

ELEVATOR

Technical Field

The present invention relates to an elevator, and in particular to an elevator with a double anti-vibration structure between a traction machine and a bearing beam within a machine room.

Background

The elevator within the machine room comprises a bearing beam erected in the machine room, and a stand-fixation table arranged on the bearing beam and used for mounting the traction machine thereon. When the car is freely moving up and down in the hoistway at the time of running of the elevator, the traction machine and the like installed in the machine room vibrate due to the operation, and this kind of vibrate is embodied as noise in the machine room.

In the conventional elevator, an anti-vibration mechanism is provided between the traction machine and the bearing beam (specifically between the stand-fixation table on which the traction machine is mounted and the bearing beam) to damp the vibration and reduce noise. However, when the elevator runs at a high speed, for example, when the running speed reaches 120 m/min or more, the vibration is intensified. At this time, the single anti-vibration structure only with an anti-vibration mechanism between the bearing beam and the traction machine can not sufficiently alleviate the vibration, and the noise in the machine room will be very large and may exceed the specified range.

Contents of the Invention

One object of the present invention is to provide an elevator, which doubles the single vibration-proof structure to form a dual vibration-proof structure, thereby reliably absorbing vibration and reducing noise in the machine room.

An elevator according to one aspect of the invention is characterized in that the elevator is provided with in the machine room: bearing beams erected in the machine room; a stand-fixation table disposed on the bearing beams; a traction machine that is mounted on the stand-fixation table through a stand and has a traction sheave wound with a rope; and a guide wheel that directs one end of the rope from the traction sheave toward the counterweight side, wherein the stand-fixation table comprises: lower stand-fixation tables arranged on the upper surfaces of the bearing beams, middle stand-fixation tables

arranged on the upper surfaces of the lower stand-fixation tables, and upper stand-fixation tables arranged on the upper surfaces of the middle stand-fixation tables, the traction machine is mounted on the upper surfaces thereof; a first vibration-proof mechanism is installed between the bearing beams and the lower stand-fixation tables; and a second vibration-proof mechanism is installed between the middle stand-fixation tables and the upper stand-fixation tables.

The above elevator also may be configured such that the first vibration-proof mechanism is provided with a first vertical vibration-proof member that is installed between the upper surfaces of the bearing beams and the lower surfaces of the lower stand-fixation tables to absorb the vertical vibration, and the second vibration-proof mechanism is provided with a second vertical vibration-proof member that is installed between the upper surfaces of the middle stand-fixation tables and the lower surfaces of the upper stand-fixation tables to absorb the vertical vibration.

The above elevator also may be configured such that the second vibration-proof mechanism further comprises: a gusset member having vertically-arranged horizontal surface and vertical surface, wherein the horizontal surface is secured on the upper surface of the middle stand-fixation table, and the vertical surface is secured on the side surface of the upper stand-fixation table on the guide wheel side; and a horizontal vibration-proof member installed between the side surface of the upper stand-fixation table on the guide wheel side and the vertical surface of the gusset member to absorb the horizontal vibration.

The above elevator also may be configured such that the bearing beam, the lower stand-fixation table, the middle stand-fixation table and the upper stand-fixation table each are two horizontally-extending and mutually-parallel mechanical beams, the two mechanical beams as the lower stand-fixation tables are respectively arranged along the two mechanical beams as the bearing beams in such a way that the extending direction is parallel to the two mechanical beams as the bearing beams, the two mechanical beams as the lower stand-fixation tables are arranged to intersect with the two mechanical beams as the middle stand-fixation tables, and the two mechanical beams as the middle stand-fixation tables are arranged to intersect with the two mechanical beams as the upper stand-fixation tables.

The above elevator also may be configured such that a plurality of the first vertical vibration-proof members of the first vibration-proof mechanism are disposed at predetermined intervals along the extending direction of the two mechanical beams as the

lower stand-fixation tables, the second vertical vibration-proof members of the second vibration-proof mechanism are disposed at the overlapping locations of the two mechanical beams as the middle stand-fixation tables with the two mechanical beams as the upper stand-fixation tables, and disposed on the side surfaces of the two mechanical beams as the upper stand-fixation tables on the guide wheel side are the horizontal vibration-proof members of the second vibration-proof mechanism, one on each side surface.

The above elevator also may be configured such that each of the two mechanical beams is provided with a plurality of reinforcing ribs at predetermined intervals along the extending direction.

The above elevator also may be configured such that the two mechanical beams as the lower stand-fixation tables perpendicularly intersect with the two mechanical beams as the middle stand-fixation tables, and the two mechanical beams as the middle stand-fixation tables perpendicularly intersect with the two mechanical beams as the upper stand-fixation tables.

The above elevator also may be configured such that a rotating shaft of the guide wheel is supported on the lower stand-fixation table.

The above elevator also may be configured such that the first vertical vibration-proof member, the second vertical vibration-proof member and the horizontal vibration-proof member are formed by a rubber gasket respectively.

The above elevator also may be configured such that the elevator is the one having a traction ratio of 2:1.

According to the elevator having the above configuration, it is possible to reliably absorb the vibration and reduce the noise in the machine room by providing the dual vibration-proof structure in the machine room.

Description of the Drawings

FIG. 1 is a schematic view showing the basic structure of an elevator of the invention.

FIG. 2 is a schematic view showing the basic structure of an elevator of the invention, which is a schematic top view of the hoistway arrangement.

FIG. 3 is a schematic top view showing the machine room arrangement of the elevator of the invention.

FIG. 4 is a perspective view showing a dual vibration-proof structure of the elevator of the invention, which is viewed from one direction of the rotating shaft of the traction

sheave.

FIG. 5 is a perspective view showing a dual vibration-proof structure of the elevator of the invention, which is viewed from another direction of the rotating shaft of the traction sheave.

FIG. 6 is a perspective view partially showing the second vibration-proof mechanism of the invention.

List of reference signs:

- 1 car
- 10 car sheave
- 2 counterweight
- 20 counterweight sheave
- 3 traction machine
- 30 traction sheave
- 4 bearing beam
- 40 guide wheel
- 5 stand-fixation table
- 51 lower stand-fixation table
- 52 middle stand-fixation table
- 53 upper stand-fixation table
- 6 first vibration-proof mechanism
- 61 first vertical vibration-proof member
- 7 second vibration-proof mechanism
- 71 second vertical vibration-proof member
- 72 gusset member
- 73 horizontal vibration-proof member
- 721 horizontal surface
- 722 vertical surface

Embodiments

The structure of the elevator in terms of space generally comprises: a machine room part, which is equipped with power switches, a control cabinet, a traction machine, a guide wheel, a speed governor and the like; a hoistway part, which is equipped with guide rails, counterweight and so on; and a car part being lifted in the hoistway.

The examples of an elevator according to the present invention will be described in detail hereinafter with reference to the drawings.

FIG. 1 is a schematic view showing the basic structure of the elevator. FIG. 2 also is a schematic view showing the basic structure of the elevator, which is a schematic top view of the hoistway arrangement. FIG. 3 is a schematic top view showing the machine room arrangement of the elevator of the invention. As shown in FIG. 1 to FIG. 3, the elevator of the embodiment includes a car (CAR) 1 for passengers to board moving up and down in the hoistway; a counterweight (C/W) 2 moving up and down in the hoistway; and a traction machine 3 arranged within the machine room, which transmits traction power to the car 1 and the counterweight 2 so that counterweight are relatively hoisted and lowered within the hoistway.

The elevator according to the embodiment is provided with as sheaves: a traction sheave 30; a guide wheel 40 arranged within the machine room for directing one end of the rope from the traction sheave 30 towards the counterweight side; a counterweight sheave 20 arranged above the counterweight for receiving one end of the rope from the traction sheave 30 and winding it; and a car sheave 10 arranged on the upper beam of the car frame for receiving the other end of the rope from the traction sheave and wind it. The elevator having a traction ratio of 2:1 is shown in Fig. 1, but is not limited thereto.

FIG. 4 is a perspective view showing a dual vibration-proof structure of the elevator according to the invention, which is viewed from one direction of the rotating shaft of the traction sheave. FIG. 5 is a perspective view showing the dual vibration-proof structure of the elevator according to the invention, which is viewed from another direction of the rotating shaft of the traction sheave.

As illustrated in FIG. 4 and FIG. 5, in the elevator according to this embodiment the bearing beams 4 formed by two horizontally-extending and mutually-parallel mechanical beams are erected in the machine room, and the traction machine 3 is mounted on the bearing beams 4 through a stand-fixation table 5. Concretely, the stand-fixation table 5 comprises lower stand-fixation tables 51 arranged on the upper surfaces of the bearing beams 4, middle stand-fixation tables 52 arranged on the upper surfaces of the lower stand-fixation tables 51, and upper stand-fixation tables 53 arranged on the upper surfaces of the middle stand-fixation tables 52. In the stand-fixation table 5, the traction machine 3 is arranged on the upper surfaces of the upper stand-fixation tables 53 by a stand 31, and a rotating shaft of the guide wheel 30 is supported on the lower stand-fixation tables 51.

In addition, the stand-fixation table 5 according to this embodiment, as one example,

can be configured such that the lower stand-fixation tables 51, the middle stand-fixation tables 52 and the upper stand-fixation tables 53 are two horizontally-extending and mutually-parallel mechanical beams, respectively.

The two mechanical beams as the lower stand-fixation tables 51 are respectively arranged along the two mechanical beams as the bearing beams 4 in such a way that the extending direction is parallel to the two mechanical beams as the bearing beams 4, and are arranged to intersect with the mechanical beams as the middle stand-fixation tables 52. The mechanical beams as the middle stand-fixation tables 52 are arranged to intersect with the mechanical beams as the upper stand-fixation tables 53. Here, it is preferable to make the intersection in an orthogonal manner.

Next, a dual vibration-proof structure of the elevator according to the present invention will be described with reference to FIGS. 4 to 6.

As illustrated in FIG. 5, a first vibration-proof mechanism 6 is mounted between the bearing beam 4 and the lower stand-fixation table 51, and a second vibration-proof mechanism 7 is mounted between the middle stand-fixation table 52 and the upper stand-fixation table 53. Concretely speaking, the first vibration-proof mechanism 6 is provided with a first vertical vibration-proof member 61 that is installed between the upper surface of the bearing beam 4 and the lower surface of the lower stand-fixation table 51 to absorb the vertical vibration, and the second vibration-proof mechanism 7 is at least provided with a second vertical vibration-proof member 71 that is installed between the upper surface of the middle stand-fixation table 52 and the lower surface of the upper stand-fixation table 53 to absorb the vertical vibration.

In this way, the elevator according to this embodiment has the first vertical vibration-proof members 61 and the second vertical vibration-proof members 71. Whereby, it is possible to absorb the vibration from the vertical direction reliably, and so the noise in the machine room can be reliably reduced.

Furthermore, in the elevator according to this embodiment, as preferably shown in FIG. 6, the second vibration-proof mechanism 7 further comprises: a gusset member 72 having vertically-arranged horizontal surface 721 and vertical surface 722, wherein the horizontal surface 721 is secured on the upper surface of the middle stand-fixation table 52, and the vertical surface 722 is secured on the side surface of the upper stand-fixation table 53 on the guide wheel side (the left side in FIG. 4, the right side in FIG. 5); and a horizontal vibration-proof member 73 installed between the side surface of the upper stand-fixation table 53 on the guide wheel side and the vertical surface 722 of the gusset

member 72 to absorb the horizontal vibration.

In this way, the elevator according to this embodiment further comprises the horizontal vibration-proof member 73. Thus, even if a horizontal force (vibration) is generated due to transmission of traction force from the traction sheave to the guide wheel along the rope, the horizontal vibration also can be effectively absorbed by the horizontal vibration-proof member 73, further reducing the noise in the machine room reliably.

In the elevator according to this embodiment, as one example, the first vertical vibration-proof member 61, the second vertical vibration-proof member 71 and the horizontal vibration-proof member 73 are formed by a rubber gasket, but not limited to this.

Further, as illustrated in FIG. 4 and FIG. 5, a plurality of the first vertical vibration-proof members 61 are disposed at predetermined intervals along the extending direction of the two mechanical beams as the lower stand-fixation tables 51, and here as an example, provided on the upper surface of each mechanical beam are three first vertical vibration-proof members, but not limited to this in the amount. In addition, the second vertical vibration-proof members 71 are disposed at the overlapping locations of the two mechanical beams as the middle stand-fixation tables 52 with the two mechanical beams as the upper stand-fixation tables 53, and disposed on the side surfaces of the two mechanical beams as the upper stand-fixation tables 53 on the guide wheel side are the horizontal vibration-proof members 72, one on each side surface.

Furthermore, the respective two mechanical beams as the lower stand-fixation tables 51, the middle stand-fixation tables 52 and the upper stand-fixation tables 53 each may be provided with a plurality of reinforcing ribs at predetermined intervals along the extending direction, thereby reliably enhancing the strength. Preferably, the reinforcing ribs are arranged on the ends of the two mechanical beams as the upper stand-fixation tables 53 on the guide wheel side, and also serve as mounting surfaces for the horizontal vibration-proof members 72.

As described above, the elevator according to this embodiment includes the first vibration-proof mechanism 6 and the second vibration-proof mechanism 7 at the same time, forming a dual vibration-proof structure, and hereby the shock-absorbing effects can be further reliably achieved. In particular, the second vibration-proof mechanism 7 includes the horizontal vibration-proof members 72 in addition to the vertical vibration-proof members 71, so that both vibration in the vertical direction and vibration in the horizontal direction can be reliably damped. Thus, the elevator according to this

embodiment can reliably eliminate vibrations from both the vertical direction and the horizontal direction by providing the dual vibration-proof structure as a whole, and so it is possible to reduce noise in the machine room more reliably.

Although the elevator according to the invention has been described above by way of an embodiment, the embodiment is merely illustrative and is not intended to limit the scope of the invention. New embodiments can be carried out in other various ways, and various omissions, substitutions and changes can be made without departing from the scope of the invention. These embodiments and their modifications are intended to be included within the scope and spirit of the invention, and also within the scope of the appended claims and their equivalents.

CLAIMS

1. An elevator, characterized in that,
the elevator is provided with in a machine room:
bearing beams erected in the machine room;
a stand-fixation table disposed on the bearing beams;
a traction machine that is mounted on the stand-fixation table through a stand and has
a traction sheave about which a rope is wound; and
a guide wheel that directs one end of the rope from the traction sheave toward a
counterweight side,
wherein the stand-fixation table comprises:
lower stand-fixation tables arranged on the upper surfaces of the bearing beams,
middle stand-fixation tables arranged on the upper surfaces of the lower
stand-fixation tables, and
upper stand-fixation tables arranged on the upper surfaces of the middle
stand-fixation tables, the traction machine being mounted on the upper surfaces thereof,
a first vibration-proof mechanism is installed between the bearing beams and the
lower stand-fixation tables, and a second vibration-proof mechanism is installed between
the middle stand-fixation tables and the upper stand-fixation tables, wherein
the first vibration-proof mechanism is provided with a first vertical vibration-proof
member that is installed between the upper surfaces of the bearing beams and the lower
surfaces of the lower stand-fixation tables to absorb the vertical vibration;
the second vibration-proof mechanism is provided with a second vertical
vibration-proof member that is installed between the upper surfaces of the middle
stand-fixation tables and the lower surfaces of the upper stand-fixation tables to absorb the
vertical vibration, wherein
the second vibration-proof mechanism further comprises:
a gusset member having vertically-arranged horizontal surface and vertical surface,
wherein the horizontal surface is secured on the upper surface of the middle stand-fixation

table, and the vertical surface is secured on the side surface of the upper stand-fixation table on the guide wheel side; and

a horizontal vibration-proof member, installed between the side surface of the upper stand-fixation table on the guide wheel side and the vertical surface of the gusset member in such a manner of being directly connected to the side surface of the upper stand-fixation table on the guide wheel side and to the vertical surface of the gusset member, respectively, to absorb the horizontal vibration.

2. The elevator according to claim 1, characterized in that,

the bearing beam, the lower stand-fixation table, the middle stand-fixation table and the upper stand-fixation table each are two horizontally-extending and mutually-parallel mechanical beams,

the two mechanical beams as the lower stand-fixation tables are respectively arranged along the two mechanical beams as the bearing beams in such a way that the extending direction is parallel to the two mechanical beams as the bearing beams, and are arranged to intersect with the two mechanical beams as the middle stand-fixation tables,

the two mechanical beams as the middle stand-fixation tables are arranged to intersect with the two mechanical beams as the upper stand-fixation tables.

3. The elevator according to claim 2, characterized in that,

a plurality of the first vertical vibration-proof members of the first vibration-proof mechanism are disposed at predetermined intervals along the extending direction of the two mechanical beams as the lower stand-fixation tables,

the second vertical vibration-proof members of the second vibration-proof mechanism are disposed at the overlapping locations of the two mechanical beams as the middle stand-fixation tables with the two mechanical beams as the upper stand-fixation tables, and

disposed on the side surfaces of the two mechanical beams as the upper stand-fixation tables on the guide wheel side are the horizontal vibration-proof members of the second vibration-proof mechanism, one on each side surface.

4. The elevator according to claim 2, characterized in that,

the respective two mechanical beams each are provided with a plurality of reinforcing ribs at predetermined intervals along the extending direction.

5. The elevator according to claim 2, characterized in that,
the two mechanical beams as the lower stand-fixation tables perpendicularly intersect
with the two mechanical beams as the middle stand-fixation tables, and
the two mechanical beams as the middle stand-fixation tables perpendicularly
intersect with the two mechanical beams as the upper stand-fixation tables.

6. The elevator according to claim 1, characterized in that,
a rotating shaft of the guide wheel is supported on the lower stand-fixation table.

7. The elevator according to claim 1, characterized in that,
the first vertical vibration-proof member, the second vertical vibration-proof member
and the horizontal vibration-proof member each are formed by a rubber gasket.

8. The elevator according to any one of claims 1 to 5, characterized in that,
the elevator is the one having a traction ratio of 2:1.