

[DESCRIPTION]

[Title of Invention] ELEVATOR HEAVY LOAD LIFTING METHOD AND
ELEVATOR HOIST LIFTING METHOD

[Technical Field]

[0001]

The present invention relates to an elevator heavy load lifting method which is preferably applied to elevator renewal work with a heavy load of an elevator device as a target, and an elevator hoist lifting method in which the heavy load is set as a hoist.

[Background Art]

[0002]

In the background art, when an elevator which has been used for a long period of time is deteriorated, renewal work for replacing all or a part of installed elevator devices with new ones is required. A crane may be still placed on the top of a building when the building per se is newly built. On this occasion, the crane can be therefore used to do work easily to lift various elevator devices into a machine room disposed in a top portion of a hoistway for a car of the elevator. However, the crane is removed after the building is completed. Accordingly, the crane cannot be used for the renewal work. Therefore, an elevator device to be newly installed in the renewal work is usually lifted up to the machine room by human power of workers using stairs etc. Since a heavy load such

as a hoist cannot be lifted by human power, the heavy load has to be lifted up to the rooftop of the building by a crane truck or a lifting device has to be installed on stairs of the building to lift the heavy load up to the machine room.

[0003]

However, such a construction method is applied only to the case where there is an enough space in the layout of the building as a whole. In fact, it is often difficult to secure a working place for the crane truck or an installation place for the lifting device on the stairs of the building. The situation is that the application of the construction method is apt to be restricted. Therefore, in order to solve the problem of the restriction, another construction method has been used as follows. That is, an opening portion is provided in the floor of the machine room covering the top portion of the hoistway. A hoist to be newly installed is loaded into the car and lifted to the machine room. Incidentally, well-known techniques of the lifting method on the construction include "heavy load lifting method on renewal work of elevator system" (see Patent Literature 1) which can be performed rapidly to achieve improvement of safety and workability in the lifting work of old and new machines and "device for conveying shavings in elevator" (see Patent Literature 2) in which a vertically movable bucket for receiving shavings from the machine room is provided below the

floor of the machine room provided with a hole.

[Citation List]

[Patent Literature]

[0004]

[Patent Literature 1] JP-A-2011-51742

[Patent Literature 2] JP-B-7-47454

[Summary of Invention]

[Technical Problem]

[0005]

In the aforementioned technique according to Patent Literature 1, when a heavy load such as a hoist to be newly installed is lifted from the car into the machine room during elevator renewal work, the cage of the car must be dismantled. The number of man-hours for the work on this occasion is increased and reformation of the car floor is required in order to use the car floor, from which the cage has been dismantled and removed, as a working bench. The number of man-hours and components for the reformation of the car floor are required. Thus, a lot of labor is required for the work as a whole and the work is complicated. In addition, the cost increases. Therefore, there is a problem that it is difficult to put the technique according to Patent Literature 1 into practical application.

[0006]

In addition, the technique according to Patent

Literature 2 has a configuration in which the vertically movable bucket for receiving shavings from the machine room is provided below the floor of the machine room provided with the hole. The technique according to Patent Literature 2 is to improve convenience about collection of shavings of the floor which may be generated when an opening portion is provided in the floor of the machine room covering the top portion of the hoistway. However, there is no consideration for the application lifting the heavy load into the machine room during the elevator renewal work. Therefore, there is problem that it is difficult to put the configuration of the technique according to Patent Literature 2 into practical application for renewal work.

[0007]

The invention has been accomplished in order to solve the foregoing problem. A technical object of the invention is to provide an elevator heavy load lifting method in which a heavy load can be conveyed into a hoistway and lifted into a machine room easily without dismantling a cage of a car for elevator renewal work, and an elevator hoist lifting method in which the heavy load is set as a host.

[Solution to Problem]

[0008]

In order to achieve the foregoing technical object, according to the invention, there is provided an elevator heavy

load lifting method in which a heavy load as an elevator device to be newly installed is loaded into a car from a carrying-in floor of a building and transported to a floor surface of an upper working floor via the inside of a hoistway using the car moving up/down in the hoistway equipped in the building, and then the heavy load is conveyed into the hoistway and lifted into a machine room by use of a lifting device provided in the machine room in a top portion of the hoistway, the method including: a transportation step of loading the heavy load into the car from the carrying-in floor, operating the car to move up and stop at the working floor, and then transporting the heavy load to the floor surface of the working floor; a rail attachment step of attaching a split assembly type lifting guide rail to face the inside of the hoistway on the working floor where the heavy load has been transported, so that the lifting guide rail can be supported horizontally on a support member fixed between elevator guide rails provided inside the hoistway and on the floor surface of the working floor; an opening formation step of forming an opening portion in a floor portion of the machine room, the opening portion having a size large enough for the lifting device and the heavy load to pass through; an installation step of installing the lifting device inside the machine room; a conveyance step of guiding the heavy load on the lifting guide rail to convey the heavy load into the hoistway from the floor surface of the working floor by

use of the lifting device; and a lifting step of lifting the heavy load into the machine room through the opening portion in the floor portion of the machine room by use of the lifting device.

[Advantageous Effects of Invention]

[0009]

According to the lifting method according to the invention, a heavy load as an elevator device to be newly installed, which is required for elevator renewal work, is loaded into a car from a carrying-in floor of a building and transported to a floor surface of an upper working floor via the inside of a hoistway using the car in a transportation step. A lifting guide rail is attached to be supported horizontally on a support member fixed between elevator guide rails and on the floor surface of the working floor in a rail attachment step. An opening portion having a size large enough for a member of a lifting device and the heavy load to pass through is formed in a floor portion of a machine room in an opening formation step. The lifting device is installed inside the machine room in an installation step. Then, the heavy load is guided on the lifting guide rail and conveyed into the hoistway from the floor surface of the working floor by use of the lifting device in a conveyance step, and the heavy load is lifted into the machine room through the opening portion in the floor portion of the machine room by use of the lifting

device in a lifting step. Accordingly, the heavy load such as a hoist can be conveyed into the hoistway and lifted into the machine room easily without dismantling a cage of the car for the elevator renewal work. Thus, no workers need to spend considerable labor in the work for lifting the elevator device and safety can be improved.

[Brief Description of Drawings]

[0010]

[Fig. 1] A partial longitudinal sectional view showing the schematic configuration of an elevator to which an elevator hoist lifting method according to Embodiment 1 of the invention is applied at crucial points.

[Fig. 2] A partial longitudinal sectional view showing a support member and a lifting guide rail which consist of a detailed structure of the schematic configuration shown in Fig. 1.

[Fig. 3] A partial planar sectional view showing an arrangement state of the support member and the lifting guide rail shown in Fig. 2, as seen from above.

[Figs. 4A and 4B] Views showing a state in which a hoist including a cart to be lifted is lifted by the elevator hoist lifting method according to Embodiment 1, Fig. 4A being a view about a state in which the hoist including the cart, which has not been lifted yet, is supported inside a hoistway, Fig. 4B being a view about a state in which the hoist including the

cart, which has been lifted, is hung using a lifting device equipped in a machine room.

[Fig. 5] A partial longitudinal sectional view of a transportation path schematically shown for describing initial transportation of the hoist including the cart using a car of an elevator as a premise of the application of the elevator hoist lifting method according to Embodiment 1.

[Fig. 6] A flow chart showing an operation procedure for lifting the hoist including the cart into the machine room via the hoistway of a building by the elevator hoist lifting method according to Embodiment 1.

[Description of Embodiment]

[0011]

An elevator heavy load lifting method and an elevator hoist lifting method according to the invention will be described below in detail along with an embodiment with reference to the drawings.

[0012]

First, technical summary of the elevator heavy load lifting method according to the invention will be described briefly. In the elevator heavy load lifting method according to the invention, a heavy load as an elevator device to be newly installed is loaded into a car from a carrying-in floor of a building and transported to a floor surface of an upper working floor via the inside of a hoistway using the car moving up/down

in the hoistway equipped in the building, and then the heavy load is conveyed into the hoistway and lifted into a machine room by use of a lifting device provided in the machine room in a top portion of the hoistway. Specifically speaking, the elevator heavy load lifting method has: a transportation step of loading the heavy load into the car from the carrying-in floor, operating the car to move up and stop at the working floor, and then transporting the heavy load to the floor surface of the working floor; a rail attachment step of attaching a split assembly type lifting guide rail to face the inside of the hoistway on the working floor where the heavy load has been transported, so that the lifting guide rail can be supported horizontally on a support member fixed between elevator guide rails provided inside the hoistway and on the floor surface of the working floor; an opening formation step of forming an opening portion in a floor portion of the machine room, the opening portion having a size large enough for a member of the lifting device and the heavy load to pass through; an installation step of installing the lifting device inside the machine room; a conveyance step of guiding the heavy load on the lifting guide rail to convey the heavy load into the hoistway from the floor surface of the working floor by use of the lifting device; and a lifting step of lifting the heavy load into the machine room through the opening portion in the floor portion of the machine room by use of the lifting device.

[0013]

In the rail attachment step in the elevator heavy load lifting method, it is preferable that the lifting guide rail is installed after the car has been moved down to a lower floor under the working floor and fixed to use the ceiling of the car as a working foothold. In addition, it is preferable that the heavy load is configured to be mounted and fixed on a cart, the heavy load is loaded into the car by use of the cart in the transportation step, and the cart travels on the lifting guide rail to be guided by the lifting guide rail so that the heavy load can be conveyed into the hoistway in the conveyance step. Further, it is preferable that the cart traveling on the lifting guide rail abuts against a lock portion (stopper) provided in the lifting guide rail so that the cart can be positioned and stopped in the conveyance step. In addition, it is preferable that the cart is configured to be able to be folded by hinges due to its own weight so that the cart can pass through the opening portion in the floor portion of the machine room, and the cart which has been folded due to its own weight passes through the inside of the opening portion when the heavy load is lifted to pass through the opening portion in the floor portion of the machine room in the lifting step. In any case, the rail attachment step includes a process of unfastening a main rope fixed to the car after the car has been moved down and fixed, and the conveyance step includes

a process of fixing an electric winch provided in the lifting device and the heavy load to each other through the opening portion in the floor portion of the machine room by a winch rope. Incidentally, a mode of the elevator heavy load lifting method in which the heavy load is restrictively set as a hoist which is connected to the car and a counterweight by the main rope to drive the car and the counterweight inside the hoistway through the main rope is an elevator hoist lifting method. Therefore, an embodiment of the elevator hoist lifting method will be described below specifically.

[Embodiment 1]

[0014]

Fig. 1 is a partial longitudinal sectional view showing the schematic configuration of an elevator to which the elevator hoist lifting method according to Embodiment 1 of the invention is applied at crucial points. As the elevator hoist lifting method, here is shown a state that a hoist 8 including a cart 9 has been conveyed into a hoistway 6 by use of a lifting device 2 in a conveyance step following a rail attachment step, an opening formation step and an installation step which are the same as those in the aforementioned elevator heavy load lifting method. Then, the hoist 8 including the cart 9 is lifted into a machine room 1 through an opening portion 5 in a floor portion of the machine room 1 in a lifting step. Specifically speaking, here is assumed a state in which the

hoist 8 including the cart 9 to be newly installed, which is required for elevator renewal work, has been transported to a floor surface of a working floor 11 after the car loaded with the hoist 8 including the cart 9 on a carrying-in floor was operated to move up to the working floor 11 and stopped there in the transportation step which will be described later. Then, in the state shown in Fig. 1, a lifting guide rail 10 is attached to be supported horizontally on a support member 12 fixed between elevator guide rails 7 and on the floor surface of the working floor 11 in the rail attachment step as a premise, the opening portion 5 is formed in the floor portion of the machine room 1 in the opening formation step, and the lifting device 2 is installed inside the machine room 1 in the installation step. After that, an electric winch 3 attached to the lifting device 2 and the hoist 8 including the cart 9 are fixed to each other through the opening portion 5 by a winch rope 4, and the electric winch 3 is driven to guide the hoist 8 including the cart 9 on the rail 10 to thereby convey the hoist 8 including the cart 9 into the hoistway 6 from the floor surface of the working floor 11 in the conveyance step. In the following lifting step, the electric winch 3 is further driven to lift the hoist 8 including the cart 9 into the machine room 1 through the opening portion 5.

[0015]

Fig. 2 is a partial longitudinal sectional view showing

the support member 12 and the lifting guide rail 10 which consist of a detailed structure of the schematic configuration of the elevator shown in Fig. 1. In addition, Fig. 3 is a partial planar sectional view showing an arrangement state of the support member 12 and the lifting guide rail 10, as seen from above. These drawings are to describe an assembling structure of the lifting guide rail 10 on the support member 12.

[0016]

With reference to Fig. 2, the following state is shown. That is, a car 14 which has arrived at the working floor 11 is moved down to a lower floor 15 under the working floor. A worker gets on a car top 14a which is indicated as the ceiling of the car 14 and which is used as a working foothold, and fixes the car 14. After that, the worker unfastens a main rope fixed to the car 14 and installs the lifting guide rail 10 horizontally on the support member 12 between the elevator guide rails 7 and on the floor surface of the working floor 11 in the vicinity of a working port 14b in the rail attachment step. On this occasion, the worker fixes the support member 12 for supporting the lifting guide rail 10 to the opposed elevator guide rails 7 on the car top 14a and then fixes the lifting guide rail 10 onto the support member 12 so that the lifting guide rail 10 can be support horizontally on the support member 12 and on the floor surface of the working floor 11.

[0017]

As shown in Fig. 3, the lifting guide rail 10 mentioned herein has a split assembly type structure in which travelling rails 10a extending in the left and right and in parallel with each other are connected and fixed to each other at a predetermined interval by connection members 10b and a stopper 10c serving as a lock portion is disposed in end portions of the travelling rails 10a on the hoistway 6 side so that the cart 9 of the hoist 8 including the cart 9 can be brought to abut against the stopper 10c so as to be positioned and stopped. The worker assembles respective parts to install the lifting guide rail 10 using the car top 14a as the working foothold. After the installation of the lifting guide rail 10 has been completed, the worker gets into the car 14 from the working port 14b disposed in the car top 14a of the car 14, and moves to the lower floor 15 under the working floor via the car 14.

[0018]

Figs. 4A and 4B are views showing a state in which the hoist 8 including the cart 9 to be lifted is lifted by the elevator hoist lifting method according to Embodiment 1. Fig. 4A is a view about a state in which the hoist 8 including the cart 9, which has not been lifted yet, is supported inside the hoistway 6. Fig. 4B is a view about a state in which the hoist 8 including the cart 9, which has been lifted, is hung using the lifting device 2 equipped in the machine room 1. With

reference to Fig. 4A, here is shown the following state. That is, when the worker fixes the electric winch 3 provided in the lifting device 2 and the hoist 8 including the cart 9 to each other by the winch rope 4 on the working floor 11 and then drives the electric winch 3 to guide the hoist 8 including the cart 9 on the lifting guide rail 10 to convey the hoist 8 including the cart 9 into the hoistway 6 from the floor surface of the working floor 11 in the conveyance step, as shown in Fig. 1, the cart 9 travels on the travelling rails 10a of the lifting guide rail 10 to convey the hoist 8 into the hoistway 6. On this occasion, the cart 9 abuts against the stopper 10c provided in the lifting guide rail 10 so that the cart 9 can be positioned and stopped. The cart 9 per se has a structure in which frames 9a are connected to one another through hinges 9b while wheels 9c are provided under the frames 9a located on the opposite end sides and the frame 9a located in the center portion is fixed to the hoist 8. When the hoist 8 including the cart 9 is conveyed into the hoistway 6 in the conveyance step, the wheels 9c travel on the travelling rails 10a, as shown in Fig. 4A. When the hoist 8 including the cart 9 is lifted into the machine room 1 in the lifting step, the frames 9a on the opposite end sides are designed to be folded due to their own weights by the hinges 9b so that the hoist 8 including the cart 9 can pass through the opening portion 5 in the floor portion of the machine room 1, as shown in 4B.

[0019]

That is, when the hoist 8 including the cart 9 is conveyed into the hoistway 6 in the conveyance step as shown in Fig. 4A, the cart 9 abutting against the stopper 10c is positioned with the frames 9a keeping their planar shape. Thus, the cart 9 stops vertically immediately under the opening portion 5 in the floor portion of the machine room 1. In addition, when the hoist 8 including the cart 9 is lifted into the machine room 1 in the lifting step as shown in Fig. 4B, the electric winch 3 is further driven so as to hang up the hoist 8 together with the cart 9. On this occasion, the frames 9a on the opposite end sides of the cart 9 are folded into a compact shape due to their own weights by the hinges 9b so that the wheels 9c provided in the bottom can face each other. As a result, the hoist 8 including the cart 9 passes through the opening portion 5 provided between hoist support stands 13 placed in the floor portion of the machine room 1, so that the hoist 8 including the cart 9 can be lifted into the machine room 1. Then, the frames 9a on the opposite end sides of the cart 9 are unfolded into their original planar shape and the wheels 9c are mounted on the hoist support stands 13 and positioned at predetermined positions. Thus, the installation of the hoist 8 inside the machine room 1 is completed when the wheels 9c are locked. Then, the electric winch 3 and the winch rope 4 are detached from the hoist 8 including the cart 9 and the lifting device 2 so

that all the members other than the hoist 8 including the cart 9 on the hoist support stands 13 can be removed from the machine room 1 in the normal case.

[0020]

Fig. 5 is a partial longitudinal sectional view of a transportation path schematically shown for describing initial transportation of the hoist 8 including the cart 9 using the car 14 of an elevator as a premise of application of the elevator hoist lifting method according to Embodiment 1. With reference to Fig. 5, here is shown the following state. That is, in the aforementioned transportation step, the hoist 8 including the cart 9 to be newly installed, which is required for the elevator renewal work, is loaded into the car 14 from a floor surface of a carrying-in floor 16 of the building, the car 14 is operated to move up to the working floor 11 to thereby convey the hoist 8 including the cart 9 inside the hoistway 6, the car 14 is stopped at the working floor 11, and the hoist 8 including the cart 9 is transported from the car 14 to the floor surface of the working floor 11. Incidentally, a main rope 17 attached to the car 14 shown in Fig. 5 is unfastened from the car 14 after the car 14 is moved down to the lower floor 15 under the working floor and fixed in the rail attachment step which has been described with reference to Fig. 2.

[0021]

Fig. 6 is a flow chart showing an operation procedure (including transportation which has already been described with reference to Fig. 5) for lifting the hoist 8 including the cart 9 into the machine room 1 via the hoistway 6 of the building by the elevator hoist lifting method according to Embodiment 1. In the operation procedure for lifting the hoist 8 including the cart 9, first, as the transportation step, the hoist 8 including the cart 9 to be newly installed for the elevator renewal work is carried into the building from the carrying-in floor 16 of the building (Step S1) and loaded into the car 14. Then, the car 14 is operated to move up, for example, to an uppermost floor regarded as the working floor 11 where the renewal work will be performed, so that the hoist 8 including the cart 9 can be lifted (Step S2) and transported to a floor surface of the uppermost floor. Incidentally, the transportation mentioned herein may be performed in such a manner that a car 14 of another elevator than the elevator where the renewal work will be performed is used to lift the hoist 8 including the cart 9 to the uppermost floor (working floor 11).

[0022]

Next, as the rail attachment step, the worker gets on the car top 14a of the car 14 from the uppermost floor (working floor 11), operates the car 14 to move down to a lower floor under the uppermost floor (lower floor 15 under the working

floor), hangs and fixes the car 14 to a fitting etc. fixed to the hoistway 6 by a wire etc., and then unfastens the main rope 17 hanging the car 14 (Step S3). After having performed the aforementioned step, the worker installs the lifting guide rail 10 to face the inside of the hoistway 6 from the car top 14a of the car 14 which is used as the working foothold, so that the lifting guide rail 10 can be supported horizontally on the support member 12 fixed between the elevator guide rails 7 and on the floor surface of the uppermost floor (working floor 11). Then, the worker goes out of the hoistway 6 to the lower floor under the uppermost floor (lower floor 15 under the working floor) (Step S4). Further, the worker removes a device of the machine room 1 from the machine room 1 in order to remove a removable constituent component which has been installed, such as a hoist or a control panel constituting the elevator where the renewal work has not been performed yet (Step S5).

[0023]

Successively, the worker bores the opening portion 5 (having a size large enough for the member of the lifting device 2 and the hoist 8 to pass through) for lifting in the floor of the machine room 1 between the hoist support stands 13 as the opening formation step, and installs the lifting device 2 including a portal frame in the machine room 1 as the installation step (step S6). Further, as the conveyance step, the worker attaches the electric winch 3 to the portal frame

of the lifting device 2, and fixes the front end of the winch rope 4 to the hoist 8 including the cart 9 which has been conveyed to the floor surface of the uppermost floor (working floor 11) and which will be newly installed, through the opening portion 5 in the floor portion of the machine room 1 (Step S7). After having performed the aforementioned step, the worker drives the electric winch 3 to convey and introduce the hoist 8 including the cart 9 on the lifting guide rail 10 into the hoistway 6, and further drives the electric winch 3 to lift the hoist 8 including the cart 9 up to the machine room 1 through the opening portion 5 as a lifting step (Step S8). By these steps, the work for lifting the hoist 8 including the cart 9 is completed.

[0024]

According to the elevator hoist lifting method according to Embodiment 1, in the transportation step, the hoist 8 including the cart 9 is loaded into the car 14 from the carrying-in floor 16, the car 14 is operated to move up and stop at the working floor 11, and then, the hoist 8 including the cart 9 is transported from the car 14 to the floor surface of the working floor 11. The electric winch 3 attached to the lifting device 2 and the hoist 8 including the cart 9 are fixed to each other through the opening portion 5 by use of the winch rope 4. In this state, the hoist 8 including the cart 9 is guided on the lifting guide rail 10 placed above the car 14

so that the hoist 8 including the cart 9 can be conveyed into the hoistway 6 in the conveyance step. Then, in the lifting step, the hoist 8 including the cart 9 is lifted into the machine room 1 through the opening portion 5 by use of the lifting device 2 installed in the machine room 1 in the installation step. Accordingly, it is not necessary to dismantle or reform the cage of the car 14 but the total number of man-hours for the work can be reduced so that the hoist 8 including the cart 9 can be conveyed into the hoistway 6 from the working floor 11 and lifted into the machine room 1 easily. In addition, no additional components are required so that the cost for the renewal work can be suppressed.

[0025]

In addition, the lifting guide rail 10 used in the rail attachment step has a split assembly type structure using the travelling rails 10a, the connection members 10b and the stopper 10c. Each component alone can be reduced in weight so that the lifting guide rail 10 can be installed easily on the car top 14a of the car 14 used as the working foothold. Accordingly, it is not necessary to install an exclusive working bench for installing the lifting guide rail 10. In addition, the lifting guide rail 10 has the guide rails 10a which are supported horizontally on the support member 12 and on the floor surface of the working floor 11 and which guide the wheels 9c in the cart 9 of the hoist 8 including the cart

9. Thus, the hoist 8 including the cart 9 can be conveyed and introduced into the hoistway 6 while keeping its stable state. Further, when the hoist 8 including the cart 9 is conveyed and introduced into the hoistway 6 in the conveyance step and lifted into the machine room 1 through the opening portion 5 in the lifting step, no workers have to stay inside the hoistway 6. Therefore, the safety of the workers can be secured because it is not necessary to assign a plurality of workers to wait simultaneously inside the hoistway 6 and at corresponding positions in floors above and under the working floor 11. In addition, the frames 9a of the cart 9 in the hoist 8 including the cart 9 are connected to one another by the hinges 9b. During lifting of the hoist 8 including the cart 9, the frames 9a on the opposite end sides are folded to pass through the opening portion 5 in the floor of the machine room 1. Accordingly, the opening portion 5 of the machine room 1 can be formed with the smallest size between the existing hoist support stands 13. In addition, the boring work can be performed efficiently and it is not necessary to remove the hoist support stands 13. Accordingly, the lifting work can be performed in a short period of time.

[0026]

Incidentally, although the configuration in which the hoist 8 is attached to the cart 9 as a subject to be lifted has been described as a heavy load of an elevator device to

be newly installed during renewal work in the aforementioned elevator hoist lifting method according to Embodiment 1, any other heavy load than the hoist 8 may be attached to the cart 9 as the subject to be lifted. This case corresponds to the elevator heavy load lifting method which has been described initially. Accordingly, the invention is not limited to the elevator hoist lifting method disclosed and described in Embodiment 1.

[Reference Signs List]

[0027]

- 1 machine room
- 2 lifting device
- 3 electric winch
- 4 winch rope
- 5 opening portion
- 6 hoistway
- 7 elevator guide rail
- 8 hoist
- 9 cart
- 9a frame
- 9b hinge
- 9c wheel
- 10 lifting guide rail
- 10a travelling rail
- 10b connection member

- 10c stopper
- 11 working floor
- 12 support member
- 13 hoist support stand
- 14 car
- 14a car top
- 14b working port
- 15 lower floor under working floor
- 16 carrying-in floor
- 17 main rope

[CLAIMS]

[Claim 1]

An elevator heavy load lifting method in which a heavy load as an elevator device to be newly installed is loaded into a car from a carrying-in floor of a building and transported to a floor surface of an upper working floor via the inside of a hoistway using the car moving up/down in the hoistway equipped in the building, and then the heavy load is conveyed into the hoistway and lifted into a machine room by use of a lifting device provided in the machine room in a top portion of the hoistway, the method comprising:

a transportation step of loading the heavy load into the car from the carrying-in floor, operating the car to move up and stop at the working floor, and then transporting the heavy load to the floor surface of the working floor;

a rail attachment step of attaching a split assembly type lifting guide rail to face the inside of the hoistway on the working floor where the heavy load has been transported, so that the lifting guide rail can be supported horizontally on a support member fixed between elevator guide rails provided inside the hoistway and on the floor surface of the working floor;

an opening formation step of forming an opening portion in a floor portion of the machine room, the opening portion having a size large enough for a member of the lifting device

and the heavy load to pass through;

an installation step of installing the lifting device inside the machine room;

a conveyance step of guiding the heavy load on the lifting guide rail to convey the heavy load into the hoistway from the floor surface of the working floor by use of the lifting device; and

a lifting step of lifting the heavy load into the machine room through the opening portion in the floor portion of the machine room by use of the lifting device.

[Claim 2]

An elevator heavy load lifting method according to Claim 1, wherein:

the lifting guide rail is installed in the rail attachment step after the car has been moved down to a lower floor under the working floor and fixed to use the ceiling of the car as a working foothold.

[Claim 3]

An elevator heavy load lifting method according to Claim 1, wherein:

the heavy load is configured to be mounted and fixed on a cart;

the heavy load is loaded into the car by use of the cart in the transportation step; and

the cart travels on the lifting guide rail to be guided

by the lifting guide rail so that the heavy load can be conveyed into the hoistway in the conveyance step.

[Claim 4]

An elevator heavy load lifting method according to Claim 3, wherein:

the cart travelling on the lifting guide rail abuts against a lock portion provided in the lifting guide rail so that the cart can be positioned and stopped in the conveyance step.

[Claim 5]

An elevator heavy load lifting method according to Claim 3 or 4, wherein:

the cart is configured to be able to be folded by hinges due to its own weight so that the cart can pass through the opening portion in the floor portion of the machine room; and

the cart which has been folded due to its own weight passes through the inside of the opening portion when the heavy load is lifted to pass through the opening portion in the floor portion of the machine room in the lifting step.

[Claim 6]

An elevator heavy load lifting method according to any one of Claims 1 through 5, wherein:

the rail attachment step includes a process of unfastening a main rope fixed to the car after the car has been moved down and fixed; and

the conveyance step includes a process of fixing an electric winch provided in the lifting device and the heavy load to each other through the opening portion in the floor portion of the machine room by a winch rope.

[Claim 7]

An elevator hoist lifting method, wherein:

the heavy load in an elevator heavy load lifting method according to Claim 6 is set as a hoist which is connected to the car and a counterweight by the main rope to drive the car and the counterweight inside the hoistway through the main rope.