

ELEVATOR GROUP MANAGEMENT APPARATUS

FIELD

[0001]

Embodiments of the invention relate to an elevator group
5 management apparatus.

BACKGROUND

[0002]

Hitherto, there is a case where a landing floor is provided
10 with a destination floor registration device in a building
provided with a plurality of elevators. When a user manipulates
the destination floor in the destination floor registration
device of the landing floor, the car of the elevator which is
allocated by the manipulation is notified to the user by a display
15 or a voice. Then, the user moves to a desired destination floor
by using the notified elevator.

[0003]

In this way, when the landing floor is provided with the
destination floor registration device, it is possible to perform
20 a highly efficient group management control by allocating the car
in consideration of the destination floor at the time point in
which a landing call is registered.

[0004]

As such a configuration, a configuration is disclosed in
25 JP 2007-191263 A (hereinafter, referred to as Patent Literature
1).

[0005]

However, when the destination floor registration device is installed at a position far from the elevator landing place, the allocated car starts to move while the user manipulates the destination floor and moves to the elevator landing place, and
5 hence a problem arises in that the car may not be used.

[0006]

In this case, the user needs to return to the installation place of the destination floor registration device and to register
10 the landing call again. As a result, the user may not avoid such an inconvenience.

[0007]

The invention is made in view of the above-described circumstances, and an object thereof is to provide an elevator
15 group management apparatus that performs a group management control so that an elevator allocated by a destination floor registration device provided in a landing floor of an elevator is reliably used by a user.

[0008]

20 According to the embodiments for attaining the above-described object, an elevator group management apparatus includes the following configurations. That is, the elevator group management apparatus includes an estimation arrival time calculation unit, an output information generation unit, and an
25 operation control unit. The estimation arrival time calculation unit calculates estimation arrival time of cars of a plurality

of elevators inside a building to a predetermined floor when a landing call is registered by a landing destination floor registration device. The output information generation unit generates information for displaying multiple pieces of elevator
5 identification information and estimation arrival time in high-priority order as the elevator responding to the landing call based on the calculated estimation arrival time, and transmits the information to the landing destination floor registration device. The operation control unit controls the operation of the
10 elevator by allocating the elevator designated by the landing destination floor registration device as the elevator responding to the landing call through the transmission of the information.

BRIEF DESCRIPTION OF THE DRAWINGS

15 [0009]

FIG. 1 is an overall view illustrating the configuration of an elevator system that uses an elevator group management apparatus according to a first embodiment;

FIG. 2 is a front view illustrating a landing destination
20 floor registration device that is connected to the elevator group management apparatus according to the first embodiment;

FIG. 3 is a sequence diagram illustrating the operation of the elevator system that uses the elevator group management apparatus according to the first embodiment;

25 FIG. 4 is a front view illustrating a state where information on a high-priority elevator is displayed on the landing

destination floor registration device that is connected to the elevator group management apparatus according to the first embodiment;

FIGS. 5A to 5C are examples illustrating a positional
5 relation of a plurality of elevators with respect to the landing destination floor registration device in the elevator system that uses the elevator group management apparatus according to the first embodiment;

FIG. 6 is a sequence diagram illustrating the operation of
10 an elevator system that uses an elevator group management apparatus according to a second embodiment; and

FIGS. 7A and 7B are front views illustrating a state where information for inputting an estimation time to a landing place is displayed on a landing destination floor registration device
15 that is connected to the elevator group management apparatus according to the second embodiment.

DETAILED DESCRIPTION

[0010]

20 <<First embodiment>>

<Configuration of elevator system using elevator group management apparatus according to first embodiment>

The configuration of an elevator system that uses an elevator group management apparatus according to a first
25 embodiment of the invention will be described with reference to FIG. 1.

[0011]

An elevator system 1a according to the embodiment of the present invention includes six elevators 10-1 to 10-6 as an elevator A, an elevator B, an elevator C, an elevator D, an elevator E, and
5 an elevator F which are provided inside a building, three landing destination floor registration devices 20-1, 20-2, and 20-3 which are provided in a first floor as an entrance floor of the building, and an elevator group management apparatus 30a (in FIG. 1, the elevator group management apparatus is indicated by
10 Reference Sign 30, but is selectively distinguished as 30a or 30b if necessary) which is connected to six elevators and the landing destination floor registration devices 20-1 to 20-3. In FIG. 1, in the first floor of the building, three elevators as the elevator 10-1 as the elevator A, the elevator 10-2 as the
15 elevator B, and the elevator 10-3 as the elevator C and three elevators as the elevator 10-4 as the elevator D, the elevator 10-5 as the elevator E, and the elevator 10-6 as the elevator F are disposed so as to face one another with the landing place X interposed therebetween, and the landing destination floor
20 registration devices 20-1 to 20-3 are provided in the vicinity of the landing place X.

[0012]

As illustrated in FIG. 2, the landing destination floor registration devices 20-1 to 20-3 respectively include numerical
25 keypads 21-1 to 21-3 which are used to designate the destination floor or designate the use elevator and display units 22-1 to 22-3

which are respectively configured as monitors.

[0013]

The elevator group management apparatus 30a includes an operation status information acquisition unit 31, a manipulation
5 information acquisition unit 32a, an estimation arrival time calculation unit 33, an output information generation unit 34a, and an operation control unit 35a.

[0014]

The operation status information acquisition unit 31
10 acquires operation status information including car (or cage) information or call registration information at a predetermined time interval from the elevator 10-1 as the elevator A, the elevator 10-2 as the elevator B, the elevator 10-3 as the elevator C, the elevator 10-4 as the elevator D, the elevator 10-5 as the
15 elevator E, and the elevator 10-6 as the elevator F.

[0015]

The manipulation information acquisition unit 32a acquires information on the designated destination floor designated by the landing destination floor registration devices 20-1 to 20-3, and
20 registers the landing call based on the information. Further, the manipulation information acquisition unit 32a acquires elevator identification information designated by the corresponding landing destination floor registration device by transmitting the display information from the output information
25 generation unit 34a to be described later.

[0016]

The estimation arrival time calculation unit 33 calculates the estimation arrival time of the car to the first floor of each of the elevators 10-1 to 10-6 based on the destination floor of the landing call registered by the manipulation information acquisition unit 32a and the operation status information of each of the elevators 10-1 to 10-6 acquired by the operation status information acquisition unit 31.

[0017]

The output information generation unit 34a generates display information for displaying the multiple pieces of elevator identification information and the estimation arrival time in high-priority order as the elevators responding to the landing calls based on the calculated estimation arrival time, and transmits the display information to the landing destination floor registration device of the manipulation source for the registration of the destination floor.

[0018]

The operation control unit 35a allocates the elevator corresponding to the identification information acquired from the landing destination floor registration device in the manipulation information acquisition unit 32a as the elevator responding to the landing call, and controls the operation of the corresponding elevator.

[0019]

<Operation of elevator system using elevator group management apparatus according to first embodiment>

Next, the operation in which the user designates the destination floor as a "tenth floor" by the elevator group management apparatus 20-1 as the operation of the elevator system 1a using the elevator group management apparatus 30a according to the embodiment will be described with reference to a sequence diagram of FIG. 3. In the embodiment, the operation status information acquisition unit 31 of the elevator group management apparatus 30a acquires operation status information including car position information, call registration information or the like at a predetermined time interval from the elevator 10-1 as the elevator A, the elevator 10-2 as the elevator B, the elevator 10-3 as the elevator C, the elevator 10-4 as the elevator D, the elevator 10-5 as the elevator E, and the elevator 10-6 as the elevator F (S1).

15 [0020]

Then, when the user manipulates "10" of the numerical keypad 21-1 by the landing destination floor registration device 20-1, the "tenth floor" is designated as the destination floor (S2). The information on the "tenth floor" as the designated destination floor is transmitted to the elevator group management apparatus 30a.

[0021]

In the elevator group management apparatus 30a, information of the "tenth floor" as the destination floor transmitted from the landing destination floor registration device 20-1 is acquired by the manipulation information acquisition unit 32a,

and the landing call is registered based on the information (S3).

[0022]

Next, the estimation arrival time calculation unit 33 calculates the estimation arrival time of the car to the first
5 floor of each of the elevators 10-1 to 10-6 based on the destination floor of the landing call registered by the manipulation information acquisition unit 32a and the recent operation status information of each of the elevators 10-1 to 10-6 acquired by the operation status information acquisition unit 31 (S4).

10 [0023]

Next, the output information generation unit 34a generates display information for displaying the multiple pieces of elevator identification information and the estimation arrival time in high-priority order as the elevators responding to the
15 landing calls by the use of the calculated estimation arrival time, and transmits the display information to the landing destination floor registration device 20-1 of the manipulation source for the registration of the destination floor (S5).

[0024]

20 In the landing destination floor registration device 20-1, the display information that is transmitted from the elevator group management apparatus 30a is displayed on the display unit 22 (S6). An example in which the display information is displayed on the display unit 22 of the landing destination floor
25 registration device 20-1 is illustrated in FIG. 4. In FIG. 4, the elevator [1] which is recommended by the highest priority is

the elevator A, and the estimation arrival time (the estimation time in which the elevator arrives at the first floor) thereof is later than 5 seconds. Next, the elevator [2] which has a high priority is the elevator B and the estimated arrival time (the
5 estimation time in which the elevator arrives at the first floor) thereof is later than 20 seconds. Among the displayed information, the information of the elevator A is allocated to the key "1" of the numerical keypad 21-1, and the information of the elevator B is allocated to the key "2" of the numerical keypad.

10 [0025]

When the user recognizes the information displayed on the display unit 22 and desires to use the recommended elevator A as the elevator to be used, the key "1" is manipulated. When the key "1" is manipulated, the elevator 10-1 of the elevator A is
15 designated (S7), and the identification information of the elevator A is transmitted from the landing destination floor registration device 20-1 to the elevator group management apparatus 30a.

[0026]

20 In the elevator group management apparatus 30a, the identification information of the elevator A which is transmitted from the landing destination floor registration device 20-1 is acquired by the manipulation information acquisition unit 32a. Then, the operation control unit 35a controls the operation of
25 the elevator A by allocating the elevator 10-1 of the elevator A corresponding to the acquired identification information as the

elevator responding to the landing call in question (S8).

[0027]

According to the above-described first embodiment, when the user registers the destination floor by the landing destination
5 floor registration device, the estimation arrival time of the plurality of cars are displayed, and the elevator which is designated by the user among the elevators is allocated as the elevator that responds to the landing call. For this reason, it is possible to perform the elevator allocation process in
10 consideration of the user's intension such as the walking speed with reference to the estimation arrival time of the cars.

In this case, it is more effective as the distances from the landing destination floor registration device to the elevators are different. For example, when the elevators A to
15 C and the elevators D to E are disposed so as to face one another with the landing place interposed therebetween and the landing destination floor registration device 20 is located at a position deviated from the axis L_1 of dividing an area into two areas so that the elevators are line-symmetrical to one another as
20 illustrated in FIG. 5A, the distances to the elevators are different, but the user may designate the elevator to be used in consideration of the distances to the elevators determined in vision.

Further, even when the elevators A to D are disposed in
25 series and the landing destination floor registration device 20 is located at a position deviated from the axis L_2 of dividing

an area into two areas so that the elevators are line-symmetrical to one another as illustrated in FIG. 5B, the distances to the elevators are largely different, but the user may designate the elevator to be used in consideration of the distances to the
5 elevators.

Further, even when the arrangement plane of the elevators A and B and the arrangement plane of the elevators C and D are disposed so as to be perpendicular to each other and the landing destination floor registration device 20 is located at a position
10 deviated from the axis L_3 of dividing an area into two areas so that the elevators are line-symmetrical to one another as illustrated in FIG. 5C, the distances to the elevators are largely different, but the user may designate the elevator to be used in consideration of the distances to the elevators.

15 [0028]

In the above-described first embodiment, a case has been described in which the display information for displaying the multiple pieces of elevator identification information and the estimation arrival time is transmitted in step S5, but voice
20 information may be transmitted as long as the information may notify the elevator identification information and the estimation arrival time.

[0029]

Further, in the above-described first embodiment, the
25 output information generation unit may generate the display information so that the information of each elevator is displayed

by the color tone set for each estimation arrival time. For example, the color tone is red when the estimation arrival time is 0 second to 5 seconds, the color tone is yellow when the estimation arrival time is 5 seconds to 10 seconds, and the color tone is green when the estimation arrival time is 10 seconds or more. When the display information for the elevator information and the estimation arrival time information is generated, the user may intuitively recognize how fast the elevator arrives.

[0030]

10 Further, in the above-described first embodiment, the landing destination floor registration device may be provided with a reader which reads out private information stored in an IC card carried by the user. Then, when it is determined that the age of the user is older than a predetermined age by the private
15 information which read out from the IC card when the user designates the destination floor, the elevator which is closest to the landing destination floor registration device may be set as the elevator having the highest priority. Further, when it is determined that the user in question is a wheelchair user by
20 the private information read out from the IC card, the display information may be generated so that the elevator dedicated for the wheelchair is the elevator having the highest priority.

[0031]

Further, in the above-described first embodiment, a case
25 has been described in which the information for two elevators as the elevator A and the elevator B is included when the display

information is generated in step S5, but the information for three or more elevators may be included in high-priority order.

[0032]

<<Second embodiment>>

5 The description of <Configuration of elevator system using elevator group management apparatus according to second embodiment> will be omitted.

[0033]

10 In the embodiment, the elevator group management apparatus 30b includes an operation status information acquisition unit 31, a manipulation information acquisition unit 32b, an estimation arrival time calculation unit 33, an output information generation unit 34b, and an operation control unit 35b.

[0034]

15 The manipulation information acquisition unit 32b acquires the designation floor designated by the landing destination floor registration devices 20-1 to 20-3 and the estimation time to the landing place, and registers the landing call based on the information.

20 [0035]

 The operation control unit 35b controls the operation of the elevator by allocating the elevator in which the estimation arrival time calculated by the estimation arrival time calculation unit 33 is within the estimation time to the landing place acquired by the manipulation information acquisition unit 32b and the estimation time to the landing place is the closest

25

as the elevator responding to the landing call.

[0036]

The output information generation unit 34b generates the output information for displaying the identification information
5 of the elevator allocated as the elevator responding to the landing call by the operation control unit 35b, and transmits the output information to the landing destination floor registration device of the manipulation source for the registration of the destination floor.

10 [0037]

<Operation of elevator system using elevator group management apparatus according to second embodiment>

Next, the operation of the elevator system 1b that uses the elevator group management apparatus 30b according to the
15 embodiment will be described with reference to a sequence diagram of FIG. 6. In the embodiment, in the operation status information acquisition unit 31 of the elevator group management apparatus 30a, operation status information including car information or call registration information is acquired at a predetermined time
20 interval from the elevator 10-1 as the elevator A, the elevator 10-2 as the elevator B, the elevator 10-3 as the elevator C, the elevator 10-4 as the elevator D, the elevator 10-5 as the elevator E, and the elevator 10-6 as the elevator F (S11).

[0038]

25 Then, when the user manipulates "10" of the numerical keypad 21-1 in order to input the destination floor in the landing

destination floor registration device 20-1 and further manipulates "5" in order to input the estimation time to the landing place, the "tenth floor" is designated as the destination floor, and "5 seconds" are designated as the estimation time to
5 the landing place (S12).

[0039]

Here, the "estimation time to the landing place" is a value which is input from the user as the time from the installation position of the landing destination floor registration device
10 20-1 as the current position of the user to the elevator landing place. For that reason, the user who walks slowly may designate a slightly long time.

[0040]

The "estimation time to the landing place" may be input as
15 the following input methods (i) and (ii) other than the method of using the numerical keypad as described above.

[0041]

Input Method (i)

As illustrated in FIG. 7A, when the options of "[1] 5 seconds,
20 [2] 10 seconds, and [3] 15 seconds" are displayed on the display unit 22-1 of the landing destination floor registration device 20-1 and the user manipulates the number of the option to be designated as the time taken for the boarding by the numerical keypad 21-1, the corresponding seconds are input as the estimation
25 time to the landing place.

[0042]

Input Method (ii)

As illustrated in FIG. 7B, when the options of "[1] fast (fidgety), [2] normal, [3] slow" are displayed on the display unit 22-1 of the landing destination floor registration device 20-1 and the user manipulates the number of the options appropriately considered as the own walking speed by the numerical keypad 21-1, the corresponding seconds (for example, "fast (fidgety)" of 5 seconds, "normal" of 10 seconds, and "slow" of 15 seconds) are input as the estimation time to the landing place.

10 [0043]

Next, the information of the "tenth floor" as the destination floor and "5 seconds" as the estimation time to the landing place which is transmitted from the landing destination floor registration device 20-1 is acquired by the manipulation information acquisition unit 32b of the elevator group management apparatus 30b, and the landing call is registered based on the information (S13).

[0044]

Next, the estimation arrival time calculation unit 33 calculates the estimation arrival time of the car of each of the elevators 10-1 to 10-6 to the first floor based on the destination floor of the landing call registered by the manipulation information acquisition unit 32a and the operation status information of each of the elevators 10-1 to 10-6 acquired by the operation status information acquisition unit 31 (S14).

25 [0045]

Next, the operation control unit 35b controls the operation of the elevator in question by allocating the elevator in which the estimation arrival time calculated by the estimation arrival time calculation unit 33 is within the estimation time acquired
5 by the manipulation information acquisition unit 32b and the estimation time to the landing place is the closest as the elevator responding to the landing call (S15).

[0046]

Next, the output information generation unit 34b generates
10 the display information for displaying the elevator identification information allocated as the elevator responding to the landing call by the operation control unit 35b, and transmits the display information to the landing destination floor registration device 20-1 of the manipulation source for the
15 registration of the destination floor (S16).

[0047]

In the landing destination floor registration device 20-1, the display information which is transmitted from the elevator group management apparatus 30b is displayed on the display unit
20 22 (S17).

[0048]

When the allocated elevator identification information (for example, the "elevator A") is displayed on the display unit 22 of the landing destination floor registration device 20-1, the
25 user may recognize the elevator to get on.

[0049]

According to the above-described second embodiment, since the user designates the estimation time to the landing place when the destination floor is registered by the landing destination floor registration device, it is possible to allocate the elevator
5 responding to the landing call in consideration of the walking speed and the like of the user while referring to the operation status of the car.

[0050]

In the above-described second embodiment, a case has been
10 described in which the display information for displaying the elevator identification information allocated as the elevator responding to the landing call is transmitted in step S16, but voice information may be transmitted as long as the information may notify the elevator identification information.

15 [0051]

Further, in the above-described second embodiment, the landing destination floor registration device may be provided with a reader which reads out private information stored in an IC card carried by the user. Then, when the user designates the
20 destination floor, information on that the elevator closest to the landing destination floor registration device or the elevator matching the slow walking speed is selected as the elevator having the highest priority may be normally stored in the IC card by prioritizing the physical load of the user in relation to the
25 estimation arrival time of the user from the private information read out from the IC card, and the allocation process may be

performed based on the information.

[0052]

With such a process, it is possible to allocate an optimal elevator in consideration of the private information with respect
5 to a specific user.

[0053]

Further, in the above-described second embodiment, if the car of the elevator allocated as the elevator responding to the landing call arrives at the first floor and is opened when the
10 operation control unit 35b controls the operation of the elevator, the door may be continuously opened until the time corresponding to the estimation time to the designated landing place elapses.

[0054]

With such a process, even when the other user manipulate
15 the door close button before the time corresponding to the estimation time registered in the landing call, the door is reliably opened until the time, and hence the user who registers the landing call may reliably get on the elevator.

[0055]

20 While several embodiments of the present invention have been described, these embodiments are merely examples, and do not limit the scope of the present invention. These novel embodiments may be modified into other various forms, and various omissions and substitutions may be made within the scope not departing from the
25 spirit of the present invention. These embodiments or the modification thereof are included in the scope or the spirit of

the present invention, and are included in the scope of the present invention of claims or the equivalent thereof.

What is claimed is:

1. An elevator group management apparatus which is connected to a plurality of elevators provided in a building and a landing
5 destination floor registration device provided in a predetermined floor of the building, the elevator group management apparatus comprising:

an estimation arrival time calculation unit which calculates estimation arrival time of cars of the plurality of
10 elevators to the predetermined floor based on a destination floor and operation statuses of the plurality of elevators when a landing call is registered based on the destination floor designated by the landing destination floor registration device;

an output information generation unit which generates
15 output information for displaying multiple pieces of elevator identification information and an estimation arrival time in high-priority order as an elevator responding to the landing call based on the estimation arrival time calculated by the estimation arrival time calculation unit and transmits an output information
20 to the landing destination floor registration device; and

an operation control unit which controls an operation of the elevator by allocating the elevator designated by the landing destination floor registration device as the elevator responding to the landing call through the transmission of the output
25 information from the output information generation unit.

2. The elevator group management apparatus according to claim 1, further comprising

a reader which reads out private information stored in an IC card carried by a user, the reader being connected to the output
5 information generation unit,

wherein the output information generation unit generates an output information so that an elevator closest to the landing destination floor registration device is set as the elevator having a highest priority when it is determined that an age of
10 the user is older than a predetermined age based on private information read out from the IC card by the reader and an elevator dedicated for a wheelchair is set as the elevator having the highest priority when it is determined that the user is a wheelchair user by the private information read out from the IC
15 card.

3. The elevator group management apparatus according to claim 1 or 2,

wherein the output information generation unit generates
20 display information as output information so as to be displayed as a color tone set for each estimation arrival time.

4. An elevator group management apparatus which is connected to a plurality of elevators provided in a building and a landing
25 destination floor registration device provided in a predetermined floor of the building, the elevator group management apparatus

comprising:

an estimation arrival time calculation unit which calculates estimation arrival time of cars of the plurality of elevators to a predetermined floor based on a destination floor
5 and operation statuses of the plurality of elevators when a landing call is registered based on the destination floor and an estimation time to a landing place designated by the landing destination floor registration device;

an operation control unit which controls an operation of
10 the elevator by allocating an elevator in which the estimation arrival time calculated by the estimation arrival time calculation unit is within the estimation time to the landing place and the estimation time to the landing place is the closest as the elevator responding to the landing call; and

15 an output information generation unit which generates output information for displaying elevator identification information allocated as the elevator responding to the landing call in the operation control unit and transmits output information to the landing destination floor registration device.

20

5. The elevator group management apparatus according to claim 4,

wherein, when a car of the elevator allocated as the elevator responding to the landing call arrives at the predetermined floor
25 and a door is opened, the operation control unit continuously opens the door until a time corresponding to the estimation time

to the landing place elapses.