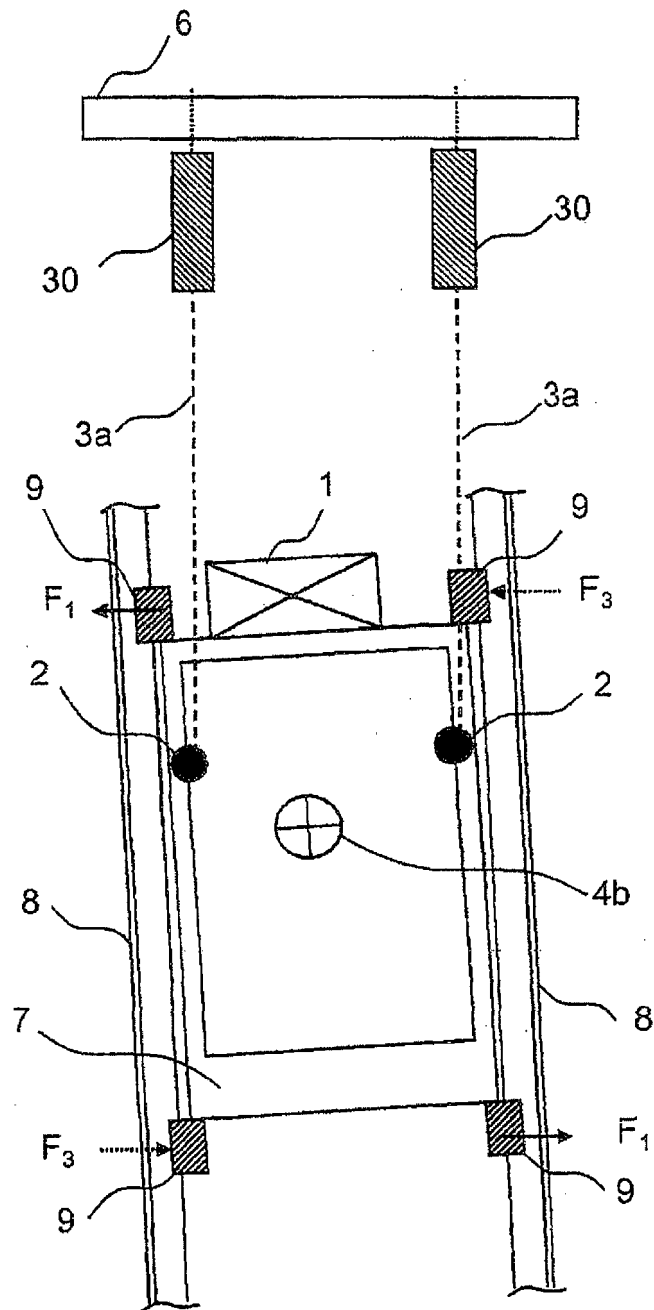


FIG. 17

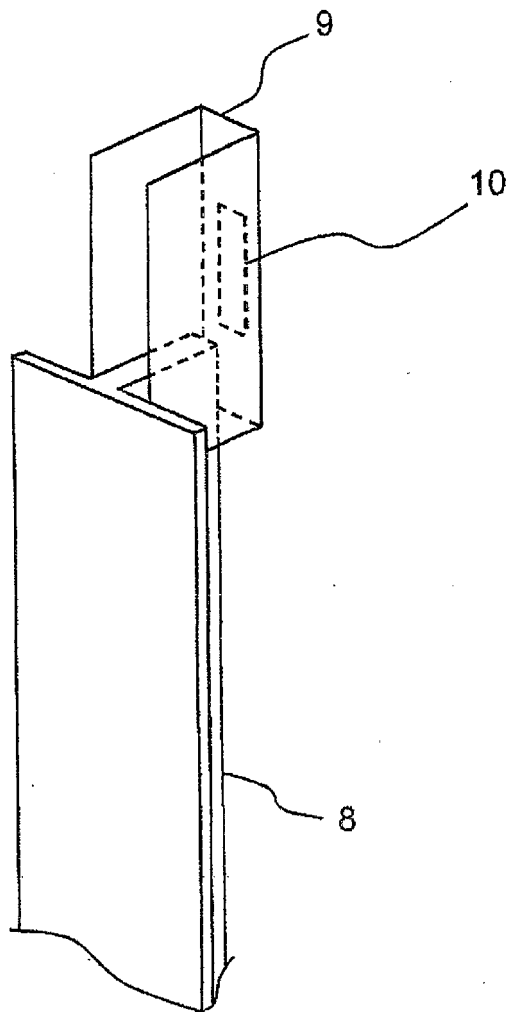


FIG. 18

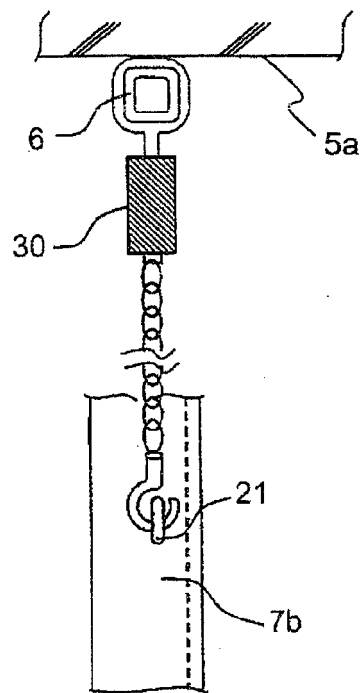


FIG. 19

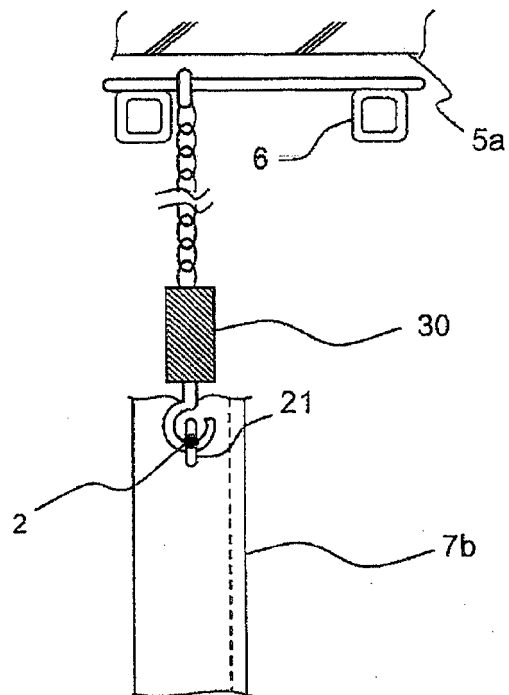


FIG. 20

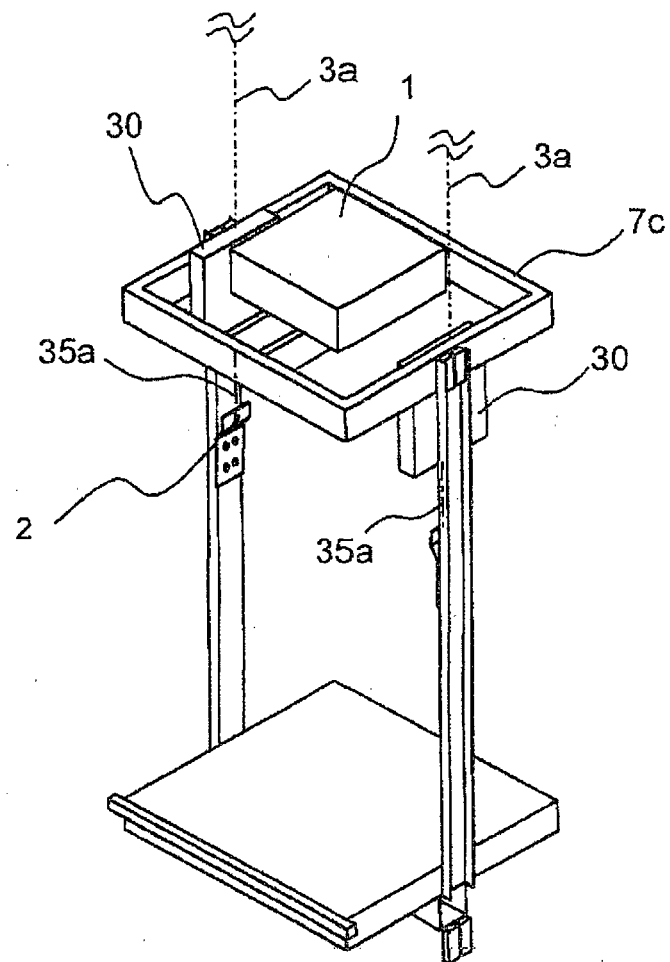


FIG. 21

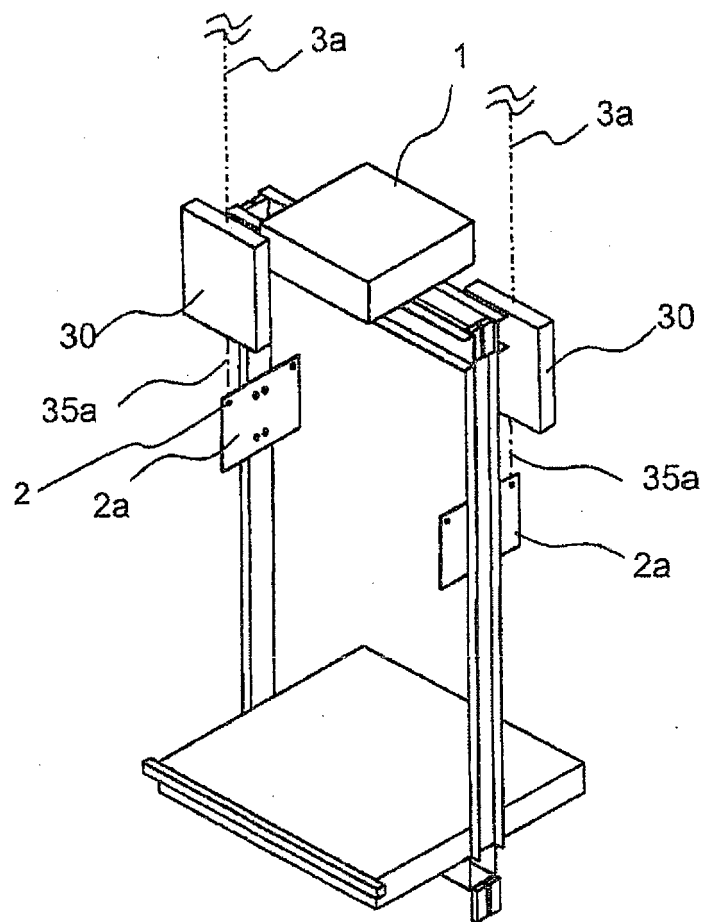


FIG. 22

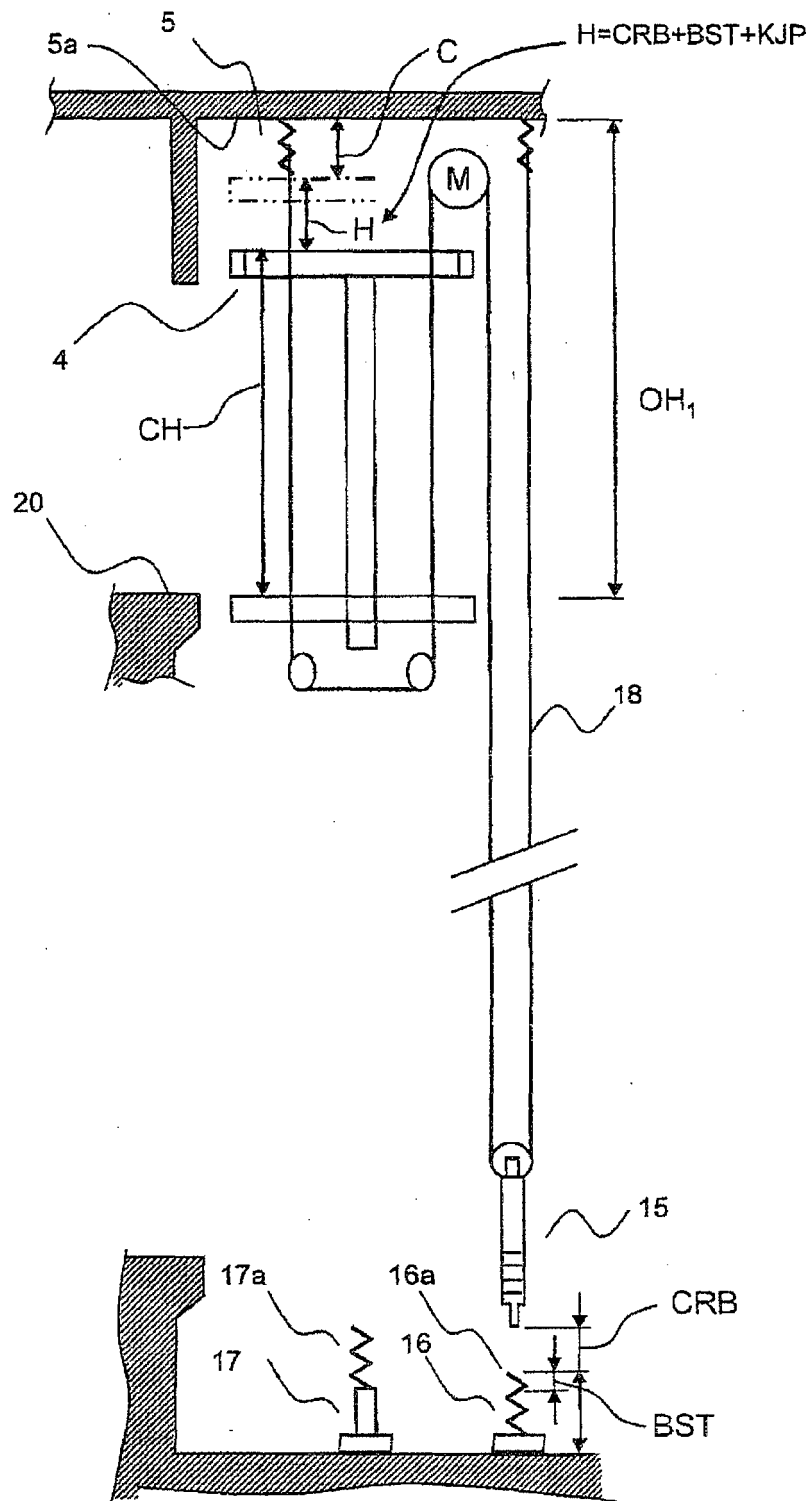


FIG. 23

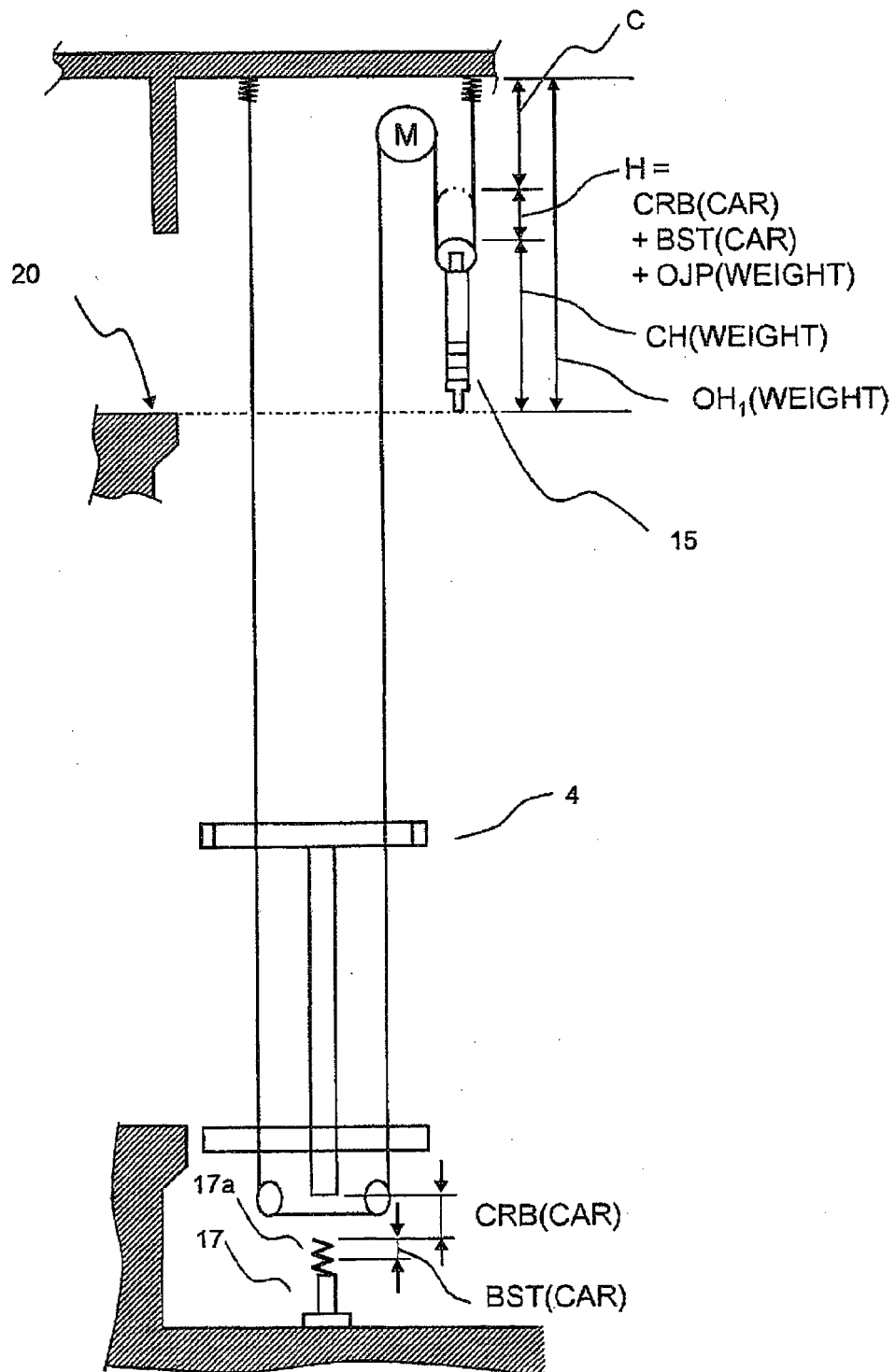


FIG. 24

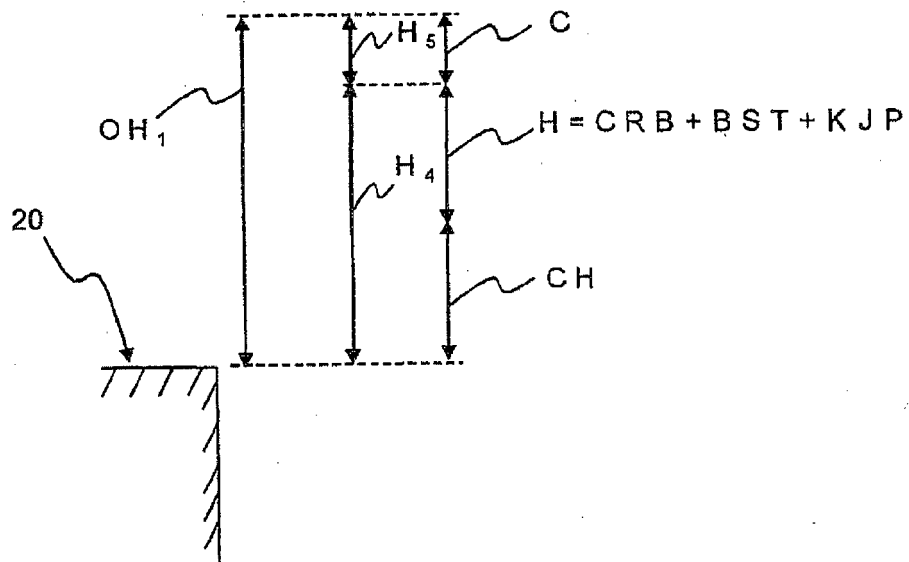


FIG. 25

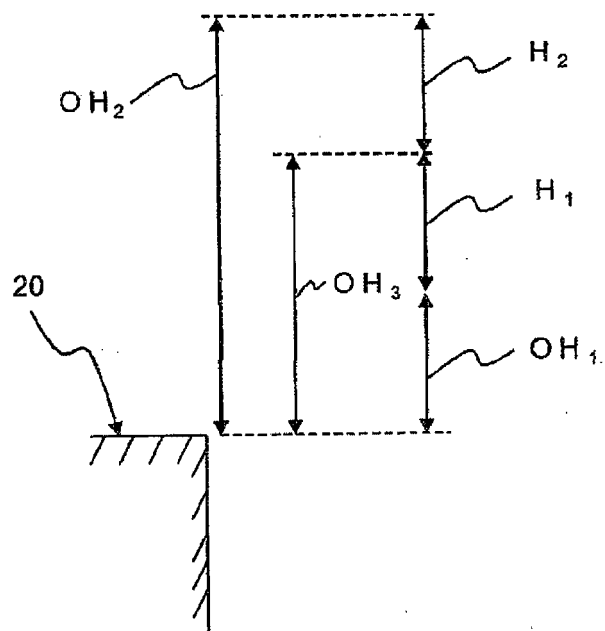
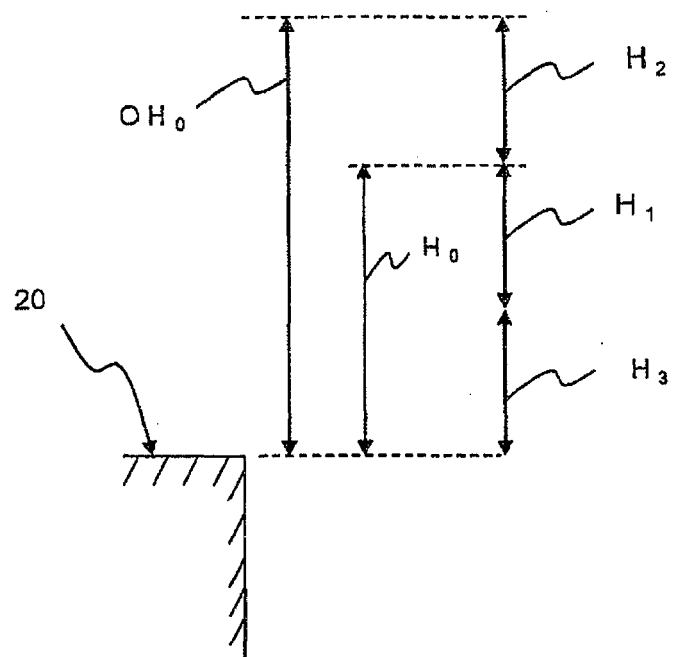


FIG. 26



REFERENCES CITED IN THE DESCRIPTION

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