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AN ELEVATOR OPERATION CONTROL APPARATUS AND A CONTROL METHOD THEREOF

The present invention relates to an elevator operation control apparatus, particularly to an operation control apparatus for changing its operation corresponding to the utilization situations.

A conventional operation control in what is called a group control of elevators for corresponding to callings from multi-floors selects and decides an elevator to be allocated to calling from a hall. After microcomputers are used to the elevator operation control, an allocation to hall calling method is used, wherein such an evaluation index as a waiting time till giving a service to calling from a hall is calculated in each elevator and an elevator to be allocated is determined on the basis of the evaluation index.

And an operation control method for allocating an elevator of the lager capacity to calling from a crowded floor is described in Japanese Patent Application Laid-Open 177267/1984, further, in Japanese Patent Application Laid-Open

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140468/1980, another method for deciding an allocation priority is disclosed, wherein a specific elevator is preferentially allocated to calling from a specific floor. In further other operation controls, an elevator exclusive to a person using a wheelchair is allocated to calling from a person on a wheel in case a button for a person using a wheelchair is provided, or an elevator allocated to VIP(Very Important Person) calling is exclusively operated, separated from a group control of elevators.

Further, in Japanese Patent Application Laid-Open 127376/1990, techniques capable of selecting " a less crowded elevator " or " an elevator of less waiting time " are disclosed in order to correspond to diverse requires.

The above-mentioned techniques described in Japanese Patent Applications Laid-Open 140468/1980 and 177267/1984, and the technique of corresponding to a wheelchair calling can not answer to diverse requires by general users since those techniques are ones for corresponding not to diverse requires by general users but for allocating a specific elevator to calling from a specific hall , and the technique of corresponding to a VIP calling can not also answer to diverse requires by general users since it responds to calling from a specific hall and the allocated elevator is controlled, separated from a group control of elevators. Further, by the technique disclosed in Japanese Patent Application Laid-Open 1277376/1990, it is not secured that even though an elevator having the state designated by a user is selected and allocated, the designated state of the elevator is kept till

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arriving at the target floor of the user since nothing is considered for state changes of the elevator after the elevator corresponding to the calling from the hall is allocated.

Although a strong person has a liking for an elevator going straight from the first floor to a roof in a high-rise building, it is sometime preferable for the weak that an elevator is slowly lifted, or stopped at several intermediate floors for persons to take the times for adapting themselves to the air pressure changes since the weak sometime feel discomfort due to air pressure changes by rapid change of height. And allocation of a specific elevator or a specific guidance is required only for users from a specific floor or a specific elevator stop. If exclusive elevators are operated in order to satisfy the above-mentioned diverse requires, there may occurs the problems that totally efficient operations of a group of elevators become impossible, or a waiting time is considerably degraded, or transport ability comes short.

The present invention has been achieved in consideration of the above-described problems, and is aimed at providing an efficient operation control of elevators by putting each elevator in possession of attributes and allocating each elevator to the calling based on the attributes.

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The above-mentioned problems are solved by controlling the elevator allocation using an apparatus for a group control of elevators, comprising an attribute content table storing plural attributes of each elevator, which are used to control the elevator allocation, an attribute storing part for determining whether attributes should be stored and what attributes the elevator should be put in possession of in storing attributes, based on the kind of calling from a hall or a floor stored in a hall calling information collecting part and a cage (is also described as an elevator hereinafter) attribute table for storing attributes of a cage on the basis of the information in the attribute storing part. The above-mentioned method is a method of controlling a cage by using attributes of each cage stored in the cage attribute table. Another control method controls the elevator allocation by providing a user recognizing device for recognizing an attribute of each user being sent to a user recognizing part for recognizing the attribute of each user which is installed in a group control unit, and being stored in a user attribute table provided in place of the cage attribute table via the attribute storing part, and by using the data stored in the user attribute table.

Since it becomes possible to put elevators in possession of attributes during a definite period and to control the elevator allocation based on the attributes by the apparatus having the above-mentioned constitution, an efficient operation control can be realized.

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That is, if a less crowded elevator is selected and allocated to a hall calling, the elevator is put in possession of the attribution " a less crowded elevator " until the user reaches the target floor and the service for the user is finished. And the elevator is so controlled that allocation of the elevator to calling is restricted whereby the user number of the elevator does not exceed the predetermined number, or that, as for an elevator for the weak, it is operated with a slow speed or stopped at intermediate floors if it is used by the weak in a high-rise building. Then, if services for all users are completed, for example, it reaches the terminal floor, the above-mentioned attributes are cancelled and receives a usual allocation.

By the present invention, the good efficiency of controlling the whole of an elevator group can be also secured by making the elevator having a specific attribute correspond to a usual allocation in accordance with requires from users within the bounds not interfering the attribute.

In the drawings:

Fig.1 shows the whole constitution of the present invention.

Fig.2 shows a flow chart of the outline operations in an example of the present invention.

Fig.3(a) shows an example of the operations of " precedence of time " in which the floors for the precedence of time are prescribed.

Fig.3(b) shows an example of the operations of "

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precedence of time " in which a calling from another floor satisfies the conditions of the attribute.

Fig.3(c) shows an example of the operations of " precedence of time " in which a calling from another floor does not satisfy the conditions of the attribute.

Fig.3(d) shows an example of the operations of " precedence of time " in which the attribute is released by the user's getting off at the target floor.

Fig.4 shows the whole constitution of one of other embodiments by the present invention.

Fig.5 is a flow chart showing the outline operations in one of other embodiments by the present invention.

Fig.6 shows the whole constitution of one of other embodiments by the present invention.

Fig.7(a) is an explanation figure showing an example operations of a specific guidance at a specific floor.

Fig.7(b) is an explanation figure showing an example operations exclusive to specific companies.

Fig.7(c) is an explanation figure showing an example operations as shown in Fig.3(c), in which another elevator is allocated.

Fig.7(d) is an explanation figure showing an example operations of " precedence of crowdedness ".

Fig.8 shows an example of an attribute table.

Fig.9 shows an example of an attribute content table.

Fig.10 explains the connection operations between elevators.

Fig.11(a) shows an example of providing a button for the

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weak together with a usual calling button at an elevator stop.

Fig.11(b) shows an example of providing the button for the weak indicated by a picture.

Fig.11(c) shows an example of an operation diagram for the usual operations.

Fig.11(d) shows an example of an operation diagram for the operations in the case of calling from the button for the weak.

Fig.11(e) shows an example of an operation diagram for the operations of stopping at intermediate floors.

Fig.12(a) shows an example of providing a button for observations together with a usual calling button at an elevator stop.

Fig.12(b) shows an example of providing a button for observations indicated by a picture.

Fig.12(c) shows an example of an operation diagram indicating difference of the usual operations and the operations for observations.

Fig.12(d) shows an example of an operation pattern for the operations for tenants and for observations in the same building.

Fig.12(e) shows an example of an operation diagram for the operation pattern shown by Fig.12(d).

Fig.13 shows another example of the attribute table.

Fig.14 shows an example of the control for displaying guidance.

Fig.15 shows examples of the guidance display in a cage.

Fig.16 shows examples of the guidance display at an

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elevator stop.

Fig.17 is an example of a user table of cages.

Hereinafter, details of the present is explained based on embodiments referring to drawings

Figure 1 shows the constitution of an elevator operation control apparatus by the present invention.

The signals from hall calling buttons 101 - 10n are transmitted to a hall calling information collecting part 31 in a group control unit 3 via a transmission way 2. Although the hall calling buttons are the buttons designating the upper and the lower direction in the figure, the buttons calling selectively an elevator in accordance with a preference of a user can be also arranged. The signals from cage calling buttons 41 - 44 are transmitted as cage information together with the weight data of each cage to cage control units 61 - 64 via cage transmission ways 51 - 54. The cage information transmitted to the cage control units 61 -64 is sent together with the information of each cage control unit to a cage calling information collecting part 32 in the group control unit 3. An attribute storing part 33 attaches attributes to some elevators during specific periods and stores the attributes in a cage attributes table 35 by referring to the information of the hall calling information collecting part 31 and the cage calling information collecting part 32, and referring to an attribute content table 34. And the attribute storing part 33 checks for whether an elevator already having

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the same attribute in the cage attribute table 35 as the newly designated attribute exists. An allocation control part 36 decides an elevator to be allocated to the generated hall calling based on the attributes in the cage attribute table 35 and the information collected in the hall calling information collecting part 31, and transmits the allocation results to the cage control units 61 - 64 via a control unit transmission way 7. The cage control units 61 - 64 drives motors 81 - 84 based on the allocation results and gives services to the hall calling by driving hoists 91 - 94 for moving elevators 111 - 114. And counter-weights 121 - 124 are hung at the terminal of a rope for driving each elevator. In the figure, display devices 131 - 13n are installed in each hall which, for example, display what attribute the coming elevator has.

By keeping the attributes of each elevator in the cage attribute table till completing the services as mentioned above, it is possible to control the elevator operations in accordance with user requirements and further to prevent the operation efficiency decrease of the whole elevator system to the minimum. Though not shown in Fig.1, a hall calling button of the prescribed hall, a specific cage calling button or one of an input terminal and an information receiving device for recognizing voices or pictures by a wireless transmitter or an infrared transmitter is installed in an elevator hall of each floor. The data for recognizing the specific attribute occurrence are sent to the attribute storing part 33, which are made by the user recognizing part 310 in the group control

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unit 3 via a user recognizing device 15 for recognizing a user by receiving the information input from one of the above-mentioned input devices. The attribute storing part 3 searches the corresponding attribute in the attribute content table 34. The search results including the attribute of a user are stored in a user table of cages, not shown in the figure, provided in place of the cage attribute table. Then, if a hall calling is generated, it is determined by the allocation control part 36 whether the user requires a specific attribute by referring to the user table of cages on determining an elevator to be allocated to the hall calling. If the user has a specific attribute, it is judged whether the conditions of the attribute is satisfied in case the elevator having the same attribute as the one to the user requiring the hall calling is allocated (it can be also considered that an attribute is added to the elevator when the user having an attribute gets on the elevator.). If it is proved by the judgements that the conditions of the attribute can not be satisfied, the elevator is excluded and another elevator is allocated for the allocation. On the other hand, if the conditions are satisfied, the elevator is allocated to the calling. In the allocation, it can be considered that weighting marks are given to the elevator having the same attribute as the one to the user so as to be easily selected. When the elevator arrives at the terminal floor or the user having the attribute in the user table of cages arrives at the target floor, the registration of the user is cleared together with the corresponding attribute in the user table of cages

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(the attribute of the cage is cleared if the cage attribute is added to the elevator.).

Figure 2 is a flow chart showing the outline of operations in the embodiment by the present invention.

Firstly, at the step 202, the attribute storing part 33 searches the corresponding attribute in the attribute content table 34 if it is detected at the step 201 that a hall calling button of a floor registered in advance or a specific cage calling button is pushed. Nextly, at the step 203, the attribute is written in the corresponding part of the cage attribute table as to the elevator allocated to the hall calling from a hall calling button, or the attribute is written in the corresponding part of the cage attribute table as to the elevator allocated to the cage calling. Then, at the step 205, if the same attribute as the one to be designated is stored in the cage attribute table 35 on checking for the cage attribute table 35 in order to allocate an elevator to the hall calling at the step 204, the allocation control part 35 examines whether the conditions of the attribute is satisfied even though the elevator having the same attribute is allocated to the hall calling. And if the conditions of the attribute is not satisfied when the elevator having the same attribute is allocated, an elevator to be allocated is determined by excluding the elevator having the same attribute at the step 206, otherwise, an elevator to be allocated is determined in all elevators at the step 207. And it is also possible to increase the possibility that the elevator having the same attribute is allocated, by weighting an evaluation

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index of the elevator having the same attribute with large points. Then, if the user requiring the attribute gets off the elevator by such a reason as arrival at the terminal floor of the elevator at the step 208, the attribute of the elevator is cleared at the step 209.

Figure 3 explains operations of each elevator by the present invention.

It is assumed that the service of preceding the time till arriving at the target floor is designated to callings from the seventh and eighth floors in Figs.3(a)-3(d). If a hall calling is generated from the seventh floor as shown in Fig.3(a), the attribute " preceding time till arriving at target " is added to the corresponding part of the cage attribute table 35 to the allocated elevator after an elevator is allocated for giving the service to the hall calling. In the case, the cage A giving the minimum waiting time is allocated as the service elevator. In the attribute of " precedence of time ", table contents such as " the destination floor is the third floor." , " the condition is the arriving time of less than 20 sec." , etc. are given under the conditions that the time till arriving at the destination floor of the cage calling after arrival at the floor from which the hall calling is generated is less than the predetermined time.

In Fig.3(b), in case a service elevator is determined to the hall calling generated from the fifth floor, it is examined whether the conditions of the attribute " precedence of time " to the cage A can satisfy the condition that the

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operation time from the seventh to the third floor is less than 20 s. In the case, since the arrival time condition is satisfied even if the elevator is stopping for 10 s at the fifth floor, the elevator giving the shortest time till arriving at the fifth floor is selected in all elevators. In the case shown by Fig.3(b), the cage A is selected.

Nextly, it is assumed that the hall calling is generated from the fourth floor as shown in Fig.3(c). Since the condition of the attribute " precedence of time " to the cage A can not be satisfied if the cage A is allocated to the hall calling though the cage A can arrive at the fourth floor with the minimum waiting time, the cage A is excluded from the allocation and the service elevator is selected in the rest cages. In the case shown by Fig.3(c), the cage B is selected.

As shown in Fig.3(d), the cage attribute table to the cage A is cleared and the usual allocation is done for the cage A after the cage A arrives at the third floor and the user requiring the attribute at the seventh floor gets off at the floor.

In the above-explained case, the destination of a user is determined and the elevator is controlled assuming that the cage calling button of the third floor is pushed by the user right after the user gets on the elevator at the seventh elevator. However, if the cage calling button is not pushed by the user in spite of getting on the elevator, the already stored attributes destined in another cage calling is kept till arriving at the furthest or the terminal floor and cleared after arrival at the furthest or the terminal floor.

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It may be effective that a destination buttons are provided at each elevator stop.

As attributes to be added to each elevator, a through operation, one company exclusive operation in a tenant building, etc. are adapted. By the present embodiment, diverse kinds of operations are possible without providing an exclusive elevator.

Figure 4 shows an example that the usual operation is allocated to a cage calling after clearing the attribute.

The constitution in the figure is different from the one in Fig.1 in the point that a situation predicting part 37 is provided in it. The situation predicting part 37 predicts the situation of an elevator at the coming position based on the information of the hall calling information collection part 31 and the cage information collection part 32, and the allocation results of the allocation control part 36. When a hall calling is generated, assuming that an elevator having an attribute is allocated, the situation predicting part 37 predicts the situation of the allocated elevator at the time the elevator arrives at the floor from which the hall calling is generated and the allocation control part 36 determines a service elevator to be allocated including the elevator if the attribute of the elevator is cleared till the arriving time.

Figure 5 is a flow chart of the process in the embodiment of executing the usual allocation after clearing the attribution.

Firstly, it is examined at the step 205 whether the conditions of the attribute is satisfied in case an elevator

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having an attribute is allocated to the calling, and if the conditions is not satisfied, the situation predicting part 37 predicts the situation of the elevator at the time the elevator arrives at the floor from which the hall calling is generated, at the step 501. On the basis of the predicted results, it is examined at the step 502 whether the attribute of the elevator is cleared at the arrival time or another attribute exist, and then if an elevator having an attribute dose not exist, an elevator to be allocated is selected in all elevators at the step 207, otherwise, a service elevator is selected in the rest elevators excluding the elevators having an attribute at the step 206.

Figure 6 is the embodiment of executing elevator controls different in each floor.

The constitution in the figure is different from the one in Fig.5 in the point that an attribute storing unit 14 is provided and a floor attribute table 38 is provided in the attribute content table 34. The attributes of each floor are stored in the attribute content table 34, and the attribute storing part 33 stores the attribute added for the floor from which a hall calling is generated into the cage attribute table 35 in the attribute content table 34 of the elevator allocated to the hall calling. Although the attributes of each floor are stored in the attribute content table 34 in the embodiment in advance, it is also possible to store or change them by the attribute storing unit 14. The attribute storing unit 14 is capable of storing or changing other attributes besides the attributes of each floor.

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Figures 7(a)-7(d) are pictures explaining operations in case of executing a different control in each floor. The figure is relating to services for a user who is on an elevator, and an example content of the services is explained in the following.

Figure 7(a) shows an example of giving a special guidance to a user going on an elevator from a special floor. Assuming that the special service is given at the third floor, the display exclusive to users from the third floor is given in the cage A allocated to the third floor calling. In case such a service as mentioned above is prepared, displays corresponding to requires by users can be given at each floor.

Figure 7(b) shows an example of avoiding allocation of the same elevator to the hall callings from the different floors in each of which a company different from another company exists for preventing persons of different companies from taking the same elevator in case plural companies exist in a tenant building. In this case, the eighth, seventh and fourth floor are exclusive to a company A. When the cage A stops at the seventh floor responding to the hall calling from the seventh floor, the cage A is set as the elevator exclusive to the company A and is not allocated to the hall calling from the fifth floor where a company B exist. Then, the cage B is allocated to the hall calling from the fifth floor. In case such a service as mentioned above is prepared, users of different companies do not take the same elevator together and users of each company can use the elevator as if the exclusive elevator to their company.

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Figure 7(c) shows an example of the above-mentioned control preceding the time till arriving at the target floor and allocating an elevator capable of arriving at the target floor within the preset time. The eighth and seventh floor are the floors of preceding the time till arriving at the target floor and the users calling an elevator from the floors are given such a service that the users arrive at the target floor within 20 s. In the figure, it is assumed that the target floor is the third floor and the cage A is allocated to the hall callings from the seventh and fifth floor. At the time the cage A is allocated to the hall calling from the seventh floor, the time till arriving at the third floor is 16 s. Then, if the cage A is also allocated to the hall calling from the fourth floor, the time till arriving at the fourth floor is 26 s exceeding the standard time 20 s assuming the 10 s of stopping time at each floor. Therefore, an elevator except the cage A is allocated to the hall calling from the fourth floor. By the above-mentioned control, the arriving time can be adjusted within the predetermined value.

Figure 7(d) shows an example of controlling the crowded degree of a cage below the preset number. Now, it is assumed that the eighth and seventh floor is designated as the service floor of preceding the crowdedness. Since the user number of the cage A exceeds the preset number at the time the cage A gives a service at the seventh floor if the cage A is allocated to the hall calling from the seventh floor, another cage except the cage A is allocated to the hall calling after the time. In the case shown by Fig.7(d), the cage B is

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allocated to the hall calling from the fifth floor.

Figure 8 shows an example of the cage attribute table. The attribute, the floor for starting the service of the attribute, the floor for ending the service of the attribute and the conditions of the attribute are described in the table.

Figure 9 is an example of the attribute content table. There are described specific events, for example, generation of a hall calling from a special floor, a special calling, attributes to be given to an elevator corresponding to every outputs from a weight sensor and other sensors in an elevator, the conditions of the attributes and the attribute releasing conditions. And such execution conditions as control execution during a specific time zone, prohibition of control operations during a crowded time zone and so on can be added to the table.

Figure 10 shows an example of a smooth connection between a shuttle elevator and a local elevator. A method that one elevator waits another elevator is conventionally adopted for the smooth connection between a shuttle elevator and a local elevator. However, the efficiency of the waiting elevator is degraded by the method. Thereupon, when the shuttle elevator arrival time at the connection floor is determined, the attribute for designating the range of arriving time is given to a local elevator and the local elevator capable of arriving at the connection floor within the range is allocated and controlled so as not to exceed the range in accordance with the given attribute. In the figure, when the cage C of a local

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elevator is allocated as a connection elevator for a shuttle elevator A, the range of arriving time is designated to the cage C which is controlled so as to arrive within the range. By the embodiment, it is possible to realize a smooth connection while preventing the efficiency of a local elevator from decreasing.

Figures 11(a)-11(e) are drawings explaining the embodiments of adopting buttons for the weak. The role of elevator equipment is to speedily transfer users to their target floors and it is generally desired that an elevator arrives at the target floor without stopping. On the other hand, since the weak sometimes feel uncomfortable due to air pressure changes induced by rapid elevation if an elevator goes straight to the target floor in a high-rise building, some weak persons prefer to go up to the target floor by stopping at several intermediate floors. For such weak persons, the users' adaptation to the air pressure changes is made easy by decreasing the elevation speed when one of the buttons for the weak provided at elevator stops or in elevators is pushed, stopping at intermediate floors corresponding to hall calling as much as possible and adopting step-shaped patterns of acceleration and deceleration.

Figure 11(a) shows an example of providing " a slowly going button " for the weak together with a usual hall calling button. Figure 11(b) shows an example of indicating a button for the weak by a picture. Figure 11(c) shows a usual operation diagram of an elevator wherein the horizontal axis means time and the vertical axis means the number of floors.

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Figure 11(d) shows an example of the decreased speed operations when the button for the weak is pushed. Although an elevator arrives at the 80-th floor by about 40 s in usual operations, it takes about 80 s to go up to the 80-th floor by executing the decreased speed operations if the button for the weak is pushed. Figure 11(e) shows an example of operation control for stopping at intermediate floors. In the example, the elevator goes up to the 80-th floor by 85 s as stopping four times at intermediate floors. Effects of the air pressure changes are described in the above explanations. Then, since some sick persons feel uncomfortable to changes of acceleration, it is effective to sick persons to prepare the attribute of small acceleration and deceleration operations. By the embodiment, it is possible to reduce the uncomfortable feelings of the weak to the changes of air pressure or accelerations while keeping the facilities for healthy persons.

Figures 12(a)-12(e) are drawings explaining the embodiment of operations for observations using an observation elevator. In the observation elevator, a button for usual users and a button for users wishing to enjoy observations are provided together and the speed of the elevator is decreased so as to enjoy observations if the button for observations is pushed. Figure 12(a) is an example of providing the calling buttons for usual operations and observation operations together. Figure 12(b) shows an example of indicating the button for observations by a picture. Figure 12(c) is an operation diagram indicating the difference between the usual

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operations and the observation operations. The operation speed of an elevator is decreased so as to enjoy observations enough corresponding to the calling for observations as shown by the figure. Figure 12(d) shows an example of providing an elevator for the both of observation operations (done for the floors upper from the seventh floor) and usual operations in case tenants use parts of a building for offices (the floors lower from the sixth floor are used for offices). In the case, the elevator is so controlled that the usual operations are executed until completion of services to the callings from the floors used for offices even if the button for observations is pushed and the observation operations are done after passing the floors of offices. Thereby, the observation operations can be executed without reducing the facilities for the office persons. To the elevator, the cage attributes of the observation operations and the usual operations till arriving at the sixth floor are added. Figure 12(e) is an operation diagram for the example shown by Fig.12(d). As shown by the figure, to the calling for observations, the elevator quickly goes up to the target floor by the usual operations till arriving at the sixth floor and its speed is decreased for the observation operations after exceeding the sixth floor so as to enjoy observations by taking enough time. The above-mentioned embodiment can satisfy the both of the office persons wanting to arrive at the target floor as soon as possible and the users hoping to enjoy the observations.

Figure 13 is an example of the attribute table wherein marks are set as one of items of the attribute table. It is

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[illegible] also in the previous embodiment that one elevator can have plural attributes based on the requires by users from the different floors and further also based on the requires from the same floor as far as some attributes. However, the attribute of the combined conditions such as " reducing the number of stopping, or making an elevator less crowded " is sometimes required. In such a case, the item of marks is provided in the cage attribute table 35 and some marks are added to (or subtracted from) the marks given to the elevator in every time the elevator having the attributes is allocated. Then, if the merits becomes more than (or less than) the predetermined points, the corresponding elevator is excluded for allocation. By this embodiment, the attribute of the combined conditions can be treated.

Figure 14 is an example constitution of the embodiment wherein display devices, voice guidance devices, etc. are used. A display control part 39 offers guidance displays corresponding to the situations based on the attributes of the cage attribute table 34 by guidance display devices 151-15n at each floor stop and guidance display devices 161-16n in each cage.

Figure 15 shows an example display by the above-mentioned display device used in a cage. An example guidance of operations for the weak is shown in Fig.15(a), an example of transfer guidance in operations for the weak in Fig.15(b), an example display for one company exclusive operation in Fig.15(c) and example guidance for observation operations in Figs. 15(d) and 15(e). By offering guidance of operation

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situations to users as explained above, the facilities for users is improved.

Figure 16 shows an example display by the display device provided at a floor stop. Example guidance of operations for the weak are shown in Figs.16(a) and 16(b), an example guidance for one company exclusive operation in Fig.16(c) and example guidance for observation operations in Figs. 16(d) and 16(e). By offering guidance of operation situations to users useful for elevator selection by a user, as explained above, the user can select an elevator preferred by the user. Furthermore, by providing the cage attribute table, the elevator in accordance with the preference of a user can be allocated without reducing the facilities for users.

Now, Fig.17 shows an example of the user table of cages previously explained, which is introduced in place of the cage attribute table 35 in Fig.1. As shown in Fig.17, services corresponding to users' requirements are offered by storing such items as the attribute, the starting floor, the ending floor, etc. to each elevator and each user in the user table and by allocating an elevator referring to the table.

By the present invention, it is possible to operate an elevator corresponding to the attributes of the elevator till the attributes required by a user is accomplished, and to offer the different operations and guidance to different users by the same elevator. Therefore, the different controls to each floor, the operations for suppressing the uncomfortable feelings due to the air pressure changes by delaying the arrival time at the target floor and the different guidance

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to each user can be offered by using the same elevator without reducing the facilities for users.

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CLAIMS

1. A method of controlling operations of a plurality of elevators, comprising the steps of:

giving specific attributes to each elevator during a definite period corresponding to prescribed callings for said elevator; and

controlling operations of each of said elevators based on said attributes given to said elevator.

2. A method of controlling operations of a plurality of elevators according to claim 1, wherein said prescribed callings are a calling signal from a prescribed floor, and signals from calling buttons at specific elevator stops and in specific elevators.

3. A method of controlling operations of a plurality of elevators according to claim 1, wherein said attributes include a running time, a crowdedness and stopping times.

4. A method of controlling operations of a plurality of elevators according to claim 1, wherein said attributes include an operation for the weak, an operation for observations and an operation exclusive to one company.

5. A method of controlling operations of a plurality of elevators according to claim 1, wherein said controlling

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operations of said plurality of elevators includes controls of contents displayed at elevator stops and in said elevators and display timing of said contents.

6. A method of controlling operations of a plurality of elevators, comprising the step of:

controlling operations of an elevator having an attribute to be released in response to occurrence of a prescribed event, according to said described attribute.

7. A method of controlling operations of a plurality of elevators according to claim 6, wherein said prescribed callings are a calling signal from a prescribed floor, and signals from calling buttons at specific elevator stops and in specific elevators.

8. A method of controlling operations of a plurality of elevators according to claim 6, wherein said attributes include a running time, a crowdedness and stopping times.

9. A method of controlling operations of a plurality of elevators according to claim 6, wherein said attributes include an operation for the weak, an operation for observations and an operation exclusive to one company.

10. A method of controlling operations of a plurality of elevators according to claim 6, wherein said controlling operations of said plurality of elevators includes controls

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of contents displayed at elevator stops and in said elevators and display timing of said contents.

11. A method of controlling operations of a plurality of elevators, comprising the steps of;

recognizing attributes to each user;

storing said attributes to each of said users; and

selecting and deciding an elevator to be allocated based on said attributes.

12. An apparatus for controlling operations of a plurality of elevators, comprising:

an information collecting part for collecting signals from devices storing elevator callings at each elevator stop and elevator calling devices;

an attribute storing part for selecting and deciding attributes to be stored, based on information of an attribute content table storing plural attributes in advance and said information collecting part;

an elevator attribute table for storing said selected and decided attributes; and

an allocation control part for selecting and deciding an elevator to be allocated, corresponding to information of said information collecting part and said elevator attribute table.

13. An apparatus for controlling operations of a plurality of elevators according to claim 12, wherein said attribute content table includes attribute tables to every floors and

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said attribute contents can be changed from an attribute storing unit provided outside said apparatus.

14. An apparatus for controlling operations of a plurality of elevators according to claim 12, said apparatus further including:

a guidance display control part for deciding contents displayed at elevator stops and in said elevators, and display timing of said contents, corresponding to information of said information collecting part, said elevator attribute table and said allocation control part.

15. A method of controlling the operation of a plurality of elevators substantially as any one herein described herein with reference to the accompanying drawings.

16. An apparatus for controlling the operation of a plurality of elevators substantially as herein described with reference to and as illustrated in Figs. 1 to 3 or Figs. 4 and 5, or Figs. 6 to 17 of the accompanying drawings.

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AN ELEVATOR OPERATION CONTROL APPARATUS AND CONTROL METHOD THEREOF

ABSTRACT

Figure (s) to accompany abstract

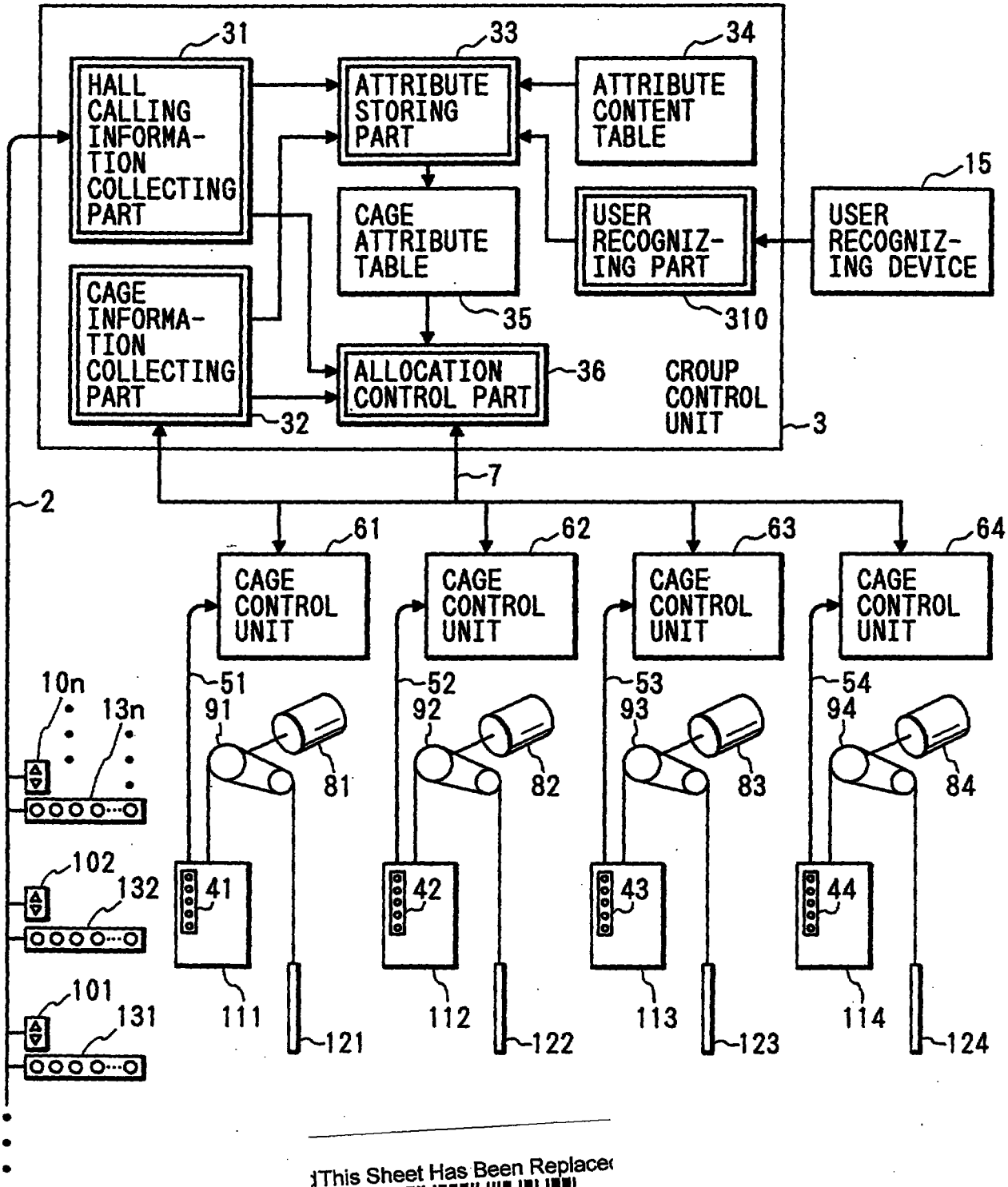
The present invention is to offer a specific service without reducing the facilities for usual users by executing a specific control and guidance only during use period by a specific user based on attributes given to each elevator. If a specific calling is generated, an attribute storing part 33 stores a cage attribute in the corresponding part of a cage attribute table 35 referring to the contents of an attribute content table 34. Then, an allocation control part 36 selects and decides a service elevator to be allocated so that the attributes of the elevator are not vitiated referring to the cage attribute table.

(Figs. 1)

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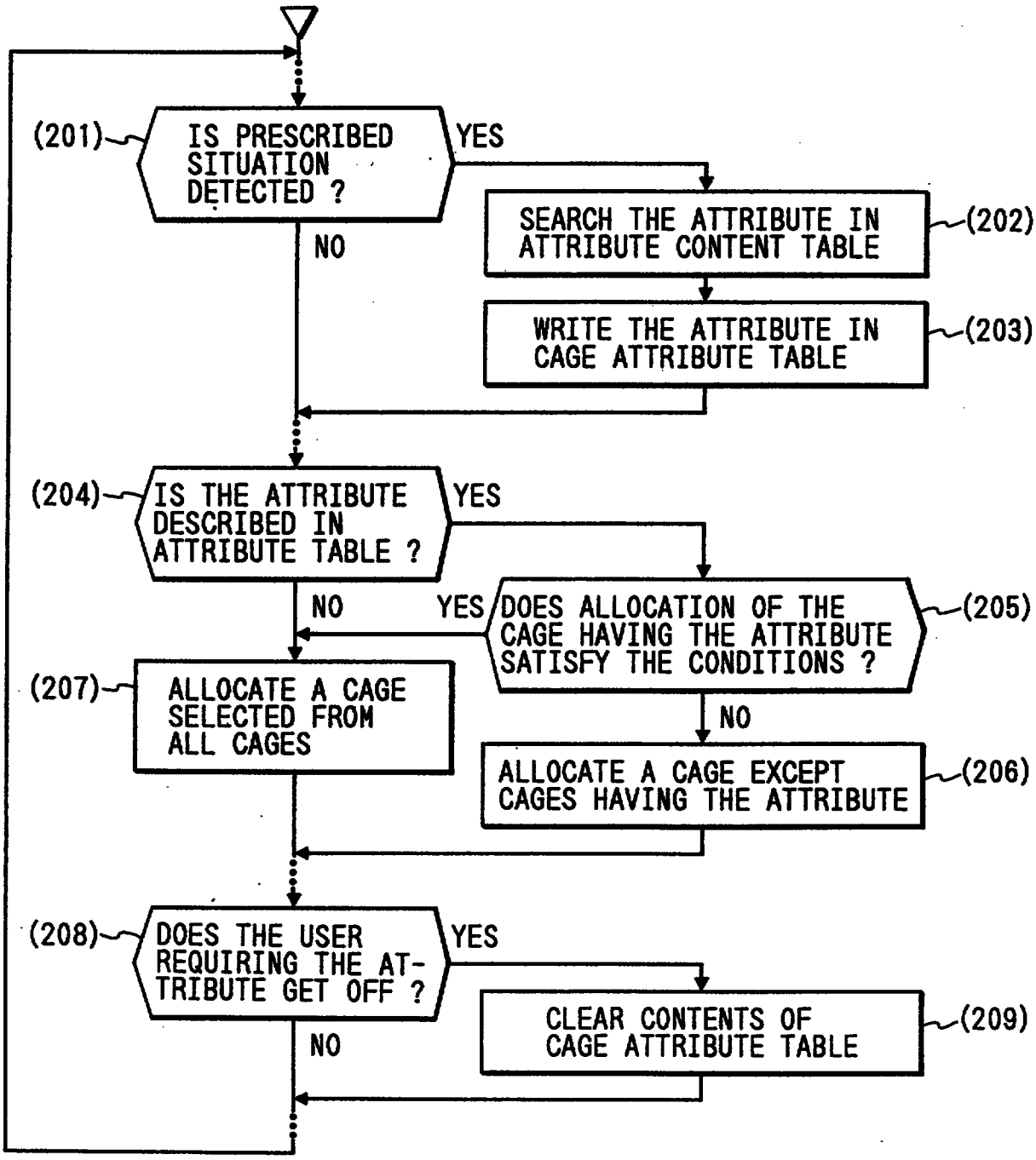
FIG. 1



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FIG. 2



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FIG. 3(a)

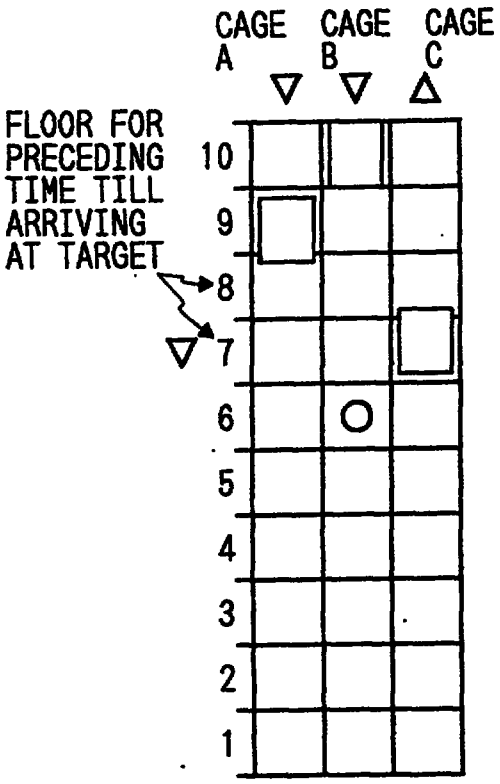


FIG. 3(b)

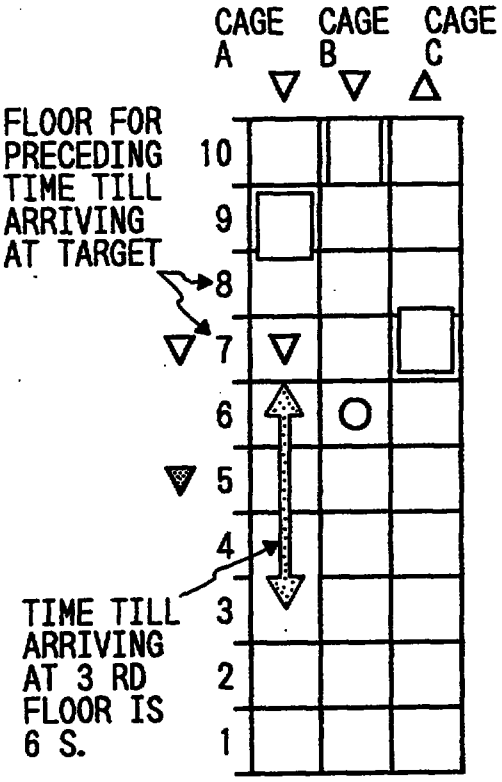


FIG. 3(c)

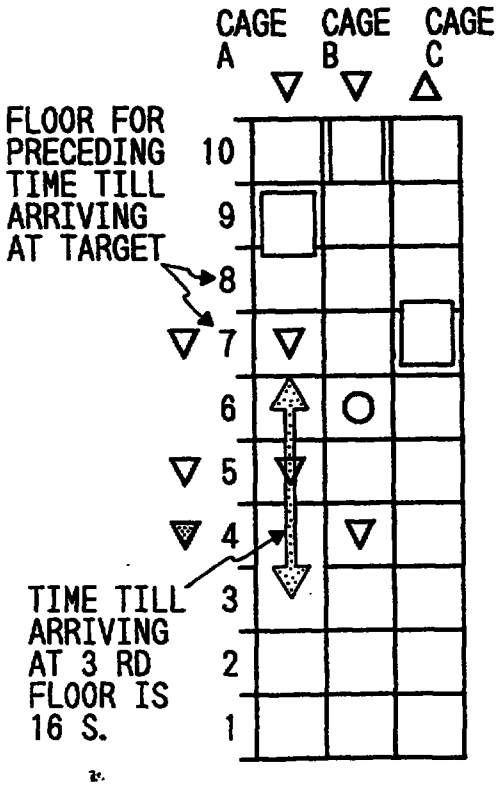
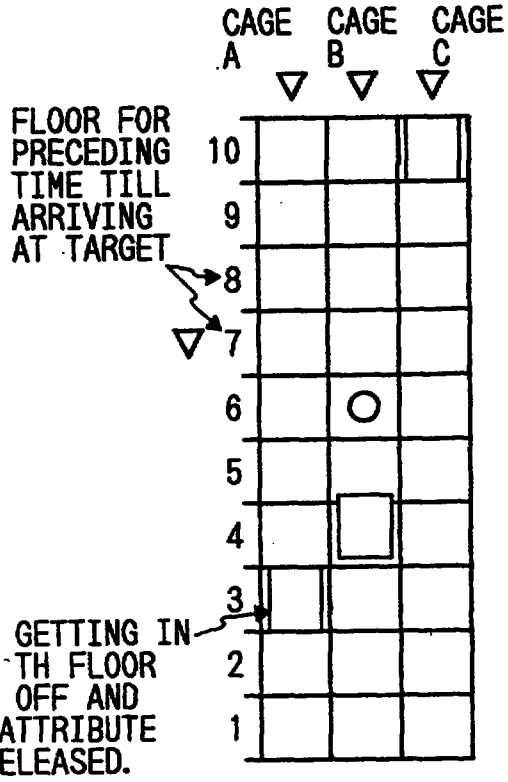
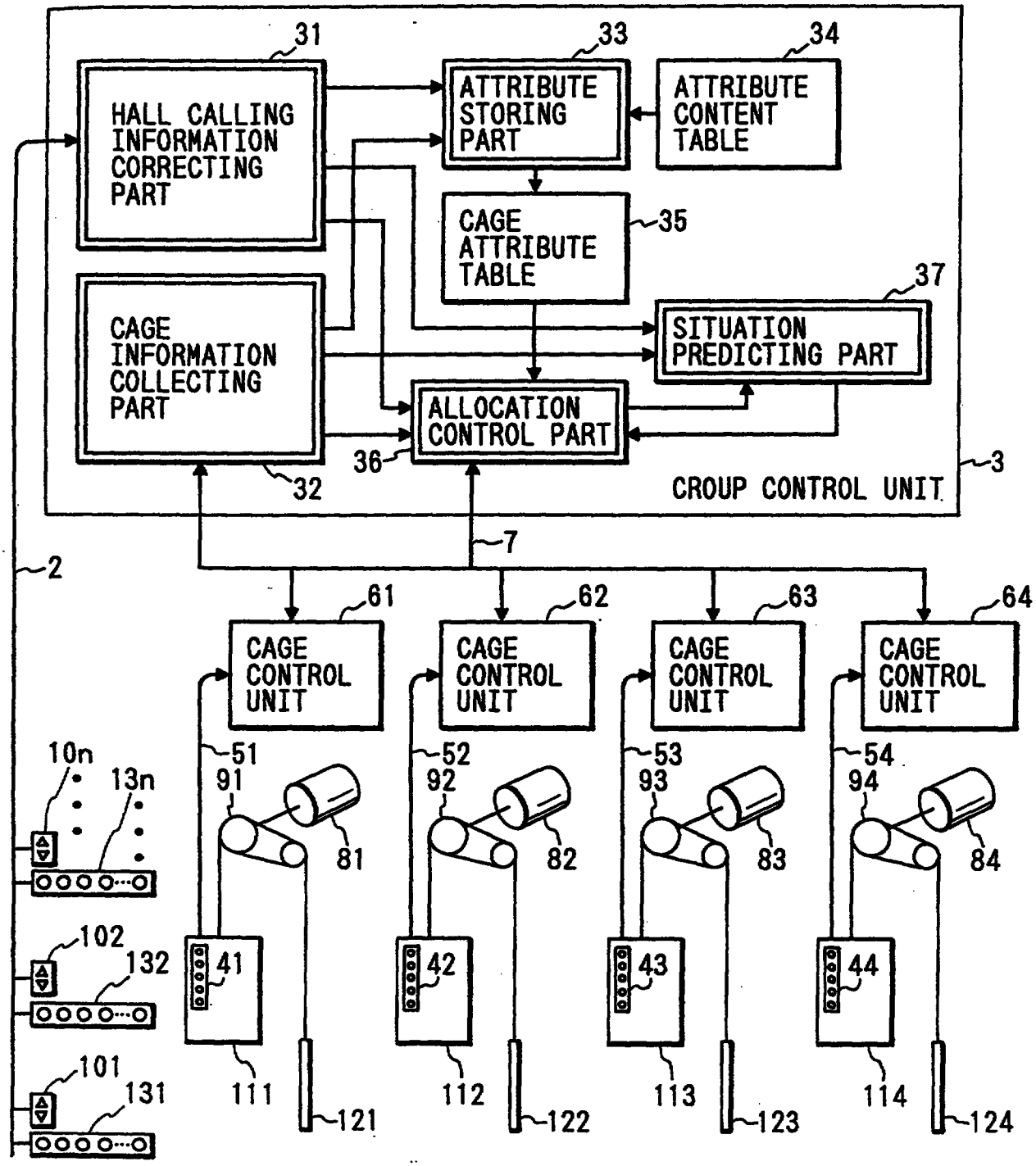


FIG. 3(d)



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FIG. 4

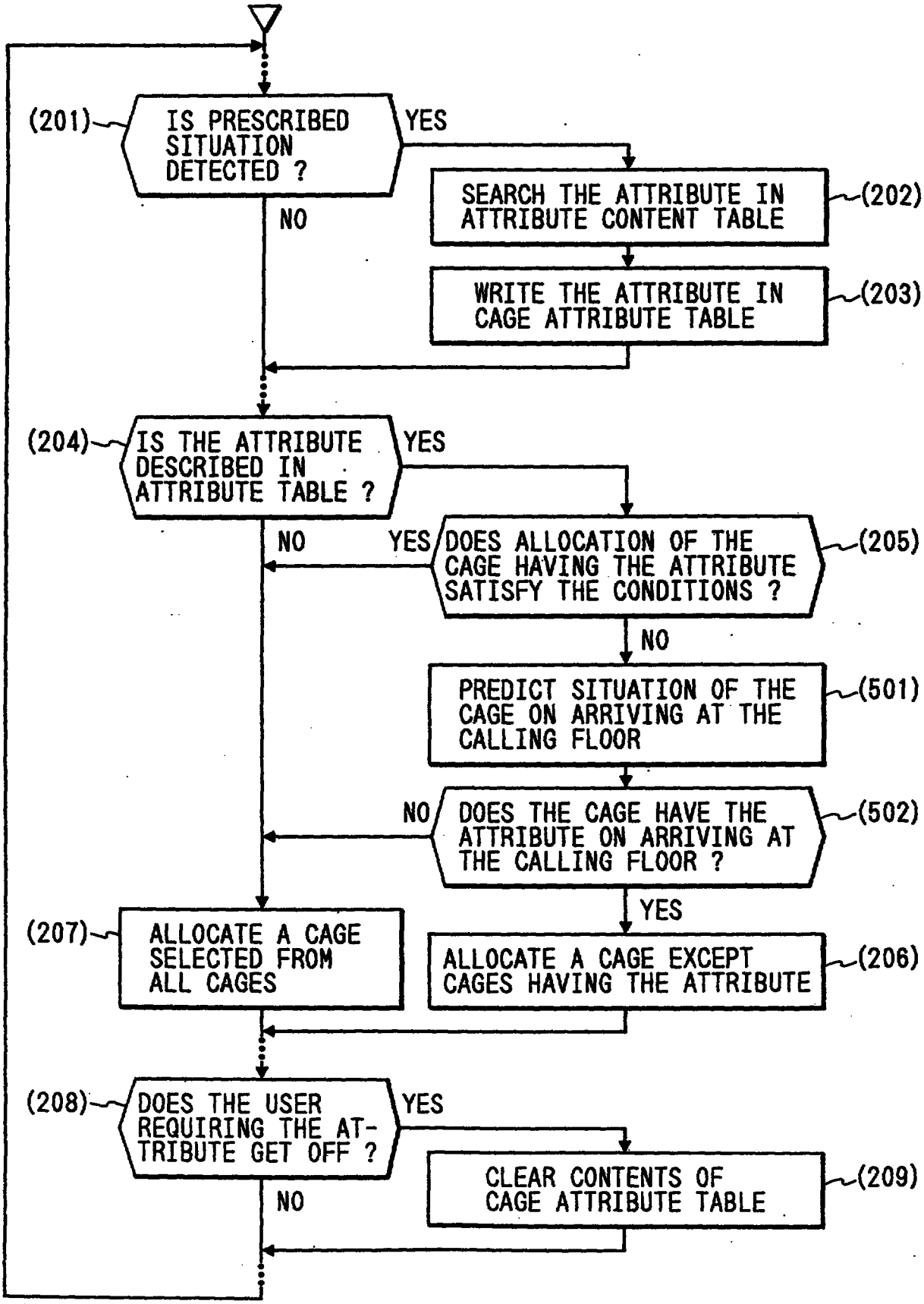


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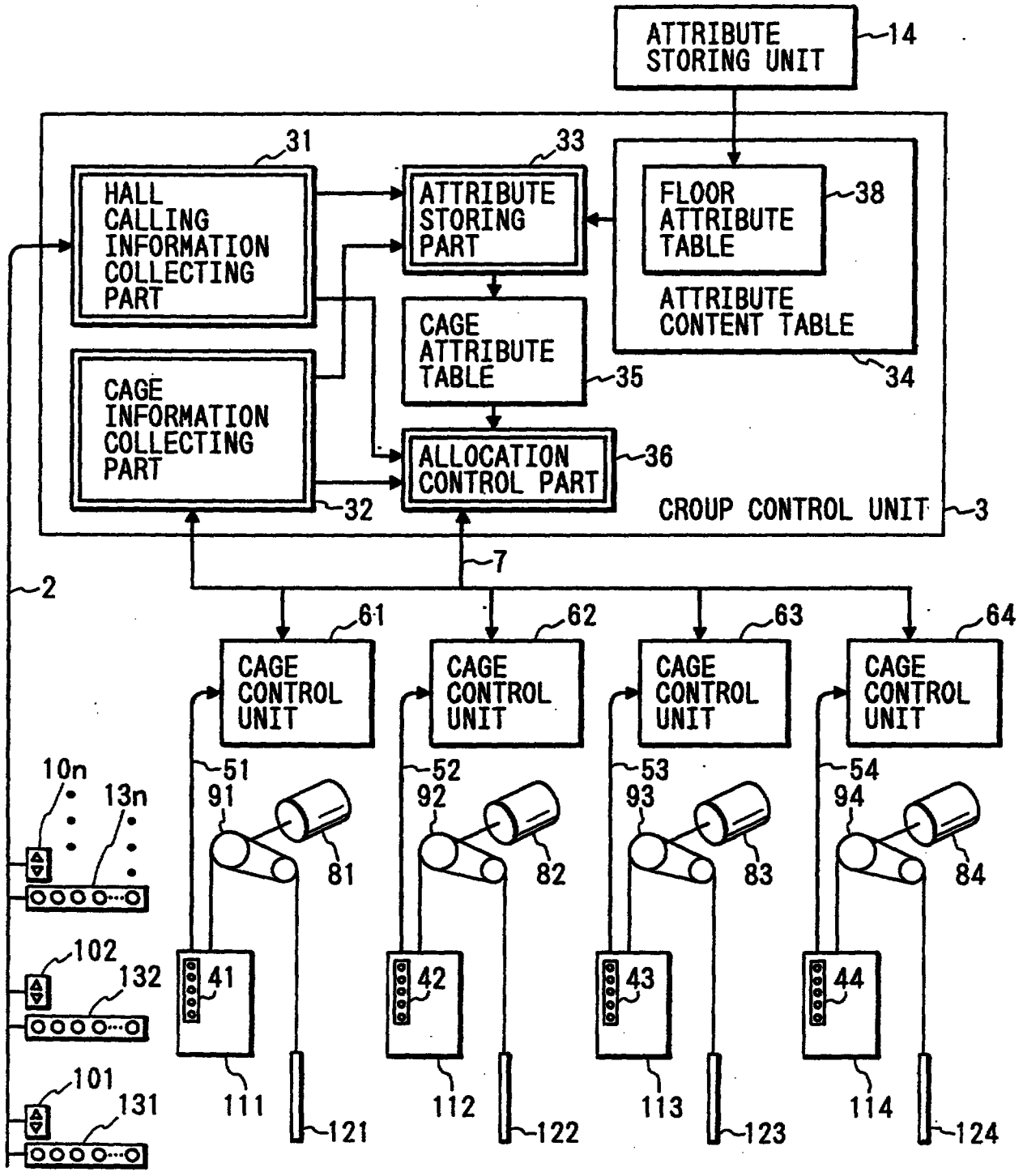
FIG. 5

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FIG. 6



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FIG. 7(a)

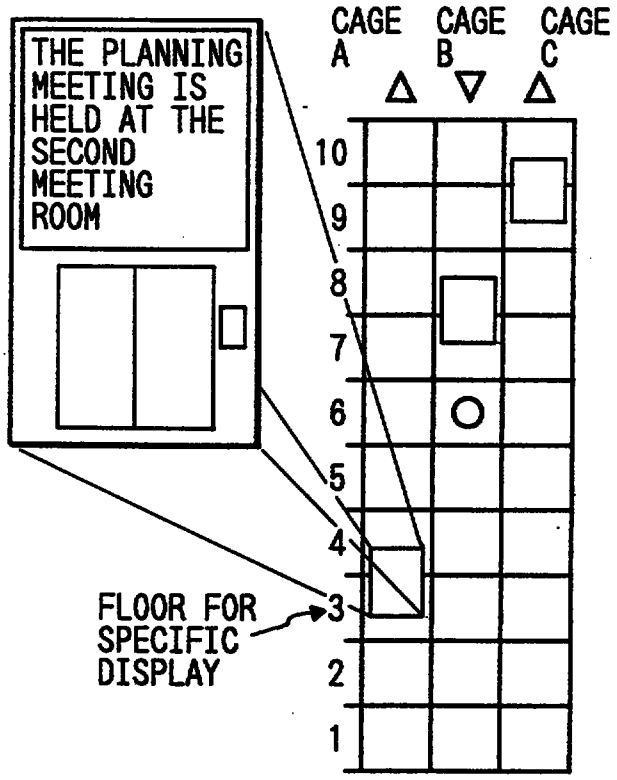


FIG. 7(b)

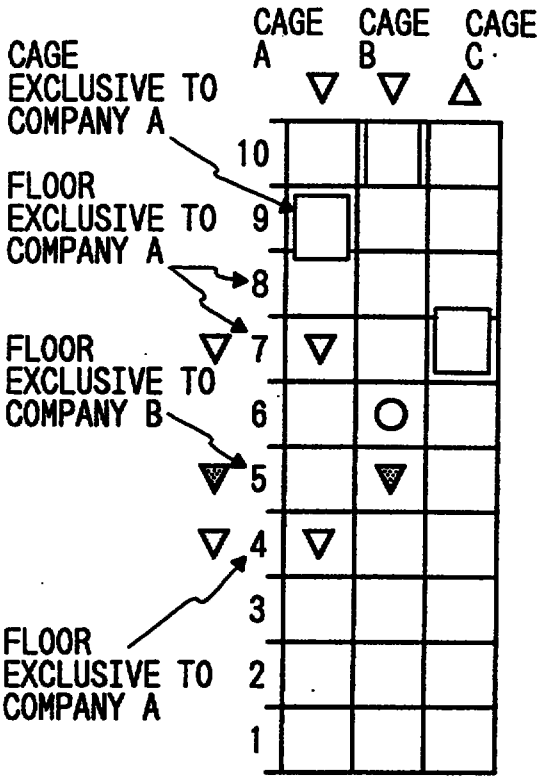


FIG. 7(c)

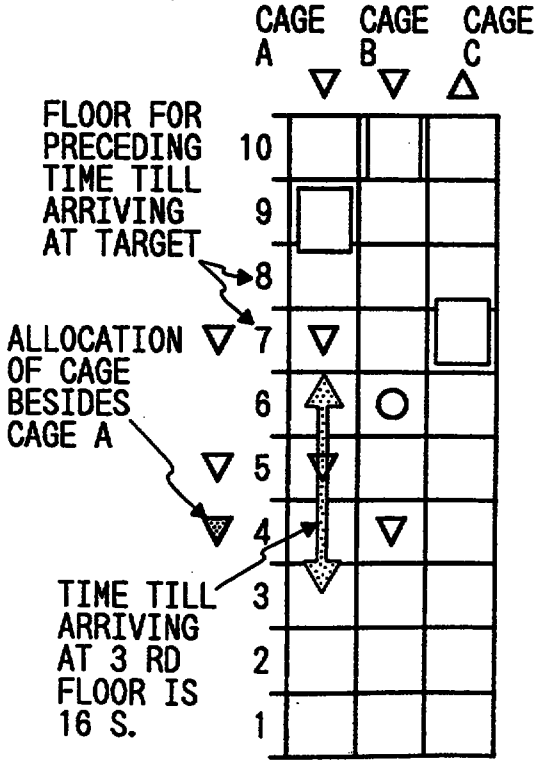
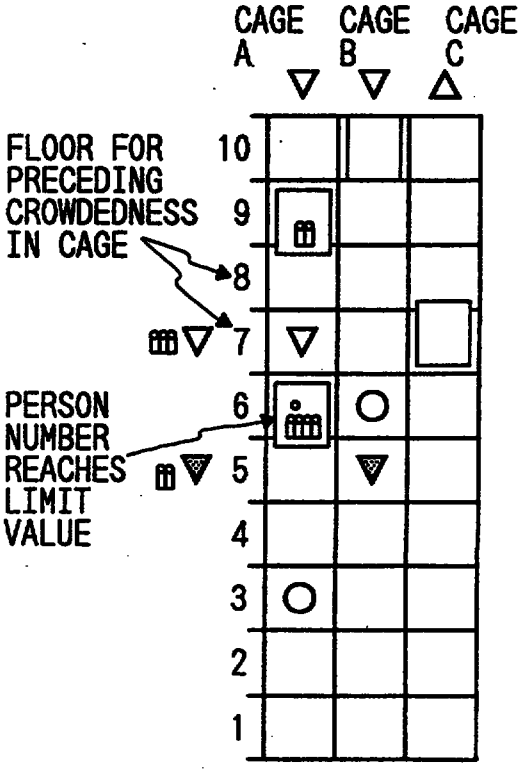


FIG. 7(d)



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FIG. 8

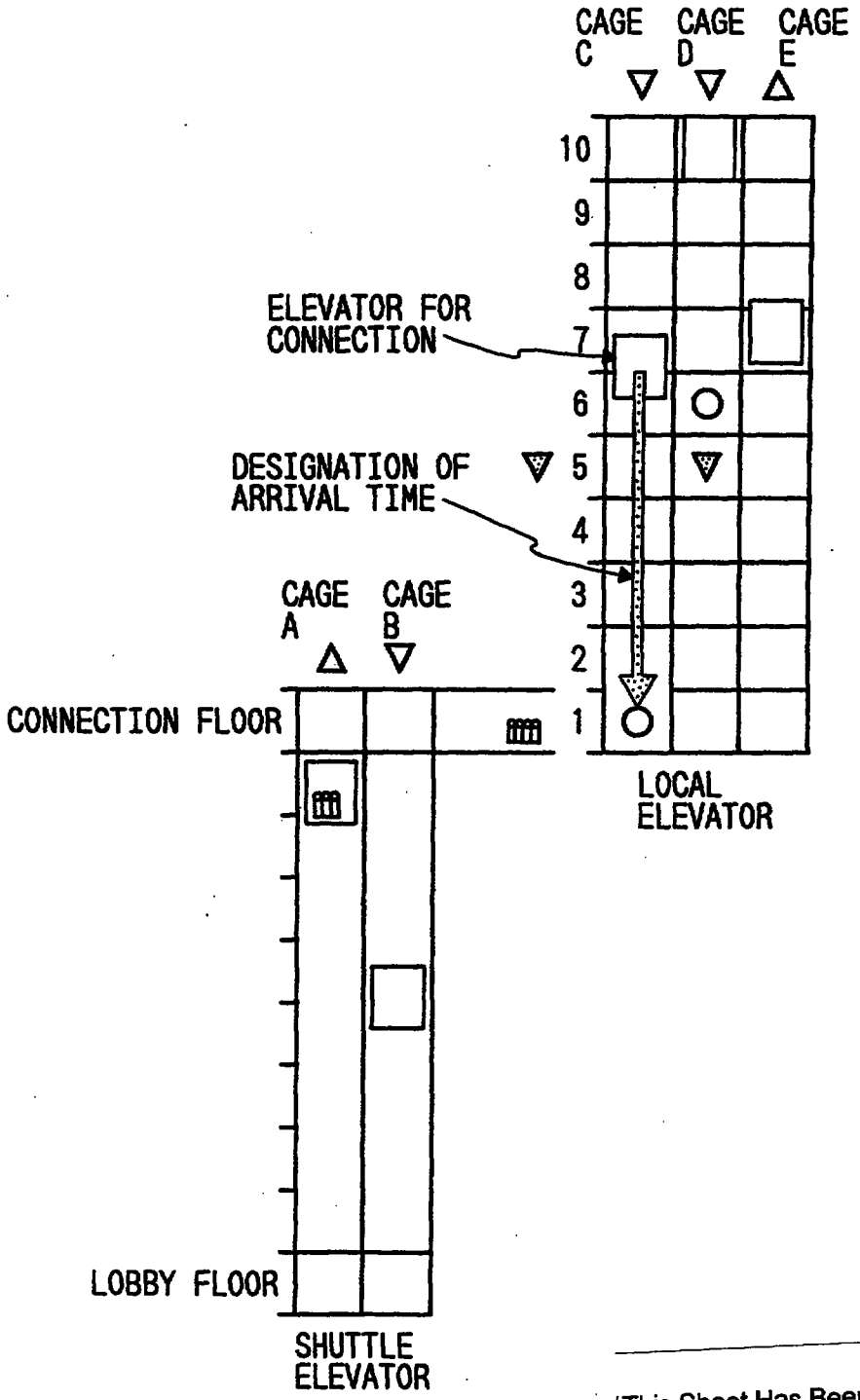
	CAGE NO. 1	CAGE NO. 2	• • •	CAGE NO. n
ATTRIBUTE	PRECEDENCE OF TIME (TILL ARRIVING AT TARGET)			
STARTING FLOOR	7 TH FLOOR			
ENDING FLOOR	3 RD FLOOR			
CONDITIONS OF ATTRIBUTE	LESS THAN 20 S TILL ARRIVING AT TARGET			
• • •				

FIG. 9

ATTRIBUTE	ATTRIBUTE ADDING CONDITIONS	ATTRIBUTE RELEASING CONDITIONS	CONDITIONS OF ATTRIBUTE	ATTRIBUTE EXECUTING CONDITIONS
PRECEDENCE OF TIME (TILL ARRIVING AT TARGET)	REGISTRATION OF CALLINGS FROM 7 TH AND 8 TH FLOOR	GETTING OFF OF USER GETTING IN AT 7 TH AND 8 TH FLOOR	LESS THAN 20 S TILL ARRIVING AT TARGET	USUAL STATE
PRECEDENCE OF CROWD-EDNESS	REGISTRATION OF CALLING FROM 6 TH FLOOR	GETTING OFF OF USER GETTING IN AT 6 TH FLOOR	LESS THAN 30% OF CROWD-EDNESS	USUAL STATE
• • •	• • •	• • •	• • •	• • •
CONTROL TO WEAK PERSON BUTTON	WEAK PERSON BUTTON	GETTING OFF OF USER OF WEAK PERSON BUTTON (ARRIVAL AT TERMINAL FLOOR)	CONTROLL-ING OPERATIONS FOR WEAK PERSON	NONE
• • •	• • •	• • •	• • •	• • •
• • •	• • •	• • •	• • •	• • •

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FIG. 10



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FIG. 11(a)

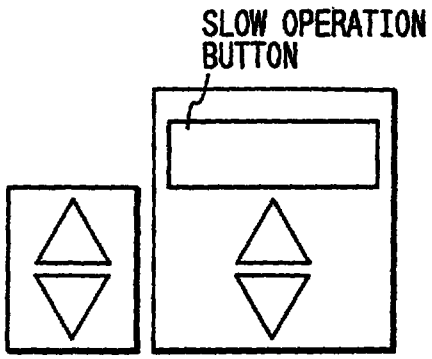


FIG. 11(b)

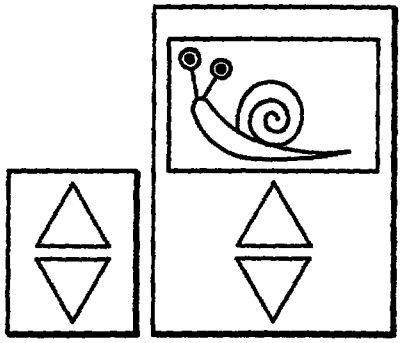


FIG. 11(c)

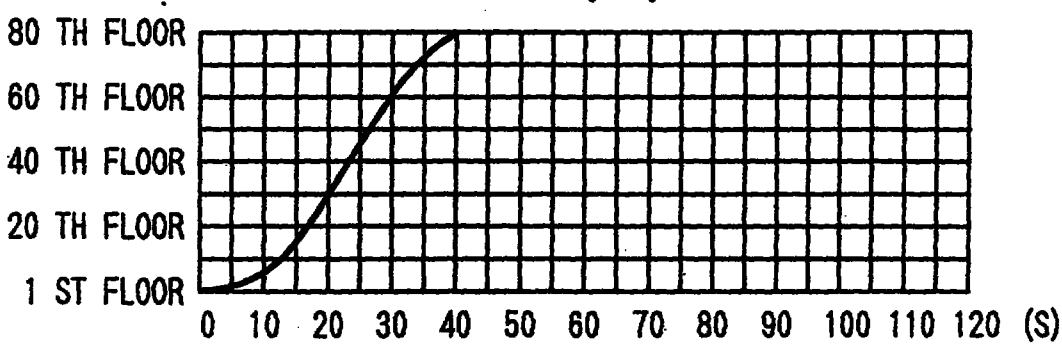


FIG. 11(d)

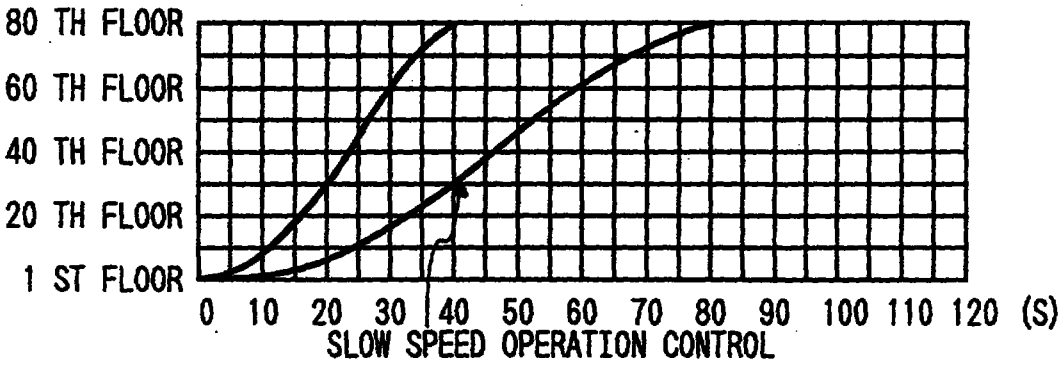
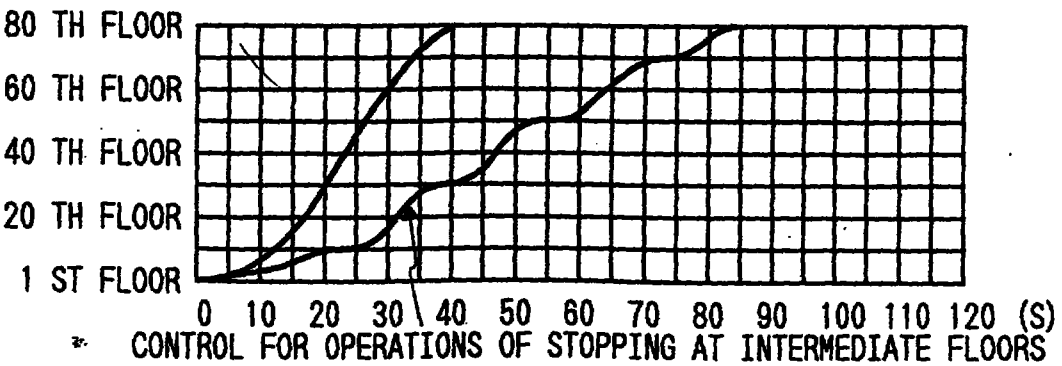


FIG. 11(e)



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FIG. 12(a)

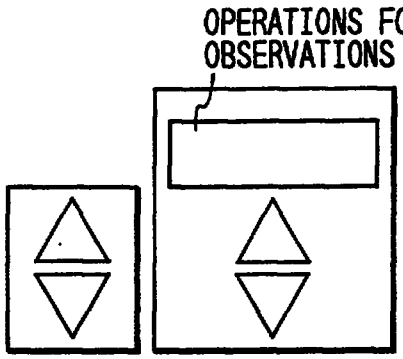


FIG. 12(b)

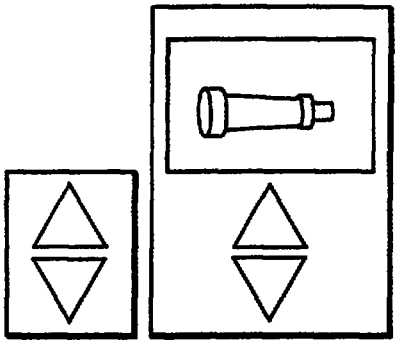


FIG. 12(c)

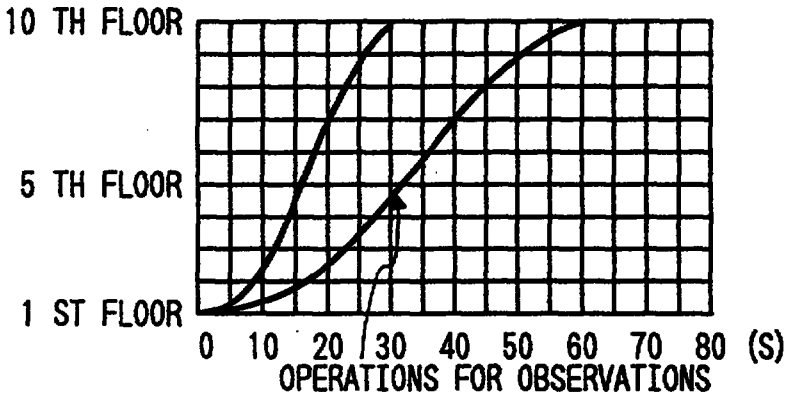


FIG. 12(d)

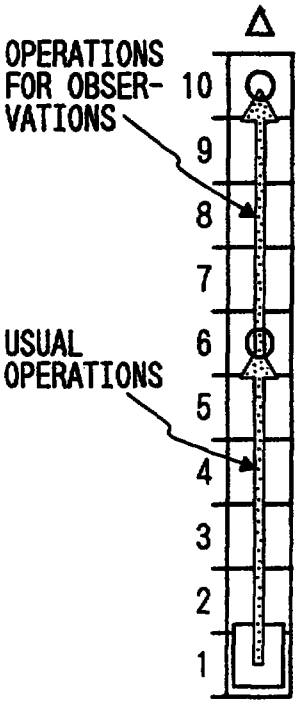
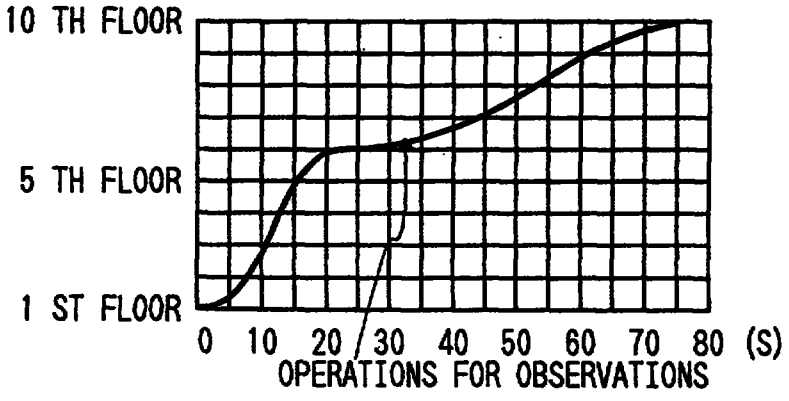


FIG. 12(e)



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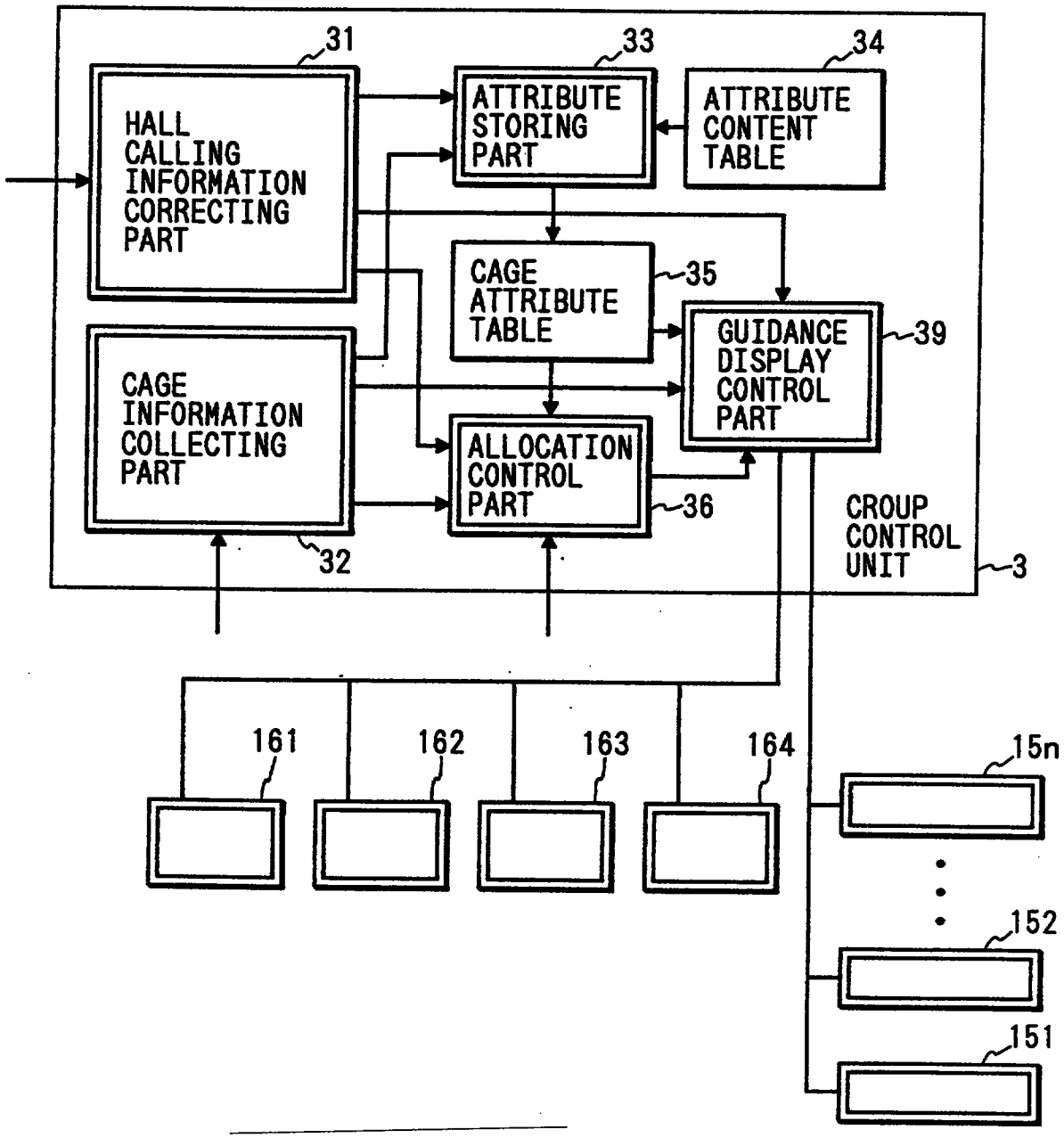
FIG. 13

	CAGE NO. 1	CAGE NO. 2	• • •	CAGE NO. n
ATTRIBUTE	PRECEDENCE OF TIME (TILL ARRIVING AT TARGET)		• • •	
STARTING FLOOR	7 TH FLOOR		• • •	
ENDING FLOOR	3 RD FLOOR		• • •	
CONDITIONS OF ATTRIBUTE	LESS THAN 20 S TILL ARRIVING AT TARGET		• • •	
DEMERIT MARKS	5 S : 20 POINTS		• • •	
ATTRIBUTE	PRECEDENCE OF CROWD-EDNESS		• • •	
STARTING FLOOR	7 TH FLOOR		• • •	
ENDING FLOOR	3 RD FLOOR		• • •	
CONDITIONS OF ATTRIBUTE	LESS THAN 20 S TILL ARRIVING AT TARGET		• • •	
DEMERIT MARKS	10% : 20 POINTS		• • •	
TOTAL MARKS	30 POINTS			

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FIG. 14



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FIG. 15

(a)

THIS IS A SLOW OPERATION ELEVATOR, IT GOES UP TO THE TOP FLOOR BY TWO MINUTES.

(b)

THIS IS SLOWLY OPERATED. IF YOU ARE IN A HURRY, PLEASE TAKE THE CAGE NO. 3.

(c)

THIS IS UNDER THE EXCLUSIVE OPERATIONS. SO, IT DOES NOT STOP AT THE FLOORS FROM THE 7 TH TO THE 4 TH.

(d)

THIS IS OPERATED FOR OBSERVATIONS. IT GOES UP SLOWLY AND PLEASE ENJOY OBSERVATIONS.

(e)

FROM NOW, THIS IS OPERATED FOR OBSERVATIONS. IT GOES UP SLOWLY AND PLEASE ENJOY OBSERVATIONS.

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FIG. 16

(a)

THIS IS NOW UNDER THE SLOW OPERATIONS. IT GOES UP TO THE TOP FLOOR BY TWO MINUTES.

(b)

THIS IS NOW UNDER THE SLOW OPERATIONS. IF YOU ARE IN A HURRY, PLEASE TRANSFER TO THE CAGE NO.3 AT THE 6 TH FLOOR.

(c)

THIS IS UNDER THE EXCLUSIVE OPERATIONS AND THE NEXT STOP IS THE 6 TH FLOOR.

(d)

THIS IS UNDER THE OBSERVATION OPERATIONS. IT GOES UP SLOWLY AND PLEASE ENJOY OBSERVATIONS

(e)

FROM NOW, THIS IS OPERATED FOR OBSERVATIONS. IT GOES UP SLOWLY AND PLEASE ENJOY OBSERVATIONS.

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FIG. 17

CAGE NO. n	USER NO. 1	USER NO. 2	• • •	USER NO. 20
CAGE NO. 2	USER NO. 1	USER NO. 2	• • •	USER NO. 20
CAGE NO. 1	USER NO. 1	USER NO. 2	• • •	USER NO. 20
ATTRIBUTE	PRECEDENCE OF TIME (TILL ARRIVING AT TARGET)			
STARTING FLOOR	7 TH FLOOR			
ENDING FLOOR	3 RD FLOOR			
CONDITIONS OF ATTRIBUTE	LESS THAN 20 S TILL ARRIVING AT TARGET			
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AN ELEVATOR OPERATION CONTROL APPARATUS AND A CONTROL METHOD THEREOF .

The present invention relates to an elevator operation control apparatus, particularly to an operation control apparatus for changing its operation corresponding to the utilization situations.

A conventional operation control in what is called a group control of elevators for corresponding to callings from multi-floors selects and decides an elevator to be allocated to calling from a hall. After microcomputers are used to the elevator operation control, an allocation to hall calling method is used, wherein such an evaluation index as a waiting time till giving a service to calling from a hall is calculated in each elevator and an elevator to be allocated is determined on the basis of the evaluation index.

And an operation control method for allocating an elevator of the lager capacity to calling from a crowded floor is described in Japanese Patent Application Laid-Open 177267/1984, further, in Japanese Patent Application Laid-Open

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140468/1980, another method for deciding an allocation priority is disclosed, wherein a specific elevator is preferentially allocated to calling from a specific floor. In further other operation controls, an elevator exclusive to a person using a wheelchair is allocated to calling from a person on a wheel in case a button for a person using a wheelchair is provided, or an elevator allocated to VIP(Very Important Person) calling is exclusively operated, separated from a group control of elevators.

Further, in Japanese Patent Application Laid-Open 127376/1990, techniques capable of selecting " a less crowded elevator " or " an elevator of less waiting time ," are disclosed in order to correspond to diverse requires.

The above-mentioned techniques described in Japanese Patent Applications Laid-Open 140468/1980 and 177267/1984, and the technique of corresponding to a wheelchair calling can not answer to diverse requires by general users since those techniques are ones for corresponding not to diverse requires by general users but for allocating a specific elevator to calling from a specific hall , and the technique of corresponding to a VIP calling can not also answer to diverse requires by general users since it responds to calling from a specific hall and the allocated elevator is controlled, separated from a group control of elevators. Further, by the technique disclosed in Japanese Patent Application Laid-Open 1277376/1990, it is not secured that even though an elevator having the state designated by a user is selected and allocated, the designated state of the elevator is kept till

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13 SEP 1996

arriving at the target floor of the user since ~~nothing~~ is considered for state changes of the elevator after the elevator corresponding to the calling from the hall is allocated.

Although a strong person has a liking for an elevator going straight from the first floor to a roof in a high-rise building, it is sometime preferable for the weak that an elevator is slowly lifted, or stopped at several intermediate floors for persons to take the times for adapting themselves to the air pressure changes since the weak sometime feel discomfort due to air pressure changes by rapid change of height. And allocation of a specific elevator or a specific guidance is required only for users from a specific floor or a specific elevator stop. If exclusive elevators are operated in order to satisfy the above-mentioned diverse requires, there may occurs the problems that totally efficient operations of a group of elevators become impossible, or a waiting time is considerably degraded, or transport ability comes short.

The present invention has been achieved in consideration of the above-described problems, and is aimed at providing an efficient operation control of elevators by putting each elevator in possession of attributes and allocating each elevator to the calling based on the attributes.

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The above-mentioned problems are solved by controlling the elevator allocation using an apparatus for a group control of elevators, comprising an attribute content table storing plural attributes of each elevator, which are used to control the elevator allocation, an attribute storing part for determining whether attributes should be stored and what attributes the elevator should be put in possession of in storing attributes, based on the kind of calling from a hall or a floor stored in a hall calling information collecting part and a cage (is also described as an elevator hereinafter) attribute table for storing attributes of a cage on the basis of the information in the attribute storing part. The above-mentioned method is a method of controlling a cage by using attributes of each cage stored in the cage attribute table. Another control method controls the elevator allocation by providing a user recognizing device for recognizing an attribute of each user being sent to a user recognizing part for recognizing the attribute of each user which is installed in a group control unit, and being stored in a user attribute table provided in place of the cage attribute table via the attribute storing part, and by using the data stored in the user attribute table.

Since it becomes possible to put elevators in possession of attributes during a definite period and to control the elevator allocation based on the attributes by the apparatus having the above-mentioned constitution, an efficient operation control can be realized.

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That is, if a less crowded elevator is selected and allocated to a hall calling, the elevator is put in possession of the attribution " a less crowded elevator " until the user reaches the target floor and the service for the user is finished. And the elevator is so controlled that allocation of the elevator to calling is restricted whereby the user number of the elevator does not exceed the predetermined number, or that, as for an elevator for the weak, it is operated with a slow speed or stopped at intermediate floors if it is used by the weak in a high-rise building. Then, if services for all users are completed, for example, it reaches the terminal floor, the above-mentioned attributes are cancelled and receives a usual allocation.

By the present invention, the good efficiency of controlling the whole of an elevator group can be also secured by making the elevator having a specific attribute correspond to a usual allocation in accordance with requires from users within the bounds not interfering the attribute.

In the drawings:

Fig.1 shows the whole constitution of the present invention.

Fig.2 shows a flow chart of the outline operations in an example of the present invention.

Fig.3(a) shows an example of the operations of precedence of time " in which the floors for the precedence of time are prescribed.

Fig.3(b) shows an example of the operations of

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precedence of time " in which a calling from another floor satisfies the conditions of the attribute.

Fig.3(c) shows an example of the operations of " precedence of time " in which a calling from another floor does not satisfy the conditions of the attribute.

Fig.3(d) shows an example of the operations of " precedence of time " in which the attribute is released by the user's getting off at the target floor.

Fig.4 shows the whole constitution of one of other embodiments by the present invention.

Fig.5 is a flow chart showing the outline operations in one of other embodiments by the present invention.

Fig.6 shows the whole constitution of one of other embodiments by the present invention.

Fig.7(a) is an explanation figure showing an example operations of a specific guidance at a specific floor.

Fig.7(b) is an explanation figure showing an example operations exclusive to specific companies.

Fig.7(c) is an explanation figure showing an example operations as shown in Fig.3(c), in which another elevator is allocated.

Fig.7(d) is an explanation figure showing an example operations of " precedence of crowdedness ".

Fig.8 shows an example of an attribute table.

Fig.9 shows an example of an attribute content table.

Fig.10 explains the connection operations between elevators.

Fig.11(a) shows an example of providing a button for the

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weak together with a usual calling button at an elevator stop.

Fig.11(b) shows an example of providing the button for the weak indicated by a picture.

Fig.11(c) shows an example of an operation diagram for the usual operations.

Fig.11(d) shows an example of an operation diagram for the operations in the case of calling from the button for the weak.

Fig.11(e) shows an example of an operation diagram for the operations of stopping at intermediate floors.

Fig.12(a) shows an example of providing a button for observations together with a usual calling button at an elevator stop.

Fig.12(b) shows an example of providing a button for observations indicated by a picture.

Fig.12(c) shows an example of an operation diagram indicating difference of the usual operations and the operations for observations.

Fig.12(d) shows an example of an operation pattern for the operations for tenants and for observations in the same building.

Fig.12(e) shows an example of an operation diagram for the operation pattern shown by Fig.12(d).

Fig.13 shows another example of the attribute table.

Fig.14 shows an example of the control for displaying guidance.

Fig.15 shows examples of the guidance display in a cage.

Fig.16 shows examples of the guidance display at an

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elevator stop.

Fig.17 is an example of a user table of cages.

Hereinafter, details of the present is explained based on embodiments referring to drawings

Figure 1 shows the constitution of an elevator operation control apparatus by the present invention.

The signals from hall calling buttons 101 - 10n are transmitted to a hall calling information collecting part 31 in a group control unit 3 via a transmission way 2. Although the hall calling buttons are the buttons designating the upper and the lower direction in the figure, the buttons calling selectively an elevator in accordance with a preference of a user can be also arranged. The signals from cage calling buttons 41 - 44 are transmitted as cage information together with the weight data of each cage to cage control units 61 - 64 via cage transmission ways 51 - 54. The cage information transmitted to the cage control units 61 -64 is sent together with the information of each cage control unit to a cage calling information collecting part 32 in the group control unit 3. An attribute storing part 33 attaches attributes to some elevators during specific periods and stores the attributes in a cage attributes table 35 by referring to the information of the hall calling information collecting part 31 and the cage calling information collecting part 32, and referring to an attribute content table 34. And the attribute storing part 33 checks for whether an elevator already having

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the same attribute in the cage attribute table 35 as the newly designated attribute exists. An allocation control part 36 decides an elevator to be allocated to the generated hall calling based on the attributes in the cage attribute table 35 and the information collected in the hall calling information collecting part 31, and transmits the allocation results to the cage control units 61 - 64 via a control unit transmission way 7. The cage control units 61 - 64 drives motors 81 - 84 based on the allocation results and gives services to the hall calling by driving hoists 91 - 94 for moving elevators 111 - 114. And counter-weights 121 - 124 are hung at the terminal of a rope for driving each elevator. In the figure, display devices 131 - 13n are installed in each hall which, for example, display what attribute the coming elevator has.

By keeping the attributes of each elevator in the cage attribute table till completing the services as mentioned above, it is possible to control the elevator operations in accordance with user requirements and further to prevent the operation efficiency decrease of the whole elevator system to the minimum. Though not shown in Fig.1, a hall calling button of the prescribed hall, a specific cage calling button or one of an input terminal and an information receiving device for recognizing voices or pictures by a wireless transmitter or an infrared transmitter is installed in an elevator hall of each floor. The data for recognizing the specific attribute occurrence are sent to the attribute storing part 33, which are made by the user recognizing part 310 in the group control

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13 SEP 1996

unit 3 via a user recognizing device 15 for recognizing a user by receiving the information input from one of the above-mentioned input devices. The attribute storing part 3 searches the corresponding attribute in the attribute content table 34. The search results including the attribute of a user are stored in a user table of cages, not shown in the figure, provided in place of the cage attribute table. Then, if a hall calling is generated, it is determined by the allocation control part 36 whether the user requires a specific attribute by referring to the user table of cages on determining an elevator to be allocated to the hall calling. If the user has a specific attribute, it is judged whether the conditions of the attribute is satisfied in case the elevator having the same attribute as the one to the user requiring the hall calling is allocated (it can be also considered that an attribute is added to the elevator when the user having an attribute gets on the elevator.). If it is proved by the judgements that the conditions of the attribute can not be satisfied, the elevator is excluded and another elevator is allocated for the allocation. On the other hand, if the conditions are satisfied, the elevator is allocated to the calling. In the allocation, it can be considered that weighting marks are given to the elevator having the same attribute as the one to the user so as to be easily selected. When the elevator arrives at the terminal floor or the user having the attribute in the user table of cages arrives at the target floor, the registration of the user is cleared together with the corresponding attribute in the user table of cages

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(the attribute of the cage is cleared if the cage attribute is added to the elevator.).

Figure 2 is a flow chart showing the outline of operations in the embodiment by the present invention.

Firstly, at the step 202, the attribute storing part 33 searches the corresponding attribute in the attribute content table 34 if it is detected at the step 201 that a hall calling button of a floor registered in advance or a specific cage calling button is pushed. Nextly, at the step 203, the attribute is written in the corresponding part of the cage attribute table as to the elevator allocated to the hall calling from a hall calling button, or the attribute is written in the corresponding part of the cage attribute table as to the elevator allocated to the cage calling. Then, at the step 205, if the same attribute as the one to be designated is stored in the cage attribute table 35 on checking for the cage attribute table 35 in order to allocate an elevator to the hall calling at the step 204, the allocation control part 35 examines whether the conditions of the attribute is satisfied even though the elevator having the same attribute is allocated to the hall calling. And if the conditions of the attribute is not satisfied when the elevator having the same attribute is allocated, an elevator to be allocated is determined by excluding the elevator having the same attribute at the step 206, otherwise, an elevator to be allocated is determined in all elevators at the step 207. And it is also possible to increase the possibility that the elevator having the same attribute is allocated, by weighting an evaluation

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index of the elevator having the same attribute with large points. Then, if the user requiring the attribute gets off the elevator by such a reason as arrival at the terminal floor of the elevator at the step 208, the attribute of the elevator is cleared at the step 209.

Figure 3 explains operations of each elevator by the present invention.

It is assumed that the service of preceding the time till arriving at the target floor is designated to callings from the seventh and eighth floors in Figs.3(a)-3(d). If a hall calling is generated from the seventh floor as shown in Fig.3(a), the attribute " preceding time till arriving at target " is added to the corresponding part of the cage attribute table 35 to the allocated elevator after an elevator is allocated for giving the service to the hall calling. In the case, the cage A giving the minimum waiting time is allocated as the service elevator. In the attribute of " precedence of time ", table contents such as " the destination floor is the third floor." , " the condition is the arriving time of less than 20 sec." , etc. are given under the conditions that the time till arriving at the destination floor of the cage calling after arrival at the floor from which the hall calling is generated is less than the predetermined time.

In Fig.3(b), in case a service elevator is determined to the hall calling generated from the fifth floor, it is examined whether the conditions of the attribute " precedence of time " to the cage A can satisfy the condition that the

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operation time from the seventh to the third floor is less than 20 s. In the case, since the arrival time condition is satisfied even if the elevator is stopping for 10 s at the fifth floor, the elevator giving the shortest time till arriving at the fifth floor is selected in all elevators. In the case shown by Fig.3(b), the cage A is selected.

Nextly, it is assumed that the hall calling is generated from the fourth floor as shown in Fig.3(c). Since the condition of the attribute " precedence of time " to the cage A can not be satisfied if the cage A is allocated to the hall calling though the cage A can arrive at the fourth floor with the minimum waiting time, the cage A is excluded from the allocation and the service elevator is selected in the rest cages. In the case shown by Fig.3(c), the cage B is selected.

As shown in Fig.3(d), the cage attribute table to the cage A is cleared and the usual allocation is done for the cage A after the cage A arrives at the third floor and the user requiring the attribute at the seventh floor gets off at the floor.

In the above-explained case, the destination of a user is determined and the elevator is controlled assuming that the cage calling button of the third floor is pushed by the user right after the user gets on the elevator at the seventh elevator. However, if the cage calling button is not pushed by the user in spite of getting on the elevator, the already stored attributes destined in another cage calling is kept till arriving at the furthest or the terminal floor and cleared after arrival at the furthest or the terminal floor.

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It may be effective that a destination buttons are provided at each elevator stop.

As attributes to be added to each elevator, a through operation, one company exclusive operation in a tenant building, etc. are adapted. By the present embodiment, diverse kinds of operations are possible without providing an exclusive elevator.

Figure 4 shows an example that the usual operation is allocated to a cage calling after clearing the attribute.

The constitution in the figure is different from the one in Fig.1 in the point that a situation predicting part 37 is provided in it. The situation predicting part 37 predicts the situation of an elevator at the coming position based on the information of the hall calling information collection part 31 and the cage information collection part 32, and the allocation results of the allocation control part 36. When a hall calling is generated, assuming that an elevator having an attribute is allocated, the situation predicting part 37 predicts the situation of the allocated elevator at the time the elevator arrives at the floor from which the hall calling is generated and the allocation control part 36 determines a service elevator to be allocated including the elevator if the attribute of the elevator is cleared till the arriving time.

Figure 5 is a flow chart of the process in the embodiment of executing the usual allocation after clearing the attribution.

Firstly, it is examined at the step 205 whether the conditions of the attribute is satisfied in case an elevator

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having an attribute is allocated to the calling, and if the conditions is not satisfied, the situation predicting part 37 predicts the situation of the elevator at the time the elevator arrives at the floor from which the hall calling is generated, at the step 501. On the basis of the predicted results, it is examined at the step 502 whether the attribute of the elevator is cleared at the arrival time or another attribute exist, and then if an elevator having an attribute dose not exist, an elevator to be allocated is selected in all elevators at the step 207, otherwise, a service elevator is selected in the rest elevators excluding the elevators having an attribute at the step 206.

Figure 6 is the embodiment of executing elevator controls different in each floor.

The constitution in the figure is different from the one in Fig.5 in the point that an attribute storing unit 14 is provided and a floor attribute table 38 is provided in the attribute content table 34. The attributes of each floor are stored in the attribute content table 34, and the attribute storing part 33 stores the attribute added for the floor from which a hall calling is generated into the cage attribute table 35 in the attribute content table 34 of the elevator allocated to the hall calling. Although the attributes of each floor are stored in the attribute content table 34 in the embodiment in advance, it is also possible to store or change them by the attribute storing unit 14. The attribute storing unit 14 is capable of storing or changing other attributes besides the attributes of each floor.

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Figures 7(a)-7(d) are pictures explaining operations in case of executing a different control in each floor. The figure is relating to services for a user who is on an elevator, and an example content of the services is explained in the following.

Figure 7(a) shows an example of giving a special guidance to a user going on an elevator from a special floor. Assuming that the special service is given at the third floor, the display exclusive to users from the third floor is given in the cage A allocated to the third floor calling. In case such a service as mentioned above is prepared, displays corresponding to requires by users can be given at each floor.

Figure 7(b) shows an example of avoiding allocation of the same elevator to the hall callings from the different floors in each of which a company different from another company exists for preventing persons of different companies from taking the same elevator in case plural companies exist in a tenant building. In this case, the eighth, seventh and fourth floor are exclusive to a company A. When the cage A stops at the seventh floor responding to the hall calling from the seventh floor, the cage A is set as the elevator exclusive to the company A and is not allocated to the hall calling from the fifth floor where a company B exist. Then, the cage B is allocated to the hall calling from the fifth floor. In case such a service as mentioned above is prepared, users of different companies do not take the same elevator together and users of each company can use the elevator as if the exclusive elevator to their company.

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Figure 7(c) shows an example of the above-mentioned control preceding the time till arriving at the target floor and allocating an elevator capable of arriving at the target floor within the preset time. The eighth and seventh floor are the floors of preceding the time till arriving at the target floor and the users calling an elevator from the floors are given such a service that the users arrive at the target floor within 20 s. In the figure, it is assumed that the target floor is the third floor and the cage A is allocated to the hall callings from the seventh and fifth floor. At the time the cage A is allocated to the hall calling from the seventh floor, the time till arriving at the third floor is 16 s. Then, if the cage A is also allocated to the hall calling from the fourth floor, the time till arriving at the fourth floor is 26 s exceeding the standard time 20 s assuming the 10 s of stopping time at each floor. Therefore, an elevator except the cage A is allocated to the hall calling from the fourth floor. By the above-mentioned control, the arriving time can be adjusted within the predetermined value.

Figure 7(d) shows an example of controlling the crowded degree of a cage below the preset number. Now, it is assumed that the eighth and seventh floor is designated as the service floor of preceding the crowdedness. Since the user number of the cage A exceeds the preset number at the time the cage A gives a service at the seventh floor if the cage A is allocated to the hall calling from the seventh floor, another cage except the cage A is allocated to the hall calling after the time. In the case shown by Fig.7(d), the cage B is

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allocated to the hall calling from the fifth floor.

Figure 8 shows an example of the cage attribute table. The attribute, the floor for starting the service of the attribute, the floor for ending the service of the attribute and the conditions of the attribute are described in the table.

Figure 9 is an example of the attribute content table. There are described specific events, for example, generation of a hall calling from a special floor, a special calling, attributes to be given to an elevator corresponding to every outputs from a weight sensor and other sensors in an elevator, the conditions of the attributes and the attribute releasing conditions. And such execution conditions as control execution during a specific time zone, prohibition of control operations during a crowded time zone and so on can be added to the table.

Figure 10 shows an example of a smooth connection between a shuttle elevator and a local elevator. A method that one elevator waits another elevator is conventionally adopted for the smooth connection between a shuttle elevator and a local elevator. However, the efficiency of the waiting elevator is degraded by the method. Thereupon, when the shuttle elevator arrival time at the connection floor is determined, the attribute for designating the range of arriving time is given to a local elevator and the local elevator capable of arriving at the connection floor within the range is allocated and controlled so as not to exceed the range in accordance with the given attribute. In the figure, when the cage C of a local

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elevator is allocated as a connection elevator for a shuttle elevator A, the range of arriving time is designated to the cage C which is controlled so as to arrive within the range. By the embodiment, it is possible to realize a smooth connection while preventing the efficiency of a local elevator from decreasing.

Figures 11(a)-11(e) are drawings explaining the embodiments of adopting buttons for the weak. The role of elevator equipment is to speedily transfer users to their target floors and it is generally desired that an elevator arrives at the target floor without stopping. On the other hand, since the weak sometimes feel uncomfortable due to air pressure changes induced by rapid elevation if an elevator goes straight to the target floor in a high-rise building, some weak persons prefer to go up to the target floor by stopping at several intermediate floors. For such weak persons, the users' adaptation to the air pressure changes is made easy by decreasing the elevation speed when one of the buttons for the weak provided at elevator stops or in elevators is pushed, stopping at intermediate floors corresponding to hall calling as much as possible and adopting step-shaped patterns of acceleration and deceleration.

Figure 11(a) shows an example of providing " a slowly going button " for the weak together with a usual hall calling button. Figure 11(b) shows an example of indicating a button for the weak by a picture. Figure 11(c) shows a usual operation diagram of an elevator wherein the horizontal axis means time and the vertical axis means the number of floors.

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13 SEP 1996

Figure 11(d) shows an example of the decreased speed operations when the button for the weak is pushed. Although an elevator arrives at the 80-th floor by about 40 s in usual operations, it takes about 80 s to go up to the 80-th floor by executing the decreased speed operations if the button for the weak is pushed. Figure 11(e) shows an example of operation control for stopping at intermediate floors. In the example, the elevator goes up to the 80-th floor by 85 s as stopping four times at intermediate floors. Effects of the air pressure changes are described in the above explanations. Then, since some sick persons feel uncomfortable to changes of acceleration, it is effective to sick persons to prepare the attribute of small acceleration and deceleration operations. By the embodiment, it is possible to reduce the uncomfortable feelings of the weak to the changes of air pressure or accelerations while keeping the facilities for healthy persons.

Figures 12(a)-12(e) are drawings explaining the embodiment of operations for observations using an observation elevator. In the observation elevator, a button for usual users and a button for users wishing to enjoy observations are provided together and the speed of the elevator is decreased so as to enjoy observations if the button for observations is pushed. Figure 12(a) is an example of providing the calling buttons for usual operations and observation operations together. Figure 12(b) shows an example of indicating the button for observations by a picture. Figure 12(c) is an operation diagram indicating the difference between the usual

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operations and the observation operations. The operation speed of an elevator is decreased so as to enjoy observations enough corresponding to the calling for observations as shown by the figure. Figure 12(d) shows an example of providing an elevator for the both of observation operations (done for the floors upper from the seventh floor) and usual operations in case tenants use parts of a building for offices (the floors lower from the sixth floor are used for offices). In the case, the elevator is so controlled that the usual operations are executed until completion of services to the callings from the floors used for offices even if the button for observations is pushed and the observation operations are done after passing the floors of offices. Thereby, the observation operations can be executed without reducing the facilities for the office persons. To the elevator, the cage attributes of the observation operations and the usual operations till arriving at the sixth floor are added. Figure 12(e) is an operation diagram for the example shown by Fig.12(d). As shown by the figure, to the calling for observations, the elevator quickly goes up to the target floor by the usual operations till arriving at the sixth floor and its speed is decreased for the observation operations after exceeding the sixth floor so as to enjoy observations by taking enough time. The above-mentioned embodiment can satisfy the both of the office persons wanting to arrive at the target floor as soon as possible and the users hoping to enjoy the observations.

Figure 13 is an example of the attribute table wherein marks are set as one of items of the attribute table. It is

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13 SEP 1996

possible also in the previous embodiment that one elevator can have plural attributes based on the requires by users from the different floors and further also based on the requires from the same floor as far as some attributes. However, the attribute of the combined conditions such as "reducing the number of stopping, or making an elevator less crowded" is sometimes required. In such a case, the item of marks is provided in the cage attribute table 35 and some marks are added to (or subtracted from) the marks given to the elevator in every time the elevator having the attributes is allocated. Then, if the merits becomes more than (or less than) the predetermined points, the corresponding elevator is excluded for allocation. By this embodiment, the attribute of the combined conditions can be treated.

Figure 14 is an example constitution of the embodiment wherein display devices, voice guidance devices, etc. are used. A display control part 39 offers guidance displays corresponding to the situations based on the attributes of the cage attribute table 34 by guidance display devices 151-15n at each floor stop and guidance display devices 161-16n in each cage.

Figure 15 shows an example display by the above-mentioned display device used in a cage. An example guidance of operations for the weak is shown in Fig. 15(a), an example of transfer guidance in operations for the weak in Fig. 15(b), an example display for one company exclusive operation in Fig. 15(c) and example guidance for observation operations in Figs. 15(d) and 15(e). By offering guidance of operation

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situations to users as explained above, the facilities for users is improved.

Figure 16 shows an example display by the display device provided at a floor stop. Example guidance of operations for the weak are shown in Figs.16(a) and 16(b), an example guidance for one company exclusive operation in Fig.16(c) and example guidance for observation operations in Figs. 16(d) and 16(e). By offering guidance of operation situations to users useful for elevator selection by a user, as explained above, the user can select an elevator preferred by the user. Furthermore, by providing the cage attribute table, the elevator in accordance with the preference of a user can be allocated without reducing the facilities for users.

Now, Fig.17 shows an example of the user table of cages previously explained, which is introduced in place of the cage attribute table 35 in Fig.1. As shown in Fig.17, services corresponding to users' requirements are offered by storing such items as the attribute, the starting floor, the ending floor, etc. to each elevator and each user in the user table and by allocating an elevator referring to the table.

By the present invention, it is possible to operate an elevator corresponding to the attributes of the elevator till the attributes required by a user is accomplished, and to offer the different operations and guidance to different users by the same elevator. Therefore, the different controls to each floor, the operations for suppressing the uncomfortable feelings due to the air pressure changes by delaying the arrival time at the target floor and the different guidance

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to each user can be offered by using the same elevator without reducing the facilities for users.

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CLAIMS

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1. A method of controlling operations of a plurality of elevators, comprising the steps of:

giving specific attributes to each elevator during a definite period corresponding to prescribed callings for said elevator; and

controlling operations of each of said elevators based on said attributes given to said elevator.

2. A method of controlling operations of a plurality of elevators according to claim 1, wherein said prescribed callings are a calling signal from a prescribed floor, and signals from calling buttons at specific elevator stops and in specific elevators.

3. A method of controlling operations of a plurality of elevators according to claim 1, wherein said attributes include a running time, a crowdedness and stopping times.

4. A method of controlling operations of a plurality of elevators according to claim 1, wherein said attributes include an operation for the weak, an operation for observations and an operation exclusive to one company.

5. A method of controlling operations of a plurality of elevators according to claim 1, wherein said controlling

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operations of said plurality of elevators includes controls of contents displayed at elevator stops and in said elevators and display timing of said contents.

6. A method of controlling operations of a plurality of elevators, comprising the step of:

controlling operations of an elevator having an attribute to be released in response to occurrence of a prescribed event, according to said described attribute.

7. A method of controlling operations of a plurality of elevators according to claim 6, wherein said prescribed callings are a calling signal from a prescribed floor, and signals from calling buttons at specific elevator stops and in specific elevators.

8. A method of controlling operations of a plurality of elevators according to claim 6, wherein said attributes include a running time, a crowdedness and stopping times.

9. A method of controlling operations of a plurality of elevators according to claim 6, wherein said attributes include an operation for the weak, an operation for observations and an operation exclusive to one company.

10 A method of controlling operations of a plurality of elevators according to claim 6, wherein said controlling operations of said plurality of elevators includes controls

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13 SEP 1996

of contents displayed at elevator stops and in said elevators and display timing of said contents.

11. A method of controlling operations of a plurality of elevators, comprising the steps of;

recognizing attributes to each user;

storing said attributes to each of said users; and

selecting and deciding an elevator to be allocated based on said attributes.

12. An apparatus for controlling operations of a plurality of elevators, comprising:

an information collecting part for collecting signals from devices storing elevator callings at each elevator stop and elevator calling devices;

an attribute storing part for selecting and deciding attributes to be stored, based on information of an attribute content table storing plural attributes in advance and said information collecting part;

an elevator attribute table for storing said selected and decided attributes; and

an allocation control part for selecting and deciding an elevator to be allocated, corresponding to information of said information collecting part and said elevator attribute table.

13. An apparatus for controlling operations of a plurality of elevators according to claim 12, wherein said attribute content table includes attribute tables to every floors and

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said attribute contents can be changed from an attribute storing unit provided outside said apparatus.

14. An apparatus for controlling operations of a plurality of elevators according to claim 12, said apparatus further including:

a guidance display control part for deciding contents displayed at elevator stops and in said elevators, and display timing of said contents, corresponding to information of said information collecting part, said elevator attribute table and said allocation control part.

15. A method of controlling the operation of a plurality of elevators substantially as any one herein described herein with reference to the accompanying drawings.

16. An apparatus for controlling the operation of a plurality of elevators substantially as herein described with reference to and as illustrated in Figs. 1 to 3 or Figs. 4 and 5, or Figs. 6 to 17 of the accompanying drawings.

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AN ELEVATOR OPERATION CONTROL APPARATUS AND CONTROL METHOD THEREOF

ABSTRACT

The present invention is to offer a specific service without reducing the facilities for usual users by executing a specific control and guidance only during use period by a specific user based on attributes given to each elevator. If a specific calling is generated, an attribute storing part 33 stores a cage attribute in the corresponding part of a cage attribute table 35 referring to the contents of an attribute content table 34. Then, an allocation control part 36 selects and decides a service elevator to be allocated so that the attributes of the elevator are not vitiated referring to the cage attribute table.

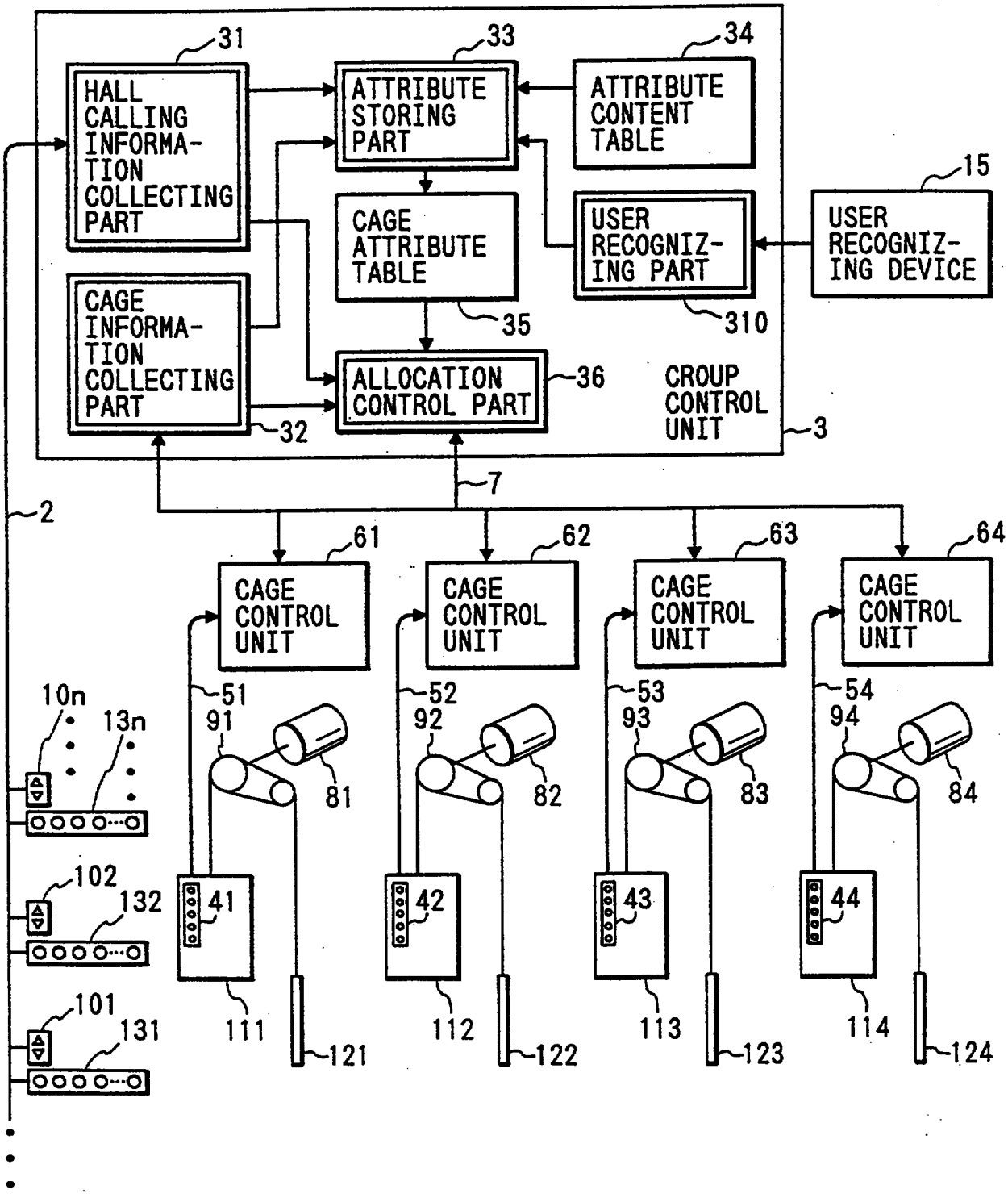
FIGURE 1

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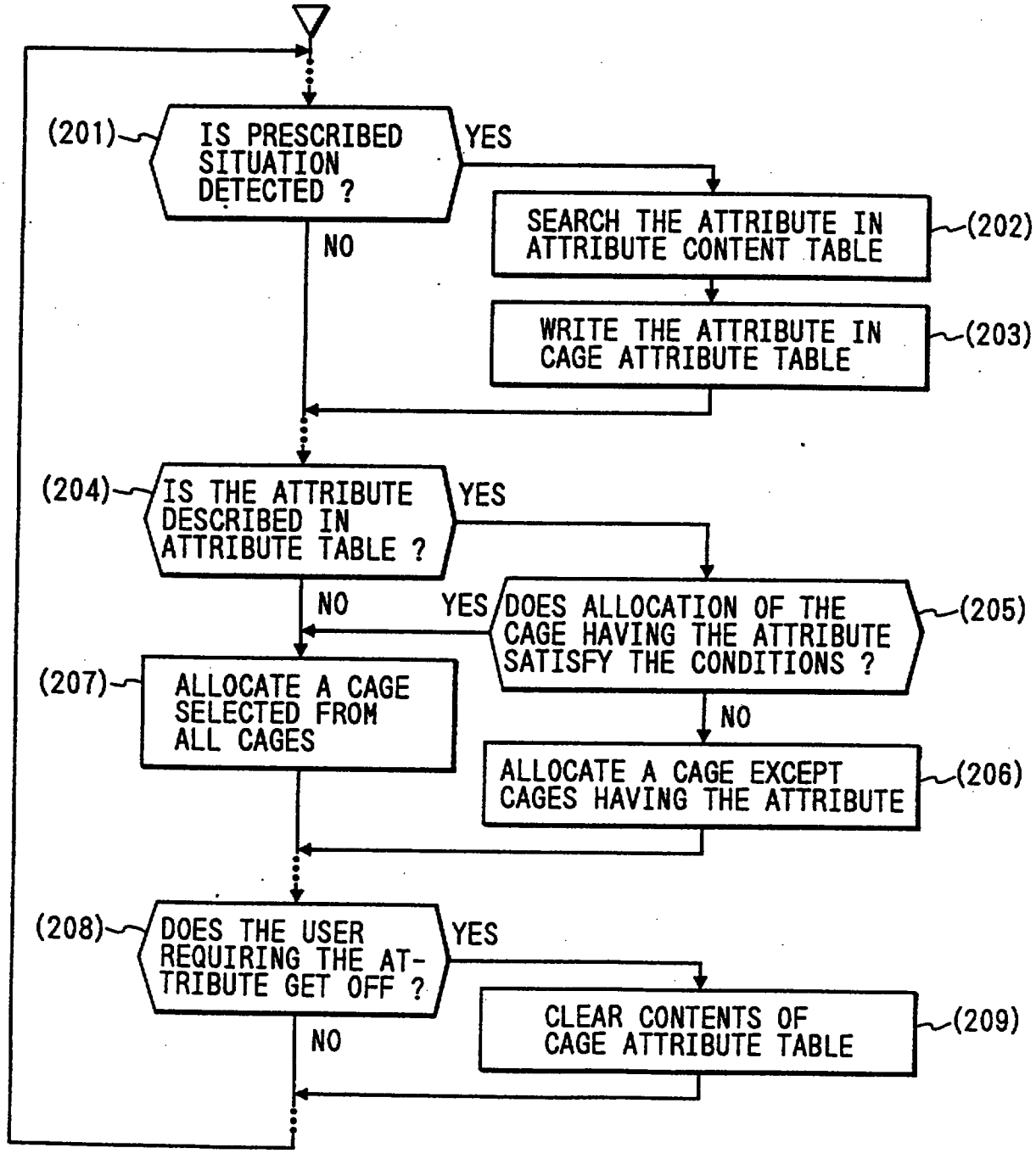
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FIG. 1



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FIG. 2



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FIG. 3a

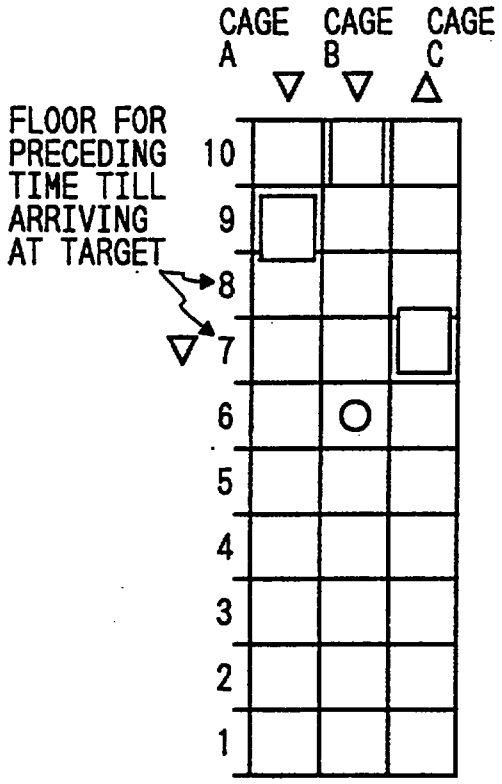


FIG. 3b

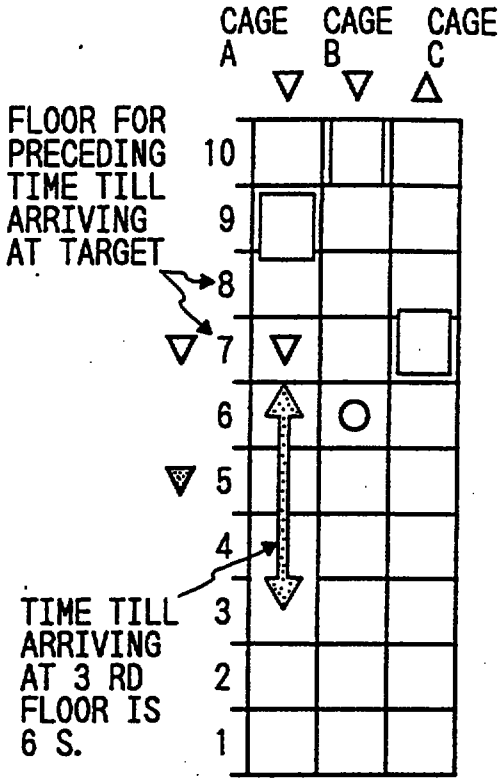


FIG. 3c

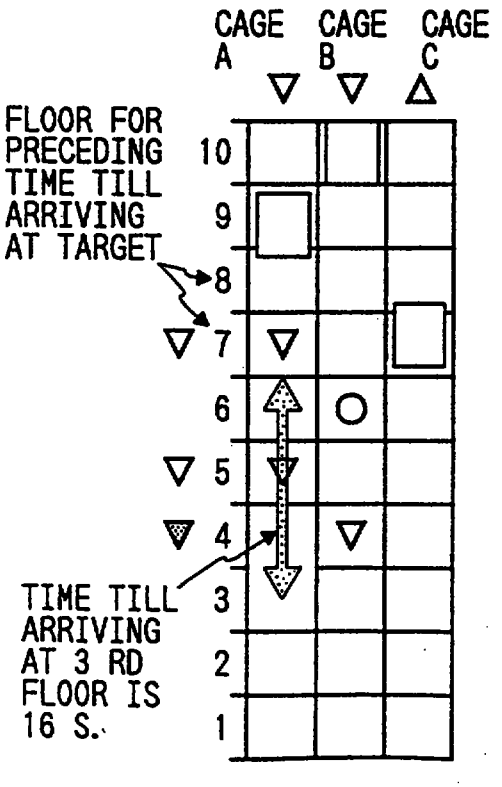
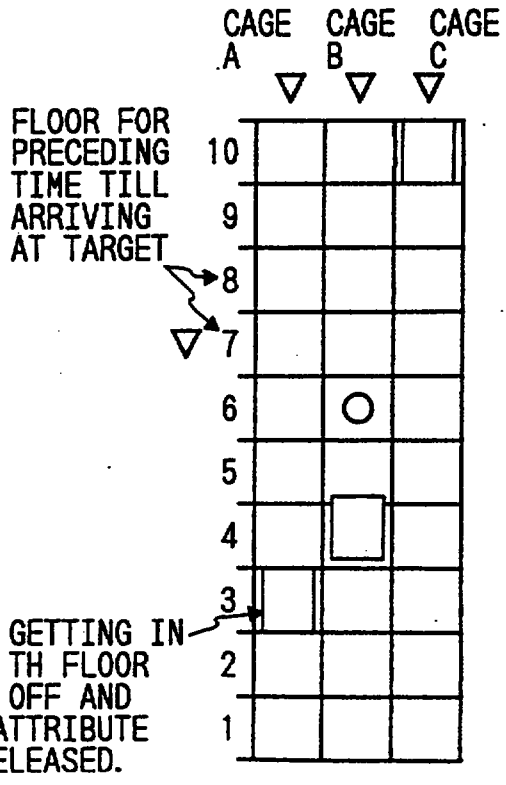
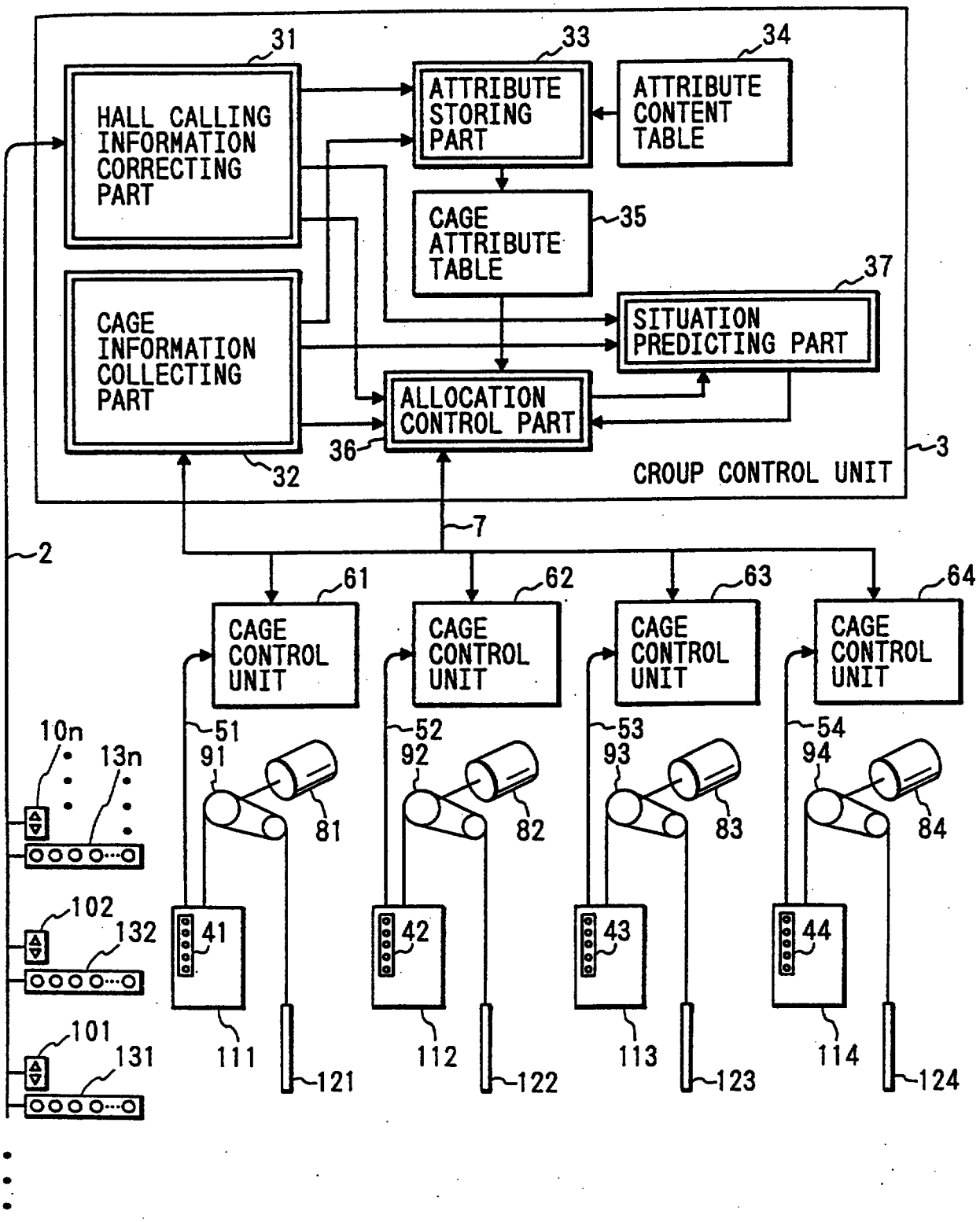


FIG. 3d



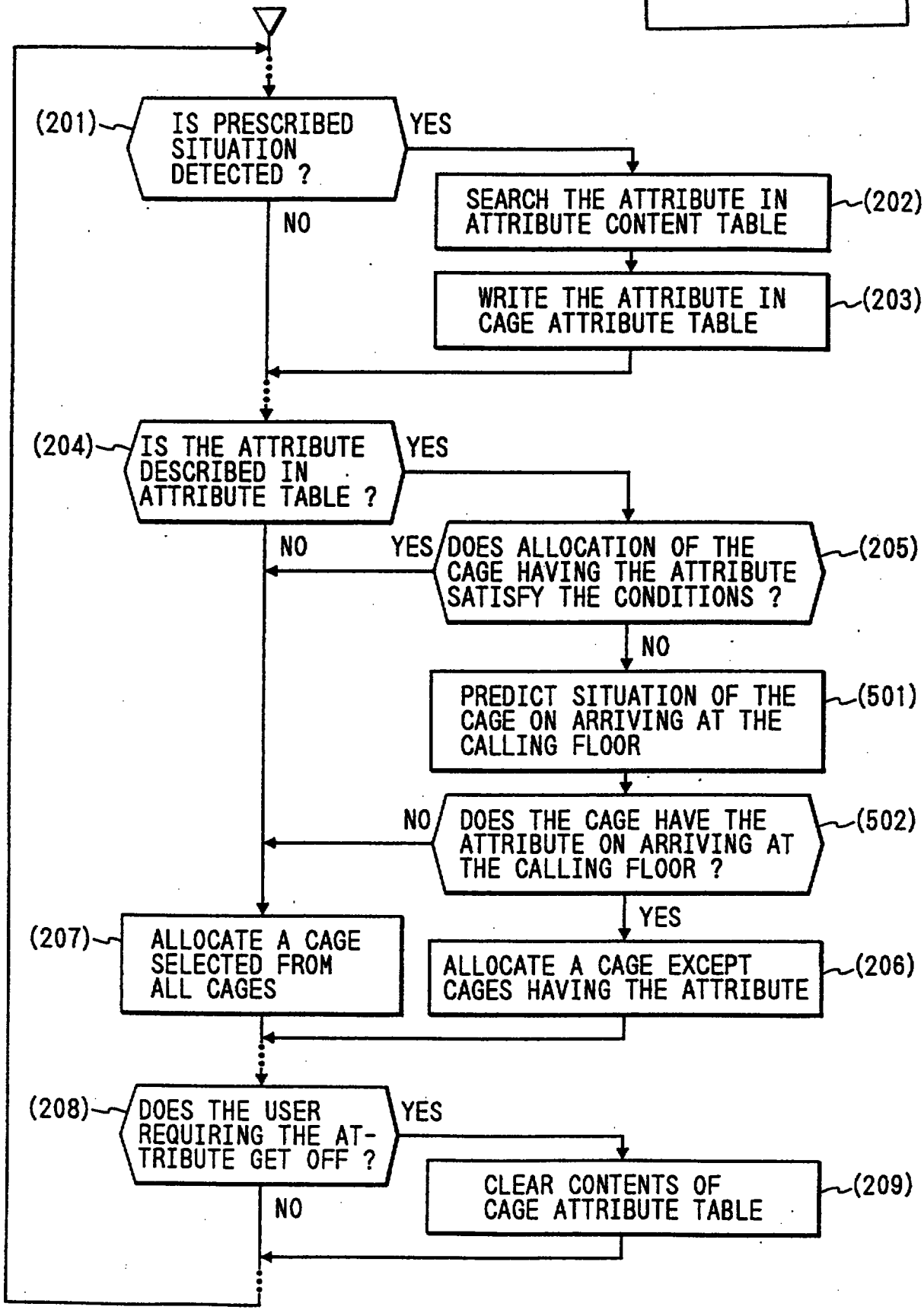
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FIG. 4



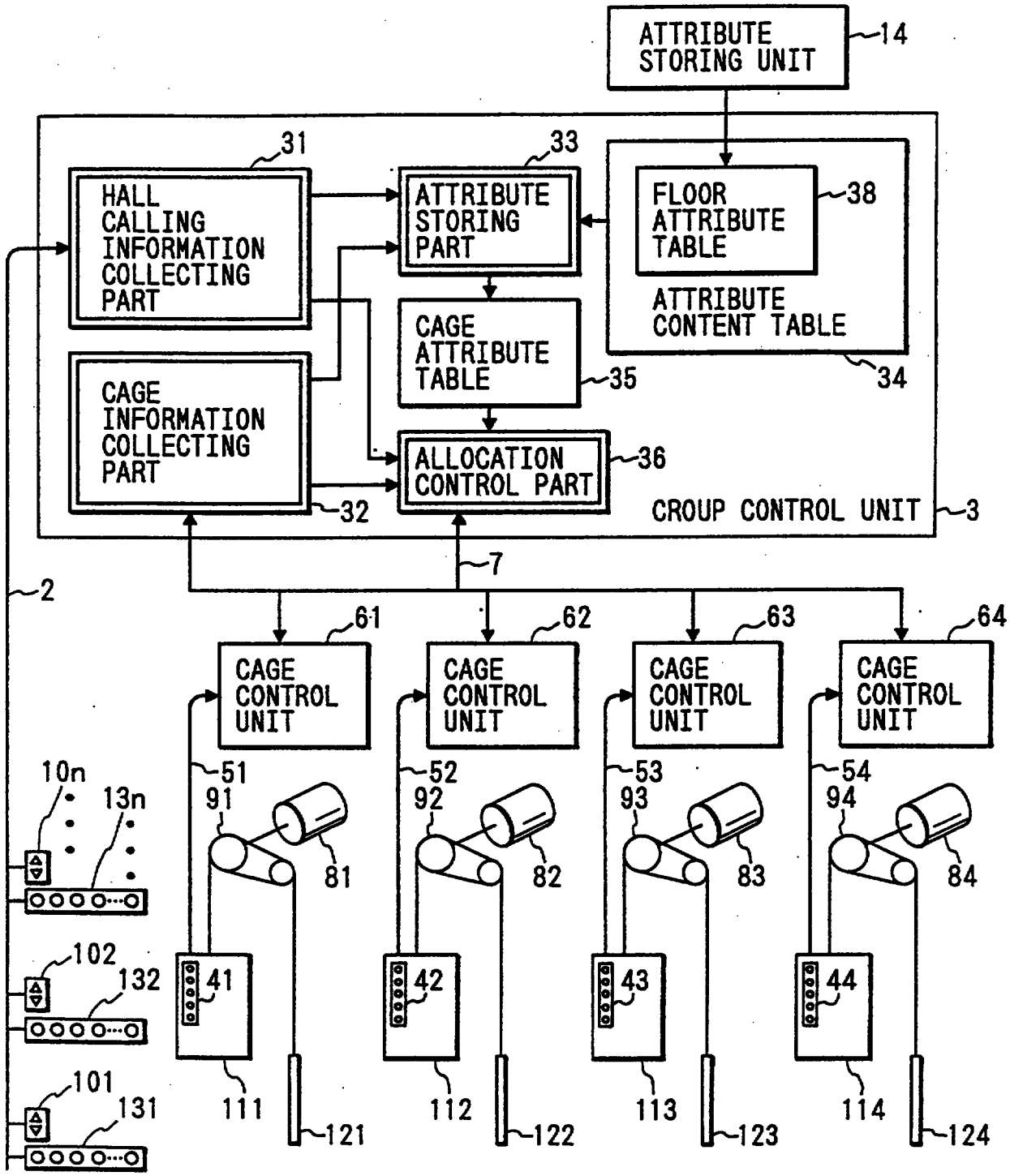
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FIG. 5



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FIG. 6



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FIG. 7a

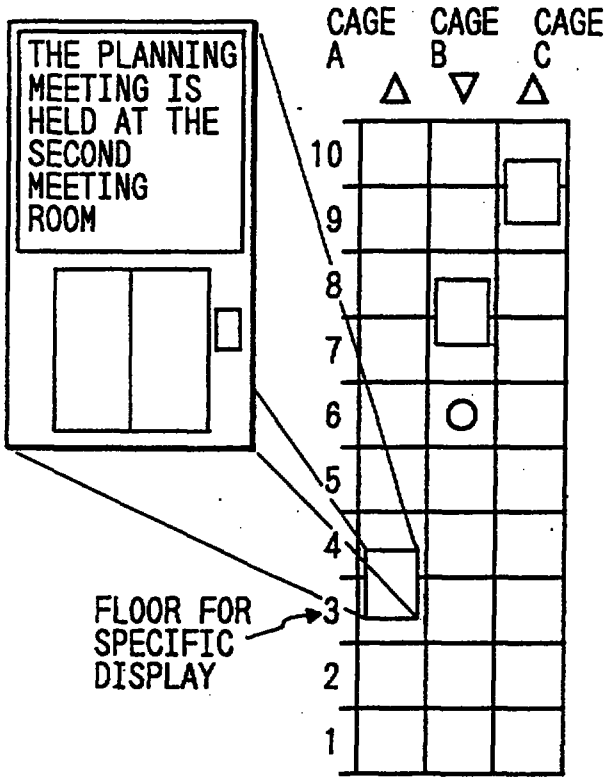


FIG. 7b

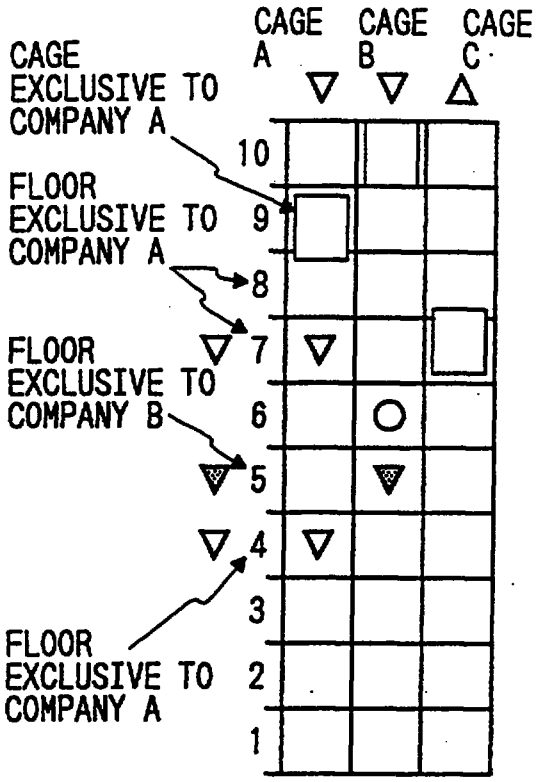


FIG. 7c

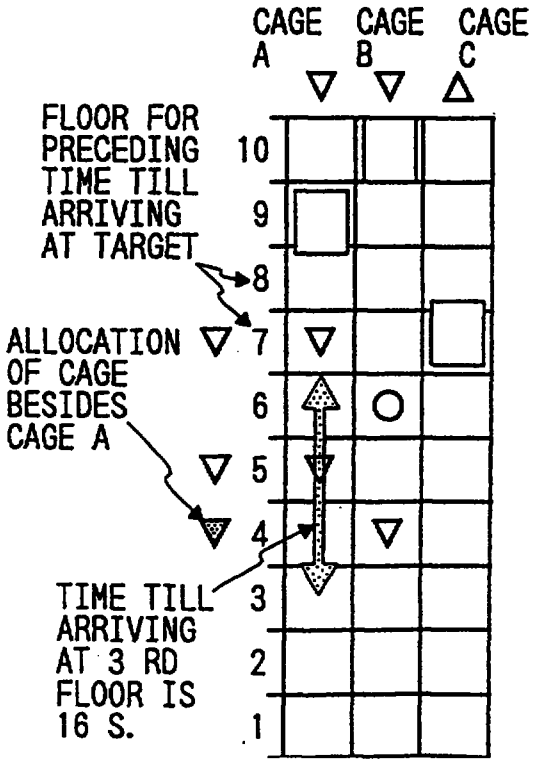
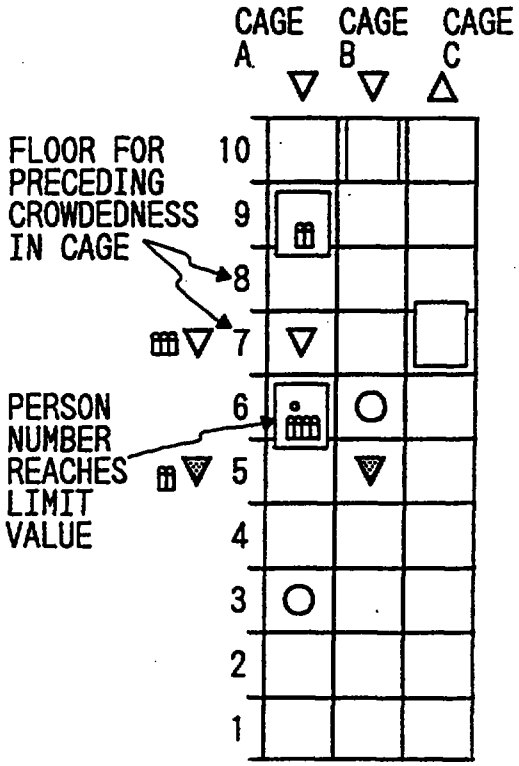


FIG. 7d



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13 SEP 1996

FIG. 8

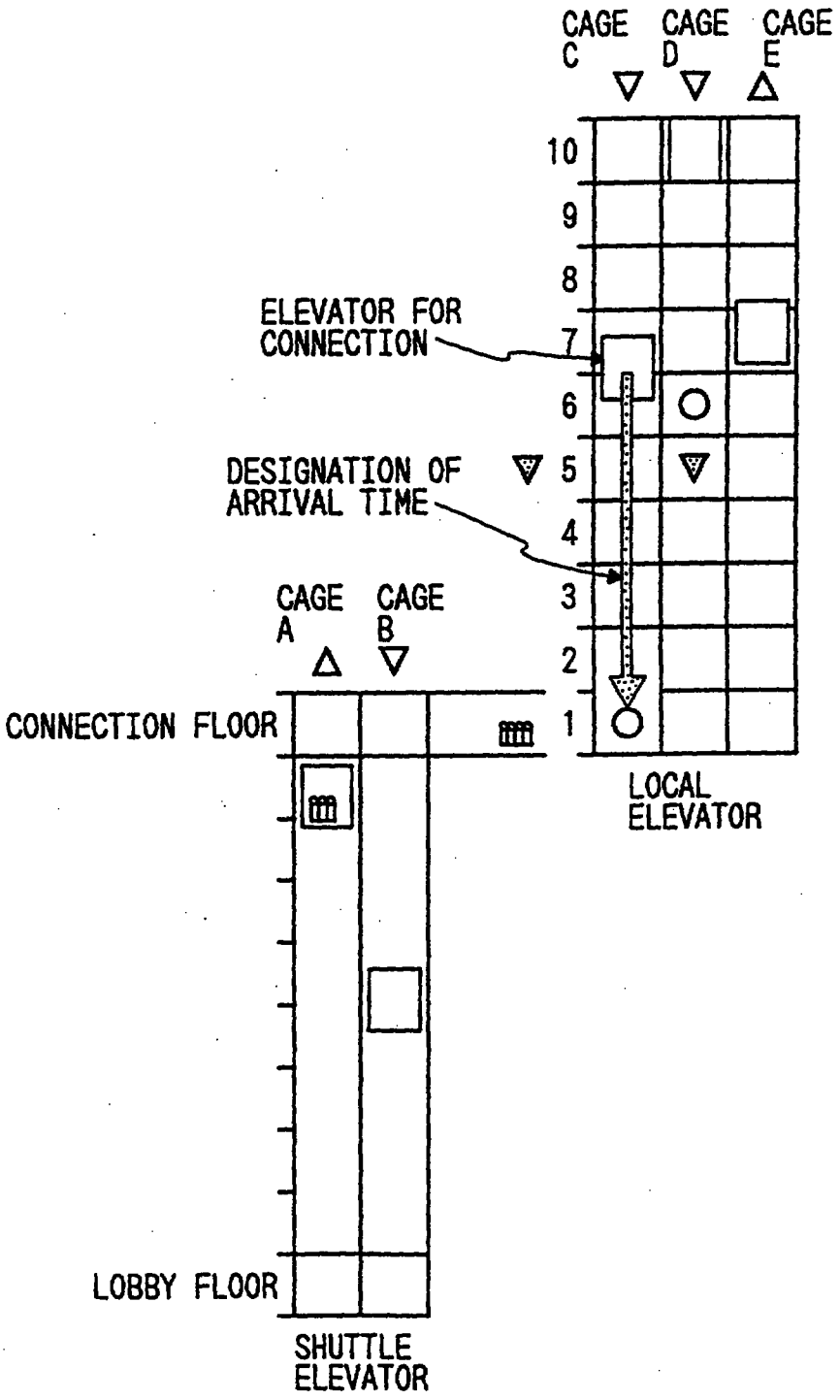
	CAGE NO. 1	CAGE NO. 2	• • •	CAGE NO. n
ATTRIBUTE	PRECEDENCE OF TIME (TILL ARRIVING AT TARGET)			
STARTING FLOOR	7 TH FLOOR			
ENDING FLOOR	3 RD FLOOR			
CONDITIONS OF ATTRIBUTE	LESS THAN 20 S TILL ARRIVING AT TARGET			
• • •				

FIG. 9

ATTRIBUTE	ATTRIBUTE ADDING CONDITIONS	ATTRIBUTE RELEASING CONDITIONS	CONDITIONS OF ATTRIBUTE	ATTRIBUTE EXECUTING CONDITIONS
PRECEDENCE OF TIME (TILL ARRIVING AT TARGET)	REGISTRATION OF CALLINGS FROM 7 TH AND 8 TH FLOOR	GETTING OFF OF USER GETTING IN AT 7 TH AND 8 TH FLOOR	LESS THAN 20 S TILL ARRIVING AT TARGET	USUAL STATE
PRECEDENCE OF CROWD-EDNESS	REGISTRATION OF CALLING FROM 6 TH FLOOR	GETTING OFF OF USER GETTING IN AT 6 TH FLOOR	LESS THAN 30% OF CROWD-EDNESS	USUAL STATE
• • •	• • •	• • •	• • •	• • •
CONTROL TO WEAK PERSON BUTTON	WEAK PERSON BUTTON	GETTING OFF OF USER OF WEAK PERSON BUTTON (ARRIVAL AT TERMINAL FLOOR)	CONTROLL-ING OPERATIONS FOR WEAK PERSON	NONE
• • •	• • •	• • •	• • •	• • •
• • •	• • •	• • •	• • •	• • •

REPLACEMENT SHEET
13 SEP 1996

FIG. 10



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13 SEP 1996

FIG. 11a

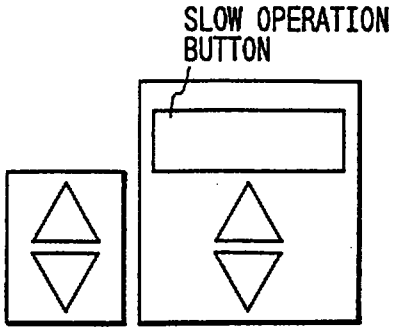


FIG. 11b

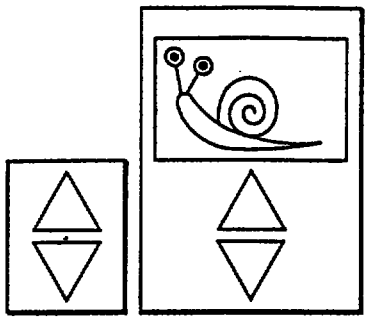


FIG. 11c

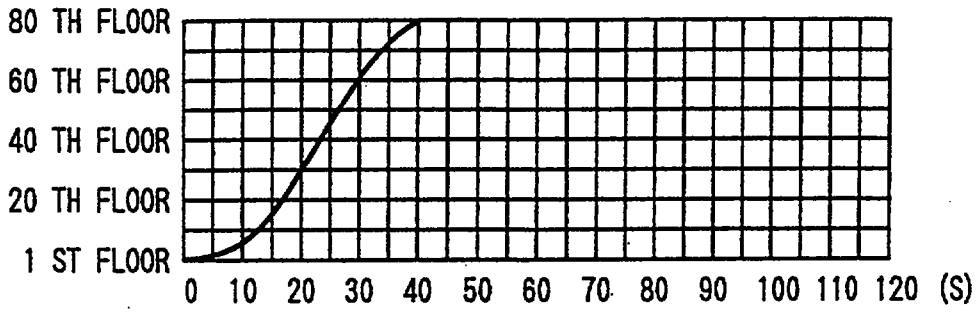


FIG. 11d

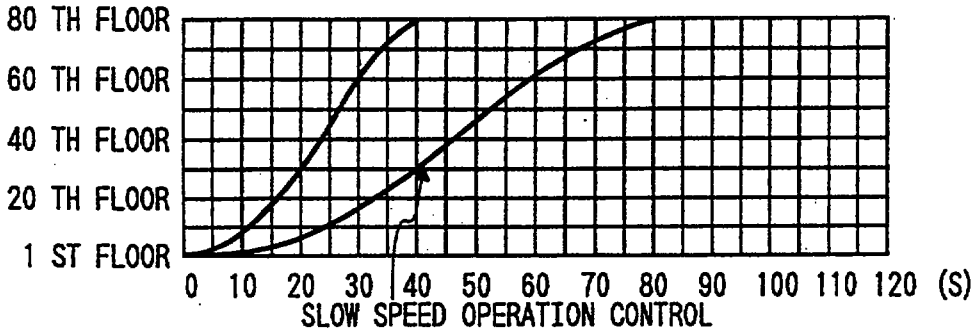
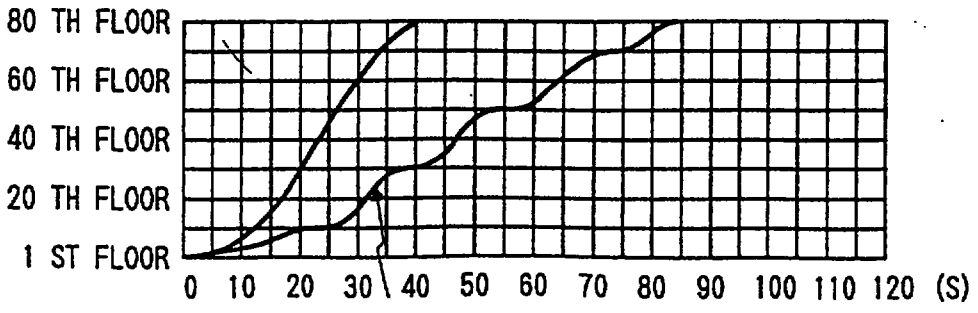


FIG. 11e



CONTROL FOR OPERATIONS OF STOPPING AT INTERMEDIATE FLOORS

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13 SEP 1996

FIG. 12 a

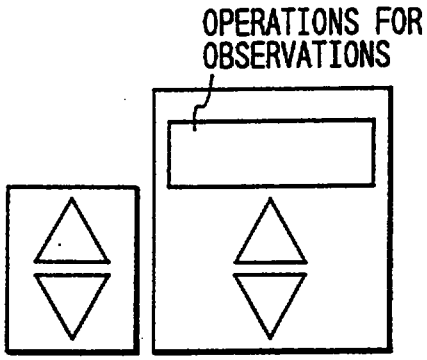


FIG. 12 b

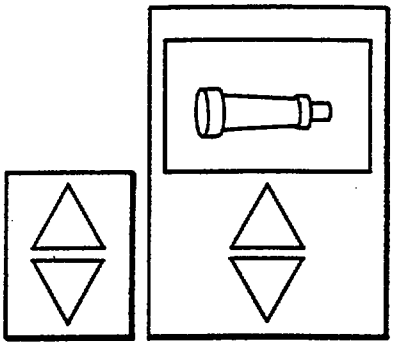


FIG. 12 c

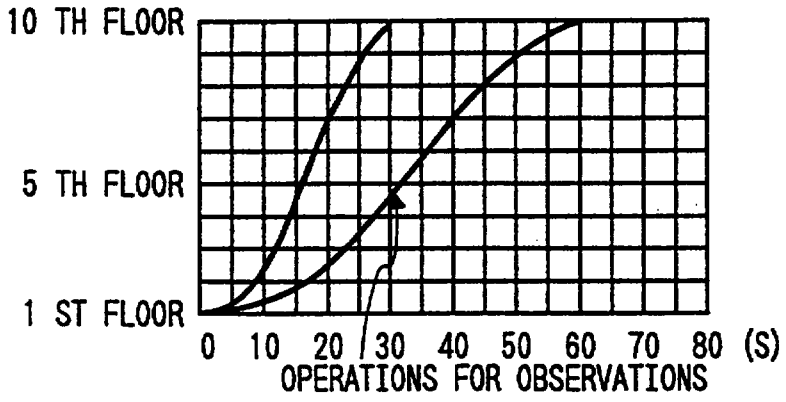


FIG. 12 d

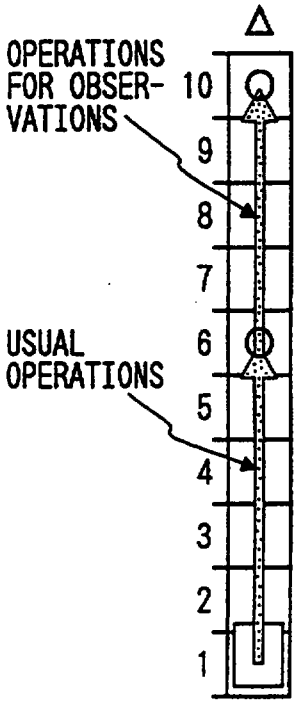
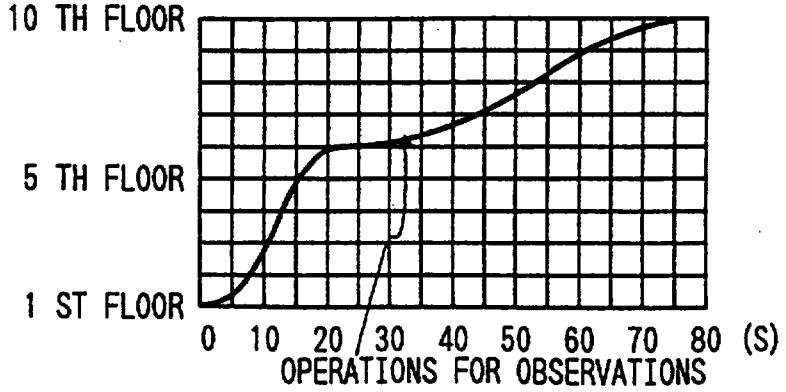


FIG. 12 e



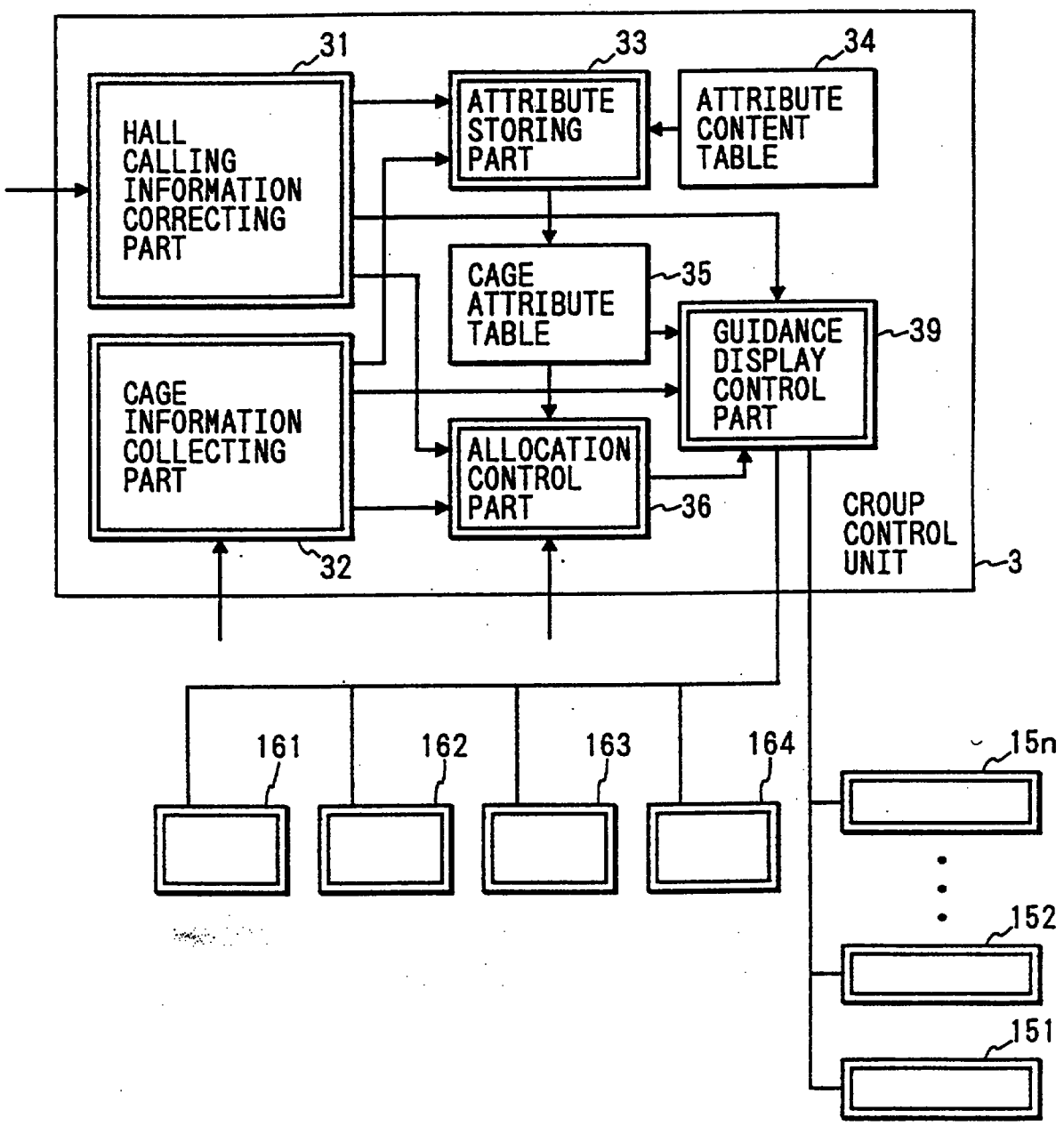
REPLACEMENT SHEET
13 SEP 1996

FIG. 13

	CAGE NO. 1	CAGE NO. 2	• • •	CAGE NO. n
ATTRIBUTE	PRECEDENCE OF TIME (TILL ARRIVING AT TARGET)		• • •	
STARTING FLOOR	7 TH FLOOR		• • •	
ENDING FLOOR	3 RD FLOOR		• • •	
CONDITIONS OF ATTRIBUTE	LESS THAN 20 S TILL ARRIVING AT TARGET		• • •	
DEMERIT MARKS	5 S : 20 POINTS		• • •	
ATTRIBUTE	PRECEDENCE OF CROWD-EDNESS		• • •	
STARTING FLOOR	7 TH FLOOR		• • •	
ENDING FLOOR	3 RD FLOOR		• • •	
CONDITIONS OF ATTRIBUTE	LESS THAN 20 S TILL ARRIVING AT TARGET		• • •	
DEMERIT MARKS	10% : 20 POINTS		• • •	
TOTAL MARKS	30 POINTS			

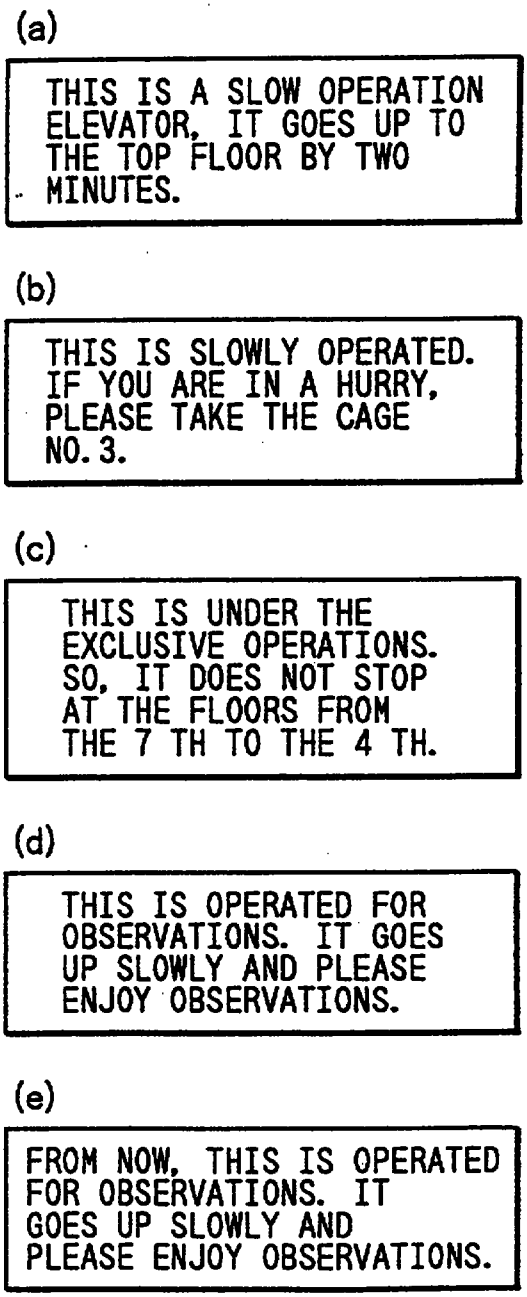
REPLACEMENT SHEET
13 SEP 1996

FIG. 14



REPLACEMENT SHEET
13 SEP 1996

FIG. 15



REPLACEMENT SHEET
13 SEP 1996

FIG. 16

(a)

THIS IS NOW UNDER THE SLOW OPERATIONS. IT GOES UP TO THE TOP FLOOR BY TWO MINUTES.

(b)

THIS IS NOW UNDER THE SLOW OPERATIONS. IF YOU ARE IN A HURRY, PLEASE TRANSFER TO THE CAGE NO. 3 AT THE 6 TH FLOOR.

(c)

THIS IS UNDER THE EXCLUSIVE OPERATIONS AND THE NEXT STOP IS THE 6 TH FLOOR.

(d)

THIS IS UNDER THE OBSERVATION OPERATIONS. IT GOES UP SLOWLY AND PLEASE ENJOY OBSERVATIONS

(e)

FROM NOW, THIS IS OPERATED FOR OBSERVATIONS. IT GOES UP SLOWLY AND PLEASE ENJOY OBSERVATIONS.

REPLACEMENT SHEET
13 SEP 1996

FIG. 17

CAGE NO. n	USER NO. 1	USER NO. 2	• • •	USER NO. 20

CAGE NO. 2	USER NO. 1	USER NO. 2	• • •	USER NO. 20

CAGE NO. 1	USER NO. 1	USER NO. 2	• • •	USER NO. 20
ATTRIBUTE	PRECEDENCE OF TIME (TILL ARRIVING AT TARGET)			
STARTING FLOOR	7 TH FLOOR			
ENDING FLOOR	3 RD FLOOR			
CONDITIONS OF ATTRIBUTE	LESS THAN 20 S TILL ARRIVING AT TARGET			
• • •				

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12 DEC 1997

CLAIMS

1. A method of controlling the operation of an elevator system having a plurality of elevators, comprising the steps of:

selecting one of said elevators for assignment of a specific one of a plurality of attributes thereto in response to a prescribed call from a user, the selection of said one of said elevators being on the basis of attributes already assigned to said elevators of said elevator system:

assigning said specific attribute to an elevator in response to the prescribed call from a user, the attribute being automatically determined by the elevator system, the assignment of said specific attribute being for a period which commences no earlier than the time of said prescribed call;

controlling the operation of said elevator in dependence on the or all attributes assigned to said elevator; and

cancelling the assignment of said specific attribute to said elevator no later than the arrival of said user at a destination.

2. A method according to claim 1, wherein said prescribed call is a calling signal from a prescribed floor, and/or a signal from calling buttons at specific elevator stops and in specific elevators.

3. A method according to claim 1 or claim 2, wherein said attributes include a running time, a crowdedness and stopping time.

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REPLACEMENT SHEET

12 DEC 1997

4. A method according to any one of the preceding claims, wherein said controlling of the operation of said elevator includes control of information displayed at elevator stops and in said elevator, including controlling the timing of the display of said information.

5. A method according to any one of the preceding claims, wherein the assignment of the specific attribute is cancelled in response to the occurrence of a prescribed event.

6. A method according to any one of the preceding claims wherein at least some of said attributes relates to respective users of the elevator system.

7. An apparatus for controlling the operation of a plurality of elevators, comprising:

an attribute storage table for storing attributes assignable to elevators of said system;

an information collecting part for collecting signals corresponding to prescribed calls from users of the system;

means for automatically selecting a specific attribute to be assigned to one of said elevators in response to any of said prescribed calls from a user;

allocation means for automatically selecting one of said elevators and, assigning laid specific attribute thereto, the selection of said one of said elevators being on the basis of attributes already assigned to elevators of said system, the assignment of said specific attribute being

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REPLACEMENT SHEET
REPLACEMENT SHEET
12 DEC 1994

for a period which commences no earlier than the time of said prescribed call; and

control means for controlling the operation of said elevator in dependence on the or all attributes assigned to said elevator;

wherein the allocation means for assigning said specific attributes is arranged to cancel the assignment of said specific attribute to said elevator no later than the arrival of said user at a destination.

8. An apparatus according to claim 7, wherein said attribute storage table includes attributes corresponding to respective floors and said attributes are changeable by an attribute storing unit.

9. An apparatus according to claim 7, further including:

a guidance display control part for deciding information displayed at elevator stops and in said elevators, and the timing of said display, corresponding to information from said information collecting part, said attribute storage table and said allocation means.

10. A method controlling the operation of a plurality of elevators substantially as herein described with reference to the accompanying drawings.

11. An apparatus for controlling the operation of a plurality of elevators substantially as herein described with reference to and as illustrates in Figs. 1 to 3 or Figs. 4 and 5, or Figs, 6 to 17 of the accompanying drawings.

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REPLACEMENT SHEET

AN ELEVATOR OPERATION CONTROL APPARATUS AND CONTROL METHOD THEREOF

ABSTRACT

The present invention is to offer a specific service without reducing the facilities for usual users by executing a specific control and guidance only during use period by a specific user based on attributes given to each elevator. If a specific calling is generated, an attribute storing part 33 stores a cage attribute in the corresponding part of a cage attribute table 35 referring to the contents of an attribute content table 34. Then, an allocation control part 36 selects and decides a service elevator to be allocated so that the attributes of the elevator are not vitiated referring to the cage attribute table.

FIGURE 1

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REPLACEMENT SHEET
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REPLACEMENT SHEET
26 MAY 1998

AN ELEVATOR OPERATION CONTROL APPARATUS AND A CONTROL METHOD THEREOF

The present invention relates to an elevator operation control apparatus, particularly to an operation control apparatus for changing its operation corresponding to the utilization situations.

A conventional operation control in what is called a group control of elevators for corresponding to callings from multi-floors selects and decides an elevator to be allocated to calling from a hall. After microcomputers are used to the elevator operation control, an allocation to hall calling method is used, wherein such an evaluation index as a waiting time till giving a service to calling from a hall is calculated in each elevator and an elevator to be allocated is determined on the basis of the evaluation index.

And an operation control method for allocating an elevator of the lager capacity to calling from a crowded floor is described in Japanese Patent Application Laid-Open 177267/1984, further, in Japanese Patent Application Laid-Open

REPLACEMENT SHEET
26 MAY 1998

140468/1980, another method for deciding an allocation priority is disclosed, wherein a specific elevator is preferentially allocated to calling from a specific floor. In further other operation controls, an elevator exclusive to a person using a wheelchair is allocated to calling from a person on a wheel in case a button for a person using a wheelchair is provided, or an elevator allocated to VIP(Very Important Person) calling is exclusively operated, separated from a group control of elevators.

Further, in Japanese Patent Application Laid-Open 127376/1990, techniques capable of selecting " a less crowded elevator " or " an elevator of less waiting time ." are disclosed in order to correspond to diverse requires.

The above-mentioned techniques described in Japanese Patent Applications Laid-Open 140468/1980 and 177267/1984, and the technique of corresponding to a wheelchair calling can not answer to diverse requires by general users since those techniques are ones for corresponding not to diverse requires by general users but for allocating a specific elevator to calling from a specific hall , and the technique of corresponding to a VIP calling can not also answer to diverse requires by general users since it responds to calling from a specific hall and the allocated elevator is controlled, separated from a group control of elevators. Further, by the technique disclosed in Japanese Patent Application Laid-Open 127376/1990, it is not secured that even though an elevator having the state designated by a user is selected and allocated, the designated state of the elevator is kept till

REPLACEMENT SHEET
26 MAY 1998

arriving at the target floor of the user since nothing is considered for state changes of the elevator after the elevator corresponding to the calling from the hall is allocated.

Although a strong person has a liking for an elevator going straight from the first floor to a roof in a high-rise building, it is sometime preferable for the weak that an elevator is slowly lifted, or stopped at several intermediate floors for persons to take the times for adapting themselves to the air pressure changes since the weak sometime feel discomfort due to air pressure changes by rapid change of height. And allocation of a specific elevator or a specific guidance is required only for users from a specific floor or a specific elevator stop. If exclusive elevators are operated in order to satisfy the above-mentioned diverse requires, there may occurs the problems that totally efficient operations of a group of elevators become impossible, or a waiting time is considerably degraded, or transport ability comes short.

The present invention has been achieved in consideration of the above-described problems, and is aimed at providing an efficient operation control of elevators by putting each elevator in possession of attributes and allocating each elevator to the calling based on the attributes.

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

The present invention provides a method of controlling the operation of an elevator system having a plurality of elevators, comprising the steps of:

selecting one of said elevators for assignment of a specific one of a plurality of attributes thereto in response to a prescribed call from a user, the selection of said one of said elevators being on the basis of attributes already assigned to said elevators of said elevator system:

assigning said specific attribute to an elevator in response to the prescribed call from a user, the attribute being automatically determined by the elevator system, the assignment of said specific attribute being for a period which commences no earlier than the time of said prescribed call;

controlling the operation of said elevator in dependence on the or all attributes assigned to said elevator; and

cancelling the assignment of said specific attribute to said elevator no later than the arrival of said user at a destination.

The present invention also provides an apparatus for controlling the operation of a plurality of elevators, comprising:

an attribute storage table for storing attributes assignable to elevators of said system;

an information collecting part for collecting signals corresponding to prescribed calls from users of

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

the system;

means for automatically selecting a specific attribute to be assigned to one of said elevators in response to any of said prescribed calls from a user;

allocation means for selecting one of said elevators and assigning said specific attribute thereto, the selection of said one of said elevators being on the basis of attributes already assigned to elevators of said system, the assignment of said specific attribute being for a period which commences no earlier than the time of said prescribed call; and

control means for controlling the operation of said elevator in dependence on the or all attributes assigned to said elevator;

wherein the allocation means for assigning said specific attribute is arranged to cancel the assignment of said specific attribute to said elevator no later than the arrival of said user at a destination.

Since it becomes possible to put elevators in possession of attributes during a definite period and to control the elevator allocation based on the attributes by the apparatus having the above-mentioned constitution, an efficient operation control can be realised.

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

That is, if a less crowded elevator is selected and allocated to a hall calling, the elevator is put in possession of the attribution " a less crowded elevator " until the user reaches the target floor and the service for the user is finished. And the elevator is so controlled that allocation of the elevator to calling is restricted whereby the user number of the elevator does not exceed the predetermined number, or that, as for an elevator for the weak, it is operated with a slow speed or stopped at intermediate floors if it is used by the weak in a high-rise building. Then, if services for all users are completed, for example, it reaches the terminal floor, the above-mentioned attributes are cancelled and receives a usual allocation.

By the present invention, the good efficiency of controlling the whole of an elevator group can be also secured by making the elevator having a specific attribute correspond to a usual allocation in accordance with requires from users within the bounds not interfering the attribute.

In the drawings:

Fig.1 shows the whole constitution of the present invention.

Fig.2 shows a flow chart of the outline operations in an example of the present invention.

Fig.3(a) shows an example of the operations of precedence of time " in which the floors for the precedence of time are prescribed.

Fig.3(b) shows an example of the operations of

REPLACEMENT SHEET
26 MAY 1998

precedence of time " in which a calling from another floor satisfies the conditions of the attribute.

Fig.3(c) shows an example of the operations of " precedence of time " in which a calling from another floor does not satisfy the conditions of the attribute.

Fig.3(d) shows an example of the operations of " precedence of time " in which the attribute is released by the user's getting off at the target floor.

Fig.4 shows the whole constitution of one of other embodiments by the present invention.

Fig.5 is a flow chart showing the outline operations in one of other embodiments by the present invention.

Fig.6 shows the whole constitution of one of other embodiments by the present invention.

Fig.7(a) is an explanation figure showing an example operations of a specific guidance at a specific floor.

Fig.7(b) is an explanation figure showing an example operations exclusive to specific companies.

Fig.7(c) is an explanation figure showing an example operations as shown in Fig.3(c), in which another elevator is allocated.

Fig.7(d) is an explanation figure showing an example operations of " precedence of crowdedness ".

Fig.8 shows an example of an attribute table.

Fig.9 shows an example of an attribute content table.

Fig.10 explains the connection operations between elevators.

Fig.11(a) shows an example of providing a button for the

REPLACEMENT SHEET
26 MAY 1998

weak together with a usual calling button at an elevator stop.

Fig.11(b) shows an example of providing the button for the weak indicated by a picture.

Fig.11(c) shows an example of an operation diagram for the usual operations.

Fig.11(d) shows an example of an operation diagram for the operations in the case of calling from the button for the weak.

Fig.11(e) shows an example of an operation diagram for the operations of stopping at intermediate floors.

Fig.12(a) shows an example of providing a button for observations together with a usual calling button at an elevator stop.

Fig.12(b) shows an example of providing a button for observations indicated by a picture.

Fig.12(c) shows an example of an operation diagram indicating difference of the usual operations and the operations for observations.

Fig.12(d) shows an example of an operation pattern for the operations for tenants and for observations in the same building.

Fig.12(e) shows an example of an operation diagram for the operation pattern shown by Fig.12(d).

Fig.13 shows another example of the attribute table.

Fig.14 shows an example of the control for displaying guidance.

Fig.15 shows examples of the guidance display in a cage.

Fig.16 shows examples of the guidance display at an

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

elevator stop.

Fig.17 is an example of a user table of cages.

Hereinafter, details of the present is explained based on embodiments referring to drawings

Figure 1 shows the constitution of an elevator operation control apparatus by the present invention.

The signals from hall calling buttons 101 - 10n are transmitted to a hall calling information collecting part 31 in a group control unit 3 via a transmission way 2. Although the hall calling buttons are the buttons designating the upper and the lower direction in the figure, the buttons calling selectively an elevator in accordance with a preference of a user can be also arranged. The signals from cage calling buttons 41 - 44 are transmitted as cage information together with the weight data of each cage to cage control units 61 - 64 via cage transmission ways 51 - 54. The cage information transmitted to the cage control units 61 -64 is sent together with the information of each cage control unit to a cage calling information collecting part 32 in the group control unit 3. An attribute storing part 33 attaches attributes to some elevators during specific periods and stores the attributes in a cage attributes table 35 by referring to the information of the hall calling information collecting part 31 and the cage calling information collecting part 32, and referring to an attribute content table 34. And the attribute storing part 33 checks for whether an elevator already having

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

the same attribute in the cage attribute table 35 as the newly designated attribute exists. An allocation control part 36 decides an elevator to be allocated to the generated hall calling based on the attributes in the cage attribute table 35 and the information collected in the hall calling information collecting part 31, and transmits the allocation results to the cage control units 61 - 64 via a control unit transmission way 7. The cage control units 61 - 64 drives motors 81 - 84 based on the allocation results and gives services to the hall calling by driving hoists 91 - 94 for moving elevators 111 - 114. And counter-weights 121 - 124 are hung at the terminal of a rope for driving each elevator. In the figure, display devices 131 - 13n are installed in each hall which, for example, display what attribute the coming elevator has.

By keeping the attributes of each elevator in the cage attribute table till completing the services as mentioned above, it is possible to control the elevator operations in accordance with user requirements and further to prevent the operation efficiency decrease of the whole elevator system to the minimum. Though not shown in Fig.1, a hall calling button of the prescribed hall, a specific cage calling button or one of an input terminal and an information receiving device for recognizing voices or pictures by a wireless transmitter or an infrared transmitter is installed in an elevator hall of each floor. The data for recognizing the specific attribute occurrence are sent to the attribute storing part 33, which are made by the user recognizing part 310 in the group control

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

unit 3 via a user recognizing device 15 for recognizing a user by receiving the information input from one of the above-mentioned input devices. The attribute storing part 3 searches the corresponding attribute in the attribute content table 34. The search results including the attribute of a user are stored in a user table of cages, not shown in the figure, provided in place of the cage attribute table. Then, if a hall calling is generated, it is determined by the allocation control part 36 whether the user requires a specific attribute by referring to the user table of cages on determining an elevator to be allocated to the hall calling. If the user has a specific attribute, it is judged whether the conditions of the attribute is satisfied in case the elevator having the same attribute as the one to the user requiring the hall calling is allocated (it can be also considered that an attribute is added to the elevator when the user having an attribute gets on the elevator.). If it is proved by the judgements that the conditions of the attribute can not be satisfied, the elevator is excluded and another elevator is allocated for the allocation. On the other hand, if the conditions are satisfied, the elevator is allocated to the calling. In the allocation, it can be considered that weighting marks are given to the elevator having the same attribute as the one to the user so as to be easily selected. When the elevator arrives at the terminal floor or the user having the attribute in the user table of cages arrives at the target floor, the registration of the user is cleared together with the corresponding attribute in the user table of cages

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

(the attribute of the cage is cleared if the cage attribute is added to the elevator.).

Figure 2 is a flow chart showing the outline of operations in the embodiment by the present invention.

Firstly, at the step 202, the attribute storing part 33 searches the corresponding attribute in the attribute content table 34 if it is detected at the step 201 that a hall calling button of a floor registered in advance or a specific cage calling button is pushed. Nextly, at the step 203, the attribute is written in the corresponding part of the cage attribute table as to the elevator allocated to the hall calling from a hall calling button, or the attribute is written in the corresponding part of the cage attribute table as to the elevator allocated to the cage calling. Then, at the step 205, if the same attribute as the one to be designated is stored in the cage attribute table 35 on checking for the cage attribute table 35 in order to allocate an elevator to the hall calling at the step 204, the allocation control part 35 examines whether the conditions of the attribute is satisfied even though the elevator having the same attribute is allocated to the hall calling. And if the conditions of the attribute is not satisfied when the elevator having the same attribute is allocated, an elevator to be allocated is determined by excluding the elevator having the same attribute at the step 206, otherwise, an elevator to be allocated is determined in all elevators at the step 207. And it is also possible to increase the possibility that the elevator having the same attribute is allocated, by weighting an evaluation

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

index of the elevator having the same attribute with large points. Then, if the user requiring the attribute gets off the elevator by such a reason as arrival at the terminal floor of the elevator at the step 208, the attribute of the elevator is cleared at the step 209.

Figure 3 explains operations of each elevator by the present invention.

It is assumed that the service of preceding the time till arriving at the target floor is designated to callings from the seventh and eighth floors in Figs.3(a)-3(d). If a hall calling is generated from the seventh floor as shown in Fig.3(a), the attribute " preceding time till arriving at target " is added to the corresponding part of the cage attribute table 35 to the allocated elevator after an elevator is allocated for giving the service to the hall calling. In the case, the cage A giving the minimum waiting time is allocated as the service elevator. In the attribute of " precedence of time ", table contents such as " the destination floor is the third floor." , " the condition is the arriving time of less than 20 sec." , etc. are given under the conditions that the time till arriving at the destination floor of the cage calling after arrival at the floor from which the hall calling is generated is less than the predetermined time.

In Fig.3(b), in case a service elevator is determined to the hall calling generated from the fifth floor, it is examined whether the conditions of the attribute " precedence of time " to the cage A can satisfy the condition that the

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

operation time from the seventh to the third floor is less than 20 s. In the case, since the arrival time condition is satisfied even if the elevator is stopping for 10 s at the fifth floor, the elevator giving the shortest time till arriving at the fifth floor is selected in all elevators. In the case shown by Fig.3(b), the cage A is selected.

Nextly, it is assumed that the hall calling is generated from the fourth floor as shown in Fig.3(c). Since the condition of the attribute " precedence of time " to the cage A can not be satisfied if the cage A is allocated to the hall calling though the cage A can arrive at the fourth floor with the minimum waiting time, the cage A is excluded from the allocation and the service elevator is selected in the rest cages. In the case shown by Fig.3(c), the cage B is selected.

As shown in Fig.3(d), the cage attribute table to the cage A is cleared and the usual allocation is done for the cage A after the cage A arrives at the third floor and the user requiring the attribute at the seventh floor gets off at the floor.

In the above-explained case, the destination of a user is determined and the elevator is controlled assuming that the cage calling button of the third floor is pushed by the user right after the user gets on the elevator at the seventh elevator. However, if the cage calling button is not pushed by the user in spite of getting on the elevator, the already stored attributes destined in another cage calling is kept till arriving at the furthest or the terminal floor and cleared after arrival at the furthest or the terminal floor.

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

It may be effective that a destination buttons are provided at each elevator stop.

As attributes to be added to each elevator, a through operation, one company exclusive operation in a tenant building, etc. are adapted. By the present embodiment, diverse kinds of operations are possible without providing an exclusive elevator.

Figure 4 shows an example that the usual operation is allocated to a cage calling after clearing the attribute.

The constitution in the figure is different from the one in Fig.1 in the point that a situation predicting part 37 is provided in it. The situation predicting part 37 predicts the situation of an elevator at the coming position based on the information of the hall calling information collection part 31 and the cage information collection part 32, and the allocation results of the allocation control part 36. When a hall calling is generated, assuming that an elevator having an attribute is allocated, the situation predicting part 37 predicts the situation of the allocated elevator at the time the elevator arrives at the floor from which the hall calling is generated and the allocation control part 36 determines a service elevator to be allocated including the elevator if the attribute of the elevator is cleared till the arriving time.

Figure 5 is a flow chart of the process in the embodiment of executing the usual allocation after clearing the attribution.

Firstly, it is examined at the step 205 whether the conditions of the attribute is satisfied in case an elevator

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

having an attribute is allocated to the calling, and if the conditions is not satisfied, the situation predicting part 37 predicts the situation of the elevator at the time the elevator arrives at the floor from which the hall calling is generated, at the step 501. On the basis of the predicted results, it is examined at the step 502 whether the attribute of the elevator is cleared at the arrival time or another attribute exist, and then if an elevator having an attribute dose not exist, an elevator to be allocated is selected in all elevators at the step 207, otherwise, a service elevator is selected in the rest elevators excluding the elevators having an attribute at the step 206.

Figure 6 is the embodiment of executing elevator controls different in each floor.

The constitution in the figure is different from the one in Fig.5 in the point that an attribute storing unit 14 is provided and a floor attribute table 38 is provided in the attribute content table 34. The attributes of each floor are stored in the attribute content table 34, and the attribute storing part 33 stores the attribute added for the floor from which a hall calling is generated into the cage attribute table 35 in the attribute content table 34 of the elevator allocated to the hall calling. Although the attributes of each floor are stored in the attribute content table 34 in the embodiment in advance, it is also possible to store or change them by the attribute storing unit 14. The attribute storing unit 14 is capable of storing or changing other attributes besides the attributes of each floor.

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

Figures 7(a)-7(d) are pictures explaining operations in case of executing a different control in each floor. The figure is relating to services for a user who is on an elevator, and an example content of the services is explained in the following.

Figure 7(a) shows an example of giving a special guidance to a user going on an elevator from a special floor. Assuming that the special service is given at the third floor, the display exclusive to users from the third floor is given in the cage A allocated to the third floor calling. In case such a service as mentioned above is prepared, displays corresponding to requires by users can be given at each floor.

Figure 7(b) shows an example of avoiding allocation of the same elevator to the hall callings from the different floors in each of which a company different from another company exists for preventing persons of different companies from taking the same elevator in case plural companies exist in a tenant building. In this case, the eighth, seventh and fourth floor are exclusive to a company A. When the cage A stops at the seventh floor responding to the hall calling from the seventh floor, the cage A is set as the elevator exclusive to the company A and is not allocated to the hall calling from the fifth floor where a company B exist. Then, the cage B is allocated to the hall calling from the fifth floor. In case such a service as mentioned above is prepared, users of different companies do not take the same elevator together and users of each company can use the elevator as if the exclusive elevator to their company.

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

Figure 7(c) shows an example of the above-mentioned control preceding the time till arriving at the target floor and allocating an elevator capable of arriving at the target floor within the preset time. The eighth and seventh floor are the floors of preceding the time till arriving at the target floor and the users calling an elevator from the floors are given such a service that the users arrive at the target floor within 20 s. In the figure, it is assumed that the target floor is the third floor and the cage A is allocated to the hall callings from the seventh and fifth floor. At the time the cage A is allocated to the hall calling from the seventh floor, the time till arriving at the third floor is 16 s. Then, if the cage A is also allocated to the hall calling from the fourth floor, the time till arriving at the fourth floor is 26 s exceeding the standard time 20 s assuming the 10 s of stopping time at each floor. Therefore, an elevator except the cage A is allocated to the hall calling from the fourth floor. By the above-mentioned control, the arriving time can be adjusted within the predetermined value.

Figure 7(d) shows an example of controlling the crowded degree of a cage below the preset number. Now, it is assumed that the eighth and seventh floor is designated as the service floor of preceding the crowdedness. Since the user number of the cage A exceeds the preset number at the time the cage A gives a service at the seventh floor if the cage A is allocated to the hall calling from the seventh floor, another cage except the cage A is allocated to the hall calling after the time. In the case shown by Fig.7(d), the cage B is

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

allocated to the hall calling from the fifth floor.

Figure 8 shows an example of the cage attribute table. The attribute, the floor for starting the service of the attribute, the floor for ending the service of the attribute and the conditions of the attribute are described in the table.

Figure 9 is an example of the attribute content table. There are described specific events, for example, generation of a hall calling from a special floor, a special calling, attributes to be given to an elevator corresponding to every outputs from a weight sensor and other sensors in an elevator, the conditions of the attributes and the attribute releasing conditions. And such execution conditions as control execution during a specific time zone, prohibition of control operations during a crowded time zone and so on can be added to the table.

Figure 10 shows an example of a smooth connection between a shuttle elevator and a local elevator. A method that one elevator waits another elevator is conventionally adopted for the smooth connection between a shuttle elevator and a local elevator. However, the efficiency of the waiting elevator is degraded by the method. Thereupon, when the shuttle elevator arrival time at the connection floor is determined, the attribute for designating the range of arriving time is given to a local elevator and the local elevator capable of arriving at the connection floor within the range is allocated and controlled so as not to exceed the range in accordance with the given attribute. In the figure, when the cage C of a local

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

elevator is allocated as a connection elevator for a shuttle elevator A, the range of arriving time is designated to the cage C which is controlled so as to arrive within the range. By the embodiment, it is possible to realize a smooth connection while preventing the efficiency of a local elevator from decreasing.

Figures 11(a)-11(e) are drawings explaining the embodiments of adopting buttons for the weak. The role of elevator equipment is to speedily transfer users to their target floors and it is generally desired that an elevator arrives at the target floor without stopping. On the other hand, since the weak sometimes feel uncomfortable due to air pressure changes induced by rapid elevation if an elevator goes straight to the target floor in a high-rise building, some weak persons prefer to go up to the target floor by stopping at several intermediate floors. For such weak persons, the users' adaptation to the air pressure changes is made easy by decreasing the elevation speed when one of the buttons for the weak provided at elevator stops or in elevators is pushed, stopping at intermediate floors corresponding to hall calling as much as possible and adopting step-shaped patterns of acceleration and deceleration.

Figure 11(a) shows an example of providing " a slowly going button " for the weak together with a usual hall calling button. Figure 11(b) shows an example of indicating a button for the weak by a picture. Figure 11(c) shows a usual operation diagram of an elevator wherein the horizontal axis means time and the vertical axis means the number of floors.

REPLACEMENT SHEET
26 MAY 1998

Figure 11(d) shows an example of the decreased speed operations when the button for the weak is pushed. Although an elevator arrives at the 80-th floor by about 40 s in usual operations, it takes about 80 s to go up to the 80-th floor by executing the decreased speed operations if the button for the weak is pushed. Figure 11(e) shows an example of operation control for stopping at intermediate floors. In the example, the elevator goes up to the 80-th floor by 85 s as stopping four times at intermediate floors. Effects of the air pressure changes are described in the above explanations. Then, since some sick persons feel uncomfortable to changes of acceleration, it is effective to sick persons to prepare the attribute of small acceleration and deceleration operations. By the embodiment, it is possible to reduce the uncomfortable feelings of the weak to the changes of air pressure or accelerations while keeping the facilities for healthy persons.

Figures 12(a)-12(e) are drawings explaining the embodiment of operations for observations using an observation elevator. In the observation elevator, a button for usual users and a button for users wishing to enjoy observations are provided together and the speed of the elevator is decreased so as to enjoy observations if the button for observations is pushed. Figure 12(a) is an example of providing the calling buttons for usual operations and observation operations together. Figure 12(b) shows an example of indicating the button for observations by a picture. Figure 12(c) is an operation diagram indicating the difference between the usual

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

operations and the observation operations. The operation speed of an elevator is decreased so as to enjoy observations enough corresponding to the calling for observations as shown by the figure. Figure 12(d) shows an example of providing an elevator for the both of observation operations (done for the floors upper from the seventh floor) and usual operations in case tenants use parts of a building for offices (the floors lower from the sixth floor are used for offices). In the case, the elevator is so controlled that the usual operations are executed until completion of services to the callings from the floors used for offices even if the button for observations is pushed and the observation operations are done after passing the floors of offices. Thereby, the observation operations can be executed without reducing the facilities for the office persons. To the elevator, the cage attributes of the observation operations and the usual operations till arriving at the sixth floor are added. Figure 12(e) is an operation diagram for the example shown by Fig.12(d). As shown by the figure, to the calling for observations, the elevator quickly goes up to the target floor by the usual operations till arriving at the sixth floor and its speed is decreased for the observation operations after exceeding the sixth floor so as to enjoy observations by taking enough time. The above-mentioned embodiment can satisfy the both of the office persons wanting to arrive at the target floor as soon as possible and the users hoping to enjoy the observations.

Figure 13 is an example of the attribute table wherein marks are set as one of items of the attribute table. It is

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

possible also in the previous embodiment that one elevator can have plural attributes based on the requires by users from the different floors and further also based on the requires from the same floor as far as some attributes. However, the attribute of the combined conditions such as "reducing the number of stopping, or making an elevator less crowded" is sometimes required. In such a case, the item of marks is provided in the cage attribute table 35 and some marks are added to (or subtracted from) the marks given to the elevator in every time the elevator having the attributes is allocated. Then, if the merits becomes more than (or less than) the predetermined points, the corresponding elevator is excluded for allocation. By this embodiment, the attribute of the combined conditions can be treated.

Figure 14 is an example constitution of the embodiment wherein display devices, voice guidance devices, etc. are used. A display control part 39 offers guidance displays corresponding to the situations based on the attributes of the cage attribute table 34 by guidance display devices 151-15n at each floor stop and guidance display devices 161-16n in each cage.

Figure 15 shows an example display by the above-mentioned display device used in a cage. An example guidance of operations for the weak is shown in Fig. 15(a), an example of transfer guidance in operations for the weak in Fig. 15(b), an example display for one company exclusive operation in Fig. 15(c) and example guidance for observation operations in Figs. 15(d) and 15(e). By offering guidance of operation

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

situations to users as explained above, the facilities for users is improved.

Figure 16 shows an example display by the display device provided at a floor stop. Example guidance of operations for the weak are shown in Figs.16(a) and 16(b), an example guidance for one company exclusive operation in Fig.16(c) and example guidance for observation operations in Figs. 16(d) and 16(e). By offering guidance of operation situations to users useful for elevator selection by a user, as explained above, the user can select an elevator preferred by the user. Furthermore, by providing the cage attribute table, the elevator in accordance with the preference of a user can be allocated without reducing the facilities for users.

Now, Fig.17 shows an example of the user table of cages previously explained, which is introduced in place of the cage attribute table 35 in Fig.1. As shown in Fig.17, services corresponding to users' requirements are offered by storing such items as the attribute, the starting floor, the ending floor, etc. to each elevator and each user in the user table and by allocating an elevator referring to the table.

By the present invention, it is possible to operate an elevator corresponding to the attributes of the elevator till the attributes required by a user is accomplished, and to offer the different operations and guidance to different users by the same elevator. Therefore, the different controls to each floor, the operations for suppressing the uncomfortable feelings due to the air pressure changes by delaying the arrival time at the target floor and the different guidance

REPLACEMENT SHEET

to each user can be offered by using the same elevator without reducing the facilities for users.

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

CLAIMS

1. A method of controlling the operation of an elevator system having a plurality of elevators, comprising the steps of:

selecting one of said elevators for assignment of a specific one of a plurality of attributes thereto in response to a prescribed call from a user, the selection of said one of said elevators being on the basis of attributes already assigned to said elevators of said elevator system:

assigning said specific attribute to an elevator in response to the prescribed call from a user, the attribute being automatically determined by the elevator system, the assignment of said specific attribute being for a period which commences no earlier than the time of said prescribed call;

controlling the operation of said elevator in dependence on the or all attributes assigned to said elevator; and

cancelling the assignment of said specific attribute to said elevator no later than the arrival of said user at a destination.

2. A method according to claim 1, wherein said prescribed call is a calling signal from a prescribed floor, and/or a signal from calling buttons at specific elevator stops and in specific elevators.

3. A method according to claim 1 or claim 2, wherein said attributes include a running time, a crowdedness and stopping time.

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REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

4. A method according to any one of the preceding claims, wherein said controlling of the operation of said elevator includes control of information displayed at elevator stops and in said elevator, including controlling the timing of the display of said information.

5. A method according to any one of the preceding claims, wherein the assignment of the specific attribute is cancelled in response to the occurrence of a prescribed event.

6. A method according to any one of the preceding claims wherein at least some of said attributes relates to respective users of the elevator system.

7. An apparatus for controlling the operation of a plurality of elevators, comprising:

an attribute storage table for storing attributes assignable to elevators of said system;

an information collecting part for collecting signals corresponding to prescribed calls from users of the system;

means for automatically selecting a specific attribute to be assigned to one of said elevators in response to any of said prescribed calls from a user;

allocation means for automatically selecting one of said elevators and, assigningsaidspecific attribute thereto, the selection of said one of said elevators being on the basis of attributes already assigned to elevators of said system, the assignment of said specific attribute being

REPLACEMENT SHEET
26 MAY 1998

REPLACEMENT SHEET

for a period which commences no earlier than the time of said prescribed call; and

control means for controlling the operation of said elevator in dependence on the or all attributes assigned to said elevator;

wherein the allocation means for assigning said specific attribute is arranged to cancel the assignment of said specific attribute to said elevator no later than the arrival of said user at a destination.

8. An apparatus according to claim 7, wherein said attribute storage table includes attributes corresponding to respective floors and said attributes are changeable by an attribute storing unit.

9. An apparatus according to claim 7, further including:

a guidance display control part for deciding information displayed at elevator stops and in said elevators, and the timing of said display, corresponding to information from said information collecting part, said attribute storage table and said allocation means.

10. A method controlling the operation of a plurality of elevators substantially as herein described with reference to the accompanying drawings.

11. An apparatus for controlling the operation of a plurality of elevators substantially as herein described with reference to and as illustrates in Figs. 1 to 3 or Figs. 4 and 5, or Figs, 6 to 17 of the accompanying drawings.

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REPLACEMENT SHEET

AN ELEVATOR OPERATION CONTROL APPARATUS AND CONTROL METHOD THEREOF

ABSTRACT

The present invention is to offer a specific service without reducing the facilities for usual users by executing a specific control and guidance only during use period by a specific user based on attributes given to each elevator. If a specific calling is generated, an attribute storing part 33 stores a cage attribute in the corresponding part of a cage attribute table 35 referring to the contents of an attribute content table 34. Then, an allocation control part 36 selects and decides a service elevator to be allocated so that the attributes of the elevator are not vitiated referring to the cage attribute table.

FIGURE 1

REPLACEMENT SHEET
26 MAY 1998