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(54) **CONTROL DEVICE OF ELEVATOR**

STEUERVORRICHTUNG FÜR AUFZUG

DISPOSITIF DE COMMANDE D'ASCENSEUR

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Description

Technical Field

[0001] The present invention relates to an elector control device that presents running performance exhibited by an elevator during running so that one of the running performance can be selected automatically or by any passenger or a building superintendent, thus achieving car running that suits the taste of the passenger and building superintendent.

Background Art

[0002] For example, Japanese Utility Model Laid-Open No. 1-47744 describes a conventional technique for enabling the running speed of an elevator to be varied; with this technique, speed instruction switching means is provided in a car of an elevator in order to enable the running speed of the elevator to be varied. Further, as described in, for example, Japanese Patent Laid-Open No. 61-119579, to inform the interior of a car of an expected change in the running performance of the car, the elevator is provided with means for informing the interior of the car of an expected change in speed when a sufficient pit depth cannot be obtained, so that the car is operated at a speed lower than a normal one near the terminal floor. Furthermore, as described in, for example, Japanese Patent Laid Open No. 2002-145542, the elevator has a speed control device which can limit running patterns so as to enable a safe call so that running can be controlled by switching the car speed pattern to one with an acceleration lower than a normal one and to enable a high-speed call so that running can be controlled by switching the car speed pattern to one with an acceleration higher than the normal one. Moreover, as described in, for example, Japanese Patent Laid-Open No. 2003-238037, to maximize the running capacity of the elevator, the maximum speed or acceleration is varied depending on a possible load and moving distance, to reduce operation time and thus the time required to move passengers, thus increasing the operation efficiency of cars.

[0003] Some conventional elevator control devices allow any passenger to select a running pattern and inform the interior of the car of the status of the running pattern on the basis of the car speed. However, the passenger can select only from the running patterns that can be exhibited by the car during running under assumed running conditions. Consequently, the maximum speed is set at a rated value, and the passenger can select only the running pattern limited to low acceleration running (low acceleration and deceleration running) or high acceleration running (high acceleration and deceleration running). Further, the invention having the object to maximize the running capacity of the elevator is intended to reduce the operation time. This is inconvenient for passengers who like running at a low acceleration or speed. Further, disadvantageously, the passengers do not know what running pattern is used depending on running conditions for the car. US 6199 667 discloses an elevator control device according to the preamble of claim 1,

[0004] The present invention is made to solve these problems. It is an object of the present invention to provide an elevator control device which enables a running performance that can be exhibited by a car during running to be selected automatically or by any passenger, a building superintendent, or maintenance personnel depending on running condition for the car and which, before the car starts to travel, informs the interior of the car, a hall, or an elevator centralized superintending area of the running performance exhibited by the car during running, thus achieving car running that suits the taste of each of the passenger, building superintendent, and maintenance personnel.

Disclosure of the Invention

[0005] The present invention and its objects as defined by the independent claims. Further advantageous embodiments are defined by the dependent claims. Further examples are provided for facilitating the understanding of the invention.

[0006] According an example it is provided a device comprising running performance table means having a plurality of running performance tables in which parameters classified according to running performances of a car and determining running patterns for the car are tabulated according to running conditions for the car, running condition acquiring means for acquiring the car running conditions when the car starts to running, table selecting means for selecting one running performance table from the running performance table means on the basis of the car running conditions acquired, control means for causing the car to travel in accordance with a running pattern determined by the running performance table selected by the table selecting means, and running performance informing means for informing at least one of an interior of the car, a hall, or an elevator centralized superintending device, of the selected running performance table. This makes it possible to inform passengers of the running performance automatically selected by the control device. Consequently, when the car starts to running, it travels in a manner recognized by the passengers.

[0007] According to a further example, the device further comprises running performance setting means installed in a car operation panel and in a hall operation panel to display classified running performances so that any passenger can select from the running performances to set one of the plurality of running performance tables, priority determining means for giving top priority to either of the running performance tables selected by the car operation panel and the hall operation panel, and running performance informing means for informing the interior of the car, the hall, or the elevator centralized superintending device, of the running performance in the pref-

erentially selected running performance table. This enables the passenger to set the running performance that can be provided by the control device. It is thus possible to achieve car running that suits the passengers taste.

[0008] According to a further example, the device further comprises running performance table registering and discarding means for enabling registration and discarding of each running performance table in the running performance table means having the plurality of running performance tables, the means being provided in at least one of inspection and maintenance means for elevator maintenance personnel, elevator centralized superintending means in the building, and remote superintending means for remotely superintending elevators in a plurality of buildings. This makes it possible to provide car running that suits the tastes of the maintenance personnel and a building superintendent.

[0009] According to a further example, the device further comprises running performance table means having a plurality of running performance tables in which parameters classified according to running performances of a car and determining running patterns for the car are tabulated according to running conditions for the car, running condition acquiring means for acquiring the car running conditions when the car starts to running, running parameter extracting means for extracting achievable running parameters from the running performance table means on the basis of the car running conditions acquired, parameter selecting means for displaying, in the car and at a hall, candidates for running patterns determined by the running parameters extracted by the running parameter extracting means so that any passenger can select one of the running pattern candidates, control means for causing the car to travel in accordance with the running pattern selected by the parameter selecting means, and running performance informing means for informing an interior of the car or the hall of the selected running pattern. This allows the passenger to select the running pattern in which the car can travel on the basis of the car running conditions acquired. Therefore, car running can be provided which suits the passenger's taste.

[0010] According to a further example, the device further comprises means for selecting achievable running parameters from the plurality of running performance tables, the means being provided in at least one of inspection and maintenance means for elevator maintenance personnel, elevator centralized superintending means in the building, and remote superintending means for remotely superintending elevators in a plurality of buildings. This makes it possible to provide car running that suits the tastes of the maintenance personnel, a building superintendent, and a building owner.

[0011] Specifically, according to a further example, the car running condition is one of or a combination of any of car load, running direction, next stopping floor, and temperature status of a power driving device. The running performance table means is one of or a combination of maximum speed and both acceleration and deceleration. The running pattern is the waveform of a speed target signal for the car, or one of or a combination of the maximum speed and the acceleration and deceleration for the speed target signal.

[0012] Further, the present invention reflects information on the selected running performance table means or the selected running parameter in elevator group superintending means. This makes it possible to improve the accuracy of predicted calculations on the group superintendence of elevators.

Brief Description of the Drawings

[0013]

Figure 1 is a diagram of a system configuration showing an elevator control device in accordance with Embodiment 1 of the present invention.

Figure 2 shows tables corresponding to examples of the running performance table means; the figure illustrates an elevator control device in accordance with Embodiment 1 of the present invention.

Figure 3 shows tables corresponding to examples of the running performance table means; the figure illustrates an elevator control device in accordance with Embodiment 2 and Embodiment 3 of the present invention.

Figure 4 is a diagram of a system configuration showing an elevator control device in accordance with Embodiment 4 of the present invention.

Figure 5 is a diagram of a system configuration showing an elevator control device in accordance with Embodiment 6 of the present invention.

Figure 6 is a front view showing an example of iconized display of candidates for running parameters one of which is selected by any passenger;

Figure 7 is a front view showing an example of iconized display of the candidates for running parameters one of which is selected by the passenger; and

Figure 8 is a front view showing an example of iconized display of the candidates for running parameters one of which is selected by the passenger.

Best Mode for Carrying Out the Invention

Embodiment 1

[0014] The present invention will be described below in further detail with reference to the accompanying drawings. Figure 1 is a diagram of a system configuration showing an elevator control device in accordance with Embodiment 1, which implements the present invention. In the figure, a main control device 1 controls the operation of an elevator and provides functions different from those of conventional control devices. A power driving device 2 receives instructions from the main control device 1 to drive an electric motor (not shown in the draw-

ings). The power driving device 2 corresponds to, for example, an inverter. The electric motor rotates a traction machine 5 to elevate and lower a car 6 and a counter weight 7 joined together via a rope 9. A temperature detector 3 is installed in the power driving device 2 to detect its temperature status. A weighing device 8 is installed in the car 6 to detect a load in the car. The power driving device 2, temperature detector 3, electric motor, traction machine 5, car 6, counter weight 7, and weighing device 8 have the same configurations as those in conventional elevator control devices.

[0015] The main control device 1 comprises running performance table means 10 having a plurality of running performance tables including a table for a normal running performance like Table I shown in Figure 2, the table having, as a running performance of the car 6, for example, a normal running performance, a running performance exhibited by the car during running using the maximum speed (rated speed) at which the car can elevate under the maximum car load as well as a normal acceleration and deceleration, a table for a minimum time arrival running performance (high-speed running performance) like Table II shown in Figure 2, the table having, as a minimum time arrival running performance, a performance that can be exhibited by the car when arriving at the next stopping floor in the minimum time, by varying the maximum speed or the acceleration and deceleration depending on the magnitude of the car load, and a table for a low acceleration and maximum speed running performance like Table III shown in Figure 2, the table having, as a low acceleration and maximum speed running performance, a running performance exhibited by the car during running using a maximum speed varying depending on the magnitude of the car load as well as an acceleration and deceleration set at a small value. The running performance table means 10 has the plurality of tables including Tables I, II, and III in which parameters such as the maximum speed and acceleration and deceleration which determine a running pattern, for example, a target speed waveform, for the car 6 are tabulated on the basis of a running condition for the car 6, such as the load in the car (indicated by the percentage of the maximum payload of the car for which the load in the car accounts) and the moving direction. The main control device 1 also comprises running condition acquiring means 11 for acquiring running conditions for the car 6 on the basis of, for example, destination floor information indicating the next stopping floor, car load information from the weighing device 8, temperature information from a temperature detector 3 provided in the power driving device 2, or the like. The main control device 1 also comprises table selecting means 12 for selecting one table from the running performance table means 10 having the plurality of tables on the basis of the car running conditions acquired by the running condition acquiring means 11. The main control device 1 further comprises running pattern output means 13 for outputting, to the power driving device 2, a running pattern of the car 6 determined on the basis of the table selected by the table selecting means 12. Further, destination floor setting means 14 and running performance informing means 15 are provided in the car 6; the destination floor setting means is used to set the destination floor. The running performance informing means 15 may be provided at a hall, in an elevator centralized superintending area, or the like rather than in the car.

[0016] Now, the operation will be described with reference to, for example, Tables I and II, shown in Figure 2. In Table I, a specified maximum speed of 60 m/min and a specified acceleration and deceleration of 0.5 m/s^2 are set on the basis of the payload in the car (car load). Table I provides a conventional standard normal running performance. In Table II, the maximum speed and the acceleration and deceleration vary depending on the load in the car to achieve a high speed running performance, thus enabling the car to arrive at the next stopping floor in the minimum time to provide a minimum time arrival performance. The load on the traction machine 5 is normally lightest near a location where the car load is balanced with the counter weight 7, and so the maximum speed and the acceleration and deceleration are set at larger values near the balance. The settings in Table II require higher power than those in Table I. This increases the quantity of heat generated by the power driving device 2.

[0017] When the destination floor setting means 14 in the car is used to set a destination floor, the running condition acquiring means 11 in the main control device 1 acquires the direction in which and the distance that the car 6 travels, the temperature status of the power driving device 2, and information on the load in the car 6; the temperature status of the power driving device 2 is provided by the temperature detector 3 and the information on the load in the car 6 is provided by the weighing device 8. If the running conditions acquired indicate that, for example, the temperature status of the power driving device 2 is high, the table selecting means 12 operates to determine that running based on Table II increases a rise in the temperature of the power driving device 2 to shorten the lifetime of the elevator control device. The table selecting means 12 thus selects Table I for the normal running performance from the plurality of tables in the running performance table means 10. The table selecting means 12 indicates the selection of Table 1 to the running performance information means 15 in the car 6. The running performance informing means 15 informs the passengers in the car of the selected running performance. The running performance informing means 15 informs the passengers of the running performance using a voice or letters on a display device in the car showing the running performance. However, the running performance informing means 15 may inform a hall or the elevator centralized superintending area of the running performance in addition to the car. Alternatively, the running performance informing means 15 may not perform an informing operation if Table I for the normal running performance

is selected but may do so only if special running such as high-speed running is selected. Alternatively, the information may be provided by changing the color of or blinking the corresponding button in the destination floor setting means 14. Further, the destination floor setting means 14 may be adapted so as to return the running performance to the normal one if the indicated running performance is dissatisfactory. For example, the destination floor setting means 14 may be adapted to be determined to return the running performance to the normal one upon sensing two depressions of the corresponding button in the destination floor setting means 14, each depression lasting a specified time, or a depression of the button lasting a specified time.

[0018] Embodiment 1 of the present invention is configured as described above. Consequently, the running performance that can be exhibited by the car during running can be automatically selected on the basis of the running conditions for the car. It is also possible to inform the interior of the car, the hall, or the elevator centralized superintending area, of the selected running performance.

Embodiment 2

[0019] Figure 3 shows tables corresponding to examples of the running performance table means; the figure illustrates an elevator control device in accordance with Embodiment 2 of the present invention. The tables can be set as described below.

[0020] In Table A shown in Figure 3, the speed and the acceleration and deceleration are set depending on the capacity of a motor, a power supply facility, or the like. The table is set so that the power consumption during operation remains almost constant with respect to the car load. When the car weight and the weight of the counter weight are in a state similar to a balanced one (for example, the car load is 30 to 69%), it is still possible to utilize substantial torque from the motor and substantial power from the power supply facility. This allows the car speed and the acceleration and deceleration to be increased. Consequently, the speed and the acceleration and deceleration are set at larger values. Further, when the car is elevated and the load in the car is light (for example, the car load is 0 to 29%), the weight of the counter weight pulls the car upward. This reduces the motor torque required for acceleration. Accordingly, a high acceleration can be provided using the available motor torque. High accelerations are thus set in Table A. For the same reason, a large deceleration is set during a descending operation of the car. The settings in Table A improve operation efficiency without imposing any burdens on the motor or power supply facility. In Table A, power is set lower than that in Table II in accordance with Embodiment 1. Thus, for example, Table A may be added so that Table I for the normal running performance can be selected if the temperature condition for the power driving device 2 is severest, Table II for the minimum time arrival running performance (high-speed running performance) can be selected if the temperature condition for the power driving device 2 is not severe, and Table A for a power saving running performance can be selected under an intermediate temperature condition.

Embodiment 3

[0021] Table B shown in Figure 3 is set taking into account the distribution of passengers utilizing the elevator. That is, Table B is an example of settings corresponding to an up peak such as a commuting time zone for an office building. Table B is also set so that if there is a tradeoff between the car speed and the car acceleration and deceleration, for example, such as the relationship between the generated torque and rotation speed of the motor, priorities can be determined using the running time as a determination criterion. At an up peak, if the car is elevated, it is frequently stopped at small intervals and the moving distance per running operation is thus short. Accordingly, the operation efficiency can be improved by increasing the acceleration and deceleration instead of the speed. Therefore, for elevating operations, the table is set taking into account the acceleration and deceleration instead of the speed. On the other hand, when the car is lowered, only a small number of passengers are present in the car. In this case, the car is likely to move a long distance, for example, it lowers from the highest floor to the lowest floor within one running operation. Accordingly, the operation efficiency can be improved by increasing the speed instead of the acceleration and deceleration. Therefore, for lowering operations, the table is set taking the speed into account. Table B is set using the up peak as an example. However, for other passenger distributions, the table can be set in the same manner. Further, if the passenger distribution varies over time, tables corresponding to the various passenger distributions may be provided so that the tables can be switched in accordance with the time zone. Alternatively, the table may be set and selected on the basis of the time for which passengers must wait, traffic, the number of times the elevator is activated, or the like.

[0022] Table C shown in Figure 3 is set taking the car load into account with respect to the tradeoff between the car speed and the car acceleration and deceleration. If the car load is light, that is, only a small number of passengers are present in the car (for example, the car load is 0 to 29%), the car is stopped only a small number of times. It is thus expected that the car is likely to travel a long distance. Consequently, since the operation efficiency is improved by increasing the speed instead of the acceleration and deceleration, the speed are set at larger values. In contrast, if the car load is heavy (for example, the car load is 70 to 100%), it is expected that the car is likely to travel a short distance. Consequently, the acceleration and deceleration is determined to be more important. Thus, instead of the speed, the acceleration and deceleration is set at larger values. Alternative-

ly, Tables A, B, and C may correspond only to the payload or operating direction. Alternatively, only one of the speed and the acceleration and deceleration may be referenced from the table.

[0023] In Table D shown in Figure 3, the speed and the acceleration and deceleration are set at smaller values. Table D is selected when an excessive load is imposed on the elevator equipment. It is also selected for the summer, when power consumption is restricted, the nighttime, or the like.

[0024] Table E shown in Figure 3 is set taking the moving distance of the car into account with respect to the tradeoff between the car speed and the car acceleration and deceleration. A plurality of Tables E are preferably provided according to the moving distance L. If the moving distance L is short ($L < 5$), the acceleration and deceleration is set at a larger value because the operation efficiently is improved by increasing the acceleration and deceleration instead of the speed to reduce the operation time. In contrast, if the moving distance L is long ($L \geq 10$), the speed is set at a larger value because the operation efficiently is improved by increasing the speed instead of the acceleration and deceleration. In this case, the moving distance L is first calculated on the basis of information on the floor on which the car is stopped upon activation and on the next stopping floor. A table is then selected on the basis of the distance L. If, for example, the moving distance L is 12 meters, the lowest table is selected from Table E. Then, the speed and acceleration and deceleration corresponding to the car load are selected from the selected table. The operation of the elevator is then started.

[0025] For Tables B, C, and E, the tradeoff between the car speed and the car acceleration and deceleration is set using the running time as a determination criterion. However, the tradeoff may be set on the basis of any of various environmental conditions such as the power consumption of the elevator, the temperature of the elevator equipment, and the time for which passengers must wait.

[0026] Further, Table E corresponds to the moving distance L, load, and operating direction. However, it may correspond only to the moving distance L. Alternatively, the table may correspond to a combination of any of the above conditions, for example, a combination of the moving distance L and operating direction.

[0027] Alternatively, the table may be set in accordance with a building application. For example, a table focusing on the acceleration and deceleration may be set for a building such as a department store where the car is frequently stopped at small intervals. A table focusing on the speed may be set for such a building as has an express zone.

[0028] The present invention appropriately switches the tables depending on the situation so as to improve passenger service; the present invention allows any passenger, maintenance personnel, an external input based on a remote operation or the like, or the control device to carry out the switching.

[0029] Further, in the present embodiment, the setting of the speed or the acceleration is read from the table. However, the control device may be provided with means for calculating a function that allows the speed and the acceleration and deceleration to be output, using the load or moving distance as a variable so that the setting can be calculated. Further, in the present embodiment, the maximum speed and the acceleration and deceleration are the parameters determining the target speed waveform for the car 6. However, jerk (additional acceleration and deceleration) may additionally be used as a parameter.

[0030] As described above, passenger service can be improved by allowing the passenger or control device to reference an appropriate running performance table on the basis of the time zone, building application, moving distance, or the like.

Embodiment 4

[0031] Figure 4 is a diagram of a system configuration showing an elevator control device in accordance with Embodiment 4 of the present invention. In this figure, means having the same reference numerals as those in Embodiment 1 are the same as the corresponding means in Embodiment 1. As additional constituent means, an operation panel 19 in the car 6 comprises running performance setting means 16 that enables running performances to be set. Hall operation panels 20a and 20b on each floor comprise car call means 22a and 22b, running performance setting means 21a and 21b, and running performance informing means 23a and 23b. The main control device 1 comprises priority determining means 17 for giving priorities to set values from the car operation panel 19 and from the hall operation panels 20a and 20b on each floor taking a car load status from the weighing device 8 into consideration. An elevator superintending device 25 comprises running performance informing means 24.

[0032] Now, the operation will be described. In the car operation panel 19 and the hall operation panel 20, the running performance setting means 16 and 21 display classified running performances so that any passenger can select from the running performances to choose one table from the running performance table means 10, having the plurality of tables. Immediately before the car starts to travel, if the priority determining means 17 determines, on the basis of a signal from the weighing device 8, that there is any passenger in the car, it operates to give top priority to the table selected, using the car operation panel 19, from those set by the running performance setting means 16 and 21. If the priority determining means 17 determines that there is no passenger in the car, it operates to give top priority to the table selected using the hall operation panel 20. The subsequent operation is the same as that in Embodiment 1. Furthermore, the selected running performance is made known by the running performance informing means provided

in the car, at the hall, and in the elevator centralized superintending device.

[0033] The above configuration enables any passenger to select from the running performances. Further, if there is any passenger in the car, top priority is given to the running performance set using the car operation panel. If there is no passenger in the car, top priority is given to the running performance set using the hall operation panel. Moreover, the selected running performance is made known to the interior of the car, the hall, and the elevator centralized superintending area.

Embodiment 5

[0034] According to Embodiment 5, table registering and discarding means is provided in inspection and maintenance means for elevator maintenance personnel, elevator centralized superintending means in the building, or remote superintending means for remotely superintending elevators in a plurality of buildings; the table registering and discarding means enables registration and discarding of each table in the running performance table means 10, having the plurality of tables as described in Embodiments 1 to 4.

[0035] This configuration enables the table determining the running performance of the car to be switched depending on the building or the season.

Embodiment 6

[0036] Figure 5 is a diagram of a system configuration showing an elevator control device in accordance with Embodiment 6 of the present invention. In the figure, the basic configuration of the present embodiment is the same as that of Embodiment 1. However, the main control device 1 comprises running parameter extracting means 26 for extracting a plurality of achievable running parameters from the running performance table means 10, having the plurality of tables, on the basis of information from the running condition acquiring means 11. The car 6 comprises parameter selecting means 27 for selecting one of the plurality of running parameters extracted by the running parameter extracting means 26.

[0037] Now, description will be given on the running performance table means including Table I for the normal running performance, Table II for the high-speed running performance, and Table III for the low acceleration and maximum speed performance such as those shown in Figure 2. Immediately before the car starts to running, the running condition acquiring means 11 acquires the car load, destination floor setting information, and temperature information; the car load is provided by the weighing device 8 and the temperature information is provided by the power driving device 2. In this case, when, for example, the car load is 50%, the running parameter extracting means 26 extracts, from Table I to III, a maximum speed of 60 m/min and an acceleration and deceleration of 0.5 m/s^2 as a parameter candidate 1, a maximum speed of 80 m/min and an acceleration and deceleration of 0.9 m/s^2 as a parameter candidate 2, and a maximum speed of 90 m/min and an acceleration and deceleration of 0.3 m/s^2 as a parameter candidate 3. Then, the parameter selecting means 27 displays these pieces of information on a graph as icons with numbers arranged at positions indicating the corresponding performances; the graph shows the speed on the axis of abscissa and the acceleration on the axis of ordinate as shown in Figure 6. Alternatively, the parameter selecting means 27 draws and displays actual speed patterns on a graph showing time on the axis of abscissa and the speed on the axis of ordinate as shown in Figure 7. The parameter selecting means 27 further displays legends of the patterns as icons. Alternatively, the parameter selecting means 27 directly displays the maximum speed, the acceleration, and the like and also shows candidates as icons as shown in Figure 8. When any passenger depresses one of the icons, the parameter selecting means 27 selects one of the parameter candidates. The selected parameter is provided to the main controller 1 as a target speed for the power driving device 2. The main controller 1 then operates to drive the car 6. The running time may be added to the display in Figure 8.

[0038] Further, in Embodiment 6, the parameter candidates are extracted from all the tables, Tables I to III. However, the lifetime of the power driving device 2 may be considered on the basis of, for example, the temperature information obtained by the running condition acquiring means 11 so that if the temperature is expected to rise markedly, it is possible to avoid extracting parameter candidates from one or two of the running performance tables.

[0039] Further, means for adjusting the selection of running performance tables as candidates may be provided separately in the inspection and maintenance means for elevator maintenance personnel, the elevator centralized superintending means in the building, and the remote superintending means for remotely superintending elevators in a plurality of buildings.

[0040] Furthermore, it is of course possible to provide means for reflecting, in the elevator group superintending means, the information on the selected table means and on the selected running parameter, shown in the above embodiment.

[0041] The present invention comprises running performance table means having a plurality of running performance tables in which parameters classified according to running performances of a car and determining running patterns for the car are tabulated according to running conditions for the car, running condition acquiring means for acquiring the car running conditions when the car starts to running, table selecting means for selecting one running performance table from the running performance table means on the basis of the car running conditions acquired, control means for causing the car to travel in accordance with a running pattern determined by the running performance table selected by the table selecting

means, and running performance informing means for informing at least one of an interior of the car, a hall, or an elevator centralized superintending device, of the selected running performance table. This makes it possible to inform passengers of the running performance automatically selected by the control device. Consequently, when the car starts to running, it travels in a manner recognized by the passenger. This is effective in improving service for the passengers.

[0042] The present invention further comprises running performance setting means installed in a car operation panel and in a hall operation panel to display classified running performances so that any passenger can select from the running performances to set one of the plurality of running performance tables, priority determining means for giving top priority to either of the running performance tables selected by the car operation panel and the hall operation panel, and running performance informing means for informing the interior of the car, the hall, or the elevator centralized superintending device, of the running performance in the preferentially selected running performance table. This enables the passenger to set the running performance that can be provided by the control device. The present invention is thus effective in improving service to the passengers.

[0043] The present invention further comprises running performance table registering and discarding means for enabling registration and discarding of each running performance table in the running performance table means having the plurality of running performance tables, the means being provided in at least one of inspection and maintenance means for elevator maintenance personnel, elevator centralized superintending means in the building, and remote superintending means for remotely superintending elevators in a plurality of buildings. This makes it possible to easily provide car running that suits the tastes of the maintenance personnel, a building superintendent, and a building owner.

[0044] The present invention comprises running performance table means having a plurality of running performance tables in which parameters classified according to running performances of a car and determining running patterns for the car are tabulated according to running conditions for the car, running condition acquiring means for acquiring the car running conditions when the car starts to running, running parameter extracting means for extracting achievable running parameters from the running performance table means on the basis of the car running conditions acquired, parameter selecting means for displaying, in the car and at a hall, candidates for running patterns determined by the running parameters extracted by the running parameter extracting means so that any passenger can select one of the running pattern candidates, control means for causing the car to travel in accordance with the running pattern selected by the parameter selecting means, and running performance informing means for informing an interior of the car or the hall of the selected running pattern. This allows the passenger to select the running pattern in which the car can travel on the basis of the car running conditions acquired. Therefore, car running can be easily provided which suits the passenger's taste.

[0045] The present invention further comprises means for selecting achievable running parameters from the plurality of running performance tables, the means being provided in at least one of inspection and maintenance means for elevator maintenance personnel, elevator centralized superintending means in the building, and remote superintending means for remotely superintending elevators in a plurality of buildings. This makes it possible to easily provide car running that suits the tastes of the maintenance personnel, building superintendent, and building owner.

[0046] Further, the present invention reflects information on the selected running performance table means or the selected running parameter in elevator group superintending means. This makes it possible to improve the accuracy of predicted calculations on the group superintendence of elevators.

Industrial Applicability

[0047] As described above, the elevator control device according to the present invention enables the running performance that can be exhibited by the elevator during running to be selected automatically or by any passenger, the building superintendent, or maintenance personnel depending on running conditions for the car. The elevator control device also informs the interior of the car, the hall, or the centralized superintending area of the running performance exhibited by the car during running before the car starts to running. This makes it possible to achieve car running that suits the tastes of passengers, the building superintendent, the maintenance personnel, and a building owner.

Claims

1. An elevator control device comprising running performance table means (10) having a plurality of running performance tables preset to achieve desired running performances, running condition acquiring means (11) for acquiring the car running conditions when the car starts to running, table selecting means (12) for selecting one running performance table from the running performance table means (10) on the basis of the car running conditions, control means for causing the car to travel in accordance with a running pattern determined by the running performance table selected by the table selecting means (12), and running performance informing means (15) for informing an expected running performance,
characterized in that the car running condition is one of or a combination of any of car load, running

direction, next stopping floor, and temperature status of a power driving device.

2. The elevator control device according to claim 1, wherein in said plurality of running performance tables parameters classified according to running performances of a car and determining running patterns for the car are tabulated according to running conditions for the car, and wherein
said running performance informing means (15, 23, 24) are for further informing at least one of an interior of the car (6), a hall, or an elevator centralized superintending device (25), of the selected running performance table.

3. The elevator control device according to Claim 1 or 2, **characterized by** further comprising running performance setting means (16, 21) installed in a car operation panel and in a hall operation panel (19, 20) to display classified running performances so that any passenger can select from the running performances to set one of the plurality of running performance tables, priority determining means (17) for giving top priority to either of the running performance tables selected by the car operation panel (19) and the hall operation panel (20), and running performance informing means (15, 23, 24) for informing the interior of the car (6), the hall, or the elevator centralized superintending device (25), of the running performance in the preferentially selected running performance table.

4. The elevator control device according to any of Claims 1 to 3, **characterized by** further comprising running performance table registering and discarding means for enabling registration and discarding of each running performance table in the running performance table means (10) having the plurality of running performance tables, the means being provided in at least one of inspection and maintenance means for elevator maintenance personnel, elevator centralized superintending means in the building, and remote superintending means for remotely superintending elevators in a plurality of buildings.

5. The elevator control device according to claim 1, wherein in said plurality of running performance tables parameters classified according to running performances of a car and determining running patterns for the car are tabulated according to running conditions for the car, wherein the elevator control device further comprises
running parameter extracting means (26) for extracting achievable running parameters from the running performance table means (10) on the basis of the car running conditions acquired,
parameter selecting means (27) for displaying, in the car (6) and at a hall, candidates for running patterns determined by the running parameters extracted by the running parameter extracting means (26) so that any passenger can select one of the running pattern candidates, and wherein
said running performance informing means (15, 23) are for further informing an interior of the car (6) or the hall of the selected running pattern.

6. The elevator control device according to Claim 5, **characterized by** further comprising means for selecting achievable running parameters from the plurality of running performance tables, the means being provided in at least one of inspection and maintenance means for elevator maintenance personnel, elevator centralized superintending means in the building, and remote superintending means for remotely superintending elevators in a plurality of buildings.

7. The elevator control device according to any of Claims 1 to 6, **characterized in that** the running performance table means is one of or a combination of maximum speed and both acceleration and deceleration, and the running pattern is the waveform of a speed target signal for the car, or one of or a combination of the maximum speed and the acceleration and deceleration for the speed target signal.

8. The elevator control device according to any of Claims 1 to 7, **characterized in that** information on the selected running performance table means (10) or the selected running parameter is reflected in elevator group superintending means.

Patentansprüche

1. Aufzugsteuervorrichtung, umfassend ein Fahrleistungstabellenmittel (10) mit einer Mehrzahl von Fahrleistungstabellen, die voreingestellt sind, um die gewünschten Fahrleistungen zu erzielen, ein Fahrbedingungs-Erfassungsmittel (11), um Kabinenfahrbedingungen zu erfassen, wenn die Kabine beginnt, zu fahren, Tabellenauswahlmittel (12) zum Auswählen einer Fahrleistungstabelle aus dem Fahrleistungstabellenmittel (10) auf Basis der Kabinenfahrbedingungen, ein Steuermittel, um die Kabine zu veranlassen, anhand eines Fahrmusters zu fahren, das durch die, durch das Tabellenauswahlmittel (12) ausgewählte Fahrleistungstabelle bestimmt ist, und Fahrleistungsinformationsmittel (15) zum Informieren über eine erwartete Fahrleistung,
dadurch gekennzeichnet, dass die Kabinenfahrbedingung eine(s) oder eine Kombination von Kabinenlast, Fahrtrichtung, nächstem Haltestockwerk und Temperaturstatus einer Stromantriebsvorrichtung ist.

2. Aufzugsteuervorrichtung gemäß Anspruch 1, wobei bei der Mehrzahl von Fahrleistungstabellenparametern, die anhand von Fahrleistungen einer Kabine und bestimmenden Fahrmustern für die Kabine klassifiziert sind, anhand von Fahrbedingungen für die Kabine tabelliert werden, und wobei
das Fahrleistungsinformationsmittel (15, 23, 24) weiterhin zum Informieren eines Innenraums der Kabine (6), eines Flurs, und/oder einer zentralisierten Aufzugüberwachungsvorrichtung (25) über die ausgewählte Fahrleistungstabelle dient.

3. Aufzugsteuervorrichtung gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** sie weiterhin umfasst ein Fahrleistungseinstellmittel (16, 21), das in einem Kabinen-Bedienpaneel und in einem Flurbedienpaneel (19, 20) installiert ist, um klassifizierte Fahrleistungen anzuzeigen, so dass irgendein Fahrgast aus den Fahrleistungen auswählen kann, um eine aus der Mehrzahl von Fahrleistungstabellen auszuwählen, ein Prioritätsbestimmungsmittel (17), um eine oberste Priorität einer der durch das Kabinenbedienpaneel (19) oder das Flurbedienpaneel (20) ausgewählten Fahrleistungstabellen zu geben, und ein Fahrleistungsinformationsmittel (15, 23, 24), um das Innere der Kabine (6), den Flur oder die zentralisierte Aufzugüberwachungsvorrichtung (25) über die Fahrleistung in der bevorzugt ausgewählten Fahrleistungstabelle zu informieren.

4. Aufzugsteuervorrichtung gemäß einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** sie weiter umfasst ein Fahrleistungstabellen-Registrierungs- und Verwerfsmittel zum Freischalten von Registrieren und Verwerfen jeder Fahrleistungstabelle in dem Fahrleistungstabellenmittel (10), das die Mehrzahl von Fahrleistungstabellen aufweist, wobei das Mittel in zumindest einem der Inspektions- und Wartungsmittel für Aufzugwartungspersonal, zentralisiertem Aufzugsüberwachungsmittel für das Gebäude und Fernüberwachungsmittel zum Fernüberwachen von Aufzügen in einer Mehrzahl von Gebäuden vorgesehen ist.

5. Aufzugsteuervorrichtung gemäß Anspruch 1, wobei in der Mehrzahl von Fahrleistungstabellenparametern, die anhand von Fahrleistungen einer Kabine klassifiziert sind, und Bestimmungsfahrmuster für die Kabine anhand von Fahrbedingungen für die Kabine tabelliert sind, wobei die Aufzugsteuervorrichtung weiter umfasst:

ein Fahrparameter-Extraktionsmittel (26) zum Extrahieren erzielbarer Fahrparameter aus dem Fahrleistungstabellenmittel (10) auf Basis der ermittelten Kabinenfahrbedingungen,
ein Parameterauswahlmittel (27) zum Anzeigen, in der Kabine (6) und in einem Flur, von Kandidaten für Fahrmuster, welche durch die, durch das Fahrparameter-Extraktionsmittel (26) extrahierten Fahrparameter bestimmt sind, so dass jeglicher Fahrgast einen der Fahrmusterkandidaten auswählen kann, und wobei
das Fahrleistungsinformationsmittel (15, 23) weiter zum Informieren eines Inneren der Kabine (6) oder dem Flur über das ausgewählte Fahrmuster dient.

6. Aufzugsteuervorrichtung gemäß Anspruch 5, **gekennzeichnet durch** weiter Umfassen eines Mittels zum Auswählen erzielbarer Fahrparameter aus der Mehrzahl von Fahrleistungstabellen, wobei das Mittel in einem Inspektions- und Wartungsmittel für Aufzugswartungspersonal, einem zentralisierten Aufzugsüberwachungsmittel im Gebäude und/oder einem Fernüberwachungsmittel zum Fernüberwachen von Aufzügen in einer Mehrzahl von Gebäuden vorgesehen ist.

7. Aufzugsteuervorrichtung gemäß einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** das Fahrleistungstabellenmittel eines oder eine Kombination von Maximalgeschwindigkeit und sowohl Beschleunigung als auch Abbremsung ist, und das Fahrmuster die Wellenform eines Geschwindigkeitszielsignals für die Kabine ist, oder eines oder eine Kombination von Maximalgeschwindigkeit und Beschleunigung und Abbremsung für das Geschwindigkeitszielsignal.

8. Aufzugsteuervorrichtung gemäß einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** Informationen zum ausgewählten Fahrleistungstabellenmittel (10) oder dem ausgewählten Fahrparameter in einem Aufzugsgruppenüberwachungsmittel reflektiert sind.

Revendications

1. Dispositif de commande d'ascenseur comprenant un moyen de tables de caractéristiques de marche (10) ayant une pluralité de tables de caractéristiques de marche définies à l'avance pour parvenir à des caractéristiques de marche souhaitées, un moyen d'acquisition de condition de marche (11) pour acquérir les conditions de marche de la cabine lorsque la cabine commence à se déplacer, un moyen de sélection de table (12) pour sélectionner une table de caractéristiques de marche à partir du moyen de tables de caractéristiques de marche (10) sur la base des conditions de marche de la cabine, un moyen de commande pour amener la cabine à se déplacer selon un modèle de marche déterminé par la table de caractéristiques de marche sélectionnée par le moyen de sélection de table (12), et un moyen d'in-

formation de caractéristiques de marche (15) pour informer de caractéristiques de marche attendues, **caractérisé en ce que** la condition de marche de cabine est l'un quelconque ou une combinaison de n'importe lequel de la charge de cabine, de la direction de marche, du prochain étage d'arrêt, et de l'état de température d'un dispositif d'entraînement de puissance.

2. Dispositif de commande d'ascenseur selon la revendication 1, dans lequel, dans ladite pluralité de tables de caractéristiques de marche, des paramètres classés selon des caractéristiques de marche d'une cabine et déterminant des modèles de marche pour la cabine sont mis en table selon des conditions de marche pour la cabine, et dans lequel
lesdits moyens d'information de caractéristiques de marche (15, 23, 24) servent à informer en outre au moins l'un d'un intérieur de la cabine (6), d'un hall, ou d'un dispositif centralisé de supervision d'ascenseur (25), de la table de caractéristiques de marche sélectionnée.

3. Dispositif de commande d'ascenseur selon la revendication 1 ou 2, **caractérisé en ce qu'**il comprend en outre un moyen de réglage de caractéristiques de marche (16, 21) installé dans un panneau de mise en oeuvre de cabine et dans un panneau de mise en oeuvre de hall (19, 20) pour afficher des caractéristiques de marche classées de sorte que n'importe quel passager peut sélectionner, à partir des caractéristiques de marche, de fixer une table de la pluralité de tables de caractéristiques de marche, un moyen de détermination de priorité (17) pour donner une priorité supérieure à l'une ou l'autre de n'importe laquelle des tables de caractéristiques de marche sélectionnée par le panneau de mise en oeuvre de cabine (19) et le panneau de mise en oeuvre de hall (20), et des moyens d'information de caractéristiques de marche (15, 23, 24) pour informer l'intérieur de la cabine (6), le hall, ou dispositif centralisé de supervision d'ascenseur (25), des caractéristiques de marche dans la table de caractéristiques de marche sélectionnée de façon préférentielle.

4. Dispositif de commande d'ascenseur selon l'une quelconque des revendications 1 à 3, **caractérisé en ce qu'**il comprend en outre un moyen d'enregistrement et de rejet de table de caractéristiques de marche pour permettre l'enregistrement et le rejet de chaque table de caractéristiques de marche dans le moyen de tables de caractéristiques de marche (10) ayant la pluralité de tables de caractéristiques de marche, le moyen étant prévu dans au moins l'un d'un moyen d'inspection et de maintenance pour le personnel de maintenance d'ascenseur, d'un moyen centralisé de supervision d'ascenseur dans le bâtiment, et d'un moyen distant de supervision pour la supervision à distance d'ascenseurs dans une pluralité de bâtiments.

5. Dispositif de commande d'ascenseur selon la revendication 1, dans lequel, dans ladite pluralité de tables de caractéristiques de marche, des paramètres classés selon des caractéristiques de marche d'une cabine et déterminant des modèles de marche pour la cabine sont mis en table selon des conditions de marche pour la cabine, dans lequel le dispositif de commande d'ascenseur comprend en outre
un moyen d'extraction de paramètres de marche (26) pour extraire des paramètres de marche réalisables à partir du moyen de tables de caractéristiques de marche (10) sur la base des conditions de marche de cabine acquises,
un moyen de sélection de paramètres (27) pour afficher, dans la cabine (6) et au niveau d'un hall, des candidats pour des modèles de marche déterminés par les paramètres de marche extraits par le moyen d'extraction de paramètres de marche (26) de sorte que n'importe quel passager peut sélectionner l'un des candidats de modèle de marche, et dans lequel lesdits moyens d'information de caractéristiques de marche (15, 23) servent à informer en outre un intérieur de la cabine (6) ou le hall du modèle de marche sélectionné.

6. Dispositif de commande d'ascenseur selon la revendication 5, **caractérisé en ce qu'**il comprend en outre un moyen pour sélectionner des paramètres de marche réalisables à partir de la pluralité de tables de caractéristiques de marche, le moyen étant prévu dans au moins l'un d'un moyen d'inspection et de maintenance pour le personnel de maintenance d'ascenseur, d'un moyen centralisé de supervision d'ascenseur dans le bâtiment, et d'un moyen distant de supervision pour la supervision à distance d'ascenseurs dans une pluralité de bâtiments.

7. Dispositif de commande d'ascenseur selon l'une quelconque des revendications 1 à 6, **caractérisé en ce que** le moyen de tables de caractéristiques de marche est l'un quelconque ou une combinaison de la vitesse maximale et tant de l'accélération que du ralentissement, et le modèle de marche est la forme d'onde d'un signal cible de vitesse pour la cabine, ou l'un quelconque ou une combinaison de la vitesse maximale et de l'accélération et du ralentissement pour le signal cible de vitesse.

8. Dispositif de commande d'ascenseur selon l'une quelconque des revendications 1 à 7, **caractérisé en ce que** des informations concernant le moyen de tables de caractéristiques de marche sélectionné (10) ou le paramètre de marche sélectionné sont reflétées dans le moyen de supervision de groupe d'ascenseurs.

FIG. 1

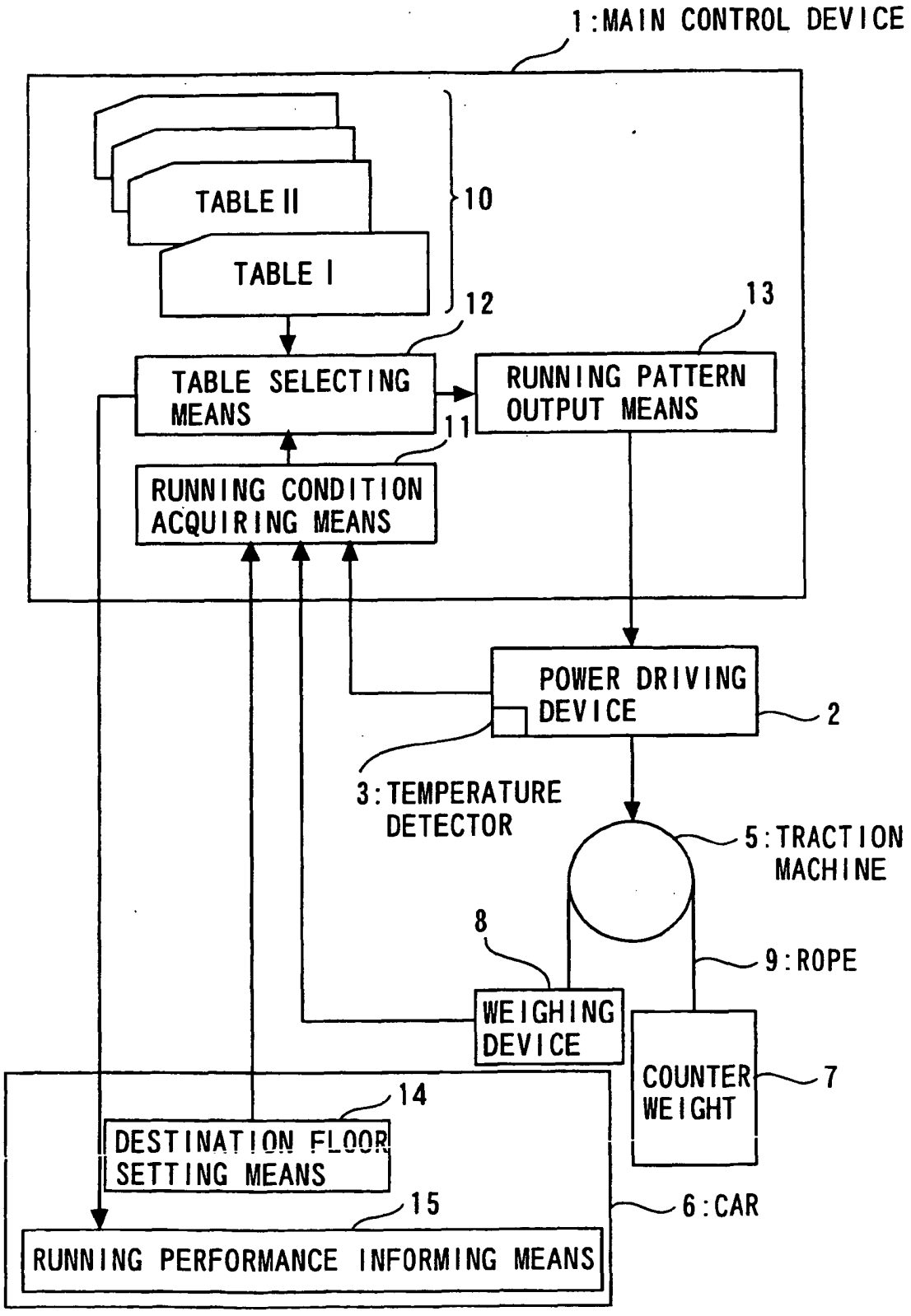

1:MAIN CONTROL DEVICE
TABLE II
TABLE I
10
12
13
TABLE SELECTING MEANS
RUNNING PATTERN OUTPUT MEANS
11
RUNNING CONDITION ACQUIRING MEANS
POWER DRIVING DEVICE
2
3:TEMPERATURE DETECTOR
5:TRACTION MACHINE
8
9:ROPE
WEIGHING DEVICE
COUNTER WEIGHT
7
14
DESTINATION FLOOR SETTING MEANS
15
6:CAR
RUNNING PERFORMANCE INFORMING MEANS

FIG. 2

TABLE I

CAR LOAD[%]		0～29	30～69	70～100
SPEED [m/min]	UP	60	60	60
	DOWN	60	60	60
ACCELERATION [m/s^2]	UP	0.5	0.5	0.5
	DOWN	0.5	0.5	0.5
DECELERATION [m/s^2]	UP	0.5	0.5	0.5
	DOWN	0.5	0.5	0.5

TABLE II

CAR LOAD[%]		0～29	30～69	70～100
SPEED [m/min]	UP	60	80	60
	DOWN	60	80	60
ACCELERATION [m/s^2]	UP	0.7	0.9	0.7
	DOWN	0.7	0.9	0.7
DECELERATION [m/s^2]	UP	0.7	0.9	0.7
	DOWN	0.7	0.9	0.7

TABLE III

CAR LOAD[%]		0～29	30～69	70～100
SPEED [m/min]	UP	60	90	60
	DOWN	60	90	60
ACCELERATION [m/s^2]	UP	0.3	0.3	0.3
	DOWN	0.3	0.3	0.3
DECELERATION [m/s^2]	UP	0.3	0.3	0.3
	DOWN	0.3	0.3	0.3

FIG. 3

TABLE A

CAR LOAD[%]		0～29	30～69	70～100
SPEED [m/min]	UP	60	80	60
	DOWN	60	80	60
ACCELERATION [m/s2]	UP	0.7	0.8	0.6
	DOWN	0.6	0.8	0.7
DECELERATION [m/s2]	UP	0.6	0.8	0.7
	DOWN	0.7	0.8	0.6

TABLE B

CAR LOAD[%]		0～29	30～69	70～100
SPEED [m/min]	UP	60	80	60
	DOWN	80	80	80
ACCELERATION [m/s2]	UP	0.8	0.8	0.8
	DOWN	0.5	0.8	0.5
DECELERATION [m/s2]	UP	0.8	0.8	0.8
	DOWN	0.5	0.8	0.5

TABLE C

CAR LOAD[%]		0～29	30～69	70～100
SPEED [m/min]	UP	80	80	60
	DOWN	80	80	60
ACCELERATION [m/s2]	UP	0.5	0.8	0.8
	DOWN	0.5	0.8	0.8
DECELERATION [m/s2]	UP	0.5	0.8	0.8
	DOWN	0.5	0.8	0.8

TABLE D

CAR LOAD[%]		0～29	30～69	70～100
SPEED [m/min]	UP	50	60	50
	DOWN	50	60	50
ACCELERATION [m/s2] 2	UP	0.5	0.6	0.5
	DOWN	0.5	0.6	0.5
DECELERATION [m/s2] 2	UP	0.5	0.6	0.5
	DOWN	0.5	0.6	0.5

FIG. 3 (A SERIES OF)

TABLE I

TABLE E

L<5

CAR LOAD[%]		0～29	30～69	70～100
SPEED [m/min]	UP	60	70	60
	DOWN	60	70	60
ACCELERATION [m/s2]	UP	0.8	0.9	0.8
	DOWN	0.8	0.9	0.8
DECELERATION [m/s2]	UP	0.8	0.9	0.8
	DOWN	0.8	0.9	0.8

5≦L<10

CAR LOAD[%]		0～29	30～69	70～100
SPEED [m/min]	UP	70	80	70
	DOWN	70	80	70
ACCELERATION [m/s2]	UP	0.7	0.8	0.7
	DOWN	0.7	0.8	0.7
DECELERATION [m/s2]	UP	0.7	0.8	0.7
	DOWN	0.7	0.8	0.7

L≧10

CAR LOAD[%]		0～29	30～69	70～100
SPEED [m/min]	UP	80	90	80
	DOWN	80	90	80
ACCELERATION [m/s2]	UP	0.6	0.7	0.6
	DOWN	0.6	0.7	0.6
DECELERATION [m/s2]	UP	0.6	0.7	0.6
	DOWN	0.6	0.7	0.6

FIG. 4

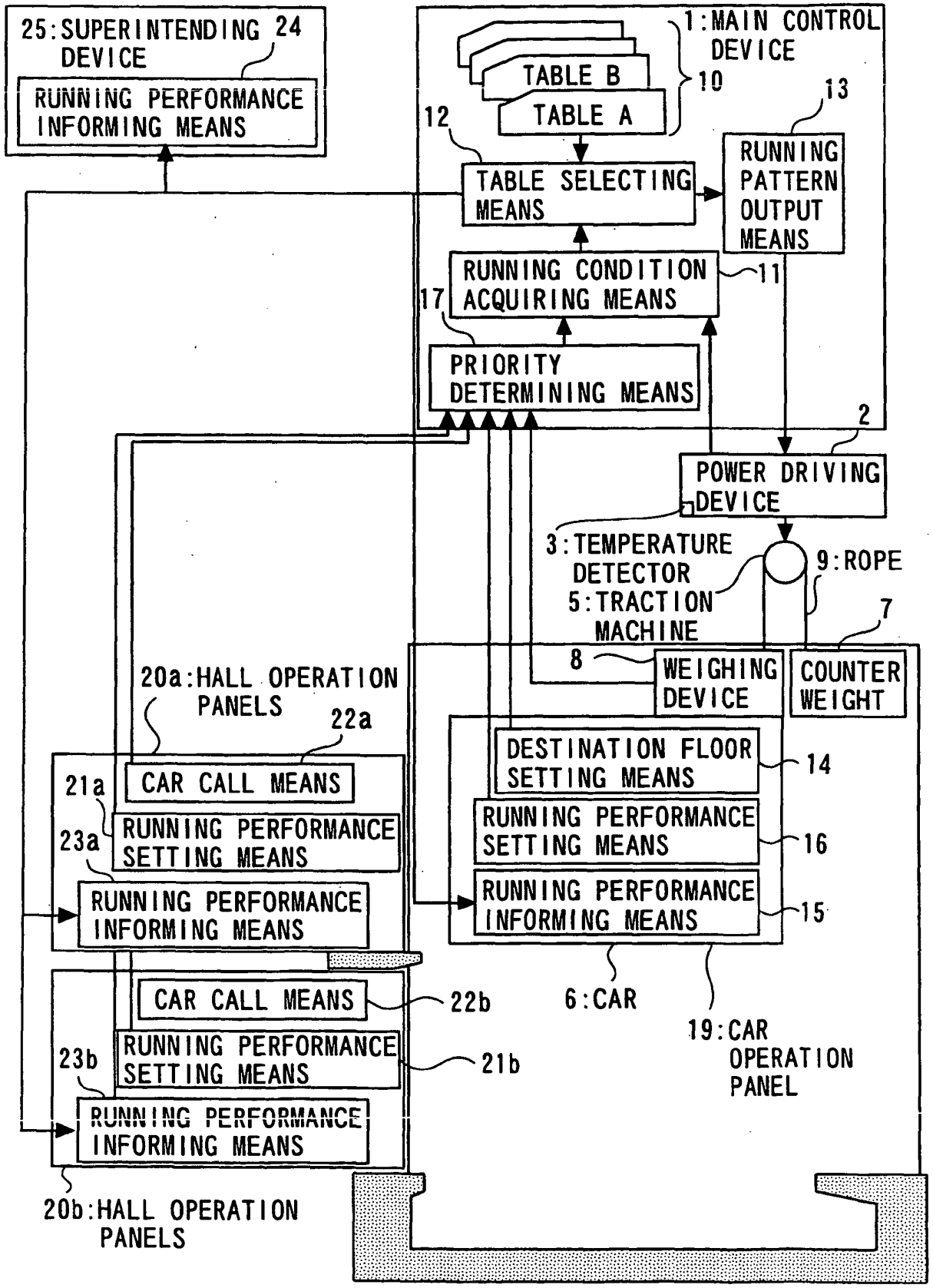

25:SUPERINTENDING DEVICE
24
RUNNING PERFORMANCE INFORMING MEANS
1:MAIN CONTROL DEVICE
10
TABLE B
TABLE A
12
TABLE SELECTING MEANS
13
RUNNING PATTERN OUTPUT MEANS
RUNNING CONDITION ACQUIRING MEANS
11
17
PRIORITY DETERMINING MEANS
2
POWER DRIVING DEVICE
3:TEMPERATURE DETECTOR
5:TRACTION MACHINE
9:ROPE
7
8
WEIGHING DEVICE
COUNTER WEIGHT
20a:HALL OPERATION PANELS
22a
21a
CAR CALL MEANS
23a
RUNNING PERFORMANCE SETTING MEANS
RUNNING PERFORMANCE INFORMING MEANS
DESTINATION FLOOR SETTING MEANS
14
RUNNING PERFORMANCE SETTING MEANS
16
RUNNING PERFORMANCE INFORMING MEANS
15
CAR CALL MEANS
22b
6:CAR
19:CAR OPERATION PANEL
23b
RUNNING PERFORMANCE SETTING MEANS
21b
RUNNING PERFORMANCE INFORMING MEANS
20b:HALL OPERATION PANELS

FIG. 5

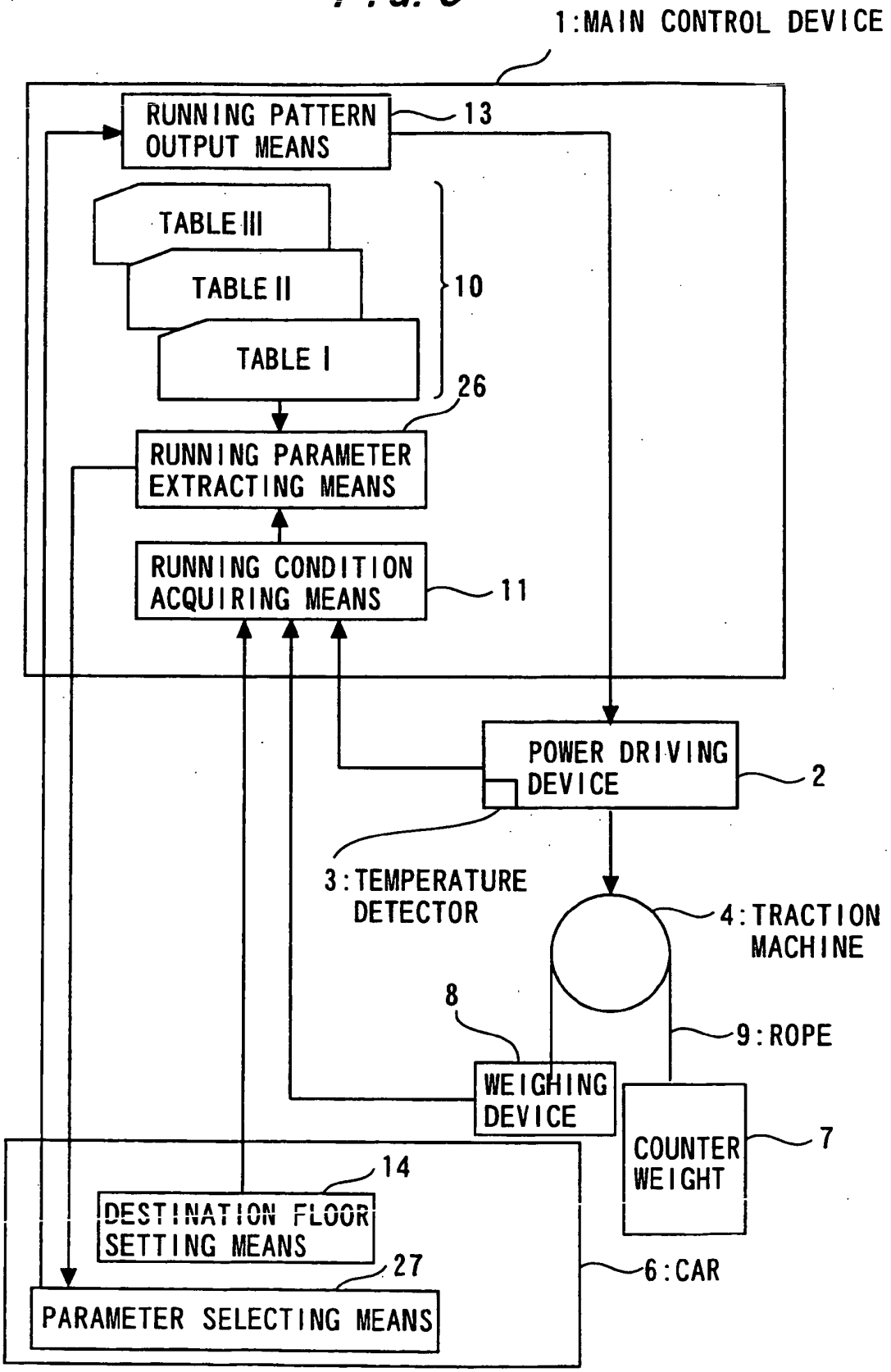

1:MAIN CONTROL DEVICE
RUNNING PATTERN OUTPUT MEANS
13
TABLE III
TABLE II
TABLE I
10
26
RUNNING PARAMETER EXTRACTING MEANS
RUNNING CONDITION ACQUIRING MEANS
11
POWER DRIVING DEVICE
2
3:TEMPERATURE DETECTOR
4:TRACTION MACHINE
8
9:ROPE
WEIGHING DEVICE
COUNTER WEIGHT
7
14
DESTINATION FLOOR SETTING MEANS
27
PARAMETER SELECTING MEANS
6:CAR

FIG. 6

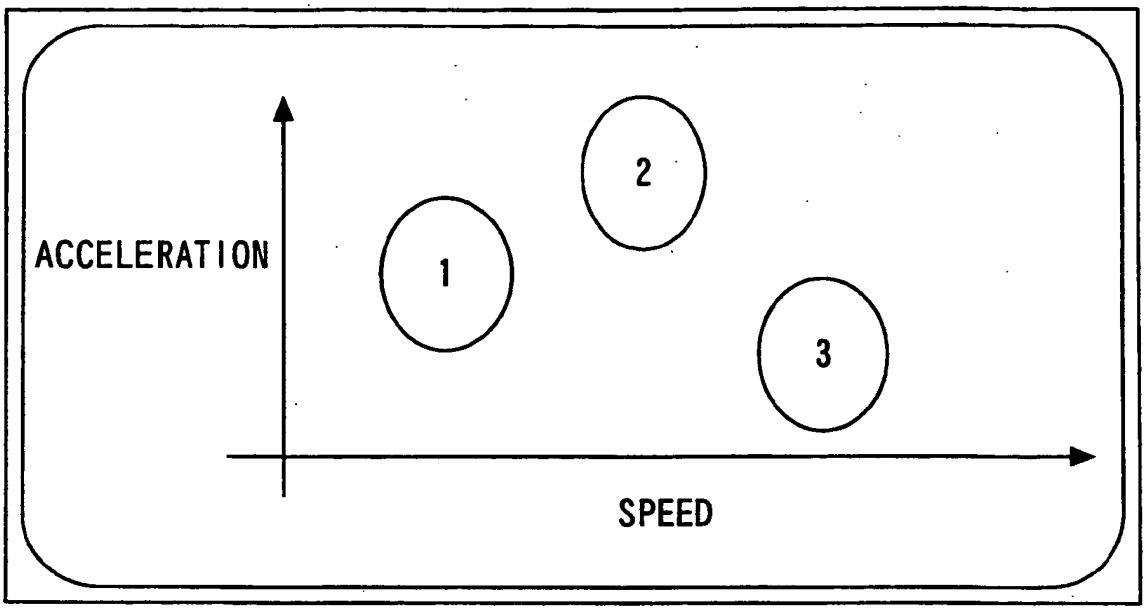


FIG. 7

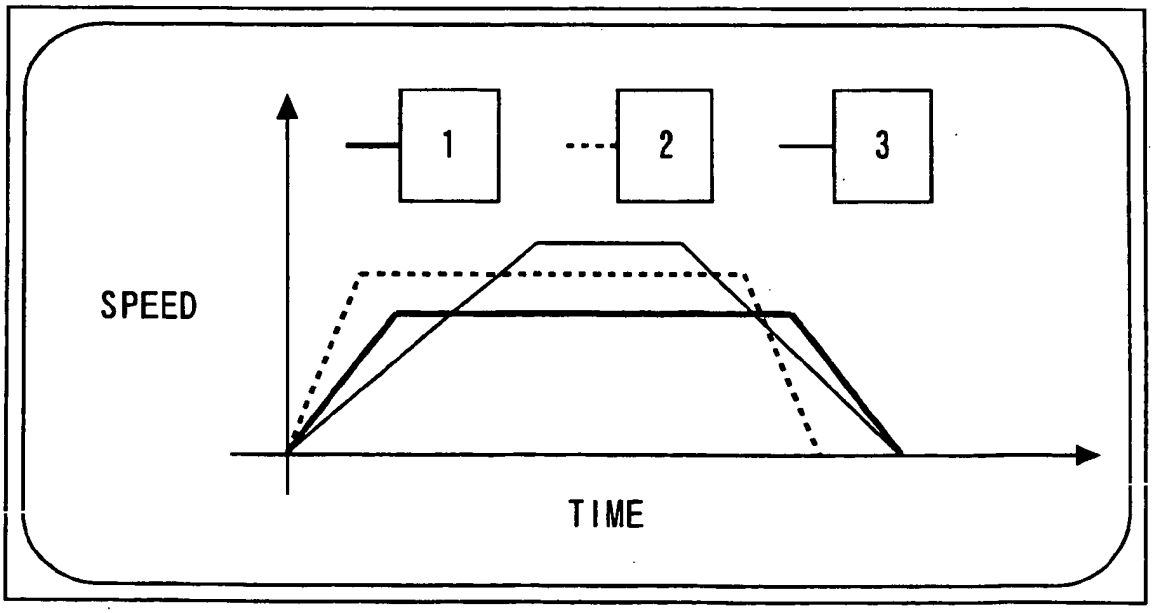
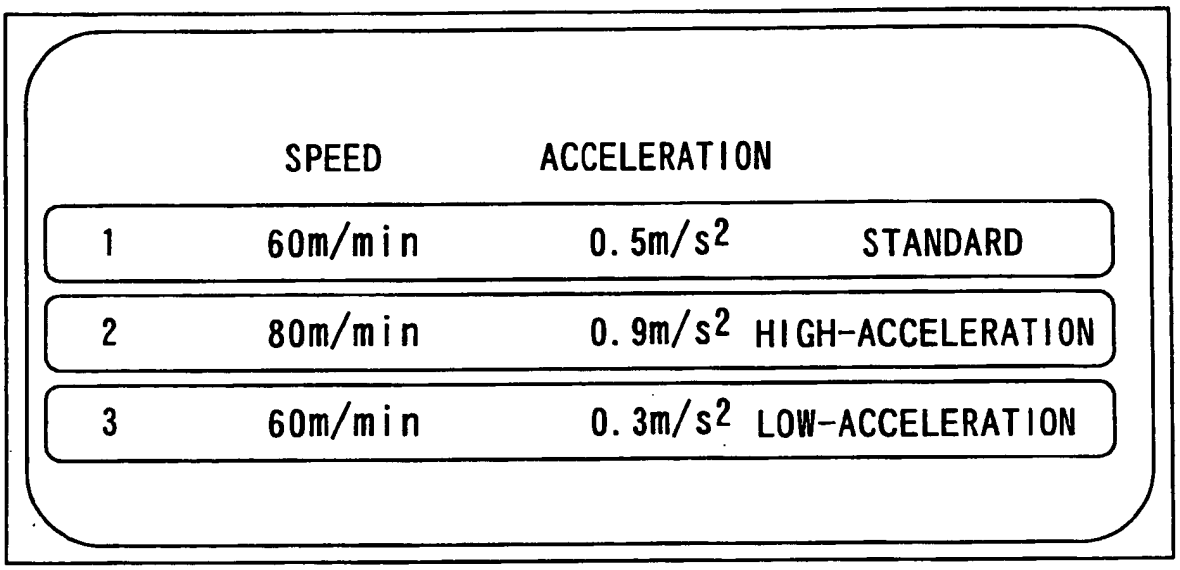


FIG. 8


SPEED
ACCELERATION
1
60m/min
0.5m/s2
STANDARD
2
80m/min
0.9m/s2
HIGH-ACCELERATION
3
60m/min
0.3m/s2
LOW-ACCELERATION

REFERENCES CITED IN THE DESCRIPTION

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- JP 61119579 A **[0002]**
- JP 2002145542 A **[0002]**
- JP 2003238037 A **[0002]**
- US 6199667 B **[0003]**