

ELEVATOR

FIELD

Embodiments described herein generally relate to an elevator including a camera which is installed in a car to perform an imaging operation in a range from a doorway of the car to a hall.

BACKGROUND

In order to detect passengers who get into and/or off a car of an elevator, various sensors are installed at a jamb of a door apparatus of the car. Since the car is assembled in an elevator shaft, the sensors are also set at the time of assembling the car. In an inner region behind a modesty panel, a guide rail for a door panel or panels, etc., are set. These sensors are installed so as not to interfere with the set guide rail, etc.

It is known that in order to detect motion of a person who uses an elevator, both the inside of the car and a hall are observed. In this case, if cameras are respectively installed in the inside of the car and the hall, it is expensive, and it is therefore being contemplated that a camera is installed in the car only. However, if a camera is set at a ceiling of the car, an imaging range of the camera on a hall side is reduced. By contrast, in order that the imaging operation be performed in such a way as to cover a location on the hall side which is far away from the car as far as possible, a camera is installed at the back of the interior of the car. In this case, since the shooting distance of the camera is long, as the camera, a high-quality camera needs to be provided, which has high detection accuracy. Furthermore, in the case where the camera is installed at the back of the interior of the car, there is a possibility that the field of view of the camera may be blocked by a passenger in the car. In view of this, it is proposed that a camera is installed at an inner part of a

modesty panel located at an upper portion of the door apparatus.

5 However, in order to control the door apparatus of the elevator, sensors are installed in accordance with respective intended uses and objects in detection, as a result of which lines extended from the sensors require large space, and in addition are complicated. In this state, in the case where the camera is installed at an inner part of the modesty of the car, it needs to be
10 accurately installed in a designed position and at a designed angle such that an area to be monitored is within the angle of view of the camera.

SUMMARY

15 According to one aspect, there is provided an elevator comprising: a modesty panel provided above a door apparatus of a car, and comprising a window portion configured to form an opening extending from an outer wall facing a hall to a bottom wall; a transparent member fitted in the window portion; a
20 camera installed above the window portion and has a angle of view to shoot a range from an inside of the car to the hall, while the door apparatus is opened; a bracket fixing the camera such that a center line of the angle of view is inclined toward the hall; and a
25 cover attached to an upper surface of the bottom wall of the modesty panel, and surrounding the window portion and at least a light receiving portion of the camera, wherein the transparent member is held between the outer wall of the modesty panel and the cover.
30 Alternatively, the transparent member comprises a flange configured to engage with an edge of the window portion, and the cover comprises a lower edge configured to contact an upper edge of the flange contacting the outer wall from above.

35 BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view illustrating an elevator according to a first embodiment.

FIG. 2 is a perspective view illustrating a camera at a modesty panel of a car of the elevator as illustrated in FIG. 1 and the vicinity of the camera, as seen from below.

5 FIG. 3 is an exploded perspective view illustrating the modesty panel and the camera as illustrated in FIG. 2.

10 FIG. 4 is a cross-sectional view of the camera and the modesty panel, which is taken along line F4-F4 in FIG. 2.

 FIG. 5 is a cross-sectional view of the camera and the modesty panel, which is taken along line F5-F5 in FIG. 2.

15 FIG. 6 is a perspective view illustrating a camera installed at a modesty panel of an elevator according to a second embodiment and the vicinity of the camera.

 FIG. 7 is an exploded perspective view illustrating the modesty panel and the camera as illustrated in FIG. 6.

20 FIG. 8 is a cross-sectional view of the camera and the modesty panel, which is taken along line F8-F8 in FIG. 6.

FIG. 9 is a cross-sectional view of the camera and the modesty panel, which is taken along line F9-F9 in FIG. 8.

FIG. 10 is an exploded perspective view
5 illustrating a camera installed at a modesty panel of an elevator according to a third embodiment and the vicinity of the camera.

FIG. 11 is a cross-sectional view illustrating the modesty panel and the camera as illustrated in FIG. 10.

10 DETAILED DESCRIPTION

Various embodiments will be described hereinafter with reference to the accompanying drawings.

In general, according to one embodiment, there is provided an elevator in which a camera can be easily
15 and accurately attached to a modesty panel of a car.

According to one embodiment, an elevator includes a modesty panel, a camera, and a bracket. The modesty panel is provided at an upper portion of a door apparatus of a car and comprises an outer wall facing a
20 hall, a bottom wall and a window portion configured to form an opening extended over two different planes one of which extends along the outer wall and another of which extends along the bottom wall. The camera is installed above the window portion and has an angle of
25 view to shoot a range from an inside of the car to the hall, while the door apparatus is opened. The bracket fixes the camera such that a center line of the angle of view is inclined toward the hall.

An elevator 1 according to a first embodiment will
30 be described with reference to FIGS. 1 to 5. FIG. 1 is a cross-sectional view schematically illustrating a state of a car 2 which arrives at an arbitrary floor. As illustrated in FIG. 1, the elevator 1 is equipped with a camera 4 which is installed at an inner part of
35 a modesty panel 22. The camera 22 shoots a range to cover an area in the car 2 which starts from a door apparatus 21 of the car 2 and an area in the hall 3

which starts from a door apparatus 31 of the hall 3,
and which is larger than the area in the car 2, while
these door apparatuses are open at the floor at which
the elevator 1 arrives. The elevator 1 determines
5 whether a person in the hall 3 who is present close to
the elevator 1 will get into the elevator 1 or not,
based on video information obtained by the camera 4,
and controls an operation of the door apparatus 21. In
the following, as a matter of convenience for
10 explanation, there is a case where the interior of the
car 2 is referred to as "inside", a hall side where the
hall 3 is located is referred to as "outside", and a
direction in which door panels 21A and 31A of the door
apparatuses 21 and 31 are moved is referred to as
15 "width direction". Furthermore, with respect to a
direction in which gravity acts, "upper", "above",
"down" and "below" will be used.

The elevator 1 comprises a modesty panel 22, a
transparent member 5, the camera 4, a bracket 61 and a
20 cover 62, the modesty panel being illustrated in
FIG. 2. These elements are illustrated in detail in
FIGS. 2 to 5. FIG. 2 illustrates that the camera 4 is
installed at substantially the center of the modesty
panel 22 in the width direction of the door apparatus
21, and the modesty panel 22 is indicated by a phantom
25 line in order that the location of the camera 4 be
clearly seen. FIG. 3 is an exploded perspective view
in which the transparent member 5, the bracket 61 and
the cover 62 are removed upwardly from the modesty
30 panel 22, with the camera 4 fixed to the bracket 61,
and which illustrates a state in which the transparent
member 5 and the bracket 61 are further shifted from a
car side to a hall side. FIG. 4 is a side view
illustrating cross sections of the modesty panel 22,
35 the transparent member 5 and the bracket 61, which are
taken along line F4-F4 in FIG. 2. FIG. 5 illustrates
cross sections of the modesty panel 22 and the

transparent member 5, which are taken along line F5-F5 in FIG. 2, as the vicinity of the camera 4 is seen from the inside of the car 2.

As illustrated in FIGS. 1 and 2, the modesty panel 22 is provided at an upper portion of the door apparatus 21 of the car 2, and includes an outer wall 221 which faces the hall 3, an inner wall 222 which faces the inside of the car 2, a bottom wall 223 which is continuous with the outer wall 221 and the inner wall 222 to connect them to each other, and a window portion 224 configured to form an opening extending from the outer wall 221 to the bottom wall 223. The inner wall 222 and the bottom wall 223 are part of a fancy member which can be seen from the inside of the car 2. There is a case where at the inner wall 222, A display device may be provided at the inner wall 222 to indicate the floor at which the car 2 arrives, the moving direction thereof, information regarding each of floors, etc.

As illustrated from FIGS. 2 to 5, the transparent member 5 has a flange 51 which is larger than the window portion 224, and is set in the window portion 224 from above. The transparent member 5 is bent to be L-shaped along the outer wall 221 and the bottom wall 223 as illustrated in FIG. 4, and has a thickness such that it is substantially flush with an outer surface of the modesty panel 22, i.e., an outer surface of the outer wall 221 which faces the hall 3, and a bottom surface of the bottom wall 223. The flange 51 may be fixed by a caulking agent or an adhesive agent in order to fix the transparent member 5. The flange 51 need not always to be provided on the entire transparent member 5; that is, it may be provided on part of the transparent member 5 as long as it can hold the transparent member 5 at the window portion 224.

The transparent member 5 has such a light-transmission characteristic as to not only allow light

to pass through the transparent member 5 but allow the camera 4 to detect motion of a person or the like passing through the door apparatus. It should be noted that the transparent member 5 may be colored so as not to diffuse or absorb light passing through the transparent member 5. Also, the transparent member 5 may include a polarizing filter which is located in the transparent member 5 or on an outer part thereof, or in an intermediate layer of a laminated member.

The camera 4 is located above the window portion 224, and has an angle V of view which enables the camera 4 to shoot a range from the inside of the car 2 to the hall 3, while the door apparatuses 21 and 31 are opened. To be more specific, as illustrated in FIG. 1, the camera 4 has the angle V of view and can shoot in a range covering an area in the car 2 which starts from the door apparatus 21 thereof and in which one person can stand and an area in the hall 3 which starts from the door apparatus 31 thereof and in which five or six steps by an ordinary person takes about. Center line A of the angle V of view extends toward the hall 3, and a distance from the door apparatus 31 of the hall 3 to the center line A is greater than that from the door apparatus 21 of the car 2 to the innermost end of an area of the inside of the car 2 on which the camera can be shooting. Furthermore, the camera 4 is located at substantially the center of the modesty panel 22 in the width direction of the door apparatus 21. Therefore, the range which can be shot by the camera 4 on the hall 3 is larger than the width of the door apparatus 31 of the hall 3 in the width direction. In the case of attaching the camera 4, it is inclined such that the center line A of the angle V of view is inclined at, for example, an angle of 60 degrees against to a vertical line.

The bracket 61, as illustrated in FIGS. 2 to 4, is bent at an acute angle, and includes a vertical wall

611 extending in a vertical direction and an inclined wall 612 which faces the hall 3 such that the normal to the inclined wall 612 is coincident with the center line A of the angle V of view of the camera 4. The camera 4 is fixed to the inclined wall 612, and thus kept inclined at a predetermined angle. To be more specific, as illustrated in FIGS. 1 to 4, the bracket 61 fixes the camera 4 such that the center line A of the angle V of view is inclined toward the hall 3, and the imaging range is set to a range corresponding to the angle V of view. The vertical wall 611 of the bracket 61 is fixed to the inner wall 222 of the modesty panel 22. Furthermore, a reinforcement member which connects between the vertical wall 612 of the bracket 61 and the inclined wall 612 thereof may be provided to prevent the inclined wall 612 from being vibrated with respect to the vertical wall 611 thereof.

The vertical wall 611, in this embodiment as illustrated in FIG. 4, is fixed to a stud bolt 225 joined to the inner wall 222 by a nut 226. They may be bonded to each other by an adhesive agent or fixed to each other by soldering, instead of using of the stud bolt 225. Furthermore, the camera 4 includes a square seat 42 serving as a fixing portion for a cylindrical lens barrel portion 41 and screw holes 43 provided in four corners of the seat 42, which project from the lens barrel portion 41 in the radial direction, as illustrated in FIGS. 4 and 5. The inclined wall 612 includes through holes 613 which correspond in position to the screw holes 43 as illustrated in FIG. 4 as cuts in the seat 42 and the inclined wall 612 in positions corresponding to portions through which the screw hole 43 extends. Bolts 614 are inserted into the through holes 613, and then screwed and fitted in the screw holes 43, thereby fixing the camera 4 to the inclined wall 612. They may be bonded to each other by an adhesive agent or fixed to each other by soldering,

instead of using the bolt 614.

The cover 62, as illustrated in FIGS. 2 and 3, is attached to an upper surface of the bottom wall 223 of the modesty panel 22 in such a way as to surround the window portion 224 and at least a light receiving portion 411 which is a distal end portion of the lens barrel portion 41 of the camera 4. The cover 62, as illustrated in FIGS. 2 to 4, is provided between the outer wall 221 of the modesty panel 22 and the inner wall 222 thereof, with a gap between them, and is formed in the outer shape of a rectangular box which is longitudinal in the width direction of the door apparatus 21. The cover 62 includes: a first side wall 621 which faces the outer wall 221; an upper wall 622 which covers the camera 4 from above; two second side walls 623 which cross the width direction of the door apparatus 21; and two leg portions 624 which extend from lower ends of the second side walls 62 in both direction away from the camera 4. Also, in the cover 62, a lower side which faces the window portion 224 is open, a part of the first side wall 621 facing the outer wall 221 is open, and a side which faces the inner wall 222, i.e., which is closer to the car 2, is open. With respect to the first embodiment, in order that the two second side wall 623 and the two leg portions 624 be distinguished from each other, respectively, there is a case where as illustrated in FIGS. 2 and 5, as seen from the inside of the car 2, a right second side wall 623 and a right leg portion 624 will be referred to a right side wall 623R and a right leg portion 624R, respectively, and a left second side wall 623 and a left leg portion 624 will be referred to as a left side wall 623L and a left leg portion 624L, respectively.

The leg portions 624, as illustrates in FIG. 2, include long holes 625 which are longitudinal in a direction where a passenger passes through the door

apparatus 21. As illustrated in FIG. 5, the modesty panel 22 includes stud bolts 227 which are attached to the upper surface of the bottom wall 223 in positions corresponding to those of the long holes 625. The stud bolts 227 are inserted in the long holes 625, and nuts 228 are screwed on them, thereby fixing the cover 62. At this time, as illustrated in FIGS. 4 and 5, the transparent member 5 is fixed in the following manner: the cover 62 is moved closer to the outer wall 221 such that in the flange 51 of the transparent member 5, extending along an edge of the window portion 224 which is located at the outer wall 221 of the modesty panel 22 is pushed by the first side wall 621 against the inner surface of the outer wall 221 of the modesty panel 22, i.e., the transparent member 5 is held between the inner wall 222 of the modesty panel 22 and the cover 62. To be more specific, as illustrated in FIG. 5, the entire edge of the window portion 224 which is located at the outer wall 221 is pressed by a lower edge 621A of the first side wall 621 of the cover 62 from the car side. Thus, even if an object carried by a passenger who passes through the door apparatus 21 hits the transparent member 5 from below, the transparent member 5 abuts from below against an inner peripheral surface of the window portion 224 which is located at the outer wall 221, and can thus be prevented from being floated. Edges of the upper wall 622 and the second side wall 623 of the cover 62, which extend along the inner wall 222 of the modesty panel 22, as illustrated in FIG. 4, are located such that a gap is provided between the edges and the inner wall 222, in order that the cover 62 be moved closer to the inner wall 222. The gap may be closed by a caulking agent, an adhesive tape or the like to prevent a foreign object such as dust from entering the gap.

According to the first embodiment, in the elevator 1 having the above structure, in the case where the

camera 4 can be used as a sensor which detects whether a passenger waiting in the hall 3 at a floor at which the car 2 arrives moves toward the car 2, moves away from the car 2, stands still, or crosses in front of the door apparatus 31, the camera 4 can be fixed to the modesty panel 22 by the bracket 61, and the transparent member 5 can be tenaciously pressed against the window portion 224 by the cover 62. The above structure for installing the camera 4 at the modesty panel is simple, and can be easily assembled in the actual place. Furthermore, a detection range from the inside of the car 2 to the hall 3 is shot by the camera 4 through the transparent member 5. It should be noted that if a relative position of the transparent member 5 to the camera 4 offsets, the angle V of view of the camera 4 changes like a prism. In the first embodiment, the transparent member 5 is firmly fixed, and the angle V of view of the camera 4 is set with a high accuracy. That is, by virtue of the above structure of the elevator 1, it is possible to easily and accurately install the camera 4 at the modesty panel 22.

The elevator 1 according to a second embodiment will be described with reference to FIGS. 6 to 9. In the elevator 1 according to the second embodiment, the bracket 61 for fixing the camera 4 is formed continuous with the cover 62 to form a housing 6. In this regard, the elevator 1 according to the second embodiment is different from that according to the first embodiment; that is, the other functions of the elevator 1 according to the second embodiment are the same as those of the elevator 1 according to the first embodiment. With respect to the second embodiment, structural elements having the same functions as those in the elevator 1 according to the first embodiment will be denoted by the same reference numerals as in the first embodiment, and their detailed explanations are also the same as those made with respect to the

first embodiment.

FIG. 6 is a perspective view illustrating the camera 4 installed at the modesty panel 22 of the car 2 and peripheral portions of the camera 4, as seen from below in the hall 3, and the right half of the modesty panel 22 as seen from the hall 3 is indicated by a phantom line in order that the structure of the housing 6 be understandable. FIG. 7 is an exploded perspective view illustrating a state in which the housing 6, the camera 4 and the transparent member 5 are detached upwardly from the bottom wall 223 of the modesty panel 22. FIG. 8 is a cross-sectional view illustrating a side view of the camera 4 and cross sections of the modesty panel 22, the transparent member 5 and the housing 6, which are taken along line F8-F8 in FIG. 6, and portions of the seat 42 and the inclined wall 612 are cut at the screw holes 43 to indicate a cross-section. FIG. 9 is a cross-sectional view illustrating rear-view of the camera 4 and cross sections of the modesty panel 22, the transparent member 5 and the housing 6, which are taken along line F9-F9 in FIG. 8.

In the second embodiment, the cover 62 is formed by bending a sheet metal as in the first embodiment. At this time, as can be seen from FIG. 8, the vertical wall 611 of the bracket 61 of the elevator 1 according to the second embodiment is formed as part of a third side wall 626 extending downwards and formed continuous with an edge of the upper wall 622 which faces the inner wall 222 of the modesty panel 22. Furthermore, the inclined wall 612 of the bracket 61 is formed by bending part of the third side wall 626, such that it extends from a center portion of the third side wall 626 toward an upper region of the hall 3 side. As illustrated in FIG. 8, an end portion 612A of the inclined wall 612 which faces the hall 3 extends to the inside of a corner between the first side wall 621 and the upper wall 622, whereby the inclined wall 612 is

firmly held, and the stiffness of the housing 6 is improved.

5 The camera 4, as illustrated in FIG. 7, is mounted on the inclined wall 612 from below. In order that bolts 614 be screwed into the screw holes 43 of the camera 4 through the through holes 613 of the inclined wall 612, as illustrated in FIG. 8, the housing 6 includes holes 622A and 626A for insertion of the bolts 614, and the holes 622A and 626A are formed in portions of the upper wall 622 and the third wall 626, which are located on extended lines of the screw holes 43 of the camera 4. In the second embodiment, the leg portions 624 are fixed to the bottom wall 223 of the modesty panel 22, after the camera 4 is assembled in the housing 6.

15 When the housing 6 is set at the modesty panel 22, as illustrated in FIG. 8, the lower edge 621A of the first side wall 621 of the housing 6 is brought from above into contact with an upper edge of the flange 51 of the transparent member 5 set in the window portion 224. Furthermore, a turndown for pressing down the flange 51 from the car side may be provided at the lower edge 621A. As illustrated in FIG. 9, the leg portions 624 of the housing 6 are pressed down from above by the nuts 228 against the stud bolts 227 of the bottom wall 223 of the modesty panel 22, the lower edge 621A of the side wall 621 of the housing 6 is engaged with the flange 51 of the transparent member 5, and the transparent member 5 is pressed down from above and fixed to the window portion 224 by the flange 51. In order to absorb an error made out of manufacturing tolerances and assembling tolerances, an elastic member such as synthetic resin having rubber elasticity may be interposed between the flange 51 and the lower edge 621A of the first side wall 621.

35 In such a manner, the elevator 1 according to the second embodiment, in which a member for attaching the

camera 4 has the above structure, has the same advantage as that according to the first embodiment; the transparent member 5 is firmly fixed to the window portion 224; and also the camera 4 can be easily set at the modesty panel 22 simply in the actual place by fixing the housing 6 to the bottom wall 223 of the modesty panel 22.

The elevator 1 according to a third embodiment will be explained with reference to FIGS. 10 and 11. In the elevator 1 according to the third embodiment, the bracket 61 fixing the camera 4 is formed continuous with the cover 62 to form a housing 6. In this regard, elevator 1 according to the third embodiment is different from the elevator 1 according to the first embodiment. Also, in the third embodiment, the shape of the housing 6 is different from that of the housing 6 in the second embodiment. The other functions and structural features of the third embodiment are the same as those in the first embodiment. Therefore, with respect to the third embodiment, structural elements having the same functions as structural elements in the first embodiment will be denoted by the same reference numerals as in the first embodiment, and their detailed explanations are also the same as those made with respect to the first embodiment.

FIG. 10 is an exploded perspective view illustrating a state in which the camera 4, transparent member 5 and housing 6 set at the modesty panel 22 of the car 2 are detached upwardly from the bottom wall 223 of the modesty panel 22. In FIG. 10, both side portions of the modesty panel 22 which further extend than the housing 6 in the width direction of the door apparatus 21 are omitted. FIG. 11 is a cross-sectional view illustrating a state in which the camera 4, the transparent member 5 and the housing 6 are set at the modesty panel 22.

In the third embodiment, the cover 62 is formed by

bending a sheet metal as in the first and second
embodiments. In the third embodiment, the cover 62 and
the bracket 61 are formed continuous with each other to
form the housing 6 as in the second embodiment. In the
5 housing 6, as can be seen from FIGS. 10 and 11, the
inclined wall 612 of the bracket 61, which holds the
camera 4, corresponds to the upper wall 622 of the
cover 62. That is, the upper wall 622 of the cover 62
is also the inclined wall 612 holding the camera 4 at a
10 predetermined angle. Therefore, the housing 6 is
formed in the shape of a trapezoid box which is tall on
the hall side and short on the car side. The first
side wall 621, the second side wall 623 and the third
side wall 626 are formed by bending a sheet metal
15 downwards from outer peripheral edges of the upper wall
622.

The lens barrel portion 41 of the camera 4 is
obliquely inserted from above and into a through hole
612B formed in the upper wall 622 (inclined wall 612),
20 and the bolts 614 are passed from below through the
through holes 613, and screwed into the screw holes 43,
thereby fixing the camera 4 to the housing 6. The
housing 6, as in the first and second embodiments, is
fastened on the modesty panel 22 such that the long
25 holes 625 of the leg portions 224 are engaged with the
stud bolts 227 of the bottom wall 223 of the modesty
panel 22, and the leg portions 224 are then fixed onto
the bottom wall 223 by the nuts 228. When the housing
6 is fixed to the bottom wall 223 of the modesty panel
30 22, the flange 51 of the transparent member 5, which is
superposed on an edge of the window portion 224 which
is located at the outer wall 221, is pressed down from
above by the lower edge 621A of the first side wall
621, thereby the transparent member 5 is firmly fixed
35 to the modesty panel 22. Furthermore, the window
portion 224 with which the transparent member 5 is
engaged and at least the light receiving portion 411 of

the lens barrel portion 41 of the camera 4 are surrounded by the housing 6 which is integrally formed by the bracket 61 and the cover 62.

5 Instead of inserting the bolts 614 from below, it may be set that the screw holes of the seat 42 of the camera 4 are formed as bolt holes, stud bolts are previously attached to the upper wall 622 (inclined wall 612), the bolt holes of the camera 4 are set such that the stud bolts are inserted in the bolt holes, and
10 the nuts are screwed onto the stud bolts, thereby fixing the camera 4 to the housing 6. Alternatively, it may be set that the through holes 613 provided in the upper wall 622 is subjected to form flared screw holes, and the camera 4, which is inserted in the
15 through holes 61B, is fixed by screwing the bolts 614 into the screw holes.

 The elevator 1 according to the third embodiment configured to form an attaching portion for the camera 4 as the above structure, has the same advantage as
20 those according to the first and second embodiments. Furthermore the camera 4 can be attached to the inclined wall 612 from above, whereby the camera 4 can be set into the housing 6, after the transparent member 5 and the housing 6 are assembled at the modesty panel
25 22. To be more specific, the timing at which the camera 4 and lines for the camera 4 are set can be more freely determined in an assembling work in the actual place, and also the camera 4 and its lines can be easily set at the modesty panel 22 in the case where
30 parts are sub-assembled in a factory. Furthermore, even if it becomes necessary to replace an existing camera 4 with a new one in future, it can be easily removed.

 It should be noted that the elevators 1 according
35 to the first to third embodiments are explained above with respect to the case where each of the door apparatuses 21 and 31 are a biparting door. Thus, the

camera 4 is located in substantially the center portion of the door apparatus 21 in the width direction thereof in each embodiment. However, in the case where each of the above door apparatuses opens in a single direction only, the camera 4 is located on a side where a doorstop is located. Furthermore, it is explained above that the cover 62 or the housing 6 is formed by bending a sheet metal. However, the cover 62 or the housing 6 may be formed by injection-molding synthetic resin.

These embodiments were presented as an example, and the scope of the invention is not intended to be limited though some embodiments of the present invention were described. These novel embodiments can be embodied in other various modes, and various omissions, substitutions and changes in the form of the embodiment described in above may be made without departing from the gist of the invention. These embodiments and the modifications are included in the scope and gist of the inventions and included within the invention described in the claims and the range of the equivalent.

For example, although in the third embodiment, the camera 4 is set such that the lens barrel portion 41 is inserted from above into the through hole 612B provided in the inclined wall 612, this structure can also be applied to the inclined wall 612 of the bracket 61 in the first embodiment. Furthermore, in the first embodiment, the bracket 61 may be fixed to the outer wall 221. In this case, the vertical wall 611 of the bracket 61 is fixed to the outer wall 221 such that the inclined wall 612 extends downwardly from the upper end of the vertical wall 611 toward the car 2. In this case, a portion of the cover 62 where interferes with the bracket 61 is cut off. Furthermore, in the case where as in the third embodiment, the camera 4 is set from above in the housing of the second embodiment, it

suffices that a hole which allows the seat 42 of the camera 4 to pass through the hole is formed in the upper wall 622 and the third side wall 626. The housing 6 is sufficiently larger than the camera 4 in the width direction of the door apparatus 21. Thus, the inclined wall 612 is continuous with the third side wall 626 at both side portions thereof with respect to the hole.

In addition, in each of the embodiments, the camera 4 is used not only to detect a passenger who will get into the car 2 at the hall 3 in a floor at which the car 2 arrives, but as a sensor which detects whether an object is present close to the door panels 21A and 31A when the door apparatuses 21 and 31 are opened/closed.

It should be noted that the elevator according to one embodiment includes an elevator provided with a modesty panel, a camera and a bracket. The modesty panel is located at an upper portion of a door apparatus of a car, and includes a window portion configured to form an opening continuously extending over two planes one of which extends along an outer wall facing a hall and another of which extends along a bottom wall. The camera is located above the window portion, and has an angle V of view at which it shoots a range from the inside of the car to the hall, while the door apparatuses are opened. The bracket fixes the camera such that the center line of the angle of view is inclined toward the hall.

Alternatively, the elevator according to another embodiment includes an elevator comprising a modesty panel, a transparent member, a camera and a bracket. The modesty panel is located at an upper portion of a door apparatus of a car, and comprises a window portion configured to form an opening continuously extending from an outer wall facing the hall to a bottom wall. The transparent member is engaged with the window

portion from a plane extending along the outer wall to a plane extending along the bottom wall. The camera is located above the window portion, and has an angle V of view to shoot a range from the inside of the car to a hall, while the door apparatuses are opened. The bracket fixes the camera such that the center line of the angle of view is inclined toward the hall.

Alternatively, the elevator according to a further embodiment includes an elevator provided with a modesty panel, a camera and a bracket. The modesty panel is located at an upper portion of a door apparatus of a car, and includes a window portion configured to form an opening continuously extending over an outer wall facing the hall and a bottom wall. The camera is located above the window portion, shoots a range from the inside of the car to a hall while the door apparatuses are opened, and has an angle of view which includes a ridgeline on which a plane extending along the outer wall and a plane extending along the bottom wall cross each other. The bracket fixes the camera such that the center line of the angle of view is inclined toward the hall.

Alternatively, the elevator according to still another embodiment comprises a modesty panel, a transparent member, a camera, a bracket and a cover. The modesty panel is located at an upper portion of the door apparatus of the car, and includes a window portion configured to form an opening extending from an outer wall facing the hall to a bottom wall. The transparent member is engaged with the window portion. The camera is located above the window portion, and has an angle of view to shoot a range from the inside of the car to a hall while the door apparatuses are opened. The bracket fixes the camera such that the center line of the angle of view is inclined toward the hall. The cover is attached to an upper surface of the bottom wall of the modesty panel in such a way as to

surround the window portion and at least a light receiving portion of the camera. Furthermore, the transparent member is held between the outer wall of the modesty panel and the cover.

5 Alternatively, the elevator according to another further embodiment comprises a modesty panel, a transparent member, a camera, a bracket and a cover. The modesty panel is located above the door apparatus of the car, and includes a window portion configured to
10 form an opening extending over an outer wall facing the hall and a bottom wall. The transparent member is engaged with the window portion. The camera is located above the window portion, and has an angle of view to shoot a range from the inside of the car to a hall
15 while the door apparatuses are opened. The bracket fixes the camera such that the center line of the angle of view is inclined toward the hall. The cover is attached to an upper surface of the bottom wall of the modesty panel in such a way as to surround the window
20 portion and at least a light receiving portion of the camera. Furthermore, the transparent member includes a flange which is engaged with an edge of the window portion, and the cover includes a lower edge which abuts from above with an upper edge of the flange. The
25 upper edge of the flange fits to the outer wall. In the elevator, the transparent member may be further held between the outer wall of the modesty panel and the cover.

30 Also, in the elevator, the bracket may be fixed to an inner wall of the modesty panel which faces the inside of the car. Furthermore, the cover may be formed continuous with the bracket.

35 While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms;

furthermore, various omissions, substitutions and changes in the form of the embodiment described herein may be made without departing from the spirit of the invention. The accompanying claims and their
5 equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

WHAT IS CLAIMED IS:

1. An elevator comprising:

a modesty panel provided above a door apparatus of a car,
5 and comprising a window portion configured to form an opening
extending from an outer wall facing a hall to a bottom wall;
a transparent member fitted in the window portion;
a camera installed above the window portion and has a angle
of view to shoot a range from an inside of the car to the hall,
10 while the door apparatus is opened;
a bracket fixing the camera such that a center line of the
angle of view is inclined toward the hall; and
a cover attached to an upper surface of the bottom wall of
the modesty panel, and surrounding the window portion and at
15 least a light receiving portion of the camera, wherein
the transparent member is held between the outer wall of
the modesty panel and the cover.

2. An elevator comprising:

20 a modesty panel provided above a door apparatus of a car,
and comprising a window portion configured to form an opening
extending from an outer wall facing a hall to a bottom wall;
a transparent member fitted in the window portion;
a camera installed above the window portion and has a angle
25 of view to shoot a range from an inside of the car to the hall,
while the door apparatus is opened;
a bracket fixing the camera such that a center line of the
angle of view is inclined toward the hall; and
a cover attached to an upper surface of the bottom wall of
30 the modesty panel, and surrounding the window portion and at
least a light receiving portion of the camera, wherein
the transparent member comprises a flange configured to

engage with an edge of the window portion, and

the cover comprises a lower edge configured to contact an upper edge of the flange contacting the outer wall from above.

5 3. The elevator of Claim 2, wherein

the transparent member is held between the outer wall of the modesty panel and the cover.

4. The elevator of any one of Claims 1 to 3, wherein

10 the bracket is fixed to an inner wall of the modesty panel which faces an inside of the car.

5. The elevator of one of Claims 1 and 2, wherein

the cover is formed continuously with the bracket.