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(54) ELEVATOR EQUIPMENT

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EQUIPEMENT DE DISPOSITIF ELEVATEUR

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- **BARKAND T D: "ASCENDING ELEVATOR ACCIDENTS: GIVE THE MINER A BRAKE" IEEE TRANSACTIONS ON INDUSTRY APPLICATIONS, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 28, no. 3, 1 May 1992 (1992-05-01), pages 720-729, XP000306123 ISSN: 0093-9994**

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Description

Technical Field

[0001] The present invention relates to an elevator system in which a car is suspended within a hoistway by a main rope that is wound around a drive sheave, the car ascending and descending by a traction force between the drive sheave and the main rope.

Background Art

[0002] In general, if a car travels further upward than its normal travel excursion and a counterweight travels further downward than its normal travel excursion for some reason or other in an elevator system, the counterweight will impact against a buffer in a bottom portion of the hoistway, and stop. If the load of the counterweight is supported by the buffer, the traction force in the drive sheave decreases rapidly, and the drive sheave slips and skids with respect to the main rope, even if rotation of the drive sheave continues. Accordingly, the ascending car also stops when the counterweight impacts the buffer.

[0003] On the other hand, an elevator system in which a resin coats the outer circumference of a main rope is disclosed in JP 2001-262482 A, for example. With this type of conventional elevator system, a friction force between the drive sheave and the main rope can be made larger, and traction capacity can be increased. With this type of elevator system with high traction capacity, however, the car may not stop smoothly even if the counterweight impacts the buffer and stops, because the reduction in the traction force is small.

[0004] Further, the dead weight of the main rope is large with a high lift elevator system. Accordingly, there are cases where the reduction in the traction force is similarly small when the counterweight impacts the buffer and stops.

[0005] The manuscript by Barkand, "Ascending Elevator Accidents : Give the Miner a Brake" as published under IEEE Transactions on Industry Applications; 28 (3), 720-729 (1992), discusses basic elevator designs, hazards, regulations, and emergency braking system to provide an ascending car overspeed protection. In addition, a pneumatic rope brake system is discussed. Further, DD 212 242 A1 discloses an elevator apparatus that is devoted to limit hazards that may arise from slack in the elevator rope. To this end, a rope quenching apparatus is suggested that is provided between the traction sheave and the suspension of the elevator car. In case an overload of the system is detected, the rope quenching apparatus is engaged.

Disclosure of Invention

[0006] The present invention has been made in order to solve problems like those described above. An object of the present invention is to obtain an elevator system in which normally a sufficient traction capacity can be secured, and moreover, a traction force can be made to suitably decrease when a counterweight or a car travels downward more than a normal travel excursion.

[0007] To this end, according to one aspect of the present invention, there is provided an elevator system comprising the features of claim 1.

[0008] According to another aspect of the present invention, there is provided an elevator system comprising: a driving machine that comprises a drive sheave and a driving machine main body that rotates the drive sheave; a main rope that is wound around the drive sheave; and a car and a counterweight that are suspended down within a hoistway by the main rope and that ascend and descend within a hoistway by a driving force of the driving machine; wherein the main rope comprises a first portion that passes through the drive sheave when the car and the counterweight ascend and descend in their normal travel excursion, and a second portion that contacts the drive sheave when the counterweight travels further downward than its normal travel excursion; wherein an outer circumference of the first portion is covered by a high friction covering portion made from a high friction resin material; and wherein a coefficient of friction of an outer circumference of the second portion is lower than a coefficient of friction of the high friction resin material. According to a still further aspect of the present invention, there is provided an elevator system comprising the features of claim 9.

Brief Description of the Drawings

[0009]

Fig. 1 is a block diagram that shows an elevator system according to Embodiment Mode 1 of the present invention,
Fig. 2 is a cross sectional view that shows a blow-up of a contact portion of a drive sheave of Fig. 1 with a main rope, and the main rope,
Fig. 3 is a side surface view that shows a drive sheave, a deflector wheel, and a main rope of an elevator system

according to Embodiment Mode 2 of the present invention, Fig. 4 is a plan view that shows the drive sheave, the deflector wheel, and the main rope of Fig. 3, and

Fig. 5 is a block diagram that shows an elevator system according to Embodiment Mode 3 of the present invention.

Best Modes for Carrying Out the Invention

[0010] Preferred embodiment modes of the present invention are explained below with reference to the drawings.

Embodiment Mode 1

[0011] Fig. 1 is a block diagram that shows an elevator system according to Embodiment Mode 1 of the present invention. In Fig. 1 a machine room 2 is disposed in an upper portion of a hoistway 1. A machine platform 3 is installed within the machine room 2. A driving machine 4 is mounted to the machine platform 3. The driving machine 4 has a drive sheave 5, and a driving machine main body 6 that causes the drive sheave 5 to rotate. A rotatable deflector wheel 7 is mounted to the machine platform 3 with a gap between the deflector wheel 7 and the drive sheave 5.

[0012] A plurality of main ropes 8 (only one is shown in Fig. 1) are wound around the drive sheave 5 and the deflector wheel 7 in a half-hung (half-lap) style. That is, the angles at which the main ropes 8 are wound to the drive sheave 5 and the deflector wheel 7 are each less than 180°.

[0013] A car 9 is suspended down from one side of the drive sheave 5 by the main ropes 8. End portions of the main ropes 8 are connected to an upper beam 9a of the car 9, through a car side rope stopping apparatus 10. A counterweight 11 is suspended down from the other side of the drive sheave 5 by the main ropes 8. The other end portions of the main ropes are connected to the counterweight 11 through a counterweight side rope stopping apparatus 12. The car 9 and the counterweight 11 ascend and descend within the hoistway 1 by a driving force of the driving machine 4.

[0014] A car buffer 13 and a counterweight buffer 14 are installed in a bottom portion (pit) of the hoistway 1. The car buffer 13 and the counterweight buffer 14 reduce impacts with the bottom portion of the hoistway 1 for cases where the car 9 or the counterweight 11 drops further downward than its normal travel excursion for some reason or other. A detection switch 15 that detects a reducing action of the counterweight buffer 14 is provided on the counterweight buffer 14.

[0015] A smoke detector 16 is installed in a ceiling portion of the hoistway 1 as a fire sensor that detects smoke. A rope braking apparatus 17 that stops the car 9 from ascending and descending via the driving machine 5 by gripping the main ropes 8 is provided on the machine platform 3. The rope braking apparatus 17 grips the main ropes 8 at a side more toward the counterweight 11 than the drive sheave 5.

[0016] A control device 18 controls the rope braking apparatus 17. An action detection signal from the detection switch 15 and a fire sensor signal from the smoke detector 16 are input to the control device 18. That is, the rope braking apparatus 17 acts to grip and brake the main ropes 8 when the action detection signal from the detector switch 15 is input to the control device 18, and when the fire sensor signal from the smoke detector 16 is input to the control device 18.

[0017] Further, when the fire sensor signal is input, the control device 18 operates to control the rope braking apparatus 17 after implementing emergency fire operations.

[0018] Next, Fig. 2 is a cross sectional view that shows a blow-up of a contact portion of a drive sheave of Fig. 1 with a main rope, and the main rope. In Fig. 2, a plurality of rope grooves 5a, into which the main ropes 8 are inserted, are provided to the drive sheave 5. The cross sectional shape of bottom portions of the rope grooves 5a is a semi-arc shape (semi-circular shape). That is, undercut grooves are not formed in the bottom portions of the rope grooves 5a.

[0019] Each of the main ropes 8 has a core rope 21, a core rope covering 22 that covers an outer circumference of the core rope 21 and that is manufactured out of a resin, an outer layer 23 that is disposed on an outer circumference of the core rope covering 22, and an outer layer covering 24 that covers an outer circumference of the outer layer 23 and that is manufactured out of a resin.

[0020] The core rope 21 has a plurality of core strands 25 that are mutually twisted around each other. Each of the core strands 25 has a plurality of core wires 26 that are mutually twisted around each other and that are manufactured out of steel.

[0021] The outer layer 23 has a plurality of outer layer strands 27 that are twisted together around an outer periphery of the core rope covering 22. Each of the outer layer strands 27 has a plurality of outer layer wires 28 that are mutually twisted around each other and that are manufactured out of steel.

[0022] The core rope covering 22 is configured by a polyethylene resin, for example. The outer layer covering 24 is configured by a high friction resin material having a coefficient of friction equal to or greater than 0.2, such as polyurethane resin.

[0023] The outer layer covering 24 that is disposed on the outermost layer of the main rope 8 and that contacts the rope grooves 5a is configured by a high friction resin with this type of elevator system. Accordingly, a sufficient traction capacity can be secured even if the main rope 8 is wound around the drive sheave 5 and the deflector wheel 7 in a half-hung style, and even if the cross sectional shape of the bottom portion of the rope groove 5a is a semi-arc shape.

Furthermore, undercut grooves are not formed in the bottom portion of the rope grooves 5a. Accordingly, damage to the outer layer covering 24 caused by the undercut grooves can be prevented.

[0024] In addition, an axial load acting on the driving machine main body 6 can be reduced approximately in half for cases where the main rope 8 is wound around the drive sheave 5 and the deflector wheel 7 in a half-hung style compared to cases where a full-hung (full-lap) style is used, and the driving machine 4 can be made smaller.

[0025] The traction capacity is computed by the following equation here.

$$\text{Traction capacity} = e^{\mu \bullet K2 \bullet \theta}$$

μ: Coefficient of friction

K_2: Coefficient for contact state (normally groove shape) with rope groove

θ: Winding angle of main rope to sheave

[0026] For cases where a rope manufactured out of steel and not possessing an outer layer covering is wound around a drive sheave in a full-hung style, and an undercut groove is formed in a rope groove, the coefficient of friction μ = 0.1, the coefficient K_2 = 1.38 (undercut angle 50°), and the winding angle θ = 330°.

[0027] Therefore the traction capacity = $e^{(0.1 \times 1.38 \times 330/180 \times \pi)}$ = 2.21.

[0028] The coefficient of friction necessary for securing the traction capacity equal to the above with the elevator system according to Embodiment Mode 1 can be computed by the following equation.

$$\text{The coefficient of friction } \mu = \ln(2.21)/(K_2 \times \theta) = \ln(2.21)/(1.2 \times 150/180 \times \pi) = 0.25$$

where the coefficient K_2 = 1.2 (no undercut), and the winding angle θ = 150° (330 - 180 = 150°).

[0029] Therefore a substantially sufficient traction capacity can be secured provided that the coefficient of friction between the outer layer covering 24 and the drive sheave 5 is equal to or greater than 0.2. Further, the traction capacity can be further reliably secured if the coefficient of friction between the outer layer covering 24 and the drive sheave 5 is equal to or greater than 0.25.

[0030] Furthermore, the rope braking apparatus 17 grips and brakes the main ropes 8 at the counterweight 11 side in Embodiment Mode 1 when the action detection signal is input to the control device 18 from the detection switch 15. The rope braking apparatus 17 therefore supports the weight of the main ropes 8 on the counterweight 11 side. Further, the load on the counterweight 11 side becomes smaller because the counterweight buffer 14 supports the counterweight 11, and the traction force at the drive sheave 5 can be suitably reduced. The drive sheave 5 can therefore be made to slip and the car 9 can be stopped smoothly when the counterweight impacts the counterweight buffer 14.

[0031] This type of system can also be applied to elevator systems which use steel ropes that do not possess outer layer coverings. In particular, this type of system is effective for high lift elevator systems whose main rope has a large dead weight.

[0032] In addition, the rope braking apparatus 17 also grips and brakes the main ropes 8 when the fire sensor signal is input to the control device 18 from the smoke detector 16. Movement of the car 9 caused by the main ropes 8 slipping with respect to the drive sheave 5 can therefore also be stopped for cases in which the outer layer covering 24 by chance melts due to heat from a fire and the traction force decreases.

[0033] Still further, the control device 18 operates to control the rope braking apparatus 17 after the emergency fire operations are implemented when the fire sensor signal is input, and therefore passengers within the car 9 can smoothly evacuate during a fire.

[0034] It should be noted that the fire sensor is not limited to the smoke detector 16, and other types of devices such as heat detectors may also be used.

[0035] Further, the fire sensor may be disposed within the hoistway 1 for exclusive use by the elevator system, and may also be disposed in a landing hall or the like in a building.

Embodiment Mode 2

[0036] Next, Fig. 3 is a side surface view that shows a drive sheave, a deflector wheel, and a main rope of an elevator system according to Embodiment Mode 2 of the present invention, and Fig. 4 is a plan view that shows the drive sheave, the deflector wheel, and the main rope of Fig. 3. Further, Figs. 3 and 4 show relationships between a drive sheave, a deflector wheel, and a main rope when the counterweight has arrived at the counterweight buffer.

[0037] In Figs. 3 and 4, an outer circumference of a main rope 31 is covered by an outer layer covering 32 manufactured out of a resin. The outer layer covering 32 has a high friction covering portion 33 that is positioned in a portion that passes through the drive sheave 5 when the car 9 and the counterweight 11 (refer to Fig. 1) ascend and descend through their normal travel excursion, and a low friction covering portion 34 that is positioned in a portion that contacts the drive sheave 5 when the counterweight 11 travels further downward than the normal travel excursion.

[0038] In other words, the main rope 31 has a first portion that passes through the drive sheave 5 when the car 9 and the counterweight 11 are ascending and descending in their normal travel excursion, and a second portion that contacts the drive sheave 5 when the counterweight 11 travels further downward than the normal travel excursion. An outer circumference of the first portion is covered by the high friction covering portion 33, and an outer circumference of the second portion is covered by the low friction covering portion 34.

[0039] The high friction covering portion 33 is made from a high friction resin material such as polyurethane. As described above, a substantially sufficient traction capacity can be secured provided that the coefficient of friction between the high friction covering portion 33 and the drive sheave 5 is equal to or greater than 0.2. Further, the traction performance can be further reliably secured if the coefficient of friction between the high friction covering portion 33 and the drive sheave 5 is equal to or greater than 0.25.

[0040] Furthermore, the low friction covering portion 34 is made from a resin material having a smaller coefficient of friction than that of the resin material configuring the high friction covering portion 33, such as polyethylene materials, nylon, silicon, polypropylene, or polyvinyl chloride. In addition, the high friction covering portion 33 and the low friction covering portion 34 are colored with mutually different colors. Other structures are similar to those of Embodiment Mode 1.

[0041] With this type of elevator system, the high friction covering portion 33 contacts the drive sheave 5 when the car 9 and the counterweight 11 are ascending and descending in their normal travel excursion. Accordingly, a sufficient traction capacity can be obtained, similar to Embodiment Mode 1.

[0042] Further, when the car 9 travels further upward than its normal travel excursion for some reason or other, that is when the counterweight 11 travels further downward than its normal travel excursion, the low friction covering portion 34 contacts the drive sheave 5, and a friction force between the drive sheave 5 and the main rope 31 decreases from its normal level. -

[0043] Accordingly, the traction force suitably decreases, it becomes easier for the drive sheave 5 to slip, and a required torque for the driving machine 4 during slipping can be reduced when the counterweight 11 travels further downward than its normal travel excursion.

[0044] Further, the detection switch 15 of Embodiment Mode 1 can be omitted by providing the low friction covering portion 34 in the outer layer covering 32.

[0045] In addition, the high friction covering portion 33 and the low friction covering portion 34 are colored by using different colors, and therefore the orientation of the main rope 31 can easily be determined during installation or during replacement of the main rope 31. Additionally, it can easily be verified whether or not the low friction covering portion 34 is contacting the drive sheave 5 when the counterweight 11 has traveled downward more than its normal travel excursion.

[0046] It should be noted that, although the outer circumference of the second portion of the main rope 31 is covered by the low friction covering portion 34 in Embodiment Mode 2, it is sufficient that the coefficient of friction of the outer circumference of the second portion be smaller than the coefficient of friction of the high friction covering portion. Strands may also be exposed without covering the outer circumference of the second portion by using a resin.

Embodiment Mode 3

[0047] Fig. 5 is a block diagram that shows an elevator system according to Embodiment Mode 3 of the present invention. In Fig. 5, a rope braking apparatus 19 that grips the main ropes 8 to stop ascent and descent of the counterweight 11 due to the driving machine 4 is provided on the machine platform 3. The rope braking apparatus 19 grips the main ropes 8 at a side more toward the car 9 than the drive sheave 5. A detection switch 20 that detects buffering action of the car buffer 13 is provided on the car buffer 13.

[0048] The control device 18 controls the rope braking apparatus 19. An action detection signal from the detection switch 20 is input to the control device 18. That is, the rope braking apparatus 17 grips and brakes the main ropes 8 when the action detection signal from the detection switch 15 is input to the control device 18. Other configurations and actions are similar to those of Embodiment Mode 1.

[0049] With this type of elevator system, the rope braking apparatus 17 grips the main ropes 8 when the car 9 impacts the car buffer 13. The drive sheave 5 can therefore be made to slip, and the counterweight 11 can be smoothly stopped. Impact of the ceiling portion of the hoistway 1 by the counterweight 11 can therefore be prevented, and equipment damage can be prevented.

[0050] It should be noted that, although the rope braking apparatuses 17 and 19 are both used in Embodiment Mode 3, only the rope braking apparatus 19 may be used and ascent of the car 9 may be stopped by employing another type of braking apparatus.

[0051] Further, in Embodiment Modes 1 to 3, the cross sectional structure of the main ropes on an inner side of the outer layer covering is not limited to the structure shown in Fig. 2. It is possible to make a variety of changes to the number of layers, the strand placement, and the like.

Claims

1. An elevator system comprising:

   a driving machine (4) that comprises a drive sheave (5) and a driving machine main body (6) that rotates the drive sheave (5);
   a main rope (8) that is wound around the drive sheave (5) ;
   a car (9) that is suspended down within a hoistway (1) by the main rope (8) at one side of the drive sheave (5), and that ascends and descends within the hoistway (1) by a driving force of the driving machine (4); and
   a counterweight (11) that is suspended down within a hoistway (1) by the main rope (8) at another side of the drive sheave (5), and that ascends and descends within the hoistway (1) by the driving force of the driving machine (4);
   characterized in that
   provided on a counterweight (11) side of the drive sheave (5) is a rope braking apparatus (17) for stopping ascent of the car (9) due to the driving machine (4) by gripping the main rope (8) when the counterweight (11) travels further downward than its normal travel excursion;
   and by further comprising: a counterweight buffer (14) installed within the hoistway (1) below the counterweight (11); and a detection switch (15) for detecting buffering action of the counterweight buffer (14), which is provided to the counterweight buffer (14), wherein the rope braking apparatus (17) acts in response to an action detection signal from the detection switch (15).

2. The elevator system according to claim 1, wherein an outer circumference of the main rope (8) is covered by an outer layer covering (24) manufactured out of a high friction resin material, and the rope braking apparatus (17) acts in response to a fire sensor signal from a fire sensor (16) that is provided to at least a building or within the hoistway (1).

3. The elevator system according to claim 2, further comprising a control device (18) for controlling the driving machine (4) and the rope braking apparatus (17) in response to the fire sensor signal, wherein the control device causes the rope braking apparatus (17) to act after an emergency fire operation is implemented when the fire sensor signal is input.

4. An elevator system comprising:

   a driving machine (4) that comprises a drive sheave (5) and a driving machine main body (6) that rotates the drive sheave (5);
   a main rope (8) that is wound around the drive sheave (5) ;
   a car (9) that is suspended down within the hoistway (1) by the main rope (8) at one side of the drive sheave (5), and that ascends and descends within the hoistway (1) by a driving force of the driving machine (4); and
   a counterweight (11) that is suspended down within a hoistway (1) by the main rope (8) at another side of the drive sheave (5), and that ascends and descends within the hoistway (1) by the driving force of the driving machine (4);
   characterized in that
   provided on a counterweight (11) side of the drive sheave (5) is a rope braking apparatus (17) for stopping ascent of the counterweight (11) due to the driving machine (4) by gripping the main rope (8) when the car (9) travels further downward than its normal travel excursion;
   and by further comprising: a car buffer (13) installed within the hoistway (1) below the car (9); and a detection switch (20) for detecting buffering action of the car buffer (13), which is provided to the car buffer (13), wherein the rope braking apparatus (17) acts in response to an action detection signal from the detection switch (20).

Patentansprüche

1. Aufzugsystem mit:

einer Antriebsmaschine (4), die eine Treibscheibe (5) und einen Antriebsmaschinen-Hauptkörper (6) aufweist, der die Treibscheibe (5) in Drehung versetzt;
einem Hauptseil (8), das um die Treibscheibe (5) gewunden ist;
einer Kabine (9), die in einem Aufzugschacht (1) durch das Hauptseil (8) an einer Seite der Treibscheibe (5) nach unten aufgehängt ist und in dem Aufzugschacht (1) durch eine Antriebskraft der Antriebsmaschine (4) hinauf und hinab fährt; und
einem Gegengewicht (11), das in einem Aufzugschacht (1) durch das Hauptseil (8) an einer anderen Seite der Treibscheibe (5) nach unten aufgehängt ist und in dem Aufzugschacht (1) durch die Antriebskraft der Antriebsmaschine (4) hinauf und hinab fährt;
dadurch gekennzeichnet, dass
auf der Gegengewichts (11) -Seite der Treibscheibe (5) eine Seilbremsvorrichtung (17) angeordnet ist, zum Stoppen des Hinauffahrens der Kabine (9) aufgrund der Antriebsmaschine (4) durch Greifen des Hauptseils (8), wenn das Gegengewicht (11) weiter nach unten fährt als sein normaler Fahrbereich;
und das Aufzugsystem ferner aufweist: einen Gegengewicht-Puffer (14), der in dem Aufzugschacht (1) unter dem Gegengewicht (11) angeordnet ist, und einen Erfassungsschalter (15) zum Erfassen einer Puffertätigkeit des Gegengewicht-Puffers (14), mit welchem der Gegengewicht-Puffer (14) versehen ist, wobei die Seilbremsvorrichtung (17) in Reaktion auf ein Tätigkeits-Erfassungssignal von dem Erfassungsschalter (15) tätig wird.

2. Aufzugsystem nach Anspruch 1, wobei ein Außenumfang des Hauptseils (8) durch eine Außenschicht-Beschichtung (24) bedeckt ist, die aus einem Hochfriktions-Harzmaterial hergestellt ist, und die Seilbremsvorrichtung (17) in Reaktion auf ein Feuersensor-Signal von einem Feuersensor (16) tätig wird, der in einem Gebäude und/oder in dem Aufzugschacht (1) angeordnet ist.

3. Aufzugsystem nach Anspruch 2, ferner mit einer Steuereinrichtung (18) zum Steuern der Antriebsmaschine (4) und der Seilbremsvorrichtung (17) in Reaktion auf das Feuersensor-Signal, wobei die Steuereinrichtung die Seilbremsvorrichtung (17) dazu veranlasst, tätig zu werden, nachdem, wenn das Feuersensor-Signal eingegeben ist, ein Feuer-Notfallbetrieb in Gang gesetzt ist.

4. Aufzugsystem mit:

einer Antriebsmaschine (4), die eine Treibscheibe (5) und einen Antriebsmaschinen-Hauptkörper (6) aufweist, der die Treibscheibe (5) in Drehung versetzt;
einem Hauptseil (8), das um die Treibscheibe gewunden ist (5);
einer Kabine (9), die in dem Aufzugschacht (1) durch das Hauptseil (8) an einer Seite der Treibscheibe (5) nach unten aufgehängt ist und in dem Aufzugschacht (1) durch eine Antriebskraft der Antriebsmaschine (4) hinauf und hinab fährt; und
einem Gegengewicht (11), das in einem Aufzugschacht (1) durch das Hauptseil (8) an einer anderen Seite der Treibscheibe (5) nach unten aufgehängt ist und in dem Aufzugschacht (1) durch die Antriebskraft der Antriebsmaschine (4) hinauf und hinab fährt;
dadurch gekennzeichnet, dass
an der Gegengewichts (11) -Seite der Treibscheibe (5) eine Seilbremsvorrichtung (17) angeordnet ist, zum Stoppen des Hinauffahrens des Gegengewichts (11) aufgrund der Antriebsmaschine (4) durch Greifen des Hauptseils (8), wenn die Kabine (9) weiter nach unten fährt als ihr normaler Fahrbereich;
und das Aufzugsystem ferner aufweist: einen Kabinen-Puffer (13), der in dem Aufzugschacht (1) unter der Kabine (9) angeordnet ist, und einen Erfassungsschalter (20) zum Erfassen einer Puffertätigkeit des Kabinen-Puffers (13), mit welchem der Kabinen-Puffer (13) versehen ist, wobei die Seilbremsvorrichtung (17) in Reaktion auf ein Tätigkeits-Erfassungssignal von dem Erfassungsschalter (20) tätig wird.

Revendications

1. Système d'ascenseur, comprenant :

une machine d'entraînement (4) qui comprend une poulie d'entraînement (5) et un corps principal de machine d'entraînement (6) qui fait tourner la poulie d'entraînement (5) ;
un câble principal (8) qui est enroulé autour de la poulie d'entraînement (5) ;
une cabine (9) qui est suspendue à l'intérieur d'une cage (1) par le câble principal (8) sur un côté de la poulie d'entraînement (5), et qui monte et descend à l'intérieur de la cage (1) par l'intermédiaire d'une force d'entraî-

nement de la machine d'entraînement (4) ; et

un contrepoids (11) qui est suspendu à l'intérieur d'une cage (1) par le câble principal (8) sur un autre côté de la poulie d'entraînement (5), et qui monte et descend à l'intérieur de la cage (1) par la force d'entraînement de la machine d'entraînement (4) ;

caractérisé en ce que

un appareil de freinage de câble (17) est prévu sur un côté contrepoids (11) de la poulie d'entraînement (5) pour arrêter la montée de la cabine (9), due à la machine d'entraînement (4), en saisissant le câble principal (8) lorsque le contrepoids (11) se déplace plus vers le bas que sa course normale de déplacement ;

et **en ce qu'**il comprend en outre : un amortisseur de contrepoids (14) installé à l'intérieur de la cage (1) en dessous du contrepoids (11) ; et un commutateur de détection (15) pour détecter une action d'amortissement de l'amortisseur de contrepoids (14), qui est prévu sur l'amortisseur de contrepoids (14), dans lequel l'appareil de freinage de câble (17) agit en réponse à un signal de détection d'action à partir du commutateur de détection (15).

2. Système d'ascenseur selon la revendication 1, dans lequel une circonférence extérieure du câble principal (8) est couverte par une couverture de couche extérieure (24) fabriquée à partir de matériau en résine à haute friction, et l'appareil de freinage de câble (17) agit en réponse à un signal de capteur d'incendie à partir d'un capteur d'incendie (16) qui est prévu sur au moins un bâtiment ou à l'intérieur de la cage (1).

3. Système d'ascenseur selon la revendication 2, comprenant en outre un dispositif de commande (18) pour commander la machine d'entraînement (4) et l'appareil de freinage de câble (17) en réponse au signal de capteur d'incendie, dans lequel le dispositif de commande fait en sorte que l'appareil de freinage de câble (17) agisse après qu'un fonctionnement d'urgence d'incendie est mis en oeuvre lorsque le signal de capteur d'incendie est entré.

4. Système d'ascenseur, comprenant :

une machine d'entraînement (4) qui comprend une poulie d'entraînement (5) et un corps principal de machine d'entraînement (6) qui fait tourner la poulie d'entraînement (5) ;

un câble principal (8) qui est enroulé autour de la poulie d'entraînement (5) ;

une cabine (9) qui est suspendue à l'intérieur de la cage (1) par le câble principal (8) sur un côté de la poulie d'entraînement (5), et qui monte et descend à l'intérieur de la cage (1) par l'intermédiaire d'une force d'entraînement de la machine d'entraînement (4) ; et

un contrepoids (11) qui est suspendu à l'intérieur d'une cage (1) par le câble principal (8) sur un autre côté de la poulie d'entraînement (5), et qui monte et descend à l'intérieur de la cage (1) par l'intermédiaire de la force d'entraînement de la machine d'entraînement (4) ; **caractérisé en ce que**

un appareil de freinage de câble (17) est prévu sur un côté contrepoids (11) de la poulie d'entraînement (5) pour arrêter la montée du contrepoids (11), due à la machine d'entraînement (4), en saisissant le câble principal (8) lorsque la cabine (9), se déplace plus vers le bas que sa course normale de déplacement ;

et **en ce qu'** il comprend en outre : un amortisseur de cabine (13) installé à l'intérieur de la cage (1) en dessous de la cabine (9) ; et un commutateur de détection (20) pour détecter une action d'amortissement de l'amortisseur de cabine (13), qui est prévu sur l'amortisseur de cabine (13), dans lequel l'appareil de freinage de câble (17) agit en réponse à un signal de détection d'action à partir du commutateur de détection (20).

FIG. 1

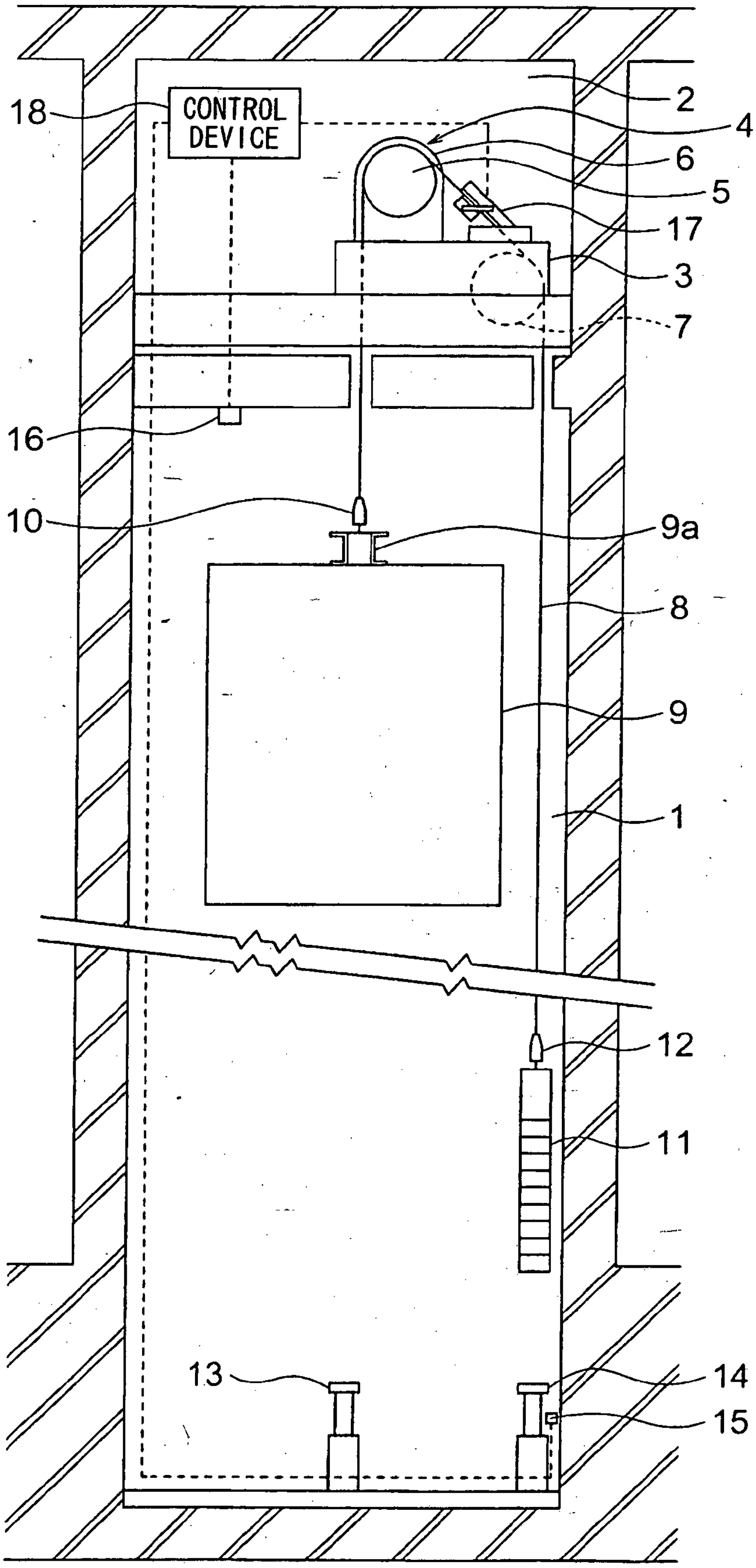


FIG. 2

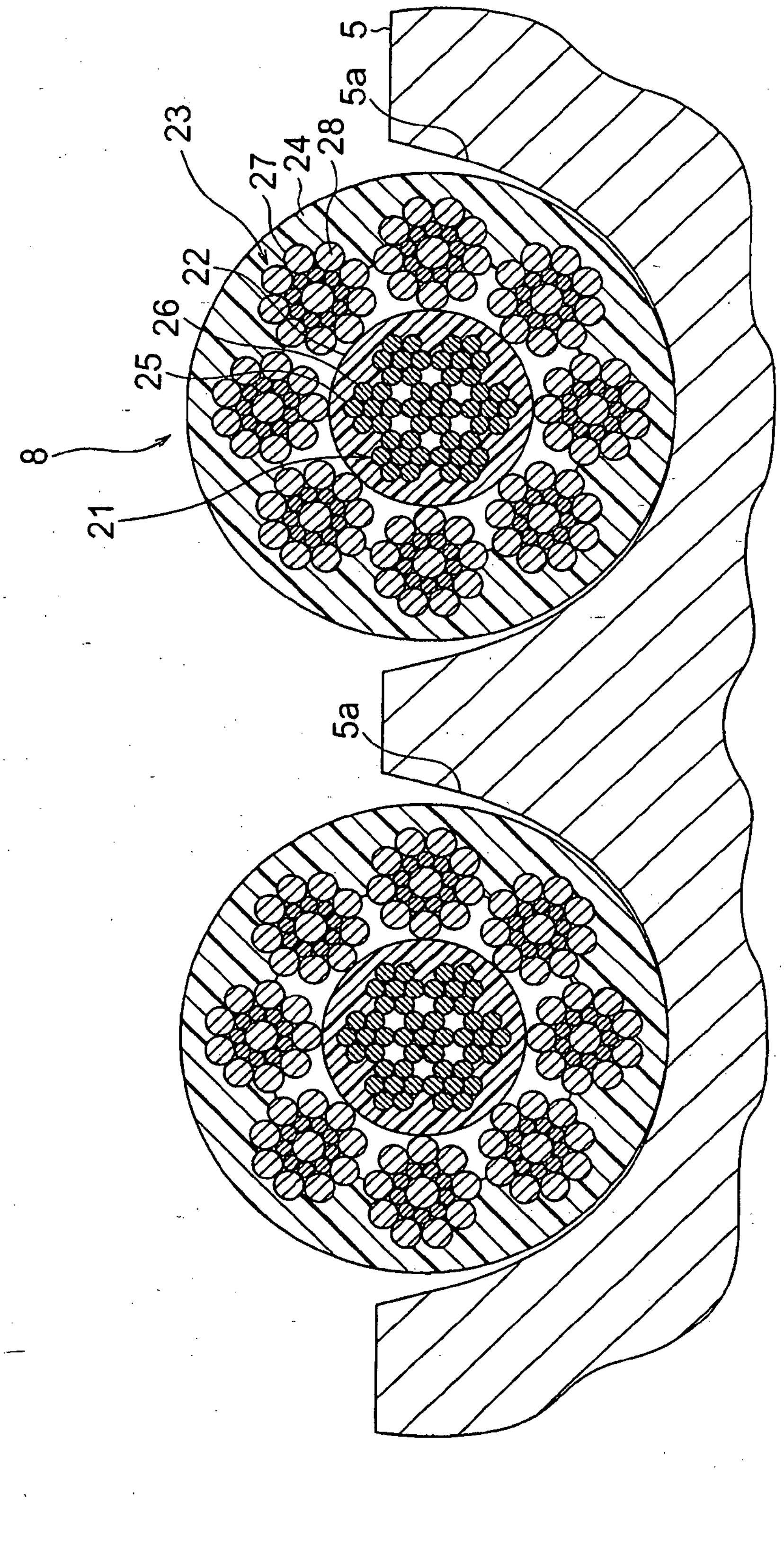
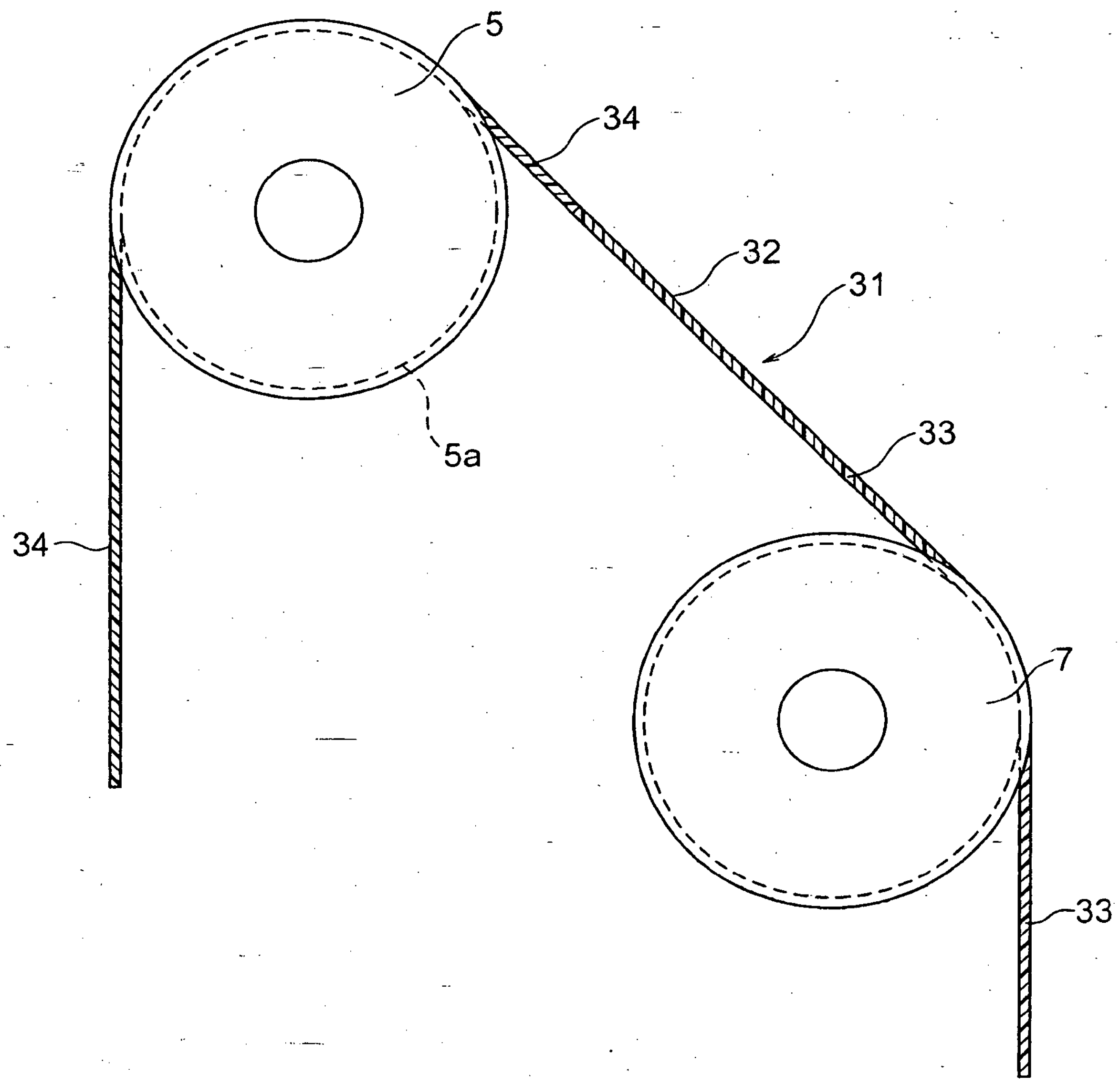


FIG. 3



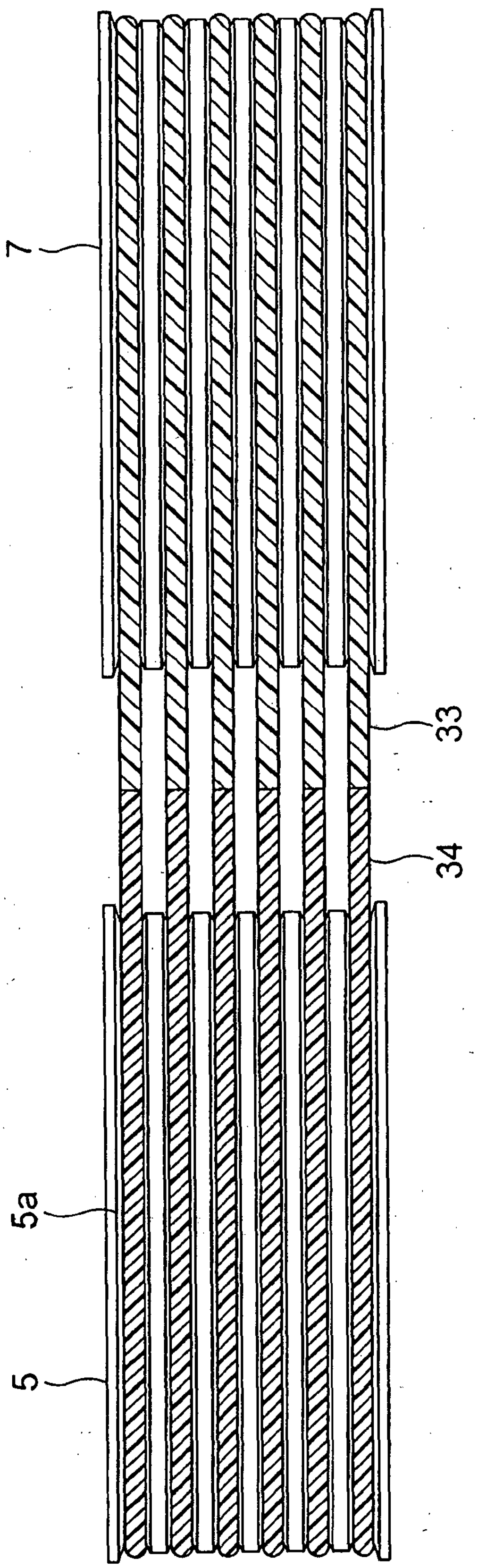
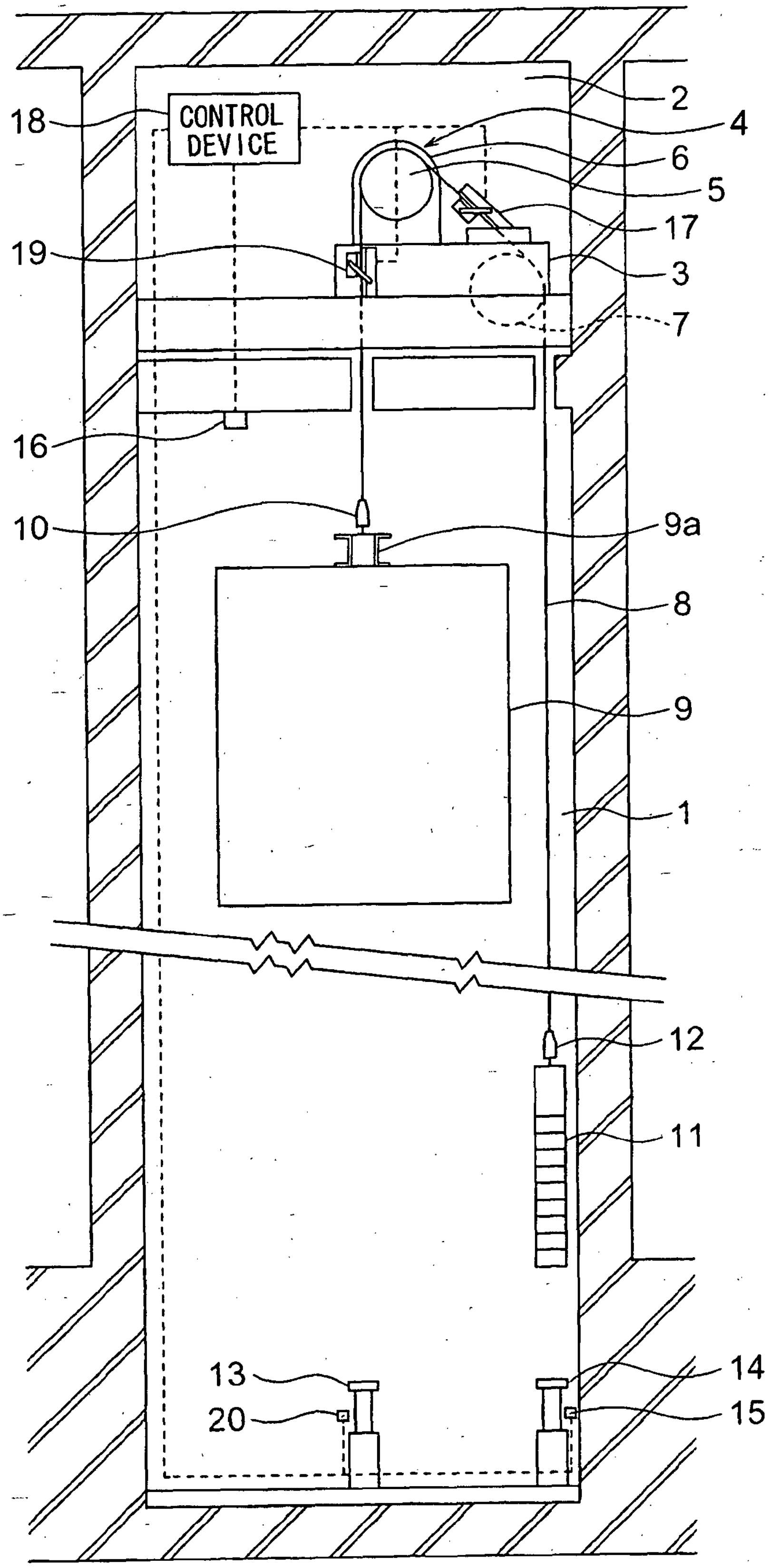


FIG. 4

FIG. 5



REFERENCES CITED IN THE DESCRIPTION

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