

DESTINATION FLOOR CONTROL DEVICE AND ELEVATOR OPERATION
METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is based upon and claims the benefit of priority from the prior Japanese Patent Application No.2017-119260 filed on June 19, 2017, the entire contents of which are incorporated herein by reference.

FIELD

[0001]

Embodiments described herein relate generally to a destination floor control device and an elevator operation method.

BACKGROUND

[0002]

Buildings installed with elevators include those adopting a landing destination floor control system (also referred to as a destination control system (DCS)).

[0003]

This landing destination floor control system is a system to allocate a car that a user is to board among an elevator group, when the user registers a target destination floor in advance from a landing destination floor registration device that is a destination floor

registration device installed at a landing (elevator hall) of each floor. This makes it possible to enhance operation efficiency as compared with normal group management.

[0004]

Meanwhile, if an abnormality occurs in the landing destination floor control system due to a failure or the like of a landing destination floor registration device, call registration from the landing can not be performed. This disables the use of the elevator by a user who is present at a failure occurrence floor where the landing destination floor registration device has failed.

[0005]

Therefore, conventionally, when an abnormality occurs in a landing destination floor registration system, all the elevators targeted by the failed landing destination floor registration device are operated so as to shift to each floor operation. This enables the use of the elevator without leaving the user who is present at the failure occurrence floor, at the failure occurrence floor.

[0006]

However, the conventional operation method has a problem that the elevator stops even at a floor where a call does not occur, which increases unnecessary stop floors where a call does not occur, and deteriorates service to users. Further, some buildings have a floor at which the elevator is set so as not to stop for security

reasons. If the elevator stops also at the floor, anyone of the elevator users can get on and off, which causes a problem of lowering the security level of the entire building.

SUMMARY

[0007]

An embodiment provides,

A destination floor control device for allocating a car based on a destination floor registered from a destination floor registration device installed at a landing of each floor, the destination floor control device comprising:

a failure monitoring unit configured to monitor whether or not the destination floor registration device has failed; and

a call registration unit configured to perform, when a failure of the destination floor registration device is detected, call registration indicating that there is occurrence of destination floor registration to a reference floor from a failure occurrence floor.

Further, an embodiment provides,

An elevator operation method comprising:

monitoring whether or not a failure has occurred in a destination floor registration device installed in a landing of each floor;

performing, when a failure of the destination floor registration device is detected, call registration indicating that there is occurrence of destination floor registration to a reference floor from a failure occurrence floor; and

stopping, in an operation direction toward a reference floor via a failure occurrence floor in which a failure has occurred in a destination floor registration device, every car at the failure occurrence floor.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Fig. 1 is an overall view showing a configuration of a landing destination floor registration system including a destination floor control device according to an embodiment;

Fig. 2 is an explanatory view of operation in a case where a failure has occurred in a landing destination floor registration device in the configuration shown in Fig. 1; and

Fig. 3 is a flowchart showing a processing procedure at occurrence of a failure in the landing destination floor registration system according to the embodiment.

DETAILED DESCRIPTION

[0009]

A configuration of a landing destination floor registration system according to an embodiment will be described with reference to Fig. 1.

[0010]

As shown in Fig. 1, a building of the embodiment is provided with four cars of a car A, a car B, a car C, and a car D. Further, a landing destination floor registration system 1 (destination floor registration system) of the embodiment includes a destination floor control device (hereinafter referred to as "DCS control device") 10, and this DCS control device 10 is connected to landing destination floor registration devices 11, 12, 13, 14, and 15 (destination floor registration devices) each provided on each floor. Further, there are provided a car-A control device 20 configured to control the car A, a car-B control device 30 configured to control the car B, a car-C control device 40 configured to control the car C, and a car-D control device 50 configured to control the car D. The car-A control device 20, the car-B control device 30, the car-C control device 40, and the car-D control device 50 are connected to the DCS control device 10 and managed by the DCS control device 10.

[0011]

The DCS control device 10 includes a failure monitoring unit 16, a call registration unit 17, and a car allocation unit 18.

[0012]

The failure monitoring unit 16 is connected to each of the landing destination floor registration devices 11 to 15, and transmits failure monitoring signals (heartbeat signals) to each of the landing destination floor registration devices 11 to 15 periodically (about several times per second) to execute heartbeat monitoring. For the landing destination floor registration devices 11 to 15 that do not respond to the failure monitoring signals, it is determined that a failure has occurred.

[0013]

When a failure occurs in any of the landing destination floor registration devices 11 to 15, the call registration unit 17 changes the destination floor to a reference floor (for example, main floor) for all the cars managed by the landing destination floor registration device in which the failure has occurred. Further, the call is changed so as to stop the cars at the failure occurrence floor.

[0014]

Upon receiving a destination floor registration signal from the landing destination floor registration devices 11 to 15, the car allocation unit 18 allocates any one of the car A, the car B, the car C, and the car D based on the destination floor registration signal, and outputs an operation command to a corresponding car control device

20, 30, 40, 50.

[0015]

Next, operation of the present embodiment will be described with reference to Figs. 2 and 3.

[0016]

As shown in Fig. 2, it is now assumed that a failure has occurred in the landing destination floor registration device 14 on the 4th floor. Further, it is assumed that the reference floor is set to the 1st floor.

[0017]

In a flowchart shown in Fig. 3, the failure monitoring unit 16 of the DCS control device 10 constantly monitors a failure of the landing destination floor registration devices 11 to 15 at respective floors (ST1). That is, the failure monitoring unit 16 transmits heartbeat signals to the landing destination registration devices 11 to 15 at a fixed cycle of several times per second, and monitors whether or not there is a response signal to the heartbeat signals. When the failure monitoring unit 16 does not receive the response signal, it is determined that a failure has occurred in the landing destination floor registration devices 11 to 15 that are not responding (ST2). In this case, since there is no response from the landing destination floor registration device 14 on the 4th floor, it is recognized that a failure has occurred in the landing destination floor registration device 14 on the 4th floor.

[0018]

When the landing destination floor registration device 14 in which the failure occurred is recognized, the failure monitoring unit 16 assumes that there has been a destination floor registration from the landing destination floor registration device 14 in which the failure has occurred, and transmits a call registration signal to the call registration unit 17. As a result, the call registration unit 17 registers a call regarding the reference floor as the destination floor from the 4th floor. In other words, the call registration unit 17 registers a call assuming that there is occurrence of destination floor registration to a reference floor from the 4th floor. The car allocation unit 18 selects an optimum car capable of responding to the call, and outputs an operation command to corresponding car control devices 20 to 50 (ST3). As a result, the car allocated with the call stops at the 4th floor (ST4) and then travels to the reference floor (ST5, ST6). At the reference floor, a user is instructed to use another car (ST7). As a result, even if the landing destination floor registration device 14 on the 4th floor fails and the destination floor registration is disabled, it is possible to reliably allocate and send a car to the 4th floor, and no user is left behind on the 4th floor.

[0019]

<Other Examples>

In the above processing procedure, the call registration unit 17 performs call registration such that all the cars stop at a failure occurrence floor in an operation direction toward the reference floor via the failure occurrence floor where the failure occurred in the landing destination floor registration devices 11 to 15. When the destination floor is in a direction toward the reference floor (1st floor) (ST3 YES), the car stops at the failure occurrence floor to allow the user to board, and travels to the 1st floor as the reference floor (ST5, ST6). [0020]

For example, a building with five floors under ground (floor B5) and 30 floors above ground is assumed. If a current elevator car position of a car B is the 15th floor and a failure occurs at the 4th floor during an ascending operation to the 30th floor, the call registration unit 17 performs call registration indicating that a call has occurred from the 4th floor to the 1st floor (the reference floor) as the destination floor. Therefore, in a descending operation from the 30th floor to the reference floor, the car B stops at the 4th floor to allow a user to board, and then travels to the 1st floor as the reference floor. Further, when a failure occurs at the 3rd basement floor while the car B stops at the 5th basement floor, the call registration unit 17 performs call registration indicating that a call has occurred from the 3rd basement

floor to the 1st floor (the reference floor) as the destination floor. As a result, the car B certainly stops at the 3rd basement floor to allow a user to board, and then travels to the 1st floor as the reference floor.

[0021]

As described above, according to the present embodiment, it is monitored whether or not a failure has occurred in the landing destination floor registration devices 11 to 15 installed at the landings of the respective floors. When a failure of the landing destination floor registration devices 11 to 15 is detected, call registration is performed indicating that there is occurrence of destination floor registration to the 1st floor as the reference floor from the failure occurrence floor installed with the landing destination floor registration devices 11 to 15 in which the failure has occurred. Then, in the operation direction toward the reference floor via the failure occurrence floor in which the failure has occurred in the landing destination floor registration devices 11 to 15, all the cars are made to stop at the failure occurrence floor.

[0022]

Therefore, the user can certainly move to the reference floor without being left behind at the failure occurrence floor.

[0023]

In addition, there is no stop at unnecessary floors when a failure occurs in the landing destination floor registration devices 11 to 15, which allows efficient operation and improves convenience of users as compared with the conventional operation in which all the cars are made to stop at each floor.

[0024]

Furthermore, the elevator does not stop at a floor at which the elevator is set so as not to stop for security reasons, it is possible to eliminate the problem of lowering the security level of the entire building.

Therefore, there is provided a destination floor control device and an elevator operation method that inhibit deterioration of building security while considering convenience of elevator users.

[0025]

Having thus described several embodiments of the present invention above, these embodiments are presented by way of example and are not intended to limit the scope of the invention. These novel embodiments can be implemented in various other forms, and various omissions, substitutions, and changes can be made without departing from the subject matter of the invention. These embodiments and modifications thereof are included in the scope and subject matter of the invention, and are included in the invention described in the claims and the equivalent

scope thereof.

[0026]

Reference Signs List

- 1 landing destination floor registration system
- 10 destination floor control device (DCS control device)
- 11 to 15 landing destination floor registration device
- 16 failure monitoring unit
- 17 call registration unit
- 18 car allocation unit
- 20 car-A control device
- 30 car-B control device
- 40 car-C control device
- 50 car-D control device

WHAT IS CLAIMED IS:

1. A destination floor control device for allocating a car based on a destination floor registered from a destination floor registration device installed at a landing of each floor, the destination floor control device comprising:

a failure monitoring unit configured to monitor whether or not the destination floor registration device has failed; and

a call registration unit configured to perform, when a failure of the destination floor registration device is detected, call registration indicating that there is occurrence of destination floor registration to a reference floor from a failure occurrence floor.

2. The destination floor control device according to claim 1, wherein the destination floor registration device is a landing destination floor registration device.

3. The destination floor control device according to claim 1 or 2, wherein

the call registration unit configured to perform, when a failure of the destination floor registration device is detected, call registration indicating that there is occurrence of destination floor registration to a reference floor from a failure occurrence floor installed with the

destination floor registration device in which the failure has occurred.

4. The destination floor control device according to any one of claims 1 to 3, wherein the failure monitoring unit periodically transmits a failure monitoring signal to a destination floor registration device, and when a response signal to the failure monitoring signal is not received, it is regarded that a failure has occurred in this destination floor registration device.

5. The destination floor control device according to any one of claims 1 or 4, wherein the call registration unit performs call registration to make every car to stop at the failure occurrence floor in an operation direction toward a reference floor via a failure occurrence floor in which a failure has occurred in a destination floor registration device.

6. An elevator operation method comprising:

monitoring whether or not a failure has occurred in a destination floor registration device installed in a landing of each floor;

performing, when a failure of the destination floor registration device is detected, call registration indicating that there is occurrence of destination floor

registration to a reference floor from a failure occurrence floor; and

stopping, in an operation direction toward a reference floor via a failure occurrence floor in which a failure has occurred in a destination floor registration device, every car at the failure occurrence floor.

7. The elevator operation method according to claim 6, wherein

the destination floor registration device is a landing destination floor registration device.

8. The elevator operation method according to claim 6 or 7, wherein

performing, when a failure of the destination floor registration device is detected, call registration indicating that there is occurrence of destination floor registration to a reference floor from a failure occurrence floor installed with a destination floor registration device in which the failure has occurred; and

stopping, in an operation direction toward a reference floor via a failure occurrence floor in which a failure has occurred in a destination floor registration device, every car at the failure occurrence floor.