

ELEVATOR CONTROLLER

FIELD

Embodiments described herein relate generally to an elevator controller suitable for an elevator that
5 moves up and down by vertically combining a plurality of cages.

BACKGROUND

In addition to a single-deck elevator constructed of one cage, a double-deck elevator constructed by
10 vertically combining two cages is known as an elevator. The double-deck elevator having the same installed floor area as the single-deck elevator enables more mass transportation and is mainly used as a vertical means of transportation in buildings such as super
15 high-rise buildings.

In an elevator hall where people get on or off an elevator in a building, an indicator, a so-called hall indicator that indicates the floor where the elevator is positioned at that time may be installed. Because a
20 double-deck elevator has two cages for one elevator, two hall indicators for an upper cage and a lower cage are needed per elevator, entailing extra costs for equipment.

In addition, in a semi-double operation in which
25 the operation is flexibly handled without regulating stop floors of the upper cage and the lower cage, instead of a single operation in which only one of the

upper and lower cages of a double-deck elevator is used for operation and a double operation in which allocated stop floors are fixed like, for example, the upper cage for even floors and the lower cage for odd floors, the user cannot determine which of the upper and lower cages actually responds to the floor where a job is present from the content of the indicator and confusion may be caused.

SUMMARY

Accordingly, it is an object of the present invention to provide an elevator controller capable of making an appropriate display using less display capacities in the elevator hall of each floor in operation of an elevator that moves up and down by vertically combining a plurality of cages.

An elevator controller according to one embodiment is configured to control an elevator car combining a plurality of cages in an up and down direction. The elevator controller includes a display controller that determines display content including a floor position of one of the cages, which is to be displayed in an elevator hall of each floor in a building which uses the elevator car, based on i) an operating mode which is being selected among a plurality of operating modes differing in sets of the cages and floors where the cages can stop, and ii) an operational state of the elevator car, and displays the determined display

content on a display unit in the elevator hall of each floor in the building.

With the above configuration, it is possible to make an appropriate display using less display capacities in the elevator hall of each floor in operation of an elevator that moves up and down by vertically combining a plurality of cages.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagram showing an overall configuration of an elevator controller according to an embodiment;

FIG. 2 is a diagram illustrating the configuration of a display panel provided in the elevator hall of each floor according to the embodiment;

FIG. 3 is a flow chart showing display processing content of the display panel performed by a display controller according to the embodiment;

FIGS. 4A, 4B, and 4C are diagrams showing a first transition example of the display of the display panel of each floor in accordance with the ascent/descent of a car in a semi-double operating mode according to the embodiment;

FIGS. 5A, 5B, and 5C are diagrams showing a second transition example of the display of the display panel of each floor in accordance with the ascent/descent of the car in the semi-double operating mode according to the embodiment;

FIGS. 6A, 6B, and 6C are diagrams showing a third transition example of the display of the display panel of each floor in accordance with the ascent/descent of the car in the semi-double operating mode according to the embodiment; and

FIGS. 7A, 7B, and 7C are diagrams showing a fourth transition example of the display of the display panel of each floor in accordance with the ascent/descent of the car in the semi-double operating mode according to the embodiment.

DETAILED DESCRIPTION

Hereinafter, an embodiment will be described in detail with reference to the drawings.

FIG. 1 is a diagram showing an overall configuration of an elevator controller according to an embodiment. The "elevator" here is basically a "car" and an expression of "numbered machine" is also used when there is a plurality of "cars", but in the present embodiment, a single machine is assumed to simplify the description.

In FIG. 1, reference numeral 1 is an elevator controller and reference numeral 2 is a car in a vertical double-deck structure. Here, the upper car of the car 2 is denoted as an upper cage 2U and the lower car thereof is denoted as an lower cage 2D. The car 2 travels vertically in an elevator shaft R of an n-story building.

The elevator controller 1 includes a travel controller 1A and a display controller 1B. The travel controller 1A controls the travel in a vertical direction of the car 2 and the stop thereof. The display controller 1B controls display operation units 3U, 3D inside the upper cage 2U and the lower cage 2D and display panels 4-1 to 4-n and hall buttons 5-1 to 5-n constituting a display operation unit installed in the elevator hall of each floor.

The elevator controller 1 including the travel controller 1A and the display controller 1B is constructed by a computer and an input/output mechanism thereof. In the computer, the CPU reads necessary programs and data from a program memory in which operation programs and various kinds of fixed data are stored and expands and stores the programs and data in a work memory and then sequentially executes the programs in the work memory to perform various control operations.

FIG. 2 is a diagram showing a concrete example of the display panel 4-1 (to 4-n) (hereinafter, the "display panel 4") installed together with the hall buttons 5-1 to 5-n on each floor. In FIG. 2, the display panel 4 has a floor number display unit 4F constructed of a 7-segment display of one digit to three digits (two digits in FIG. 2) in accordance with the number of floors n and a traveling direction

display unit 4D including arrows in up and down directions indicating the traveling direction of the car 2.

Each segment constituting the floor number display unit 4F and the traveling direction display unit 4D is constructed of one or a plurality of light emitting diodes (LEDs) and a diffuser on the front side and the display panel 4 is made as simple as possible as a whole and manufacturing costs thereof are low.

Also, the floor number display unit 4F and the traveling direction display unit 4D may together be constructed of a liquid crystal display panel of the segment type having a backlight or the dot matrix type.

Next, the operation of the above embodiment will be described.

First, the flow of basic control operation by the display controller 1B will be described.

FIG. 3 is a flow chart showing content of display processing of the display panels 4-1 to 4-n performed by the display controller 1B of the elevator controller 1 in parallel with operation control of the car 2 by the travel controller 1A. At the start of processing, from the travel controller 1A, information of the floor position at the present time of the upper cage 2U and the lower cage 2D of the car 2 is input to the display controller 1B (step S101).

Then, similarly from the travel controller 1A,

information of the traveling pattern and acceleration/deceleration of the car 2 at that time, that is, information whether ascending, stopped, or descending and if ascending or descending, whether accelerating/decelerating or traveling at a constant speed and particularly if decelerating, and information of the floor to stop next and the corresponding upper cage 2U or lower cage 2D are input to the display controller 1B (step S102).

10 Further, from an operating mode controller (not shown) provided separately from the travel controller 1A, information of the operating mode indicating an traveling pattern set at that time is input to the display controller 1B (step S103).

15 More specifically, from the operating mode controller, information indicating one of the "single operating mode" using one of the upper cage 2U and the lower cage 2D, for example, the lower cage 2D only, the "double operating mode" that limits arrivals of the upper cage 2U and the lower cage 2D to, for example, even floors and odd floors respectively, and the "semi-double operating mode" that allows the upper cage 2U and the lower cage 2D to stop on any floors appropriately at that time is input to the display controller 1B.

25 If a group management controller (not shown) that manages a plurality of elevators as a group exists, the

operating mode controller incorporated into the group management controller provides information of the operating mode to the display controller in the elevator controller of each numbered machine. The present embodiment is configured to control the traveling of the elevator 2 as a single machine by the elevator controller 1 and information of the operating mode is assumed to be provided to the display controller 1B from the operating mode controller provided separately from the travel controller 1A.

Incidentally, if the input frequency of the position information of the upper cage 2U and the lower cage 2D in step S101 described above is f_1 , the input frequency of information of the traveling pattern and traveling state in step S102 described above is f_2 , and the input frequency of information of the operating mode in step S103 described above is f_3 , " $f_1 > f_2 > f_3$ " applies, instead of " $f_1 = f_2 = f_3$ ".

Regarding information whose input frequency is low, content input last may be held in the display controller 1B to be invoked.

Based on each piece of information input in steps S101 to S103 described above, the display controller 1B determines whether the timing to update display content of the display panels 4-1 to 4-n has come (step S104).

The timing to update display content includes a case when the position information of the upper cage 2U

and the lower cage 2D at that time is different from
the content immediately before, a case when the
traveling pattern of the car 2 has changed, a case when
the car 2 has changed from the constant-speed traveling
5 to deceleration traveling, a case when the car 2 has
changed from the stopped state to acceleration
traveling, and a case when the operating mode is
switched.

If it is determined in step S104 described above
10 that the timing to update display content of the
display panels 4-1 to 4-n has not yet come (NO in step
S104), the display controller 1B returns to the
processing in step S101 and thereafter.

If it is determined in step S104 described above
15 that the timing to update display content of the
display panels 4-1 to 4-n has come (YES in step S104),
next the display controller 1B determines whether the
operating mode of the car 2 at that time is the
“single operating mode” using only the lower cage 2D
20 (step S105).

If it is determined that the operating mode is the
“single operating mode” (YES in step S105), the display
controller 1B causes the floor number display unit 4F
of the display panels 4-1 to 4-n on each floor to
25 display the floor position of the lower cage 2D and
also causes the traveling direction display unit 4D to
display an up direction arrow “↑” if the car 2 is

ascending and a down direction arrow "↓" if the car 2 is descending (step S106) before returning to the processing in step S101 described above and thereafter.

5 If it is determined in step S105 described above that the operating mode of the car 2 is not the "single operating mode" (NO in step S105), next the display controller 1B determines whether the operating mode of the car 2 at that time is the "double operating mode" that limits the upper cage 2U and the lower cage 2D to
10 arrivals of, for example, even floors and odd floors respectively (step S107).

If it is determined that the operating mode is the "double operating mode" (YES in step S107), the display controller 1B causes the display panels 4-1 to 4-n on
15 each floor to display the floor position of the stopping cage chamber, for example, the floor position of the lower cage 2D for an odd floor and the floor position of the upper cage 2U for an even floor and also causes the traveling direction display unit 4D to
20 display the up direction arrow "↑" if the car 2 is ascending and the down direction arrow "↓" if the car 2 is descending (step S108) before returning to the processing in step S101 described above and thereafter.

If it is determined in step S107 described above
25 that the operating mode of the car 2 is not the "double operating mode" (NO in step S107), the operating mode is the "semi-double operation mode" that causes the

upper cage 2U and the lower cage 2D to arrive at any floors appropriately at that time. The display controller 1B causes the display panel to display the floor position of the side of the cage to stop on the floor where the stop of the upper cage 2U or the lower
5 cage 2D is determined (step S109).

In this case, if the lowest floor of the building can physically use the lower cage 2D only and the highest floor can use the upper cage 2U only, the display panels 4 of these floors display the floor
10 position at that time of the relevant cage.

In addition, if the car 2 is decelerating and information of the floor to stop next is provided by the travel controller 1A, the floor number display unit 4F of the display panel 4 is caused to display the
15 floor position at that time of the upper cage 2U or the lower cage 2D allocated to the relevant floor.

That is, in the present embodiment, the floor to stop next is to be determined in the timing when
20 deceleration toward the relevant floor is started.

Then, the display controller 1B first determines whether the car 2 is ascending or not from information of the traveling pattern of the car 2 input immediately before for the display of the display panels 4 of all
25 floors for which the cage stop is not determined other than the floor for which the cage stop is determined (step S110).

If it is determined that the car 2 is ascending (YES in step S110), the display controller 1B causes the floor number display unit 4F of the display panels 4 of each floor for which the cage stop is not
5 determined other than the floor for which the cage stop is judged to be determined in step S109 immediately before to display the floor position at that time of the upper cage 2U. In addition, the display controller 1B causes the traveling direction display unit 4D of
10 the display panels 4-1 to 4-n on all floors to display the up direction arrow "↑" (step S111) before returning to the processing in step S101 described above and thereafter.

If it is determined in step S110 described above
15 that the car 2 is not ascending (NO in step S110), next the display controller 1B determines whether the car 2 is descending (step S112).

If it is determined that the car 2 is descending (YES in step S112), the display controller 1B causes
20 the display panels on the floors where the cage stop is not determined to display the floor position of the lower cage 2D and also causes the traveling direction display unit 4D of the display panels 4-1 to 4-n on all floors to display the down direction arrow "↓" (step
25 S113) before returning to the processing in step S101 described above and thereafter.

If it is determined in step S112 described above

that the car 2 is not descending (NO in step S112), the car 2 is stopped at that time. The display controller 1B causes the floor number display unit 4F of the display panel 4 of the floor where the upper cage 2U of the car 2 is stopped to display the floor position (if stopped on, for example, the 4th floor, "4") and the floor number display unit 4F of the display panel 4 of the floor where the lower cage 2D is stopped to display the floor position (if stopped on, for example, the 3rd floor, "3") (step S114) before returning to the processing in step S101 described above and thereafter.

On floors other than the floors where the upper cage 2U or the lower cage 2D of the car 2 is stopped, the floor number display unit 4F of the display panel 4 is caused to display the floor position at that time of the upper cage 2U if, for example, the next traveling pattern is traveling in the up direction and the floor position at that time of the lower cage 2D if the next traveling pattern is traveling in the down direction.

Next, the transition of the display of the display panel 4 on each floor in accordance with the concrete ascent/descent of the car 2 in semi-double operating mode is illustrated in FIGS. 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 6C, 7A, 7B, and 7C. Here, a case when in a building from the 1st floor to the 15th floor without underground floor, a projecting space (called "projected" in FIGS. 4A, 4B, and 4C) where the upper

cage 2U can withdraw is formed above the 15th floor so that the lower cage 2D of the car 2 can also arrive at the 15th floor as the highest floor. On the other hand, only the lower cage 2D can arrive at the 1st floor as the lowest floor.

FIGS. 4A, 4B, and 4C are diagrams showing a first transition example of the display of the display panel of each floor in accordance with the ascent/descent of the car in the semi-double operating mode. FIGS. 4A, 4B, and 4C illustrate the display content of the display panel 4 (4-1, to 4-15) on each floor when the car 2 during ascent temporarily stops and then ascends again.

FIG. 4A shows a state in which the upper cage 2U of the car 2 is in the floor position of approximately the 4th floor and the lower cage 2D is in the floor position of approximately the 3rd floor and the car 2 is still ascending. On the 1st floor as the lowest floor, according to the processing in step S109 described above, the floor number display unit 4F of the display panel 4-1 displays the floor position "3" of the lower cage 2D. Also according to the processing in step S111 described above, the floor number display unit 4F of the display panels 4-2 to 4-15 of the remaining 2nd to 15th floors displays the floor position "4" of the upper cage 2U. Also, the up direction arrow "↑" is displayed in the traveling

direction display unit 4D of the display panels 4-1 to 4-15 of each floor.

Then, in the process of the upper cage 2U of the car 2 arriving at the 5th floor and the lower cage 2D arriving at the 4th floor as shown in FIG. 4B, the display of the floor number display unit 4F in the display panel 4-4 on the 4th floor is changed to "4" by switching from the floor position of the upper cage 2U to the floor position of the lower cage 2D when the deceleration of the car 2 is started. When the car 2 stops, the floor number display unit 4F of the display panel 4-1 of the 1st floor and the display panel 4-4 of the 4th floor displays the floor position "4" and the floor number display unit 4F of the display panels 4-2, 4-3, 4-5 to 4-15 displays the floor position "5".

In this case, regarding the display of the floor number display unit 4F of the display panel 4-4 on the 4th floor, the processing as shown in FIG. 3 is performed when the arrival of the lower cage 2D on the 4th floor is determined and the ascending speed starts to be decelerated as the timing to update the display. Because, by this processing stroke, information indicating the arrival on the 4th floor is provided to the display controller 1B and the display controller 1B temporarily fixes the display "4" of the floor number display unit 4F of the display panel 4-4 on the 4th floor early in step S109 described above, by

controlling the display content like "3→4→4"
(apparently "3→4") while avoiding the display content
changing like "3→4→5→4", people in the elevator hall
on the 4th floor are prevented from being confused by
5 viewing the display.

Subsequently, FIG. 4C shows a state in which when
the car 2 starts to ascend, the upper cage 2U is in the
floor position of approximately the 5th floor and the
lower cage 2D is in the floor position of approximately
10 the 4th floor and the car 2 is still ascending. On the
1st floor as the lowest floor, according to the
processing of step S109 described above, the floor
number display unit 4F of the display panel 4-1
displays the floor position "4" of the lower cage 2D.
15 The floor number display unit 4F of the display panels
4-2 to 4-15 of the remaining 2nd to 15th floors
including the display panel 4-4 of the 4th floor
displays, according to the processing in step S111
described above, the floor position "5" of the upper
20 cage 2U. Also, the up direction arrow "↑" is
displayed in the traveling direction display unit 4D of
the display panels 4-1 to 4-15 of each floor.

When the car 2 starts to ascend, the display
controller 1B determines the start of acceleration as
25 the display timing and the display content is switched
as described above. Then, when the floor position of
the upper cage 2U is near the 6th floor, the state "4"

shown in FIG. 4B is switched to "5" in the floor number display unit 4F of the display panel 4-4 of the 4th floor before the floor position "6" of the upper cage 2U is displayed in the floor number display unit 4F of the display panels 4-2 to 4-15 of the 2nd floor and above.

Thus, an unnatural transition of the display content in the floor number display unit 4F of the display panel 4-4 of the 4th floor like "4→6" is avoided and a natural floor number display of "4→5→6" can be made.

FIGS. 5A, 5B, and 5C are diagrams showing a second transition example of the display of the display panel of each floor in accordance with the ascent/descent of the car in the semi-double operating mode. FIGS. 5A, 5B, and 5C illustrate the display content of the display panel 4 (4-1, to 4-15) on each floor when a cage call to a specific floor is issued successively from the display operation unit 3U in the upper cage 2U and the display operation unit 3D in the lower cage 2D while the car 2 is ascending.

FIG. 5A shows a state in which the upper cage 2U of the car 2 is in the floor position of approximately the 4th floor and the lower cage 2D is in the floor position of approximately the 3rd floor, the car 2 is still ascending, and a cage call to the 10th floor is issued by operating the display operation unit 3U

inside the upper cage 2U.

In this case, the travel controller 1A exercises travel control by allocation so as to cause the upper cage 2U of the car 2 to arrive on the 10th floor.

5 On the 1st floor as the lowest floor, according to the processing of step S109 described above, the display panel 4-1 displays the floor position "3" of the lower cage 2D. Also according to the processing in step S111 described above, the floor number display
10 unit 4F of the display panels 4-2 to 4-15 of the remaining 2nd to 15th floors displays the floor position "4" of the upper cage 2U. Also, the up direction arrow "↑" is displayed in the traveling direction display unit 4D of the display panels 4-1 to
15 4-15 of each floor.

Then, when the upper cage 2U of the car 2 passes by substantially the 5th floor and the lower cage 2D passes by substantially the 4th floor in the process of the car 2 still ascending as shown in FIG. 5B, it is
20 assumed that a cage call to the 9th floor is further issued by operating the display operation unit 3D inside the lower cage 2D.

In this case, a cage call to the 9th floor is registered by the travel controller 1A in the lower
25 cage 2D, but at this point, there is still a possibility that the upper cage 2U stops on the 9th floor and thus, the display of the floor number display

unit 4F of the display panel 4-9 of the 9th floor
remains the floor position "5" of the upper cage 2U.

FIG. 5C shows a state when, after the car 2
further ascends and the upper cage 2U of the car 2
5 passes by substantially the 7th floor and the lower
cage 2D passes by substantially the 6th floor,
deceleration to stop the upper cage 2U on the 10th
floor is started.

In step S104 described above, the processing by
10 the display controller 1B is performed after the start
of deceleration being determined as the display timing.
With the upper cage 2U of the car 2 stopped on the 10th
floor and the lower cage 2D stopped on the 9th floor by
being linked thereto and the lower cage 2D registered
15 in response to a cage call to the 9th floor, the
display of the floor number display unit 4F in the
display panel 4-9 on the 9th floor is changed to "6" by
switching from the upper cage 2U to the lower cage 2D.

In this case, by controlling the display like "5→
20 6→6→6" (apparently "5→6") while avoiding the
display content of the display of the floor number
display unit 4F of the display panel 4-9 on the 9th
floor changing like "5→6→7→6" , people in the
elevator hall on the 9th floor are prevented from being
25 confused by viewing the display.

FIGS. 6A, 6B, and 6C are diagrams showing a third
transition example of the display of the display panel

of each floor in accordance with the ascent/descent of the car in the semi-double operating mode. FIGS. 6A, 6B, and 6C illustrate the display content of the display panel 4 (4-1, to 4-15) on each floor when an
5 elevator hall call is further issued from the elevator hall of an upper floor while the car 2 is ascending after a cage call to a specific floor being issued by the display operation unit 3U in the upper cage 2U.

FIG. 6A shows a state in which the upper cage 2U
10 of the car 2 is in the floor position of approximately the 4th floor and the lower cage 2D is in the floor position of approximately the 3rd floor, the car 2 is still ascending, and a cage call to the 13th floor is issued by operating the display operation unit 3U in
15 the upper cage 2U.

In this case, the travel controller 1A exercises travel control by allocation so as to cause the upper cage 2U of the car 2 to arrive on the 13th floor.

On the 1st floor as the lowest floor, according to
20 the processing of step S109 described above, the display panel 4-1 displays the floor position "3" of the lower cage 2D. Also according to the processing in step S111 described above, the display panels 4-2 to 4-15 of the remaining 2nd to 15th floors display the
25 floor position "4" of the upper cage 2U. Also, the up direction arrow "↑" is displayed in the traveling direction display unit 4D of the display panels 4-1 to

4-15 of each floor.

Then, when the upper cage 2U of the car 2 passes by substantially the 5th floor and the lower cage 2D passes by substantially the 4th floor in the process of the car 2 still ascending as shown in FIG. 6B, it is assumed that an elevator hall call in the up direction is issued by the hall button 5-6 installed in the elevator hall of the 6th floor.

In this case, the lower cage 2D is allocated so as to arrive on the 6th floor by the travel controller 1A, but before the car 2 starts to decelerate, the display of the floor number display unit 4F of the display panel 4-6 of the 6th floor remains the floor position "5" of the upper cage 2U.

FIG. 6C shows a state when, after the car 2 further ascends and the upper cage 2U of the car 2 approaches substantially the 7th floor and the lower cage 2D approaches substantially the 6th floor, the car 2 is decelerated to stop the lower cage 2D on the 6th floor.

In step S104 described above, the processing by the display controller 1B is performed after the start of deceleration being determined as the display timing. Because the lower cage 2D is registered in response to a call in the up direction from the 6th floor, the display of the floor number display unit 4F in the display panel 4-6 on the 6th floor is changed to "6" by

switching from the upper cage 2U to the lower cage 2D.

In this case, by controlling the display like "5→
6→6→6" (apparently "5→6") while avoiding the
display content of the display of the floor number
5 display unit 4F of the display panel 4-6 on the 6th
floor changing like "5→6→7→6", people in the
elevator hall on the 6th floor are prevented from being
confused by viewing the display.

FIGS. 7A, 7B, and 7C are diagrams showing a fourth
10 transition example of the display of the display panel
of each floor in accordance with the ascent/descent of
the car in the semi-double operating mode. FIGS. 7A,
7B, and 7C illustrate the display content of the
display panel 4 (4-1, to 4-15) on each floor when a
15 call is further made in accordance with an operation of
the hall button 5 of the elevator hall of another floor
while the car 2 is ascending in accordance with an
operation of the hall button 5 of an elevator hall.

In FIG. 7A, the upper cage 2U of the car 2 is in
20 the floor position of approximately the 4th floor and
the lower cage 2D is in the floor position of
approximately the 3rd floor and the car 2 is still
ascending. It is assumed that first an elevator hall
call in the up direction is issued by the hall button
25 5-8 in the elevator hall of the 8th floor and the
travel controller 1A allocates the lower cage 2D so as
to arrive on the 8th floor. Then, it is assumed that

an elevator hall call in the up direction is also issued by the hall button 5-7 in the elevator hall of the 7th floor and the travel controller 1A allocates the upper cage 2U so as to arrive on the 7th floor.

5 On the 1st floor as the lowest floor, according to the processing of step S109 described above, the display panel 4-1 displays the floor position "3" of the lower cage 2D. Also according to the processing in step S111 described above, the display panels 4-2 to 4-10 15 of the remaining 2nd to 15th floors display the floor position "4" of the upper cage 2U. Also, the up direction arrow "↑" is displayed in the traveling direction display unit 4D of the display panels 4-1 to 4-15 of each floor.

15 Then, when the upper cage 2U of the car 2 passes by substantially the 5th floor and the lower cage 2D passes by substantially the 4th floor in the process of the car 2 still ascending as shown in FIG. 7B, it is assumed that the travel controller 1A makes allocation 20 changes.

 In this case, the travel controller 1A allocates such that the upper cage 2U arrives on the 8th floor and the lower cage 2D arrives on the 7th floor, before the car 2 starts to decelerate, the display of the 25 floor number display unit 4F of both of the display panel 4-7 on the 7th floor and the display panel 4-8 on the 8th floor remains the floor position "5" of the

upper cage 2U.

FIG. 7C shows a state when, after the car 2 further ascends and the upper cage 2U of the car 2 approaches substantially the 8th floor and the lower cage 2D approaches substantially the 7th floor, the car 2 is decelerated to stop.

In step S104 described above, the processing by the display controller 1B is performed after the start of deceleration being determined as the display timing. The upper cage 2U is registered in response to a call in the up direction from the 8th floor and the lower cage 2D is registered in response to a call in the up direction from the 7th floor. Therefore, the display of the floor number display unit 4F of the display panel 4-8 on the 8th floor changes to the floor position "8" of the upper cage 2U and the display of the floor number display unit 4F of the display panel 4-7 on the 7th floor changes to "7" by switching from the floor position of the upper cage 2U to the floor position of the lower cage 2D.

In this case, by controlling the display like "6→7→7→7" (apparently "6→7") while avoiding the display content of the display of the floor number display unit 4F of the display panel 4-7 on the 7th floor changing like "6→7→8→7", people in the elevator hall on the 7th floor are prevented from being confused by viewing the display.

With reference to FIGS. 4 to 7 shown above, a case when the car 2 travels in the up direction has been described, but as described in the control processing in FIG. 3, the present embodiment can also be applied when traveling in the down direction using the same concept.

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.

CLAIMS

1. An elevator controller configured to control an elevator car combining a plurality of cages in an up and down direction, the elevator controller comprising:

5 a display controller that determines display content including a floor position of one of the cages, which is to be displayed in an elevator hall of each floor in a building which uses the elevator car, based on i) an operating mode which is being selected among a
10 plurality of operating modes differing in sets of the cages and floors where the cages can stop, and ii) an operational state of the elevator car, and displays the determined display content on a display unit in the elevator hall of each floor in the building.

15 2. The elevator controller according to claim 1, wherein the display controller updates the display content in a timing after the floor where a cage stops next is determined based on the operational state of the elevator car.

20 3. The elevator controller according to claim 2, wherein the display controller updates the display content in a timing after the floor where a cage stops next is determined and the cage starts acceleration from a stopped state based on the operational state of
25 the elevator car.

4. The elevator controller according to claim 2, wherein the display controller updates the display

content in a timing when a cage starts deceleration toward the floor where the cage stops next based on the operational state of the elevator car.

5 5. The elevator controller according to claim 1,
wherein the display controller determines the display
content based on the operational state of the elevator
car when the operating mode is an operating mode in
which the floors where each of the cages stops are not
restricted.