

TITLE OF THE INVENTION

GROUP CONTROL ELEVATOR

FIELD OF THE INVENTION

5 The present invention relates to a group control elevator adapted in consideration of physical impairment.

BACKGROUND OF THE INVENTION

 As related art concerning a group control elevator adapted
10 in consideration of physical impairment, techniques described in Japanese Unexamined Patent Application Publication (Translation of PCT Application) No. 2007-537962 and in Japanese Unexamined Patent Application Publication No. Hei (1997) 9-216776 are known.

15 A technique described in Japanese Unexamined Patent Application Publication (Translation of PCT Application) No. 2007-537962 is outlined below. When an elevator passenger operates a switch button for floor selection, situated nearby in an elevator hall, announcement of a destination floor or
20 floors is started. The passenger operates the button again upon the announcement of a desired destination floor or floors the passenger seeks to travel to. At this time, the group control elevator assigns the last announced destination floor or floors before the passenger operates the button again to any elevator
25 within a group of elevators and causes an elevator car identifier

to issue sound for identifying that elevator.

A technique described in Japanese Unexamined Patent Application Publication No. Hei9 (1997)-216776 is outlined below. When an elevator hall button for exclusive use has been
5 operated by a passenger, the passenger is informed by audio guidance that a hall call has been registered to which of two juxtaposed elevators made convenient for a visual impairment.

SUMMARY OF THE INVENTION

10 In a group control elevator of related art, as outlined above, audio guidance enables a passenger to make sure of a destination floor registered by the passenger or an elevator to which a hall call was assigned. However, a congested
situation or the like in the elevator hall would make it difficult
15 for a passenger to get in an elevator car smoothly, because no consideration is taken for getting in an elevator car arrived at an elevator hall

Thus, the present invention provides a group control elevator adapted in consideration of physical impairment, which
20 enables a passenger to get in an elevator car smoothly.

To address the above problem, a group control elevator according to the present invention includes plural elevators, a destination floor registration apparatus located in an
elevator hall floor, and a group controller that assigns any
25 of the elevators to a destination floor which is registered

by operating the destination floor registration apparatus. The group control elevator further includes a physical impairment cognition means that is provided in the elevator hall floor to cognize a passenger with physical impairment and a guidance output device that, when a passenger with physical impairment has been cognized by the physical impairment cognition means, outputs guidance to advise attention to the physical impairment in the elevator hall of an elevator assigned by the group controller.

According to a group control elevator according to the present invention, the guidance output device is provided that outputs guidance to advise attention to a physical impairment, so that the passenger can get in an elevator car smoothly.

Problems other than noted above, configurations, and advantageous effects will be clarified by the following description of embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view depicting an elevator hall for a group control elevator which is a first embodiment of the present invention;

Fig. 2 is a block diagram depicting a control system of the group control elevator of the first embodiment;

Fig. 3 is a front view of an operating panel of a destination floor registration apparatus in Fig. 1 to illustrate an example

of the operating panel structure;

Fig. 4 is a flowchart illustrating a procedure for destination floor registration, which is performed by the group control elevator depicted in Fig. 1; and

Fig. 5 is a flowchart illustrating a procedure for destination floor registration, which is performed by a group control elevator which is a second embodiment of the present invention.

10 DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

In the following, embodiments of the present invention are described based the drawings.

First Embodiment

15 Fig. 1 is a perspective view depicting an elevator hall for a group control elevator which is a first embodiment of the present invention.

A group control elevator of the present embodiment includes plural (four, according to Fig. 1) elevators (A to D), a centralized destination floor registration apparatus 2
20 which is fixedly situated within the elevator hall or near the entrance of the elevator hall in the floor of the elevator hall, a hall lantern 3 indicating the arrival of the car of an elevator in response to a hall call from upper or lower floors, and an
25 output device 4 which is disposed above a landing door of each

elevator and outputs information in audible or text form. A hall call is registered when a passenger operates an operating panel 1 of the destination floor registration apparatus 2 to register a destination floor, as will be described later.

5 In the present embodiment, two elevator doors are located in both side walls of the elevator hall space. On the surface of a wall positioned between the two adjacent elevator doors, a destination floor registration apparatus 10 is provided. An elevator passenger can register or re-register a destination
10 floor with the destination floor registration apparatus 10, if a passenger missed a chance to register a destination floor with the destination floor registration apparatus 2 or wants to change a destination floor once registered.

Fig. 2 is a block diagram depicting a control system of
15 the group control elevator of the present embodiment. The control system 20 includes destination floor registration apparatuses 2 and 10, elevator controllers 22 which control the service of each elevator (elevators A to D in Fig. 1) and the operation of equipment such as a hall lantern, and a group
20 controller 21 which creates a control command to be given to the destination floor registration apparatuses 2 and 10 and the elevator controllers 22, based on, inter alia, a data signal such as a destination floor signal from the destination floor registration apparatuses 2 and 10 and service conditions data
25 of the elevators, which are sent from the elevator controllers

22. As will be described later, when the group controller 21 cognizes a physical impairment of a passenger by a signal from the destination floor registration apparatuses 2 and 10, it activates software for control with consideration of physical impairment, creates a control command, and executes control with consideration of physical impairment by the control command.

Then, a description is provided about registering a destination floor using the destination floor registration apparatus 2. Here, the destination floor registration apparatus 2 also has a function as a cognition device which cognizes a passenger with physical impairment.

Fig. 3 is a front view of the operating panel 1 of the destination floor registration apparatus 2 in Fig. 1 to illustrate an example of the operating panel structure. The operating panel 1 of the destination floor registration apparatus 2 includes floor buttons 5 composed of plural numeric buttons (a numeric keypad according to Fig. 2) to be pressed by a passenger when registering a destination floor, a physical impairment signifying button 6 which is pressed by a passenger who is registering a destination floor to tell the elevator system about a physical impairment, a display output unit 7 which displays the number of a destination floor pressed by the passenger and displays a character and symbol corresponding to a registered destination floor and an elevator assigned to

the hall call in the floor where the destination floor registration apparatus 2 is installed, an audio guidance output unit 8 which outputs audio guidance representing the above destination floor and elevator assigned to the hall call, when
5 the physical impairment signifying button 6 has been pressed, and a visual impairment signifying button 9 for a passenger to tell the elevator system about visual impairment.

Each of these buttons is a button switch of a push button type. Of each button, in the surface area to press on, a number
10 or symbol is marked to be visible by printing or other means and Braille is added thereto.

The destination floor registration apparatus 2, when any of the floor buttons 5 has been operated, causes the display output unit 7 to display the number of a destination floor
15 specified by the floor button 5 operated and sends a signal indicating the specified destination floor to the group controller 21 (see Fig. 2). When the group controller 21 receives the signal indicating the destination floor and the destination floor has been registered, the group controller
20 21 selects an elevator that is proper for shortening the passenger's wait time, taking account of the service conditions of the elevators, and assigns the selected elevator to the registered destination floor and the hall call in the floor where the destination floor was specified. Then, the group
25 controller 21 causes the display output unit 7 of the destination

floor registration apparatus 2 to display a character and symbol corresponding to the destination floor and the elevator assigned to the hall call and causes the audio output unit 8 to provide audio guidance on the assigned elevator. This audio guidance
5 may be general audio guidance which is performed regardless of whether or not the physical impairment signifying button 6 or the visual impairment signifying button 9 has been operated. This audio guidance includes only a number or name to identify an elevator as information relevant to an elevator; for example,
10 "please use elevator C".

When the physical impairment signifying button 6 or the visual impairment signifying button 9 is operated, a notification signal is sent from the destination floor registration apparatus 2 to the group controller 21. When the
15 group controller 21 receives this notification signal and has cognized a physical impairment or a visual impairment of a passenger, the group controller 21 executes audio guidance with consideration of physical impairment or visual impairment in addition to the above-mentioned general audio guidance or
20 without executing the above-mentioned general announcement guidance.

When the physical impairment signifying button 6 or the visual impairment signifying button 9 has been operated, the group controller 21 may operate as follows: it selects an
25 elevator that surely allows the passenger to get in the elevator

car arrived and that can arrive in a shorter time at the floor where the passenger waits, also taking account of time estimated to take for the passenger who operated the button to move from the installation location of the destination floor registration
5 apparatus 2 to in front of the elevator door, and assigns the selected elevator to the registered destination floor and the hall call.

Audio guidance with consideration of physical impairment or visual impairment may be executed regardless of whether or
10 not the physical impairment signifying button 6 or the visual impairment signifying button 9 has been operated. In this case also, when the physical impairment signifying button 6 or the visual impairment signifying button 9 has been operated, the group controller 21 may select an elevator which is to be assigned
15 to the destination floor or the hall call, taking account of the passenger's moving time.

Fig. 4 is a flowchart illustrating a procedure for destination floor registration, which is performed by the group control elevator of the present embodiment. Fig. 4 illustrates
20 the procedure to be initiated when a passenger operates any of the floor buttons 5 and the physical impairment signifying button 6 of the destination floor registration apparatus 2 in order to register a destination floor.

The group controller 21 of the group control elevator
25 of the present embodiment supervises the destination floor

registration apparatus 2 when the elevators are in service and, in a supervisory operation, determines whether or not the physical impairment signifying button 6 has been pressed, according to whether or not it receives a notification signal
5 from the destination floor registration apparatus 2 (step S1). When it is determined that the physical impairment signifying button 6 has been pressed, software for control with consideration of visual impairment is activated (step S1, YES). If it is not detected that the physical impairment signifying
10 button 6 has been pressed, the group controller continues to supervise the destination floor registration apparatus 2 (step S1, NO).

Upon determining that the physical impairment signifying button 6 has been pressed (step S1, YES), the group controller
15 21 then determines whether or not any of the floor buttons 5 of the destination floor registration apparatus 2 has been pressed, according to whether or not it receives a destination floor signal from the destination floor registration apparatus 2 (step S2). When the group controller 21 determines that any
20 of the floor buttons 5 has been pressed (step S2, YES), the group controller 21 takes in a destination floor signal, selects an optimal elevator, taking account of the service conditions of the elevators and time estimated to take for a passenger to move to in front of the doors of the elevators, assigns the
25 selected elevator to the destination floor and the hall call,

and sends a notification of the assigned elevator to the destination floor registration apparatus 2 (step S3). Upon having received this notification, the destination floor registration apparatus 2 causes the display output unit 7 to display information relevant to the assigned elevator.

Furthermore, this information may be output by the audio output unit 8 by way of general audio guidance mentioned previously.

The group controller may proceed to the next step S4 without the output of general audio guidance. If it is not determined

that any of the floor buttons 5 has been pressed (step S2, NO), the group controller 21 executes step S2 again.

Then, the group controller 21 causes the audio output unit 8 to provide guidance by voice and, in particular, make an announcement to tell the passenger where to move (step S4).

It is here assumed that the group controller 21 preliminarily stores a data table which relates announcement phrases to combinations of the position of the destination floor registration apparatus 2 and the positions of the respective elevators in the elevator hall. The group controller 21

retrieves, from the data table, an announcement phrase mapped to a combination of the position information of the destination floor registration apparatus 2 operated by the passenger and the position information of the assigned elevator, and causes the audio output unit 8 to output the retrieved announcement

phrase.

This announcement phrase guides the passenger who is now at the installation location of the destination floor registration apparatus 2 as to which direction to move toward the door of the assigned elevator; for example, "please advance 5 meters to diagonally forward right and get in elevator C". The passenger can know the assigned elevator and the direction toward that elevator from this phrase, because information identifying the assigned elevator, like "elevator C", for example, is included in this phrase. If, before announcement of this phrase, the above-mentioned general audio guidance is output which includes only the information identifying the elevator as information relevant to the elevator, the passenger can make sure of the assigned elevator more reliably. The position information of the destination floor registration apparatus 2 operated by the passenger is included as information identifying the destination floor registration apparatus in a signal that is sent to the group controller when any push-button of the destination floor registration apparatus 2 has been operated.

Then, the group controller 21 actuates an elevator's output device 4 (see Fig. 1) disposed above the landing door of the assigned elevator to output guidance information to advise other passengers to pay attention to the visual impairment (step S5). It is assumed that the group controller 21 preliminarily stores a phrase of guidance information. The guidance

information phrase is audio guidance or guidance on display to advise priority to get in the elevator, such as, for example, "a passenger who is given priority to get in the elevator is coming; please open a space for that person in front of the door and wait". By voice announced from the elevator's output device 4 (see Fig. 1) disposed at the assigned elevator, the passenger can make sure of the exact position of the assigned elevator by sensing which direction from which the voice is heard.

According to guiding announcement which is output from the audio output unit 8 of the destination floor registration apparatus 2, the passenger can easily move to in front of the assigned elevator, for example, elevator C which is at 5 meters to diagonally forward right. At this time, even if other passengers wait around the landing door of the assigned elevator, they are advised to pay attention to the visual impairment by way of guiding announcement or message display provided by the elevator's output device 4; consequently, it will be easy for the passenger preferentially to get in the elevator car arrived.

Guidance information, at step S5, may be output from an audio output unit 11 (see Fig. 1) with which a destination floor registration apparatus 10 is equipped. Because a destination floor registration apparatus 10 is installed between adjacent elevators, the passenger can make sure of the exact position of the assigned elevator by sensing which direction from which

the voice is heard in the elevator hall.

As will be appreciated from the foregoing, according to the present embodiment, by control operation with consideration for a visual impairment from destination floor registration to the stage of getting in an elevator car, such passenger can make use of an elevator smoothly.

In the group control elevator of the present embodiment, when the physical impairment signifying button 6 of the destination floor registration apparatus 2 has been pressed, the software for control with consideration of visual impairment is activated. However, the visual impairment signifying button 9 should be used exclusively to tell the elevator system about the visual impairment. It may be arranged that, when the visual impairment signifying button 9 has been pressed, the software for control with consideration of visual impairment is activated. Additionally, a visual impairment cognition device may be provided as an image processing device which cognizes a visual impairment through image processing on an image of an elevator hall obtained by a camera which is installed in the elevator hall. When a passenger who uses a cane has been detected by this cognition device, the group controller 21 may cognize a visual impairment and execute control operation with consideration of visual impairment, as in the foregoing description.

Second Embodiment

Fig. 5 is a flowchart illustrating a procedure for destination floor registration, which is performed by a group control elevator which is a second embodiment of the present invention. In the present embodiment, a destination floor is registered through the use of a cellular terminal device (not depicted). It is assumed that the cellular terminal device preliminarily stores destination floor data and passenger identification data and transmits a radio signal carrying these data items. This radio signal is received by a receiver including an antenna installed in an elevator hall. From the received signal, the group controller 21 acquires each data item.

When the group controller 21 of the present embodiment has detected a signal transmitted by a cellular terminal device for destination floor registration, which an elevator passenger has in advance, and if it cognizes a visual impairment by the passenger identification data, the group controller 21 executes control operation with consideration of visual impairment. That is, the group controller 21 acquires passenger's current location information and destination floor information by the signal transmitted by the cellular terminal device and, based on these items of information acquired, provides audio guidance that guides the passenger to move toward an elevator assigned to the passenger's destination floor and the hall call. The

audio guidance is output from an audio output unit with which the cellular terminal device is equipped. Particulars of control operation in the present embodiment are as follows.

As shown in Fig. 5, the group controller 21 listens for a signal from a cellular terminal device and, in a listening operation, determines whether or not it has received a signal from a cellular terminal device (step S6). When it is determined that the controller has received a signal from a cellular terminal device, software for control with consideration of visual impairment is activated (step S6, YES). If it is not determined that the controller has received a signal from a cellular terminal device, the group controller continues to listen for a signal from a cellular terminal device (step S6, NO).

Here, in order to prevent erroneous determination at step S6, when listening for a signal from a cellular terminal device, the group controller 21 may determine whether the source that is transmitting the signal it receives, namely, the cellular terminal device is going away from or coming to the elevator hall. If the cellular terminal device is coming to the elevator hall, the group controller 21 determines that a person who has the cellular terminal device is an elevator passenger and executes processing at step S7 and subsequent steps, based on the signal from the cellular terminal device. If the cellular terminal device is going away from the elevator hall, the group

controller 21 determines that a person who has the cellular terminal device is not an elevator passenger and continues to listen for a signal from a cellular terminal device (step S6).

It can be detected whether the cellular terminal device is going away from or coming to the elevator hall by change in the strength of a signal that is transmitted by the cellular terminal device or change in the receiving conditions of plural receivers installed in the elevator hall.

It is assumed that the group controller 21 stores a data table in which destination floor information is related to signal information such as passenger identification information from a cellular terminal device. Upon determining that it has received a signal from a cellular terminal device (step S6, YES), the group controller 21 retrieves, from the data table, destination floor information mapped to the received signal information and registers the destination floor (step S7).

Furthermore, the group controller 21 assigns an optimal elevator to the registered destination floor and the hall call in a floor where the cellular terminal device, namely, the passenger is located in the same way as in the first embodiment and sends a notification of the assigned elevator to the cellular terminal device (step S8). Upon having received this notification, the cellular terminal device outputs information relevant to the assigned elevator (e.g., the elevator's number or name) from its audio output unit by way of the above-mentioned

general audio guidance. Thereby, the passenger can know the elevator that has been assigned to the destination floor he or she seeks to travel to. As is the case for the first embodiment, the group controller may proceed to the next step S9 without the execution of general audio guidance.

Then, the group controller 21 causes the audio output unit of the cellular terminal device to provide audio guidance by voice to guide the passenger to move to in front of the assigned elevator (step S9). It is here assumed that the group controller

21 preliminarily stores a data table which relates announcement phrases to combinations of the position of the cellular terminal device and the positions of the respective elevators in the elevator hall. The group controller 21 retrieves, from the data table, an announcement phrase mapped to a combination of the position information of the cellular terminal device, as indicated by the signal received from the cellular terminal device, and the position information of the assigned elevator, and causes the audio output unit with which the cellular terminal device is equipped to output the retrieved announcement phrase.

This announcement phrase guides the passenger who has the cellular terminal device as to which direction to move toward the door of the assigned elevator; for example, "please advance 5 meters to diagonally forward right and get in elevator C". Thereby, according to the guidance from the audio output unit of the cellular terminal device, the passenger can easily move

to in front of the assigned elevator.

After announcement of the above phrase, the group controller may transmit navigation information to the cellular terminal device, based on the position information of the cellular terminal device, which is included in the signal that the controller continues to receive from the cellular terminal device. This navigation information is output by voice from the audio output unit of the cellular terminal device and its phrase is prepared to direct the passenger to the assigned elevator; for example, "please advance to diagonally forward right as is, 3 meters before you arrive at elevator C". Thereby, the passenger can move to in front of the assigned elevator easily and reliably.

Plural items of announcement phrase data may be stored in a cellular terminal device beforehand and, according to an announcement command from the group controller 21, the cellular terminal device may retrieve an announcement phrase and output it from the audio output unit. When this is the case, at step 8, the group controller 21 creates an announcement command, based on the position information of the cellular terminal device and the position information of the assigned elevator, and transmits it to the cellular terminal device.

After execution of step S9, as is the case for the first embodiment, the group controller 21 actuates the elevator's output device 4 (see Fig. 1) disposed above the landing door

of the assigned elevator to output guidance information to advise other passengers to pay attention to the visual impairment by way of voice announcement or message display (step S10).

Thereby, it will be easy for the passenger who has the cellular terminal device to get in the elevator car arrived, because, even if other passengers wait around the landing door of the assigned elevator, they are advised to pay attention to the visual impairment by way of guiding announcement or message display provided by the elevator's output device 4.

As will be appreciated from the foregoing, according to the present embodiment, by control operation with consideration for a visual impairment from destination floor registration to the stage of getting in an elevator car, such passenger can make use of an elevator smoothly. In particular, upon detecting a visual impairment, the group controller automatically executes control with consideration of visual impairment; this automatic operation dispenses with button operation by the passenger. In addition, guidance is provided to direct the passenger to the assigned elevator. Thus, such passenger can make use of an elevator easily. Besides, a destination floor is registered, based on a signal including destination floor information which is transmitted by a cellular terminal device. Thus, a burden for the passenger to operate the device is reduced.

The present invention is not limited to the described embodiments and various modifications are included therein.

For example, the foregoing embodiments are those described in detail to explain the present invention clearly and the invention is not necessarily limited to those including all components described. A part of the configuration of an embodiment can be replaced by the configuration of another embodiment. To the configuration of an embodiment, the configuration of another embodiment can be added. As for a part of the configuration of each embodiment, another configuration can be added to it or it can be removed and replaced by another configuration.

For example, control operation of the group control elevator may be adapted in consideration of, not only visual impairment, but also, use of a wheelchair, use of a walking aid such as a cane, and physical impairment such as heart-lung and breathing impairments.

It may be arranged that a screen corresponding to the operating panel of the destination floor registration apparatus, as depicted in Fig. 3, is displayed on the display screen of a cellular terminal device and operated in a touch panel manner.

Claims

1. A group control elevator comprising a plurality of elevators, a destination floor registration apparatus located in an elevator hall floor, and a group controller that assigns any of the plurality of elevators to a destination floor which is registered by operating the destination floor registration apparatus,

the group control elevator further comprising:

a physical impairment cognition means that is provided in the elevator hall floor to cognize a visual impairment of a passenger;

plural guidance output devices each of which, when a visual impairment has been cognized by the physical impairment cognition means, outputs a guidance to advise attention to the visual impairment in the elevator hall of an elevator assigned by the group controller;

wherein the guidance comprises a phrase meaning that the passenger is given priority to get in the elevator;

wherein an output unit of the guidance output device is installed at each of the plurality of elevators;

wherein the guidance is output by voice announced from the output unit of the assigned elevator so that a direction in which the voice can be heard differs according to a position of the

assigned elevator;

wherein the destination floor registration apparatus has an audio output unit, and

wherein the audio output unit outputs a guidance by voice about an information identifying the assigned elevator and a direction to move toward the assigned elevator when the visual impairment is cognized by the physical impairment cognition means, and then the output unit installed in the assigned elevator outputs with voice the guidance comprising the phrase meaning that the passenger is given priority to get in the assigned elevator.

2. A group control elevator comprising a plurality of elevators, a destination floor registration apparatus located in an elevator hall floor, and a group controller that assigns any of the plurality of elevators to a destination floor which is registered by operating the destination floor registration apparatus,

the group control elevator further comprising:

a physical impairment cognition means that is provided in the elevator hall floor to cognize a visual impairment of a passenger;

plural guidance output devices each of which , when a visual impairment has been cognized by the physical impairment

cognition means, outputs a guidance to advise attention to the visual impairment in the elevator hall of an elevator assigned by the group controller;

wherein the guidance comprises a phrase meaning that the passenger is given priority to get in the elevator;

wherein an output unit of the guidance output device is installed between adjacent elevators among the plurality of elevators;

wherein the destination floor registration apparatus has an audio output unit, and

wherein the audio output unit outputs a guidance by voice about an information identifying the assigned elevator and a direction to move toward the assigned elevator when the visual impairment is cognized by the physical impairment cognition means, and then the output unit adjacent to the assigned elevator outputs with voice the guidance comprising the phrase meaning that the passenger is given priority to get in the assigned elevator.

3. The group control elevator according to claim 1 or claim 2, wherein the physical impairment cognition means is an image processing device that cognizes the visual impairment based on an image of an elevator hall obtained by a camera.

4. The group control elevator according to claim 1 or claim 2, wherein the destination floor registration apparatus is fixedly situated in the elevator hall floor.

5. The group control elevator according to claim 1 or claim 2, wherein the destination floor registration apparatus is a cellular terminal device that a passenger has.

6. The group control elevator according to claim 5,
wherein the cellular terminal device preliminarily stores destination floor data and passenger identification data and transmits the destination floor data and passenger identification data by a radio signal, and

wherein the group controller registers a destination floor according to the destination floor data it received and cognizes a passenger with visual impairment according to the passenger identification data it received.