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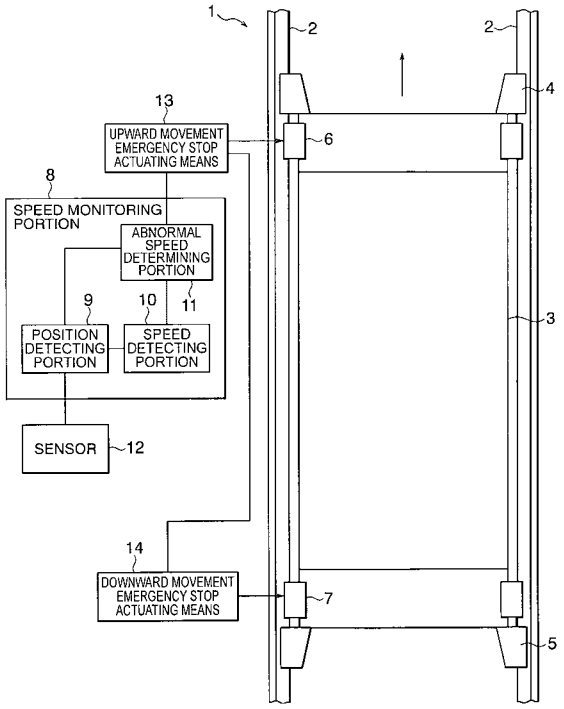
(54) ELEVATOR CONTROLLER

(57) In an elevator apparatus, the traveling speed of a car is monitored by a speed monitoring portion. The speed monitoring portion generates an abnormality detection signal when the speed of the car being raised reaches a set overspeed that is set in advance. The car is mounted with an upward movement safety device for stopping the upward movement of the car when the abnormality detection signal is generated. The upward movement safety device has an actuator that is driven depending on whether or not the abnormality detection signal is generated, and a braking member that is operated by the actuator.

FIG. 1



EP 1 749 785 A1

Description

Technical Field

[0001] The present invention relates to an elevator apparatus in which an elevator car is raised and lowered in a hoistway while being guided by a car guide rail.

Background Art

[0002] In a conventional elevator apparatus disclosed in, for example, JP 2001-80840 A, when the traveling speed of a car reaches an abnormal speed, a safety device is actuated by a governor to thereby bring the car to an emergency stop. More specifically, when the abnormal speed of the car is detected by the governor, a governor rope is held by a rope gripping device incorporated into the governor, and the safety device is actuated through the intermediation of a safety link mounted in the car.

[0003] In the conventional elevator apparatus, however, the operation force for actuating the safety device is transmitted mechanically, so it takes a while until the safety device is actuated after the detection of an abnormal speed, with the result that the braking distance the car travels until it comes to a stop increases.

Disclosure of the Invention

[0004] The present invention has been made with a view to solving the above-mentioned problems, and therefore it is an object of the present invention to provide an elevator apparatus capable of reducing the time required for bringing the car to a stop after detecting an abnormal speed.

[0005] To this end, according to one aspect of the present invention, there is provided an elevator apparatus comprising: a car that is raised and lowered in a hoistway; a car guide rail for guiding raising and lowering of the car; a speed monitoring portion that generates an abnormality detection signal when a speed of the car being raised reaches a set overspeed; and an upward movement safety device mounted in the car and having an actuator that is driven depending on whether or not the abnormality detection signal is generated, and a braking member that is operated by the actuator, the upward movement safety device causing the braking member to be engaged with the car guide rail to stop upward movement of the car when the abnormality detection signal is generated.

Brief Description of the Drawings

[0006]

Fig. 1 is a schematic diagram showing an elevator apparatus according to Embodiment 1 of the present invention;

Fig. 2 is a graph showing set overspeed patterns stored in an abnormal speed determining portion shown in Fig. 1;

Fig. 3 is a side view showing an upward movement safety device shown in Fig. 1;

Fig. 4 is a side view showing a state in which braking is applied by the upward movement safety device shown in Fig. 3;

Fig. 5 is a sectional view taken along the line V-V of Fig. 3;

Fig. 6 is a side view showing an upward movement safety device of an elevator apparatus according to Embodiment 2 of the present invention;

Fig. 7 is a side view showing a state in which braking is applied by the upward movement safety device shown in Fig. 6;

Fig. 8 is a side view showing an upward movement safety device of an elevator apparatus according to Embodiment 3 of the present invention;

Fig. 9 is a side view showing a state in which braking is applied by the upward movement safety device shown in Fig. 8; and

Fig. 10 is a sectional view taken along the line X-X of Fig. 8.

Best Mode for carrying out the Invention

[0007] Hereinbelow, preferred embodiments of the present invention will be described with reference to the drawings.

Embodiment 1

[0008] Fig. 1 is a schematic diagram showing an elevator apparatus according to Embodiment 1 of the present invention. Referring to the drawing, a pair of car guide rails 2 are disposed in a hoistway 1. A car 3 is raised and lowered in the hoistway 1 while being guided by the car guide rails 2.

[0009] The car 3 is suspended in the hoistway 1 together with a counterweight (not shown) by means of a plurality of main ropes (not shown). The main ropes are wound around a drive sheave of a drive device (not shown). The car 3 and the counterweight are raised and lowered in the hoistway 1 by the drive force of the drive device.

[0010] Provided in an upper portion of the car 3 are a pair of upper car guide shoes 4 that engage with the car guide rails 2. Provided in a lower portion of the car 3 are a pair of lower car guide shoes 5 that engage with the car guide rails 2.

[0011] Further, mounted in an upper portion of the car 3 are a pair of upward movement safety devices 6 for bringing the car 3 being raised to an emergency stop. Mounted in a lower portion of the car 3 are a pair of downward movement safety devices 7 for bringing the car 3 being lowered to an emergency stop.

[0012] A speed monitoring portion 8 monitors whether

or not the speed of the car 3 has reached a set overspeed (abnormal speed) that is set in advance. The speed monitoring portion 8 is provided with a position detecting portion 9 that detects the position of the car 3, a speed detecting portion 10 that detects the speed of the car 3, and an abnormal speed determining portion 11 that performs a comparison between the set overspeed and the car speed.

[0013] A signal from a sensor 12 is input to the position detecting portion 9. The sensor 12 generates a signal in accordance with the amount of movement of the car 3. The position detecting portion 9 obtains the car position based on the signal from the sensor 12. The speed detecting portion 10 obtains the car speed based on the amount of change over time in the car position.

[0014] As the sensor 12, for example, an encoder that outputs a pulse signal according to the rotation of a governor sheave (not shown) can be used. Further, the car 3 may be mounted with a detection roller that rolls along each of the car guide rails 2 so that the encoder outputs a pulse signal according to the rotation of the detection roller. Other than these, various sensors may be used as the sensor 12 as long as they generate a signal for detecting the position and speed of the car 3, for example, a distance sensor generating a signal in accordance with the distance to the car 3, or the like.

[0015] The speed monitoring portion 8 is composed specifically of a microcomputer. That is, the speed monitoring portion 8 has a CPU (processing portion), a RAM, a ROM (storage portion), a timer, and the like. The CPU executes computation processing for obtaining the car position and car speed, computation processing of comparing the car speed with the set overspeed, and the like. The RAM stores computation data. The ROM stores a program for obtaining the car speed and car position for comparison with the set overspeed.

[0016] The CPU executes computation processing based on the program stored in the ROM. A speed monitoring program is repeatedly executed at each predetermined computation cycle (for example, 5 msec).

[0017] When the car speed is judged to be abnormal by the abnormal speed determining portion 11, depending on the traveling direction of the car 3, an abnormality detection signal is output to upward movement emergency stop actuating means 13 or downward movement emergency stop actuating means 14. The upward movement emergency stop actuating means 13 or the downward movement emergency stop actuating means 14 are thus actuated, thereby bringing the car 3 to an emergency stop.

[0018] The speed monitoring portion 8 and the emergency stop actuating means 13, 14 may be provided inside a control panel (not shown) for controlling the normal operation of the car 3 or may be provided separately from the control panel. Further, the speed monitoring portion 8 and the emergency stop actuating means 13, 14 may also be mounted in the car 3.

[0019] Fig. 2 is a graph showing set overspeed patterns stored in the abnormal speed determining portion 11 shown in Fig. 1. When the car 3 travels at a normal speed (rated speed) from the bottom terminal floor to the top terminal floor, the speed pattern of the car 3 is a normal speed pattern 115. A first set overspeed pattern 116 is set to be higher in value than the normal speed pattern 115. Further, a second set overspeed pattern 117 is set to be even higher in value than the first overspeed pattern 116.

[0020] The first and second set overspeed patterns 116, 117 are each set at a substantially equal interval from the normal speed pattern 115 over the entire hoisting stroke. That is, the set overspeed patterns 116, 117 change according to the car position. Specifically, each set overspeed becomes lower with increasing proximity to the terminal floor. Accordingly, the car speed that is judged to be abnormal is lower near the terminal floor than in the vicinity of the intermediate floor.

[0021] Fig. 3 is a side view showing the upward movement safety device 6 shown in Fig. 1, Fig. 4 is a side view showing a state in which braking is applied by the upward movement safety device 6 shown in Fig. 3, and Fig. 5 is a sectional view taken along the line V-V of Fig. 3.

[0022] Referring to the drawings, an emergency stop frame 15 is fixed on top of an upper beam of the car 3. Formed on the inner side of the emergency stop frame 15 are a pair of guide surfaces 15a, 15b (Fig. 5) each opposed to the side surface of the car guide rail 2. Each of the guide surfaces 15a, 15b is formed in a tapered shape so that its distance to the car guide rail 2 increases toward the upper side.

[0023] The lower end portions of a pair of wedge members (braking members) 16 are arranged in between each of the guide surfaces 15a, 15b and the car guide rail 2. Each wedge member 16 is displaceable between a normal position shown in Fig. 3 and a braking position shown in Fig. 4. When in the normal position, a predetermined gap is maintained between each wedge member 16 and a side surface of the car guide rail 2. Further, when in the braking position, each wedge member 16 is in abutment with the side surface of the car guide rail 2.

[0024] An actuator 17 is arranged above the emergency stop frame 15. The actuator 17 is driven depending on whether or not an abnormality detection signal is generated by the abnormal speed determining portion 11. The actuator 17 has a movable portion 18 that engages with the upper end portion of the wedge member 16, and an electromagnetic solenoid portion 19 that drives the movable portion 18.

[0025] In the normal state, the upper end portion of the wedge member 16 is engaged with the movable portion 18, so the wedge member 16 is retained in the normal portion. When an abnormality detection signal is generated and thus electric power is supplied from the upward movement emergency stop actuating means 13, the electromagnetic solenoid portion 19 is excited, so the movable portion 18 separates from the wedge member 16. When released from its engagement with the mova-

ble portion 18, the wedge member 16 falls by its own weight into the braking position.

[0026] A spring bearing 20 is fixed to an upper portion of the actuator 17. Provided between the spring bearing 20 and each wedge member 16 is an auxiliary spring 21 for urging the wedge member 16 toward the braking position. The auxiliary spring 21 serves as back-up urging means for forcibly displacing the wedge member 16 into the braking position when the wedge member 16 does not fall by its own weight alone due to rust or the like.

[0027] Provided between each of the guide surfaces 15a, 15b and each wedge member 16 is a guide roller device 22 (Fig. 5) for smoothly displacing the wedge member 16 into the braking position.

[0028] It should be noted that the operations of the right and left upward movement safety devices 6 are synchronized with each other by means of an electrical command signal.

[0029] Next, operation will be described. During the normal operation, the car speed is monitored by the speed monitoring portion 8. When the car speed is normal, the wedge member 16 is held in the normal position where the wedge member 16 is separated from the car guide rail 2. When the car speed reaches the first set overspeed, the passage of electric current through the drive device is cut off, and braking is applied to the rotation of the drive sheave by the brake device of the drive device. The car 3 is thus brought to a sudden stop.

[0030] When, even after a braking command is output to the drive device, the car speed does not stop increasing due to a failure or the like and the car speed reaches the second set overspeed, an abnormality detection signal is output to the upward movement emergency stop actuating means 13 or the downward movement emergency stop actuating means 14, so the car 3 is brought to an emergency stop by the upward movement safety device 6 or the downward movement safety device 7.

[0031] When an actuating signal is output to the actuator 17 of the upward movement safety device 6, the movable portion 18 is moved in the rightward direction as seen in Fig. 3, so the wedge member 16 falls. As it falls, the wedge member 16 is guided by each of the guide surfaces 15a, 15b to be displaced into the braking position. When displaced into the braking position, the wedge member 16 is wedged in between each of the guide surfaces 15a, 15b and the car guide rail 2 as the car 3 moves upwards. As a result, the car 3 is brought to an emergency stop.

[0032] To return the upward movement safety device 6 to the normal state, the car 3 is slightly lowered to release the wedging of the wedge member 16, causing the upper end portion of the wedge member 16 to be engaged with the movable portion 18. It should be noted that when the passage of electric current through the actuator 17 is cut off, the movable portion 18 returns to the normal position as shown in Fig. 3 due to the spring force of a return spring (not shown) built in the actuator 17.

[0033] In the elevator apparatus as described above, a command signal is output to the actuator 17 of the upward movement safety device 6 upon detecting an abnormal speed, so there is hardly any mechanical transmission of the operation force, thus making it possible to reduce the time it takes to bring the car 3 to a stop after the detection of the abnormal speed. As a result, the braking distance can also be reduced.

[0034] Further, basically, the wedge member 16 falls into the braking position by its own weight, thus making it possible to achieve a simplified structure.

[0035] Further, the provision of the auxiliary spring 21 enables an increase in the operation speed of the braking operation, and also an improvement in the reliability and stability of the braking operation.

[0036] Furthermore, the set overspeed is set to be smaller near the terminal floor than in the vicinity of the intermediate floor, whereby the braking distance can be further reduced. Further, it is possible to achieve not only reduced buffer size but also reduced pit depth and overhead dimension.

[0037] While in Embodiment 1 the engagement of the movable portion 18 with the wedge member 16 is released upon exciting the electromagnetic solenoid portion 19, the movable portion 18 may, conversely, be displaced by a spring or the like when the passage of electric current through the electromagnetic solenoid portion 19 is cut off to thereby release the engagement of the movable portion 18 with the wedge member 16.

Embodiment 2

[0038] Next, Fig. 6 is a side view showing an upward movement safety device of an elevator apparatus according to Embodiment 2 of the present invention, and Fig. 7 is a side view showing a state in which braking is applied by the upward movement safety device shown in Fig. 6.

[0039] Referring to the drawings, the actuator 17 is disposed on top of the car 3 so as to be placed by the side of the emergency stop frame 15. The movable portion of the actuator 17 is connected to the upper end portion of the wedge member 16 through the intermediation of a lever type connecting mechanism 23.

[0040] The actuator 17 has a built-in urging spring (not shown) for urging the movable portion 18 to the both sides of the neutral point thereof. A disc spring is used as the urging spring, for example.

[0041] To displace the movable portion 18 from the normal position as shown in Fig. 6 into the braking position as shown in Fig. 7, the electromagnetic solenoid portion 19 is excited to displace the movable portion 18 in the rightward direction as seen in the drawing. At this time, once it moves past the neutral position, the movable portion 18 is displaced into the braking position at a stroke by the spring force of the urging spring. As a result, the lever type connecting mechanism 23 is rocked about a shaft 23a in the counter-clockwise direction as seen in the drawing, causing the wedge member 16 to return to

the braking position.

[0042] Conversely, to return the movable portion 18 from the braking position into the normal position, the electromagnetic solenoid portion 19 is excited to displace the movable portion 18 in the leftward direction as seen in the drawing. At this time, once it moves past the neutral position, the movable portion 18 is displaced into the normal position at a stroke by the spring force of the urging spring. As a result, the lever type connecting mechanism 23 is rocked about the shaft 23a in the clockwise direction as seen in the drawing, causing the wedge member 16 to return to the normal position. When the wedge member 16 is wedged in between each of the guide surfaces 15a, 15b and the car guide rail 2, the actuator 17 is drivenwhile slightly lowering the car 3. Otherwise, Embodiment 2 is of substantially the same construction as Embodiment 1.

[0043] In the elevator apparatus as described above, the operation of returning the upward movement safety device 6 to the normal state can be effected by means of a command from a remote location, thereby making it possible to achieve improved workability. Further, an operation test or the like can be easily carried out on the upward movement safety device 6.

[0044] Further, the actuator 17 and the wedge member 16 are connected to each other through the lever type connecting mechanism 23, whereby the displacement of the movable portion 18 can be transmitted to the wedge member 16 while being magnified.

[0045] While in Embodiment 2 the actuator used has the built-in urging spring, the actuator may be one which displaces the movable portion solely by the electromagnetic force of the electromagnetic solenoid portion.

Embodiment 3

[0046] Next, Fig. 8 is a side view showing an upward movement safety device of an elevator apparatus according to Embodiment 3 of the present invention, Fig. 9 is a side view showing a state in which braking is applied by the upward movement safety device shown in Fig. 8, and Fig. 10 is a sectional view taken along the line X-X of Fig. 8.

[0047] Referring to the drawings, the actuator 17 is disposed on top of the car 3 so as to be spaced apart from the emergency stop frame 15. A movable pulley supporting member 24 is fixed to the movable portion 18. The movable pulley supporting member 24 is provided with a plurality of movable pulleys 25. The movable pulleys 25 are arranged symmetrically on both side surfaces of the movable pulley supporting member 24.

[0048] A stationary pulley supporting member 26 opposed to the movable pulley supporting member 24 is fixed to a position on top of the car 3 between the emergency stop frame 15 and the actuator 17. The stationary pulley supporting member 26 is provided with a plurality of stationary pulleys 27. The stationary pulleys 27 are arranged symmetrically on both side surfaces of the stationary pulley supporting member 26.

[0049] Wires 28 are alternately wound around the movable pulleys 25 and the stationary pulleys 27 respectively arranged on one sides of the pulley supporting members 24, 26. The wires 28 are also wound alternately around the movable pulleys 25 and the stationary pulleys 27 respectively arranged on the other sides of the pulley supporting members 24, 26. Each wire 28 has a first end portion 28a connected to the stationary pulley supporting member 26, and a second end portion 28b connected to an upper end portion of the wedge member 16.

[0050] Arranged diagonally above the wedge member 16 are a pair of first guide pulleys 29 for guiding the wires 28 to the wedge member 16. The first guide pulleys 29 are supported in position above the emergency stop frame 15. A pair of second guide pulleys 30 for guiding the wires 28 to the first guide pulleys 29 are provided at a position on top of the car 3 between the emergency stop frame 15 and the stationary pulley supporting member 26. Otherwise, Embodiment 2 is of substantially the same construction as Embodiment 1.

[0051] Next, operation will be described. When an abnormality detection signal is input to the upward movement emergency stop actuating means 13 (Fig. 1), the actuator 17 is driven, so the movable pulley supporting member 24 is displaced towards the stationary pulley supporting member 26. That is, the distance between the movable pulley supporting member 24 and the stationary pulley supporting member 26 is made to be narrower. As a result, the wire 28 loses its tension, causing the wedge member 16 to be displaced into the braking position due to its own weight.

[0052] When displaced into the braking position, the wedge member 16 is wedged in between each of the guide surfaces 15a, 15b and the car guide rail 2 as the car 3 moves upwards. The car 3 is thus brought to an emergency stop.

[0053] Further, by separating the movable pulley supporting member 24 from the stationary pulley supporting member 26 while slightly lowering the car 3, the wedging of the wedge member 16 is released, and furthermore the wedge member 16 is pulled up through the wire 28 to be returned to the normal position.

[0054] In the elevator apparatus as described above, the operation of returning the upward movement safety device 6 to the normal state can also be effected by means of a command from a remote location, thereby making it possible to achieve improved workability. Further, an operation test or the like can be easily carried out on the upward movement safety device 6.

[0055] Further, the wire 28 for transmitting the operation force of the actuator 17 to the wedge member 16 is alternately wound around the movable pulley 25 and the stationary pulley 27, and the distance between the movable pulley 25 and the stationary pulley 27 changes, whereby the displacement of the movable portion 18 of the actuator 17 can be transmitted to the wedge member 16 while being sufficiently magnified.

[0056] It should be noted that the construction of the

upward movement safety device 6 as described in Embodiments 1 through 3 can be applied to the downward movement safety device 7 as it is or after slight modifications.

[0057] Further, while in the case of the speed monitoring portion described above the set overspeed changes according to the car position, the set overspeed may be constant irrespective of the car position.

[0058] Further, the actuator is not limited to an electromagnetic actuator; for example, various actuators may be used as long as they are driven depending on whether or not an abnormality detection is generated, such as a motor, linear motor, hydraulic cylinder, or air cylinder having a rotary shaft.

[0059] Furthermore, the signal to be transferred between the speed monitoring portion and the upward movement safety device is not limited to an electrical signal but may be, for example, a light signal.

Claims

1. An elevator apparatus comprising:

a car that is raised and lowered in a hoistway;
a car guide rail for guiding raising and lowering of the car;
a speed monitoring portion that generates an abnormality detection signal when a speed of the car being raised reaches a set overspeed; and
an upward movement safety device mounted in the car and having an actuator that is driven depending on whether or not the abnormality detection signal is generated, and a braking member that is operated by the actuator, the upward movement safety device causing the braking member to be engaged with the car guide rail to stop upward movement of the car when the abnormality detection signal is generated.

2. An elevator apparatus according to Claim 1, wherein a set overspeed pattern that changes according to a car position is set in the speed monitoring portion.

3. An elevator apparatus according to Claim 1, wherein when the speed monitoring portion generates the abnormality detection signal, the braking member falls by its own weight to be engaged with the car guide rail.

4. An elevator apparatus according to Claim 3, wherein the upward movement safety device comprises an auxiliary spring for assisting in falling of the braking member.

5. An elevator apparatus according to Claim 1, wherein the braking member is displaceable by a drive force of the actuator between a braking position where the braking member is engaged with the car guide rail and a normal position where the braking member is separated from the car guide rail.

6. An elevator apparatus according to Claim 5, wherein the actuator is connected to the braking member through a lever type connecting mechanism.

7. An elevator apparatus according to Claim 1, further comprising:

a stationary pulley supporting member;
a plurality of stationary pulleys provided to the stationary pulley supporting member;
a movable pulley supporting member whose distance from the stationary pulley supporting member can be changed due to a drive force of the actuator;
a plurality of movable pulleys provided to the movable pulley supporting member; and
a wire alternately wound around the stationary pulleys and the movable pulleys and connected to the braking member, for transmitting displacement of the movable pulley supporting member by the actuator to the braking member while magnifying the displacement.

FIG. 1

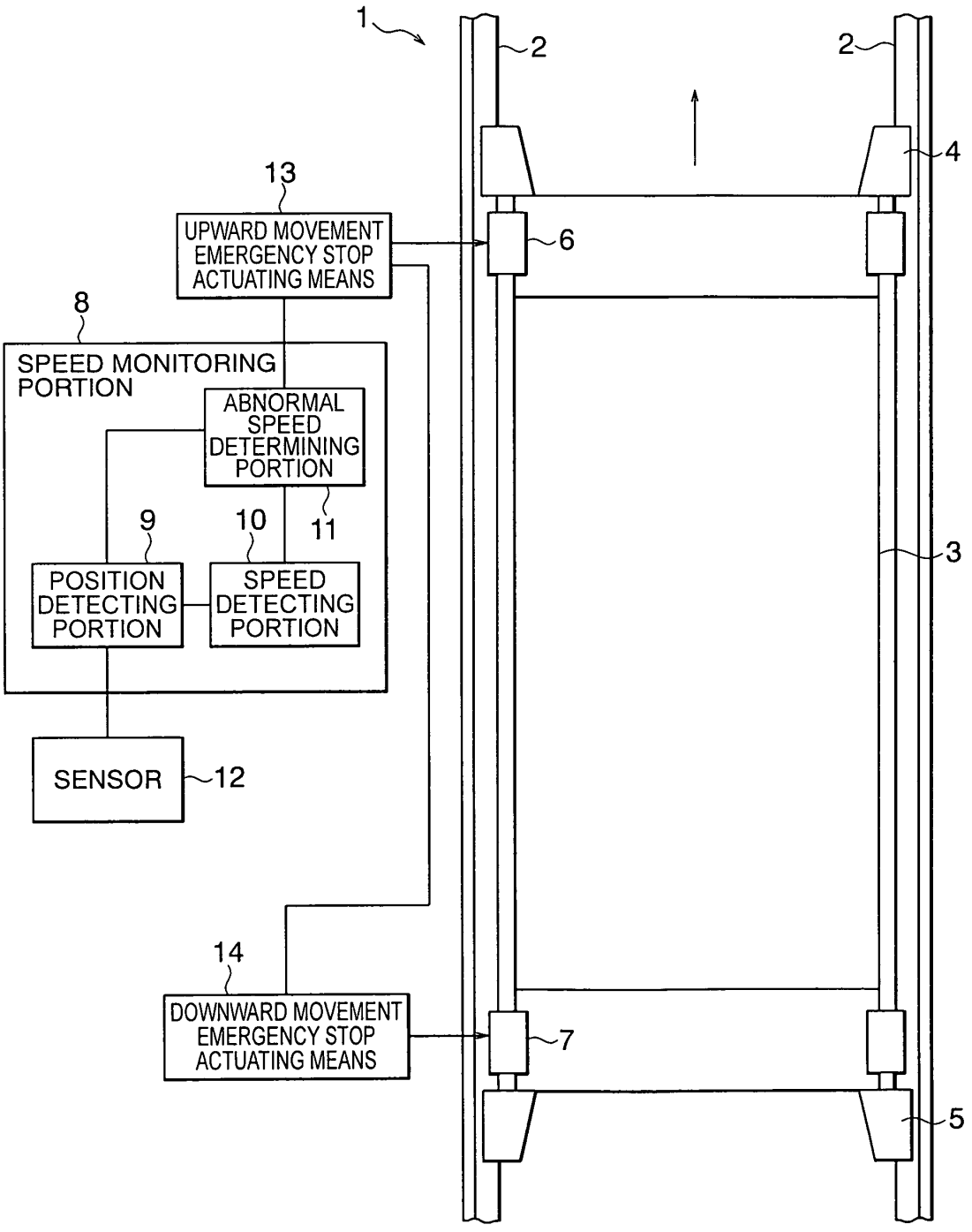

1
2
2
4
13
UPWARD MOVEMENT EMERGENCY STOP ACTUATING MEANS
6
8
SPEED MONITORING PORTION
ABNORMAL SPEED DETERMINING PORTION
9
10
11
POSITION DETECTING PORTION
SPEED DETECTING PORTION
3
SENSOR
12
14
DOWNWARD MOVEMENT EMERGENCY STOP ACTUATING MEANS
7
5

FIG. 2

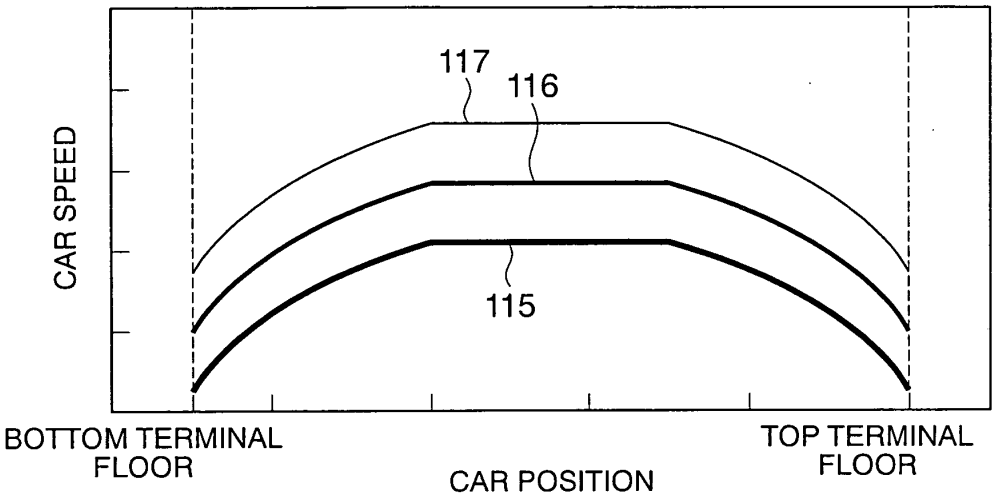

117
116
115
CAR SPEED
BOTTOM TERMINAL FLOOR
TOP TERMINAL FLOOR
CAR POSITION

FIG. 3

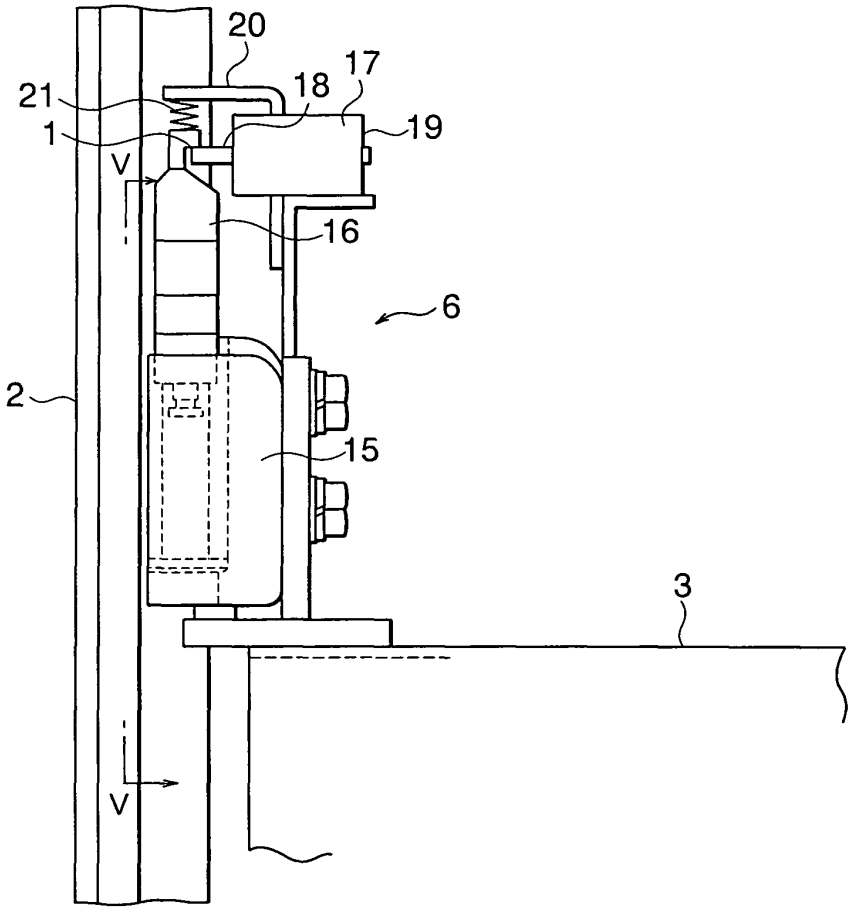


FIG. 4

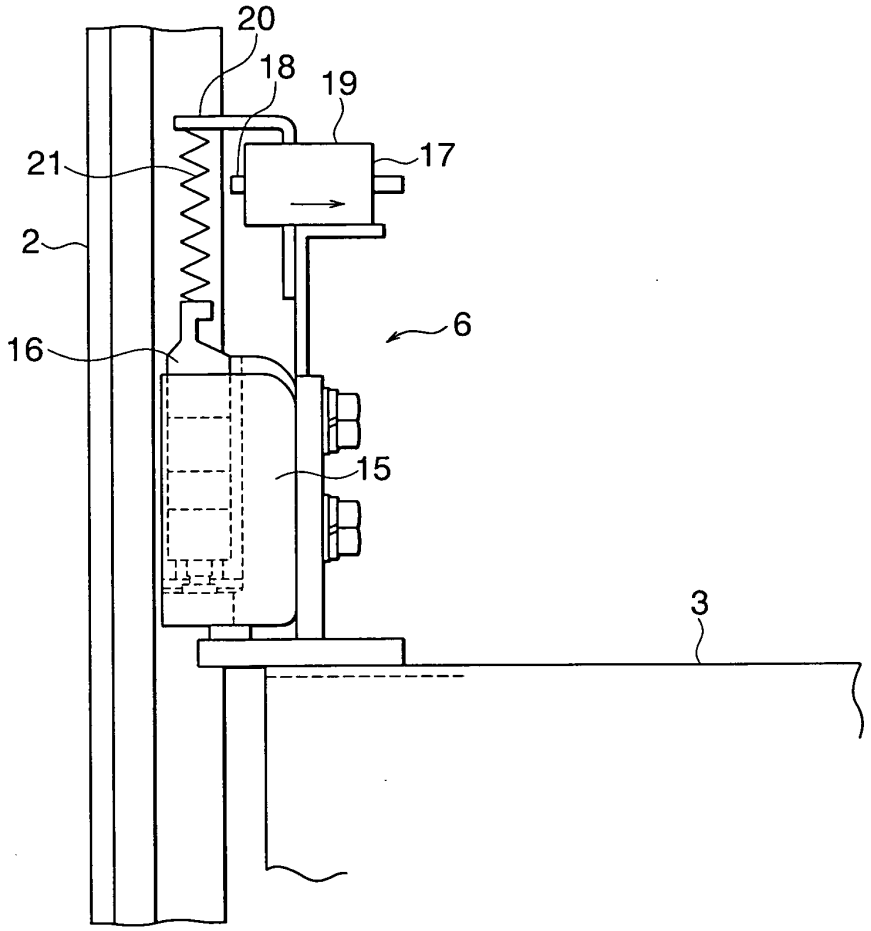


FIG. 5

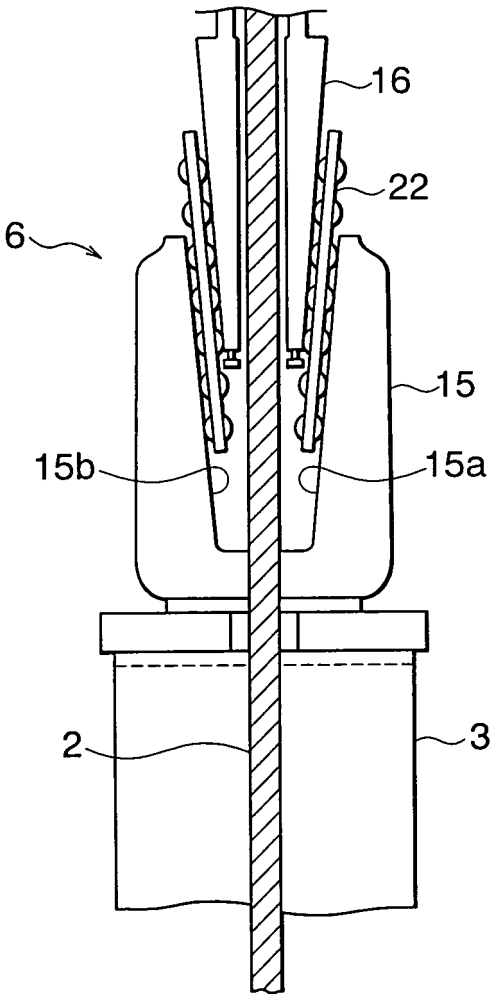


FIG. 6

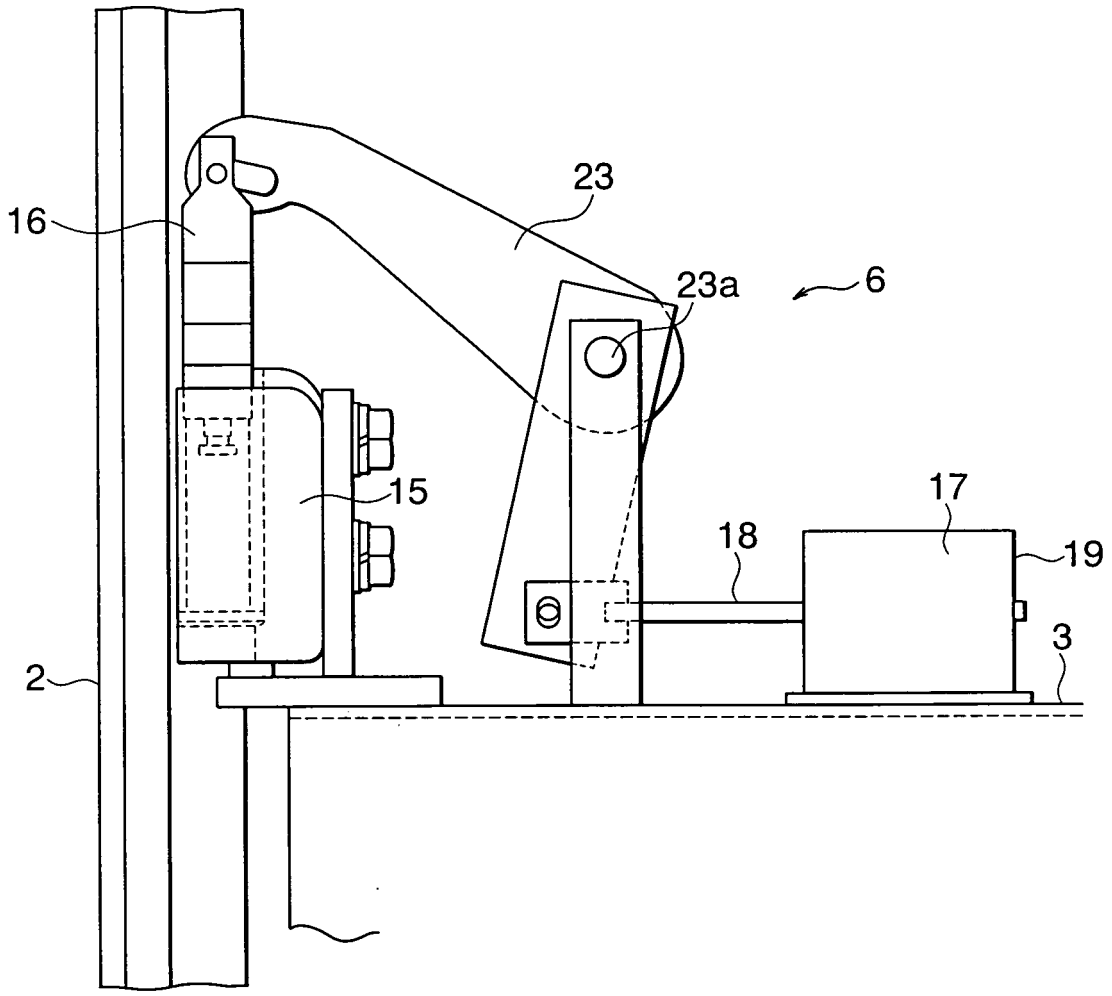


FIG. 7

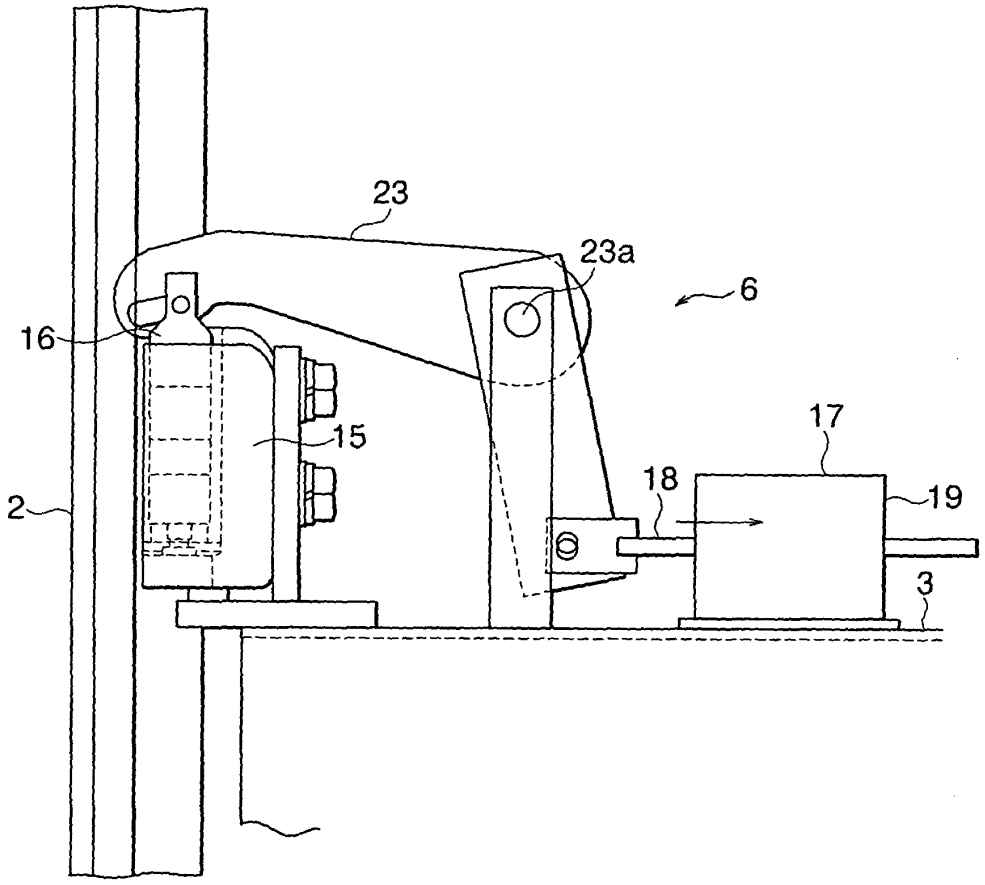


FIG. 8

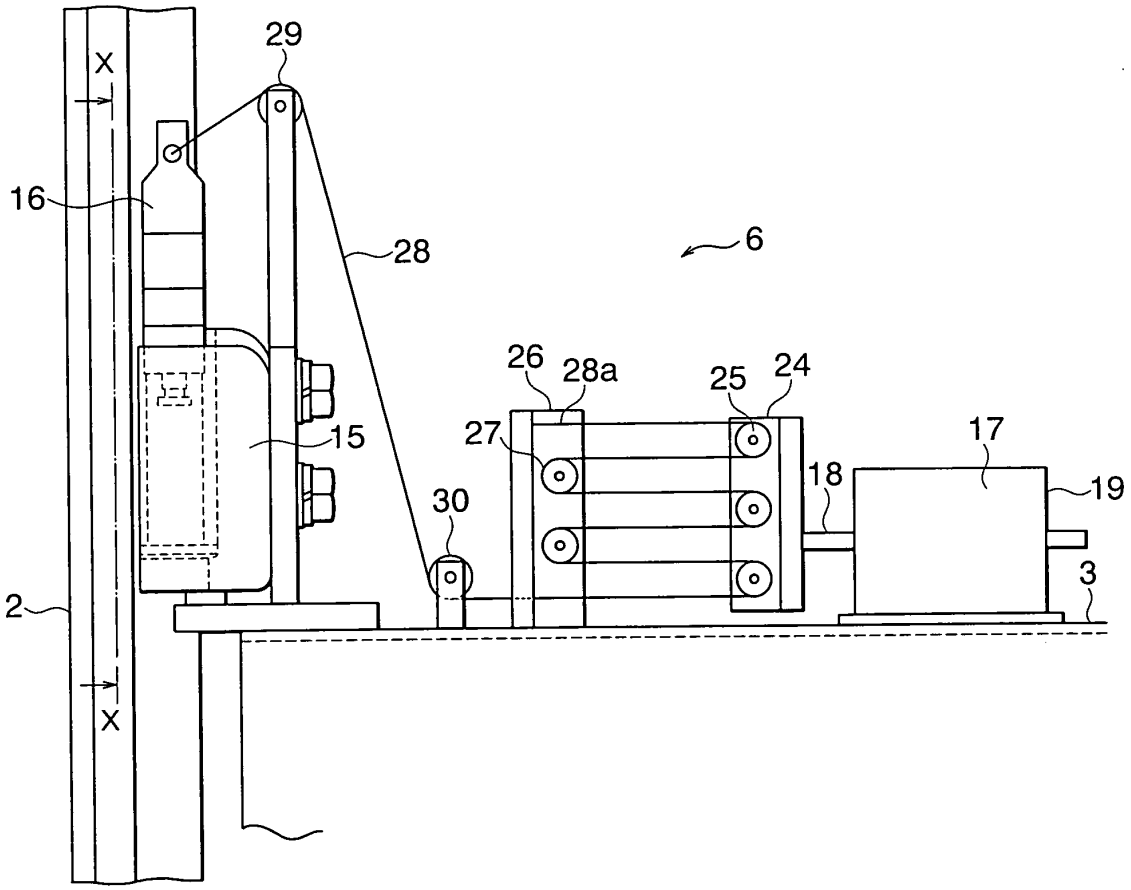


FIG. 9

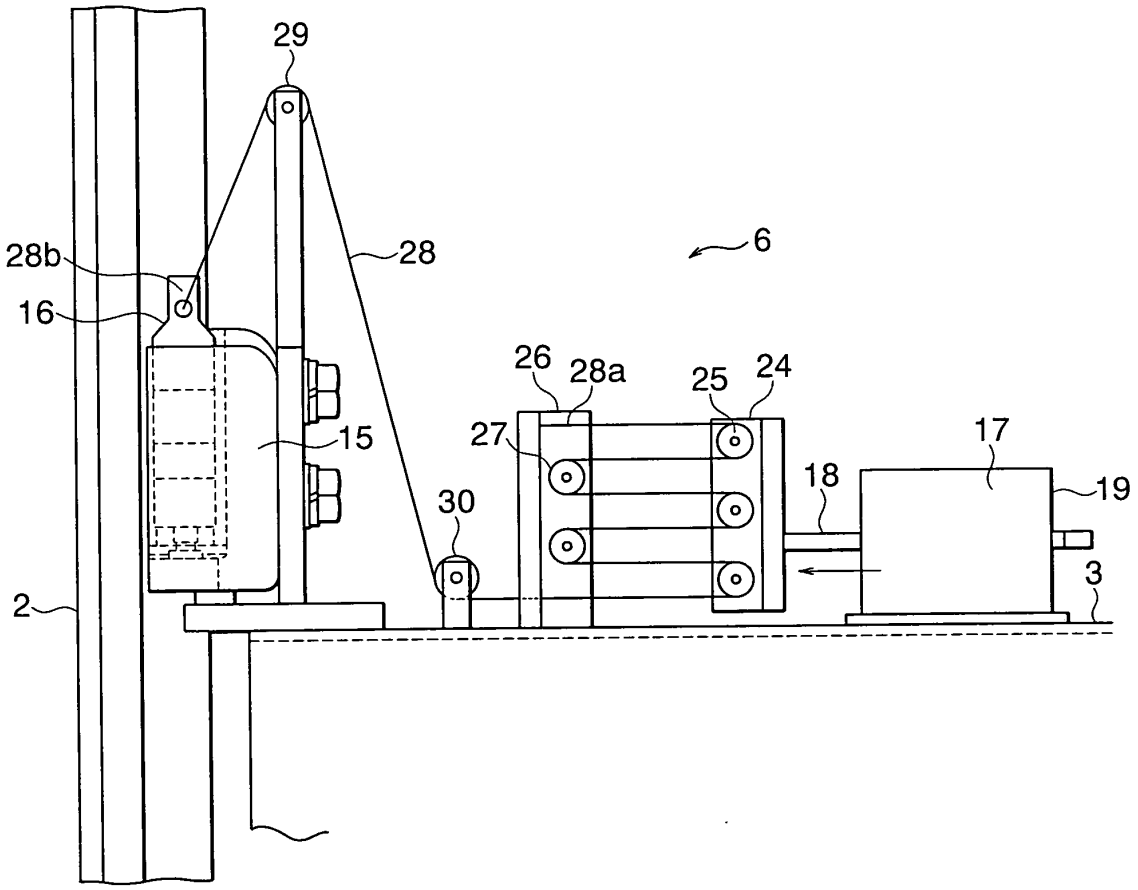
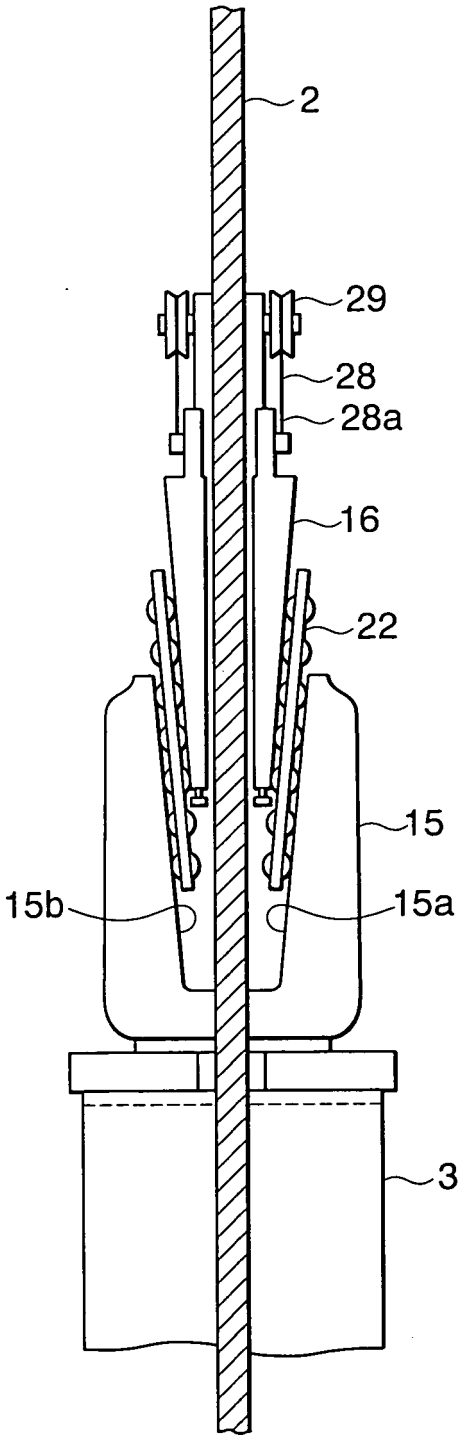


FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2004/007647

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] B66B5/18

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] B66B5/00-B66B5/28

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2005
Kokai Jitsuyo Shinan Koho 1971-2005 Toroku Jitsuyo Shinan Koho 1994-2005

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 03/008317 A1 (Mitsubishi Electric Corp.), 30 January, 2003 (30.01.03), Description; page 3, line 16 to page 6, line 11; Figs. 1 to 4	1-2,5
A	Description, page 1, column of "Technical Background", lines 7 to 12; Fig. 7 & EP 1431230 A1	3-4
Y	JP 2003-104648 A (Mitsubishi Electric Corp.), 09 April, 2003 (09.04.03), Par. Nos. [0014] to [0017]; Figs. 1 to 2, 4 to 5 & EP 1431229 A & WO 03/029123 A1	1-2,5

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
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Date of the actual completion of the international search	Date of mailing of the international search report
24 February, 2005 (24.02.05)	15 March, 2005 (15.03.05)
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2004/007647

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2001-158579 A (Hitachi, Ltd.), 12 June, 2001 (12.06.01), Par. Nos. [0030] to [0048], [0063] to [0069]; figs. 1 to 6, 8 (Family: none)	4,6-7

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REFERENCES CITED IN THE DESCRIPTION

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- JP 2001080840 A **[0002]**