

Elevator Device

Technical Field

The invention relates to an elevator device, in particular to an elevator device provided with a light box constituting a car ceiling.

Background

A light box for use in lighting and the like has been installed on a car ceiling of the elevator device, and in this case, in order to perform work such as maintenance and cleaning of lamps and the like in the light box, it is necessary for a worker to stand on the top of the car to perform the work through the manhole. However, many parts are installed on the top of the car and the space is small, so it is inconvenient to perform the maintenance and cleaning operations. In addition, due to the restrictions on the structure of the car, the size of the manholes provided on the roof of the car is limited, and thus it is difficult to maintain and replace the larger-sized lamps.

In order to solve the above problems, a ceiling inspection window assembly for elevator device is proposed, wherein the ceiling inside the car is drilled with an inspection window, which is provided with an inspection window panel, and when inspecting the lamps and the like installed inside the ceiling, inspections are performed by disassembling the inspection window (Patent Document 1).

Patent Document 1: CN204999471U

However, in the ceiling inspection window assembly described in Patent Document 1, the size of the inspection window is also small, and it is difficult to maintain and replace the large-sized lamps. In addition, since the inspection window is arranged on the car ceiling, it will adversely affect the appearance of the car ceiling.

Contents of the Invention

The present invention was developed in view of the above-mentioned problems, and its purpose is to provide an elevator device with a light box constituting a car ceiling, which makes it possible to maintain and replace the larger-sized lamps, without adversely affecting the appearance of the car ceiling.

In order to solve the above problems and achieve the objects, in an elevator device according to the first technical solution of the invention, it comprises a light box formed as a ceiling of a car, *characterized in that*, the light box comprises: a bottom plate for mounting luminaire thereon; four frames, which are fixed to each other in a quadrilateral shape and are mounted on the bottom plate, and are respectively secured with respect to the four side walls of the car; at least one intermediate beam, which is vertically erected between any two first frames parallel to each other among the four frames; a plurality of cover plates, which are arranged between the intermediate beam and a second frame parallel to the intermediate beam among the four frames; and a sliding mechanism, which enables sliding of the cover plates to be in a fixed state or a disassembled state, wherein in the disassembled state of the cover plates, the cover plates can be lifted upward.

Further, in an elevator device according to the second technical solution of the invention, *characterized in that*, a counterweight bar is arranged on the back of the cover plate.

Further, in an elevator device according to the third technical solution of the invention, *characterized in that*, the cover plates can transmit the light emitted from the luminaire mounted on the bottom plate.

Further, in an elevator device according to the fourth technical solution of the invention, *characterized in that*, the sliding mechanism comprises: a pressure plate, which is arranged on one of the two first frames, wherein the cover plate can be inserted into a gap between the pressure plate and this first frame; first securing holes arranged on the intermediate beam and the second frame; and a second securing hole arranged on the other of the two first frames.

Further, in an elevator device according to the fifth technical solution of the invention, *characterized in that*, in the fixed state of the cover plates, fasteners mounted on the cover plates are clamped into the first securing holes and the second securing hole, respectively, and in the disassembled state of the cover plates, the fasteners can be disengaged from the first securing holes and the second securing hole.

Effects of the invention

In the elevator device of the embodiment configured as described above, when

performing maintenance, cleaning and other operations on the lamps in the light box, the workers can slightly slide the cover plates in the car and lift them upwards, thereby forming an opening equivalent to the size of the cover plate and then enabling maintenance and cleaning of the lamps in the light box. Thereby, the lamps can be easily maintained and replaced, without the need to stand in a small space on the top of the car. In addition, due to the formation of a larger opening equivalent to the size of the cover plate, maintenance and replacement of the larger-sized lamps can be conveniently performed. In addition, in the elevator device of the embodiment, the light box constitutes the ceiling of the entire car, so it will not adversely affect the appearance of the car ceiling.

Description of the Drawings

Fig. 1 is a diagram showing the overall configuration of a light box of an elevator device according to the embodiment.

Fig. 2 is a diagram showing the back surface of the light box to which the cover plate is attached according to the elevator device of the embodiment.

Fig. 3 is a diagram showing the back surface of the light box without the cover plate according to the elevator device of the embodiment.

Fig. 4A is an enlarged perspective view of the cover plate at the portion A in Fig. 2 in a fixed state.

Fig. 4B is an enlarged perspective view of the cover plate at the portion A in Fig. 2 in a disassembled state.

Fig. 4C is an X-X sectional view in Fig. 3.

Fig. 5A is an enlarged plan view of the cover plate at the portion B in Fig. 3 in the fixed state.

Fig. 5B is an enlarged plan view of the cover plate at the portion B in Fig. 3 in the disassembled state.

Fig. 6A is an enlarged plan view of the cover plate at the portion C in Fig. 3 in the fixed state.

Fig. 6B is an enlarged perspective view of the cover plate at the portion C in Fig. 3 in the fixed state.

Fig. 6C is an enlarged perspective view of the cover plate at the portion C in Fig. 3 in

the disassembled state.

Fig. 7A is a diagram showing the first step for disassembling the cover plate.

Fig. 7B is a diagram showing the second step for disassembling the cover plate.

Fig. 7C is a diagram showing the third step for disassembling the cover plate.

Reference signs:

1: light box; 2: cover plate (car ceiling); 3: intermediate beam; 4: counterweight bar; 5: fastener; 6: rear frame (first frame); 7: front frame (first frame); 8: left frame (second frame); 9: right frame (second frame); 10: bottom plate; 11: pressure plate; 12: side securing hole (first securing hole); 13: end securing hole (second securing hole); L: lamp (luminaire).

Embodiments

Hereinafter, the overall configuration of a light box of an elevator device of one embodiment will be described in detail with reference to the drawings in the specification.

First, the overall configuration of the light box 1 of the elevator device of the embodiment will be described based on Figs. 1 to 3. Fig. 1 is a diagram showing the overall configuration of the light box 1 of the elevator device according to the embodiment. Fig. 2 is a diagram showing the back surface of the light box 1 in the fixed state of the cover plate 2 of the elevator device of the present embodiment. Fig. 3 is a diagram showing the back surface of the light box 1 in a state where the cover plate 2 of the elevator device of the present embodiment is removed.

In this embodiment, the side (bottom in the figure) of the elevator car (not shown) on which the car door (not shown) is provided is defined as the front side, and the left in the figure is defined as the left side, and on this basis the back side and the right side are defined for explanation.

As shown in Fig. 1 to Fig. 3, the light box 1 of this embodiment is formed into a four-sided shape by a rear frame 6 (first frame), a front frame 7 (first frame), a left frame 8 (second frame), and a right frame 9 (second frame). Further, the rear frame 6, the front frame 7, the left frame 8 and the right frame 9 constituting the light box 1 are fixedly arranged on the upper parts of the four side walls forming the elevator car, respectively. In

addition, as shown in Fig. 7 described later, the light box 1 includes a bottom plate 10 installed on the ceiling of the elevator car. Further, a lamp (luminaire) and the like for emitting light are disposed on the bottom plate 10. In addition, the rear frame 6, the front frame 7, the left frame 8 and the right frame 9 constituting the light box 1 each are fixedly provided on the bottom plate 10. However, in the embodiment, the ceiling of the elevator car and the bottom plate 10 of the light box 1 can also be regarded as one piece, that is, the lamp (luminaire) and the like can be directly installed on the ceiling of the elevator car.

Furthermore, intermediate beams 3 are erected between the front frame 7 and the rear frame 6 of the embodiment and perpendicular to them. In this embodiment, a case where two intermediate beams 3 are provided will be described. However, the number of intermediate beams 3 is not limited and can be adjusted according to the actual size of the elevator car. For example, one intermediate beam 3 may be provided as shown in Fig. 7B and Fig. 7C described later, or three or more intermediate beams may be provided.

As shown in Fig. 1, three cover plates 2 are respectively mounted in the three regions formed by the rear frame 6, the front frame 7, the left frame 8, the right frame 9 and the intermediate beams 3. The cover plates 2 are used to transmit the light emitted from the lamp L provided in the light box 1 to illuminate the elevator car. The cover plate 2 only needs to comprise the material capable of transmitting light, for example, it can be formed from resin, plastic, glass, paper, etc. However, in consideration of weight and strength and other factors, an acrylic plate is preferable.

In addition, as shown in Fig. 2, a counterweight bar 4 is installed on the side edge of the cover plate 2, specifically on the side edges of the left frame 8, right frame 9 and intermediate beam 3. The counterweight bar 4 functions to increase the weight of the cover plate 2 and the friction of the side edges, so that the cover plate 2 can be installed stably without vibration and noise during the operation of the elevator. In the embodiment, as shown in Fig. 7 to be described later, the lamp L and the like in the light box 1 can be maintained and cleaned by removing the cover plate 2.

Hereinafter, the disassembly and assembly structure of the cover plate 2 in the light box 1 of the embodiment will be described in detail with reference to Figs. 3 to 6.

As shown in Fig. 3, in the embodiment, the cover plate 2 can be in a fixed state with respect to the frames and a disassembled state by means of a sliding mechanism, wherein

when becoming the disassembled state, the cover plate 2 can be lifted up and then moved. The sliding mechanism comprises a pressure plate 11 arranged on the rear frame 6, side securing holes 12 (first securing holes) arranged on the left frame 8, the right frame 9 and the intermediate beam 3, an end securing hole 13 (second securing hole) arranged on the front frame 7, and fasteners 5 arranged on the cover plate 2.

Hereinafter, the detailed structure of the sliding mechanism will be described. First, the pressure plate 11 will be described with reference to Fig. 4. Fig. 4A is an enlarged perspective view of the cover plate 2 at the portion A in Fig. 2 in the fixed state. Fig. 4B is an enlarged perspective view of the cover plate 2 at the portion A in Fig. 2 in the disassembled state. Fig. 4C is an X-X sectional view in Fig. 3.

As shown in Figs. 4A to 4C, the pressure plate 11, which is a part of the sliding mechanism, is secured on the rear frame 6 by means of bolts or the like, and the pressure plate 11 is formed as an inclined surface on the side where the cover plate 2 is to be inserted, so as to guide the end of the cover plate 2 when the cover plate 2 is inserted. In addition, the thickness of a gap S formed between the pressure plate 11 and the rear frame 6 is approximately the same as the thickness of the cover plate 2. In this way, when the cover plate 2 is installed, the cover plate 2 is slid in the direction of the gap S between the pressure plate 11 and the rear frame 6, so that the cover plate 2 is guided by the inclined surface of the pressure plate 11 to be easily inserted into the gap S, and after being inserted into the gap S, the cover plate 2 is clamped and fixed.

In addition, in order to make the cover plate 2 in the disassembled state, the worker needs to apply an external force to the cover plate 2 from the bottom surface of the cover plate 2 in the direction of the arrow shown in Fig. 4A and Fig. 4B, so that the cover plate 2 slides in the direction of the arrow, and hereby the cover plate 2 can be disengaged from the gap S.

Next, the side securing holes 12 (first securing holes) arranged on the left frame 8, the right frame 9 and the intermediate beam 3 will be described with reference to Fig. 5. Fig. 5A is an enlarged plan view of the cover plate 2 at the portion B in Fig. 3 in the fixed state. Fig. 5B is an enlarged plan view of the cover plate 2 at the portion B in Fig. 3 in the disassembled state. The situations shown in Figs. 5A and 5B are situations where the cover plate 2 is viewed from the bottom of the elevator car.

Fig. 5A illustrates such a situation where two side securing holes 12 are arranged side by side on the intermediate beam 3, and the fasteners 5 installed at the corresponding positions of the two adjacent cover plates 2 are inserted through and locked in the side securing holes 12. Fig. 5B illustrates such a situation where the side securing hole 12 is arranged on the left frame 8 or the right frame 9, and the fastener 5 installed at the corresponding position of the cover plate 2 is inserted through and locked in this side securing hole 12.

As shown in the Figs, in the embodiment, the side securing holes 12 are formed as a gourd-like hole. When the cover plate 2 is to be installed, as shown in Fig. 5B, the fastener 5 installed on the cover plate 2 is inserted through from the large diameter part of the side securing hole 12. Then, as shown in Fig. 5A, by sliding the cover plate 2 upward in the figure, the fastener 5 is moved to the small diameter part of the side securing hole 12, and the diameter of the small diameter part is slightly smaller than the diameter of the fastener 5, as a result of which the fastener 5 can be locked and fixed in the small diameter part. Thus, the cover plate 2 is secured to the left frame 8, the right frame 9 and the intermediate beam 3 by means of the locking securement of the fasteners 5 with the side securing holes 12 arranged on the left frame 8, the right frame 9 and the intermediate beam 3. In addition, when the cover plate 2 needs to be removed, the reverse process to the above can be performed, that is, the worker slides the cover plate 2 downward in the figure to make the fastener 5 enter the large diameter part of the side securing hole 12, so that the fastener 5 can pass through the side securing hole 12, and thereby the cover plate 2 can move freely.

In addition, the case where the side securing hole 12 is a gourd-like hole is described above, but the shape of the side securing hole 12 is not limited to this. For example, the side securing hole 12 may also be formed as a triangular hole, or may be formed as a rectangle with an elastic latching notch or the like provided on one side.

Next, the end securing hole 13 (second securing hole) provided on the front frame 7 will be described with reference to Fig. 6. Fig. 6A is an enlarged plan view of the cover plate 2 at the portion C in Fig. 3 in the fixed state. Fig. 6B is an enlarged perspective view of the cover plate 2 at the portion C in Fig. 3 in the fixed state. Fig. 6C is an enlarged perspective view of the cover plate 2 at the portion C in Fig. 3 in the disassembled state. The situations shown in Figs. 6A to 6C are these where the cover plate 2 is viewed from

the bottom of the elevator car.

Fig. 6A illustrates such a situation where the front frame 7 is provided with an end securing hole 13, and the fastener 5 installed at the corresponding position of the end edge of the cover plate 2 is inserted into the end securing hole 13. Fig. 6C is an enlarged perspective view of the cover plate 2 after the cover plate 2 is slid, in order to remove the cover plate 2. As described above, when the cover plate 2 is slid to the front side in order to remove the cover plate 2, the fastener 5 installed at the end of the cover plate 2 is disengaged from the end securing hole 13 and enters the free space, so that the cover plate 2 can be disassembled, as shown in Fig. 6C.

Furthermore, Figs. 6B and 6C illustrate one example of the fastener 5, wherein the fastener 5 is formed into a dumbbell shape, the small diameter part in the middle is locked with the above-mentioned side securing hole 12 and end securing hole 13, and the large diameter parts at both ends prevent the fastener 5 from separating from the side securing hole 12 and end securing hole 13.

Hereinafter, in order to make it easier to understand the configuration of this embodiment, the process of disassembling and assembling the cover plate 2 will be described in detail with reference to Fig. 7. Fig. 7A, Fig. 7B and Fig. 7C are diagrams showing the states when the cover plate is disassembled.

First, as shown in Fig. 7A, a force is applied to the cover plate 2 from below the cover plate 2 in the direction indicated by the arrow, thereby sliding the cover plate 2 in the direction of the arrow. At this time, the cover plate 2 is disengaged from the gap S between the rear frame 6 and the pressure plate 11. At the same time, the fasteners 5 installed on the side edge of the cover plate 2 slide to the large diameter parts in the side securing holes 12 arranged on the left frame 8, the right frame 9 and the intermediate beam 3, respectively, and the fastener 5 mounted at the end of the cover plate 2 is disengaged from the end securing hole 13 provided on the front frame 7 and enters the free space.

Next, as shown in Fig. 7B, the worker can apply an upward pushing force to the lower surface of the cover plate 2 to lift the cover plate 2 upward, and then as shown in Fig. 7C, by moving the cover plate 2 to one side, the cover plate 2 is transferred to the top of the adjacent cover plate 2 and temporarily placed. Subsequently, in this state, the

worker can directly perform maintenance and cleaning operations to the lamp L arranged on the bottom plate 10 of the light box 1 through an opening formed by removing the cover plate 2.

In this way, in the embodiment, by disassembling the cover plate 2 to form an opening equivalent to the size of the cover plate 2, the lamp L can be easily maintained and replaced. Further, since the opening formed by disassembling the cover plate 2 is very large, it is possible to conveniently maintain and replace the lamp L with a larger size. In addition, as mentioned above, the cover plate 2 constitutes the ceiling of the entire car, so it will not adversely affect the appearance of the car ceiling, and the different car ceilings can be formed by adjusting the number and pattern design of the cover plate 2.

In addition, as shown in FIG. 7, in the embodiment, the lamp L is formed in a long strip shape, and the length of the cover plate 2 is approximately the same as the length of the lamp L. Thereby, by moving the cover plate 2 to the side as described above, an opening having approximately the same size as the cover plate 2 can be formed. In this case, the maintenance and cleaning of the lamp L can be easily carried out through this opening.

Further, the aforementioned opening is formed by the rear frame 6, the front frame 7, the left frame 8 (or right frame 9) and the intermediate beam 3, and thus the size of the cover plate 2 is greater than the size of the above opening. As a result, when the cover plate 2 is disassembled, the cover plate 2 will not fall from the opening, thereby ensuring the safety of workers. In addition, during the operation of the elevator, the cover plates 2 will not fall off from the ceiling, thereby ensuring the safety of passengers.

In addition, the shape of the lamp L is not limited to a long strip shape, and other shapes, such as a lamp bulb, a ring lamp tube, etc., may be used.

In addition, in the above embodiment, the case where the pressure plate 11 is provided on the rear frame 6 and the end securing hole 13 is provided on the front frame 7 has been described. On the contrary, it is also possible to arrange the pressure plate 11 on the front frame 7 and the end securing hole 13 on the rear frame 6. In this case, it is necessary to change the direction of the side securing hole 12 and the direction in which the cover plate 2 slides. In addition, in the above embodiment, the case where the intermediate beams 3 are uniformly arranged between the rear frame 6 and the front frame

7 has been described. However, the intermediate beams 3 also can be arranged between the left frame 8 and the right frame 9, and the interval between the intermediate beams 3 also can be changed appropriately according to the design. In this case, it is only required to change the sliding mechanism correspondingly.

In the foregoing, several embodiments of the present invention have been described, but these embodiments are presented just as examples and are not intended to limit the scope of rights. These new embodiments can be implemented in various other ways, and various omissions, substitutions, and changes can be made without departing from the gist. The embodiments and their modifications are included in the scope and gist of the invention, and are included in the scope of the invention described in the claims and its equivalents.

CLAIMS

1. An elevator device, comprising a light box formed as a ceiling of a car, *characterized in that*, the light box comprises:

a bottom plate for mounting luminaire thereon;

four frames, which are fixed to each other in a quadrilateral shape and mounted on the bottom plate, and are respectively secured with respect to four side walls of the car;

at least one intermediate beam, which is vertically erected between any two first frames parallel to each other among the four frames;

a plurality of cover plates, which are arranged between the intermediate beam and a second frame parallel to the intermediate beam among the four frames; and

a sliding mechanism, which enables sliding of the cover plates to be in a fixed state or a disassembled state,

wherein in the disassembled state of the cover plates, the cover plates can be lifted upward.

2. The elevator device according to claim 1, *characterized in that*, a counterweight bar is arranged on the back of the cover plate.

3. The elevator device according to claim 1 or 2, *characterized in that*, the cover plates can transmit the light emitted from the luminaire mounted on the bottom plate.

4. The elevator device according to claim 1, *characterized in that*, the sliding mechanism comprises:

a pressure plate, which is arranged on one of the two first frames, wherein the cover plate can be inserted into a gap between the pressure plate and this first frame;

first securing holes arranged on the intermediate beam and the second frame; and

a second securing hole arranged on the other of the two first frames.

5. The elevator device according to claim 4, *characterized in that*,

in the fixed state of the cover plates, fasteners mounted on the cover plates are

clamped into the first securing holes and the second securing hole, respectively; and
in the disassembled state of the cover plates, the fasteners can be disengaged from the
first securing holes and the second securing hole.