

DESCRIPTION

ELEVATORTECHNICAL FIELD

The present invention relates to a traction-type elevator having a car, a counterweight, and a hoisting machine for driving a rope connecting the car and the counterweight, and not needing any elevator machinery room.

BACKGROUND ART

Referring to Fig. 5, a prior art traction-type elevator has a car 3 that moves vertically by a pair of car guide rails 2a and 2b, and a counterweight 10 that moves vertically along a pair of counterweight guide rails 1a and 1b. A rope 6a connecting the car 3 and the counterweight 10 is driven by a hoisting machine 5. When the hoisting machine 5 is installed in an upper part of an elevator shaft 15, the hoisting machine 5 is supported on the pair of counterweight guide rails 1a and 1b in a space between the car 3 and a side wall of the elevator shaft 15. (Jpn. Pat. App. Hei 7-308515).

In this prior art elevator, the center of gravity of the car 3 that moves vertically along the pair of car guide rails 2a and 2b is apart from the center of the pair of counterweight guide rails 1a and 1b and hence a high force acts on the hoisting machine 5. Therefore, a high bending force act on the pair of counterweight guide rails 1a and 1b.

DISCLOSURE OF THE INVENTION

The present invention has been made in view of such circumstances and it is therefore an object of the present invention seeking to provide an elevator including a pair of counterweight guide rails, and a hoisting

machine supported on the pair of counterweight guide rails, and capable of limiting a bending force that acts on the counterweight guide rails to a low level.

According to an aspect of the present invention, there is provided an elevator comprising: a car placed in a elevator shaft so as to move vertically along a pair of car guide rails; a counterweight placed in the elevator shaft so as to move vertically along a pair of counterweight guide rails, and connected to the car by a rope; and a hoisting machine for driving the rope; wherein the hoisting machine is mounted on a base attached to the upper ends of the pair of counterweight guide rails and the upper end of one of the pair of car guide rails, and the hoisting machine overlaps the car in a projection on a horizontal plane.

In the elevator according to embodiments of the present invention, the rope has one end attached to a rope-suspending member, and the rope-suspending member is mounted on the base.

In the elevator according to embodiments of the present invention, the base is mounted on the upper ends of the pair of counterweight guide rails and the upper end of one of the pair of car guide rails through rubber vibration isolators held between the base and the upper ends of the pair of counterweight guide rails and one of the car guide rails.

In the elevator according to embodiments of the present invention, the hoisting machine and the car overlap each other.

In the elevator according to embodiments of the present invention, a straight line extending between the pair of counterweight guide rails, and a straight line extending between the pair of car guide rails are perpendicular to each other.

In the elevator according to embodiments of the present invention, the base has three parts respectively mounted on the upper ends of the pair of counterweight guide rails and

the upper end of one of the pair of car guide rails.

In the elevator according to embodiments of the present invention, the base is mounted on the upper ends of the counterweight guide rails and the upper end of one of the pair of car guide rails through length-adjustable shims held between the base and the upper ends of the pair of counterweight guide rails and one of the pair of car guide rails.

In the elevator according to embodiments of the present invention, the rubber vibration isolators are provided with bolt holes, respectively.

In the elevator according to embodiments of the present invention, the base has a rectangular shape, the hoisting machine is disposed on a part near one end of the base, and the rope-suspending member is disposed on a part near the other end of the base.

In the elevator according to embodiments of the present invention, the center of gravity of the hoisting machine is near one of the guide rails.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of an elevator in a preferred embodiment according to the present invention;

Fig. 2 is a plan view of the elevator;

Fig. 3 is an enlarged view of a base support structure;

Figs. 4 (a) and 4 (b) are views of a shim and rubber vibration isolators; and

Fig. 5 is a perspective view of a prior art elevator.

BEST MODE FOR CARRYING OUT THE INVENTION

A preferred embodiment of the present invention will be described with reference to the accompanying drawings. Figs. 1 to 4 (a) (b) show an elevator in a preferred embodiment according to the present invention.

Referring to Figs. 1 to 4 (a) (b), an elevator has a car 3 placed in an elevator shaft 15 so as to move vertically along a pair of car guide rails 2a and 2b, and a counterweight 10 placed in the elevator shaft 15 so as to move vertically along a pair of counterweight guide rails 1a and 1b. The car 3 and the counterweight 10 are connected by a rope 6a wound around a sheave 5a mounted on the output shaft of a hoisting machine 5. The hoisting machine 5 drives the rope 6a through the sheave 5a.

As shown in Fig. 2, the pair of counterweight guide rails 1a and 1b, and the pair of car guide rails 2a and 2b are disposed so that a straight line L_2 extending between the car guide rails 2a and 2b, and a straight line L_1 extending between the counterweight guide rails 1a and 1b are perpendicular to each other.

The hoisting machine 5 is mounted on a rectangular base 9. The base 9 is mounted on the upper ends of the pair of counterweight guide rails 1a and 1b, and the upper end of the car guide rail 2a, i.e., one of the car guide rails 2a and 2b.

The rope 6a has one end attached to a rope-suspending member 6 mounted on the base, and the other end attached to a rope-suspending member attached to an upper part of the car guide rail 2b.

A support structure for supporting the base 9 will be described with reference to Figs. 3 and 4. Referring to Figs. 3 and 4, brackets 7 are attached to the upper ends of the pair of counterweight guide rails 1a and 1b, and the upper end of the car guide rail 2a. The base 9 is mounted on the counterweight guide rails 1a and 1b, and the car guide rail 2a. A pair of rubber vibration isolators 8 and a shim 8b are held between the base 9 and each of the brackets 7.

As shown in Fig. 2 in a plan view, the hoisting machine 5 partially overlaps the car 3.

The operation of this embodiment will be described.

The hoisting machine 5 drives the rope 6a through the sheave 5a to move the car 3 and the counterweight 10 vertically in the elevator shaft 15.

5 The base 9 supporting the hoisting machine 5 has three parts respectively mounted on the upper ends of the pair of counterweight guide rails 1a and 1b, and the upper end of the car guide rail 2a, i.e., one of the pair of car guide rails 2a and 2b. Thus, force exerted
10 through the rope 6a on the hoisting machine 5 is distributed uniformly to the guide rails 1a, 1b and 2a. Therefore, the pair of counterweight guide rails 1a and 1b may be of a small size.

 Since the car 3 and the hoisting machine 5
15 partially overlap each other in a projection on a horizontal plane, the car 3 can be moved by the rope 6a wound round the sheave 5a mounted on the output shaft of the hoisting machine 5 and nearer to the center of gravity of the car 3. Thus, the car 3 can stably be
20 moved by the rope 6a.

 The base 9 is mounted on the upper ends of the pair of counterweight guide rails 1a and 1b, and the upper end of the car guide rail 2a through the length-adjustable shim 8b held between the base 9 and each of
25 the upper ends of the guide rails 1a, 1b and 2a. Therefore, the base 9 can stably and horizontally be set on the guide rails 1a, 1b and 2a even if the guide rails 1a, 1b and 2a have different lengths, respectively. The rubber vibration isolators 8 held between the base 9 and
30 the upper ends of the pair of counterweight guide rails 1a and 1b, and the upper end of the car guide rail 2a isolates the hoisting machine 5 from the vibrations of the guide rails 1a, 1b and 2a.

 Since the rubber vibration isolators 8 are provided
35 with bolt holes 8a as shown in Figs. 4(a) and 4(b), the rubber vibration isolators 8 can easily be attached to

the base 9 and the brackets 7 by passing bolts, not shown, through the bolt holes 8a.

Since the hoisting machine 5 is disposed on a part near one end of the base, and the rope-suspending member 6 is disposed on a part near the other end of the base, as viewed in a plan view shown in Fig. 2, force is distributed uniformly exerted on the base 9, and hence force can uniformly be exerted on the guide rails 1a, 1b and 2a by the base 9. The center of gravity of the hoisting machine 5 is near the guide rail 2a.

As apparent from the foregoing description, according to the present invention, the force produced by the hoisting machine is distributed to the pair of counterweight guide rails and one of the car guide rails. Thus, high bending force does not act only on the pair of counterweight guide rails supporting the hoisting machine because the hoisting machine is attached to the upper parts of the pair of counterweight guide rails, and the upper part of one of the car guide rails. Therefore, the counterweight guide rails do not need to be of a very large shape. Since the hoisting machine and the car partially overlap each other as viewed in a projection on a horizontal plane, the hoisting machine can be disposed near the center of gravity of the car and the hoisting machine can stably drive the car through the rope.

CLAIMS

1. An elevator comprising:
 - a car placed in a elevator shaft so as to move vertically along a pair of car guide rails;
 - a counterweight placed in the elevator shaft so as to move vertically along a pair of counterweight guide rails, and connected to the car by a rope; and
 - a hoisting machine for driving the rope;wherein the hoisting machine is mounted on a base attached to the upper ends of the pair of counterweight guide rails and the upper end of one of the pair of car guide rails, and the hoisting machine overlaps the car in a projection on a horizontal plane.
2. The elevator according to claim 1, wherein the rope has one end attached to a rope-suspending member, and the rope-suspending member is mounted on the base.
3. The elevator according to claim 1, wherein the base is mounted on the upper ends of the pair of counterweight guide rails and the upper end of one of the pair of car guide rails through rubber vibration isolators held between the base and the upper ends of the pair of counterweight guide rails and one of the pair of car guide rails.
4. The elevator according to claim 1, wherein the hoisting machine and the car partially overlap each other.
5. The elevator according to claim 1, wherein a straight line extending between the pair of counterweight guide rails, and a straight line extending between the pair of car guide rails are perpendicular to each other.
6. The elevator according to claim 1, wherein the base has three parts respectively mounted on the upper ends of the pair of counterweight guide rails and the upper end of one of the pair of car guide rails.

7. The elevator according to claim 1, wherein the base is mounted on the upper ends of the counterweight guide rails and the upper end of one of the pair of car guide rails through length-adjustable shims held between the base and the upper ends of the pair of counterweight guide rails and one of the pair of car guide rails.

8. The elevator according to claim 3, wherein the rubber vibration isolators are provided with bolt holes, respectively.

9. The elevator according to claim 3, wherein the base has a rectangular shape, the hoisting machine is disposed on a part near one end of the base, and the rope-suspending member is disposed on a part near the other end of the base.

10. The elevator according to claim 1, wherein the center of gravity of the hoisting machine is near one of the guide rails.