

CAR STRUCTURE OF ELEVATOR

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to a car structure of an elevator and, more particularly, to a car structure of an elevator in which the size of the overhead (OH), which is a height dimension of the space between a ceiling of a shaft and an elevator car, is shortened.

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Related Art

FIGS. 8(a) and 8(b) are block diagrams showing a conventional car structure of an elevator. A car 1 that ascends and descends within a shaft is provided with a car door panel 8 that opens or closes an entrance of this car 1, a transmission mechanism 9 that transmits opening and closing actions to this car door panel 8, a door header case 3 to which this transmission mechanism 9 is attached, and a door motor 5 that is provided on this door header case 3 and drives the transmission mechanism 9, and a door opening and closing device is constituted by the door header case 3, the door motor 5, the door panel 8 and the transmission mechanism 9. The door header case 3, the door motor 5, and the transmission mechanism 9 are provided within a space of an overhead distance D_{OH} , which is a space portion above a ceiling 2 of the car 1.

Incidentally, a hall door panel 12 is provided in a landing-zone hall 11 on each floor of a building provided with the shaft. The hall door panel 12 provided in a hall 11 of a service floor of an elevator engages with the door panel 8 after the landing of the car 1 and performs opening and closing actions in synchronization with the door panel 8 by use of the door opening and closing device provided on the car 1 side. The hall door panel 12 moves along a wall surface 13 of the hall 11.

Furthermore, as shown in FIGS. 8(a) and 8(b), the door

header case 3 to which the door panel 8 is attached is bent in the horizontal and downward directions, and a bent portion at the leading end of the header case 3 is in such a positional relationship that this bent portion is opposed to a bent portion of the ceiling 2 of the car 1 on the hall side. The door motor 5 is placed on the upper part side of the horizontal bent portion of the header case 3, and this door motor 5 is provided disproportionately toward the right side from the header case 3 as viewed from the width direction (the front direction of FIG. 8(a)) of the car 1.

The transmission mechanism 9 is attached to a drive shaft 5a of the motor 5 and provided along the width direction of the car 1 within the space of the overhead distance D_{OH} as shown in FIG. 8(a). Therefore, the installation area of the transmission mechanism 9 occupies a prescribed area all over the space of the overhead distance D_{OH} above an outer surface of the front of the car 1 on the hall side. As described above, part of the space of the overhead distance D_{OH} is occupied by the motor 5. A technique related to a conventional car structure of an elevator is described in Japanese Patent Application Laid-Open No. 1996-157169.

However, the conventional car structure of an elevator shown in FIGS. 8(a) and 8(b) has the problem that the overhead space of the car is restricted by the door motor 5. Furthermore, the fact that the door motor 5 is provided in the overhead portion of the car in a protruding manner means that the transmission mechanism 9 is provided horizontally from the drive shaft of the motor and has a length substantially equivalent to the width of the car. Thus, there is the problem that the overhead space of the car 1 is restricted also by this transmission mechanism 9 all over in the width direction of the car 1.

SUMMARY OF THE INVENTION

The present invention has been made in view of the above-described problems and has as its object the provision of

a car structure of an elevator capable of shortening the overhead distance.

To solve the above problems, a car structure of an elevator according to the present invention has a configuration which contains: a protrusion which is such that at least part of a corner portion where an inner wall surface within an elevator car on the hall side and a ceiling surface meet is protruded within the car; and a door motor that is housed in a space formed outside the car by the formation of the protrusion within the car and opens and closes a door of the car.

A car structure of an elevator according to the present invention may be characterized in that in the above configuration, the protrusion has an inclined surface portion that obliquely blocks the corner portion with an inclined surface.

A car structure of an elevator according to the present invention may be characterized in that in the above configuration, the car structure of an elevator contains an information supplying device that is provided on a surface of the inclined surface portion on the inner side of the car and supplies information to users of the car.

A car structure of an elevator according to the present invention may be characterized in that in the above configuration, a shielding member that shields the information supplying device is provided on a surface of the inclined surface portion on the inner side within the car.

A car structure of an elevator according to the present invention may be characterized in that in the above configuration, the protrusion is a portion in the opening and closing direction of the door in a corner portion where an inner wall surface on the hall side and a ceiling surface meet and is provided in a position where at least the motor of the door opening and closing device is provided outside the car, and the space is provided outside the car so as to correspond to the protrusion and houses the door motor.

A car structure of an elevator according to the present invention may be characterized in that in the above

configuration, the car structure of an elevator contains an information supplying device that is provided on a surface of the inclined surface portion on the inner side of the car and supplies information to users of the car.

5 A car structure of an elevator according to the present invention may be characterized in that in the above configuration, the shielding member that shields the information supplying device is provided on an inner-side surface of the inclined surface portion within the car.

10 A car structure of an elevator according to the present invention may be characterized in that in the above configuration, in the door opening and closing device, the motor that drives the door in an opening and closing manner is constituted by a long-axis door motor and at least part of a
15 main body of the long-axis door motor is housed in the space.

A car structure of an elevator according to the present invention may be characterized in that in the above configuration, in the door opening and closing device, the door motor that drives the door in an opening and closing manner is
20 constituted by a flat-type motor and part of a door header case constituting the door opening and closing device including the flat-type door motor is housed in the space.

A car structure of an elevator according to the present invention may be characterized in that in the above
25 configuration, a surface on which the protrusion is formed within the car is provided with an opening and closing lid which enables the space formed on the outside of the car so as to correspond to the protrusion to be peeped at from inside the car.

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BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1(a), 1(b) and 1(c) are, respectively, a partial sectional view, a front view and a partial upward view showing a car structure of an elevator in the first embodiment of the
35 present invention;

FIG. 2 is a partial sectional view showing a car structure

of the second embodiment;

FIG. 3 is a partial sectional view showing a car structure of the third embodiment;

FIG. 4 is a partial sectional view showing a car structure of the fourth embodiment;

FIG. 5 is a partial sectional view showing a car structure of the fifth embodiment;

FIG. 6 is a partial sectional view showing a car structure of the sixth embodiment;

FIGS. 7(a) and 7(b) are, respectively, a partial sectional view and a front view showing a car structure of an elevator in the seventh embodiment of the present invention; and

FIGS. 8(a) and 8(b) are, respectively, a partial sectional view and a front view showing a conventional car structure.

DETAILED DESCRIPTION OF THE INVENTION

[First Embodiment]

Embodiments of a car structure of an elevator related to the present invention will be described below with reference to the accompanying drawings. FIGS. 1(a), 1(b) and 1(c) are schematic explanatory views showing a car structure of an elevator in the first embodiment. For the general configuration of the car, as shown in FIG. 1(b), a car door 8 is provided on the hall side of the car 1, and this car door 8 is opened and closed by the driving force of a door motor 5 transmitted via a transmission mechanism 9.

FIG. 1(a) is a schematic sectional view from the direction of the line A-A of FIG. 1(b). In FIG. 1(a), in a corner portion where an inner wall surface within the car 1 on the hall 11 side and an inner surface of a ceiling 2 meet, there is provided a protrusion 15 which is such that at least part of the corner portion is protruded within the car 1. The outside of the car 2 of this protrusion 15 provides a space 16 that can house a door opening and closing device 10 including at least a door motor 5 that drives the door of the car 1 in an opening and closing manner.

The car door 8 is attached on the hall 11 side of the car 1, and a hall-side door 12 that works in synchronization with this car door 8 is attached to a wall surface 13 of the hall 11 so as to be able to open and close. Therefore, the door motor 5 has a driving force large enough to simultaneously open and close the car door 8 and the hall-side door 12.

FIG. 1(c) is a perspective view of an upward direction in which the interior of the car 1 is looked up in the ceiling direction from below. An operating panel 17 is provided beside the car door 8 of the car 1, and above this operating panel 17, that is, in a corner portion where an inner wall surface within the car 1 on the hall 11 side and an inner surface of the ceiling 2 meet, there is provided the protrusion 15 which is such that at least part of the corner portion is protruded within the car 1. The part above the protrusion 15 provides the space 16, and as shown by this partially cutaway view, the door motor 5 is housed in this space 16.

According to the above-described configuration, at least part of the corner portion of the ceiling 2 of the car 1 on the hall 11 side is protruded within the car 1, a space is provided above this protruded portion, and at least the door motor 5 of the door opening and closing device 10 that opens and closes the car door 8 is housed in this space. Therefore, it is possible to shorten the overhead distance of the car 1.

[Second Embodiment]

Next, a car structure of an elevator in the second embodiment will be described with reference to FIG. 2. FIG. 2 is a partial sectional view in which the car of an elevator is viewed from the side direction. In FIG. 2, in a corner portion of a ceiling 2 of a car 1 on the hall side, an inclined surface portion 4 is formed as a protrusion 15. A space 16 is provided by forming this inclined surface portion 4. A door header case 3 is provided on a side wall of the car 1 on the hall side (in the direction of the arrow), the upper side of this door header case 3 is horizontally bent, and a door motor 5 is placed on top of

the upper side.

In this second embodiment, the inclined surface portion 4 is formed in a corner portion of the ceiling 2 of the car 1 on the hall side, whereby within the space 16 formed outside the car 1 by forming the inclined surface portion 4, the bent portion at the top end of the door header case 3 where the door motor 5 is placed is positioned. As a result, the installation height of the door motor 5 is made lower than the height of the ceiling 2.

Thanks to the above-described configuration, at least the door motor 5 that constitutes the door opening and closing device 10, which was the largest protrusion above the car 1, is housed in a position lower than the ceiling 2. Thus, because the top end of the largest protrusion above the car becomes low, it is possible to shorten the overhead distance in the elevator car.

[Third Embodiment]

Next, a car structure of an elevator in the third embodiment will be described with reference to FIG. 3. The basic configuration of the third embodiment is the same as the car structure of the second embodiment, and the third embodiment differs from the second embodiment in that an indicator 6 is provided as an example of an information supplying device on an inclined surface portion 4.

FIG. 3 is a partial sectional view in which the car structure of an elevator is viewed from the side direction. In FIG. 3, in a corner portion of a ceiling 2 of a car 1 on the hall side, an inclined surface portion 4 is provided as a protrusion 15. A space 16 is formed by providing this inclined surface portion 4. A door header case 3 is provided on a side wall of the car 1 on the hall side (in the direction of the arrow), the upper side of this door header case 3 is horizontally bent, and a door motor 5 is placed on the top surface of the upper side.

In this third embodiment, an indicator 6 is provided on a surface of an inclined surface portion 4, which is formed in a hall-side corner portion of the ceiling 2 of the car 1, on the car

side. By forming the inclined surface portion 4, as in the second embodiment, the bent portion of the top end of the door header case 3 is positioned within the space 16 formed outside the car 1 and the installation height of the door motor 5 is made lower than the height of the ceiling 2. Furthermore, the viewability of indications supplied to the users of the elevator is improved because the indicator 6 is provided on the inclined surface portion 4.

Thanks to the above-described configuration, at least the door motor 5 that constitutes the door opening and closing device 10, which was the largest protrusion above the car 1, is housed in a position lower than the ceiling 2. Thus, because the top end of the largest protrusion above the car becomes low, it is possible to shorten the overhead distance in the elevator car and it is also possible to increase the viewability of indications supplied to the users in the car 1.

Incidentally, the indicator 6 is only an example of the information supplying device and a liquid crystal television and a monitor may also be provided as other examples. Furthermore, a mirror may also be mounted. It is also possible to use as a surface on which an advertisement is put. All information supplying devices that can supply some information to the users are allowed, and the information supplying device may supply any kind of information, such as the operation information of the elevator (an indicator), various kinds of image information (a liquid crystal television and a monitor), information on the personal appearance of the users (a mirror) and purchase incentive information of the users (an advertisement). The indicator 6 that is provided as the information supplying device on an inner-side surface of a corner portion on the hall side of the car 1 may be provided with a shielding member that shields the surface of the indicator. The shielding member shields the information supplied by the information supplying device to the users and has also the function of protecting the surface of the information supplying device.

[Fourth Embodiment]

As shown in FIG. 4, a car structure of an elevator in the fourth embodiment is such that an opening is formed on the back side of an indicator 6 as an information supplying device provided on an inclined surface portion 4 and a hinge is provided on the top end of the indicator 6, thereby making it possible to open and close the inclined surface portion 4 as indicated by an imaginary line. The basic configuration of the fourth embodiment is the same as the second embodiment of FIG. 2 and the third embodiment of FIG. 3.

The indicator 6 provided on the inclined surface portion 4 is rotatably attached by the hinge to the inclined surface portion 4 so as to block the opening formed on the inclined surface portion 4. By rotating the indicator 6 as indicated by the imaginary line, the part where the indicator 6 is attached is opened and a space 16 outside the car 1 in which a door motor 5 is housed can be peeped at from inside the car 1. Incidentally, by providing a shielding member that shields the front surface of the indicator 6 as the information supplying device, it is also possible to protect the surface of the information supplying device during the rotation of the information supplying device.

Thanks to the above-described configuration, it is possible to increase the view-ability of indications supplied to the users in the car 1 while shortening the overhead distance in the elevator car and it is also possible to peep at the space from inside the car 1, thereby contributing to inspection work.

[Fifth Embodiment]

As shown in FIG. 5, a car structure of an elevator in the fifth embodiment differs from the car structure of the first embodiment in that the door motor that constitutes a door opening and closing device 10 provided on the ceiling 2 of the car 1 on the hall side is a long-axis door motor 7. Other features of the configuration are the same as in the first embodiment. A protrusion 15 is formed in a corner portion of

the ceiling 2 of the car 1 on the hall side (in the direction of the arrow), a space 16 is formed on the upper side of the ceiling 2 on the hall side by the protruding of this protrusion 15 to inside the car 1, and the long-axis door motor 7 is positioned in this
 5 space 16.

Because the thickness of the main body of the long-axis door motor 7 is formed to be flat, the top surface of the long-axis door motor 7 is almost at the same height as the top surface of the ceiling 2. Therefore, the height of the door
 10 motor, which is the largest protrusion on the upper side of the car 2, decreases. Thus, it is possible to shorten the overhead distance for the amount by which the height of the door motor decreases.

15 [Sixth Embodiment]

As shown in FIG. 6, a car structure of an elevator in the sixth embodiment is such that the protruding shape of a protrusion 15 that protrudes to inside the car 1 has a vertical surface that suspends downward from a ceiling 2, a horizontal
 20 surface parallel to the ceiling 2, and an inclined surface portion 4 that obliquely connects the vertical surface and the horizontal surface. The size of the inclined surface portion 4 is smaller than that of the inclined surface portion 4 of the second embodiment.

In a case where as shown in FIG. 6, the height of the leading end of the bent portion of a door header case 3 is relatively low and the protruding amount of the protrusion 15 to the inside of the car 1 is relatively large due to the great protruding of the main body of a door motor 5 in the direction
 30 of the car 1, the users feel an oppressive feeling in the case of a shape in which the vertical surface and the horizontal surface are orthogonal to each other. In this case, by providing the inclined surface portion 4 that connects the vertical surface and the horizontal surface and removing the corner portion of the protrusion 15, the oppressive feeling above the users is
 35 lessened and when the information supplying device such as a

liquid crystal monitor is installed, a suitable installation place can be provided by attaching the information supplying device to the inclined surface portion 4.

5 [Seventh Embodiment]

As shown in FIG. 7, a car structure of an elevator in the seventh embodiment differs from the car structures of the first to sixth embodiments in that the door motor that constitutes a door opening and closing device 10 is constituted by a flat-type motor 14 and is installed inside or outside a side surface of the door header case 3. Also, the car structure of an elevator in the seventh embodiment differs in that a protrusion 15 is formed in a corner portion of the ceiling 2 of a car 1 on the hall side so that the top surface of the door header case 3 and the bent portion thereof are lower than the height level of the ceiling 2, and that a space 16 capable of housing the bent portion of the door header case 3 that supports the motor 14 is formed on the upper side of the protrusion 15. Because the bent portion of the door header case 3 is indispensable for holding the motor 14, in a broad sense the space 16 is intended for housing the motor 14.

By applying the flat-type motor 14, it is possible to substantially reduce the volume of the door opening and closing device 10 that occupies the overhead space of the car 1 as the door motors 5, 7 and the like of the first to sixth embodiments. Therefore, the door opening and closing device 10 can be housed substantially within the space between the hall and the car if only the treatment of the bent portion of the door header case 3 is performed and it is possible to reduce the overhead distance on the upper side of the ceiling 2 of the car 1.

As described above, according to the present invention, it is possible to shorten the overhead distance.

What is claimed is:

1. A car structure of an elevator, comprising:
a protrusion which is such that at least part of a corner portion where an inner wall surface within an elevator car on the hall side and a ceiling surface meet is protruded within the car; and
a door motor that is housed in a space formed outside the car by the formation of the protrusion within the car and opens and closes a door of the car.
2. The car structure of an elevator according to claim 1, wherein the protrusion has an inclined surface portion that obliquely blocks the corner portion with an inclined surface.
3. The car structure of an elevator according to claim 2, comprising an information supplying device that is provided on a surface of the inclined surface portion on the inner side of the car and supplies information to users of the car.
4. The car structure of an elevator according to claim 3, wherein a shielding member that shields the information supplying device is provided on a surface of the inclined surface portion on the inner side within the car,
5. The car structure of an elevator according to any one of the preceding claims, wherein the protrusion in a portion in the opening and closing direction of the door in a corner portion where an inner wall surface on the hall side and a ceiling surface meet and is provided in a position where at least the motor of the door opening and closing device is provided outside the car, and the space is provided outside the car so as to correspond to the protrusion and houses the motor.
6. The car structure of an elevator according to any one of the preceding claims, comprising an information supplying device that is provided on an inner-side surface of the car other than the protrusion in a

corner portion on the hall side where the protrusion is provided and supplies information to users of the car.

7. The car structure of an elevator according to any one of claims 4 to 6, wherein the shielding member that shields the information supplying device is provided on an inner-side surface of the inclined surface portion within the car.

8. The car structure of an elevator according to any one of the preceding claims, wherein in the door opening and closing device, the motor that drives the door in an opening and closing manner is constituted by a long-axis motor and at least part of a main body of the long-axis motor is housed in the space.

9. The car structure of an elevator according to any one of the preceding claims, wherein in the door opening and closing device, the motor that drives the door in an opening and closing manner is constituted by a flat-type motor and the whole of the door opening and closing device including the flat-type motor is housed in the space disposed on a side surface of a door header case.

10. The car structure of an elevator according to any one of the preceding claims, wherein a surface on which the protrusion is formed within the car is provided with an opening and closing lid which enables the space formed on the outside of the car so as to correspond to the protrusion to be peeped at from inside the car.