

ESCALATOR MONITORING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001]

The present invention relates to an escalator monitoring apparatus which monitors an escalator with a monitoring camera.

2. Description of the Background Art

[0002]

When an escalator is installed alone in a building, a narrow-angle portion (triangular portion) is formed between a moving handrail and a ceiling. There is some kind of escalator installation structure in which an ascending escalator and a descending escalator are provided crosswise in side view between upper and lower floors. In this installation structure, a narrow-angle portion is formed between a moving handrail of one escalator and a bottom portion of the other escalator. Protection bodies for preventing passengers from getting caught are generally placed in such narrow-angle portions.

[0003]

In a safety apparatus of a man conveyor disclosed in JP-UM-A-61-154278, a cylindrical detection body is suspended from a ceiling in front of a guard plate as a protection body. A lower end portion of the detection body is coupled with a

balustrade through an elastic body. Any passenger on an ascending escalator cannot touch the protection body before the passenger touches the detection body. Thus, the passenger can notice the approach of a narrow-angle portion before the passenger touches the protection body.

[0004]

An escalator monitoring apparatus disclosed in JP-A-2002-114475 includes a monitoring camera and a sensor. The monitoring camera is provided on a post of a building located oppositely to a narrow-angle portion protection plate as a protection body on a lower floor side so that the monitoring camera can take pictures about states of passengers. The sensor detects shaking of the narrow-angle portion protection plate. Images taken by the monitoring camera can be recoded for a predetermined period around a point of time when the sensor detects the shaking of the narrow-angle portion protection plate. Thus, the situation of any accident in which any passenger falls or tumbles down the steps or gets caught in the vicinities of the narrow-angle portion can be stored.

[0005]

A background-art technique for installing a monitoring camera has been disclosed in JP-A-2006-206283. In this background-art technique, a monitoring camera is provided in a guide fence provided in a boarding area on each of upper and

lower floors. The monitoring camera is received in a pole of the guide fence so that the monitoring camera can take pictures while viewing the escalator side through a monitoring window provided in the pole.

[0007]

In the escalator monitoring apparatus disclosed in JP-A-2002-114475, the sensor for detecting the shaking of the guard plate (protection body), a monitor for displaying images taken by the monitoring camera, and a recording unit for recording the images are connected to the monitoring camera through electric wires. Wiring ducts are used for wiring the electric wires, in order to suppress exposure of the electric wires. The wiring ducts are placed on a ceiling, a beam, a floor, etc. so as to cover the electric wires. There is a problem that the wiring ducts placed on the ceiling, the beam, the floor, etc. may spoil the appearance of the building. Further, there is another problem that installation expenses may be required for wiring work on the building side.

[0008]

Although the monitoring camera is placed on the post of the building as disclosed in JP-A-2002-114475, the monitoring camera may be placed on a ceiling of the building or on a wall of the building. When the monitoring camera is placed on a structural portion of the building, the place where the

monitoring camera can be placed is limited due to a double height structure of the building, glass finishing of the wall, special finishing of the ceiling, etc. Or there arises a problem that the monitoring camera cannot be placed.

[0009]

In the technique disclosed in JP-A-2006-206283, in order to place the pole of the guide fence, there is a problem that time or expense is required for construction works on the building, such as excavating the floor of the building, fixing the pole to the floor or laying a wiring duct under the floor. The monitoring camera is placed in the pole of the guide fence lower than the balustrade. Thus, there is also a fear that passengers may feel ill as the passengers are viewed from below.

SUMMARY OF THE INVENTION

[0010]

The invention was developed in consideration of the foregoing circumstances. An object of the invention is to provide an escalator monitoring apparatus in which a monitoring camera for taking pictures about states of passengers on an escalator can be placed out of the way of the passengers without making the passengers be viewed from below so as not to make the passengers feel ill, and in which exposure of electric wires connected to the monitoring camera can be suppressed easily.

[0011]

In order to attain the foregoing object, the invention provides an escalator monitoring apparatus provided in a building having a narrow-angle portion formed between a ceiling and a moving handrail of an escalator or a narrow-angle portion formed between a bottom portion of one of two escalators and a moving handrail of the other escalator, the two escalators being disposed crosswise and adjacently, and a protection body provided in the narrow-angle portion to prevent any one of passengers from getting caught in the narrow-angle portion when the escalator is being driven to ascend, the apparatus including: a monitoring camera which takes images of the escalator and the passengers; an electric wire member which electrically connects the monitoring camera with an external apparatus; a camera receiving cylinder which is a cylindrical body provided in a posture to extend in an up/down direction at the rear of the protection body when an ascending direction of the escalator is regarded as a front direction, the monitoring camera being received in the camera receiving cylinder; a wiring cylinder which is a cylindrical body provided in a posture to extend in the up/down direction at the rear of the protection body when the ascending direction of the escalator is regarded as the front direction, a part of the electric wire member being received in the wiring cylinder; and an outer deck board which

is provided outside a base portion of a balustrade of the escalator so as to receive another part of the electric wire member than the part of the electric wire member; wherein: the electric wire member is wired to be led out from a lower end of the wiring cylinder and guided into the outer deck board; and a slit is provided in the up/down direction in the wiring cylinder, and the electric wire member is inserted through the slit.

[0012]

According to the invention configured thus, the monitoring camera is received in the camera receiving portion provided together with the protection body in the narrow-angle portion. Accordingly, the monitoring camera can be placed out of the way of passengers without making the passengers be viewed from below so as not to make the passengers feel ill. In addition, the electric wire member is inserted through the slit provided in the up/down direction in the wiring cylinder and wired between the wiring cylinder and the outer deck board. Thus, the electric wire member does not have to be wired in a ceiling, a beam or a space around the ceiling, the beam, or the like. It is therefore possible to suppress exposure of the wiring.

[0013]

In addition, in the invention, an inner surface side slit width in the slit of the wiring cylinder may be made narrower

than a width of the electric wire member while an outer surface side slit width in the slit of the wiring cylinder is made not narrower than the width of the electric wire member. According to this configuration, the electric wire member is prevented from moving in the wiring cylinder. Thus, the electric wire member can be surely positioned in the slit.

[0014]

In addition, in the invention, the escalator monitoring apparatus may include a cylindrical body which serves as both the camera receiving cylinder and the wiring cylinder, the slit being provided in the cylindrical body. According to this configuration, the monitoring camera and the electric wire member are received in the same cylindrical body. Thus, the wiring length is shorted so that exposure of the wiring can be suppressed.

[0015]

In addition, in the invention, the escalator monitoring apparatus may include: a cylindrical body which serves as both the camera receiving cylinder and the wiring cylinder, the slit being provided in the cylindrical body; and an antireflection sheet which is provided in the cylindrical body and with which a part of the electric wire member located in the slit is bonded. According to this configuration, the electric wire member and the antireflection sheet are bonded with each other so as to

prevent the antireflection sheet and the electric wire member from moving relative to each other. Thus, there hardly occurs a misalignment between the antireflection sheet and the electric wire member. It is therefore possible to position both the antireflection sheet and the electric wire member surely.

[0016]

In addition, in the invention, an inner surface side slit width in the slit of the cylindrical body may be made narrower than a width of the electric wire member while an outer surface side slit width in the slit of the cylindrical body is made not narrower than the width of the electric wire member, and the inner surface side slit width in the slit of the cylindrical body is made wider than a width of a connection portion between the electric wire member and the antireflection sheet. According to this configuration, the electric wire member which has been bonded with the antireflection sheet can be inserted through the slit easily. Thus, it is possible to do assembling easily.

[0017]

According to the invention, as described previously, the monitoring camera can be disposed out of the way of passengers without making the passengers be viewed from below so as not to make the passengers feel ill, and exposure of the electric wires connected to the monitoring camera can be easily suppressed

by the wiring cylinder.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

Fig. 1 is a side view showing a plurality of escalators provided with escalator monitoring apparatuses according to an embodiment of the invention, the escalators being placed crosswise;

Fig. 2 is a partially broken side view showing a cylindrical body serving a camera receiving cylinder and a wiring cylinder when the escalator monitoring apparatus according to the embodiment of the invention is applied to an escalator installation structure shown in Fig. 1;

Figs. 3A-3C are views showing an internal condition of the cylindrical body and a cylindrical body suspending structure shown in Fig. 2, Fig. 3A being a partially sectional view of the cylindrical body, Fig. 3B being a perspective view of a base member and ring members used for suspending the cylindrical body, Fig. 3C being a perspective view of a first electric wire member;

Fig. 4 is an enlarged view showing a state where the first electric wire member shown in Fig. 3C is spread;

Fig. 5 is a sectional view taken on line A-A, showing the first electric wire member shown in Fig. 4;

Fig. 6 is a sectional view of Fig. 3A;

Fig. 7 is a partially sectional view showing another example of the cylindrical body shown in Fig. 3A;

Fig. 8 is a view showing an embodiment in which a camera and wiring are received in a cylindrical portion provided in a movable warning body;

Fig. 9 is a view showing an embodiment in which a camera receiving cylinder and a wiring cylinder are formed as separate cylindrical bodies; and

Fig. 10 is a view showing an embodiment in which an escalator monitoring apparatus is provided in a single escalator placed between upper and lower floors.

DETAILED DESCRIPTION OF THE INVENTION

[0019]

An embodiment of an escalator monitoring apparatus according to the invention will be described below with reference to the drawings.

[0020]

Fig. 1 is a side view showing a plurality of escalators provided with escalator monitoring apparatuses according to an embodiment of the invention, the escalators being placed crosswise.

[0021]

In a three-story building shown in Fig. 1, a first ascending escalator 1A placed between the first floor and the second floor and a second ascending escalator 1B placed between the second floor and the third floor are provided like a bent shape in side view, so that a landing area of the first ascending escalator 1A and a boarding area of the second ascending escalator 1B form a middle floor. Similarly, a first descending escalator 2A placed between the first floor and the second floor and a second descending escalator 2B placed between the second floor and the third floor are provided like a bent shape in side view, which shape is reverse in direction to that of the first and second ascending escalators 1A and 1B, so that a boarding area of the first descending escalator 2A and a landing area of the second descending escalator 2B form a middle floor. In order to use the space in the building effectively, the first ascending escalator 1A and the second descending escalator 2B are disposed to overlap in an up/down direction. Similarly, the second ascending escalator 1B and the first descending escalator 2A are disposed to overlap in the up/down direction.

[0022]

The first ascending escalator 1A, the second ascending escalator 1B, the first descending escalator 2A and the second descending escalator 2B are placed in this manner. Thus, narrow-angle portions 7 are formed between a moving handrail

5 of the first ascending escalator 1A and a bottom portion 2a of the first descending escalator 2A, between a moving handrail 5 of the first descending escalator 2A and a bottom portion 2a of the first ascending escalator 1A, between the moving handrail 5 of the first ascending escalator 1A and a bottom portion 2a of the second ascending escalator 1B, between the moving handrail 5 of the first descending escalator 2A and a bottom portion 2a of the second descending escalator 2B, between a moving handrail 5 of the second ascending escalator 1B and the bottom portion 2a of the second descending escalator 2B, and between a moving handrail 5 of the second descending escalator 2B and the bottom portion 2a of the second ascending escalator 1B, respectively.

[0023]

The first ascending escalator 1A has a frame 3 which is laid between the first floor and the second floor so as to be formed as a framework of the first ascending escalator 1A, a plurality of steps (not shown) which are provided movably endlessly on the frame 3, a pair of balustrades 4 which are located oppositely to each other with interposition of the track of ones of the steps conveying passengers, and outer deck boards 6 which support the balustrades 4 from their outsides, that is, from their opposite sides to the track of the steps. Moving handrails 5 move endlessly around the balustrades 4 respectively.

Though not shown, a motor, a transmission unit for transmitting the output of the motor to the steps and the moving handrails 5, a control panel for controlling the motor, etc. are provided inside the frame 3. The frame 3 is covered with plate members such as the outer deck boards 6. Thus, a storage portion 2 is formed for storing the motor, the transmission unit, the control panel, etc. The lower surface of the storage portion 2 corresponds to the bottom portion 2a of the first ascending escalator 1A.

[0024]

The second ascending escalator 1B, the first descending escalator 2A and the second descending escalator 2B are configured in the same manner as the first ascending escalator 1A. A lighting unit (not shown) for lighting the first descending escalator 2A is provided in the bottom portion 2a of the second ascending escalator 1B. A lighting unit (not shown) for lighting the first ascending escalator 1A is provided in the bottom portion 2a of the second descending escalator 2B. An electric wire member (not shown) for supplying power to each lighting unit is disposed in the storage portion 2 of an escalator provided with the lighting unit.

[0025]

In Fig. 1, a protection body for preventing passengers from getting caught is provided in each narrow-angle portion

7 formed between escalators intersecting each other. For example, in a narrow-angle portion 7 formed by the moving handrail 5 of the first ascending escalator 1A and the bottom portion 2a of the first descending escalator 2A, a fixed protection body 8 constituted by a trapezoidal plate member fixed to the bottom portion 2a of the first descending escalator 2A is provided as a protection body for the narrow-angle portion 7. Further, a movable warning body 9 constituted by a trapezoidal plate member suspended on the bottom portion 2a of the first descending escalator 2A is provided at the rear of the fixed protection body 8 when an ascending direction (the direction of arrow U) of the first ascending escalator 1A is regarded as a front direction. The movable warning body 9 also serves as a kind of protection body. The fixed protection body 8 and the movable warning body 9 are members which are made of the same material, for example, transparent acrylic members. The fixed protection body 8 and the movable warning body 9 are disposed above the outer deck board 6.

[0026]

At the rear end of the movable warning body 9, a transparent acrylic cylindrical portion 9a extending in the up/down direction is provided integrally with the movable warning body 9. The cylindrical portion 9a has a cylindrical shape whose outer diameter is larger than the plate thickness of the fixed

protection body 8 or the movable warning body 9. That is, the impact with which a passenger touches the movable warning body 9 can be easily scattered to enhance safety of the passenger when the passenger touches the movable warning body 9. The passenger who touches the movable warning body 9 before touching the fixed protecting body 8 can notice the approach of the narrow-angle portion 7 before the passenger touches the fixed protection body 8.

[0027]

At the rear of the cylindrical portion 9a of the movable warning body 9, a monitoring camera 11 is disposed for taking images of passengers on and around a boarding area 1a of the first ascending escalator 1A. The monitoring camera 11 is suspended on the bottom portion 2a of the first descending escalator 2A.

[0028]

A cylindrical body 10 extending in the up/down direction is disposed at the rear of the cylindrical portion 9a of the movable warning body 9. The cylindrical body 10 which receives the monitoring camera 11 in its upper portion is suspended on the bottom portion 2a of the first descending escalator 2A. That is, the cylindrical body 10 serves as a camera receiving cylinder for receiving the monitoring camera 11. The outer diameter (ϕ D shown in Fig. 2) of the cylindrical body 10 is

set at a value larger than the plate thickness of the fixed protection body 8 or the movable warning body 9 in the same manner as the cylindrical portion 9a of the movable warning body 9. The inner diameter of the cylindrical body 10 is set at a value which is large enough to receive the monitoring camera 11.

[0029]

As shown in Fig. 2, an electric wire member 20 is connected to the monitoring camera 11. The electric wire member 20 is a cable for supplying power to the monitoring camera 11 and transmitting video data to the outside of the monitoring camera 11, etc.

[0030]

A part of the electric wire member 20 is wired in the state where the part has been received in the cylindrical body 10. That is, the cylindrical body 10 also serves as a wiring cylinder which receives a part of the electric wire member 20.

[0031]

A power supply for the monitoring camera 11 and a video recording apparatus 24 as an external apparatus to which the video data of the monitoring camera 11 are transmitted are provided in the storage portion 2. The electric wire member 20 is connected to the power supply and the video recording apparatus 24 in the storage portion 2. The video recording

apparatus 24 may be provided in a control room of the building. In this case, the electric wire member 20 is connected to the video recording apparatus 24 through an electric wire member wired from the control room to the storage portion 2.

[0032]

The electric wire member 20 includes a part in which a first electric wire member 21, a second electric wire member 22 and a third electric wire member 23 are joined into a line. The first electric wire member 21 has a connector 21a in its one end and a female connector 21b in the other end. The connector 21a is connected to the monitoring camera 11. The female connector 21b includes a connection terminal. The second electric wire member 22 has male connectors 22b and 22c on its opposite ends respectively. The male connectors 22b and 22c include connection terminals respectively. The third electric wire member 23 has a female connector 23c on its one end. The female connector 23c includes a connection terminal. The other end of the third electric wire member 23 is connected directly or indirectly to the video recording apparatus 24.

[0033]

The connection terminal in the other end of the first electric wire member 21 and the connection terminal in the one end of the second electric wire member 22 are connected by coupling between the female connector 21b and the male connector

22b. The connection terminal in the other end of the second electric wire member 22 and the connection terminal in the one end of the third electric wire member 23 are connected by coupling between the male connector 22c and the female connector 23c. Housings of the female connector 21b, the male connector 22b, the male connector 22c and the female connector 23c are moldings of insulating materials (synthetic resin).

[0034]

When the female connector 21b and the male connector 22b are coupled, the connection terminal in the other end of the first electric wire member 21 and the connection terminal in the one end of the second electric wire member 22 are covered with the housing of the female connector 21b and the housing of the male connector 22b so as to be electrically insulated from the outside. When the male connector 22c and the female connector 23c are coupled, the connection terminal in the other end of the second electric wire member 22 and the connection terminal in the one end of the third electric wire member 23 are covered with the housing of the male connector 22c and the housing of the female connector 23c so as to be electrically insulated from the outside.

[0035]

As described previously, a part of the electric wire member 20 is received in the cylindrical body 10. The part chiefly

corresponds to the first electric wire member 21.

[0036]

The third electric wire member 23 is disposed so that the female connector 23c is exposed from the outer deck board 6 while the other portion of the third electric wire member 23 is located in the storage portion 2.

[0037]

As shown in Fig. 1, a lower edge of the fixed protection body 8, a lower edge of the movable warning body 9, a lower end of the cylindrical portion 9a and a lower end of the cylindrical body 10 are located under the moving handrail 5. Especially the lower end of the cylindrical portion 9a and the lower end of the cylindrical body 10 are located 200 mm or more under the moving handrail 5.

[0038]

As shown in Figs. 2 and 3A, the monitoring camera 11 has a cylindrical casing 11a, a lens (not shown) provided to protrude from the casing 11a, and a dome-like cover 11b covering the lens. The monitoring camera 11 is suspended on the bottom portion 2a of the first descending escalator 2A so that the casing 11a is located on the upper side and the cover 11b is located on the lower side. A field angle α of the lens of the monitoring camera 11 is set to include the vicinities of the boarding area 1a of the first floor and the narrow-angle portion

7 (see Fig. 1) within a photographing range.

[0039]

In the state where the monitoring camera 11 is suspended on the bottom portion 2a of the first descending escalator 2A, a connector to the cable is provided on a top surface of the casing 11a, and the connector 21a of the first electric wire member 21 is connected thereto. In addition, suspension portions 12 and 13 arranged in a radial direction of the casing 11a are provided on the top surface of the casing 11a so as to protrude upward. Suspension holes 12a and 13a penetrating the suspension portions 12 and 13 in the radial direction of the casing 11a are formed in upper end portions of the suspension portions 12 and 13 respectively. The position of the suspension hole 12a and the position of the suspension hole 13a are different in height from each other correspondingly to the inclination angle of the bottom portion 2a of the first descending escalator 2A. Ring members 14 and 15 are inserted into the suspension holes 12a and 13a respectively. A plate-like base member 16 is screwed to the bottom portion 2a of the first descending escalator 2A. Annular support portions 16a and 16b are formed in the base member 16. The ring members 14 and 15 are also inserted into the annular support portions 16a and 16b respectively. That is, the monitoring camera 11 is suspended on the bottom portion 2a of the first descending escalator 2A

through the suspension portions 12 and 13, the ring members 14 and 15 and the base member 16.

[0040]

In this manner, the monitoring camera 11 suspended on the bottom portion 2a of the first descending escalator 2A is received in the cylindrical body 10. The cylindrical body 10 is fastened to the suspension portion 12 at its upper end portion by a screw 17. The cylindrical body 10 is also fastened to the suspension portion 13 by a screw 18. That is, the cylindrical body 10 is suspended on the bottom portion 2a of the first descending escalator 2A through the suspension portions 12 and 13, the ring members 14 and 15 and the base member 16.

[0041]

In addition, a shaking preventing wire 30 is stretched between a lower end portion of the cylindrical body 10 and the outer deck board 6 so as to serve as a shaking preventing member for suppressing the shaking of the cylindrical body 10 with respect to the bottom portion 2a of the first descending escalator 2A. A first attachment rod 31 and a second attachment rod (not shown) are provided in the lower end portion of the cylindrical body 10. The first attachment rod 31 is laid in the radial direction in the cylindrical body 10. The second attachment rod is laid in the radial direction in the cylindrical body 10 above the first attachment rod 31 so as to intersect

the first attachment rod 31 like a cross shape. A screw 32 is screwed to one end of the first attachment rod 31 from an outer circumferential side of the cylindrical body 10. A screw 33 is screwed to the other end of the first attachment rod 31 from the outer circumferential side of the cylindrical body 10. Both head portions of the screws 32 and 33 limit the radial movement of the first attachment rod 31 with respect to the cylindrical body 10 so that the first attachment rod 31 can be prevented from dropping out from the cylindrical body 10. In the same manner, the second attachment rod is also prevented from dropping out from the cylindrical body 10. The reference numeral 34 represents one screw for preventing the second attachment rod from dropping out.

[0042]

Since both the first attachment rod 31 and the second attachment rod are inserted into an annular portion provided in a cylindrical body 10 side end portion of the shaking preventing wire 30 so that one end of the shaking preventing wire 30 can be retained in an intersection portion between the first attachment rod 31 and the second attachment rod. An attachment member 36 is provided in a portion of the outer deck board 6 located under the cylindrical body 10. An insertion hole 36a is provided in the attachment member 36. An annular portion inserted into the insertion hole 36a is provided in

an outer deck board 6 side end portion of the shaking preventing wire 30 so that the shaking preventing wire 30 can be coupled with the outer deck board 6. The shaking preventing member may be not a wire but a chain.

[0043]

Of the second electric wire member 22, a part located between the lower end of the cylindrical body 10 and the outer deck board 6 is retained on the shaking preventing wire 30 by bind wires 40 and 41.

[0044]

The first electric wire member 21 has a cable 21c, the connector 21a and the female connector 21b. The cable 21c is disposed on an antireflection sheet 21d. The connector 21a for camera connection and the female connector 21b are provided on the opposite ends of the cable 21c respectively. The impedance of the cable 21c is set correspondingly to the characteristic impedance of the second electric wire member 22.

[0045]

As shown in Fig. 2, light C for illumination of the building enters the inside of the cylindrical body 10 from its lower end. Total reflection occurs when an incident angle β of the light C is larger than a critical angle. The total reflected light C travels toward the monitoring camera 11 while repeating

reflection on an inner wall surface of the cylindrical body 10. Thus, the light C enters the field angle α of the monitoring camera 11. As a result, there occurs a phenomenon of so-called reflected glare in which the light C enters an image.

[0046]

As a measurement against the reflected glare, as shown in Fig. 3, the antireflection sheet 21d is set to cover the inner wall surface of the cylindrical body 10 and have dimensions and a shape with which the antireflection sheet 21d can serve as a means for reducing the unnecessary entrance of the light C into the monitoring camera 11. The up/down direction length of the antireflection sheet 21d is set at a length L_a which is slightly shorter than the length from the upper end of the casing 11a of the monitoring camera 11 to the lower end of the cylindrical body 10. The width of the antireflection sheet 21d is set to be as large as almost half the inner circumference of the cylindrical body 10.

[0047]

In addition, the first electric wire member 21 further includes a blindfold portion 21e. The up/down direction length of the blindfold portion 21e is set at a length L_b large enough to cover all the parts of the suspension portions 12 and 13 located in the cylindrical body 10. The up/down direction length L of the first electric wire member 21 is set to be equal

to the sum of the length L_a of the antireflection sheet 21d and the length L_b of the blindfold portion 21e. The width W of the blindfold portion 21e is set to be substantially equal to the inner circumference of the cylindrical body 10.

[0048]

In a width direction of the antireflection sheet 21d, a coupling portion between the blindfold portion 21e and the antireflection sheet 21d is set in a position leaning toward a line 21c1 of the electric wire. Thus, the first electric wire member 21 has an L-shape as shown in Fig. 4. Incidentally, the coupling portion between the antireflection sheet 21d and the blindfold portion 21e may be set at the center of the blindfold portion 21e in the width direction to form the first electric wire member 21 into a T-shape.

[0049]

The first electric wire member 21 is received in the cylindrical body 10 so that the height position of the edge on the blindfold portion 21e side is substantially level with the height position of the upper end of the cylindrical body 10. The antireflection sheet 21d which has been received in the cylindrical body 10 covers, of the inner wall surface of the cylindrical body 10 located outside the field angle α of the monitoring camera 11, a region almost half the circumference of the cylindrical body 10 on the opposite side to the field

angle α , so as to form a semi-cylindrical shape along the inner wall surface.

[0050]

One surface of the antireflection sheet 21d which corresponds to the inner circumferential surface of the semi-cylindrical shape has a low-lightness color such as black. The antireflection sheet 21d may be colored in black by a black sheet-like seal pasted onto a sheet member or by a black paint applied to a sheet member.

[0051]

At least one of a writing, an illustration and a mark for calling passenger's attention to the fact that the camera is in operation and caution for not getting over toward the narrow-angle portion 7 is provided in the other surface of the antireflection sheet 21d by printing or pasting a seal. Not those writing, illustration and mark but only a simple colored design may be provided.

[0052]

As shown in Fig. 4, a first stop hole 21f and a second stop hole 21g are provided in the blindfold portion 21e of the first electric wire member 21. In the blindfold portion 21e received in the cylindrical body 10, one end side and the other end side are brought into contact with each other so as to form a cylindrical shape. In this state, the first stop hole 21f

and the second stop hole 21g are located radially oppositely to each other. The screw 17 for fastening the cylindrical body 10 to the suspension portion 12 is inserted into the first stop hole 21f. Similarly, the screw 18 for fastening the cylindrical body 10 to the suspension portion 13 is inserted into the second stop hole 21g opposed to the first stop hole 21f. In Fig. 3C, the first stop hole 21f and the second stop hole 21g are not shown.

[0053]

Next, as shown in Fig. 5, the cable 21c of the first electric wire member 21 is bonded onto the antireflection sheet 21d by a coating member 21h. That is, the first electric wire member 21 has a section formed like a protrusion in which the cable 21c swells with respect to the antireflection sheet 21d, while the width D1 of the connection portion between the cable 21c and the antireflection sheet 21d is smaller than a sectional diameter ϕD_c of the cable. Incidentally, the coating material 21h is not shown in Figs. 2, 3C and 4.

[0054]

As shown in Fig. 6, the cylindrical body 10 has a slit 10a. The cable 21c of the first electric wire member 21 is inserted into the slit 10a, and located in the slit 10a. Accordingly, the part of the first electric wire member 21 located in the slit 10a is bonded with the antireflection sheet

21d. An outer surface side slit width D_{so} of the slit 10a is wider than an inner surface side slit width D_{si} of the slit 10a. In addition, the inner surface side slit width D_{si} is wider than a width D_1 (see Fig. 5) of the connection portion between the cable 21c and the antireflection sheet 21d, and the outer surface side slit width D_{so} is not smaller than the cable sectional diameter ϕD_c (see Fig. 5). That is, the dimensional relation between the slit 10a of the cylindrical body 10 and the first electric wire member 21 can be expressed by the following expression (1)

[0055]

$$D_{so} \geq D_c > D_{si} > D_1 \dots (1)$$

Further, the antireflection sheet 21d to be mounted with the cable 21c is disposed on the inner surface of the cylindrical body 10, while the cable 21c is inserted through the slit 10a and disposed along the outside of the cylindrical body 10.

[0056]

The dimensions of the slit 10a of the cylindrical body 10 are not limited to those shown in Fig. 6. As shown in Fig. 7, the outer surface side slit width D_{so} may be substantially equal to the inner surface side slit width D_{si} .

[0057]

According to the aforementioned embodiment, the following principal effects can be obtained.

[0058]

In the escalator monitoring apparatus according to the embodiment, the monitoring camera 11 is located in the cylindrical body 10 extending in the up/down direction at the rear of the fixed protection body 8 and the movable warning body 9 as protection bodies. Thus, the monitoring camera 11 can be placed out of the way of the passengers without making the passengers be viewed from below so as not to make the passengers feel ill. Further, the cable 21c of the first electric wire member 21 included in the electric member 20 connected to the monitoring camera 11 is inserted through the slit 10a of the cylindrical body 10 and wired along the cylindrical body 10 so that exposure of wiring can be suppressed. Further, wiring on a ceiling, a beam or the like is not required, but exposure of wiring can be suppressed without using any wiring duct. In addition, the place where wiring is exposed is limited to a short distance between the lower end portion of the cylindrical body 10 and the outer deck. It is therefore possible to suppress point-to-point construction in which wiring is led around in a space of the cylindrical body 10.

[0059]

Further, the cable 21c of the first electric wire member 21 included in the electric wire member 20 is bonded with the antireflection sheet 21d. Accordingly, when the cable 21c is

inserted through the slit 10a, the antireflection sheet 21d can be inserted into the cylindrical body 10 while being guided. Thus, the antireflection sheet 21d can be positioned easily in the cylindrical body 10, while the antireflection sheet 21d can be prevented from being displaced in the cylindrical body 10. In addition, the cable 21c of the first electric wire member 21 is bonded with the antireflection sheet 21d. Thus, the antireflection sheet 21d serves as resistance to prevent the cable 21c of the first electric wire member 21 from dropping out to the outside of the cylindrical body 10 through the slit 10a. Thus, the cable 21c of the first electric wire member 21 can be surely located in the slit 10a.

[0060]

In addition, the outer surface side slit width D_{so} and the inner surface side slit width D_{si} of the cylindrical body 10, the width D_1 of the connection portion between the cable 21c and the antireflection sheet 21d (see Fig. 5), and the cable sectional diameter ϕD_c (see Fig. 5) are set in accordance with the aforementioned expression (1) ($D_{so} \geq D_c > D_{si} > D_1$). As a result, the cable 21c of the first electric wire member 21 can be easily inserted into the slit 10a in the state where the cable 21c has been bonded to the antireflection sheet 21d. Thus, assembling can be made easily. In addition, since $D_{so} \geq D_c > D_{si}$ is established as in the aforementioned expression (1), the

cable 21c can be prevented from protruding into the cylindrical body 10 or dropping out. Thus, the antireflection sheet 21d can be more surely positioned in the cylindrical body 10, and the cable 21c of the first electric wire member 21 can be more surely positioned in the slit 10a.

[0061]

According to the aforementioned embodiment, the following effects can be further obtained.

[0062]

In the escalator monitoring apparatus according to the embodiment, the cylindrical body 10 serving as a camera receiving cylinder is provided in parallel with the movable warning body 9. Accordingly, the cylindrical body 10 hardly gives such a sense of incompatibility that the cylindrical body 10 is provided particularly for installing the monitoring camera 11.

[0063]

In addition, in the embodiment, the cylindrical body 10 serves as a camera receiving cylinder and a wiring cylinder, and the electric wire member 20 including the first electric wire member 21 and so on is wired inside the outer deck board 6, i.e. in the storage portion 2, from the lower end of the cylindrical body 10. As a result, the electric wire member 20 can be wired without placing wiring on the bottom portion 2a, the post of the building, the ceiling, etc. That is, the

electric wire member 20 for connecting the monitoring camera 11 with the video recording apparatus 24 can be wired without using any wiring duct. In addition, it is not necessary to set up scaffolding for the wiring work of the electric wire member 20. Accordingly, the escalator monitoring apparatus can be installed in a short time, and expenses required for the installation can be reduced.

[0064]

In addition, in the embodiment, the electric wire member 20 has a portion in which the first electric wire member 21, the second electric wire member 22 and the third electric wire member 23 are joined into a line. Thus, the electric wire member 20 can be wired smoothly.

[0065]

In addition, in the embodiment, the antireflection sheet 21d reduces the entrance of unnecessary light C into the monitoring camera 11. Thus, it is possible to reduce reflected glare of light into an image taken by the monitoring camera 11.

[0066]

In addition, in the embodiment, the first electric wire member 21 is bonded integrally with the antireflection sheet 21d. It is therefore possible to reduce the number of components.

[0067]

In addition, in the embodiment, the cable 21c of the first electric wire member 21 is inserted through the slit 10a provided in the cylindrical body 10 so that the antireflection sheet 21d can be attached to a predetermined position easily. In addition, it is possible to prevent the antireflection sheet 21d from floating from the inner surface of the cylindrical body 10.

[0068]

In addition, in the embodiment, the cylindrical body 10 serves as a wiring cylinder, and the upper end of the cylindrical body 10 is located near the bottom portion 2a of the escalator located above, while the lower end of the cylindrical body 10 is located between the moving handrail 5 and the outer deck board 6 in the up/down direction. Accordingly, all or substantially all of the part of the electric wire member 20 located between the bottom portion 2a and the moving handrail 5 can be covered with the cylindrical body 10, and the part of the electric wire member 20 led out from the lower end of the cylindrical body 10 can be separated from passengers through the balustrade 4. As a result, the electric wire member 20 can be protected from disconnection by mischief.

[0069]

In addition, in the embodiment, connectors which can

connect/disconnect connection terminals to/from each other, that is, the female connector 21b, the male connector 22b, the male connector 22c and the female connector 23c are used for connection between the first electric wire member 21 and the second electric wire member 22 and connection between the second electric wire member 22 and the third electric wire member 23. Accordingly, those connections can be carried out easily, so that it is possible to improve efficiency in the wiring work for installation of the monitoring camera 11 between the monitoring camera 11 and the power supply, the video recording apparatus 24, etc.

[0070]

The embodiment of the invention is not limited to the aforementioned embodiment, but various embodiments can be carried out within the scope of technical ideas of the invention.

[0071]

For example, although the cylindrical body 10 serves both the camera receiving cylinder and the wiring cylinder in the aforementioned embodiment, the cylindrical body 10 is not provided but the cylindrical portion 9a of the movable warning body 9 may serve both the camera receiving cylinder and the wiring cylinder as shown in Fig. 8. Though not shown, neither the cylindrical body 10 nor the movable warning body 9 are provided, but a cylindrical portion may be provided in the fixed

protection body 8 so as to serve both the camera receiving cylinder and the wiring cylinder. Further, as shown in Fig. 9, the cylindrical body 10 may serve as the camera receiving cylinder while the cylindrical portion 9a of the movable warning body 9 serves as the wiring cylinder. In this case, the antireflection sheet 21d is provided in the cylindrical body 10, while the slit through which the cable 21c of the first electric wire member 21 included in the electric wire member 20 is inserted is provided in the cylindrical portion 9a of the movable warning body 9.

[0072]

Further, in the aforementioned embodiment, a combination of the female connector 21b and the male connector 22b, and a combination of the male connector 22c and the female connector 23c are used for connection between the first electric wire member 21 and the second electric wire member 22 and connection between the second electric wire member 22 and the third electric wire member 23, respectively. The embodiment of the invention is not limited to the case where connectors are used for those connections. The connections may be carried out by screwing or soldering while electric insulation from the outside is secured.

[0073]

In addition, although the escalator monitoring apparatus

is provided in the narrow-angle portion 7 formed between escalators crossing each other in the aforementioned embodiment, the escalator monitoring apparatus may be installed in a narrow-angle portion 52 formed between a ceiling 51 and a moving handrail 5 of an escalator as shown in Fig. 10. In Fig. 10, an ascending escalator 50 for conveying passengers from the first floor to the second floor is provided alone in a building. The narrow-angle portion 52 is formed between the moving handrail 51 of the ascending escalator 50 and the ceiling 51 of the second floor. The fixed protection body 8, the movable warning body 9, and the cylindrical body 10 in which the monitoring camera 11 is received and on which the cable 21c of the first electric wire member 21 included in the aforementioned electric wire member 20 is retained is provided in the narrow-angle portion 52.

What is claimed is:

1. An escalator monitoring apparatus provided in a building having a narrow-angle portion formed between a ceiling and a moving handrail of an escalator or a narrow-angle portion formed between a bottom portion of one of two escalators and a moving handrail of the other escalator, the two escalators being disposed crosswise and adjacently, and a protection body provided in the narrow-angle portion to prevent any one of passengers from getting caught in the narrow-angle portion when the escalator is being driven to ascend, the apparatus comprising:

a monitoring camera which takes images of the escalator and the passengers;

an electric wire member which electrically connects the monitoring camera with an external apparatus;

a camera receiving cylinder which is a cylindrical body provided in a posture to extend in an up/down direction at the rear of the protection body when an ascending direction of the escalator is regarded as a front direction, the monitoring camera being received in the camera receiving cylinder;

a wiring cylinder which is a cylindrical body provided in a posture to extend in the up/down direction at the rear of the protection body when the ascending direction of the escalator is regarded as the front direction, a part of the

electric wire member being received in the wiring cylinder;
and

an outer deck board which is provided outside a base portion of a balustrade of the escalator so as to receive another part of the electric wire member than the part of the electric wire member; wherein:

the electric wire member is wired to be led out from a lower end of the wiring cylinder and guided into the outer deck board; and

a slit is provided in the up/down direction in the wiring cylinder, and the electric wire member is inserted through the slit.

2. An escalator monitoring apparatus according to Claim 1, wherein:

an inner surface side slit width in the slit of the wiring cylinder is made narrower than a width of the electric wire member while an outer surface side slit width in the slit of the wiring cylinder is made not narrower than the width of the electric wire member.

3. An escalator monitoring apparatus according to Claim 1 or 2, further comprising:

a cylindrical body which serves as both the camera receiving cylinder and the wiring cylinder, the slit being provided in the cylindrical body.

4. An escalator monitoring apparatus according to Claim 1, further comprising:

a cylindrical body which serves as both the camera receiving cylinder and the wiring cylinder, the slit being provided in the cylindrical body; and

an antireflection sheet which is provided in the cylindrical body and with which a part of the electric wire member located in the slit is bonded.

5. An escalator monitoring apparatus according to Claim 4, wherein:

an inner surface side slit width in the slit of the cylindrical body is made narrower than a width of the electric wire member while an outer surface side slit width in the slit of the cylindrical body is made not narrower than the width of the electric wire member, and the inner surface side slit width in the slit of the cylindrical body is made wider than a width of a connection portion between the electric wire member and the antireflection sheet.