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(54) CONTROL DEVICE FOR ELEVATOR

STEUERVORRICHTUNG FÜR AUFZÜGE

DISPOSITIF DE COMMANDE POUR ASCENSEUR

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(56) References cited:
JP-A- 3 082 390
JP-A- 61 243 781
JP-A- 2003 238 037
JP-A- 2005 280 935
JP-U- 63 182 699

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Description

TECHNICAL FIELD

[0001] The present invention relates to an elevator controlling apparatus that controls car speed.

BACKGROUND ART

[0002] Conventionally, elevator apparatuses are known that modify acceleration and deceleration rates and maximum speed of a car in response to load inside the car in order to make maximum use of driving capacity of a motor that moves the car. The load inside the car is detected by a weighing device that is disposed on the car. Modification of the acceleration and deceleration rates and of the maximum speed of the car is performed within a driving capacity of the motor and electrical machinery and equipment that drive the motor (Patent Literature 1).

[0003] However, if an error arises in the value detected by the weighing device, there is a risk that the acceleration and deceleration rates and the maximum speed of the car may be set higher than the driving capacity of the motor. In that case, there is a risk that operation of the elevator may be stopped by interruption of the electrical power supply system due to overcurrent, or the motor being damaged by heat generation, etc.

[0004] Conventionally, in order to prevent the occurrence of such problems due to detection errors in the weighing device, elevator controlling apparatuses have been proposed in which electric current to the motor is detected by an electric current detector, and the acceleration and deceleration rates or the maximum speed of the car is lowered if the value of electric current detected by the electric current detector exceeds a predetermined value (Patent Literature 2).

CITATION LIST

PATENT LITERATURE

[0005]

[Patent Literature 1]
Japanese Patent Laid-Open No. 2003-238037 (Gazette)
[Patent Literature 2]
Japanese Patent Laid-Open No. 2005-280935 (Gazette)

SUMMARY OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0006] In the conventional elevator controlling apparatus that is disclosed in Patent Literature 2, the deceleration rate of the car can also be kept lower than a set value during decelerating movement of the car in order to reduce the burden on the motor due to the decelerating movement of the car. However, in the elevator controlling apparatus according to Patent Literature 2, because the deceleration rate of the car modified during the decelerating movement of the car is maintained as an unmodified low value, the car may go past the destination floor, the stopping position of the car deviating from the destination floor.

[0007] The present invention aims to solve the above problems and an object of the present invention is to provide an elevator controlling apparatus that can stop a car at a destination floor even if a deceleration rate of the car is modified during decelerating movement.

MEANS FOR SOLVING THE PROBLEM

[0008] In order to achieve the above object, according to one aspect of the present invention, there is provided an elevator controlling apparatus including: a speed pattern generating portion that generates a speed pattern for performing control that accelerates and decelerates a car to stop at a destination floor; and a deceleration rate command portion that determines during decelerating movement of the car whether or not a deceleration rate value of the speed pattern can be increased based on information from a torque detector that detects torque of a driving apparatus that moves the car, the elevator controlling apparatus being characterized in that the speed pattern generating portion is able to reduce the deceleration rate value of the speed pattern from a first deceleration value initially then switch over to a second deceleration value that is greater than the first deceleration value if the deceleration rate command portion determines that increasing the deceleration rate of the speed pattern is possible.

EFFECTS OF THE INVENTION

[0009] In an elevator controlling apparatus according to the present invention, because the deceleration rate command portion determines whether or not the speed pattern deceleration rate value can be increased during decelerating movement of the car based on the information from the electric current detector, and the speed pattern generating portion initially reduces the speed pattern deceleration rate value from the first deceleration value, then switches over to the second deceleration value, which is greater than the first deceleration value, if increasing the deceleration of the speed pattern is possible, the car can be stopped at the destination floor without the stopping position of the car deviating from the destination floor even if the deceleration of the car is modified during the decelerating movement. Consequently, the movement time of the car can be shortened, enabling deterioration in elevator operating service to be suppressed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Figure 1 is a configuration diagram that shows an elevator according to Embodiment 1 of the present invention;

Figure 2 is a graph that shows two speed patterns that are generated by a speed pattern generating portion from Figure 1, a speed pattern when a deceleration rate value is a first deceleration value η, and a speed pattern when the deceleration rate value is switched over from the first deceleration value η to a second deceleration value ζ;

Figure 3 is a flowchart that shows processing in a controlling apparatus from Figure 1 before movement of a car is started;

Figure 4 is a flowchart that shows processing in the controlling apparatus from Figure 1 during accelerating movement of the car;

Figure 5 is a flowchart that shows processing in the controlling apparatus from Figure 1 during decelerating movement of the car; and

Figure 6 is a flowchart that shows processing when adjustment of the speed pattern is performed by the speed pattern generating portion from Figure 1.

DESCRIPTION OF EMBODIMENTS

[0011] A preferred embodiment of the present invention will now be explained with reference to the drawings.

Embodiment 1

[0012] Figure 1 is a configuration diagram that shows an elevator according to Embodiment 1 of the present invention. In the figure, a car 2 and a counterweight 3 that can move vertically are disposed inside a hoistway 1. A hoisting machine 4 that constitutes a driving apparatus that moves the car 2 and the counterweight 3 is disposed in an upper portion of the hoistway 1 .

[0013] The hoisting machine 4 has: a motor 5; and a driving sheave 6 that is rotated by the motor 5. A main rope 7 is wound around the driving sheave 6. The car 2 and the counterweight 3 are suspended by the main rope 7. The car 2 and the counterweight 3 are moved inside the hoistway 1 by the rotation of the driving sheave 6.

[0014] Electric power from the alternating-current power supply 8 is supplied to the motor 5. The electric power from the alternating-current power supply 8 is supplied to the motor 5 through an electric power supply breaking portion 9, a converter 10, and an inverter 11.

[0015] The rated electric current value is preset in the electric power supply breaking portion 9 based on capacity of the motor 5, the converter 10, and the inverter 11. The electric power supply breaking portion 9 disconnects a circuit that includes the converter 10, the inverter 11, etc., from the alternating-current power supply 8 when the electric current value from the alternating-current power supply 8 exceeds the rated electric current value. The motor 5, the converter 10, and the inverter 11 are protected thereby. A fuse, or a circuit breaker, for example, can be used as the electric power supply breaking portion 9.

[0016] The converter 10 converts alternating current from the alternating-current power supply 8 into direct current. The electric current that is converted to direct current by the converter 10 is sent to the inverter 11. The inverter 11 adjusts the frequency of the electric current from the converter 10. The electric current that is frequency-adjusted by the inverter 11 is sent to the motor 5. The motor 5 rotates the driving sheave 6 at a rotational frequency that corresponds to the frequency of the electric current from the inverter 11 on receiving electric power from the inverter 11.

[0017] The electric current value that is sent from the electric power supply breaking portion 9 to the converter 10 is detected by the electric current detector 12. The electric current value that is detected by the electric current detector 12 changes in response to the torque that the motor 5 generates. Consequently, the electric current detector 12 functions as a torque detector that detects the torque of the motor 5.

[0018] A speed detector 13 that generates signals that correspond to the rotation of the driving sheave 6 is disposed on the hoisting machine 4. Since the car 2 is moved in response to the rotation of the driving sheave 6, the speed detector 13 generates signals that correspond to the position and speed of the car 2. An encoder, for example, can be used as the speed detector 13. A weighing device (a car load detecting apparatus) 14 that detects the weight (i.e., load inside the car 2) of the burden (passengers, freight, etc.) inside the car 2 is disposed on the car 2.

[0019] The respective information from the electric current detector 12, the speed detector 13, and the weighing device 14 is sent to a controlling apparatus 15 that controls elevator operation. The controlling apparatus 15 controls the inverter 11 to control movement of the car 2 based on the respective information from the electric current detector 12, the speed detector 13, and the weighing device 14.

[0020] The controlling apparatus 15 has a speed pattern generating portion 16, a deceleration rate command portion 17, and a speed controlling portion 18.

[0021] The speed pattern generating portion 16 generates a speed pattern for performing control that accelerates and decelerates the car 2 to stop at a destination floor.

[0022] The speed pattern generating portion 16 generates the speed pattern for the car 2 based on the information from the weighing device 14 before movement of the car 2 is started. Specifically, before movement of the car 2 is started, the speed pattern generating portion 16 finds an acceleration rate, a maximum speed, and a deceleration rate that correspond to the respective infor-

mation from the weighing device 14, and also finds a distance (a decelerating movement distance) from when deceleration of the car 2 is started until the car 2 is stopped based on the maximum speed and the deceleration rate found, and generates a speed pattern for the car 2 based on the respective acceleration rate, maximum speed, deceleration rate, and decelerating movement distance found.

[0023] In this example, the respective values of acceleration rate, maximum speed, deceleration rate, and decelerating movement distance that are found before movement of the car 2 is started function as an initial acceleration value α, an initial maximum value V_0, an initial deceleration value β, and an initial deceleration distance value S_β.

[0024] During accelerating movement of the car 2, the speed pattern generating portion 16 finds the actual acceleration value γ of the car 2 based on the information from the speed detector 13, and determines whether or not it is necessary to modify the speed pattern deceleration rate value (i.e., the initial deceleration value β) by comparing an actual acceleration value γ and the initial acceleration value α. The speed pattern generating portion 16 modifies the speed pattern deceleration rate value from the initial deceleration value β to a first deceleration value η that is less than the initial deceleration value β if it is determined that modification of the speed pattern deceleration rate value is necessary, and maintains the speed pattern deceleration rate value as an unmodified initial deceleration value β if it is determined that modification of the speed pattern deceleration rate value is unnecessary. The first deceleration value η may be a preset value, and may also be a value based on the actual acceleration value γ found.

[0025] In other words, during accelerating movement of the car 2, the speed pattern generating portion 16 reduces the speed pattern deceleration rate value if the acceleration value of the car 2 does not reach the initial acceleration value α due to overloading of the motor 5, for example, in order to prevent overloading of the motor 5 during the decelerating movement of the car 2.

[0026] Specifically, the speed pattern generating portion 16 lowers the speed pattern deceleration rate value from the initial deceleration value β to the first deceleration value η if a difference between the actual acceleration value γ that is found based on the information from the speed detector 13 and the initial acceleration value α is greater than or equal to a preset threshold value Δa, and maintains the unmodified initial deceleration value β as the speed pattern deceleration rate value if the difference between the actual acceleration value γ and the initial acceleration value α is less than the threshold value Δa.

[0027] In addition, if the speed pattern deceleration rate value is modified from the initial deceleration value β to the first deceleration value η, the speed pattern generating portion 16 finds a decelerating movement distance value (a first deceleration distance value) S_η that corresponds to the first deceleration value η after modification, and regenerates the speed pattern based on the first deceleration value η and the decelerating movement distance value S_η. The regeneration of the speed pattern by the speed pattern generating portion 16 is performed during accelerating movement of the car 2.

[0028] If the speed pattern deceleration rate value is reduced to the first deceleration value η, the deceleration rate command portion 17 determines during the decelerating movement of the car 2 whether or not the speed pattern deceleration rate value can be increased, based on the information from the electric current detector 12.

[0029] In other words, the deceleration rate command portion 17 determines during the decelerating movement of the car 2 whether or not there is spare load capacity in the motor 5 by comparing the electric current value detected by the electric current detector 12 during the decelerating movement of the car 2 and the allowable electric current value of the motor 5. If it is determined that there is spare load capacity in the motor 5, the deceleration rate command portion 17 finds a second deceleration value ζ that corresponds to a difference between the electric current value that is detected by the electric current detector 12 and the allowable electric current value of the motor 5 based on the information from the electric current detector 12. The deceleration rate command portion 17 determines whether or not the speed pattern deceleration rate value can be switched over to the second deceleration value ζ from the first deceleration value η in order to stop the car 2 at the destination floor. Moreover, the second deceleration value ζ is a deceleration rate value that is larger than the first deceleration value η.

[0030] The deceleration rate command portion 17 determines that increasing the speed pattern deceleration rate value is possible if it is determined that switching over to the second deceleration value ζ is possible, and determines that increasing the speed pattern deceleration rate value is impossible if it is determined that there is no spare load capacity in the motor 5, or if it is determined that switching over to the second deceleration value ζ is impossible.

[0031] The deceleration rate command portion 17 sends a command to increase the deceleration of the speed pattern and information about the second deceleration value ζ to the speed pattern generating portion 16 if it is determined that increasing the speed pattern deceleration rate value is possible.

[0032] The speed pattern generating portion 16 performs amendment of the speed pattern based on the information about the second deceleration value ζ on receiving the command from the deceleration rate command portion 17. The amendment of the speed pattern is performed by switching over to the second deceleration value ζ after the deceleration rate value in the speed pattern is initially reduced from the first deceleration value η in order to maintain the stopping position of the car 2 at the destination floor.

[0033] The speed controlling portion 18 performs control over the inverter 11 that conforms to the speed pattern while comparing changes in speed and the speed pattern of the car 2 based on the respective information from the speed detector 13 and the speed pattern generating portion 16.

[0034] Figure 2 is a graph that shows two speed patterns that are generated by the speed pattern generating portion 16 from Figure 1, a speed pattern when the deceleration rate value is the first deceleration value η, and a speed pattern when the deceleration rate value is switched over from the first deceleration value η to the second deceleration value ζ. Moreover, in Figure 2, a speed pattern is shown from a time t_0 at which deceleration of the car 2 is started until the car 2 is stopped. In the figure, the speed of the two speed patterns A and B at time t_0 at which deceleration of the car 2 is started is the maximum speed V_0.

[0035] In the speed pattern A, when the deceleration rate value is switched over from the first deceleration value η to the second deceleration value ζ, switching over from the first deceleration value η to the second deceleration value ζ is started at point a (speed V_1) at time t_1, passes through point b (speed V_2) at time t_2 and point c (speed V_3) at time t_3, and switching over to the second deceleration value ζ is completed on reaching point d (speed V_4) at time t_4.

[0036] The deceleration rate value in speed pattern A. decreases continuously as it approaches point b in a zone between point a and point b The deceleration rate value in speed pattern A is 0 and the speed constant in a zone between point b and point c. In addition, the deceleration rate value in speed pattern A increases continuously as it approaches point d in a zone between point c and point d.

[0037] In speed pattern A, switching over to the second deceleration value ζ is completed at point d, and then the speed of the car 2 reaches zero and the car 2 is stopped by passing through point e (speed V_5) at time t_5 and point f (speed V_6) at time t_6 to reach point g at time t_7.

[0038] The deceleration rate value in speed pattern A is maintained at the second deceleration value ζ in a zone between point d and point f. In a zone between point f and point g in speed pattern A, the deceleration rate value decreases continuously as it approaches point g.

[0039] Speed pattern A and speed pattern B, in which switching over to the second deceleration value ζ is not performed, cross each other at point e at time t_5. Consequently, the speed of the two speed patterns A and B is identical at point e, namely V_5.

[0040] In speed pattern B, deceleration of the car 2 is started, and the deceleration rate value reaches the first deceleration value η, then the deceleration rate value is maintained at the first deceleration value η until point h (speed V_8) at time t_8, the deceleration rate value decreases continuously to point h and the speed of the car 2 reaches zero and the car 2 is stopped on reaching point i at time tg.

[0041] If the decelerating movement distance value for the car 2 according to speed pattern A and the decelerating movement distance value for the car 2 according to speed pattern B are equal, the car 2 is stopped at a common destination floor irrespective of which of the two speed patterns A and B the car 2 is moved by. In order to make the decelerating movement distance value of the car 2 according to speed pattern A and the decelerating movement distance value of the car 2 according to speed pattern B equal, it is necessary for an area Sp of region P that is bounded by a - b - c - d - e - a in Figure 2 and an area Sq of a region Q that is bounded by e - h - i - g - f - e in Figure 2 to be equal. Consequently, when speed pattern B is amended to speed pattern A in the speed pattern generating portion 16, the area Sp of region P and the area Sq of region Q are computed so as to be equal. In order to make the area Sp of region P and the area Sq of region Q equal, the length of the zone between point b and point c in speed pattern A (i.e., the length of time between time t_2 and time t_3) is adjusted.

[0042] Next, operation will be explained. Figure 3 is a flowchart that shows processing in the controlling apparatus 15 from Figure 1 before movement of the car 2 is started. Before movement of the car 2 is started, a speed pattern is generated by the speed pattern generating portion 16 based on the information from the weighing device 14. Specifically, the initial acceleration value α, the initial maximum value V_0, and the initial deceleration value β are first found in the speed pattern generating portion 16 based on the information from the weighing device 14 before starting movement of the car 2 (S11). The initial deceleration distance value S_β is subsequently found in the speed pattern generating portion 16 (S12). A speed pattern is subsequently generated in the speed pattern generating portion 16 based on the initial acceleration value α, the initial maximum value V_0, the initial deceleration value β, and the initial deceleration distance value S_β.

[0043] Figure 4 is a flowchart that shows processing in the controlling apparatus 15 from Figure 1 during accelerating movement of the car 2. During accelerating movement of the car 2, it is determined in the speed pattern generating portion 16 whether or not the difference between the actual acceleration value γ and the initial acceleration value α is greater than or equal to the threshold value Δa (S21).

[0044] If the difference between the actual acceleration value γ and the initial acceleration value α is greater than or equal to the threshold value Δa, then the speed pattern deceleration rate value is decreased from the initial deceleration value β to the first deceleration value η (S22), and then the decelerating movement distance value S_η is found based on the first deceleration value η (S23). In this case, the speed pattern is regenerated in the speed pattern generating portion 16 based on the first deceleration value η and the decelerating movement distance S_η.

[0045] If the difference between the actual acceleration

value γ and the initial acceleration value α is less than the threshold value Δa, on the other hand, the speed pattern deceleration rate value is maintained at the initial deceleration value β without being modified.

[0046] Figure 5 is a flowchart that shows processing in the controlling apparatus 15 from Figure 1 during decelerating movement of the car 2. When decelerating movement of the car 2 is started after the car 2 performs constant movement at the maximum speed, whether or not the speed pattern deceleration rate value can be increased is determined by the deceleration rate command portion 17 based on the information from the electric current detector 12.

[0047] Specifically, in order to find the shortest time that enables switching over to the second deceleration value ζ, first time t_2 and time t_3 in Figure 2 are set to equal values in the deceleration rate command portion 17 (S31). The area Sp of region P and the area Sq of region Q are then found in the deceleration rate command portion 17 (S32), and it is determined whether or not the area Sp of region P is less than or equal to the area Sq of region Q (S33).

[0048] If the area Sp of region P is greater than the area Sq of region Q, it is determined by the deceleration rate command portion 17 that increasing the speed pattern deceleration rate value is impossible, and the speed pattern deceleration rate value is maintained at the first deceleration value η. In that case, the above processing is repeated at intervals of a computational period Δt of the controlling apparatus 15 until the area Sp of region P becomes less than or equal to the area Sq of region Q.

[0049] If the area Sp of region P is less than or equal to the area Sq of region Q, it is determined by the deceleration rate command portion 17 that increasing the speed pattern deceleration rate value is possible, and a command to increase the deceleration rate of the speed pattern, and information about the second deceleration value ζ are sent from the deceleration rate command portion 17 to the speed pattern generating portion 16.

[0050] The value of time t_3 is then found in the speed pattern generating portion 16 such that the area Sq of region Q and the area Sp of region P are equal (S34). The value of time t_3 is expressed by time t_2 + (the area Sq - the area Sp)/speed V_3.

[0051] Amendment of the speed pattern for switching over the deceleration rate value from the first deceleration value η to the second deceleration value ζ is then performed in the speed pattern generating portion 16 (S35).

[0052] Figure 6 is a flowchart that shows processing when adjustment of the speed pattern is performed by the speed pattern generating portion 16 from Figure 1. First, the speed pattern is amended in the zone from time t_1 to time t_2 such that the speed change from speed V_1 to speed V_2 is smooth (S41). Next, the speed pattern is amended from time t_2 such that speed V_2 and speed V_3 are constant in a zone extending to time t_3 that is found in S34 above (S42). Next, the speed pattern is amended in a zone from time t_3 to time t_4 such that the speed change from speed V_3 to speed V_4 is smooth (S43).

[0053] In an elevator controlling apparatus of this kind, because the deceleration rate command portion 17 determines whether or not the speed pattern deceleration rate value can be increased during decelerating movement of the car 2 based on the information from the electric current detector 12, and the speed pattern generating portion 16 initially reduces the speed pattern deceleration rate value from the first deceleration value η, then switches over to the second deceleration value ζ, which is greater than the first deceleration value η, if increasing the deceleration of the speed pattern is possible, the car 2 can be stopped at the destination floor without the stopping position of the car 2 deviating from the destination floor even if the deceleration rate of the car 2 is modified during the decelerating movement. Consequently, the movement time of the car 2 can be shortened, enabling deterioration in elevator operating service to be suppressed.

[0054] Because a zone exists in the speed pattern in which the deceleration rate value becomes zero in an interval in which the deceleration rate value is switched over from the first deceleration value η to the second deceleration value ζ (a zone in an interval from time t_2 to time t_3), amendment of the speed pattern can be performed easily.

[0055] Because the second deceleration value ζ is found based on the information from the electric current detector 12, the speed pattern deceleration rate value can be increased effectively in response to the degree of reserve in the motor 5 relative to the load during the decelerating movement of the car 2.

[0056] Moreover, in the above example, the speed in the zone between time t_2 and time t_3 in speed pattern A is assumed to be constant (i.e., the deceleration rate value is assumed to be zero at all times), but the speed in the zone between time t_2 and time t_3 does not need to be constant provided that the area Sq of region Q is equal to the area Sp of region P. For example, the speed in the zone between time t_2 and time t_3 may also be increased or decreased so as to have a constant gradient.

EXPLANATION OF NUMBERING

[0057] 1 HOISTWAY, 2 CAR, 13 ENCODER (SIGNAL GENERATING APPARATUS), 15 CAR POSITION DETECTING PLATE (MAGNETIC SHIELDING BODY), 16 PLATE DETECTING APPARATUS (SHIELDING BODY DETECTING APPARATUS), 18 FIRST MAGNETIC DETECTOR, 19 SECOND MAGNETIC DETECTOR, AND 20 CONTROLLING APPARATUS.

Claims

1. An elevator controlling apparatus comprising:

a speed pattern generating portion (16) that generates a speed pattern for performing control that accelerates and decelerates a car (2) to stop at a destination floor; and
a deceleration rate command portion (17) that determines during decelerating movement of the car (2) whether or not a deceleration rate value of the speed pattern can be increased based on information from a torque detector (12) that detects torque of a driving apparatus (4) that moves the car (2),
the elevator controlling apparatus being **characterized in that** the speed pattern generating portion (16) is able to reduce the deceleration rate value of the speed pattern from a first deceleration value initially then switch over to a second deceleration value that is greater than the first deceleration value if the deceleration rate command portion (17) determines that increasing the deceleration rate of the speed pattern is possible.

2. An elevator controlling apparatus according to Claim 1, **characterized in that** a zone in which the deceleration rate value is zero exists in the speed pattern in an interval in which the deceleration rate value is switched over from the first deceleration value to the second deceleration value,

3. An elevator controlling apparatus according to Claim 1, **characterized in that** the second deceleration value is found based on information from the torque detector (12).

Patentansprüche

1. Aufzugsteuervorrichtung, die aufweist:

einen Geschwindigkeitsmuster-Erzeugungsabschnitt (16), der ein Geschwindigkeitsmuster zum Durchführen einer Steuerung erzeugt, die eine Kabine (2) beschleunigt und verzögert, um bei einer Zieletage anzuhalten; und
einen Verzögerungsrate-Befehlsabschnitt (17), der während einer Verzögerungsbewegung der Kabine (2) bestimmt, ob ein Verzögerungsratenwert des Geschwindigkeitsmusters basierend auf einer Information von einem Drehmomentdetektor (12) erhöht werden kann oder nicht, der ein Drehmoment einer Antriebsvorrichtung (4) erfasst, die die Kabine (2) bewegt,
wobei die Aufzugsteuervorrichtung **dadurch gekennzeichnet ist, dass** der Geschwindigkeitsmuster-Erzeugungsabschnitt (16) den Verzögerungsratenwert des Geschwindigkeitsmusters vom ersten Verzögerungswert anfänglich verringern kann, dann zu einem zweiten Verzögerungswert umschaltet, der größer als der erste Verzögerungswert ist, falls der Verzögerungsrate-Befehlsabschnitt (17) bestimmt, dass ein Erhöhen der Verzögerungsrate des Geschwindigkeitsmusters möglich ist.

2. Aufzugsteuervorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** eine Zone, in welcher der Verzögerungsratenwert Null ist, im Geschwindigkeitsmuster in einem Intervall existiert, in welchem der Verzögerungsratenwert von dem ersten Verzögerungswert zum zweiten Verzögerungswert umgeschaltet wird.

3. Aufzugsteuervorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der zweite Verzögerungswert basierend auf einer Information vom Drehmomentdetektor (12) gefunden wird.

Revendications

1. Appareil de commande d'ascenseur comprenant :

une partie de génération de motif de vitesse (16) qui génère un motif de vitesse pour effectuer une commande qui accélère et décélère une cabine (2) pour l'arrêter à un étage de destination ; et
une partie de commande de taux de décélération (17) qui détermine, au cours du mouvement de décélération de la cabine (2), si une valeur du taux de décélération du motif de vitesse peut être accrue ou non sur la base des informations provenant d'un détecteur de couple (12) qui détecte le couple d'un appareil d'entraînement (4) qui déplace la cabine (2),
l'appareil de commande d'ascenseur étant **caractérisé en ce que** la partie de génération de motif de vitesse (16) est capable de réduire initialement la valeur du taux de décélération du motif de vitesse à partir d'une première valeur de décélération, puis de commuter à une deuxième valeur de décélération qui est supérieure à la première valeur de décélération si la partie de commande de taux de décélération (17) détermine que l'augmentation du taux de décélération du motif de vitesse est possible.

2. Appareil de commande d'ascenseur selon la revendication 1, **caractérisé en ce qu'**une zone dans laquelle la valeur du taux de décélération est nulle existe dans le motif de vitesse dans un intervalle dans lequel la valeur du taux de décélération est commutée de la première valeur de décélération à la deuxième valeur de décélération.

3. Appareil de commande d'ascenseur selon la reven-

dication 1, **caractérisé en ce que** la deuxième valeur de décélération est trouvée sur la base d'une information provenant du détecteur de couple (12).

FIG. 1

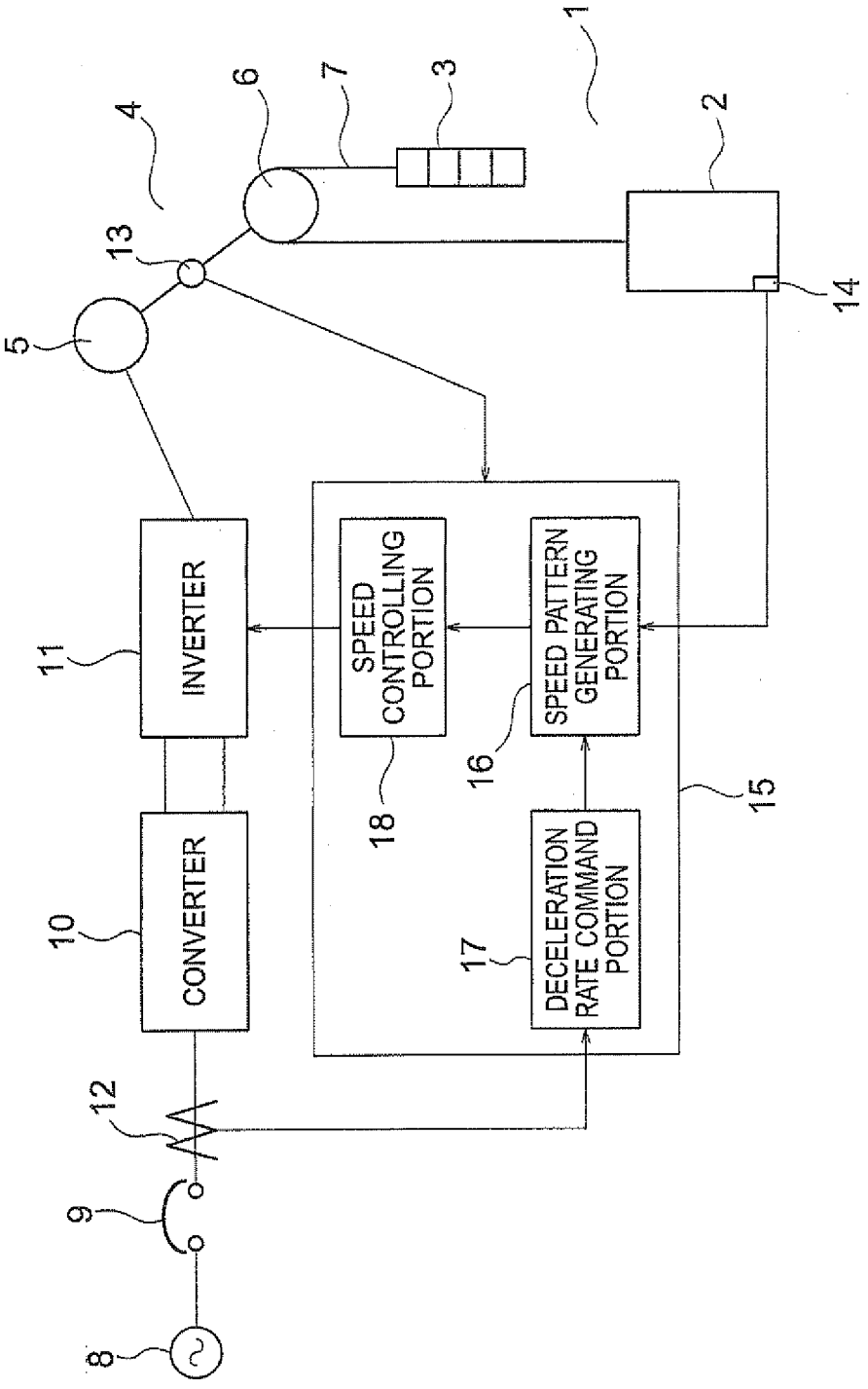

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18
INVERTER
CONVERTER
SPEED CONTROLLING PORTION
SPEED PATTERN GENERATING PORTION
DECELERATION RATE COMMAND PORTION

FIG. 2

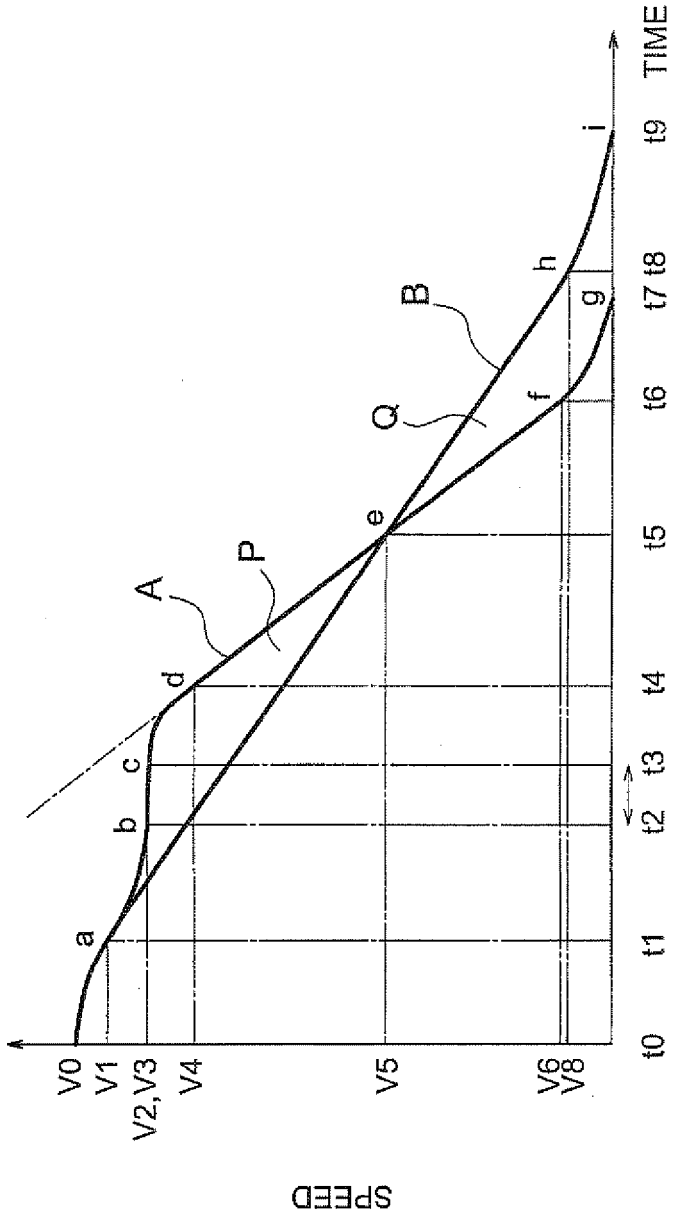

SPEED
TIME
V0
V1
V2,V3
V4
V5
V6
V8
t0
t1
t2
t3
t4
t5
t6
t7
t8
t9
a
b
c
d
e
f
g
h
i
A
B
P
Q

FIG. 3

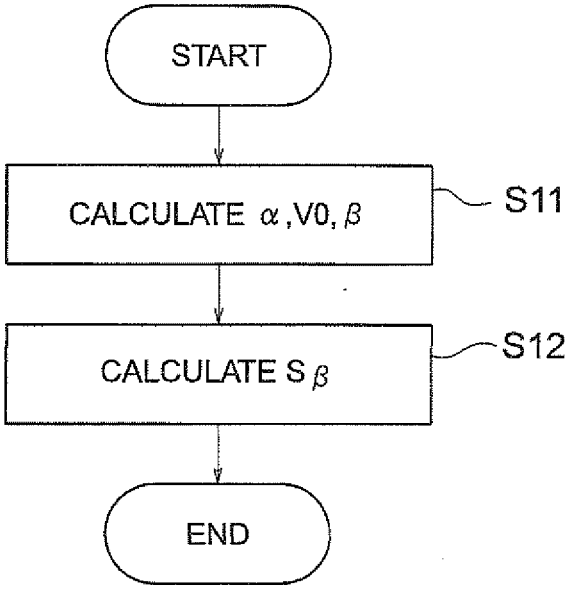

START
CALCULATE α,V0,β
S11
CALCULATE S β
S12
END

FIG. 4

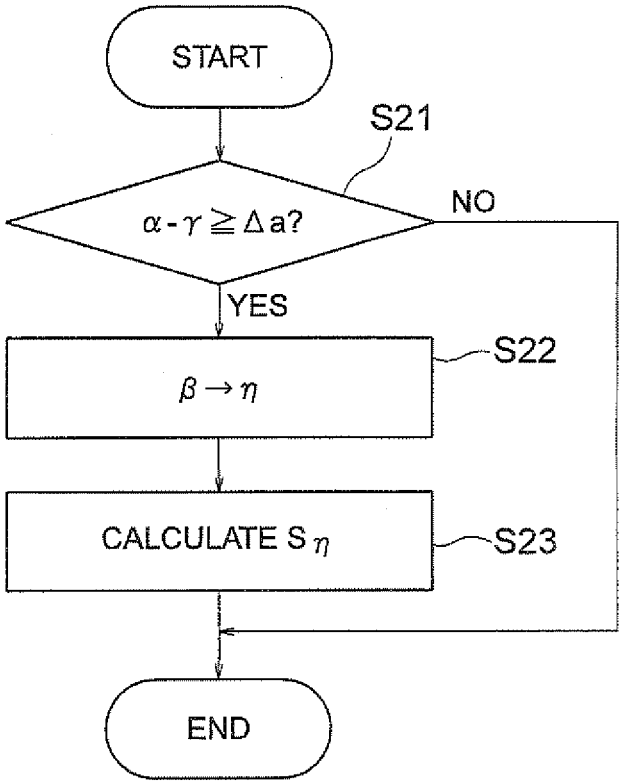

START
S21
α-γ≧Δa?
NO
YES
β→η
S22
CALCULATE S η
S23
END

FIG. 5

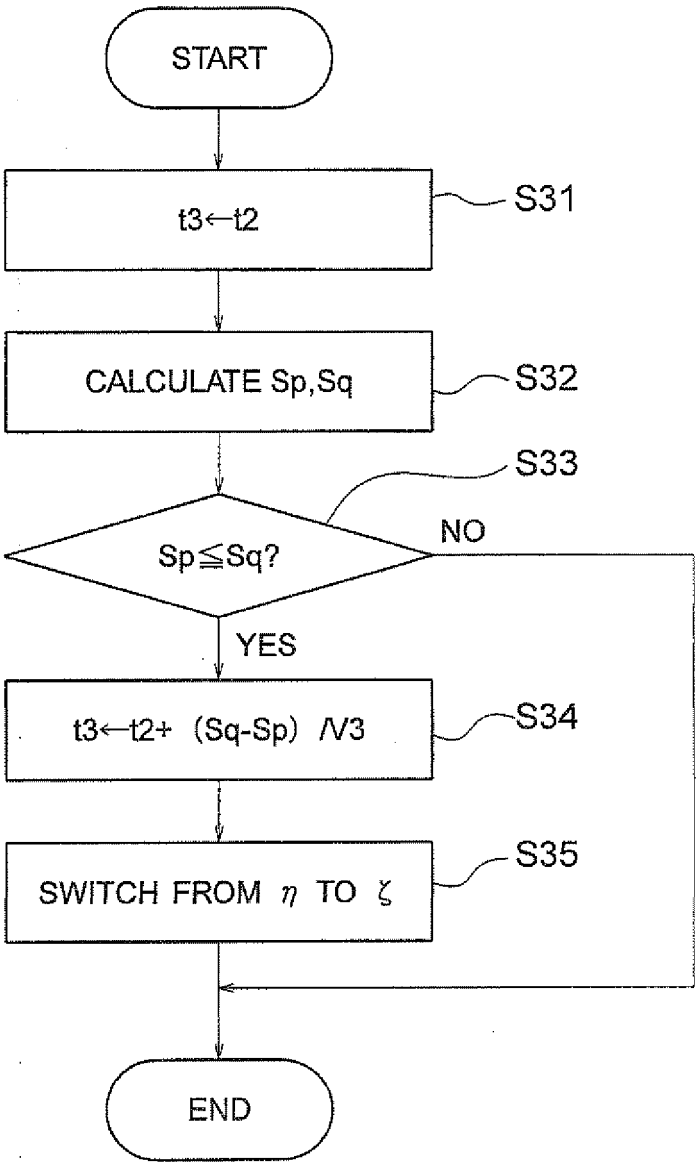
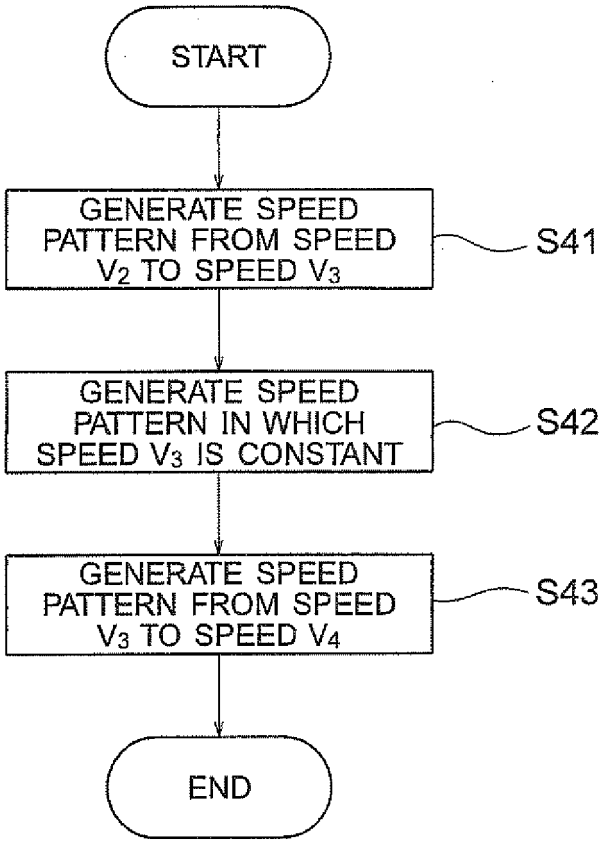

START
t3←t2
S31
CALCULATE Sp,Sq
S32
S33
Sp≦Sq?
NO
YES
t3←t2+ (Sq-Sp) /V3
S34
SWITCH FROM η TO ζ
S35
END

FIG. 6


START
GENERATE SPEED PATTERN FROM SPEED V_2 TO SPEED V_3
S41
GENERATE SPEED PATTERN IN WHICH SPEED V_3 IS CONSTANT
S42
GENERATE SPEED PATTERN FROM SPEED V_3 TO SPEED V_4
S43
END

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2003238037 A **[0005]**
- JP 2005280935 A **[0005]**