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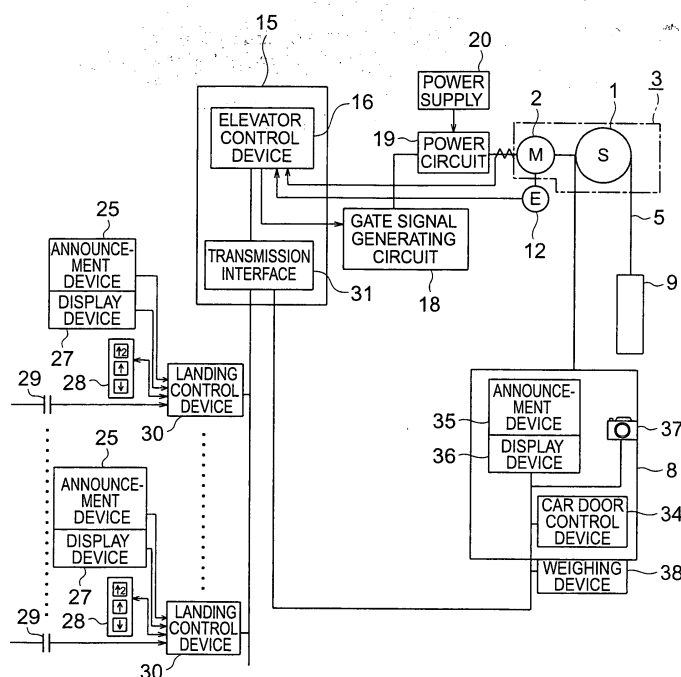
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(54) **ELEVATOR CONTROLLER AND METHOD OF OPERATING ELEVATOR**

(57) Provided is an elevator control device, including travel control means for selectively making a switchover between allocation of a car in response to registrations of calls from non-fire occurrence floors and direct transfer

of the car to each of evacuation floors, in accordance with a user boarding situation within the car, which is detected by in-car situation detecting means, in an event of a fire inside a building.

FIG. 1



Description

Technical Field

[0001] The present invention relates to an elevator control device for making a switchover in travel control in an event of a fire inside a building, and to a method of operating an elevator.

Background Art

[0002] In a conventional device, a travel control mode is switched over from a normal mode to a fire emergency travel mode in an event of a fire inside a building. A car is then automatically landed on an evacuation floor through travel control according to the fire emergency travel mode. Also, registrations of calls made through operations of users are invalidated, and the car is stopped traveling (e.g., see Patent Document 1).

[0003] Patent Document 1: JP 10-182029 A

Disclosure of the Invention

Problem to be solved by the Invention

[0004] In the conventional device structured as described above, the car is automatically stopped traveling at the evacuation floor in the event of a fire inside the building. Therefore, for example, people in wheelchairs, elderly people, and the like cannot be transferred with ease, and cannot be evacuated immediately to the outside of the building even when a rescue team arrives at the building. As a result, it takes a long time to rescue those people.

[0005] The present invention has been made to solve the above-mentioned problem, and it is therefore an object of the present invention to provide an elevator control device capable of further enhancing efficiency in rescuing users.

Means for solving the Problem

[0006] An elevator control device according to the present invention includes: in-car situation detecting means for detecting a user boarding situation within a car; and travel control means for selectively making a switchover between allocation of the car in response to registrations of calls from non-fire occurrence floors and direct transfer of the car to each of evacuation floors in accordance with the user boarding situation within the car, which is detected by the in-car situation detecting means, in an event of a fire inside a building.

Further, a method of operating an elevator according to the present invention includes the steps of: making a determination on a user boarding situation within a car in an event of a fire inside a building; and selectively making a switchover between allocation of the car in response to registrations of calls from non-fire occurrence floors

and direct transfer of the car to an evacuation floor, in accordance with the user boarding situation within the car.

Brief Description of the Drawings

[0007]

[Fig. 1] A schematic diagram showing an elevator apparatus according to Embodiment 1 of the present invention.

[Fig. 2] A schematic diagram showing an elevator control device of Fig. 1 in detail.

[Fig. 3] An explanatory diagram showing evacuation floor priority level information registered in a ROM of Fig. 2.

[Fig. 4] A schematic diagram showing a control device body of Fig. 2.

[Fig. 5] A flowchart showing a travel control operation performed by travel control means of Fig. 4.

Best Mode for carrying out the Invention

[0008] A best mode for carrying out the present invention will be described hereinafter with reference to the drawings.

Embodiment 1

[0009] Fig. 1 is a schematic diagram showing an elevator apparatus according to Embodiment 1 of the present invention. Referring to Fig. 1, a drive device 3 having a drive sheave 1 and a motor 2 is disposed in an upper portion of a hoistway. A plurality of main ropes 5 are wound around the drive sheave 1. A car 8 and a counterweight 9 are suspended within the hoistway by the main ropes 5. The car 8 and the counterweight 9 are raised/lowered due to a driving force of the motor 2.

[0010] The motor 2 is provided with an encoder 12 attached thereto for detecting a rotational speed of a rotary shaft of the motor 2. A signal of the encoder 12 is input to an elevator control device 16 in an elevator control circuit 15. The elevator control device 16 is connected to the motor 2 via a gate signal generating circuit 18 and a power circuit 19. A power supply 20 is connected to the gate signal generating circuit 18. The operation of the drive device 3 is controlled by the elevator control device 16 via the gate signal generating circuit 18 and the power circuit 19.

[0011] A landing announcement device 25 and a landing display device 27 each serving as a landing annunciation device, a plurality of fire sensors 29, a landing button device 28, and a landing control device 30 are disposed at each landing floor. The landing announcement device 25, the landing display device 27, the landing button device 28, and the fire sensors 29 are connected to the landing control device 30. The landing control devices 30 are connected to the elevator control device 16

via a transmission interface 31 in the elevator control circuit 15.

[0012] The landing announcement device 25 informs a user at a landing of a message. The landing display device 27 displays the message for the user. The landing control device 30 controls the operations of the landing announcement device 25 and the landing display device 27 based on a signal from the elevator control device 16.

[0013] Each of the fire sensors 29 detects a fire at a corresponding landing floor. A signal generated by each of the fire sensors 29 is input to the elevator control device 16 via the landing control device 30 and the transmission interface 31. The elevator control device 16 detects the occurrence of a fire at the landing and a location of the occurrence thereof based on the signal output from the fire sensor 29.

[0014] The landing button device 28 registers a call. A registration of a call made by the landing button device 28 is input to the elevator control device 16 via the landing control device 30 and the transmission interface 31. When the registration of the call made by the landing button device 28 is input to the elevator control device 16, the elevator control device 16 allocates the car 8 based on the registration of the call.

[0015] The car 8 is mounted with a car door control device 34, an in-car announcement device 35, an in-car display device 36, an in-car camera 37, and a weighing device 38. The car door control device 34, the in-car announcement device 35, the in-car display device 36, the in-car camera 37, and the weighing device 38 are connected to the elevator control device 16 via the transmission interface 31.

[0016] The car door control device 34 controls opening/closing operations of a car door (not shown) in accordance with a command signal from the elevator control device 16. The in-car announcement device 35 informs users as passengers in the car 8 of a message. The in-car display device 36 displays the message for the users within the car 8. The operations of the in-car announcement device 35 and the in-car display device 36 are controlled by the elevator control device 16.

[0017] The in-car camera 37 photographs an image which is used to confirm a situation within the car 8. The weighing device 38 detects a load within the car 8. The elevator control device 16 detects a user boarding situation within the car 8 based on signals from the in-car camera 37 and the weighing device 38.

[0018] Reference is made next to Fig. 2, which is a schematic diagram showing the elevator control device 16 of Fig. 1 in detail. Referring to Fig. 2, the elevator control device 16 is a computer having a control device body 39, a pulse count unit 49, and a PWM unit 50. The control device body 39 has a CPU 41, a ROM 40, a RAM 43, and a two-port RAM 46. The CPU 41 is designed as a central processing unit. The ROM 40, the RAM 43, and the two-port RAM 46 are each designed as a storage unit. Information on programs or the like is stored in the ROM 40. The CPU 41 performs various calculation

processings based on the programs stored in the ROM 40. Information on calculation data of the CPU 41 or the like is stored in the RAM 43.

[0019] Data transmitted and received between the elevator control device 16 and the transmission interface 31 are stored in the two-port RAM 46. That is, call registration data from the landing button device 28, fire occurrence data from the fire sensors 29, image data from the in-car camera 37, load detection data from the weighing device 38, and command data for the car door control device 34, the announcement devices 25 and 35, and the display devices 27 and 36 are stored in the two-port RAM 46.

[0020] The pulse count unit 49 counts the number of pulse output from the encoder 12. The control device body 39 calculates a rotational speed (a speed at which the car 8 is raised/lowered) of the rotary shaft of the motor 2 and a position of the car 8 based on a count value counted by the pulse count unit 49. When data on a registration of a call made by the landing button device 28 are input to the two-port RAM 46, the control device body 39 reads a predetermined speed pattern (a speed command) stored in the ROM 40 in accordance with the registration of the call. The control device body 39 inputs a speed pattern command value to the PWM unit 50 such that the speed pattern command value conforms to a speed pattern at each position of the car 8. The PWM unit 50 inputs a pulse width modulation signal to the gate signal generating circuit 18 based on the speed pattern command value. The gate signal generating circuit 18 inputs a gate signal to the power circuit 19 based on the input pulse width modulation signal. The power circuit 19 performs a switching operation corresponding to the input gate signal, thereby modulating a power supplied from the power supply 20 to the motor 2. The rotational speed of the rotary shaft of the motor 2, namely, the moving speed of the car 8 is changed in accordance with the power supplied to the motor 2.

[0021] The control device body 39 performs fire occurrence travel control based on the fire occurrence data, the image data, and the load detection data. That is, the control device body 39 controls the travel of the car 8 such that the users can move to predetermined evacuation floors using the car 8 in the event of a fire inside the building. Evacuation floor priority level information indicating priority levels of the evacuation floors is registered in the ROM 40.

[0022] Reference is made next to Fig. 3, which is an explanatory diagram showing the evacuation floor priority level information registered in the ROM 40 of Fig. 2. The building in which the elevator apparatus according to Embodiment 1 of the present invention is installed is assumed to be an eight-story building. The respective floors of the building are classified into a first evacuation floor, a second evacuation floor, third evacuation floors, and non-evacuation floors. The first evacuation floor is a first floor (lobby floor), which is considered to allow the users to escape to the outside of the building most easily.

The second evacuation floor is the eighth floor, which is considered to allow the users to escape to a rooftop and a penthouse and to be rescued with the aid of, for example, a helicopter. The third evacuation floors are a second floor, a third floor, and a fourth floor, which are considered to allow the users to be rescued with the aid of an aerial ladder truck such as a fire truck. The non-evacuation floors are floors other than the first evacuation floor, the second evacuation floor, and the third evacuation floors. The priority levels set as evacuation destinations of the users are set in the order of the first evacuation floor, the second evacuation floor, the third evacuation floors, and the non-evacuation floors. In other words, the priority levels of the evacuation floors are set in the order of ease with which the users can move to the outside of the building (i.e., the users can be rescued).

[0023] Reference is made next to Fig. 4, which is a schematic diagram showing the control device body 39 of Fig. 2. Referring to Fig. 4, the control device 39 is provided with door opening/closing control means 60, travel control means 61, landing control detecting means 64, annunciation means 65, in-car situation detecting means 66, fire occurrence floor storing means 69, and evacuation floor priority level storing means 70.

[0024] The door opening/closing control means 60 outputs a door opening command and a door closing command to the car door control device 34 in response to opening/closing request signals from the car door control device 34 and the travel control means 61. The landing control detecting means 64 detects a registration of a call made through an operation of the landing button device 28, which is input via the landing control device 30. The travel control means 61 controls the operation of the drive device 3 in accordance with the registration of the call detected by the landing control detecting means 64. That is, the travel control means 61 controls the travel of the car 8.

[0025] The annunciation means 65 includes announcement issuing means 65a and indicator display means 65b. The announcement issuing means 65a outputs announcement information to the landing announcement device 25 and the in-car announcement device 35 via the landing control device 30 in response to an announcement sounding command from the travel control means 61. The indicator display means 65b outputs display information to the landing display device 27 and the in-car display device 36 in response to a display output command from the travel control means 61.

[0026] The in-car situation detecting means 66 includes in-car load detecting means 66a and in-car image detecting means 66b. The in-car load detecting means 66a detects a load within the car 8 based on a signal from the weighing device 38. The in-car load detecting means 66a also determines whether or not the load within the car 8 has reached a predetermined value (e. g. , 30 kg). Further, when the load within the car 8 has reached the predetermined value, the in-car load detecting means 66a determines that there is at least one user within the

car 8. The in-car image detecting means 66b analyzes an image from the in-car camera 37, and determines whether or not there is at least one user within the car 8. That is, the in-car situation detecting means 66 detect a user boarding situation within the car 8 based on signals from the in-car camera 37 and the weighing device 38.

[0027] The fire occurrence floor storing means 69 detects a floor and a location at which there a fire occurs, based on a signal from one of the fire sensors 29. The fire occurrence floor storing means 69 also stores fire occurrence floor information indicating a floor at which the use of the car 8 is difficult due to the occurrence of a fire. The evacuation floor priority level information as shown in Fig. 3 is stored in the evacuation floor priority level storing means 70.

[0028] When a fire is detected inside the building by one of the fire sensors 29, the travel control means 61 performs fire occurrence travel control (rescue operation control) based on the information detected by the in-car load detecting means 66a, the in-car image detecting means 66b, and the landing control detecting means 64, and the information stored in the fire occurrence floor storing means 69 and the evacuation floor priority level storing means 70. Hereinafter, the fire occurrence travel control of the travel control means 61 will be described.

[0029] The travel control means 61 prohibits the use of a landing at a fire occurrence floor. To be specific, the travel control means 61 causes the landing announcement device 25 and the landing display device 27 at the fire occurrence floor to annunciate that there is a fire occurring and that the use of the landing is prohibited, turns off an indicator (not shown) for indicating the position of the car 8, and invalidates a registration of a call made by the fire occurrence floor. The travel control means 61 also causes the landing announcement device 25 and the landing display device 27 at each of non-fire occurrence floors to annunciate that a rescue operation is being performed. Further, the travel control means 61 causes the in-car announcement device 35 and the in-car display device 36 to annunciate that the rescue operation is being performed.

[0030] The travel control means 61 also selects evacuation destinations of the users from the first evacuation floor, the second evacuation floor, the third evacuation floors, and the non-evacuation floors, based on the location of the occurrence of the fire and the evacuation floor priority level information. To be specific, the travel control means 61 sequentially determines whether or not there is a fire occurring at the first evacuation floor, the second evacuation floor, and the third evacuation floors. When it is determined that there is no fire occurring at at least one of the first evacuation floor, the second evacuation floor, and the third evacuation floors, the travel control means 61 designates the first evacuation floor, the second evacuation floor, or the third evacuation floors, which is at a relatively high priority level and has not been exposed to the fire, as the evacuation destinations.

[0031] Further, the travel control means 61 selectively

makes a switchover between direct transfer of the car 8 to each of the evacuation floors and allocation of the car 8 in response to registrations of calls from the non-fire occurrence floors, in accordance with the user boarding situation within the car 8, which is detected by the in-car situation detecting means 66.

[0032] More specifically, the travel control means 61 determines, based on the user boarding situation within the car 8, which is detected by the in-car situation detecting means 66, whether or not there is at least one user within the car 8. When it is determined that there is no user within the car 8, the travel control means 61 allocates the car 8 in response to registrations of calls from the non-fire occurrence floors in the order of descending priorities corresponding to decreases in the distance from each of the determined evacuation floors. When neither the in-car load detecting means 66a nor the in-car image detecting means 66b has detected the presence of a user, the travel control means 61 determines that there is no user within the car 8.

[0033] When it is determined that there is at least one user within the car 8, the travel control means 61 determines based on the user boarding situation within the car 8, which is detected by the in-car situation detecting means 66, whether or not the car can afford to allow at least one more user to ride in the car 8. When it is determined that the car can afford to allow at least one more user to ride in the car 8, the travel control means 61 sequentially allocates the car 8 in response to registrations of calls from the non-fire occurrence floors which are located on the way to each of the evacuation floors. That is, the travel control means 61 causes the car 8 to travel toward each of the evacuation floors while sequentially causing the car 8 to stop at the non-fire occurrence floors located on the way thereto. Further, when it is determined that the interior of the car 8 is full, the travel control means 61 transfers the car 8 directly to each of the evacuation floors. When at least one of the in-car load detecting means 66a and the in-car image detecting means 66b has detected the presence of a user, the travel control means 61 determines that there is at least one user within the car 8.

[0034] In addition, when there is a fire occurring at all the evacuation floors, namely, the first evacuation floor, the second evacuation floor, and the third evacuation floors during an attempt to land the car 8 on each of the evacuation floors, the travel control means 61 performs an operation of further facilitating rescue activities following fire fighting. More specifically, the travel control means 61 lands the car 8 on the lowest one of the non-evacuation floors at which there is no fire occurring, and causes the car 8 to wait at that non-evacuation floor in a door-closed state. That is, the travel control means 61 lands the car 8 on that one of the floors at which there is no fire occurring, and stops a door-opening command from being output from the door opening/closing control means 60 to the car door control device 34. A landing door device (not shown) exhibiting high smoke-blocking

performance and high flame-blocking performance is disposed at each of the landings.

[0035] Next, an operation and a method of operating the elevator apparatus will be described. Fig. 5 is a flow-chart showing a travel control operation performed by the travel control means 61 of Fig. 4. Referring to Fig. 5, it is first determined whether or not a fire occurrence signal from any one of the fire sensors 29 has been detected (step S1). When no fire occurrence signal is detected, a normal operation (service) of operating the elevator apparatus is continued (step S2).

[0036] On the other hand, when the fire occurrence signal is detected, the use of a landing at a fire occurrence floor is prohibited (step S3). More specifically, the registration of the call made by the fire occurrence floor is invalidated, an indicator disposed at the fire occurrence floor is turned off, and the landing announcement device 25 and the landing display device 27 at the fire occurrence floor annunciate that there is a fire occurring and that the use of the landing is prohibited. Also, announcement information and display information are output to the landing announcement device 25 and the landing display device 27 at each of the non-fire occurrence floors. Then, the landing announcement device 25 and the landing display device 27 annunciate that a rescue operation is being performed (step S4).

[0037] Subsequently, an evacuation destination is determined based on a fire occurrence situation and the evacuation floor priority level information. More specifically, it is first determined whether or not there is a fire occurring at the first evacuation floor (step S5). When there is no fire occurring at the first evacuation floor, the evacuation destination is determined as the first evacuation floor (step S6). On the other hand, when there is a fire occurring at the first evacuation floor, it is then determined whether or not there is a fire occurring at the second evacuation floor (step S7). When there is no fire occurring at the second evacuation floor, the evacuation destination is determined as the second evacuation floor (step S8). When there is a fire occurring at the second evacuation floor, it is then determined whether or not there is a fire occurring at each of the third evacuation floors (step S9). When there is no fire occurring at each of the third evacuation floors, the evacuation destination is determined as that one of the third evacuation floors (step S10).

[0038] When the evacuation destination is determined, it is determined based on a boarding situation detected by the in-car situation detecting means 66 whether or not there is at least one user within the car 8 (step S11). When it is determined that there is no user within the car 8, the car 8 is allocated in response to registrations of calls from the floors in the order of descending priorities corresponding to decreases in distance from the evacuation destination (step S12).

[0039] On the other hand, when it is determined that there is at least one user within the car 8 after the evacuation destination is determined or when it is determined

that there is at least one user within the car 8 after the car 8 is allocated to one of the non-fire occurrence floors, announcement information and display information are output to the in-car announcement device 35 and the in-car display device 36. Then, the in-car announcement device 35 and the in-car display device 36 annunciate to the interior of the car 8 that a rescue operation is being performed (step S13).

[0040] It is then determined based on the boarding situation detected by the in-car situation detecting means 66 whether or not the car can afford to allow at least one more user to ride in the car 8 (step S14). When it is determined that the car can afford to allow at least one more user to ride in the car 8, the car 8 is allocated in response to registrations of calls from the non-fire occurrence floors located on the way to the determined evacuation destination (step S15). When it is determined that the interior of the car 8 is full, the car 8 is transferred directly to the evacuation destination (step S16). When the car 8 is landed on the first evacuation floor, the second evacuation floor, or one of the third evacuation floors (step S17), it is determined again whether or not a fire occurrence signal is detected.

[0041] On the other hand, when it is determined that there is a fire occurring at all the evacuation floors, namely, the first evacuation floor, the second evacuation floor, and the third evacuation floors during an attempt to determine the evacuation destination, the operation of further facilitating the rescue activities following fire extinguishing is performed. That is, announcement information and display information are output to the in-car announcement device 35 and the in-car display device 36. Then, the in-car announcement device 35 and the in-car display device 36 annunciate that the rescue operation is being performed (step S18). For instance, waiting command information such as "Please wait for a while" is annunciated within the car 8 (step S19). Also, the car 8 is landed on the lowest one of the non-evacuation floors at which there is no fire occurring (step S20), and the car 8 is caused to wait at that non-evacuation floor in the door-closed state (step S21).

[0042] In the elevator control device 16 configured as described above, the travel control means 61 selectively makes a switchover between allocation of the car 8 in response to registrations of calls from the non-fire occurrence floors and direct transfer of the car 8 to each of the evacuation floors in accordance with a user boarding situation within the car 8, which is detected by the in-car situation detecting means 66, in the event of a fire within the building. Therefore, as compared to the above-mentioned conventional device, more users are allowed to move to each of the evacuation floors with the aid of the car 8, so the efficiency in rescuing the users can further be enhanced.

[0043] The travel control means 61 determines based on a user boarding situation within the car 8, which is detected by the in-car situation detecting means 66, whether or not the car can afford to allow at least one

more user to ride in the car 8, in the event of a fire inside the building. When it is determined that the car can afford to allow at least one more user to ride in the car 8, the travel control means 61 allocates the car 8 in response to registrations of calls from the non-fire occurrence floors which are located on the way to each of the evacuation floors. When it is determined that the interior of the car 8 is full, the travel control means 61 transfers the car 8 directly to each of the evacuation floors. Therefore, the efficiency in causing the car 8 to travel during the rescue operation can be enhanced, and the efficiency in rescuing the users can further be enhanced.

[0044] Further, the travel control means 61 determines based on a user boarding situation within the car 8, which is detected by the in-car situation detecting means 66, whether or not there is at least one user within the car 8, in the event of a fire inside the building. When there is no user within the car 8, the travel control means 61 allocates the car 8 in response to registrations of calls from the non-fire occurrence floors in the order of descending priorities corresponding to decreases in the distance from each of the evacuation floors. Therefore, the users at those floors which are considered to make their transfer to the outside of the building relatively difficult can be rescued by priority, so the efficiency in rescuing the users can further be enhanced.

[0045] Still further, the travel control means 61 determines an evacuation floor based on the pre-registered evacuation floor priority level information and a location of the occurrence of a fire, during an attempt to land the car 8 on the evacuation floor. Therefore, the evacuation destination can be changed in accordance with the degree of propagation of the fire, and the users can be transferred to the non-fire occurrence floors. As a result, the efficiency in rescuing the users can further be enhanced.

[0046] When there is a fire occurring at all the evacuation floors during an attempt to land the car 8 on each of the evacuation floors, the travel control means 61 lands the car 8 on the lowest one of the non-evacuation floors at which there is no fire occurring, and causes the car 8 to wait at that non-evacuation floor in the door-closed state. Therefore, the users can be kept further away from flames and smoke, and can be transferred to each of the evacuation floors immediately after fire extinguishing. As a result, the efficiency in rescuing the users can further be enhanced.

[0047] In addition, the evacuation floor priority level information is set based on the degree of difficulty in performing the rescue operation at each of the floors. Therefore, even in an event of a fire at the first evacuation floor (lobby floor), the users can be transferred to the second evacuation floor, which is considered to be the second-ranked floor in terms of easiness of the rescue of the users. As a result, rescuers, for example, firefighters are allowed to engage in the rescue activities with ease, so the efficiency in rescuing the users can further be enhanced.

[0048] Still further, the travel control means 61 invali-

dates a registration of a call made by a floor at which there is a fire occurring, in the event of the fire inside the building, and causes the landing announcement device 25 and the landing display device 27 disposed at the floor to annunciate that the registrations of the calls are invalidated. Therefore, the users at the fire occurrence floor can be urged to escape according to a method other than the use of the elevator apparatus, and the possibility of the car 8 being landed on the fire occurrence floor can be reduced. Consequently, the efficiency in rescuing the users can further be enhanced.

[0049] According to the description of Embodiment 1 of the present invention, the building in which the elevator apparatus is installed is the eight-story building. However, the building may be structured arbitrarily.

[0050] According to the description of Embodiment 1 of the present invention, the eight floor, from which the users can be rescued with the aid of a helicopter, is designated as the second evacuation floor. However, it is preferable that the evacuation floor priority level information be set based on the degree of difficulty in performing the rescue operation at each of the floors. For instance, if it is difficult to perform the rescue operation with the aid of the helicopter due to the structure of the building, one of the floors which is considered to allow the rescue operation to be performed with the aid of an aerial ladder truck may be designated as the second evacuation floor. It is also appropriate to enhance the priority level of one of the floors which is provided with an accessway leading to a neighboring building.

[0051] Further, according to the description of Embodiment 1 of the present invention, the elevator control device 16 determines based on signals of both the weighing device 38 and the in-car camera 37 whether or not there is at least one user within the car 8. However, the elevator control device 16 may determine based on a signal from only one of the weighing device 38 and the in-car camera 37 whether or not there is at least one user within the car 8.

[0052] Still further, according to the description of Embodiment 1 of the present invention, the elevator control device 16 determines in the event of a fire inside the building whether or not the car can afford to allow at least one more user to ride in the car 8, and transfers the car 8 directly to each of the evacuation floors when it is determined that the interior of the car 8 is full. However, the car 8 may be transferred directly to the evacuation floor as soon as it turns out that there is one user within the car 8.

Claims

1. An elevator control device, comprising:

in-car situation detecting means for detecting a user boarding situation within a car; and
travel control means for selectively making a

switchover between allocation of the car in response to registrations of calls from non-fire occurrence floors and direct transfer of the car to each of evacuation floors in accordance with the user boarding situation within the car, which is detected by the in-car situation detecting means, in an event of a fire inside a building.

2. The elevator control device according to Claim 1, wherein the travel control means determines, based on the user boarding situation within the car, which is detected by the in-car situation detecting means, whether or not the car can afford to allow at least one more user to ride in the car in the event of the fire inside the building, allocates the car in response to the registrations of the calls from the non-fire occurrence floors which are located on a way to each of the evacuation floors when it is determined that the car can afford to allow at least one more user to ride in the car, and transfers the car directly to each of the evacuation floors when it is determined that an interior of the car is full.
3. The elevator control device according to Claim 1, wherein the travel control means determines, based on the user boarding situation within the car, which is detected by the in-car situation detecting means, whether or not there is at least one user within the car in the event of the fire inside the building, and allocates the car in response to the registrations of the calls from the non-fire occurrence floors in an order of descending priorities corresponding to decreases in distance from each of the evacuation floors when it is determined that there is no user within the car.
4. The elevator control device according to Claim 1, wherein the travel control means determines the evacuation floors based on pre-registered evacuation floor priority level information and a location of occurrence of the fire in the event of the fire inside the building.
5. The elevator control device according to Claim 4, wherein:

the building includes at least one non-evacuation floor; and

the travel control means lands the car on a lowest non-evacuation floor at which there is no fire occurring and causes the car to wait in a door-closed state when there is a fire occurring at all the evacuation floors during an attempt to land the car on each of the evacuation floors.

6. The elevator control device according to Claim 4, wherein the evacuation floor priority level information is set based on a degree of difficulty in performing a

rescue operation at each of the floors.

7. The elevator control device according to Claim 1, wherein the travel control means invalidates registrations of calls from a fire occurrence floor in the event of the fire inside the building, and causes a landing annunciation device disposed at a landing of that floor to annunciate that the registrations of the calls are invalidated.

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8. A method of operating an elevator, comprising the steps of:

making a determination on a user boarding situation within a car in an event of a fire inside a building; and
selectively making a switchover between allocation of the car in response to registrations of calls from non-fire occurrence floors and direct transfer of the car to an evacuation floor, in accordance with the user boarding situation within the car.

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FIG. 1

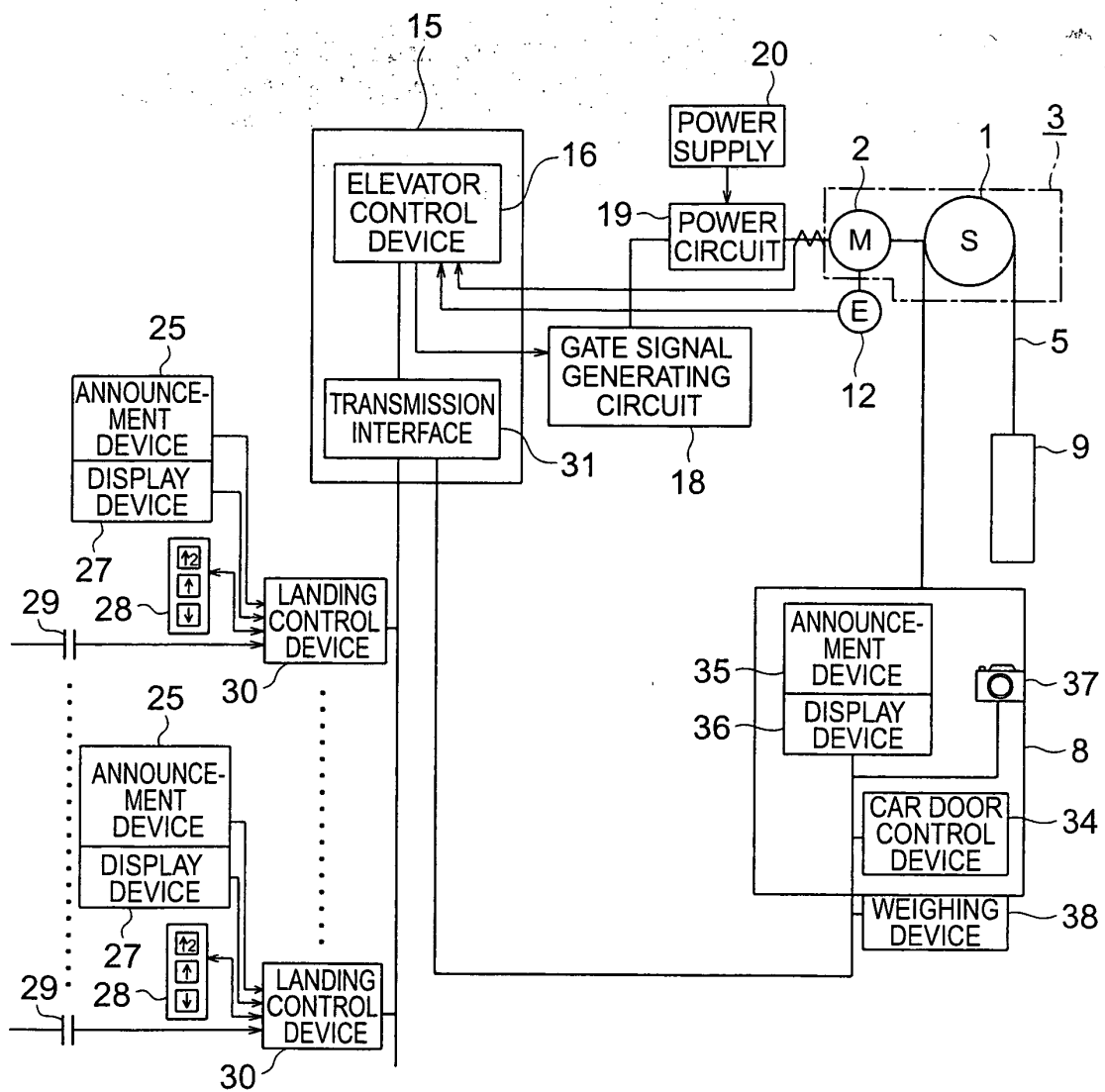


FIG. 2

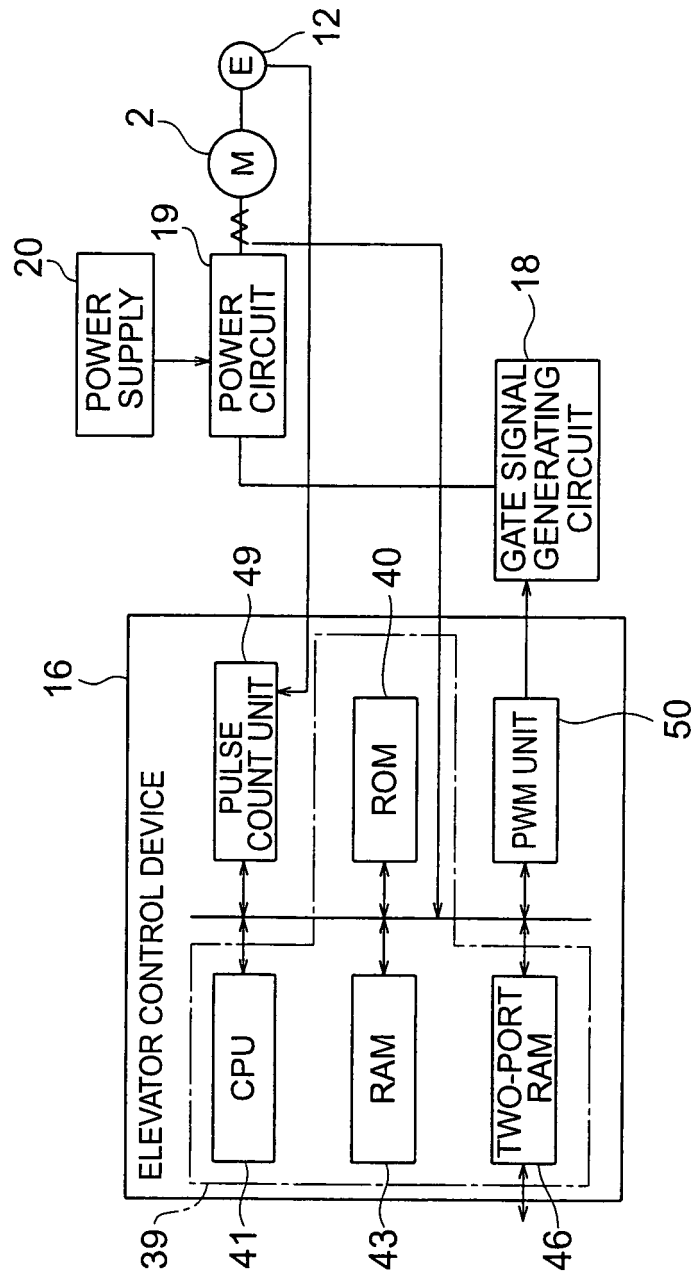


FIG. 3

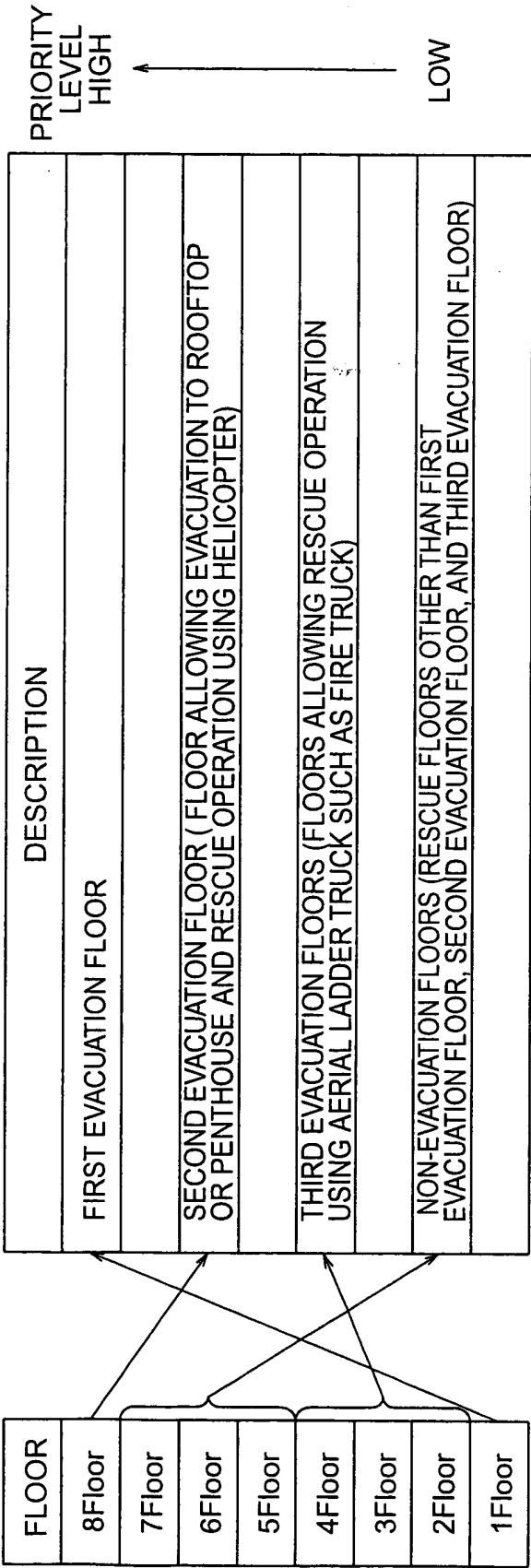


FIG. 4

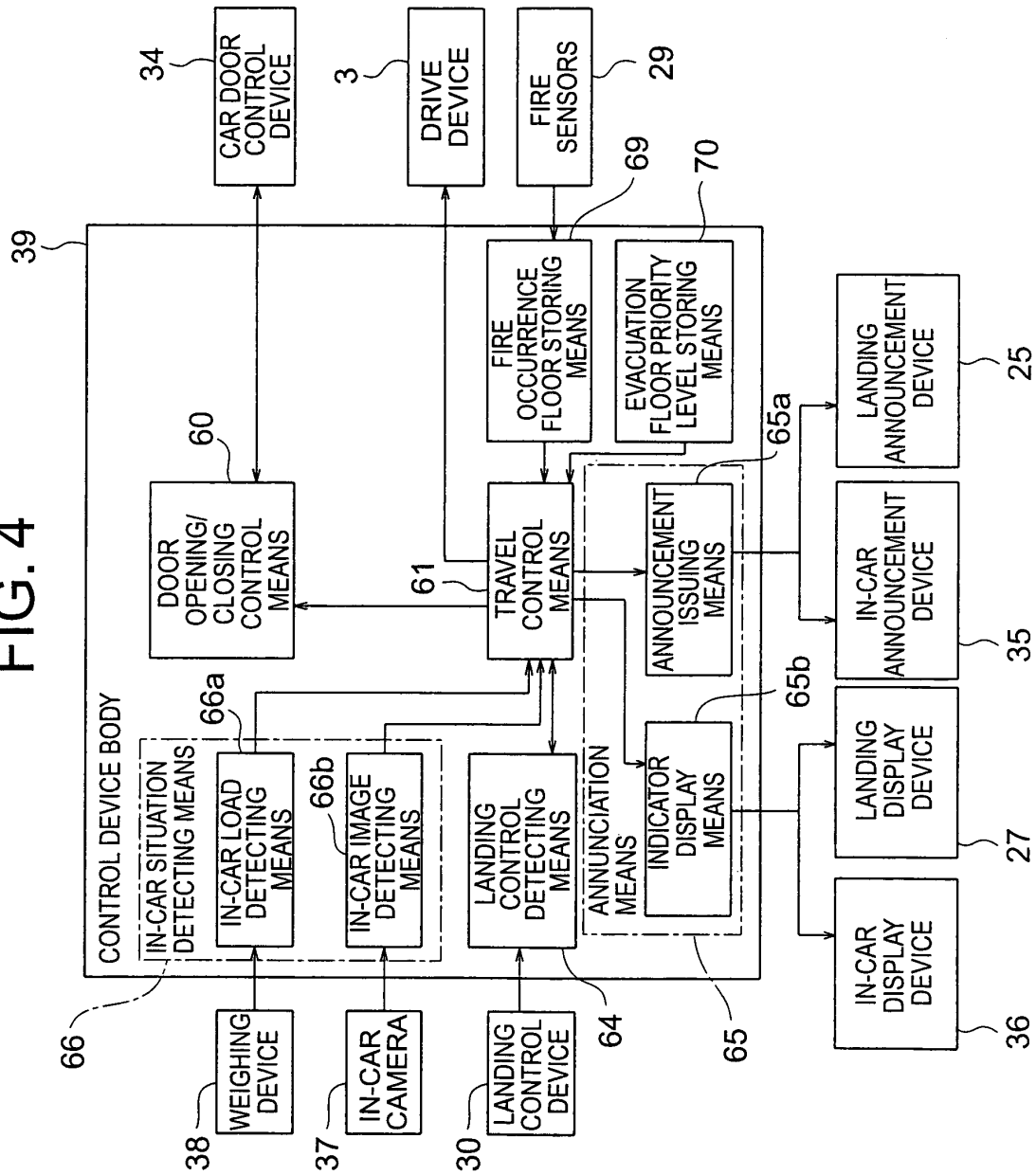
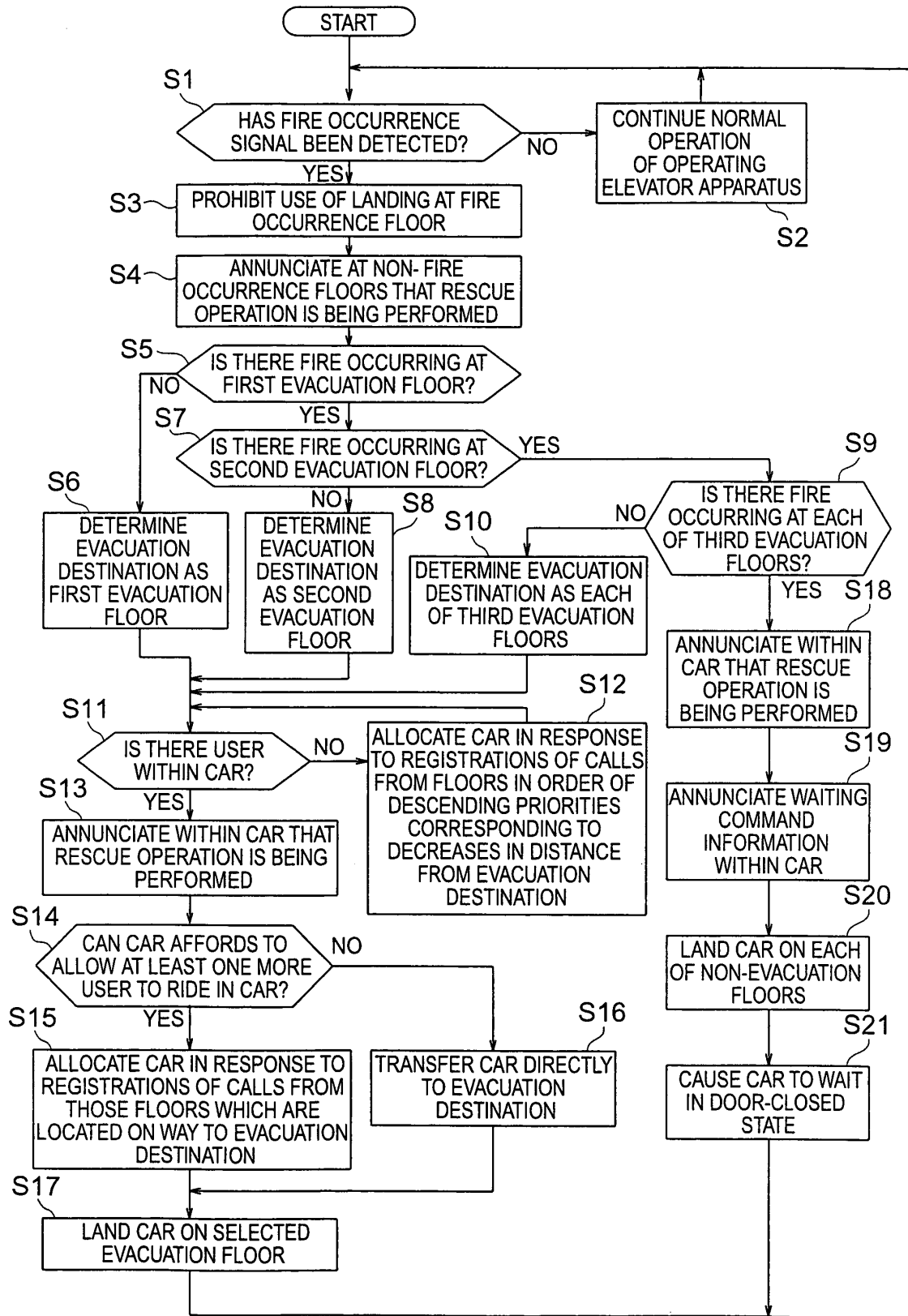


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/309091

A. CLASSIFICATION OF SUBJECT MATTER

B66B5/02 (2006.01) i, B66B3/00 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B66B1/00-B66B20/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2006

Kokai Jitsuyo Shinan Koho 1971-2006 Toroku Jitsuyo Shinan Koho 1994-2006

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	JP 2003-276964 A (Mitsubishi Electric Corp.), 02 October, 2003 (02.10.03), (Family: none)	1-3, 8 4, 6-7 5
Y	JP 10-182029 A (Toshiba Elevator and Building Systems Corp.), 07 July, 1998 (07.07.98), Abstract (Family: none)	4, 6

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

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Date of the actual completion of the international search
09 August, 2006 (09.08.06)Date of mailing of the international search report
22 August, 2006 (22.08.06)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2006/309091

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 138936/1986 (Laid-open No. 045759/1988) (Fujitec Co., Ltd.), 28 March, 1988 (28.03.88), Description, page 5, line 14 to page 6, line 10 (Family: none)	7

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 10182029 A [0003]