



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 464 606 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
06.10.2004 Bulletin 2004/41

(51) Int Cl.7: **B66B 5/00, B66B 7/00**

(21) Application number: **01974829.2**

(86) International application number:
PCT/JP2001/008994

(22) Date of filing: **12.10.2001**

(87) International publication number:
WO 2003/033389 (24.04.2003 Gazette 2003/17)

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**

(72) Inventor: **YOSHIKAWA, Masami,**
c/o Mitsubishi Denki K. K.
Tokyo 100-8310 (JP)

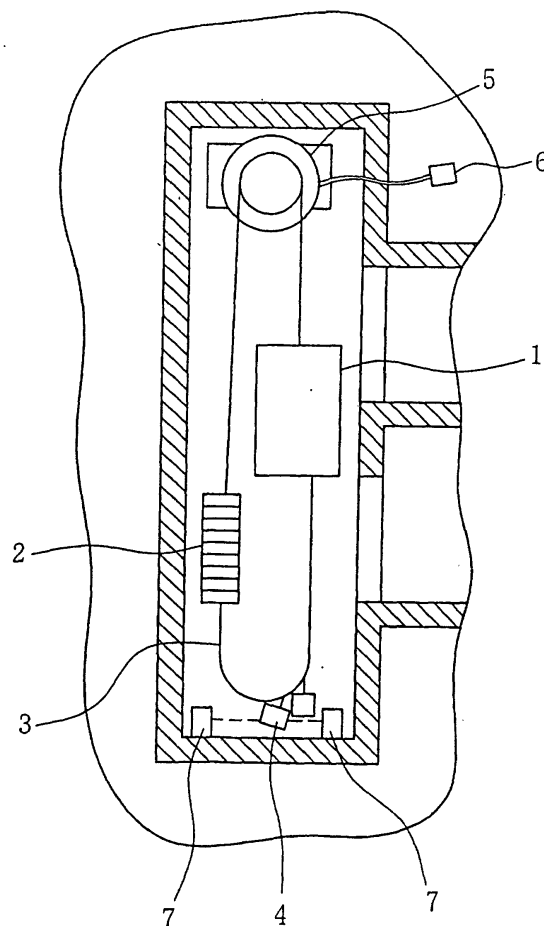
(71) Applicant: **mitsubishi denki kabushiki
kaisha**
Tokyo 100-8310 (JP)

(74) Representative: **HOFFMANN - EITLE**
Patent- und Rechtsanwälte
Arabellastrasse 4
81925 München (DE)

(54) **ELEVATOR**

(57) An elevator system including a hoist disposed on the top portion of a hoistway, a wire rope wound around a traction sheave of the hoist and provided with an elevator car at its one end and a counter weight at the other end, a compensation chain having respective ends fastened to the lower portion of the elevator car and the lower portion of the counter weight, a relief weight connectable to the compensation chain in emergencies for adjusting the balance between the elevator car and the counter weight to cause the elevator car to move, and detecting means for detecting that the relief weight is connected to the compensation chain.

FIG. 1



Description

TECHNICAL FIELD

[0001] This invention relates to an elevator system and, particularly, to a safe method for restoring from an emergency mode to a normal mode in elevators having no machine room.

BACKGROUND ART

[0002] Examples of a known elevator system are disclosed in Japanese Patents Laid-Open Nos. 2000-351548 and 2000-169055, and one of such examples is shown in Figure 3. Figure 3 is a sectional view of a conventional elevator system showing the structure thereof.

[0003] In Figure 3, 1 is an elevator car. 2 is a counter weight (CWT). 3 is a compensation chain. 4 is a relief weight. 5 is a hoist, and it is disposed on the top of the hoistway. 6 is a brake releasing apparatus.

[0004] The elevator car 1 and the CWT 2 described above are connected to either end of the wire rope wound around the hoist 5. The compensation chain 3 is disposed such that the both ends thereof locate separately under the elevator car 1 or the CWT 2. The relief weight 4 is connected to the compensation chain 3 in cases such as necessitating rescues in emergencies, and adjusts the balance between the elevator car 1 weight and the CWT 2. The brake releasing apparatus 6 disposed on the hoist 5 releases the brake of the hoist 5. The brake releasing apparatus 6 of the hoist 5 is operated by remote control at the side of the landing or the like on the uppermost floor.

[0005] The operation in emergencies of the conventional elevator system shown in Figure 3 is described in the following.

[0006] If the elevator car 1 suspends halfway between floors due to power failure or the like, for instance, elevator passengers in such emergencies are generally rescued by making the car 1 alight on the nearest floor using the brake releasing apparatus 6 to let the passengers get off the car. The brake releasing apparatus 6 allows the brake of the hoist 5 to be manually released to cause the elevator car 1 to move upward or downward due to the unbalance between the elevator car 1 weight and the CWT 2. It is not possible to make the elevator car 1 move, however, if the weight of the elevator car 1 and the CWT 2 is balanced (in such cases as where the elevator car 1 is accommodating half the nominal riding capacity), even if the brake is released, and so in such cases the relief weight 4 is mounted to the compensation chain 3 disposed under the elevator car 1 for adjusting the balance between the elevator car 1 weight and the CWT 2 and causing an unbalance therebetween and letting the elevator car 1 move.

[0007] Thus, conventional elevator systems have a problem that relief weights, if left unremoved, could fall

on and hit elevator machinery and tools to damage them after restoration to a normal driving following rescuing of elevator passengers.

DISCLOSURE OF INVENTION

[0008] The present invention, that has been made to solve the problem described above, has as its object to provide an elevator system in which restoration to a normal driving with the relief weight unintentionally failed to dismount is restrained.

[0009] In order to achieve the above object, an elevator system according to the invention comprises a hoist disposed on the top portion of a hoistway, a wire rope wound around a traction sheave of the hoist and provided with an elevator car at its one end and a counter weight at the other end, a compensation chain having respective ends fastened to the lower portion of the elevator car and the lower portion of the counter weight, a relief weight connectable to the compensation chain in emergencies for adjusting the balance between the elevator car and the counter weight to cause the elevator car to move, and detecting means for detecting that the relief weight is connected to the compensation chain.

[0010] Also, according to the elevator system of the present invention, the driving of the elevator car may be suspended when said detecting means detects that the relief weight is connected to said compensation chain.

[0011] Also, according to the elevator system of the present invention, the detecting means may comprise a light switch, which detects that the relief weight is connected to the compensation chain when the relief weight interrupts the beam of light between a light emitting section and a light receiving section of the light switch.

[0012] Further, in the elevator system of the present invention, the detecting means may be disposed at either the lower portion of the elevator car or the lower portion of the counter weight, and the operation of the elevator car is suspended when it detects the load of the relief weight.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Figure 1 is a sectional view of an elevator system of exemplary embodiment 1 of the invention showing the structure thereof;

Figure 2 is an enlarged view of the compositions under the elevator car in an elevator system of exemplary embodiment 2 of the invention; and

Figure 3 is a sectional view of a conventional elevator system showing the structure thereof.

BEST MODE FOR CARRYING OUT THE INVENTION

[0014] Exemplary embodiments of the invention will

be described in the following.

Embodiment 1.

[0015] An elevator system of one exemplary embodiment of the invention will now be described while referring to Figure 1. Figure 1 is a sectional view of an elevator system of Embodiment 1 of the invention showing the structure thereof.

[0016] In Figure 1, 7 is a light switch or a detecting means that is disposed at the bottom of the hoistway, and detects whether or not something has passed based on the occurrence or not of the interruption of beams of light running between the light emitting section and the light receiving section thereof opposing each other. An attempt to restore to a normal driving with a relief weight 4 remained connected to a compensation chain 3 fails because an omission to remove the relief weight 4 is revealed through the interruption of the beams of light of the light switch 7 by the relief weight 4 connected to the compensation chain 3, and this induces the suspension of the movement of an elevator car 1, thus preventing restoration to a normal driving.

[0017] In Figure 1, those components that are common in the example of a conventional elevator system shown in Figure 3 or those the counterparts thereof are found in Figure 3 are given the same reference numerals with no explanation, and the component that is not found in Figure 3 is given a new reference numeral.

[0018] Thus, it is possible to prevent the occurrence of a situation in which the relief weight 4 falls down on and hit the elevator machinery and tools to damage them because restoration to a normal driving with the relief weight 4 left unremoved is not possible as the light switch 7 disposed at the bottom of the hoistway detects whether or not the relief weight 4 is connected to the compensation chain 3 and whether or not the elevator system can be restored to a normal driving through the occurrence or not of the interruption of the beams of light running between the light emitting section and the light receiving section of the light switch 7.

[0019] Further, it is possible to prevent the occurrence of undesirable phenomenon of generating a slip between the wire rope and the hoist sheave due to insufficient friction therebetween that could happen when the elevator is operated with the car accommodating full passengers, for example, because of the unbalance between the elevator car 1 and the CWT 2 as a consequence of the presence of the relief weight 4 when the elevator system is restored to a normal driving by omitting the removal of the relief weight 4.

Embodiment 2.

[0020] The elevator system of another exemplary embodiment of the present invention will now be described with reference to Figure 2. Figure 2 is an enlarged view of an elevator system of Embodiment 2 of the invention

showing the composition under the elevator car.

[0021] In Figure 2, 9 is a beam onto which one end of the compensation chain 3 is fastened. One end of the beam 9 is arranged to be rotatable about a pin 8 under the elevator car. 10 is a spring, and it supports the beam 9 at the other end to bear the weight of the compensation chain 3. 11 is a switch, and it restrains the elevator system's normal driving when the beam 9 serving as an operation lever is pulled downward. The operation lever is pulled downward when the spring 10 is compressed under the loads of the compensation chain 3 and the relief weights 4 mounted thereto.

[0022] Thus, when the switch 11 is turned on upon the downward movement of the operation lever, it is determined that the relief weights 4 are mounted on the compensation chain 3 and the restoration of the elevator operation to a normal driving mode is prevented when the relief weights 4 are unintentionally failed to be dismounted.

[0023] Although the integral components are disposed at the lower portion of the elevator car 1 in this embodiment, such the components may equally be disposed at the lower portion of the CWT 2.

[0024] As has been described, an elevator system according to the invention comprises a hoist disposed on the top portion of a hoistway, a wire rope wound around a traction sheave of the hoist and provided with an elevator car at its one end and a counter weight at the other end, a compensation chain having respective ends fastened to the lower portion of the elevator car and the lower portion of the counter weight, a relief weight connectable to the compensation chain in emergencies for adjusting the balance between the elevator car and the counter weight to cause the elevator car to move, and detecting means for detecting that the relief weight is connected to the compensation chain, so that it is possible to prevent the relief weight from falling down on and hit the elevator machinery and tools to damage them as a consequence of unintentional failure to remove the relief weight when restoring to a normal operation.

INDUSTRIAL APPLICABILITY

[0025] As described, an elevator system of the invention is used upon providing a safe restoring method from an emergency mode to a normal mode particularly in an elevator having no machine room.

Claims

1. An elevator system comprising:

a hoist disposed on the top portion of a hoistway;
a wire rope wound around a traction sheave of said hoist and is provided with an elevator car

at one end thereof and a counter weight at the other end thereof;

a compensation chain having respective end thereof fastened to the lower portion of the elevator car and the lower portion of the counter weight; 5

a relief weight connectable to said compensation chain in emergencies for adjusting the balance between the elevator car and the counter weight to cause the elevator car to move; and 10
detecting means for detecting that said relief weight is connected to said compensation chain.

2. An elevator system as claimed in claim 1 wherein the driving of the elevator car is suspended when said detecting means detects that the relief weight is connected to said compensation chain. 15

3. An elevator system as claimed in claim 2 wherein said detecting means comprises a light switch, which detects that the relief weight is connected to the compensation chain when the relief weight interrupts the beam of light between a light emitting section and a light receiving section of the light switch. 20 25

4. An elevator system as claimed in claim 1 wherein said detecting means is disposed at either the lower portion of the elevator car or the lower portion of the counter weight, and the operation of the elevator car is suspended when it detects the load of the relief weight. 30

35

40

45

50

55

FIG. 1

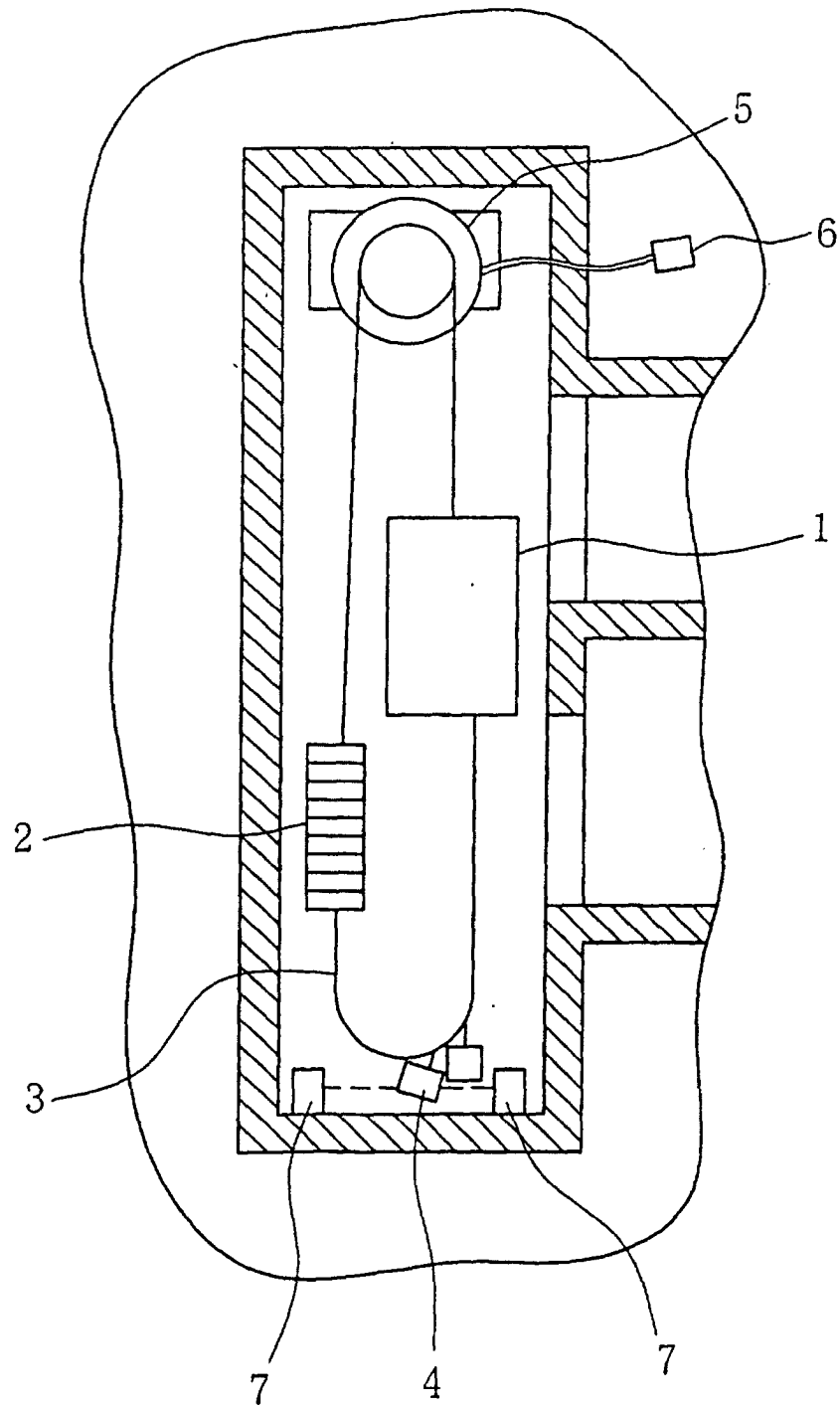


FIG. 2

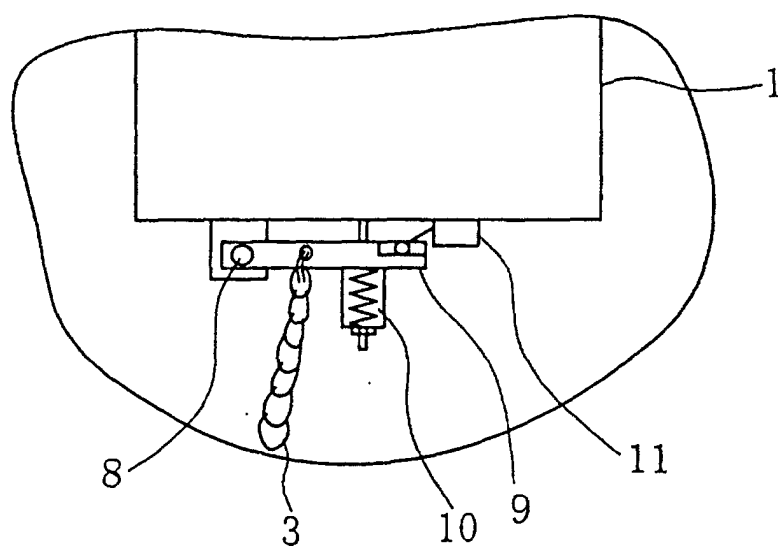
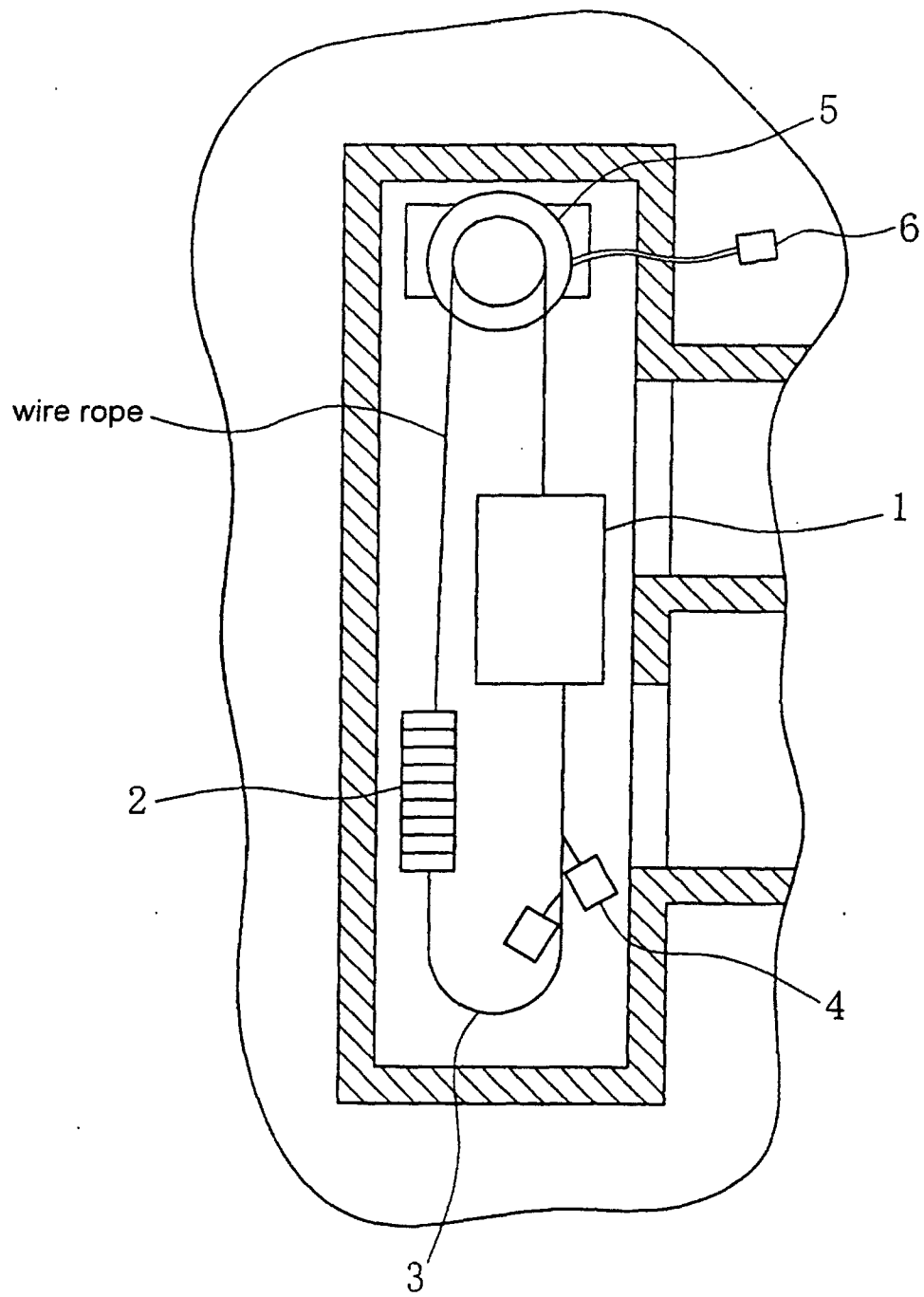


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP01/08994

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl.⁷ B66B5/00, B66B7/00

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, B66B5/02, B66B7/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1926-1996 Toroku Jitsuyo Shinan Koho 1994-2001
Kokai Jitsuyo Shinan Koho 1971-2001 Jitsuyo Shinan Toroku Koho 1996-2001

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.
A	JP 2000-351548 A (Mitsubishi Electric Building Techno-Service Co., Ltd.), 19 December, 2000 (19.12.00), Par. Nos. [0007], [0017] to [0022]; Figs. 1, 8 (Family: none)	1-4
A	JP 2000-318942 A (Mitsubishi Electric Building Techno-Service Co., Ltd.), 21 November, 2000 (21.11.00), Par. No. [0005]; Fig. 8 (Family: none)	1-4

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search
12 December, 2001 (12.12.01)

Date of mailing of the international search report
25 December, 2001 (25.12.01)

Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.