

DESCRIPTION

ELEVATOR SYSTEM

FIELD

[0001] Embodiments described herein relate generally to an elevator system.

BACKGROUND

[0002] Conventionally, there have been known techniques to automatically assign an elevator that is going to a specific destination floor to a user verified through a security gate. In such techniques, the user may possibly miss the elevator automatically assigned to the user. In this case, the user needs to be reassigned an elevator that is going to the specific destination floor.

CITATION LIST

Patent Literature

[0003] Patent Literature 1: Japanese Patent No. 5381990
Patent Literature 2: Japanese Laid-open Patent
Publication No. 2012-188190

SUMMARY OF THE INVENTION

Problem to be Solved by the Invention

[0004] In the conventional elevator systems, to be reassigned an elevator, the user needs to return to the security gate or operate a dedicated destination floor registration device or the like provided in an elevator hall to reassign an elevator to the user. It is necessary to improve convenience for the user in reassignment of an elevator.

Means for Solving Problem

[0005] According to one embodiment, an elevator system is configured to manage, as a group, a plurality of elevators provided in a building comprising a security gate. The elevator system comprises a verifier and a controller. The verifier is configured to verify a user who enters the building through the security gate. The controller is configured: to assign, to the user, a first elevator that is going to a first destination floor out of the elevators based on a result of verification performed by the verifier; and to start the first elevator to the first destination floor when a specific condition relating to the first elevator is satisfied. Each of the elevators comprises a car, a registration device, and a first notification device. The registration device is provided in the car and is configured to be capable of receiving registration of a destination floor from a user in the car. The first notification device is provided in the car and is configured to be capable of making notification of information. When the first elevator is started and the registration device of a single elevator out of a plurality of second elevators other than the first elevator receives registration of the first destination floor from a user who has missed the first elevator, the controller is configured to newly assign a third elevator that is going to the first destination floor out of the second elevators to the user who has missed the first elevator and to cause the first notification device of the single elevator to make notification of a guide to the third elevator.

BRIEF DESCRIPTION OF DRAWINGS

[0006] FIG. 1 is an exemplary block diagram illustrating a schematic configuration of an elevator system according

to an embodiment.

FIG. 2 is an exemplary diagram illustrating an appearance of a security gate according to the embodiment.

FIG. 3 is an exemplary diagram illustrating equipment in a car according to the embodiment.

FIG. 4 is an exemplary diagram illustrating equipment in an elevator hall according to the embodiment.

FIG. 5 is an exemplary flowchart illustrating a processing flow performed by the elevator system according to the embodiment.

FIG. 6 is an exemplary flowchart illustrating verification according to the embodiment.

FIG. 7 is an exemplary flowchart illustrating call registration according to the embodiment.

FIG. 8 is an exemplary flowchart illustrating recall registration according to the embodiment.

FIG. 9 is an exemplary flowchart illustrating processing performed when the call registration and the recall registration conflict with each other according to the embodiment.

FIG. 10 is an exemplary flowchart illustrating call registration according to a modification.

DETAILED DESCRIPTION

[0007] <Embodiment>

A configuration of an elevator system 1 according to an embodiment will be described with reference to FIGS. 1 to 4.

[0008] FIG. 1 is an exemplary block diagram illustrating a schematic configuration of the elevator system 1 according to the embodiment. As illustrated in FIG. 1, the elevator system 1 according to the embodiment includes a controller 50 that manages an elevator group 3 including

four elevators 4 from a cage A to a cage D as a group. The controller 50 includes: four single controllers 9 that control the respective four elevators 4 as a single body; and a group management controller 2 that controls the elevator group 3 including the four elevators as a group. Although FIG. 1 illustrates an example where the elevator group 3 includes the four elevators 4, the number of elevators 4 configuring the elevator group 3 may be three or less or five or more in the embodiment.

[0009] The elevators 4 each include a car 5, a counter weight 6, a main rope 7, and a hoisting machine 8. The elevators 4 are what are called traction elevators. In the elevators 4, the car 5 that is capable of being lifted up and down in a hoistway provided in a building is connected to the counter weight 6 serving as a balancing weight with the main rope 7. The main rope 7, for example, is hung on a main sheave 8a of the hoisting machine 8, a warping sheave (not illustrated) or the like provided to an upper part of the hoistway. One end of the main rope 7 is connected to the car 5, and the other end thereof is connected to the counter weight 6. The hoisting machine 8, for example, includes an electric motor (motor) 8b that generates power. The electric motor 8b rotatably drives the main sheave 8a connected to the electric motor 8b, thereby electrically winding up the main rope 7 using functional force generated between the main sheave 8a and the main rope 7. The elevators 4 are controlled by the respective single controllers 9. With this configuration, the car 5 is lifted up and down in the hoistway, and a user can go to an elevator hall 10 on a desired destination floor by taking the car 5.

[0010] The single controllers 9 each include a microcomputer and a drive circuit. The microcomputer, for

example, includes a CPU (central processing unit), a ROM (read only memory), a RAM (random access memory), a backup RAM, and an input/output port. The CPU performs various types of arithmetic processing. The ROM stores therein in advance a certain control program and other computer programs. The RAM temporarily stores therein an arithmetic result of the CPU. The backup RAM stores therein information, such as map data prepared in advance and the specifications of the elevators 4. Components included in the microcomputer are connected to one another by an interactive common bus. The single controllers 9 are electrically connected to the components of the respective elevators 4, such as the hoisting machines 8, and collectively control operations of the respective elevators 4.

[0011] Similarly to the single controller 9, the group management controller 2 also includes a microcomputer and a drive circuit. The microcomputer, for example, includes a CPU, a ROM, a RAM, a backup RAM, and an input/output port. The CPU performs various types of arithmetic processing. The ROM stores therein in advance a certain control program and other computer programs. The RAM temporarily stores therein an arithmetic result of the CPU. The backup RAM stores therein information, such as map data prepared in advance and the specifications of the elevators 4. Components included in the microcomputer are connected to one another by an interactive common bus. The group management controller 2 transmits and receives detection signals, drive signals, control instructions, and other data to and from the single controllers 9 of the respective elevators 4, thereby managing the elevator group 3 as a group.

[0012] In the embodiment, a security gate 220 is

provided at a place leading to the elevator hall 10 for the elevators 4 (e.g., an entrance of a building provided with the elevator system 1). The security gate 220 is connected to a verifier 210 that verifies the user who enters the building through the security gate 220.

[0013] FIG. 2 is an exemplary diagram illustrating an appearance of the security gate 220 according to the embodiment. The following describes an example where the verifier 210 is incorporated in the security gate 220.

[0014] As illustrated in FIG. 2, the security gate 220 is what is called a flapper gate including a door 221 capable of opening and closing. The verifier 210 includes a reader 222 and a gate-side notification device 223. The reader 222 can read, in a contact or contactless manner, specific identification information from an ID card 19 carried by the user entering the building through the security gate 220 (person who is to use the elevator 4). The gate-side notification device 223 is an output device, such as a display and a speaker, which can notify the user passing through the security gate 220 of information.

[0015] The reader 222 is provided to be exposed from the security gate 220. With this configuration, the user can cause the reader 222 to read the identification information stored in the ID card 19 by bringing the ID card 19 carried by the user in contact with or in proximity to the reader 222 when passing through the security gate 220. The ID card 19 includes an RFID (radio frequency identification) tag or the like that stores therein the identification information.

[0016] The embodiment is not limited to a configuration that reads the identification information from the ID card 19. The embodiment may be a configuration that reads the identification information from a document provided with a

two-dimensional code, such as a QR code (registered trademark) or a bar code. Let us assume a case where an employee of a company in the building sends in advance an invitation card provided with a two-dimensional code to a user who enters the building, for example. In this case, a storage, which is not illustrated, stores therein identification information corresponding to the two-dimensional code on the invitation card and a destination floor of the user to whom the invitation card is sent in a manner associated with each other.

[0017] The identification information is an object of verification performed by the verifier 210. Based on the identification information read by the reader 222, the verifier 210 determines whether the user passing through the security gate 220 is a person given admission in advance by an employee of a company in the building or the like. If it is determined that the user passing through the security gate 220 is a person given admission in advance by an employee of a company in the building or the like, the door 221 of the security gate 220 is opened, thereby making the security gate 220 passable.

[0018] In the embodiment, a destination floor to which the user can go by taking the elevator 4 (car 5) is set in advance depending on the user (identification information). In other words, based on the result of verification performed by the verifier 210, the group management controller 2 assigns, to the verified user, one elevator 4 that is going to the destination floor set in advance depending on the identification information of the user out of the elevators 4.

[0019] More specifically, if the verifier 210 finishes verification, and it is determined that the user passing through the security gate 220 is a person given admission

in advance, the group management controller 2 performs call registration to call one elevator 4 out of the elevators 4 to the elevator hall 10 and to register the destination floor set in advance depending on the user with the one elevator 4. The group management controller 2 determines the one elevator 4 to be called to the elevator hall 10 based on the state of the cars 5 of the respective elevators 4.

[0020] The group management controller 2, for example, performs a specific evaluation on the generated call based on the state of the elevators 4 and the cars 5, such as the number of all calls (total number of users) of the elevator group 3, the number of calls to the destination floors, output from various sensors and detectors, the present position and the moving direction (ascending or descending direction) of the cars 5, calls to elevator halls and calls of cars predicted to be generated, and predicted destination floors. Based on a result of the specific evaluation, the group management controller 2 performs assignment to determine the order of arrival of the cars 5 and the like and to assign the cars 5 to the respective calls such that the cars 5 optimally respond to the respective calls while rationally moving. As described above, the group management controller 2 efficiently allocates the operations of the cars 5, thereby efficiently operating the elevator group 3 as a whole.

[0021] The group management controller 2 causes the gate-side notification device 223 of the security gate 220 to display a guide to the elevator 4 assigned in the call registration. The group management controller 2, for example, causes the gate-side notification device 223 to display identification information (e.g., the name and the number) of the cage of the elevator 4 assigned in the call

registration. Furthermore, the group management controller 2 causes the gate-side notification device 223 to display the position of the cage in the elevator hall 10 together with a map of the elevator hall 10. This can facilitate the user's understanding the way to the elevator 4 into which the user is to get (elevator 4 automatically assigned by the group management controller 2) by checking the gate-side notification device 223 when passing through the security gate 220.

[0022] When a specific condition relating to the elevator 4 is satisfied, the group management controller 2 automatically starts the elevator 4. The specific condition is that the number of times of being a target of assignment performed by the group management controller 2 (i.e., number of times of assignment) has reached a specific value, for example. The specific value corresponds to an upper limit of the number of persons allowed to get into the car 5 of the elevator 4. Every time the group management controller 2 assigns an elevator 4 to the user, the group management controller 2 increments the number of times of assignment of the elevator 4. The group management controller 2 counts the number of times of assignment separately for the elevators 4 and excludes an elevator 4 the number of times of assignment of which has reached the specific value from the target of assignment. The group management controller 2 causes the excluded elevator 4 to wait for a specific period of time and then starts it to the destination floor. The specific period of time, for example, is a time long enough for the user who passes through the security gate 220 to get into the elevator 4.

[0023] Meanwhile, the elevator 4 is automatically started as described above regardless of whether the user

gets into the elevator 4. In other words, when the number of times of assignment of the elevator 4 has reached the specific value, the group management controller 2 determines that the start condition is satisfied, thereby automatically starting the elevator 4 even if the user who passes through the security gate 220 does not get into the elevator 4 automatically assigned by the group management controller 2. In a case where the user gets lost or finishes his/her business after passing through the security gate 220, the user may possibly not get into the assigned elevator 4 in the specific period of time. In this case, the user needs to be reassigned another elevator 4 that is going to the destination floor instead of the missed elevator 4.

[0024] Conventionally, to be reassigned an elevator 4, the user needs to return to the security gate 220 or operate a dedicated destination floor registration device provided in the elevator hall 10 for the elevators 4 to reassign an elevator 4 to the user, for example. Therefore, it is desirable to improve convenience for the user in reassignment of the elevator 4.

[0025] In the embodiment, the user operates an operation panel 18 provided in the car 5 as normal equipment, thereby being reassigned an elevator 4. With this configuration, the user who has missed the elevator 4 assigned when passing through the security gate 220 can be reassigned an elevator 4 simply by getting into the car 5 of another elevator 4 that has arrived and is waiting at the elevator hall 10 and by performing a specific operation with the operation panel 18 in the car 5.

[0026] FIG. 3 is an exemplary diagram illustrating equipment in the car 5 according to the embodiment. As illustrated in FIG. 3, the car 5 is provided with the

operation panels 18 and car-side notification devices 14. The operation panel 18 is a destination floor registration device, such as buttons, that can receive registration of a destination floor from the user who gets in the car 5. The car-side notification device 14 is an output device, such as a display and a speaker, which can notify the user who gets in the car 5 of information.

[0027] If the user misses the elevator 4 automatically assigned when passing through the security gate 220, the user gets into the car 5 of a single elevator 4 that has arrived at the elevator hall 10 and operates the operation panel 18 in the car 5 to input the destination floor. Herein, in the embodiment, the elevators 4 have respective destination floors set in assignment performed by the group management controller 2. Therefore, even if the user gets into the single elevator 4 and inputs the destination floor, the single elevator 4 may possibly not stop at the input destination floor. To address this, when the operation panel 18 receives input of the destination floor from the user who has missed the elevator 4, the group management controller 2 performs recall registration for newly assigning, to the user, an elevator 4 that is going to the input destination floor out of a plurality of elevators 4 other than the elevator 4 missed by the user (including the single elevator 4 that receives input of the destination floor).

[0028] The group management controller 2 causes the car-side notification device 14 in the car 5 where the user newly assigned the elevator 4 is present to make notification of a guide to the elevator 4 newly assigned in the recall registration. If the car 5 in which the user is present is identical with the car 5 of the newly assigned elevator 4, for example, the group management controller 2

causes the car-side notification device 14 in the car 5 where the user is present to make notification of a message or the like that urges the user to remain waiting in the car 5 where he/she is present. If the car 5 in which the user is present is not identical with the car 5 of the newly assigned elevator 4, the group management controller 2 causes the car-side notification device 14 in the car 5 where the user is present to make notification of a message that urges the user to transfer to the car 5 of the newly assigned elevator 4.

[0029] The transfer guide is provided by the car-side notification device 14 displaying identification information of the cage of the elevator 4 to which the user is to transfer and the position of the cage in the elevator hall 10 together with the map of the elevator hall 10. This can facilitate the user's understanding the way to another elevator 4 into which the user is to get by checking the car-side notification device 14 in the car 5 where the user registers the destination floor.

[0030] In the embodiment, the user is notified of the guide to the elevator 4 to which the user is to transfer not only by the car-side notification device 14 in the car 5 where the user is present but also by equipment in the elevator hall 10 described below.

[0031] FIG. 4 is an exemplary diagram illustrating equipment in the elevator hall 10 according to the embodiment. As illustrated in FIG. 4, the elevator hall 10 is provided with a hall-side notification device 12 and a car position floor display device 13. The hall-side notification device 12, for example, is an indicator, such as a lantern, that enables the user to recognize the cage of the elevator 4. The car position floor display device 13 can display the floor at which the corresponding car 5

is currently present. The hall-side notification device 12 and the car position floor display device 13 are provided in plurality in a manner corresponding to the respective elevators 4, for example.

[0032] When it becomes necessary to urge the user to change cars 5 by the recall registration, the group management controller 2 displays a guide to the elevator 4 to which the user is to transfer on the car-side notification device 14 in the car 5. In addition, the group management controller 2 turns on the hall-side notification device 12 corresponding to the elevator 4 to which the user is to transfer so as to enable the user to distinguish it from the other hall-side notification devices 12. With this configuration, the user can obtain the information on the elevator 4 to which the user is to transfer while he/she is moving in the elevator hall 10 after getting off the car 5. The hall-side notification device 12 may be used not only for a guide to the cage assigned in the recall registration but also for a guide to the cage assigned in the call registration.

[0033] In the embodiment, there may be a case that the call registration and the recall registration are performed simultaneously and the same cage (elevator 4) is assigned through the two processing (the call registration and the recall registration). In this case, if the number of times of assignment of the same cage has not reach the specific value through both of the call registration and the recall registration, no particular trouble occurs. However, if the number of times of assignment of the same cage has reached the specific value through one of the call registration and the recall registration, the group management controller 2 can perform control more efficiently by determining in advance whether to

preferentially assign the same cage to a user assigned the elevator by the call registration (i.e., a user in the security gate 220) or a user assigned the elevator by the recall registration (i.e., a user who is already in the car 5).

[0034] In the embodiment, when the situation described above occurs, the group management controller 2 gives priority to the user who is already in the car 5. More specifically, when the situation described above occurs, the group management controller 2 starts the cage before the user in the security gate 220 completely passes therethrough, that is, before the user gets into the cage (same cage described above) automatically assigned by the call registration. The group management controller 2 then newly assigns, to the user in the security gate 220, another cage different from the cage (same cage described above) missed by the user and causes the gate-side notification device 223 to make notification of a guide to the cage. This enables the user who is already in the car 5 to preferentially arrive at the destination floor and enables the user in the security gate 220 to arrive at the destination floor by taking another cage different from the cage assigned first.

[0035] The following describes control performed by the elevator system 1 according to the embodiment.

[0036] FIG. 5 is an exemplary flowchart illustrating a processing flow performed by the elevator system according to the embodiment.

[0037] In the processing flow illustrated in FIG. 5, at S1, the verifier 210 performs verification on a user passing through the security gate 220. As described above, the verification is a process to determine whether to give permission to pass through the security gate 220 to the

user. Because details of the processing performed at S1 will be described later with reference to FIG. 6, explanation thereof is omitted herein.

[0038] At S2, the group management controller 2 performs call registration based on the result of verification performed at S1. As described above, the call registration is a process to assign an elevator 4 (cage) that is going to a destination floor set in advance depending on identification information of the user to the user verified by the verifier 210. Because details of the processing performed at S2 will be described later with reference to FIG. 7, explanation thereof is omitted herein.

[0039] At S3, the group management controller 2 determines whether a start condition of the elevator 4 (cage) is satisfied. The start condition of the elevator 4 is that the number of times the elevator 4 is a target of assignment in the call registration and recall registration (number of times of assignment) has reached a specific value, for example.

[0040] If it is determined that the start condition is satisfied at S3, the processing proceeds to S4. At S4, the group management controller 2 starts the cage the start condition of which is satisfied. The processing is then finished.

[0041] On the other hand, if it is determined that the start condition is not satisfied at S3, the processing is finished without performing the processing at S4.

[0042] FIG. 6 is an exemplary flowchart illustrating the verification (processing performed at S1 in FIG. 5) according to the embodiment.

[0043] In the processing flow in FIG. 6, at S11, the verifier 210 reads identification information from the ID card 19 in contact with or in proximity to the reader 222

of the security gate 220. At this time, the door 221 of the security gate 220 is closed.

[0044] At S12, based on the identification information read at S11, the verifier 210 determines whether the user of the ID card 19 corresponding to the identification information is a person given admission in advance by an employee of a company in the building or the like, that is, whether to give permission to pass through the security gate 220 to the user.

[0045] If it is determined to give permission to pass through the security gate 220 at S12, the processing proceeds to S13. At S13, the verifier 210 opens the door 221 of the security gate 220. Subsequently, the processing is returned to S2 in FIG. 5.

[0046] By contrast, if it is determined not to give permission to pass through the security gate 220 at S12, the processing proceeds to S14. At S14, the verifier 210 keeps the door 221 of the security gate 220 closed. Subsequently, the processing is returned to S2 in FIG. 5.

[0047] FIG. 7 is an exemplary flowchart illustrating the call registration (processing performed at S2 in FIG. 5) according to the embodiment.

[0048] In the processing flow in FIG. 7, at S21, the group management controller 2 assigns a single cage (elevator 4) to the user verified by the verifier 210. Specifically, based on the result of verification performed by the verifier 210, the group management controller 2 assigns an elevator 4 out of the elevators 4 to the verified user.

[0049] At S22, the group management controller 2 causes the gate-side notification device 223 of the security gate 220 to make notification of a guide to the cage assigned at S21. The group management controller 2, for example,

causes the gate-side notification device 223 to display identification information of the cage assigned at S21 and the position of the cage in the elevator hall 10 together with a map of the elevator hall 10.

[0050] At S23, the group management controller 2 registers a destination floor with the cage assigned at S21. The destination floor registered at this time is a destination floor set in advance depending on the user and at which the user can arrive by taking the elevator 4 (car 5).

[0051] At S24, the group management controller 2 increments the number of times of assignment of the cage assigned at S21. Subsequently, the processing is returned to S3 in FIG. 5.

[0052] FIG. 8 is an exemplary flowchart illustrating recall registration according to the embodiment. As described above, the recall registration is a process to newly assign another cage to the user who has missed the cage (elevator 4) assigned by the call registration (refer to FIG. 7).

[0053] In the processing flow in FIG. 8, at S31, the group management controller 2 determines whether the operation panel 18 in the car 5 receives input of a destination floor from the user. If it is determined that the operation panel 18 does not receive input of a destination floor at S31, the processing is finished. By contrast, if it is determined that the operation panel 18 receives input of a destination floor at S31, the processing proceeds to S32.

[0054] At S32, the group management controller 2 newly assigns, to the user, a cage that is going to the destination floor received at S31 out of cages other than the cage missed by the user.

[0055] At S33, the group management controller 2 determines whether the car 5 including the operation panel 18 that receives input of the destination floor at S31 (i.e., the car 5 in which the user who performs the input operation of the destination floor is present) is identical with the car 5 of the elevator 4 newly assigned at S32. In other words, the group management controller 2 determines whether the destination floor received at S31 is already registered as a stop floor of the car 5 in which the user who performs the input operation of the destination floor is present.

[0056] If the destination floor received at S31 is already registered as a stop floor at S33, the processing proceeds to S34. In this case, the user can go to the destination floor without changing cars 5. At S34, the group management controller 2 causes the car-side notification device 14 in the car 5 where the user is present to make notification that the user need not change cars 5. Subsequently, at S35, the group management controller 2 increments the number of times of assignment of the cage corresponding to the car 5 in which the user is present, and then the processing is finished.

[0057] By contrast, if the destination floor received at S31 is not registered yet as a stop floor at S33, the processing proceeds to S36. In this case, because the user cannot go to the destination floor by staying in the car 5 where the user is currently present, the user needs to change cars 5 (cages). At S36, the group management controller 2 causes the car-side notification device 14 in the car 5 where the user is currently present and the hall-side notification device 12 in the elevator hall 10 outside of the car 5 to make notification of a guide to the cage to which the user is to transfer. Subsequently, at S37, the

group management controller 2 increments the number of times of assignment of the cage corresponding to the car 5 to which the user is to transfer, and then the processing is finished.

[0058] FIG. 9 is an exemplary flowchart illustrating processing performed when the call registration (refer to FIG. 7) and the recall registration (refer to FIG. 8) conflict with each other according to the embodiment.

[0059] In the processing flow in FIG. 9, at S41, the group management controller 2 determines whether the call registration and the recall registration are performed simultaneously and whether the same cage (elevator 4) is assigned to a user who passes through the security gate 220 and a user who operates the operation panel 18 in the car 5 by the two processing.

[0060] If it is determined that the call registration and the recall registration are not performed simultaneously or that the same cage is not assigned by the two processing at S41, the processing is finished. By contrast, if it is determined that the call registration and the recall registration are performed simultaneously and that the same cage is assigned by the two processing at S41, the processing proceeds to S42.

[0061] At S42, the group management controller 2 increments the number of times of assignment. Specifically, the group management controller 2 increments the number of times of assignment of the same cage by one for the call registration and one for the recall registration, that is, by a total of two.

[0062] At S43, the group management controller 2 determines whether the number of times of assignment of the above-mentioned same cage has reached the specific value through one of the call registration and the recall

registration. If it is determined that the number of times of assignment has not reached the specific value at S43, the processing is finished. By contrast, if it is determined that the number of times of assignment has reached the specific value at S43, the processing proceeds to S44.

[0063] At S44, the group management controller 2 starts the above-mentioned same cage. More specifically, before the user in the security gate 220 completely passes therethrough, that is, before the user gets into the cage (the above-mentioned same cage) automatically assigned by the call registration, the group management controller 2 starts the cage. In this case, the user in the security gate 220 misses the cage automatically assigned by the call registration.

[0064] At S45, the group management controller 2 newly assigns, to the user in the security gate 220, another cage (elevator 4) different from the cage missed by the user. Subsequently, at S46, the group management controller 2 causes the gate-side notification device 223 of the security gate 220 to make notification of a guide to the cage newly assigned at S45.

[0065] At S47, the group management controller 2 registers a destination floor set in advance depending on the identification information of the user with the cage newly assigned at S45. Subsequently, at S48, the group management controller 2 increments the number of times of assignment of the cage newly assigned at S45, and then the processing is finished.

[0066] As described above, when a cage (elevator 4) assigned to a user in the security gate 220 is started and the operation panel 18 in a car 5 out of a plurality of cages other than the cage receives registration of a

destination floor from the user who has missed the cage, the controller 50 (group management controller 2) according to the embodiment is configured: to newly assign a cage that is going to the destination floor out of the other cages to the user; and to cause the car-side notification device 14 in the car 5 including the operation panel 18 that receives registration of the destination floor to make notification of a guide to the newly assigned cage. With this configuration, even if the user misses the cage assigned in the security gate 220, the user can be reassigned a cage that is going to the destination floor in the car 5 simply by getting into the car 5 of another cage that has arrived at the elevator hall 10 and by performing a specific operation. In addition, the user can check the guide to the newly assigned cage. As a result, convenience for the user in reassignment of the cage can be improved. Because the embodiment requires no dedicated device for reassignment of an elevator 4 in the elevator hall 10, the embodiment can improve the beauty of the elevator hall 10.

[0067] <Modification>

In the above-mentioned embodiment, the explanation has been made of an example where the number of cages (elevators 4) assigned to the user in the security gate 220 is one. In a modification, however, the number of cages assigned to the user in the security gate 220 may possibly be a plurality. The following describes the modification with reference to FIG. 10.

[0068] FIG. 10 is an exemplary flowchart illustrating call registration according to the modification. The processing flow in FIG. 10 is performed after the verification by the verifier 210 is completed and corresponds to the processing from S2 to S4 in FIG. 5 of the above-mentioned embodiment.

[0069] In the processing flow in FIG. 10, at S51, the group management controller 2 assigns a plurality of cages to the user verified by the verifier 210. In other words, at S51, the group management controller 2 selects a plurality of candidates of cages to be a cage that is carrying the user in the security gate 220 and going to a destination floor.

[0070] At S52, the group management controller 2 causes the gate-side notification device 223 of the security gate 220 to make notification of a guide to the cages assigned at S51. The notification method may be a method of notifying the user of the information on the cages at once or a method of notifying the user of the information on the cages one by one.

[0071] At S53, the group management controller 2 registers the destination floor with a cage that is to start first out of the cages assigned at S51. At S54, the group management controller 2 increments the number of times of assignment of the cage that is to start first.

[0072] At S55, the group management controller 2 determines whether the number of times of assignment of the above-mentioned cage that is to start first has reached the specific value. The processing at S55 is repeated until it is determined that the number of times of assignment has reached the specific value. If it is determined that the number of times of assignment has reached the specific value at S55, the processing proceeds to S56.

[0073] At S56, the group management controller 2 starts the above-mentioned cage that is to start first. In a case where the car 5 of the cage that is to start first is provided with a sensor, the group management controller 2 may perform control so as to start the cage after checking whether the user verified by the verifier 210 gets into the

car 5 using the sensor.

[0074] At S57, the group management controller 2 determines whether all the cages assigned at S51 start. If it is determined that all the cages do not start at S57, candidates to be a cage that is carrying the user in the security gate 220 and going to the destination floor are still left, thereby the processing is returned to S53. By contrast, if it is determined that all the cages start at S57, the user verified by the verifier 210 is assumed to arrive at the destination floor by taking any one of the cages, thereby the processing is then finished.

[0075] While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the embodiments described herein may be made without departing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

REFERENCE SIGNS LIST

[0076] 1 ELEVATOR SYSTEM
 2 GROUP MANAGEMENT CONTROLLER
 4 ELEVATOR
 5 CAR
 9 SINGLE CONTROLLER
 10 ELEVATOR HALL
 12 HALL-SIDE NOTIFICATION DEVICE (SECOND NOTIFICATION DEVICE)
 14 CAR-SIDE NOTIFICATION DEVICE (FIRST NOTIFICATION

DEVICE)

18 OPERATION PANEL (REGISTRATION DEVICE)

50 CONTROLLER

210 VERIFIER

220 SECURITY GATE

223 GATE-SIDE NOTIFICATION DEVICE (THIRD NOTIFICATION
DEVICE)

CLAIMS

1. An elevator system that manages, as a group, a plurality of elevators provided in a building comprising a security gate, the elevator system comprising:

a verifier configured to verify a user who enters the building through the security gate; and

a controller configured:

to assign, to the user, a first elevator that is going to a first destination floor out of the elevators based on a result of verification performed by the verifier; and

to start the first elevator to the first destination floor when a specific condition relating to the first elevator is satisfied, wherein each of the elevators comprises:

a car;

a registration device provided in the car, the registration device being capable of receiving registration of a destination floor from a user in the car; and

a first notification device provided in the car, the first notification device being capable of making notification of information, and

when the first elevator is started and the registration device of a single elevator out of a plurality of second elevators other than the first elevator receives registration of the first destination floor from a user who has missed the first elevator, the controller is configured to newly assign a third elevator that is going to the first destination floor out of the second elevators to the user who has missed the first elevator and to cause the first notification device of the single elevator to make notification of a guide to the third elevator.

2. The elevator system according to claim 1, further comprising:

a plurality of second notification devices provided correspondingly to the respective elevators in an elevator hall for the elevators, the second notification devices being capable of making notification of information, wherein

the controller is configured to cause the first notification device of the single elevator and a second notification device corresponding to the third elevator to make notification of a guide to the third elevator.

3. The elevator system according to claim 1 or 2, wherein the specific condition includes a case in which number of times of being a target of assignment performed by the controller has reached a specific value, and

the controller is configured to count the number of times of assignment separately for the elevators, to exclude an elevator the number of times of assignment of which has reached the specific value from the target of assignment, to cause the excluded elevator to wait for a specific period of time, and then to start the excluded elevator to the first destination floor.

4. The elevator system according to claim 3, further comprising:

a third notification device provided to the security gate, the third notification device being capable of making notification of information, wherein

when assignment of the first elevator to the verified user and assignment of the third elevator to the user who has missed the first elevator are performed simultaneously, when the first elevator and the third elevator are the same elevator, and when the number of times of assignment of the

same elevator has reached the specific value through one of the assignment of the first elevator and the assignment of the third elevator, the controller is configured to start the same elevator, to newly assign a fourth elevator that is going to the first destination floor out of the elevators other than the same elevator to the verified user, and to cause the third notification device to make notification of a guide to the fourth elevator.

5. The elevator system according to any one of claims 1 to 4, further comprising:

a third notification device provided to the security gate, the third notification device being capable of making notification of information, wherein

the controller is configured to select a plurality of candidates to be the first elevator from the elevators based on the result of verification performed by the verifier and to cause the third notification device to make notification of a guide to the selected candidates.