

ESCALATOR MONITORING SYSTEM AND METHOD FOR INSTALLING THE SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001]

The present invention relates to an escalator monitoring system using a monitoring camera for monitoring an escalator, and a method for installing the same.

2. Description of the Background Art

[0002]

When an escalator is installed singly in a building, a narrow-angle portion (triangular portion) is formed between a moving handrail and a ceiling. In some escalator installation structure, an ascending escalator and a descending escalator may be 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. A protector piece is generally provided in such a narrow-angle portion to prevent passengers from getting caught therein.

[0003]

In a man conveyor safety system disclosed in JP-UM-A-61-154278, a cylindrical detector piece is suspended from a ceiling in front of a guard plate as a protector piece.

A lower end portion of the detector piece is connected to a balustrade through an elastic piece. Any passenger on an ascending escalator touches the detector piece before touching the protector piece. Thus, the passenger can be aware of the approach of a narrow-angle portion before touching the protector piece.

[0004]

An escalator monitoring system disclosed in JP-A-2002-114475 has a monitoring camera and a sensor which are provided on a column of a building located to face a narrow-angle portion protection plate as a protector piece on the lower floor side. The monitoring camera can capture pictures of the situation of passengers. The sensor can detect a vibration of the narrow-angle portion protection plate. Pictures captured by the monitoring camera for a predetermined period around the time when the sensor detects a vibration of the narrow-angle portion protection plate are recorded. Thus, the situation of an accident in which a passenger falls down, tumbles down or gets caught near the narrow-angle portion can be preserved.

[0005]

In the background art, JP-A-2006-206283 discloses a technique for installing monitoring cameras. In this background-art technique, monitoring cameras are placed in

guide fences provided in landings on upper and lower floors. The monitoring cameras are received in supports of the guide fences respectively. Each monitoring camera can look toward the side of an escalator through a monitoring window provided in the support and captures pictures therethrough.

[0007]

In the escalator monitoring system disclosed in JP-A-2002-114475, the monitoring camera is connected through electric wires to the sensor for detecting a vibration of the guardplate (protector piece), a monitor for displaying pictures captured by the monitoring camera, and a recording device for recording the pictures. Wire covers are used for wiring of electric wires so as to prevent exposure of the electric wires. The wire covers are provided on a ceiling, a beam, a floor, etc. to cover the electric wires. There is a problem that the wire covers provided on the ceiling, the beam, the floor, etc. spoil the appearance of the building. There is another problem that an installation expense is required for a wiring work on the building side.

[0008]

In addition to a monitoring camera to be installed on a column of a building as disclosed in JP-A-2002-114475, there is a monitoring camera to be installed on the ceiling of the building or a monitoring camera to be installed on a wall of

the building. When a monitoring camera is intended to be installed on a structural portion of a building in this manner, there arises a problem that a place where the monitoring camera can be installed may be limited or infeasible due to the structure of the building. For example, the building may have a double height structure, a glass wall surface finishing structure, a ceiling special finishing structure, etc.

[0009]

According to the technique disclosed in JP-A-2006-206283, supports of guide fences are provided. Accordingly, there is a problem that it takes a building work time and costs expenses to excavate floors of the building, to fix the supports to the floors, to bury wiring ducts into the floors, and soon. Further, due to the monitoring cameras provided in the supports of the guide fences which are lower than balustrades, there is a fear that an ill feeling of being peeped at from below may be given to passengers.

SUMMARY OF THE INVENTION

[0010]

The present invention was developed in consideration of the aforementioned circumstances. An object of the invention is to provide an escalator monitoring system in which a monitoring camera for capturing pictures of the situation of

passengers on an escalator can be placed in a position where an ill feeling of being peeped at from below is not given to passengers and the monitoring camera does not hinder the ways of the passengers, while exposure of wires connected to the monitoring camera can be suppressed easily. Another object of the invention is to provide a method for installing the escalator monitoring system.

[0011]

In order to attain the foregoing objects, the invention is configured as follows.

[0012]

[1] An escalator monitoring system according to the invention is provided in a building having a narrow-angle portion and a protector piece, the narrow-angle portion being formed between a ceiling of a lower floor and a moving handrail of an escalator or between a bottom portion of one of two escalators disposed crosswise and adjacently to each other and a moving handrail of the other escalator, the protector piece being provided in the narrow-angle portion in order to prevent passengers from getting caught into the narrow-angle portion during an ascending operation of the escalator. The escalator monitoring system includes a monitoring camera which captures pictures of the escalator and the passengers; a wire member which electrically connects the monitoring camera to an external device; a camera

receiving cylinder which is a cylinder provided in a posture to extend vertically on a rear end side of the protector piece when an ascending direction of the escalator is regarded as front direction, and which receives the monitoring camera; a wire receiving cylinder which is a cylinder provided in a posture to extend vertically on the rear end side of the protector piece when the ascending direction of the escalator is regarded as front direction, and which receives a part of the wire member; and an outer deck board which is provided outside a base portion of a balustrade of the escalator and which receives another part of the wire member than the part received in the wire receiving cylinder; wherein the wire member is wired to be taken out from a lower end of the camera receiving cylinder and guided to an inside of the outer deck board.

[0013]

In the escalator monitoring system described in the paragraph [1], the monitoring camera is located in the camera receiving cylinder extending vertically on the rear end side of the protector piece. Thus, the monitoring camera can be placed in a position where an ill feeling of being peeped at from below is not given to passengers and the monitoring camera does not hinder the ways of the passengers. Further, exposure of wires connected to the monitoring camera can be suppressed easily by the wire receiving cylinder.

[0014]

[2] The escalator monitoring system according to the invention is an escalator monitoring system defined in the paragraph [1], wherein the protector piece includes a fixed protector piece and a movable warning piece, the fixed protector piece being fixed to the ceiling or the bottom portion, the movable warning piece being suspended on the ceiling or the bottom portion at a rear of the fixed protector piece; a cylindrical portion extending vertically is provided integrally with at least one of a rear end of the fixed protector piece and a rear end of the movable warning piece; a cylinder extending vertically at a rear of the cylindrical portion of the movable warning piece is suspended on the ceiling or the bottom portion; and the cylinder serves as both the camera receiving cylinder and the wire receiving cylinder.

[0015]

According to the escalator monitoring system described in the paragraph [2], the wire member between the monitoring camera and the external device can be wired without using any wire cover.

[0016]

[3] The escalator monitoring system according to the invention is an escalator monitoring system defined in the paragraph [2], wherein the wire member has a part composed of

first to fourth wire members joined to one another into a single line; the first wire member has one end connected to the monitoring camera and the other end provided with a connection terminal; each of the second and third wire members has opposite ends provided with connection terminals respectively; the fourth wire member has one end provided with a connection terminal and the other end connected directly or indirectly to the external device, the connection terminal being disposed to be exposed from the outer deck board; and the connection terminal at the other end of the first wire member is connected to the connection terminal at the one end of the second wire member, the connection terminal at the other end of the second wire member is connected to the connection terminal at the one end of the third wire member, the connection terminal at the other end of the third wire member is connected to the connection terminal at the one end of the fourth wire member, and at least a part of the second wire member excluding the connection terminals is received in the cylinder.

[0017]

According to the escalator monitoring system in the paragraph [3], the wire member in the escalator monitoring system defined in the paragraph [2] can be wired smoothly.

[0018]

[4] The escalator monitoring system according to the

invention is an escalator monitoring system defined in the paragraph [1], wherein the protector piece includes a fixed protector piece and a movable warning piece, the fixed protector piece being fixed to the ceiling or the bottom portion, the movable warning piece being suspended on the ceiling or the bottom portion at a rear of the fixed protector piece; a cylindrical portion extending vertically is provided integrally with at least one of a rear end of the fixed protector piece and a rear end of the movable warning piece; a cylinder extending vertically at a rear of the cylindrical portion of the movable warning piece is suspended on the ceiling or the bottom portion; the cylinder serves as the camera receiving cylinder; the cylindrical portion provided in the movable warning piece serves as the wire receiving cylinder; and the wire member connected to the monitoring camera is wired to be taken out from an upper end of the camera receiving cylinder, be placed along the ceiling or the bottom portion, penetrate the wire receiving cylinder from an upper end of the wire receiving cylinder to the lower end thereof, and be guided into the outer deck board.

[0019]

According to the escalator monitoring system in the paragraph [4], the wire member is indeed placed along the ceiling or the bottom portion, but the place where the wire member is

placed along the ceiling of the bottom portion is located between the cylinder (camera receiving cylinder) and the cylindrical portion (wire receiving cylinder) of the movable warning piece so that a wire cover can be provided inconspicuously.

[0020]

[5] The escalator monitoring system according to the invention is an escalator monitoring system defined in the paragraph [3], wherein the second wire member is a flexible wiring sheet in which a plurality of wires are arranged in parallel in a plane and integrated like a sheet.

[0021]

According to the escalator monitoring system in the paragraph [5], the second wire member can be placed between the monitoring camera and the cylinder easily.

[0022]

[6] The escalator monitoring system according to the invention is an escalator monitoring system defined in any one of the paragraphs [1] through [5], wherein an upper end of the wire receiving cylinder is located near the ceiling or the bottom portion, and a lower end of the wire receiving cylinder is located between the moving handrail and the outer deck board vertically.

[0023]

According to the escalator monitoring system in the paragraph [6], a part of the wire member located between the

ceiling or the bottom portion and the moving handrail can be wholly or substantially wholly covered with the wire receiving cylinder, and another part of the wire member taken out from the lower end of the wire receiving cylinder can be set apart from passengers by a balustrade. As a result, the wire member can be protected from being cut by mischief.

[0024]

[7] The escalator monitoring system according to the invention is an escalator monitoring system defined in the paragraph [3], further including connectors which can removably connect the connection terminals to each other.

[0025]

According to the escalator monitoring system in the paragraph [7], the connection between the first wire member and the second wire member, the connection between the second wire member and the third wire member and the connection between the third wire member and the fourth wire member in the escalator monitoring system defined in the paragraph [3] can be carried out easily. That is, the efficiency in wiring work for electrically connecting the monitoring camera to the external device can be improved.

[0026]

[8] The escalator monitoring system according to the invention is an escalator monitoring system defined in any one

of the paragraphs [1] through [7], further including an antireflection sheet which covers an inner wall surface of the camera receiving cylinder so as to reduce unnecessary light incident on the monitoring camera.

[0027]

According to the escalator monitoring system in the paragraph [8], unnecessary light incident on the monitoring camera can be reduced by the antireflection sheet. Thus, reflected glare of light on pictures captured by the monitoring camera can be reduced.

[0028]

[9] The escalator monitoring system according to the invention is an escalator monitoring system defined in the paragraph [3], wherein the second wire member is a sheet member in which a plurality of wires are provided in parallel in a plane, and which has an antireflection sheet portion covering an inner wall surface of the camera receiving cylinder so as to reduce unnecessary light incident on the monitoring camera.

[0029]

According to the escalator monitoring system in the paragraph [9], the second wire member is a sheet member, which can be disposed between the monitoring camera and the inner wall surface of the cylinder easily. In addition, the number of parts can be reduced, compared with the case where the second

wire member and the antireflection sheet are formed separately from each other.

[0030]

[10] The escalator monitoring system according to the invention is an escalator monitoring system defined in the paragraph [3], wherein a vibration preventing member for suppressing vibration of the cylinder relative to the ceiling or the bottom portion is stretched between a lower end portion of the cylinder and the outer deck board; and the third wire member located between the lower end of the cylinder and the outer deck board is fixed to the vibration preventing member.

[0031]

According to the escalator monitoring system in the paragraph [10], the vibration of the cylinder serving as the camera receiving cylinder is suppressed by the vibration preventing member so that blurring in pictures captured by the monitoring camera can be suppressed. Further, the third wire member is fixed to the vibration preventing member so that the third wire member and the vibration preventing member can be bound together to suppress the appearance from being spoiled.

[0032]

[11] The escalator monitoring system according to the invention is an escalator monitoring system defined in the paragraph [10], wherein the connection terminal at the one end

of the fourth wire member is disposed below the cylinder; and the third wire member is set to be longer than a distance between the connection terminal at the other end of the second wire member and the connection terminal at the one end of the fourth wire member.

[0033]

According to the escalator monitoring system in the paragraph [11], when the cylinder vibrates relative to the ceiling or the bottom portion, the third wire member can be deformed following the vibration so that the tension acting on the third wire member due to the vibration of the cylinder can be reduced. It is therefore possible to prevent disconnection in the connection portion between the first wire member and the third wire member, disconnection in the connection portion between the third wire member and the fourth wire member, etc.

[0034]

[12] The method for installing an escalator monitoring system according to the invention is an installation method for use in the escalator monitoring system defined in the paragraph [1]. The installation method includes the steps of: attaching the monitoring camera to the ceiling or the bottom portion, making a trial connection between the monitoring camera and a monitor and adjusting a field angle of the monitoring camera

vertically and horizontally; and cutting off the trial connection between the monitoring camera and the monitor, and then attaching the camera receiving cylinder to the ceiling or the bottom portion in a state where the camera receiving cylinder has received the monitoring camera attached to the ceiling or the bottom portion.

[0035]

According to the method for installing the escalator monitoring system in the paragraph [12], the monitoring camera is received in the camera receiving cylinder after the field angle of the monitoring camera is adjusted. Thus, the field angle of the monitoring camera can be adjusted easily, compared with the case where the field angle of the monitoring camera is adjusted in the unwieldy state where the monitoring camera has been received in the camera receiving cylinder.

[0036]

[13] A method for installing an escalator monitoring system according to the invention is an installation method for use in the escalator monitoring system defined in the paragraph [3]. The installation method includes the steps of: attaching the monitoring camera to the ceiling or the bottom portion, making a trial connection between the monitoring camera and a monitor and adjusting a field angle of the monitoring camera vertically and horizontally; receiving at least a part of the

second wire member excluding the connection terminals into the cylinder serving as both the camera receiving cylinder and the wire receiving cylinder; cutting off the trial connection between the monitoring camera and the monitor, and then attaching the cylinder receiving at least the part of the second wire member excluding the connection terminals to the ceiling or the bottom portion in a state where the cylinder has received the monitoring camera attached to the ceiling or the bottom portion; connecting the connection terminal at the other end of the first wire member to the connection terminal at the one end of the second wire member after attaching the cylinder to the ceiling or the bottom portion; connecting the connection terminal at the other end of the second wire member to the connection terminal at the one end of the third wire member after attaching the cylinder to the ceiling or the bottom portion; and connecting the connection terminal at the other end of the third wire member to the connection terminal at the one end of the fourth wire member after attaching the cylinder to the ceiling or the bottom portion.

[0037]

According to the method for installing the escalator monitoring system in the paragraph [13], the field angle of the monitoring camera can be adjusted easily in the same manner as in the installation method in the paragraph [12].

[0038]

Further, in the method for installing the escalator monitoring system in the paragraph [13], the step in which the cylinder receiving at least the part of the second wire member excluding the connection terminals is attached to the ceiling or the bottom portion in the state where the monitoring camera attached to the ceiling or the bottom portion has been received in the cylinder is followed by the step of connecting the connection terminal at the other end of the first wire member to the connection terminal at one end of the second wire member, the step of connecting the connection terminal at the other end of the second wire member to the connection terminal at one end of the third wire member and the step of connecting the connection terminal at the other end of the third wire member to the connection terminal at one end of the fourth wire member. As a result, the first to third wire members can be wired easily, compared with the case where the second wire member is received in the cylinder and connected to the first wire member and the third wire member after the cylinder is attached to the ceiling or the bottom portion.

[0039]

According to an escalator monitoring system according to the invention, as described previously, a monitoring camera can be placed in a position where an ill feeling of being peeped

at from below is not given to passengers and the monitoring camera does not hinder the ways of the passengers. Further, exposure of wires connected to the monitoring camera can be suppressed easily by a wire receiving cylinder.

BRIEF DESCRIPTION OF THE DRAWINGS

[0040]

Fig. 1 is a side view showing a plurality of escalators installed crosswise according to the invention;

Fig. 2 is a partially cutaway side view showing a cylinder serving as a camera receiving cylinder and a wire receiving cylinder when an escalator monitoring system according to a first embodiment of the invention is applied to an escalator arrangement structure shown in Fig. 1;

Figs. 3(a)-(c) are views showing the condition inside the cylinder shown in Fig. 2 and a structure for suspending the cylinder, Fig. 3(a) being a partial sectional view of the cylinder, Fig. 3(b) being a perspective view of a base member and a ring member used for suspending the cylinder, Fig. 3(c) being a perspective view of a second wire member;

Fig. 4 is an enlarged view showing the state where the second wire member shown in Fig. 3(c) has been spread;

Fig. 5 is a flowchart showing the procedure for installing a monitoring camera;

Fig. 6 is a side view of an escalator according to the invention, which is provided singly in a building;

Fig. 7 is a side view showing arrangement of a monitoring camera and wiring of wire members in the case where an escalator monitoring system according to a second embodiment of the invention is applied to a structure for installing the escalator shown in Fig. 6; and

Fig. 8 is a side view showing arrangement of a monitoring camera and wiring in the case where an escalator monitoring system according to a third embodiment of the invention is applied to the structure for installing the escalator shown in Fig. 6.

DETAILED DESCRIPTION OF THE INVENTION

[0041]

Escalator monitoring systems according to first and second embodiments of the invention will be described next.

[0042]

First Embodiment

First, an escalator monitoring system according to the first embodiment and a method for installing the escalator monitoring system will be described with reference to Figs. 1 to 5.

[0043]

In a three-story building shown in Fig. 1, a first ascending escalator 1A placed between first and second floors and a second ascending escalator 1B placed between second and third floors are provided to form a bent shape in side view so that a landing is formed by a platform where passengers get off the first ascending escalator 1A and a platform where passengers get on the second ascending escalator 1B. In the same manner, a first descending escalator 2A placed between the first and second floors and a second descending escalator 2B placed between the second and third floors are provided to form a bent shape reverse to the bent shape formed by the first and second ascending escalators 1A and 1B in side view so that a landing is formed by a platform where passengers get on the first descending escalator 2A and a platform where passengers get off the second descending escalator 2B. In order to make an effective use of the space in the building, the first ascending escalator 1A and the second descending escalator 2B are disposed to overlap each other vertically. In the same manner, the second ascending escalator 1B and the first descending escalator 2A are disposed to overlap each other vertically.

[0044]

Since 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,

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

[0045]

The first ascending escalator 1A has a frame 3, a plurality of steps (not shown), a pair of balustrades 4, and outer deck boards 6. The frame 3 is put between the first and second floors to form a framework of the first ascending escalator 1A. The steps are provided movably and endlessly in the frame 3. The balustrades 4 are located to be opposed to each other with respect to the track of the steps for conveying passengers. The outer deck boards 6 support the balustrades 4 respectively from their outer sides, that is, 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 board for controlling the motor, etc. are provided inside the frame 3. The frame 3 is covered with plate members including the outer deck boards 6. Thus, a reception portion 2 for receiving the motor, the transmission unit, the control board, etc. is formed. The lower surface of the reception portion 2 corresponds to the bottom portion 2a of the first ascending escalator 1A.

[0046]

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 on the bottom portion 2a of the second ascending escalator 1B. A lighting unit (not shown) for lighting the first ascending escalator 1A is provided on the bottom portion 2a of the second descending escalator 2B. Wire members (not shown) for supplying electric power to those lighting units are wired in the reception portions 2 of the escalators provided with the lighting units respectively.

[0047]

A protector piece for preventing passengers from getting

caught is provided in each narrow-angle portion 7. For example, a fixed protector piece 8 consisting of a trapezoidal plate member fixed to the bottom portion 2a of the first descending escalator 2A is provided as a protector piece in the 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. Further, a movable warning piece 9 consisting of a trapezoidal plate member suspended on the bottom portion 2a of the first descending escalator 2A is also provided at the rear of the fixed protector piece 8 when the ascending direction (arrow U direction) of the first ascending escalator 1A is regarded as a front direction. The movable warning piece 9 is also a kind of protector piece. The fixed protector piece 8 and the movable warning piece 9 are made of members of the same material, for example, members of transparent acrylic resin. The fixed protector piece 8 and the movable warning piece 9 are disposed above the outer deck board 6.

[0048]

At least one of the rear end of the fixed protector piece 8 and the rear end of the movable warning piece 9, for example, only the rear end of the movable warning piece 9 is provided integrally with a transparent acrylic cylindrical portion 9a extending vertically. The cylindrical portion 9a has a cylindrical shape whose outer diameter D is larger than the

plate thickness of the movable warning piece 9. That is, an impact on a passenger touching the movable warning piece 9 is diffused so easily that safety for the passenger touching the movable warning piece 9 can be enhanced. Any passenger touches the movable warning piece 9 before touching the fixed protector piece 8. Thus, the passenger can be aware of approach of the narrow-angle portion 7 before touching the fixed protector piece 8.

[0049]

A monitoring camera 11 for capturing pictures of passengers present in and around the platform 1a where passengers get on the first ascending escalator 1A is disposed at the rear of the cylindrical portion 9a of the movable warning piece 9. The monitoring camera 11 is suspended on the bottom portion 2a of the first descending escalator 2A.

[0050]

A cylinder 10 extending vertically is also disposed at the rear of the cylindrical portion 9a of the movable warning piece 9. The cylinder 10 which has received the monitoring camera 11 in its upper portion is suspended on the bottom portion 2a of the first descending escalator 2A. That is, the cylinder 10 serves as a camera receiving cylinder for receiving the monitoring camera 11.

[0051]

A wire member 20 is connected to the monitoring camera 11. The wire member 20 serves for power supply to the monitoring camera 11, transmission of video data to the outside of the monitoring camera 11, etc.

[0052]

A part of the wire member 20 is wired in the state in which it is received in the cylinder 10. That is, the cylinder 10 also serves as a wire receiving cylinder for receiving a part of the wire member 20.

[0053]

A power supply for the monitoring camera 11 and a video recording device 25 serving as an external device to which video data of the monitoring camera 11 will be transmitted are provided in the reception portion 2. The wire member 20 is connected to the power supply and the video recording device 25 in the reception portion 2. The video recording device 25 may be provided in a control room of the building. In this case, the wire member 20 is connected to the video recording device 25 through a wire member wired from the control room to the reception portion 2.

[0054]

The wire member 20 has a portion which is composed of a first wire member 21, a second wire member 22, a third wire member 23 and a fourth wire member 24 joined to one another

in a line. The first wire member 21 has one end connected to the monitoring camera 11, and the other end provided with a male connector 21a including a connection terminal. The second wire member 22 has opposite ends provided with female connectors 22a and 22b including connection terminals respectively. The third wire member 23 has opposite ends provided with male connectors 23b and 23c including connection terminals respectively. The fourth wire member 24 has one end provided with a female connector 24c including a connection terminal, and the other end connected directly or indirectly to the video recording device 25.

[0055]

The connection terminal at the other end of the first wire member 21 and the connection terminal at one end of the second wire member 22 are connected by coupling between the female connector 22a and the male connector 21a. The connection terminal at the other end of the second wire member 22b and the connection terminal at one end of the third wire member 23 are connected by coupling between the female connector 22b and the male connector 23b. The connection terminal at the other end of the third wire member 23 and the connection terminal at one end of the fourth wire member 24 are connected by coupling between the male connector 23c and the female connector 24c. Housings of the male connector 21a, the female connector 22a,

the female connector 22b, the male connector 23b, the male connector 23c and the female connector 24c are molded products of an insulating material (synthetic resin) respectively. In the state where the female connector 22a and the male connector 21a have been coupled, the connection terminal at the other end of the first wire member 21 and the connection terminal at one end of the second wire member 22 are covered with the housing of the female connector 22a and the housing of the male connector 21a so as to be electrically insulated from the outside. In the state where the female connector 22b and the male connector 23b have been coupled, the connection terminal at the other end of the second wire member 22 and the connection terminal at one end of the third wire member 23 are covered with the housing of the female connector 22b and the housing of the male connector 23b so as to be electrically insulated from the outside. In the state where the male connector 23c and the female connector 24c have been coupled, the connection terminal at the other end of the third wire member 23 and the connection terminal at one end of the fourth wire member 24 are covered with the housing of the male connector 23c and the housing of the female connector 24c so as to be electrically insulated from the outside.

[0056]

A part of the wire member 20 is received in the cylinder

10 as described previously. The part chiefly corresponds to the second wire member 22.

[0057]

The fourth wire member 24 is wired so that the female connector 24c is exposed from the outer deck board 6 while the other part is located in the reception portion 2.

[0058]

In addition, the lower edge of the fixed protector piece 8, the lower edge of the movable warning piece 9, the lower end of the cylindrical portion 9a and the lower end of the cylinder 10 are all located below the moving handrail 5. Particularly the lower end of the cylindrical portion 9a and the lower end of the cylinder 10 are located at least 200 mm below the moving handrail 5.

[0059]

As shown in Figs. 2 and 3(a)-(c), the monitoring camera 11 includes a cylindrical case 11a, a lens (not shown) provided to protrude from the case 11a, and a dome-shaped 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 case 11a is located on the upper side while the cover 11b is located on the lower side. A field angle α of the lens of the monitoring camera 11 is set so that the vicinity of the platform 1a of the first floor and the narrow-angle portion

7 can be included in the photographic range.

[0060]

The first wire member 21 extends from the upper surface of the case 11a in the state where the monitoring camera 11 has been suspended on the bottom portion 2a of the first descending escalator 2A. In addition, suspension portions 12 and 13 arranged in the radial direction of the case 11a are provided in the upper surface of the case 11a so as to protrude upward. Suspension holes 12a and 13a are formed in the upper end portion of the suspension portion 12 and the upper end portion of the suspension portion 13 respectively so as to penetrate the suspension portions 12 and 13 in radial directions of the case 11a respectively. The suspension hole 12a and the suspension hole 13a are located on different levels 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 on 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. 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.

[0061]

The monitoring camera 11 suspended thus on the bottom portion 2a of the first descending escalator 2A is received in the cylinder 10. The cylinder 10 is fastened to the suspension portion 12 in its upper end portion by a screw 17. The cylinder 10 is also fastened to the suspension portion 13 by a screw 18. That is, the cylinder 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.

[0062]

The second wire member 22 has a flexible wiring board 22c and female connectors 21A and 22B. In the flexible wiring board 22c, a plurality of wire lines 22c1 (illustrated by thick broken lines collectively) arranged in parallel and in a plane have been printed and formed on a flexible substrate. The female connectors 22a and 22b are provided on the opposite ends of the wire lines 22c1 respectively. In the wires, a sectional area of each wire and a distance between adjacent wires are set to match with the characteristic impedances of the first and third wire members 21 and 23.

[0063]

As shown in Figs. 3(a)-(c), light C of a lighting system

of the building is incident on the inside of the cylinder 10 from below the cylinder 10. Total reflection occurs when an incident angle β of the light C is an angle larger than a critical angle. The totally reflected light C travels toward the monitoring camera 11 while being repeatedly reflected on the inner wall surface of the cylinder 10, and enters the field angle α of the monitoring camera 11. As a result, there occurs a phenomenon of so-called reflected glare in which light enters a picture.

[0064]

As a countermeasure against the reflected glare, the dimensions and shape of the second wire member 22 are set so that the second wire member 22 can cover the inner wall surface of the cylinder 10 and serve as an antireflection sheet to reduce the unnecessary incidence of the light C on the monitoring camera 11. That is, the second wire member 22 has an antireflection sheet portion 22d. The vertical length of the antireflection sheet portion 22d is set at a length L_a which is slightly shorter than the distance between the upper end of the case 11a of the monitoring camera 11 and the lower end of the cylinder 10. The width of the antireflection sheet portion 22d is set to be substantially equal to almost half the inner circumference of the cylinder 10.

[0065]

In addition, the second wire member 22 has a blinder portion 22e. The vertical length of the blinder portion 22e is set at a length L_b long enough to cover the whole parts of the suspension portions 12 and 13 located in the cylinder 10. The vertical length L of the second wire member 22 is set as the sum of the length L_a of the antireflection sheet portion 22d and the length L_b of the blinder portion 22e. The width W of the blinder portion 22e is set to be substantially equal to the inner circumference of the cylinder 10.

[0066]

In the width direction of the antireflection sheet portion 22d, the connection portion between the blinder portion 22e and the antireflection sheet portion 22d is set in a position biased to the wire lines 22c1. Accordingly, as shown in Fig. 4, the second wire member 22 has an L-shape. However, the second wire member 22 may be formed into a T-shape in which the connection portion between the antireflection sheet portion 22d and the blinder portion 22e is set at the center of the blinder portion 22e in the widthwise direction.

[0067]

The second wire member 22 is received in the cylinder 10 in the state where the height position of the edge on the blinder portion 22e side substantially corresponds to the height position of the upper end of the cylinder 10. The antireflection

sheet portion 22d, which is received in the cylinder 10, has a semicylindrical shape along the inner wall surface of the cylinder 10 which is located out of the field angle α of the monitoring camera 11 and on the opposite side to the field angle α . In this state, the antireflection sheet portion 22d covers a range of almost half the circumference of the cylinder 10.

[0068]

One surface of the antireflection sheet portion 22d which is a semicylindrical inner circumferential surface has a low-brightness color such as black. Coloring the antireflection sheet portion 22d black may be achieved by pasting a black sheet-like seal onto a sheet member or by applying a black paint thereto.

[0069]

At least one of words, an illustration and a mark for attracting passenger's attention to the camera in operation and warning passengers not to lean out to the narrow-angle portion 7 is provided on the other surface of the antireflection sheet portion 22d by printing or by pasting a seal. These words, illustration, mark, etc. may be replaced by a simple color design.

[0070]

As shown in Fig. 4, a plurality of, for example, three first drilled holes 22f to 22h and three second drilled holes

22i to 22k, i.e. the number of which is the same as the number of the first drilled holes 22f to 22h are provided in the blinder portion 22e of the second wire member 22. When the blinder portion 22e is received in the cylinder 10, the blinder portion 22e is formed into a cylindrical shape in which one end on the wire lines 22c1 side abuts against the other end opposite thereto. In this state, the first drilled hole 22f and the second drilled hole 22i are located to face each other in the radial direction, the first drilled hole 22g and the second drilled hole 22j are located to face each other in the radial direction, and the first drilled hole 22h and the second drilled hole 22k are located to face each other in the radial direction. The screw 17 for fastening the cylinder 10 to the suspension portion 12 is inserted into one of the three first drilled holes 22f to 22h. In the same manner, the screw 18 for fastening the cylinder 10 to the suspension portion 13 is inserted into the second drilled hole 22i, 22j or 22k located to face the first drilled hole 22f, 22g or 22h to which the screw 17 is inserted. Incidentally, illustration of the first drilled holes 22f to 22h and the second drilled holes 22i to 22k are not shown in Figs. 3A-3C.

[0071]

A vibration preventing wire 30 is stretched between the lower end portion of the cylinder 10 and the outer deck board

6 so as to serve as a vibration preventing member for suppressing vibration of the cylinder 10 relative 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 cylinder 10. The first attachment rod 31 is placed radially in the cylinder 10. Above the first attachment rod 31, the second attachment rod is placed radially in the cylinder 10 so as to intersect the first attachment rod 31 crisscross. A screw 32 is screwed down to one end of the first attachment rod 31 from the outer circumferential side of the cylinder 10. A screw 33 is screwed down to the other end of the first attachment rod 31 from the outer circumferential side of the cylinder 10. The radial movement of the first attachment rod 31 relative to the cylinder 10 is regulated by both the head portions of the screws 32 and 33 so that the first attachment rod 31 can be prevented from being detached from the cylinder 10. In the same manner, the second attachment rod is also prevented from being detached from the cylinder 10. The reference numeral 34 represents one of the screws for preventing the second attachment rod from being detached.

[0072]

Since both the first attachment rod 31 and the second attachment rod are inserted into a first annular portion 30a provided in the vibration preventing wire 30, one end of the

vibration preventing wire 30 is retained by an intersecting portion 35 of the first attachment rod 31 and the second attachment rod. An attachment member 36 is provided in a part of the outer deck board 6 located under the cylinder 10. An insertion hole 36a is provided in the attachment member 36. A second annular portion 30b inserted into the insertion hole 36a is provided in the other end of the vibration preventing wire 30 so as to be coupled with the outer deck board 6. The vibration preventing member may be not a wire but a chain.

[0073]

Of the third wire member 23, a part located between the lower end of the cylinder 10 and the outer deck board 6 is fastened to the vibration preventing wire 30 by binding wires 40 and 41. The length of the third wire member 23 is set to be longer than the distance between the female connector 22B of the second wire member 22 and the female connector 24c of the fourth wire member 24.

[0074]

Next, a method for installing the escalator monitoring system according to the first embodiment will be described with reference to Fig. 5.

[0075]

First in a first step S1, the work of attachment of the monitoring camera 11 to the escalator bottom portion 2a and

the work of adjustment of the field angle α of the monitoring camera 11 are carried out. In the work of attachment of the monitoring camera 11, first, the base member 16 is screwed on the bottom portion 2a of the first descending escalator 2A. Next, the monitoring camera 11 is suspended on the suspension portions 12 and 13 connected to the base member 16 by the ring members 14 and 15. Thus, the work of attachment of the monitoring camera 11 is completed. Then, in the work of adjustment of the field angle α of the monitoring camera 11, first, the male connector 21a of the first wire member 21 is connected to a monitor (not shown) through a test cable (not shown). Pictures captured by the monitoring camera 11 are checked on the monitor, and the field angle α of the monitoring camera 11 is adjusted vertically and horizontally. When the adjustment of the field angle α is completed, the test cable is removed from the male connector 21a of the first wire member 21.

[0076]

Next, in a second step S2, the work of suspension of the cylinder 10 on the bottom portion 2a of the first descending escalator 2A is carried out. In the suspension work, first, the second wire member 22 is received in the cylinder 10. On this occasion, the blinder portion 22e is formed into a cylindrical shape, and the antireflection sheet portion 22d is formed into a semicylindrical shape. Next, the cylinder

10 in which the second wire member 22 has been received is disposed near the bottom portion 2a of the first descending escalator 2A while receiving the monitoring camera 11. With this state being maintained, the upper end portion of the cylinder 10 is fastened to the suspension portion 12 by the screw 17. The upper end portion of the cylinder 10 is also fastened to the suspension portion 13 by the screw 18. On this occasion, the blinder portion 22e is disposed between the inner wall surface of the cylinder 10 and the suspension portion 12, and the screw 17 is inserted into the first drilled hole 22f, 22g or 22h of the blinder portion 22e. In the same manner, the screw 18 is inserted into the second drilled hole 22i, 22j or 22k located to face the first drilled hole 22f, 22g or 22h to which the screw 17 has been inserted.

[0077]

Next, in a third step S3, the male connector 21a of the first wire member 21 and the female connector 21A of the second wire member 22 are coupled with each other.

[0078]

Next, in a fourth step S4, the work of attachment of the vibration preventing wire 30 to the cylinder 10 is carried out. In the attachment work, first, the first attachment rod 31 and the second attachment rod are disposed in the lower end portion of the cylinder 10 so as to intersect each other crisscross,

and the first attachment rod 31 is attached to the cylinder 10 by the screws 32 and 33 while the second attachment rod is attached to the cylinder 10 by the screw 34 and so on. Next, the first annular portion 30a is provided in one end of the vibration preventing wire 30 so as to allow both the first attachment rod 31 and the second attachment rod to be inserted into the first annular portion 3a. Next, the other end of the vibration preventing wire 30 is inserted into the insertion hole 36a of the attachment member 36 provided in the outer deck board 6, and the second annular portion 30b is then provided to keep the vibration preventing wire 30 stretched between the intersecting portion 35 and the insertion hole 36a.

[0079]

Next, in a fifth step S5, the male connector 23b is coupled with the female connector 22B so as to connect the third wire member 23 to the second wire member 22.

[0080]

Next, in a sixth step S6, the male connector 23c is coupled with the female connector 24c so as to connect the third wire member 23 to the fourth wire member 24.

[0081]

Last, in a seventh step S7, the third wire member 23 is bound to the vibration preventing wire 30 by the binding wires 40 and 41.

[0082]

The following effects can be obtained by the first embodiment.

[0083]

In the escalator monitoring system according to the first embodiment, the monitoring camera 11 is located in the cylinder 10 extending vertically on the rear end side of the fixed protector piece 8 as a protector piece and the movable warning piece 9. Thus, the monitoring camera 11 is placed in a position where an ill feeling of being peeped at from below is not given to passengers and the monitoring camera 11 does not hinder the ways of the passengers. Further, exposure of the wire member 20 connected to the monitoring camera 11 can be suppressed easily by the cylinder 10.

[0084]

In the escalator monitoring system according to the first embodiment, the cylinder 10 serving as a camera receiving cylinder is provided in parallel with the movable warning piece 9 so that it can be made difficult to give a wrong feeling that the cylinder 10 is provided specially for installing the monitoring camera 11.

[0085]

In the escalator monitoring system according to the first embodiment, the cylinder 10 also serves as a camera receiving

cylinder and a wire receiving cylinder, and the wire member 20 is wired to be taken out from the lower end of the cylinder 10 and guided into the outer deck board 6, that is, into the reception portion 2. Thus, the wire member 20 can be wired without being wired on the bottom portion 2a, any column of the building, the ceiling, etc. That is, the wire member 20 for connecting the monitoring camera 11 with the video recording device 25 can be wired without using any wire cover, and scaffolding does not have to be put up for wiring the wire member 20. It is therefore possible to install the escalator monitoring system in a short time, and it is also possible to reduce expenses of the installation.

[0086]

In the escalator monitoring system according to the first embodiment, the wire member 20 has a portion composed of the first wire member 21, the second wire member 22, the third wire member 23 and the fourth wire member 24 joined to one another in a line. Thus, the wire member 20 can be wired smoothly.

[0087]

In the escalator monitoring system according to the first embodiment, the second wire member 22 is a flexible wiring board, i.e. shaped like a sheet. Thus, it is easy to dispose the second wire member 22 in a gap between the monitoring camera 11 and the inner wall surface of the cylinder 10.

[0088]

In the escalator monitoring system according to the first embodiment, the antireflection sheet portion 22d reduces the unnecessary incidence of the light C on the monitoring camera 11. It is therefore possible to reduce reflected glare of light onto pictures captured by the monitoring camera 11.

[0089]

In the escalator monitoring system according to the first embodiment, the second wire member 22 has the antireflection sheet portion 22d. Thus, the number of parts can be reduced, compared with the case where an antireflection sheet is used separately from the second wire member.

[0090]

In the escalator monitoring system according to the first embodiment, the cylinder 10 serves as a wire receiving cylinder, so that the upper end of the cylinder 10 is located near the escalator bottom portion 2a while the lower end thereof is located between the moving handrail 5 and the outer deck board 6 in the up/down direction. Thus, all or substantially all the part of the wire member 20 located between the bottom portion 2a and the moving handrail 5 can be covered with the cylinder 10, and the balustrade 4 can be placed to separate passengers from the portion of the wire member 20 taken out from the lower end of the cylinder 10. As a result, the wire member 20 can

be protected from being cut by mischief.

[0091]

In the escalator monitoring system according to the first embodiment, connectors for removably connecting connection terminals, that is, the male connector 21a, the female connector 21A, the female connector 22B, the male connector 23b, the male connector 23c and the female connector 24c are used for the connection between the first wire member 21 and the second wire member 22, the connection between the second wire member 22 and the third wire member 23 and the connection between the third wire member 23 and the fourth wire member 24. Thus, those connections can be made easily. It is therefore possible to improve the efficiency in the wiring work related to the installation of the monitoring camera 11 such as the wiring work between the monitoring camera 11 and the power supply, the video recording device 25, etc.

[0092]

In the escalator monitoring system according to the first embodiment, the vibration of the cylinder 10 is suppressed by the vibration preventing wire 30 so that the blurring of pictures captured by the monitoring camera 11 can be suppressed.

[0093]

In the escalator monitoring system according to the first embodiment, the first annular portion 30a provided in one end

of the vibration preventing wire 30 is retained in the intersecting portion 35 between the first attachment rod and the second attachment rod. Thus, the posture of the cylinder 10 can be kept easily in the posture where the axial direction of the cylinder 10 coincides with the vertical direction. It is therefore possible to prevent the cylinder 10 from being inclined to change the posture of the monitoring camera 11.

[0094]

In the escalator monitoring system according to the first embodiment, the third wire member 23 is bound to the vibration preventing wire 30. Thus, the third wire member 23 and the vibration preventing wire 30 are bound together so that the appearance can be prevented from being spoiled due to the wiring of the third wire member 23.

[0095]

In the escalator monitoring system according to the first embodiment, the female connector 24c including a connection terminal and provided at one end of the fourth wire member 24 is disposed under the cylinder 10, and the length of the third wire member 23 is set to be longer than the distance between the female connector 22B at the other end of the second wire member 22 and the female connector 24c at one end of the fourth wire member 24. Thus, when the cylinder 10 vibrates, the third wire member 23 can be deformed following the vibration of the

cylinder 10 so that the tension acting on the third wire member 23 due to the vibration of the cylinder 10 can be reduced. It is therefore possible to prevent disconnection in the connection portion between the second wire member 22 and the third wire member 23, the connection portion between the third wire member 23 and the fourth wire member 24, etc.

[0096]

In addition, in the method for installing the escalator monitoring system according to the first embodiment, the monitoring camera 11 is received in the cylinder 10 after the field angle α of the monitoring camera 11 is adjusted. Thus, the field angle α of the monitoring camera 11 can be adjusted easily, compared with the case where the field angle α of the monitoring camera 11 is adjusted in an unwieldy state where the monitoring camera 11 has been received in the cylinder 10.

[0097]

In the method for installing the escalator monitoring system according to the first embodiment, the second step S2 in which the cylinder 10 receiving the second wire member 22 is suspended on the bottom portion 2a in the state where the monitoring camera 11 attached to the bottom portion 2a has been received in the cylinder 10 is followed by the third step S3 of connecting the first wire member 21 to the second wire member 22, the fifth step S5 of connecting the second wire member 22

to the third wire member 23 and the sixth step S6 of connecting the third wire member 23 to the fourth wire member 24. In this manner, the first to third wire members 21, 22 and 23 can be wired easily, compared with the case where the cylinder 10 is attached to the bottom portion 2a and then the second wire member 22 is received in the cylinder 10 and connected to the first wire member 21 and the third wire member 23.

[0098]

Although the cylinder 10 serves as both the camera receiving cylinder and the wire receiving cylinder in the escalator monitoring system according to the first embodiment, the invention is not limited thereto. The cylinder 10 may not be provided, but the cylindrical portion 9a of the movable warning piece 9 may serve as both the camera receiving cylinder and the wire receiving cylinder. Alternatively, not only the cylinder 10 but also the movable warning piece 9 can be dispensed with, and a cylindrical portion which serves as both the camera receiving cylinder and the wire receiving cylinder may be provided in the fixed protector piece 8. Alternatively, the cylinder 10 may serve as the camera receiving cylinder while the cylindrical portion 9a of the movable warning piece 9 serves as the wire receiving cylinder.

[0099]

Although the male connector 21a and the female connector

21A, the female connector 22B and the male connector 23b, and the male connector 23c and the female connector 24c are used for the connection between the first wire member 21 and the second wire member 22, the connection between the second wire member 22 and the third wire member 23 and the connection between the third wire member 23 and the fourth wire member 24 respectively in the escalator monitoring system according to the first embodiment, the invention is not limited to any configuration using connectors for those connections. The connections may be made by screws or soldering while ensuring electric insulation from the outside.

[0100]

Although the second wire member 22 has the antireflection sheet portion 22d in the escalator monitoring system according to the first embodiment, the invention is not limited thereto. A sheet-like second wire member consisting of a flexible wiring board as a separate piece from an antireflection sheet having the same shape and dimensions as those of the second wire member 22 may be pasted to one of opposite sides of the antireflection sheet. In addition, the second wire member may be of any flexible wiring sheet in which a plurality of wires are arranged in a plane and integrated like a sheet. The flexible wiring board may be therefore replaced by a flat cable. When there is a sufficiently large clearance between the monitoring camera and

the cylinder, the second wire member does not have to be a flexible sheet wiring board. In this case, the second wire member may be a coaxial cable, a flat cable or a feeder line.

[0101]

Second Embodiment

Next, an escalator monitoring system according to a second embodiment will be described with reference to Figs. 6 and 7. Of parts shown in Figs. 6 and 7, equivalent ones to those in Figs. 1 and 2 are referred to by the same numerals as those in Figs. 1 and 2.

[0102]

In a building shown in Fig. 6, an ascending escalator 50 for conveying passengers from the first floor to the second floor is provided singly. A narrow-angle portion 52 is formed between a moving handrail 5 of the ascending escalator 50 and a ceiling 51 of the first floor. As shown in Fig. 7, a fixed protector piece 8, a movable warning piece 9 and a cylinder 10 are also provided in the narrow-angle portion 52.

Incidentally, a cylindrical portion 53 similar to that of the movable warning piece 9 is provided in the fixed protector piece 8.

[0103]

In the escalator monitoring system according to the second embodiment, the cylinder 10 serves only as the camera receiving

cylinder and the cylindrical portion 9a of the movable warning piece 9 serves as the wire receiving cylinder, differently from the escalator monitoring system according to the first embodiment.

[0104]

A monitoring camera 11 is received in the cylinder 10. In the cylinder 10, an antireflection sheet 54 is disposed on the inner wall surface opposite to the side of the field angle α of the monitoring camera 11 so as to be capable of covering almost the whole of a region corresponding to half the circumference of the cylinder 10 on the opposite side to the field angle α .

[0105]

The reference numeral 60 in Fig. 7 represents a wire member for connecting the monitoring camera 11 to a video recording device 25. The wire member 60 has a first wire member 61 and a second wire member 62. The first wire member 61 is wired to be taken out from the upper end of the cylinder 10, be placed along the ceiling 51, penetrate the cylindrical portion 9a of the movable warning piece 9 from the upper end of the cylindrical portion 9a to the lower end thereof, and be guided into an outer deck board 6. The first wire member 61 is connected to the second wire member 62. A male connector 61a (similar to the male connector 23c in the first embodiment) including a

connection terminal is provided in an end portion of the first wire member 61 on the opposite side to the monitoring camera 11. A female connector 62a (similar to the female connector 24c in the first embodiment) including a connection terminal is provided in one end of the second wire member 62. The other end of the second wire member 62 is connected directly or indirectly to the video recording device 25. The second wire member 62 is similar to the fourth wire member 24 in the first embodiment.

[0106]

A wire cover 63 is provided in a portion of the ceiling 51 located between the upper end of the cylinder 10 and the upper end of the cylindrical portion 9a. Of the first wire member 61, a portion to be placed along the ceiling 51 is covered with the wire cover 63.

[0107]

A base member 70 for suspending the movable warning piece 9 is screwed on the ceiling 51. The base member 70 has a similar structure to that of the base member 16 (see Figs. 2 and 3A-3C). A vibration preventing wire 71 inserted into the cylindrical portion 9a of the movable warning piece 9 is stretched between the base member 70 and the outer deck board 6. The upper end portion of the vibration preventing wire 71 is bound to an annular support portion (not shown) at the rear of the base member 70,

while the lower end portion of the vibration preventing wire 71 is bound to an attachment member 72 (similar to the attachment member 36) provided in the outer deck board 6. The vibration of the movable warning piece 9 relative to the ceiling 51 is suppressed by the vibration preventing wire 71.

[0108]

A portion of the first wire member 61 located between the lower end of the cylindrical portion 9a of the movable warning piece 9 and the outer deck board 6 is bound to the vibration preventing wire 71 by binding wires 80 and 81.

[0109]

According to the second embodiment, the following effects can be obtained.

[0110]

Also in the escalator monitoring system according to the second embodiment, the monitoring camera 11 is located in the cylinder 10 extending vertically on the rear end side of the fixed protector piece 8 as a protector piece and the movable warning piece 9, in the same manner as in the escalator monitoring system according to the first embodiment. Thus, the monitoring camera 11 is placed in a position where an ill feeling of being peeped at from below is not given to passengers and the monitoring camera 11 does not hinder the ways of the passengers.

[0111]

In the escalator monitoring system according to the second embodiment, exposure of the wire member 60 connected to the monitoring camera 11 can be suppressed easily by the cylindrical portion 9a of the movable warning piece 9.

[0112]

In the escalator monitoring system according to the second embodiment, the wire member 60 is inserted into the cylindrical portion 9a of the movable warning piece 9 provided separately from the cylinder 10 as the camera receiving cylinder. Therefore, the wire member 60 can be wired even if a sheet-like portion (second wire member 22) is not provided like the wire member 20 in the escalator monitoring system according to the first embodiment.

[0113]

In the escalator monitoring system according to the second embodiment, the upper end of the cylindrical portion 9a serving as the wire receiving cylinder is located near the ceiling 51 of the first floor, while the lower end of the cylindrical portion 9a is located between the moving handrail 5 and the outer deck board 6 vertically. Thus, substantially all the part of the wire member 60 located between the ceiling 51 and the moving handrail 5 can be covered with the cylindrical portion 9a, and the balustrade 4 can be placed to separate passengers from the portion of the wire member 60 taken out from the lower end of

the cylindrical portion 9a. As a result, the wire member 60 can be protected from being cut by mischief.

[0114]

In the escalator monitoring system according to the second embodiment, the antireflection sheet 54 reduces the unnecessary incidence of light on the monitoring camera 11. It is therefore possible to reduce reflected glare of light onto pictures captured by the monitoring camera 11.

[0115]

In the escalator monitoring system according to the second embodiment, the first wire member 61 is bound to the vibration preventing wire 71 between the lower end of the cylindrical portion 9a and the outer deck board 6. Thus, the wire member 60 and the vibration preventing wire 30 are bound together so that the appearance can be prevented from being spoiled due to the wiring of the first wire member 61.

[0116]

In the escalator monitoring system according to the second embodiment, the wire member 60 is placed along the ceiling 51, but the position where the wire member 60 is placed along the ceiling 51 is between the cylinder 10 (camera receiving cylinder) and the cylindrical portion 9a (wire receiving cylinder) at the upper end of the movable warning piece 9. Thus, the wire cover 63 can be used inconspicuously.

[0117]

Although the escalator monitoring system according to the second embodiment is applied to the narrow-angle portion 52 formed between the moving handrail 5 and the ceiling 51, it may be applied to the narrow-angle portion 7 formed between the moving handrail 5 and the bottom portion 2a in the same manner as the escalator monitoring system according to the first embodiment.

[0118]

Third Embodiment

Next, an escalator monitoring system according to a third embodiment will be described with reference to Fig. 8. Of parts shown in Fig. 8, equivalent ones to those in Figs. 1, 2 and 7 are referred to by the same numerals as those in Figs. 1, 2 and 7.

[0119]

The escalator monitoring system according to the third embodiment does not have the cylinder 10 but the cylindrical portion 9a of the movable warning piece 9 serves as both the camera receiving cylinder and the wire receiving cylinder.

[0120]

In the movable warning piece 9, a trapezoidal plate portion 90 is coupled with the cylindrical portion 9a consisting of a cylindrical member. The trapezoidal plate portion 90

consists of a substantially trapezoidal plate member so as to form a body of the movable warning piece 9. The structure for coupling the trapezoidal plate portion 90 with the cylindrical portion 9a will be described below.

[0121]

A protrusion portion 90a extending vertically is formed in the substantially lower half part of the lower bottom (left side in Fig. 8) of the trapezoidal plate portion 90 so as to protrude rearward (leftward in Fig. 8). A groove portion (not shown) extending vertically is formed in the substantially lower half part of the cylindrical portion 9a. The trapezoidal plate portion 90 and the cylindrical portion 9a are bonded with each other in the state where the protrusion portion 90a has been inserted into the groove portion.

[0122]

A second wire member 22 including an antireflection sheet portion in the same manner as the antireflection sheet portion 22d in the first embodiment is disposed in a region inside the cylindrical portion 9a and above the protrusion portion 90a of the trapezoidal plate portion 90. A third wire member 23 is coupled with the second wire member 22 near the upper end of the protrusion portion 90a, penetrates a space between the protrusion portion 90a and the inner wall surface of the cylindrical portion 9a and extends to the outer deck board 6.

[0123]

A base member 100 has an annular support portion 101 disposed above the cylindrical portion 9a, differently from the base member 70 in the second embodiment. Only one suspension portion (not shown) is provided for the monitoring camera 11. The monitoring camera 11 is suspended on the annular support portion 101 through the suspension portion and a ring member 102.

[0124]

According to the third embodiment, the following effects can be obtained.

[0125]

In the escalator monitoring system according to the third embodiment, the monitoring camera 11 is located in the cylindrical portion 9a provided in the movable warning piece 9 as a protector piece. Thus, the monitoring camera 11 is placed in a position where an ill feeling of being peeped at from below is not given to passengers and the monitoring camera 11 does not hinder the ways of the passengers. Further, exposure of the wire member 20 connected to the monitoring camera 11 can be suppressed easily by the cylindrical portion 9a.

[0126]

In the escalator monitoring system according to the third embodiment, the cylinder 10 is not provided. It is therefore

possible to reduce the number of parts, compared with that in the escalator monitoring system according to the first or second embodiment.

[0127]

Although the escalator monitoring system according to the third embodiment is applied to the narrow-angle portion 52 formed between the moving handrail 5 and the ceiling 51, it may be applied to the narrow-angle portion 7 formed between the moving handrail 5 and the bottom portion 2a in the same manner as the escalator monitoring system according to the first embodiment.

[0128]

It is preferable that the movable warning piece 9 is provided at the rear of the fixed protector piece 8 in order to prevent passengers from getting caught into the narrow-angle portion 7 accidentally as in the escalator monitoring system according to the third embodiment. However, when the movable warning piece 9 is not provided in the narrow-angle portion 7, the cylindrical portion 53 provided in the fixed protector piece 8 may serve as both the camera receiving cylinder and the wire receiving cylinder in place of the cylindrical portion 9a of the movable warning piece 9.

What is claimed is:

1. An escalator monitoring system provided in a building having a narrow-angle portion and a protector piece, the narrow-angle portion being formed between a ceiling of a lower floor and a moving handrail of an escalator or between a bottom portion of one of two escalators disposed crosswise and adjacently to each other and a moving handrail of the other escalator, the protector piece being provided in the narrow-angle portion in order to prevent passengers from getting caught into the narrow-angle portion during an ascending operation of the escalator, the escalator monitoring system comprising:

a monitoring camera which captures pictures of the escalator and the passengers;

a wire member which electrically connects the monitoring camera to an external device;

a camera receiving cylinder which is a cylinder provided in a posture to extend vertically on a rear end side of the protector piece when an ascending direction of the escalator is regarded as front direction, and which receives the monitoring camera;

a wire receiving cylinder which is a cylinder provided in a posture to extend vertically on the rear end side of the protector piece when the ascending direction of the escalator

is regarded as front direction, and which receives a part of the wire member; and

an outer deck board which is provided outside a base portion of a balustrade of the escalator and which receives another part of the wire member than the part received in the wire receiving cylinder;

wherein the wire member is wired to be taken out from a lower end of the camera receiving cylinder and guided to an inside of the outer deck board.

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

the protector piece includes a fixed protector piece and a movable warning piece, the fixed protector piece being fixed to the ceiling or the bottom portion, the movable warning piece being suspended on the ceiling or the bottom portion at a rear of the fixed protector piece;

a cylindrical portion extending vertically is provided integrally with at least one of a rear end of the fixed protector piece and a rear end of the movable warning piece;

a cylinder extending vertically at a rear of the cylindrical portion of the movable warning piece is suspended on the ceiling or the bottom portion; and

the cylinder serves as both the camera receiving cylinder and the wire receiving cylinder.

3. An escalator monitoring system according to Claim 2, wherein:

the wire member has a part composed of first to fourth wire members joined to one another into a single line;

the first wire member has one end connected to the monitoring camera, and the other end provided with a connection terminal;

each of the second and third wire members has opposite ends provided with connection terminals respectively;

the fourth wire member has one end provided with a connection terminal, and the other end connected directly or indirectly to the external device, the connection terminal being disposed to be exposed from the outer deck board; and

the connection terminal at the other end of the first wire member is connected to the connection terminal at the one end of the second wire member, the connection terminal at the other end of the second wire member is connected to the connection terminal at the one end of the third wire member, the connection terminal at the other end of the third wire member is connected to the connection terminal at the one end of the fourth wire member, and at least a part of the second wire member excluding the connection terminals is received in the cylinder.

4. An escalator monitoring system according to Claim 1, wherein:

the protector piece includes a fixed protector piece and a movable warning piece, the fixed protector piece being fixed to the ceiling or the bottom portion, the movable warning piece being suspended on the ceiling or the bottom portion at a rear of the fixed protector piece;

a cylindrical portion extending vertically is provided integrally with at least one of a rear end of the fixed protector piece and a rear end of the movable warning piece;

a cylinder extending vertically at a rear of the cylindrical portion of the movable warning piece is suspended on the ceiling or the bottom portion;

the cylinder serves as the camera receiving cylinder;

the cylindrical portion provided in the movable warning piece serves as the wire receiving cylinder; and

the wire member connected to the monitoring camera is wired to be taken out from an upper end of the camera receiving cylinder, be placed along the ceiling or the bottom portion, penetrate the wire receiving cylinder from an upper end of the wire receiving cylinder to the lower end thereof, and be guided into the outer deck board.

5. An escalator monitoring system according to Claim 3, wherein:

the second wire member is a flexible wiring sheet in which a plurality of wires are arranged in parallel in a plane and

integrated like a sheet.

6. An escalator monitoring system according to any one of Claims 1 through 5, wherein:

an upper end of the wire receiving cylinder is located near the ceiling or the bottom portion, and a lower end of the wire receiving cylinder is located between the moving handrail and the outer deck board vertically.

7. An escalator monitoring system according to Claim 3, further comprising:

connectors which can removably connect the connection terminals to each other.

8. An escalator monitoring system according to any one of Claims 1 through 7, further comprising:

an antireflection sheet which covers an inner wall surface of the camera receiving cylinder located out of a field angle of the monitoring camera so as to reduce unnecessary light incident on the monitoring camera.

9. An escalator monitoring system according to Claim 3, wherein:

the second wire member is a sheet member in which a plurality of wires are provided in parallel in a plane, and which has an antireflection sheet portion covering an inner wall surface of the camera receiving cylinder so as to reduce unnecessary light incident on the monitoring camera.

10. An escalator monitoring system according to Claim 3, wherein:

a vibration preventing member for suppressing vibration of the cylinder relative to the ceiling or the bottom portion is stretched between a lower end portion of the cylinder and the outer deck board; and

the third wire member located between the lower end of the cylinder and the outer deck board is fixed to the vibration preventing member.

11. An escalator monitoring system according to Claim 10, wherein:

the connection terminal at the one end of the fourth wire member is disposed below the cylinder; and

the third wire member is set to be longer than a distance between the lower end of the cylinder and the connection terminal at the one end of the fourth wire member.

12. A method for installing an escalator monitoring system according to Claim 1, comprising the steps of:

attaching the monitoring camera to the ceiling or the bottom portion, making a trial connection between the monitoring camera and a monitor and adjusting a field angle of the monitoring camera vertically and horizontally; and

cutting off the trial connection between the monitoring camera and the monitor, and then attaching the camera receiving

cylinder to the ceiling or the bottom portion in a state where the camera receiving cylinder has received the monitoring camera attached to the ceiling or the bottom portion.

13. A method for installing an escalator monitoring system according to Claim 3, comprising the steps of:

attaching the monitoring camera to the ceiling or the bottom portion, making a trial connection between the monitoring camera and a monitor and adjusting a field angle of the monitoring camera vertically and horizontally;

receiving at least a part of the second wire member excluding the connection terminals into the cylinder serving as both the camera receiving cylinder and the wire receiving cylinder;

cutting off the trial connection between the monitoring camera and the monitor, and then attaching the cylinder receiving at least the part of the second wire member excluding the connection terminals to the ceiling or the bottom portion in a state where the cylinder has received the monitoring camera attached to the ceiling or the bottom portion;

connecting the connection terminal at the other end of the first wire member to the connection terminal at the one end of the second wire member after attaching the cylinder to the ceiling or the bottom portion;

connecting the connection terminal at the other end of

the second wire member to the connection terminal at the one end of the third wire member after attaching the cylinder to the ceiling or the bottom portion; and

connecting the connection terminal at the other end of the third wire member to the connection terminal at the one end of the fourth wire member after attaching the cylinder to the ceiling or the bottom portion.