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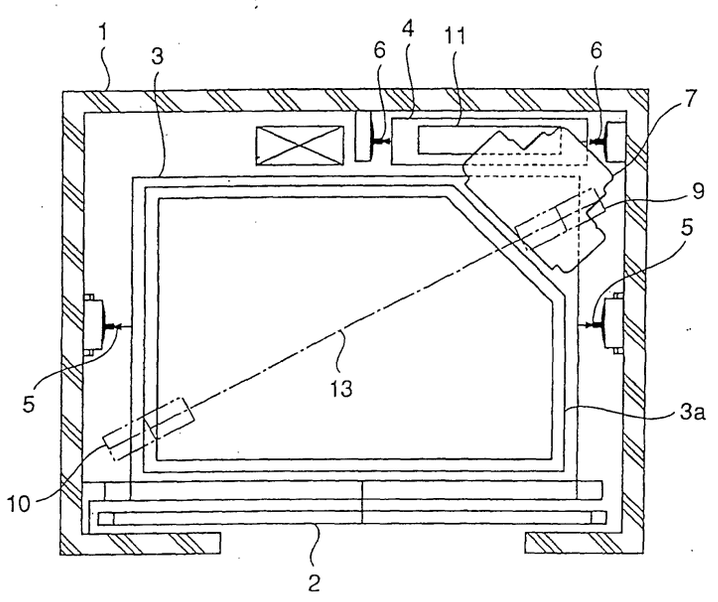
(54) ELEVATOR EQUIPMENT

(57) An elevator includes an elevator car 3 that travels up and down along car guide rails 5 in a hoistway 1; a counterweight 4 that travels up and down along a counterweight guide rail 6 in the hoistway 1; a wire rope 13 for suspending the elevator car 3 and the counterweight 4; a drive machine 7, having a sheave 14 around which the wire rope 13 is wound and a drive motor 13 that rotates the sheave 14, wherein the drive machine 7 is such that the external dimension of the drive motor 18 diametrically is larger than the external dimension of the sheave 14 diametrically, the sheave 14 side is disposed facing a wall of the hoistway 1, the revolving side of the sheave is disposed obliquely to the wall of the hoistway 1, and the drive machine is disposed to partly overlap with the elevator car 3 in the plan view of the hoistway.

Fig. 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to elevators in which the drive machine is disposed inside the upper region of the hoistway, and in which the elevator car and counterweight are run in vertically opposing directions using a wire rope wound around the drive machine sheave.

BACKGROUND ART

[0002] So-called machine room-less elevators--elevators in which the drive machine is disposed in the upper region inside the hoistway, with no machine room being provided--have been disclosed to date, for example, in Japanese Patent Laid-Open No. 1995-10434. Here, the drive machine is placed in a space between the shaft space (including the overhead extension region) required as a passageway by the elevator car, and a wall of the elevator shaft. That is, on a plan view of the hoistway, the drive machine that causes the elevator car and counterweight to travel up and down has been placed between the elevator car and the elevator shaft.

[0003] However, in the above-mentioned elevator, on the plan view of the hoistway, because the drive machine that causes the elevator car and the counterweight to travel up and down is placed between the elevator car inside the hoistway and the wall of the elevator shaft, the external dimensions of the drive machine are restricted by the size of the elevator car. Furthermore, the external dimensions of the drive machine may also influence the cross-sectional area of the hoistway, and the cross-sectional area of the hoistway may have to be enlarged.

DISCLOSURE OF THE INVENTION

[0004] The present invention is directed at solving the above-explained problems, and has as an object the provision of a machine room-less elevator whose hoistway cross-sectional area can be made small, regardless of the external dimension of the drive machine.

[0005] A further object is the provision of an elevator in which laying out the drive machine, in not being affected by the hoistway cross-sectional area and the external dimension of the drive machine, is facilitated.

[0006] An elevator related to the present invention comprises: an elevator car that travels up and down along car guide rails in a hoistway; a counterweight that travels up and down along counterweight guide rails in the hoistway; a wire rope for suspending the car and the counterweight; a drive machine provided in the top region of the hoistway, having a sheave around which the wire rope is wound and a drive motor for rotating the sheave; wherein the drive machine is such that the external dimension of the drive motor in a radial direction is larger than the external dimension of the sheave in a radial direction, the sheave side is facing the hoistway wall, the revolving side of the sheave is disposed obliquely to the hoistway wall, and the drive machine is disposed to partly overlap with the elevator car in a plan view of the hoistway.

[0007] In another aspect of the invention, an elevator comprises: an elevator car that travels up and down along car guide rails in a hoistway; a counterweight that travels up and down along counterweight guide rails in the hoistway; a wire rope for suspending the car and the counterweight; a drive machine provided in the top region of the hoistway, having a sheave around which the wire rope is wound and a drive motor for rotating the sheave; wherein the drive machine being gearless, having a rotor and a stator provided on the periphery of the rotor, the sheave side facing the hoistway wall, the revolving side of the sheave being disposed obliquely to the hoistway wall, and the drive machine being disposed to partly overlap with the elevator car in a plan view of the hoistway.

[0008] In a further aspect of the invention, an elevator comprises: an elevator car that travels up and down along car guide rails in a hoistway; a counterweight that travels up and down along counterweight guide rails in the hoistway; a wire rope for suspending the car and the counterweight; a drive machine provided in the top region of the hoistway, having a sheave around which the wire rope is wound and a drive motor for rotating the sheave; wherein the drive machine is such that the external dimension of the sheave in an axial direction is smaller than the external dimension of the sheave in the radial direction, the sheave side is facing the hoistway wall, the revolving side of the sheave is disposed obliquely to the hoistway wall, and the drive machine is disposed to partly overlap with the elevator car in a plan view of the hoistway.

[0009] Moreover the drive machine has a braking means that acts as a brake on the drive motor, the braking means being provided on the side facing the elevator car.

[0010] Furthermore, a conversion pulley disposed obliquely to the hoistway wall is provided below the elevator car and the elevator car is suspended by the wire rope via the conversion pulley.

[0011] In addition, the drive machine is supported by the car guide rails and the counterweight guide rails.

[0012] Further, in the plan view of the hoistway, handrails are disposed on the elevator car at a position apart from the drive machine.

[0013] Additionally, the portion of the handrails facing the drive machine is disposed obliquely to the hoistway wall approximately parallel to the drive machine.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

Fig. 1 is a plan view of a hoistway of an elevator relating to Embodiment 1;
Fig. 2 is a cross-sectional view of the hoistway of the elevator relating to Embodiment 1;
Fig. 3 is a cross-sectional view of a drive machine of the elevator relating to Embodiment 1;
Fig. 4 is an installation view of the drive machine of the elevator relating to Embodiment 1;
Fig. 5 is a plan view of the hoistway of the elevator relating to Embodiment 2; and
Fig. 6 is a cross-sectional view of the hoistway of the elevator relating to Embodiment 2.

BEST MODE FOR CARRYING OUT THE INVENTION

[0015] Preferred embodiments of the present invention are described below, with reference to the drawings.

Embodiment 1.

[0016] One embodiment of an elevator relating to the present invention is described using Fig. 1. Fig. 1 is a plan view of a hoistway of the elevator relating to Embodiment 1 of the present invention. Fig. 2 is a cross-sectional view of the hoistway of the elevator relating to Embodiment 1 of the present invention.

[0017] In Fig. 1 and Fig. 2, reference numeral 1 denotes a hoistway, reference numeral 2 denotes a door disposed on one side of the hoistway, reference numeral 3 denotes an elevator car (hereinafter referred to as a car) which travels up and down in the hoistway 1, reference numeral 4 is a counterweight disposed on the rear side of the car 3. The car 3 and the counterweight 4 are disposed apart from each other in a plan view of the hoistway. Reference numeral 3a denotes a car-mounted handrail provided on the car 3, which an inspector uses when he or she goes above the car 3 when carrying out maintenance of various parts of the elevator.

[0018] A pair of guide rails 5 for the car is disposed on either side of the car 3, and the car 3 travels up and down the car guide rails 5 on a predetermined path in the hoistway 1. A pair of guide rails 6 for the counterweight is disposed on either side of the counter weight 4, and the counterweight 4 travels up and down the counterweight guide rails 6 on a predetermined path in the hoistway 1.

[0019] On the plan view of the hoistway 1, reference numeral 7 denotes a drive machine disposed in the upper region of the hoistway 1, the drive machine being disposed so that at least one part of it overlaps with the car 3, the underside of the drive machine being disposed above the highest position for the car 3 and the counterweight 4.

[0020] Reference numeral 8 denotes a drive machine platform for supporting the drive machine 7; it has a L-shape in the plan view, is disposed in the upper region of the hoistway 1, and is supported by the car guide rails 5 and counterweight guide rails 6.

[0021] Reference numeral 9 denotes a first conversion pulley disposed on one side of the region under the car 3, reference numeral 10 denotes a second conversion pulley disposed on the other side of the region under the car 3, reference numeral 11 denotes a counterweight pulley disposed over the counterweight 4, and reference numeral 12 denotes a wire-rope anchorage disposed on a beam extending out from the hoistway wall. The revolving sides of these first and second conversion pulleys 9 and 10 are approximately parallel to each other, and are disposed obliquely to the wall of the hoistway 1. Also, the first conversion pulley 9 is disposed on the counterweight 4 side of the plane formed by the two car guide rails 5; and the second conversion pulley 10 is disposed on the side of the plane formed by the two car guide rails 5 opposite to the counterweight 4. A wire rope 13 between the first conversion pulley 9 and the second conversion pulley 10 traverses obliquely beneath the car 3. The drive machine 7 overlaps with the conversion pulley 9 on the plan view of the hoistway.

[0022] One end of wire rope 13 is connected, in the upper region of the hoistway 1, to the wire-rope anchorage 12 that corresponds to the second conversion pulley 10; the wire rope 13 descends, and after being wound around the second conversion pulley 10 and the first conversion pulley 9 under the car 3, in that order, it ascends; after being wound around in the drive machine 7, it descends, and after being wound around the counterweight pulley 11, it ascends, and the other end of the wire rope is connected in the upper region of the hoistway 1 to a wire-rope anchorage (not shown) that corresponds to the counterweight pulley 11.

[0023] The drive machine of the elevator according to the present invention is explained using Fig. 3. Fig. 3 is a cross-sectional view of the drive machine of the elevator related to Embodiment 1 of the present invention. In Fig. 3, reference numeral 14 denotes a sheave formed with grooves for winding the wire rope 13, reference numeral 15 denotes a shaft that provides a fixed axis, reference numeral 16 denotes a stator and reference numeral 17 denotes a rotor connected with the sheave 14. The rotor 17 is configured to be approximately cylindrical, and around the periphery of this rotor 17, the stator 16 is provided, also in a cylindrical form. Reference numeral 18 denotes a drive motor which is composed mainly of the stator 16 and the rotor 17. Thus, this drive machine 7 is a gearless traction machine having the rotor 17 and the stator 16 that surrounds the rotor 17.

[0024] Reference numeral 19 denotes brake shoes that put a brake on rotation of the rotor 17 by applying pressure, reference numeral 20 denotes a brake control means that presses the brake shoes 19 onto the rotor 17 via braking arms. Reference numeral 21 denotes a

brake comprised mainly of the brake shoes 19 and the brake control means 20 as a braking means. In the drive machine 7, these brakes 21 are provided in the side opposite the sheave 14, and, by removing an outer casing 22 from the drive machine 7, can be inspected from outside.

[0025] Here, in the drive machine 7, the external dimension of the drive motor 18 diametrically is larger than the external dimension of the sheave 14 diametrically. The external dimension of the drive motor 18 in the radial direction is determined by the size of the cylindrical stator 16. Moreover, the drive machine 7 is a so-called low-profile traction machine, in which its external dimension B in the axial orientation of the sheave 14 is smaller than its external dimension A in the diametrical orientation of the sheave 14. Thus, the overall external shape of the drive machine 7 is close to that of a tenon-on-block figure with the sheave 14 in its upper region, as shown in Fig. 3.

[0026] The installation of the drive machine of the elevator according to the present invention is explained using in Fig. 4. Fig. 4 is an installation drawing of the drive machine of the elevator related to Embodiment 1 of the present invention. In Fig. 4, the drive machine platform 8 that supports the drive machine 7 is composed of a first wide-flange steel beam 8a that forms a direct seating for the drive machine 7 and a second wide-flange steel beam 8b that supports the first wide-flange steel beam 8a. Here, the second wide-flange steel beam 8b having an L-shape in the plan view of the hoistway, is disposed in the upper region of the hoistway 1, and is supported by three guide rails--one car guide rail 5 and two counterweight guide rails 6.

[0027] In the elevator configured as above, after the drive motor 18 in the drive machine 7 is energized and the rotor receives a rotational force, the sheave 14 connected to the rotor 17 rotates, and the car 3 and the counterweight 4 travel up and down in opposite directions, via the wire rope 13. In the plan view of the hoistway, the sheave 14 of the drive machine 7 is disposed so that its diameter lies on a line joining the counterweight pulley 11 and the first conversion pulley 9 provided on one side of the region under the car 3. Thus, the drive machine 7 is disposed to the rear with respect to the door 2 of the car 3, in a corner of the hoistway 1; its sheave 14 side faces the hoistway 1 walls; and the revolving side of the sheave 14 is disposed obliquely to the walls of the hoistway 1.

[0028] In the plan view of the hoistway, the drive machine 7 is disposed so that at least a portion of it overlaps with the car 3 and the counterweight 4, and the underside of the drive machine 7 is disposed above the highest position for the car 3 and the counterweight 4. Moreover, it is preferable that the overlap area of the drive machine 7 with the car 3 is 1/2 or more of the total area of the drive machine 7, and it is even more preferable if it is 2/3 or more. Similarly, it is preferable that the overlap area of the drive machine 7 with the car 3 and with counterweight 4 is 1/2 or more of the total area of the drive machine 7, and it is even more preferable if it is 2/3 or more. In this way, in the plan view of the hoistway, 1/2 or more of the plan area of the drive machine 7 can be disposed inside the plan area of the car 3 and the counterweight 4, and the cross-sectional area of the hoistway 1 can be used effectively, that is, the resulting cross-sectional area of the hoistway 1 can be made smaller.

[0029] In the drive machine 7, the external dimension of the drive motor 18 diametrically is larger than the external dimension of the sheave 14 diametrically; this sheave 14 with the smaller external dimension is disposed directed toward the walls of the hoistway 1, and the drive motor 18 with the larger external dimension is disposed directed toward the car 3. Thus, the drive machine 7 does not interfere with the wall of the hoistway 1, which can facilitate the layout.

[0030] For this reason, the volume of the hoistway 1 can be reduced; in addition, by disposing the drive machine 7 in the upper region of the hoistway 1, the need for a separately-provided machine room can be avoided; the space in the building used for the elevator can be reduced, and, moreover, construction costs required for the elevator installation space can be curtailed.

[0031] With the drive machine 7 being a so-called low-profile traction machine in which its external dimension along the axial direction of the sheave 14 is smaller than its external dimension along the radial direction of the sheave 14, the area of the drive machine 7 that protrudes into the space above the car 3 is relatively small. Even in cases where an inspector mounts onto the top of the car 3 to carry out maintenance on the drive machine 7 and the like, sufficient maintenance space for the inspector above the car 3 can be secured. This maintenance space is demarcated by the car-mounted hand rails 3a, and in order to make the highest position for the car 3 higher, the car-mounted hand rails 3a on the plan view of the hoistway are located out of the way of the drive machine 7.

[0032] Therefore, the smaller the area of the drive machine 7 protruding into the space above the car 3, the more amply may be secured the area, surrounded by the car-mounted hand rails 3a, that is the maintenance space for the inspector. On the plan view of the hoistway, the portion of the hand rails, on the top of the car 3a, that faces the drive machine 7 is disposed obliquely to the walls of the hoistway 1, so that the inspector can carry out the maintenance of the drive machine 7 more easily.

[0033] Moreover, in cases of elevators used for heavy loads, the external dimensions of the mechanical part of the drive machine 7 are larger, and the external dimension, the diameter, of the drive motor 18 of the drive machine 7--the gearless traction machine--is larger; however, by disposing the drive motor 18 on the car 3 side, there is no interference with the wall of the hoistway 1, and even if the diameter of the drive motor 18 is enlarged by a predefined amount, the cross-sectional

area of the hoistway and the external dimension of the drive machine 7 are not affected. Thus, because the sheave 14 is disposed on the wall side of the hoistway 1 and the drive motor 18 is disposed on the car 3 side of the hoistway 1, the degree of freedom for the external dimension of the drive machine 7--the gearless traction machine--can be improved.

[0034] Moreover, in the plan view of the hoistway, a diameter of the sheave 14 of the drive machine 7 is located on a line joining the counterweight pulley 11 and the first conversion pulley 9 provided on one side below the car 3, so that there is no need to dispose a special deflector pulley, and a cost reduction can be realized. Thus, in the plan view of the hoistway, because a portion of the counterweight 4 and the sheave 14 overlap, it is not necessary to dispose the counterweight pulley 11 obliquely to the counterweight 4; the counterweight pulley 11 can be disposed within the width of the counterweight 4, and enlarging the cross-sectional area of the hoistway according to the location of the counterweight pulley 11 is unnecessary.

[0035] The drive machine 7 is supported by the drive machine platform 8; this drive machine platform 8 has an L-shape in the plan view of the hoistway, is disposed in the upper region of the hoistway 1, and is supported by a total of three guide rails--one car guide rail 5 and two counterweight guide rails 6; thus, because the load that acts on the drive machine 7 does not affect the building frame of the hoistway 1, the structure of the hoistway 1 can be made lighter in weight and the construction cost can be decreased. Moreover, as the load acting on the drive machine platform 8 due to the drive machine 7 is dispersed to the three rails, the size of each rail can be reduced and the fabrication cost can be decreased.

[0036] Because the brake 20 is disposed facing the car 3, by removing the outer casing 22 at maintenance time, maintenance of the brake and the like can be done readily.

[0037] That is, regardless of the external dimension of the drive machine, even elevators having a small hoistway cross-sectional area can be provided; moreover, the hoistway cross-sectional area and the external dimension of the drive machine are not affected, and elevators can be provided in which layout of the drive machine can be easily done.

Embodiment 2.

[0038] Another embodiment of an elevator relating to the present invention is described using Fig. 5 and Fig. 6. Fig. 5 is a plan view of a hoistway of the elevator relating to Embodiment 2 of the present invention. Fig. 6 is a cross-sectional view of the hoistway of the elevator relating to Embodiment 2 of the present invention. The configuration of the drive machine 7 of the elevator is similar to Embodiment 1, and the explanation is omitted.

[0039] In Fig. 5 and Fig. 6, reference numeral 1 denotes a hoistway, reference numeral 2 denotes a door disposed on one side of the hoistway 1, reference numeral 3 denotes an elevator car (hereinafter referred to as a car) which travels up and down in the hoistway 1, reference numeral 4 denotes a counterweight disposed on the lateral side of the car 3. The car 3 and the counterweight 4 are disposed apart from each other in the plan view of the hoistway.

[0040] A pair of car guide rails 5 is disposed on either side of the car 3, and the car 3 travels up and down the car guide rails 5 on a predetermined route in the hoistway 1. A pair of guide rails 6 for counterweight is disposed on either side of the counterweight 4, and the counterweight 4 travels up and down the counterweight guide rails 6 on a predetermined route in the hoistway 1. Thus, the width of the hoistway 1 in a lateral direction is determined by the thickness of the counterweight 4, the width of the car 3, and the size of the car guide rails 5.

[0041] On the plan view of the hoistway 1, reference numeral 7 denotes a drive machine disposed in the upper region of the hoistway 1, the drive machine being disposed so that at least one part of it overlaps with the car 3, the underside of the drive machine being disposed above the highest position for the car 3 and the counterweight 4.

[0042] Reference numeral 8 denotes a drive machine platform for supporting the drive machine 7; it has a T-shape in the plan view, is disposed in the upper region of the hoistway 1, and is supported by the car guide rails 5 and counterweight guide rails 6.

[0043] Reference numeral 9 denotes a first conversion pulley disposed on one side of the region under the car 3, reference numeral 10 denotes a second conversion pulley disposed on the other side of the region under the car 3, reference numeral 11 denotes a counterweight pulley disposed over the counterweight 4, and reference numeral 12 denotes a wire-rope anchorage disposed on a beam extending out from the hoistway wall. The revolving sides of these first and second conversion pulleys 9 and 10 are approximately parallel to each other, and are disposed obliquely to the wall of the hoistway 1. With respect to the plane formed by the two car guide rails 5, the first conversion pulley 9 is disposed opposite the door 2 side; and the second conversion pulley 10 is disposed on the door 2 side of the plane formed by the two car guide rails 5. A wire rope 13 between the first conversion pulley 9 and the second conversion pulley 10 traverses obliquely beneath the car 3.

[0044] One end of wire rope 13 is connected, in the upper region of the hoistway 1, to the wire-rope anchorage 12 that corresponds to the second conversion pulley 10; the wire rope 13 descends, and after being wound around the second conversion pulley 10 and the first conversion pulley 9 under the car 3, in that order, it ascends; after being wound around in the drive machine 7, it descends, and after being wound around the counterweight pulley 11, it ascends, and the other end of the wire rope is connected in the upper region of the hoist-

way 1 to a wire-rope anchorage (not shown) that corresponds to the counterweight pulley 11.

[0045] The drive machine of the elevator is installed in such a way that the drive machine platform 8 having a T-shape in the plan view, is disposed in the upper region of the hoistway 1, and then the drive machine is supported by three guide rails--one car guide rails 5 and two counterweight guide rail 6.

[0046] In the elevator configured as above, after the drive motor 18 in the drive machine 7 is energized to apply rotational power to the rotor, the sheave 14 connected to the rotor 17 rotates, and the car 3 and the counterweight 4 travel up and down in opposite directions, via the wire rope 13. In the plan view of the hoistway, the sheave 14 of the drive machine 7 is disposed so that a diameter thereof lies on a line joining the counterweight pulley 11 and the first conversion pulley 9 provided on one side of the region under the car 3. Thus the drive machine 7 is disposed on the lateral side on which the counterweight 4 for the car 3 is disposed, such that the revolving side of the sheave 14 is disposed obliquely to the wall of the hoistway 1.

[0047] In the plan view of the hoistway, the drive machine 7 is disposed so that at least a portion of it overlaps with the car 3 and the counterweight 4, and the underside of the drive machine 7 is disposed above the highest position for the car 3 and the counterweight 4. And although the overlap area of the drive machine 7 and the car 3 is smaller than in Embodiment 1, owing to the configuration in which one car guide rail 5 is disposed between the car 3 and the counterweight 4, the cross-sectional area of the hoistway is not made larger.

[0048] In the drive machine 7, the external dimension of the drive motor 18 diametrically is larger than the external dimension of the sheave 14 diametrically; this sheave.14 with the smaller external dimension is disposed directed toward the walls of the hoistway 1, and the drive motor 18 with the larger external dimension is disposed directed toward the car 3. The drive machine 7 is disposed closer to the car 3 than to the plane that the counterweight 4 defines on its side wall of the hoistway 1. Thus, the drive machine 7 does not interfere with the wall of the hoistway 1, which can facilitate the layout.

[0049] For this reason, the volume of the hoistway 1 can be reduced; in addition, by disposing the drive machine 7 in the upper region of the hoistway 1, the need for a separately-provided machine room can be avoided; the space in the building used for the elevator can be reduced, and, moreover, construction costs required for the elevator installation space can be curtailed.

[0050] With the drive machine 7 being a so-called low-profile traction machine in which its external dimension along the axial direction of the sheave 14 is smaller than its external diameter dimension along the radial direction of the sheave 14, the area of the drive machine 7 that protrudes into the space above the car 3 is relatively small. Even in cases where an inspector mounts onto the top of the car 3 to carry out maintenance on the drive machine 7 and the like, sufficient maintenance space for the inspector above the car 3 can be secured.

[0051] Moreover, in cases of elevators used for heavy loads, the external dimensions of the mechanical part of the drive machine 7 are larger, and the external dimension, the diameter, of the drive motor 18 of the drive machine 7--the gearless traction machine--is larger; however, by disposing the drive motor 18 on the car 3 side, there is no interference with the wall of the hoistway 1, and even if the diameter of the drive motor 18 is enlarged by a predefined amount, the cross-sectional area of the hoistway and the external dimension of the drive machine 7 are not affected. Thus, because the sheave 14 is disposed on the wall side of the hoistway 1 and the drive motor 18 is disposed on the car 3 side of the hoistway 1, the degree of freedom for the external dimension of the drive machine 7--the gearless traction machine--can be improved.

[0052] Moreover, in the plan view of the hoistway, a diameter of the sheave 14 of the drive machine 7 is located on a line joining the counterweight pulley 11 and the first conversion pulley 9 provided on one side below the car 3, so that there is no need to dispose a special deflector pulley, and a cost reduction can be realized. Thus, in the plan view of the hoistway, because a portion of the counterweight 4 and the sheave 14 overlap, it is not necessary to dispose the counterweight pulley 11 obliquely to the counterweight 4; the counterweight pulley 11 can be disposed within the width of the counterweight 4. As a result, enlarging the width, that is, the cross-sectional area of the hoistway according to the location of the counterweight pulley 11 is unnecessary.

[0053] The drive machine 7 is supported by the drive machine platform 8; this drive machine platform 8 has a T-shape in the plan view of the hoistway, is disposed in the upper region of the hoistway 1, and is supported by a total of three guide rails--one car guide rail 5 and two counterweight guide rails 6; thus, because the load that acts on the drive machine 7 does not affect the building frame of the hoistway 1, the structure of the hoistway 1 can be made lighter in weight and the construction cost can be decreased. Moreover, as the load acting on the drive machine platform 8 due to the drive machine 7 is dispersed to the three rails, the size of each rail can be reduced and the fabrication cost can be decreased.

Claims

1. An elevator comprising:

an elevator car that travels up and down along car guide rails in a hoistway;
a counterweight that travels up and down along counterweight guide rails in the hoistway;
a wire rope for suspending the car and the counterweight;

a drive machine provided in the top region of the hoistway, having a sheave around which the wire rope is wound and a drive motor for rotating the sheave;

wherein the drive machine, with the external dimension of the drive motor diametrically being larger than the external dimension of the sheave diametrically, is disposed with its sheave end facing the hoistway walls and the revolving side of the sheave oblique with respect to the hoistway walls, and is disposed to partly overlap with the elevator car in plan view of the hoistway.

2. An elevator comprising:

an elevator car that travels up and down along car guide rails in a hoistway;
a counterweight that travels up and down along counterweight guide rails in the hoistway;
a wire rope for suspending the car and the counterweight;
a drive machine provided in the top region of the hoistway, having a sheave around which the wire rope is wound and a drive motor for rotating the sheave;

wherein the drive machine is gearless, having a rotor and a stator provided around the periphery of the rotor, and is disposed with its sheave side facing the hoistway walls and the revolving side of the sheave oblique with respect to the hoistway walls, and is disposed to partly overlap with the elevator car in plan view of the hoistway.

3. An elevator comprising:

an elevator car that travels up and down along car guide rails in a hoistway;
a counterweight that travels up and down along counterweight guide rails in the hoistway;
a wire rope for suspending the car and the counterweight;
a drive machine provided in the top region of the hoistway, having a sheave around which the wire rope is wound and a drive motor for rotating the sheave;

wherein the drive machine in external dimension along the sheave axial direction is smaller than in external dimension along the sheave radial direction, and is disposed with its sheave side is facing the hoistway walls and the revolving side of the sheave oblique to the hoistway walls, and is disposed to partly overlap with the elevator car in plan view of the hoistway.

4. An elevator according to any one of claims 1-3, wherein the drive machine has a braking means that acts as a brake on the drive motor, the braking means being provided on the side facing the elevator car.

5. An elevator according to any one of claims 1-3, wherein a conversion pulley disposed obliquely to the hoistway walls is provided below the elevator car and the elevator car is suspended by the wire rope via the conversion pulley.

6. An elevator according to any one of claims 1-3, wherein the drive machine is supported by the car guide rails and the counterweight guide rails.

7. An elevator according to any one of claims 1-3, wherein, in the plan view of the hoistway, handrails are disposed on the elevator car positioning locations out of the way of the drive machine.

8. An elevator according to claim 7, wherein a portion of the handrails that opposes the drive machine is disposed obliquely to the hoistway walls, approximately parallel to the drive machine.

Fig. 1

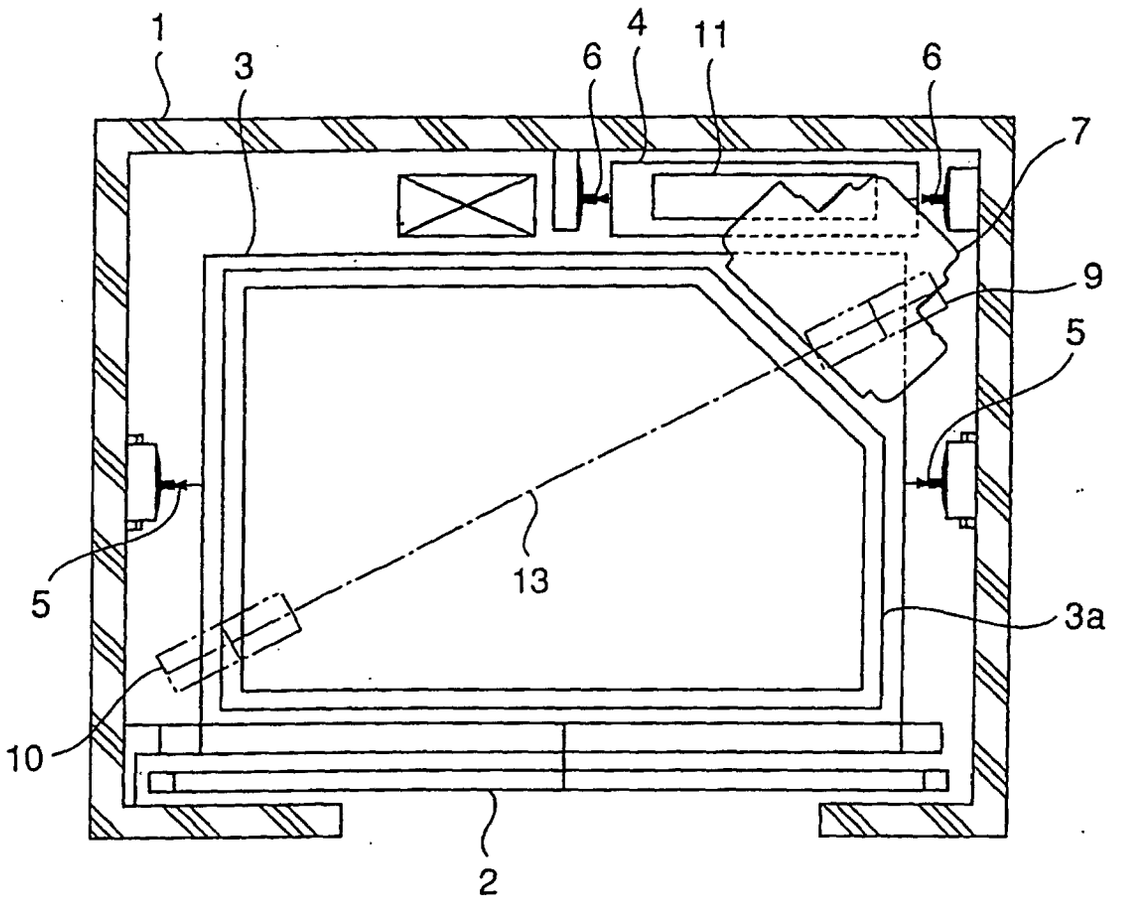


Fig. 2

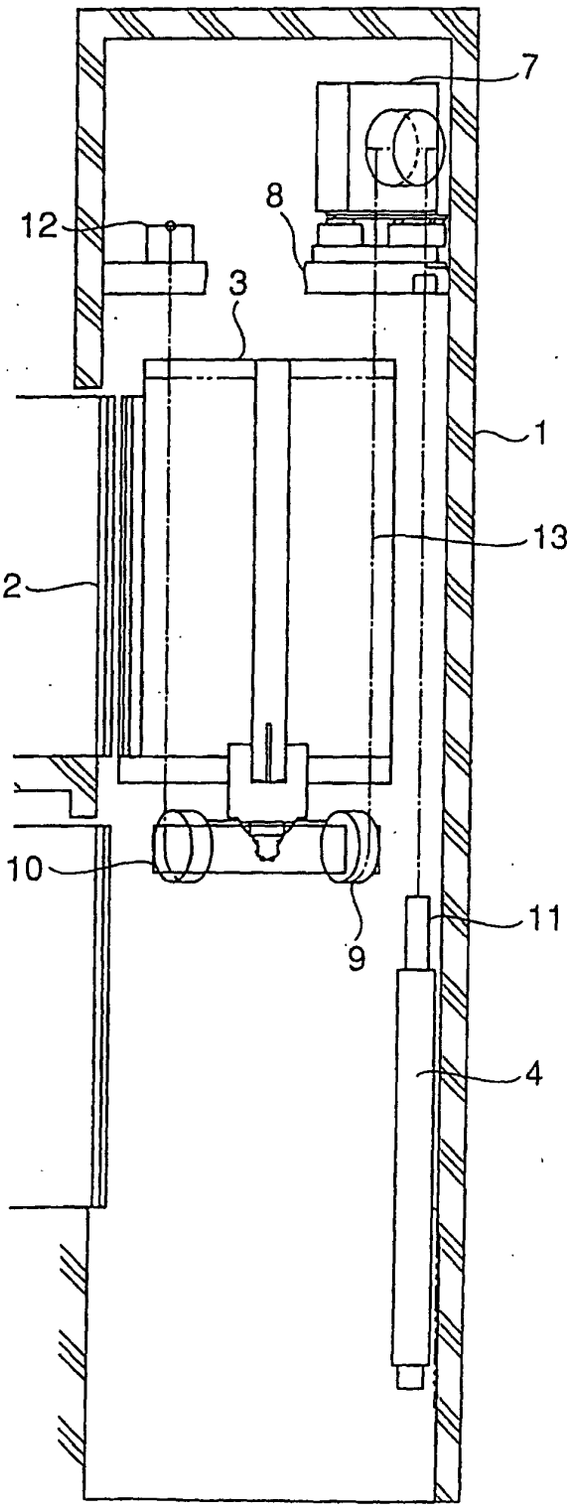


Fig. 3

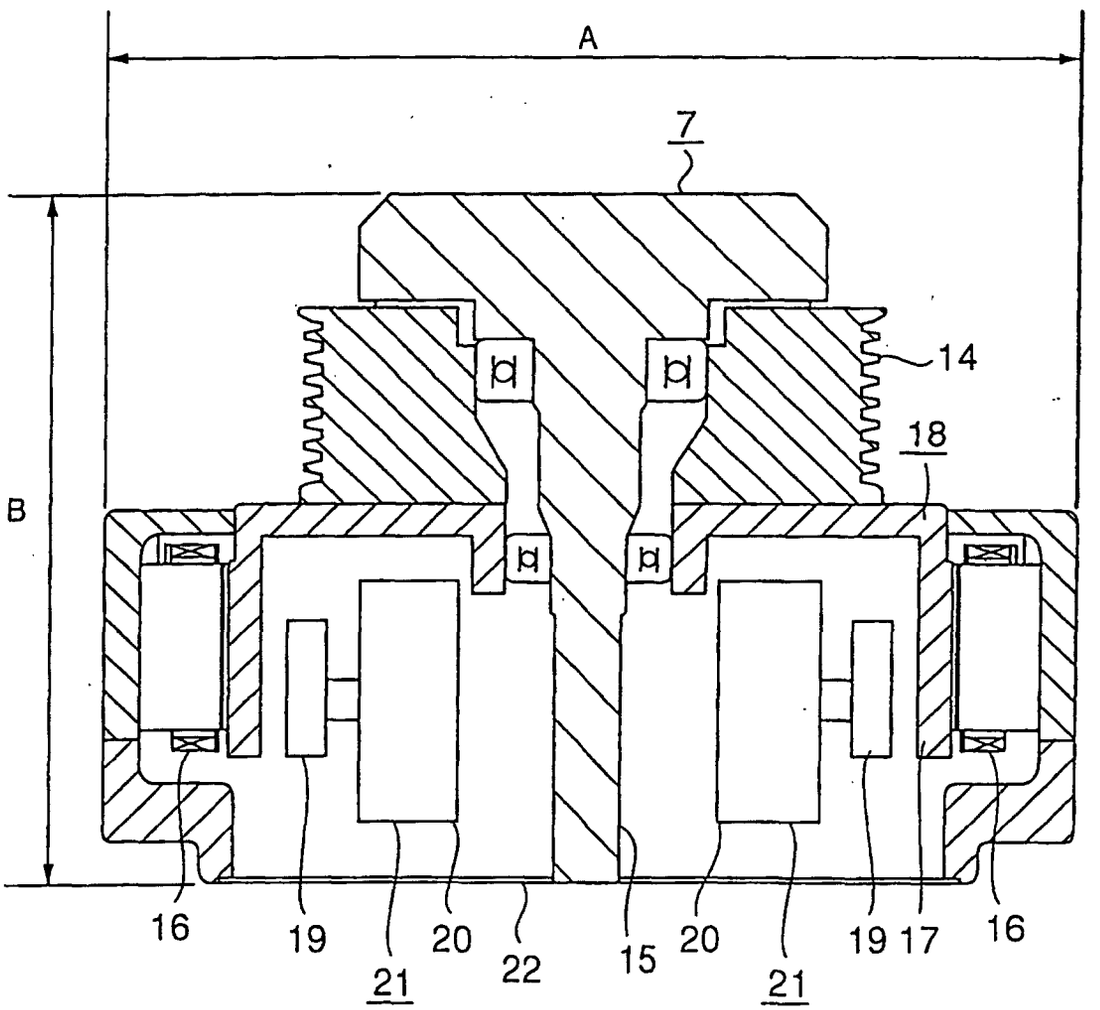


Fig. 4

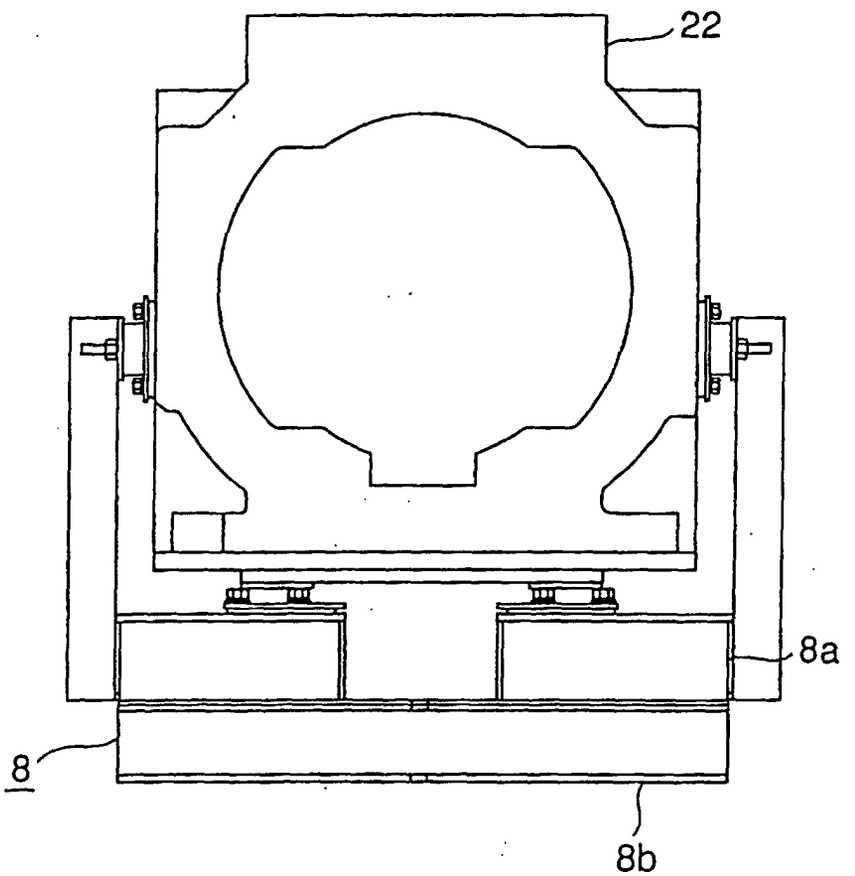


Fig. 5

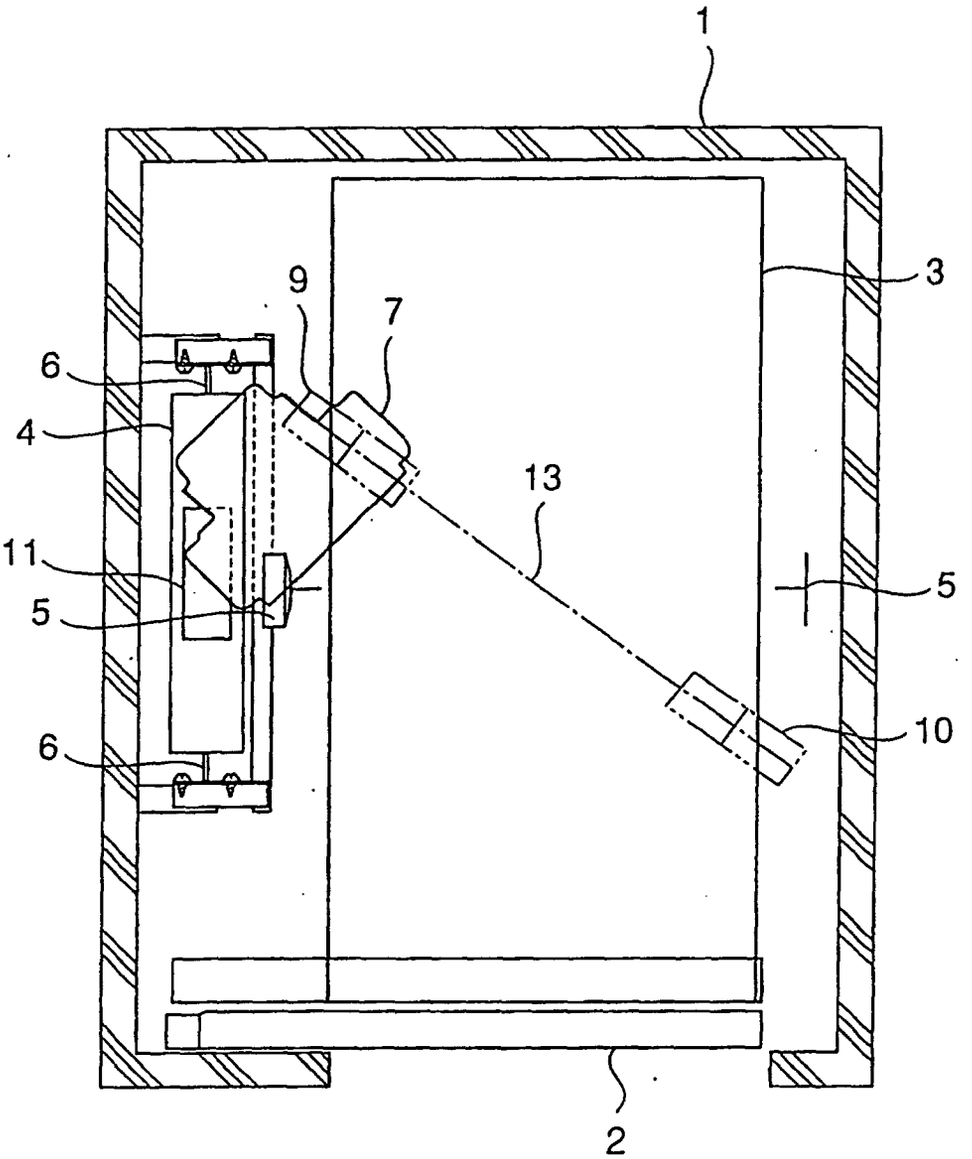
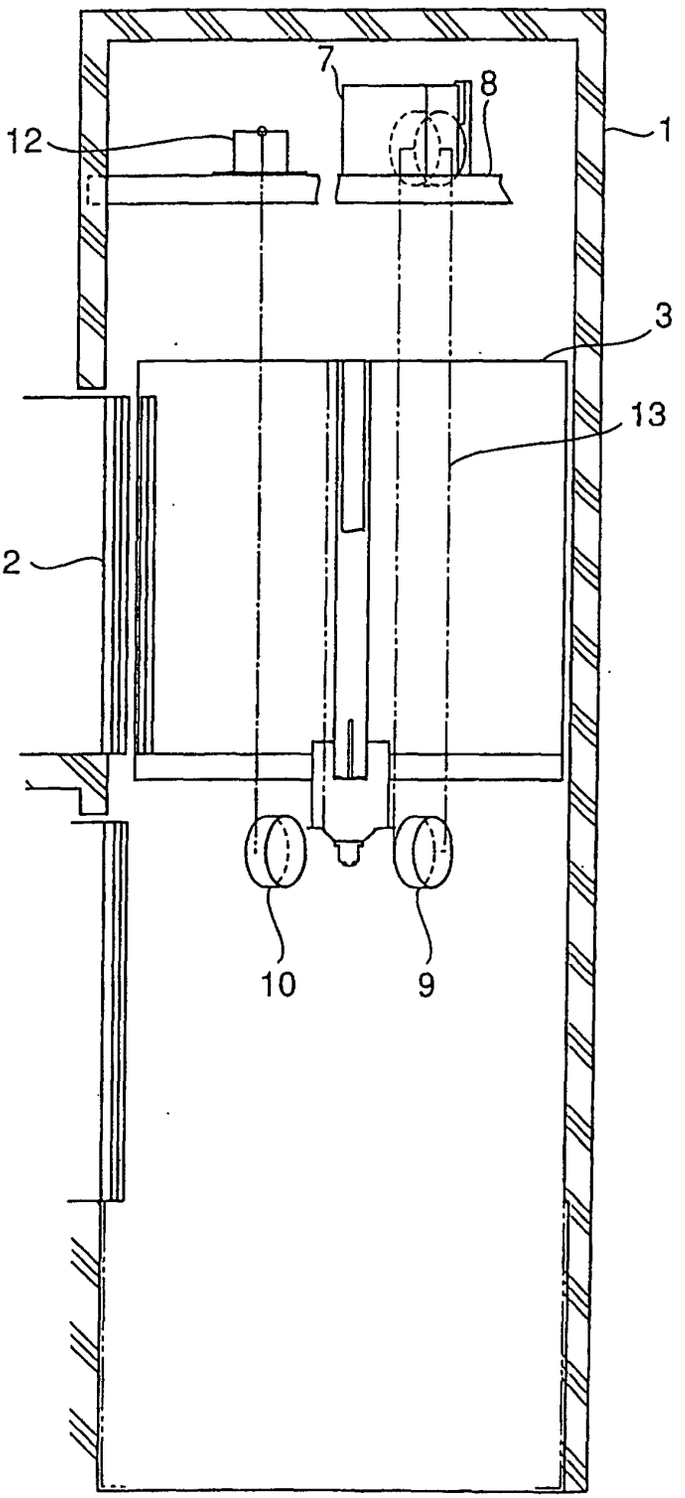


Fig. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/06232

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] B66B7/00, B66B11/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] B66B1/00-B66B11/08

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2003
Kokai Jitsuyo Shinan Koho	1971-2003	Toroku Jitsuyo Shinan Koho	1994-2003

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 2001-48451 A (Mitsubishi Electric Corp.), 20 February, 2001 (20.02.01), (Family: none)	1,3,5-6 2,4,7-8
Y	JP 2001-63933 A (Mitsubishi Electric Corp.), 13 March, 2001 (13.03.01), (Family: none)	2,4
Y	JP 2001-139249 A (Toshiba Elevator and Building Systems Corp., Toshiba Corp.), 22 May, 2001 (22.05.01), Par. No. [0023]; Fig. 1 (Family: none)	7-8
A	JP 2001-80843 A (Mitsubishi Electric Corp.), 27 March, 2001 (27.03.01), (Family: none)	1-6

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 March, 2003 (13.03.03)	25 March, 2003 (25.03.03)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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