(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 832 543 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
26.03.2014 Bulletin 2014/13

(21) Application number: **04807868.7**

(22) Date of filing: **27.12.2004**

(51) Int Cl.:
B66B 7/06 *(2006.01)* ***B66B 11/08*** *(2006.01)*
B66B 11/00 *(2006.01)*

(86) International application number:
PCT/JP2004/019513

(87) International publication number:
WO 2006/070437 (06.07.2006 Gazette 2006/27)

(54) **ELEVATOR APPARATUS**

AUFZUGSVORRICHTUNG

ASCENSEUR

(84) Designated Contracting States:
DE

(43) Date of publication of application:
12.09.2007 Bulletin 2007/37

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Description

Technical Field

[0001] The present invention relates to an elevator apparatus having a car and a counterweight that are raised/lowered within a hoistway.

Background Art

[0002] In a conventional elevator apparatus, two thin-type hoisting machines may be provided in an upper portion within a hoistway to achieve increase in capacity. The thin-type hoisting machines face each other so as to sandwich a car on a vertical projection plane of the hoistway. Different suspending ropes are looped around traction sheaves of the thin-type hoisting machines, respectively. Each of the suspending ropes is connected at one end thereof to the car, and at the other end thereof to a counterweight. The car and the counterweight are suspended within the hoistway by means of the suspending ropes, respectively.

[0003] In another conventional elevator apparatus, two thin-type hoisting machines may be arranged side by side in an upper portion within a hoistway such that axes of traction sheaves extend parallel to each other. In this case, a common suspending rope is looped around the traction sheaves of the thin-type hoisting machines, respectively. The suspending rope is connected at one end thereof to a car, and at the other end thereof to a counterweight. The suspending rope is looped around one of the traction sheaves, then around the other traction sheave, and around the aforementioned one of the traction sheaves again. In other words, the suspending rope is looped around each of the traction sheaves according to a full-wrap roping method (see Patent Document 1).

[0004] Patent Document 1 : JP 11-310372 A

Disclosure of the Invention

Problem to be solved by the Invention

[0005] However, in the elevator apparatus having the thin-type hoisting machines arranged so as to face each other, the thin-type hoisting machines are arranged apart from each other on the vertical projection plane of the hoistway. Therefore, a space for installing the two thin-type hoisting machines is required in a horizontal direction, so the horizontal cross-sectional area of the hoistway increases.

[0006] In the elevator apparatus having the thin-type hoisting machines arranged side by side, the suspending rope is looped around each of the traction sheaves according to the full-wrapping method. Therefore, a life of the suspending rope is short.

[0007] The present invention has been made to solve the problems as described above, and it is therefore an object of the present invention to obtain an elevator apparatus which makes it possible to reduce a size of a hoistway and prolong a life of a main rope for suspending a car and a counterweight.

Means for solving the Problems

[0008] An elevator apparatus includes: a car and a counterweight that can be raised/lowered within a hoistway; a driving force generating unit having a thin-type first drive device, which includes a first drive sheave rotatable about a horizontally extending first rotational shaft, and a thin-type second drive device, which includes a second drive sheave rotatable about a second rotational shaft extending parallel to the first rotational shaft, and arranged outside both regions of the car and the counterweight on a vertical projection plane of the hoistway, for generating a driving force for raising/lowering the car and the counterweight within the hoistway; and a main rope body having a first main rope, which is looped around the first drive sheave while bypassing the second drive sheave, and a second main rope, which is looped around the second drive sheave while bypassing the first drive sheave, for suspending the car and the counterweight, characterized in that a part of the first drive device overlaps with a region of the second drive device on the vertical projection plane of the hoistway, while the first drive sheave is arranged outside the region of the second drive device on the vertical projection plane of the hoistway.

Brief Description of the Drawings

[0009]

Fig. 1 is a schematic diagram showing an elevator apparatus according to Embodiment 1 of the present invention.
Fig. 2 is a plan view showing the elevator apparatus of Fig. 1.
Fig. 3 is a lateral view showing an essential part of the elevator apparatus of Fig. 1.
Fig. 4 is a schematic diagram showing an elevator apparatus according to Embodiment 2 of the present invention.
Fig. 5 is a plan view showing the elevator apparatus of Fig. 4.
Fig. 6 is a lateral view showing an essential part of the elevator apparatus of Fig. 4.

Best Modes for carrying out the Invention

[0010] Preferred embodiments of the present invention will be described hereinafter with reference to the drawings.

Embodiment 1

[0011] Fig. 1 is a schematic diagram showing an ele-

vator apparatus according to Embodiment 1 of the present invention. Fig. 2 is a plan view showing the elevator apparatus of Fig. 1. Fig. 3 is a lateral view showing an essential part of the elevator apparatus of Fig. 1. Referring to the figures, a car 2 and a counterweight 3 are provided within a hoistway 1 such that they can be raised/lowered, respectively. A front face of the car 2 is provided with a car doorway 4. The car 2 and the counterweight 3 are arranged side by side within the hoistway 1 in a depth direction thereof (direction perpendicular to the front face of the car 2 on a horizontal plane) on a vertical projection plane of the hoistway 1 . That is, the elevator apparatus according to Embodiment 1 of the present invention is designed as an elevator apparatus of a counterweight back fall type with a structure in which the counterweight 3 is raised/lowered on a back face side of the car 2.

[0012] A driving force generating unit 5 for generating a driving force for raising/lowering the car 2 and the counterweight 3 is provided in a lower portion within the hoistway 1. The driving force generating unit 5 is arranged outside regions of the car 2 and the counterweight 3, respectively, on the vertical projection plane of the hoistway 1. In this example, the driving force generating unit 5 is arranged between an inner wall surface of the hoistway 1 and the car 2 on the vertical projection plane of the hoistway 1 (Fig. 2). The driving force generating unit 5 has a first hoisting machine (first drive device) 6, and a second hoisting machine (second drive device) 7 arranged above the first hoisting machine 6.

[0013] The first hoisting machine 6 has a first drive device body 9 including a horizontally extending first rotational shaft 8, and a first drive sheave 10 provided on the first rotational shaft 8 to be rotatable about the first rotational shaft 8. The first drive sheave 10 is rotated integrally with the first rotational shaft 8 owing to a driving force of the first drive device body 9. The first hoisting machine 6 is a flat, thin-type hoisting machine having a radial dimension that is larger than an axial dimension.

[0014] The second hoisting machine 7 has a second drive device body 12 including a horizontally extending second rotational shaft 11, and a second drive sheave 13 provided on the second rotational shaft 11 to be rotatable about the second rotational shaft 11. The second drive sheave 13 is rotated integrally with the second rotational shaft 11 owing to a driving force of the second drive device body 12. The second hoisting machine 7 is a flat, thin-type hoisting machine having a radial dimension that is larger than an axial dimension.

[0015] The first hoisting machine 6 and the second hoisting machine 7 are arranged within the hoistway 1 such that the first rotational shaft 8 and the second rotational shaft 11 extend parallel to each other. The first hoisting machine 6 and the second hoisting machine 7 are arranged offset from each other in an axial direction of the first and the second rotational shafts 8, 11. Further, a part of the first hoisting machine 6 overlaps with a region of the second hoisting machine 7 on the vertical projection plane of the hoistway 1. Still further, the first drive sheave 10 is arranged outside the region of the second hoisting machine 7 on the vertical projection plane of the hoistway 1. That is, the first hoisting machine 6 is arranged offset from the second hoisting machine 7 on the vertical projection plane of the hoistway 1 such that the first drive sheave 10 is located outside the region of the second hoisting machine 7.

[0016] A plurality of first main ropes 14 are looped around the first drive sheave 10. A plurality of second main ropes 15 are looped around the second drive sheave 13. A main rope body 16 has the first main ropes 14 and the second main ropes 15. The car 2 and the counterweight 3 are suspended within the hoistway 1 by means of the main rope body 16.

[0017] A car-side return pulley 17 and a pair of counterweight-side return pulleys 18 around which the main rope body 16 is looped, respectively, are provided in an upper portion within the hoistway 1. The car-side return pulley 17 and the counterweight-side return pulleys 18 are arranged above the driving force generating unit 5. A car-side rope fastening device 19 to which one end of the main rope body 16 is connected and a counterweight-side rope fastening device 20 to which the other end of the main rope body 16 is connected are provided in the upper portion within the hoistway 1.

[0018] A pair of car suspending pulleys 21 around which the main rope body 16 is looped are provided on a lower portion of the car 2. A counterweight suspending pulley 22 around which the main rope body 16 is looped is provided on an upper portion of the counterweight 3.

[0019] Each of the first main ropes 14 is connected at one end thereof to the car-side rope fastening device 19, and at the other end of the first main ropes 14 to the counterweight-side rope fastening device 20. Each of the first main ropes 14, which extends from the car-side rope fastening device 19 to the counterweight-side rope fastening device 20, is sequentially looped around the respective car suspending pulleys 21, the car-side return pulley 17, the first drive sheave 10, the respective counterweight-side return pulleys 18, and the counterweight suspending pulley 22. That is, the first main ropes 14 are stretched within the hoistway 1 while bypassing the second drive sheave 13. Since the second hoisting machine 7 is arranged offset from the first hoisting machine 6, the first main ropes 14 looped around the first drive sheave 10 are prevented from interfering with the second hoisting machine 7.

[0020] Each of the second main ropes 15 is connected at one end thereof to the car-side rope fastening device 19, and at the other end of the second main ropes 15 to the counterweight-side rope fastening device 20. Each of the second main ropes 15, which extends from the car-side rope fastening device 19 to the counterweight-side rope fastening device 20, is sequentially looped around the respective car suspending pulleys 21, the car-side return pulley 17, the second drive sheave 13, the respective counterweight-side return pulleys 18, and the

counterweight suspending pulley 22. That is, the respective second main ropes 15 are stretched within the hoistway 1 while bypassing the first drive sheave 10.

[0021] That is, the car 2 and the counterweight 3 are suspended within the hoistway 1 by means of the first main ropes 14 and the second main ropes 15, which are looped around the respective sheaves according to a 2:1 roping method.

[0022] A control device (not shown) for controlling operation of an elevator is electrically connected to the driving force generating unit 5. The first hoisting machine 6 and the second hoisting machine 7 are controlled by the control device such that the first drive sheave 10 and the second drive sheave 13 rotate in synchronization with each other.

[0023] Next, an operation will be described. The first drive sheave 10 and the second drive sheave 13 are rotated in synchronization with each other owing to the control of the first hoisting machine 6 and the second hoisting machine 7 by the control device. Thus, the, respectively, first main ropes 14, respectively, and the second main ropes 15, respectively, are moved, so the car 2 and the counterweight 3 are raised/lowered within the hoistway 1.

[0024] In the elevator apparatus constructed as described above, the main rope body 16 for suspending the car 2 and the counterweight 3 has the first main ropes 14 looped around the first drive sheave 10 of the first hoisting machine 6 while bypassing the second drive sheave 13 of the second hoisting machine 7, and the second main ropes 15 looped around the second drive sheave 13 while bypassing the first drive sheave 10. The part of the first hoisting machine 6 overlaps with the region of the second hoisting machine 7 on the vertical projection plane of the hoistway 1, and the first drive sheave 10 is arranged outside the region of the second hoisting machine 7. Therefore, parts of spaces, respectively, for installing the first hoisting machine 6 and the second hoisting machine 7 are partially shared in a horizontal direction, so the horizontal cross-sectional area of the hoistway 1 can be reduced. Accordingly, the hoistway 1 can be reduced in size. The second hoisting machine 7 does not intersect a vertical space of the first drive sheave 10, so the first main ropes 14 can be prevented from interfering with the second hoisting machine 7. Thus, the number of sheaves for turning the first main ropes 14 can also be prevented from increasing. Further, the first main ropes 14 and the second main ropes 15 are looped around the first drive sheave 10 and the second drive sheave 13 according to a normal single-lap roping method (which is not the full-wrap roping method), so the life of each of the first main ropes 14 and the second main ropes 15 can also be prolonged.

[0025] Although the driving force generating unit 5 is provided in the lower portion within the hoistway 1 in the foregoing example, it is also appropriate that the driving force generating unit 5 be provided in the upper portion within the hoistway 1. In this case, the first hoisting machine 6 is arranged above the second hoisting machine 7 and offset from the second hoisting machine 7 such that the first drive sheave 10 is arranged outside the region of the second hoisting machine 7 on the vertical projection plane of the hoistway 1.

Embodiment 2

[0026] Fig. 4 is a schematic diagram showing an elevator apparatus according to Embodiment 2 of the present invention. Fig. 5 is a plan view showing the elevator apparatus of Fig. 4. Fig. 6 is a lateral view showing an essential part of the elevator apparatus of Fig. 4. Referring to the figures, the car 2 and the counterweight 3 are arranged side by side within the hoistway 1 in a width direction (direction of a frontage of the car doorway 4) of the hoistway 1 on the vertical projection plane of the hoistway 1. That is, the elevator apparatus according to Embodiment 2 of the present invention is designed as an elevator apparatus of a counterweight lateral fall type with a structure in which the counterweight 3 is raised/lowered on a lateral face side of the car 2.

[0027] The driving force generating unit 5 is arranged outside the regions of the car 2 and the counterweight 3 on the vertical projection plane of the hoistway 1. In this example, the driving force generating unit 5 is arranged between the region of the car 2 and the region of the counterweight 3 on the vertical projection plane of the hoistway 1. The driving force generating unit 5 has the second hoisting machine 7, and a flat, thin-type first hoisting machine 31, which is arranged below the second hoisting machine 7 and has a radial dimension that is larger than an axial dimension.

[0028] The first hoisting machine 31 has a first drive device body 33 including a horizontally extending first rotational shaft 32, and a first drive sheave 34 provided on the first rotational shaft 32 to be rotatable about the first rotational shaft 32. The first drive sheave 34 is rotated integrally with the first rotational shaft 32 owing to a driving force of the first drive device body 33.

[0029] The first hoisting machine 31 is arranged within the hoistway 1 such that the first rotational shaft 32 extends parallel to the second rotational shaft 11. The second hoisting machine 7 is arranged within a region of the first hoisting machine 31 on the vertical projection plane of the hoistway 1.

[0030] The first drive sheave 34 has a larger outer diameter than the second drive sheave 13. A part of the first drive sheave 34 overlaps with a region of the second drive sheave 13 on the vertical projection plane of the hoistway 1. In addition, the second drive sheave 13 is arranged between radial ends of the first drive sheave 34 on the vertical projection plane of the hoistway 1. In this example, the second drive sheave 13 is arranged within a region of the first drive sheave 34 on the vertical projection plane of the hoistway 1.

[0031] The first main ropes 14 are looped around the first drive sheave 34 while bypassing the second drive

sheave 13. Since the second drive sheave 13 is arranged between the radial ends of the first drive sheave 34 on the vertical projection plane of the hoistway 1, the first main ropes 14 looped around the first drive sheave 34 are prevented from interfering with the second drive sheave 13.

[0032] The control device controls the first hoisting machine 31 and the second hoisting machine 7 such that each of the first main ropes 14 and each of the second main ropes 15 move in synchronization with each other. Embodiment 2 of the present invention is identical to Embodiment 1 of the present invention in other constructional details.

[0033] In the elevator apparatus constructed as described above, the first drive sheave 34 is larger in outer diameter than the second drive sheave 13, the part of the first drive sheave 34 overlaps with the region of the second drive sheave 13 on the vertical projection plane of the hoistway 1, and the second drive sheave 13 is arranged between the radial ends of the first drive sheave 34 on the vertical projection plane of the hoistway 1. Therefore, the first hoisting machine 31 and the second hoisting machine 7 can be prevented from interfering with the main rope body 16 without increasing the number of sheaves for turning the main rope body 16. Parts of the regions of the first drive sheave 34 and the second drive sheave 13, respectively, are partially shared in the horizontal direction on the vertical projection plane of the hoistway 1, so the horizontal cross-sectional area of the hoistway 1 can further be reduced. Accordingly, the hoistway 1 can further be reduced in size.

[0034] The second hoisting machine 7 is arranged within the region of the first hoisting machine 31 on the vertical projection plane of the hoistway 1, so the area of a common portion of the first hoisting machine 31 and the second hoisting machine 7 in the horizontal direction can further be increased. Thus, the horizontal cross-sectional area of the hoistway 1 can further be reduced, and the hoistway 1 can further be reduced in size.

[0035] Although the driving force generating unit 5 is provided in the lower portion within the hoistway 1 in the foregoing example, it is also appropriate that the driving force generating unit 5 be provided in the upper portion within the hoistway 1. In this case, the first hoisting machine 31 is arranged above the second hoisting machine 7.

[0036] Although the car 2 and the counterweight 3 are suspended according to the 2:1 roping method in the foregoing embodiments, respectively, of the present invention, it is also appropriate that the car 2 and the counterweight 3 be suspended according to a 1:1 roping method. In this case, the main rope body 16 is directly connected at one end of the main rope body 16 and the other end of the main rope body 16 to the car 2 and the counterweight 3, respectively.

Claims

1. An elevator apparatus, comprising:

a car (2) and a counterweight (3) that can be raised/lowered within a hoistway (1);
a driving force generating unit (5) having a thin-type first drive device (6), which includes a first drive sheave (10) rotatable about a horizontally extending first rotational shaft (8), and a thin-type second drive device (7), which includes a second drive sheave (13) rotatable about a second rotational shaft (11) extending parallel to the first rotational shaft (8), and arranged outside both regions of the car (2) and the counterweight (3) on a vertical projection plane of the hoistway (1), for generating a driving force for raising/lowering the car (2) and the counterweight (3) within the hoistway (1) ; and
a main rope body (16) having a first main rope (14), which is looped around the first drive sheave (10) while bypassing the second drive sheave (13), and a second main rope (15), which is looped around the second drive sheave (13) while bypassing the first drive sheave (10), for suspending the car (2) and the counterweight (3), wherein
a part of the first drive device (6) overlaps with a region of the second drive device (7) on the vertical projection plane of the hoistway (1), while the first drive sheave (10) is arranged outside the region of the second drive device (7) on the vertical projection plane of the hoistway (1).

2. An elevator apparatus, comprising:

a car (2) and a counterweight (3) that can be raised/lowered within a hoistway (1);
a driving force generating unit (5) having a thin-type first drive device (31), which includes a first drive sheave (34) rotatable about a horizontally extending first rotational shaft (32), and a thin-type second drive device (7), which includes a second drive sheave (13) rotatable about a second rotational shaft (11) extending parallel to the first rotational shaft (32), and arranged outside both regions of the car (2) and the counterweight (3) on a vertical projection plane of the hoistway (1), for generating a driving force for raising/lowering the car (2) and the counterweight (3) within the hoistway (1); and
a main rope body (16) having a first main rope (14), which is looped around the first drive sheave (34) while bypassing the second drive sheave (13), and a second main rope (15), which is looped around the second drive sheave (13) while bypassing the first drive sheave (34), for suspending the car (2) and the counterweight

(3), wherein
the first drive sheave (34) has an outer diameter larger than an outer diameter of the second drive sheave (13); and
a part of the first drive sheave (34) overlaps with a region of the second drive sheave (13) on the vertical projection plane of the hoistway (1), while the second drive sheave (13) is arranged between radial ends of the first drive sheave (34) on the vertical projection plane of the hoistway (1).

3. The elevator apparatus according to Claim 2, **characterized in that** the second drive device (7) is arranged within a region of the first drive device (31) on the vertical projection plane of the hoistway (1).

Patentansprüche

1. Aufzugsvorrichtung, mit:

einer Kabine (2) und einem Gegengewicht (3), die innerhalb eines Aufzugsschachts (1) angehoben/abgesenkt werden können;
einer Antriebskrafterzeugungseinheit (5) zum Erzeugen einer Antriebskraft zum Anheben/Absenken der Kabine (2) und des Gegengewichts (3) innerhalb des Aufzugsschachts (1), die eine erste Antriebseinheit schmaler Bauart (6) aufweist, die eine erste Antriebsrolle (10), die um eine, sich horizontal erstreckende erste Drehachse (8) drehbar ist, und eine zweite Antriebseinheit schmaler Bauart (7) aufweist, die eine zweite Antriebsrolle (13) aufweist, die um eine zweite Drehachse (11), die sich parallel zu der ersten Drehachse (8) erstreckt, aufweist, und die sowohl außerhalb von Bereichen der Kabine (2) als auch des Gegengewichts (3) auf einer vertikalen Projektionsebene des Aufzugsschachts (1) angeordnet ist; und
einem Hauptseilkörper (16) zum Aufhängen der Kabine (2) und des Gegengewichts (3), der ein erstes Hauptseil (14), das um die erste Antriebsrolle (10) gelenkt ist, wobei es an der zweiten Antriebsrolle (13) vorbeiläuft, und ein zweites Hauptseil (15) aufweist, das um die zweite Antriebsrolle (13) gelenkt ist, wobei es an der ersten Antriebsrolle (10) vorbeiläuft, wobei
ein Teil der ersten Antriebseinrichtung (6) mit einem Bereich der zweiten Antriebseinrichtung (7) auf der vertikalen Projektionsebene des Aufzugsschachts (1) überlappt, wobei die erste Antriebsrolle (10) außerhalb des Bereichs der zweiten Antriebseinrichtung (7) auf der vertikalen Projektionsebene des Aufzugsschachts (1) angeordnet ist.

2. Aufzugsvorrichtung, mit:

einer Kabine (2) und einem Gegengewicht (3), die innerhalb eines Aufzugsschachts (1) angehoben/abgesenkt werden können;
einer Antriebskrafterzeugungseinheit (5) zum Erzeugen einer Antriebskraft zum Anheben/Absenken der Kabine (2) und des Gegengewichts (3) innerhalb des Aufzugsschachts (1), die eine erste Antriebseinheit schmaler Bauart (31), die eine erste Antriebsrolle (34) aufweist, die um eine, sich horizontal erstreckende erste Drehachse (32) drehbar ist, und eine zweite Antriebseinheit schmaler Bauart (7) aufweist, die eine zweite Antriebsrolle (13) aufweist, die um eine zweite Drehachse (11), die sich parallel zu der ersten Drehachse (32) erstreckt, drehbar ist, und die sowohl außerhalb von Bereichen der Kabine (2) als auch des Gegengewichts (3) auf einer vertikalen Projektionsebene des Aufzugsschachts (1) angeordnet ist; und
einem Hauptseilkörper (16) zum Aufhängen der Kabine (2) und des Gegengewichts (3), der ein erstes Hauptseil (14), das um die erste Antriebsrolle (34) gelenkt ist, wobei es an der zweiten Antriebsrolle (13) vorbeiläuft, und ein zweites Hauptseil (15) aufweist, das um die zweite Antriebsrolle (13) gelenkt ist, wobei es an der ersten Antriebsrolle (34) vorbeiläuft, wobei
die erste Antriebsrolle (34) einen Außendurchmesser größer als einen Außendurchmesser der zweiten Antriebsrolle (13) aufweist; und
ein Teil der ersten Antriebsrolle (34) mit einem Bereich der zweiten Antriebsrolle (13) auf der vertikalen Projektionsebene des Aufzugsschachts (1) überlappt, wobei die zweite Antriebsrolle (13) zwischen radialen Enden der ersten Antriebsrolle (34) auf der vertikalen Projektionsebene des Aufzugsschachts (1) angeordnet ist.

3. Aufzugsvorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die zweite Antriebseinrichtung (7) innerhalb eines Bereichs der ersten Antriebseinrichtung (31) auf der vertikalen Projektionsebene des Aufzugsschachts (1) angeordnet ist.

Revendications

1. Appareil d'ascenseur, comprenant :

une cabine (2) et un contrepoids (3) qui peuvent être élevés/abaissés à l'intérieur d'une cage d'ascenseur (1) ;
une unité de génération de force d'entraînement (5) ayant un premier dispositif d'entraînement de type mince (6), qui comporte une première

poulie d'entraînement (10) pouvant tourner autour d'un premier arbre rotatif s'étendant horizontalement (8), et un deuxième dispositif d'entraînement de type mince (7), qui comporte une deuxième poulie d'entraînement (13) pouvant tourner autour d'un deuxième arbre rotatif (11) s'étendant parallèlement au premier arbre rotatif (8), et agencée à l'extérieur des deux régions de la cabine (2) et du contrepoids (3) sur un plan de projection vertical de la cage d'ascenseur (1), pour générer une force d'entraînement afin de soulever/abaisser la cabine (2) et le contrepoids (3) à l'intérieur de la cage d'ascenseur (1) ; et

un corps de câble principal (16) ayant un premier câble principal (14), qui est enroulé autour de la première poulie d'entraînement (10) tout en contournant la deuxième poulie d'entraînement (13), et un deuxième câble principal (15), qui est enroulé autour de la deuxième poulie d'entraînement (13) tout en contournant la première poulie d'entraînement (10), pour la suspension de la cabine (2) et du contrepoids (3), où

une partie du premier dispositif d'entraînement (6) chevauche une région du deuxième dispositif d'entraînement (7) sur le plan de projection vertical de la cage d'ascenseur (1), tandis que la première poulie d'entraînement (10) est agencée à l'extérieur de la région du deuxième dispositif d'entraînement (7) sur le plan de projection vertical de la cage d'ascenseur (1).

2. Appareil d'ascenseur, comprenant :

une cabine (2) et un contrepoids (3) qui peuvent être élevés/abaissés à l'intérieur d'une cage d'ascenseur (1) ;

une unité de génération de force d'entraînement (5) ayant un premier dispositif d'entraînement de type mince (31), qui comporte une première poulie d'entraînement (34) pouvant tourner autour d'un premier arbre rotatif s'étendant horizontalement (32), et un deuxième dispositif d'entraînement de type mince (7), qui comporte une deuxième poulie d'entraînement (13) pouvant tourner autour d'un deuxième arbre rotatif (11) s'étendant parallèlement au premier arbre rotatif (32), et agencée à l'extérieur des deux régions de la cabine (2) et du contrepoids (3) sur un plan de projection vertical de la cage d'ascenseur (1), pour générer une force d'entraînement afin de soulever/abaisser la cabine (2) et le contrepoids (3) à l'intérieur de la cage d'ascenseur (1) ; et

un corps de câble principal (16) ayant un premier câble principal (14), qui est enroulé autour de la première poulie d'entraînement (34) tout en contournant la deuxième poulie d'entraînement (13), et un deuxième câble principal (15), qui est enroulé autour de la deuxième poulie d'entraînement (13) tout en contournant la première poulie d'entraînement (34), pour la suspension de la cabine (2) et du contrepoids (3), où

la première poulie d'entraînement (34) présente un diamètre extérieur supérieur à un diamètre extérieur de la deuxième poulie d'entraînement (13) ; et

une partie de la première poulie d'entraînement (34) chevauche une région de la deuxième poulie d'entraînement (13) sur le plan de projection vertical de la cage d'ascenseur (1), tandis que la deuxième poulie d'entraînement (13) est agencée entre des extrémités radiales de la première poulie d'entraînement (34) sur le plan de projection vertical de la cage d'ascenseur (1).

3. Appareil d'ascenseur selon la revendication 2, **caractérisé en ce que** le deuxième dispositif d'entraînement (7) est agencé à l'intérieur d'une région du premier dispositif d'entraînement (31) sur le plan de projection vertical de la cage d'ascenseur (1).

FIG. 1

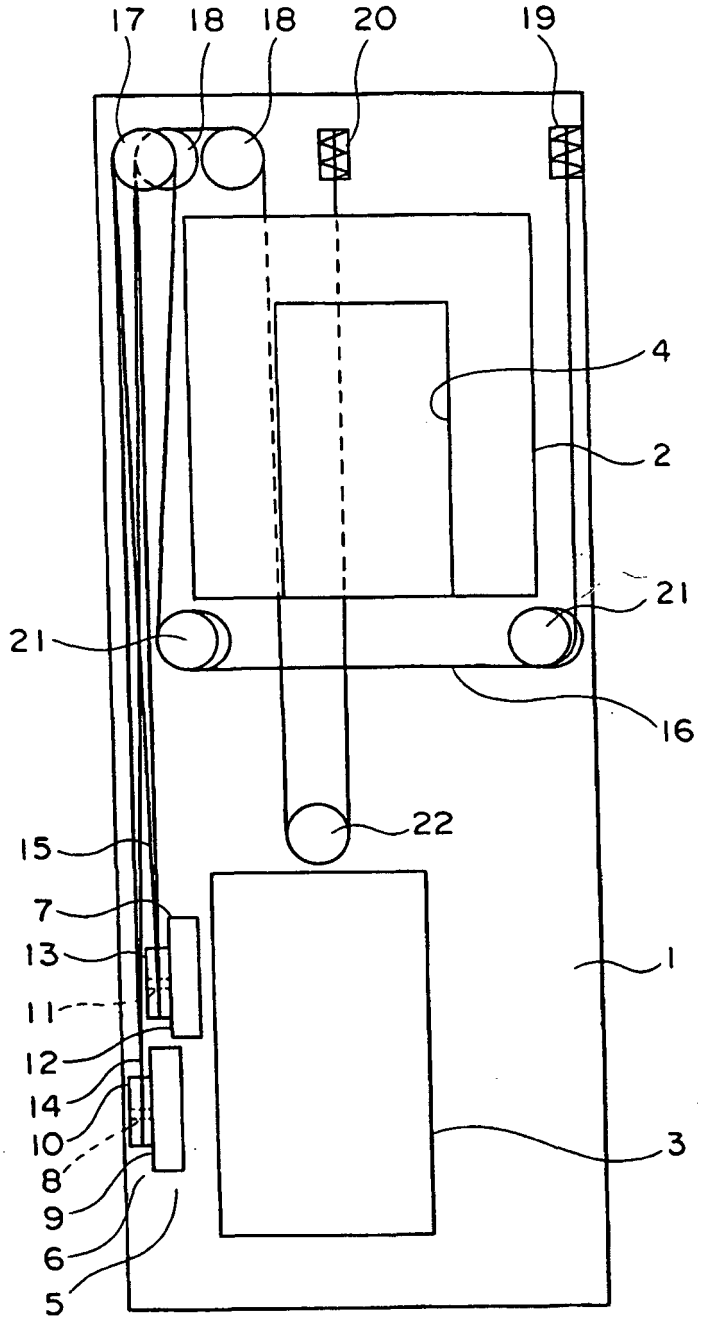


FIG. 2

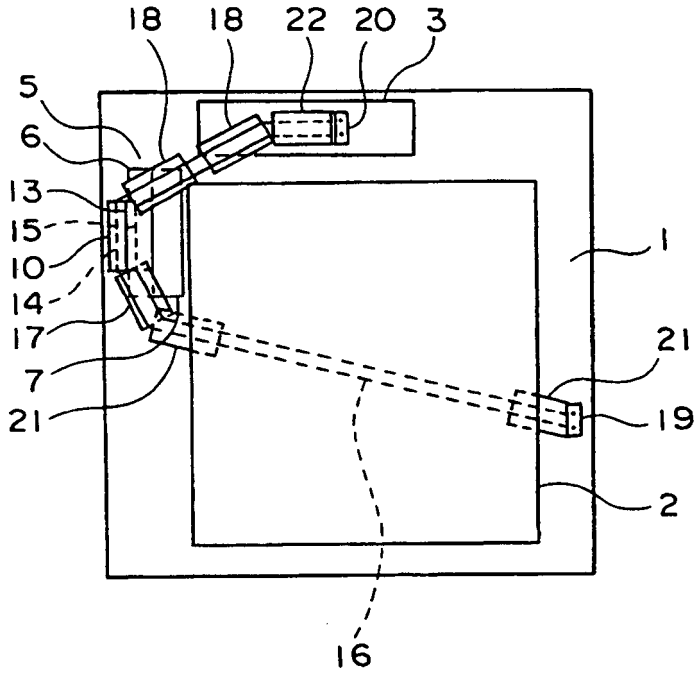


FIG. 3

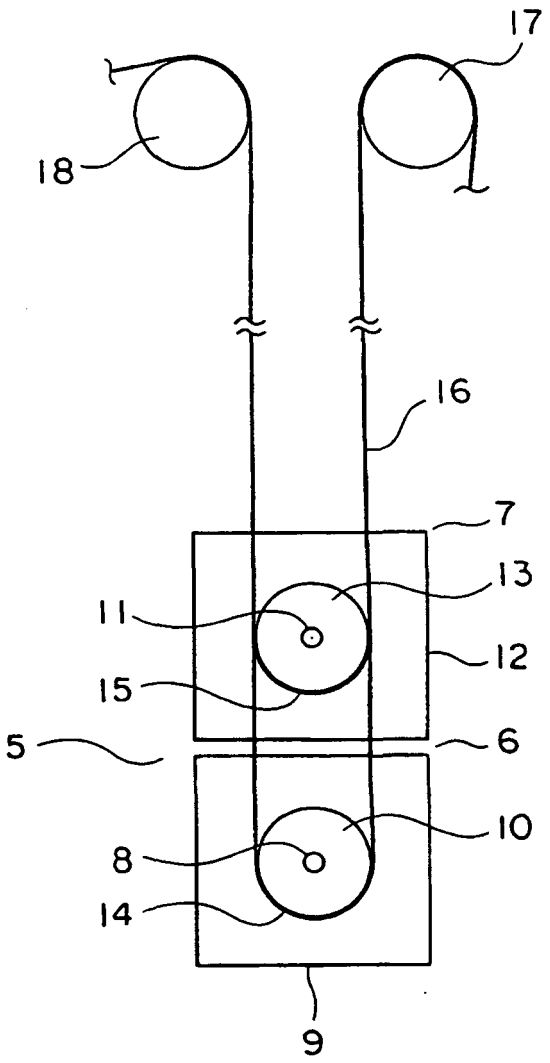


FIG. 4

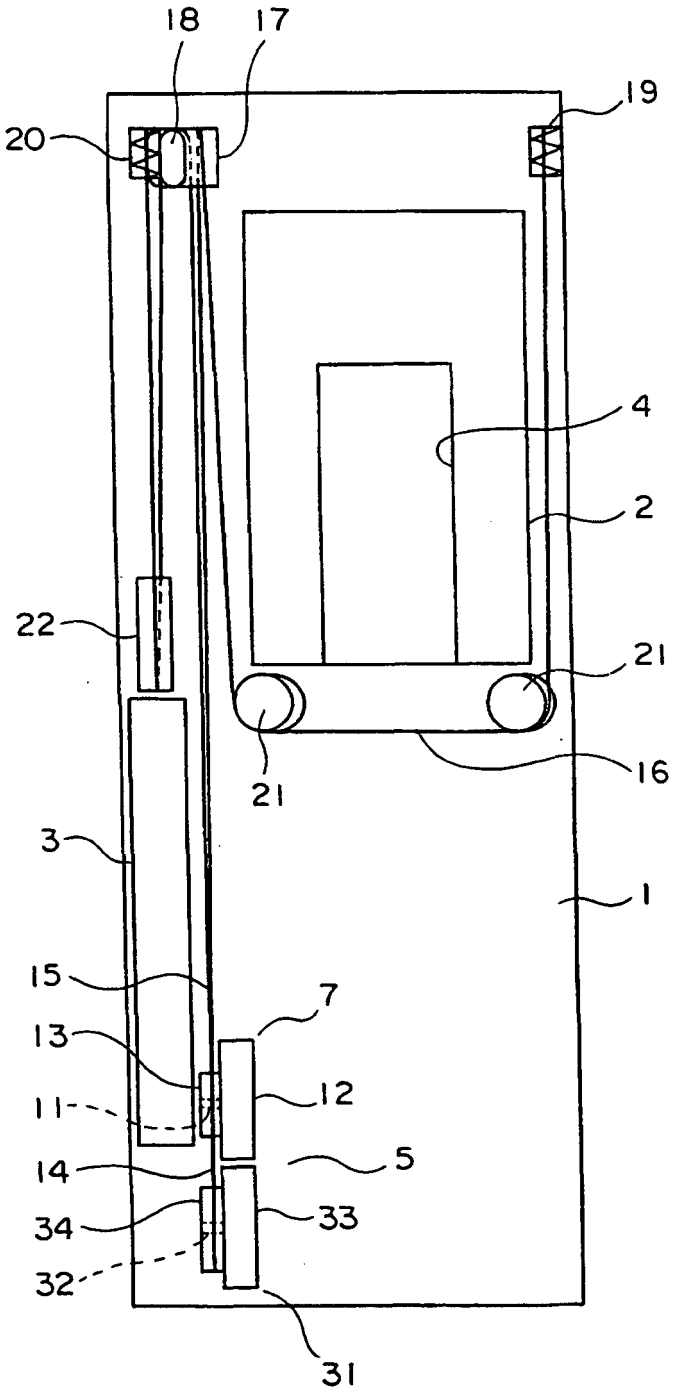


FIG. 5

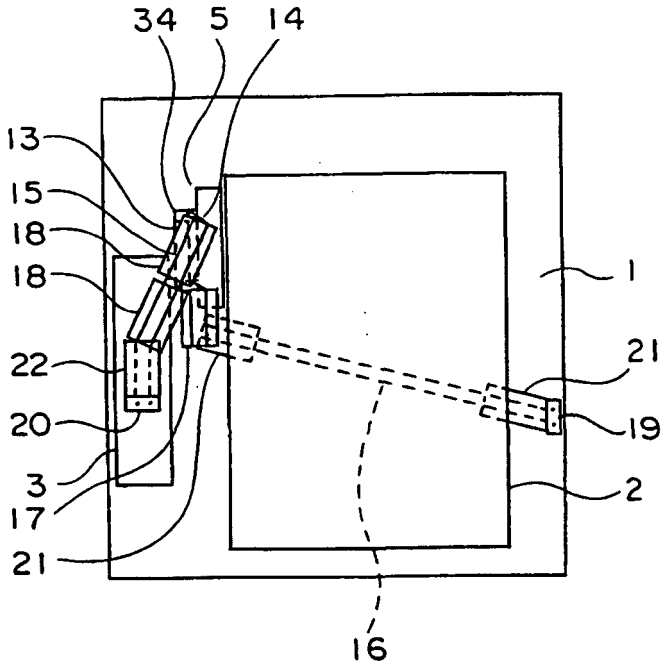
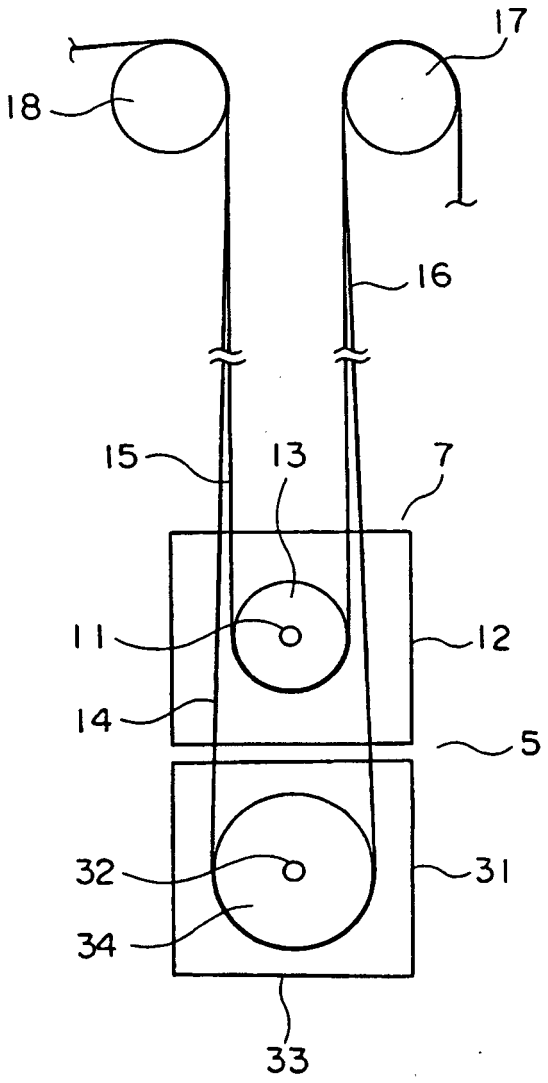


FIG. 6



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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