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(71) Applicant: **Mitsubishi Electric Corporation**
Tokyo 100-8310 (JP)

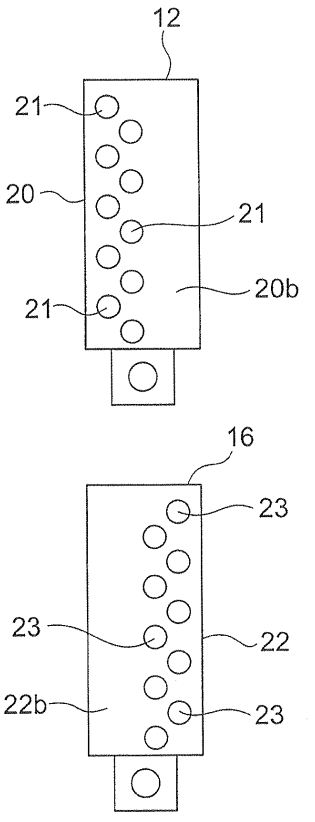
(72) Inventor: **IMURA, Mitsuyoshi**
Tokyo 100-8310 (JP)

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

(54) **EMERGENCY STOP DEVICE FOR ELEVATOR**

(57) An elevator emergency stopping apparatus is disposed on a hoisted body that is guided by a guide rail. The emergency stopping apparatus includes: a first emergency stopping mechanism portion; and a second emergency stopping mechanism portion that is disposed below the first emergency stopping mechanism portion. The first emergency stopping mechanism portion includes a first braking body that can contact with and separate from the guide rail, and applies a braking force to the hoisted body by placing the first braking body in contact with the guide rail. The second emergency stopping mechanism portion includes a second braking body that can contact with and separate from the guide rail, and applies a braking force to the hoisted body by placing the second braking body in contact with the guide rail. A contacting position of the first braking body on the guide rail and a contacting position of the second braking body on the guide rail are offset from each other in a horizontal direction.

FIG. 3



EP 2 631 208 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to an elevator emergency stopping apparatus for emergency stopping a hoisted body (a car or a counterweight, for example).

BACKGROUND ART

[0002] Conventionally, techniques are known in which an elevator emergency stopping apparatus is configured by mounting two small-mass emergency stopping apparatuses to a car so as to be linked vertically in order to achieve improvements in operational reliability. Each of the small-mass emergency stopping apparatuses has: a pair of left and right supports that are disposed on two sides of a guide rail; and a pair of wedge members that are disposed between the respective supports and the guide rail. In each of the small-mass emergency stopping apparatuses, a braking force is applied to the car by the respective wedge members wedging between the supports and the guide rail (see Patent Literature 1).

[0003] Conventionally, in order to achieve improvements in operational reliability, elevator emergency stopping apparatuses have also been proposed in which a plurality of ceramic friction pads are disposed on surfaces of the wedge members that face the guide rail (Patent Literature 2 and 3).

CITATION LIST

PATENT LITERATURE

[0004]

[Patent Literature 1]
Japanese Patent Laid-Open No. 2001-354373 (Gazette)
[Patent Literature 2]
Japanese Patent Laid-Open No. HEI 7-41272 (Gazette)
[Patent Literature 3]
Japanese Patent Laid-Open No. SHO 59-7682 (Gazette)

SUMMARY OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0005] However, in the elevator emergency stopping apparatus that is disclosed in Patent Literature 1, if the upper and lower wedge members contact the guide rail when the car descends, because the upper wedge member slides over the surface the lower wedge member has slid over, the surface of the guide rail over which the upper wedge member has slid is at high temperature, reducing the coefficient of friction of the upper wedge member on the guide rail. Thus, the upper wedge member is less likely to wedge between the supports and the guide rail, making it less likely that sufficient braking force will be generated.

[0006] In the elevator emergency stopping apparatuses that are shown in Patent Literature 2 and 3, because there is one emergency stopping apparatus on a single guide rail, it is impossible to accommodate larger cars.

[0007] The present invention aims to solve the above problems and an object of the present invention is to provide an elevator emergency stopping apparatus that enables improvements in operational reliability.

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 emergency stopping apparatus that is disposed on a hoisted body that is guided by a guide rail, for applying a braking force to the hoisted body, the elevator emergency stopping apparatus including: a first emergency stopping mechanism portion that includes a first braking body that can contact with and separate from the guide rail, and that applies a braking force to the hoisted body by placing the first braking body in contact with the guide rail; and a second emergency stopping mechanism portion that includes a second braking body that can contact with and separate from the guide rail, that is disposed below the first emergency stopping mechanism portion, and that applies a braking force to the hoisted body by placing the second braking body in contact with the guide rail, the elevator emergency stopping apparatus being characterized in that a contacting position of the first braking body on the guide rail and a contacting position of the second braking body on the guide rail are offset from each other in a horizontal direction.

EFFECTS OF THE INVENTION

[0009] In an elevator emergency stopping apparatus according to the present invention, because the contacting position of the first braking body on the guide rail and the contacting position of the second braking body on the guide rail are offset from each other in a horizontal direction, the first braking body can be slid on the guide rail so as to avoid the sliding surface of the second braking body on the guide rail. The first braking body can thereby be prevented from sliding over a sliding surface in which temperature is high due to the sliding movement of the second braking body, enabling reductions in the coefficient of friction of the first braking body on the guide rail to be suppressed. Consequently, not only the braking force from the second emergency stopping mechanism portion but also the braking force from the first emergency stopping mechanism portion can be generated reliably. Because of this, improvements in operational reliability of the emergency stopping apparatus can be achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

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

Figure 2 is a configuration diagram that shows an upper wedge and a lower wedge when both are contacting a car guide rail from Figure 1;

Figure 3 is a configuration diagram that shows the upper wedge and the lower wedge from Figure 2 when viewed from the car guide rail; and

Figure 4 is a front elevation that shows sliding trails that arise on the car guide rail due to contact of the upper wedge and the lower wedge from Figure 3 on the car guide rail.

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 car according to Embodiment 1 of the present invention. In the figure, a pair of car guide rails 1 and a pair of counterweight guide rails (not shown) are respectively installed vertically inside a hoistway. A car (a hoisted body) 2 is disposed between the car guide rails 1, and a counterweight (a hoisted body) (not shown) is disposed between the counterweight guide rails. The car 2 and the counterweight are suspended by a suspending body (not shown) that is wound around a driving sheave of a hoisting machine (a driving apparatus). Ropes or belts, for example, are used as the suspending body. The car 2 and the counterweight are moved vertically by a driving force from the hoisting machine. When the car 2 and the counterweight are moved vertically, the car 2 is guided by the car guide rails 1, and the counterweight is guided by the counterweight guide rails.

[0013] The car 2 has: a car main body 3; and a car frame 4 that supports the car main body 3 so as to surround the car main body 3. An emergency stopping apparatus 5 that applies a braking force to the car 2 to prevent falling of the car 4 is disposed on the lower portion of the car frame 4. An operating lever 6 is disposed on the emergency stopping apparatus 5. The emergency stopping apparatus 5 grips the car guide rail 1 by operation of the operating lever 6. Falling of the car 2 is prevented by gripping of the car guide rail 1 by the emergency stopping apparatus 5.

[0014] A speed governor rope 7 is connected to the operating lever 6. The speed governor rope 7 is wound around a speed governor sheave (not shown) of a speed governor that is installed in an upper portion of the hoistway. When the car 2 moves vertically, the speed governor rope 7 is moved together with the car 2, and the speed governor sheave is moved in response to the movement of the car 2. The speed governor grips the speed governor rope if rotational speed of the speed governor sheave becomes excessive. The operating lever 6 is operated by the speed governor rope 7 being gripped by the speed governor, and the car 2 being displaced relative to the speed governor rope 7.

[0015] The emergency stopping apparatus 5 has: an upper emergency stopping mechanism portion (a first emergency stopping mechanism portion) 8; a lower emergency stopping mechanism portion (a second emergency stopping mechanism portion) 9 that is disposed below the upper emergency stopping mechanism portion 8; and an emergency stopper mounting frame 10 that is fixed to the car frame 4, and that supports the upper emergency stopping mechanism portion 8 and the lower emergency stopping mechanism portion 9. In other words, the emergency stopping apparatus 5 is a duplex emergency stopping apparatus.

[0016] The upper emergency stopping mechanism portion 8 has: an upper pivoting shaft (a first pivoting shaft) 11 that is disposed horizontally on the emergency stopper mounting frame 10; a pair of upper wedges (first braking bodies) 12 that are linked to the upper pivoting shaft 11 by means of a linking lever 14, and that are displaced vertically relative to the emergency stopper mounting frame 10 by pivoting of the upper pivoting shaft 11; and a pair of upper guiding portions (first guiding portions) 13 that are fixed to the emergency stopper mounting frame 10, and that guide the upper wedges 12 that are displaced by the pivoting of the upper pivoting shaft 11 in a direction of contact with and separation from the car guide rail 1.

[0017] The upper guiding portions 13 face each other so as to have the car guide rail 1 interposed. Distances between the upper guiding portions 13 and the car guide rail 1 are reduced continuously from lower portions of the upper guiding portions 13 toward the upper portions.

[0018] The upper wedges 12 are respectively disposed between each of the upper guiding portions 13 and the car guide rail 1. The respective upper wedges 12 are guided along the upper guiding portions 13 in the direction of contact with the car guide rail 1 by being displaced upward relative to the emergency stopper mounting frame 10, and are guided along the upper guiding portions 13 in the direction of separation from the car guide rail 1 by being displaced downward relative to the emergency stopper mounting frame 10.

[0019] The respective upper wedges 12 are configured so as to wedge between each of the upper guiding portions 13 and the car guide rail 1 by being guided along the upper guiding portions 13 while being displaced upward. The car guide rail 1 is gripped between the upper wedges 12 by the respective upper wedges 12 wedging between each of the upper guiding portions 13 and the car guide rail 1. The upper emergency stopping mechanism portion 8 applies a braking force to the car 2 by

gripping the car guide rail 1 between the upper wedges 12. In other words, the upper emergency stopping mechanism portion 8 applies a braking force to the car 2 by placing the upper wedges 12 in contact with the car guide rail 1.

[0020] The lower emergency stopping mechanism portion 9 has: a lower pivoting shaft (a second pivoting shaft) 15 that is disposed horizontally on the emergency stopper mounting frame 10; a pair of lower wedges (second braking bodies) 16 that are linked to the lower pivoting shaft 15 by means of a linking lever 18, and that are displaced vertically relative to the emergency stopper mounting frame 10 by pivoting of the lower pivoting shaft 15; and a pair of lower guiding portions (second guiding portions) 17 that are fixed to the emergency stopper mounting frame 10, and that guide the lower wedges 16 that are displaced by the pivoting of the lower pivoting shaft 15 in a direction of contact with and separation from the car guide rail 1.

[0021] The lower guiding portions 17 face each other so as to have the car guide rail 1 interposed. Distances between the lower guiding portions 17 and the car guide rail 1 are reduced continuously from lower portions of the lower guiding portions 17 toward the upper portions.

[0022] The lower wedges 16 are respectively disposed between each of the lower guiding portions 17 and the car guide rail 1. The respective lower wedges 16 are guided along the lower guiding portions 17 in the direction of contact with the car guide rail 1 by being displaced upward relative to the emergency stopper mounting frame 10, and are guided along the lower guiding portions 17 in the direction of separation from the car guide rail 1 by being displaced downward relative to the emergency stopper mounting frame 10.

[0023] The respective lower wedges 16 are configured so as to wedge between each of the lower guiding portions 17 and the car guide rail 1 by being guided along the lower guiding portions 17 while being displaced upward. The car guide rail 1 is gripped between the lower wedges 16 by the respective lower wedges 16 wedging between each of the lower guiding portions 17 and the car guide rail 1. The lower emergency stopping mechanism portion 9 applies a braking force to the car 2 by gripping the car guide rail 1 between the lower wedges 16. In other words, the lower emergency stopping mechanism portion 9 applies a braking force to the car 2 by placing the lower wedges 16 in contact with the car guide rail 1.

[0024] The car guide rail 1 that is disposed between each of the upper guiding portions 13 and between each of the lower guiding portions 17 is a shared guide rail. Consequently, the respective upper wedges 12 and the respective lower wedges 16 are able to contact with and separate from the shared car guide rail 1.

[0025] The operating lever 6 is fixed to the upper pivoting shaft 11. Consequently, the upper pivoting shaft 11 is pivoted in response to the operation of the operating lever 6. A linking apparatus 19 that interlocks the upper pivoting shaft 11 and the lower pivoting shaft 15 with each other is disposed between the upper pivoting shaft 11 and the lower pivoting shaft 15. The lower pivoting shaft 15 is pivoted at an identical pivoting angle to the upper pivoting shaft 11 by being operated interdependently with the upper pivoting shaft 11 by the linking apparatus 19. Consequently, the upper wedges 12 and the lower wedges 16 are configured so as to contact the car guide rail 1 simultaneously. In other words, the upper emergency stopping mechanism portion 8 and the lower emergency stopping mechanism portion 9 grip the shared car guide rail 1 simultaneously due to the operating lever 6 being operated, and apply braking forces to the car 2 simultaneously.

[0026] Figure 2 is a configuration diagram that shows the upper wedge 12 and the lower wedge 16 when both are contacting a car guide rail 1 from Figure 1. Figure 3 is a configuration diagram that shows the upper wedge 12 and the lower wedge 16 from Figure 2 when viewed from the car guide rail 1. In the figures, the upper wedge 12 has: a cast-iron wedge main body (a braking body main body) 20 that is mounted pivotably onto the linking lever 14 (Figure 1); and a plurality of ceramic friction pads 21 that are disposed on the wedge main body 20, and that contact with and separate from the car guide rail 1. Moreover, the wedge main body 20 may also be a member that is made of general structural rolled steel (SS400).

[0027] Disposed on the wedge main body 20 is: an inclined surface 20a that is parallel to the upper guiding portion 13; and a rail-facing surface 20b that faces the car guide rail 1. The friction pads 21 are disposed on the rail-facing surface 20b. The friction pads 21 are cylindrical members that protrude outward from the rail-facing surface 20b. When the upper wedge 12 contacts the car guide rail 1, only the friction pads 21 contact the car guide rail 1 in a state in which the wedge main body 20 is separated from the car guide rail 1.

[0028] The lower wedge 16 has: a cast-iron wedge main body (a braking body main body) 22 that is mounted pivotably onto the linking lever 18 (Figure 1); and a plurality of ceramic friction pads 23 that are disposed on the wedge main body 22, and that contact with and separate from the car guide rail 1. Moreover, the wedge main body 22 may also be a member that is made of general structural rolled steel (SS400).

[0029] Disposed on the wedge main body 22 is: an inclined surface 22a that is parallel to the lower guiding portion 17; and a rail-facing surface 22b that faces the car guide rail 1. The friction pads 23 are disposed on the rail-facing surface 22b. The friction pads 23 are cylindrical members that protrude outward from the rail-facing surface 22b. When the lower wedge 16 contacts the car guide rail 1, only the friction pads 23 contact the car guide rail 1 in a state in which the wedge main body 22 is separated from the car guide rail 1.

[0030] The friction pads 21 of the upper wedges 12 are disposed on only a first region of left and right regions that have a boundary at a center line of the rail-facing

surface 20b. The friction pads 23 of the lower wedges 16 are disposed on only a second region of left and right regions that have a boundary at a center line of the rail-facing surface 22b. Thus, the region where the friction pads 21 are disposed on the rail-facing surface 20b and the region where the friction pads 23 are disposed on the rail-facing surface 22b are offset from each other in a horizontal direction. In other words, if the upper wedges 12 and the lower wedges 16 when in contact with the car guide rail 1 are viewed parallel to the longitudinal direction of the car guide rail 1 (in other words, parallel to the direction of movement of the car 2), the friction pads 21 of the upper wedges 12 are disposed so as to avoid the friction pads 23 of the lower wedges 16. Thus, the contacting positions of the upper wedges 12 on the car guide rail 1 and the contacting positions of the lower wedges 16 on the car guide rail 1 are offset from each other in a horizontal direction.

[0031] Moreover, in this example, respective width dimensions of the wedge main body 20 and the wedge main body 22 (respective dimensions in the horizontal direction of the rail-facing surfaces 20b and 22b) are identical to each other. In this example, respective positions of the wedge main body 20 and the wedge main body 22 are identical in the horizontal direction.

[0032] Figure 4 is a front elevation that shows sliding trails that arise on the car guide rail 1 due to contact of the upper wedge 12 and the lower wedge 16 from Figure 3 on the car guide rail 1. In the figure, if the upper wedges 12 and the lower wedges 16 contact to the car guide rail 1 when the car 2 is moving, the upper wedges 12 and the lower wedges 16 slide along the car guide rail 1 due to inertial force from the car 2. An upper sliding trail 24 due to the sliding movement of the upper wedges 12 and a lower sliding trail 25 due to the sliding movement of the lower wedges 16 are thereby formed on the car guide rail 1. The upper sliding trail 24 and the lower sliding trail 25 are formed at positions that are offset from each other on the car guide rail 1, and do not overlap with each other. In other words, the upper sliding trail 24 is formed on the car guide rail 1 so as to avoid the position of the lower sliding trail 25.

[0033] Next, operation will be explained. When the car 2 is moved, the speed governor rope 7 is moved together with the car 2, thereby moving the speed governor sheave in response to the movement of the car 2. If the descent speed of the car 2 rises for any reason and reaches a set overspeed that is preset, an overspeed switch that is disposed on the speed governor is activated. Thus, power supply to the hoisting machine that moves the car 2 is stopped, activating the hoisting machine braking apparatus.

[0034] If the descent speed of the car 2 rises further after the power supply to the hoisting machine is stopped and reaches an emergency stopping speed that is higher than the set overspeed, the speed governor is activated and the speed governor rope 7 is gripped by the speed governor. Thus, movement of the speed governor rope 7 stops, and the car 2 moves downward relative to the speed governor rope 7.

[0035] If the car 2 moves relative to the speed governor rope 7, the operating lever 6 is operated, pivoting the upper pivoting shaft 11. Here, the lower pivoting shaft 15 is also pivoted interdependently with the upper pivoting shaft 11 by the linking apparatus 19. Thus, the respective upper wedges 12 are guided by the respective upper guiding portions 13 while being displaced upward and the respective lower wedges 16 are guided by the respective lower guiding portions 17 while being displaced upward, and the upper wedges 12 and the lower wedges 16 contact the shared car guide rail 1 simultaneously.

[0036] Thereafter, the upper wedges 12 wedge between the respective upper guiding portions 13 and the car guide rail 1, and the lower wedges 16 wedge between the respective lower guiding portions 17 and the car guide rail 1, due to the upper wedges 12 and the lower wedges 16 respectively being slid along mutually different portions of the car guide rail 1 as the car 2 descends. Thus, a braking force is generated on the car 2, emergency stopping the car 2.

[0037] In an elevator emergency stopping apparatus 5 of this kind, because the contacting positions of the upper wedges 12 on the car guide rail 1 and the contacting positions of the lower wedges 16 on the car guide rail 1 are offset from each other in a horizontal direction, the upper wedges 12 can be slid on the car guide rail 1 so as to avoid the sliding surfaces of the lower wedges 16 on the car guide rail 1. The upper wedges 12 can thereby be prevented from sliding over sliding surfaces in which temperature is high due to the sliding movement of the lower wedges 16, enabling reductions in the coefficient of friction of the upper wedges 12 on the car guide rail 1 to be suppressed. Consequently, the upper wedges 12 can be made more likely to wedge between the upper guiding portions 13 and the car guide rail 1, enabling not only the braking force from the lower emergency stopping mechanism portion 9 but also the braking force from the upper emergency stopping mechanism portion 8 to be generated reliably. Because of this, improvements in operational reliability of the emergency stopping apparatus 5 can be achieved. Because reductions in the coefficient of friction of not only the lower wedges 16 but also the upper wedges 12 on the car guide rail 1 can be suppressed, the pressing force when the upper wedges 12 and the lower wedges 16 are made to contact the car guide rail 1 can be reduced. Consequently, size reductions, weight reductions, and cost reductions for the emergency stopping apparatus 5 can also be achieved.

[0038] Because the upper wedges 12 and the lower wedges 16 have ceramic friction pads 21 and 23 that contact with and separate from the car guide rail 1, the occurrence of plastic deformation or fusion of, or damage to, the upper wedges 12 and the lower wedges 16 during sliding movement on the car guide rail 1 can be prevented. Thus, improvements in operational reliability of the emergency stopping apparatus 5 are further enabled. In-

creases in elevator speed can also be achieved, further enabling size reductions in the emergency stopping apparatus 5.

[0039] Moreover, in the above example, the shape of the friction pads 21 and 23 is cylindrical, but is not limited thereto, and the shape of the friction pads 21 and 23 may also be parallelepipedal, or cubic, for example.

[0040] In the above example, the upper wedges 12 have ceramic friction pads 21, but the friction pads 21 do not need to be ceramic. For example, the friction pads 21 may also be made of cast iron like the wedge main bodies 20, and the wedge main bodies 20 and the friction pads 21 may be formed integrally.

[0041] In the above example, the lower wedges 16 have ceramic friction pads 23, but the friction pads 23 do not need to be ceramic. For example, the friction pads 23 may also be made of cast iron like the wedge main bodies 22, and the wedge main bodies 22 and the friction pads 23 may be formed integrally.

[0042] In the above example, pluralities of friction pads 21 and 23 are disposed on the wedge main bodies 20 and 22, but the numbers of friction pads 21 and 23 that are disposed on the wedge main bodies 20 and 22 does not need to be plural. In that case, the sizes of the friction pads are adjusted to sizes at which contact area on the car guide rail 1 is ensured to be a predetermined value.

[0043] In the above example, the wedge main bodies 20 of the upper wedges 12 and the wedge main bodies 22 of the lower wedges 16 are disposed at identical positions in a horizontal direction, but the wedge main bodies 20 and the wedge main bodies 22 may also be disposed so as to be offset from each other in the horizontal direction. In that case, the friction pads 21 may also be disposed on an entire region of the rail-facing surface 20b of the wedge main bodies 20, and the friction pads 23 disposed on an entire region of the rail-facing surface 22b of the wedge main bodies 22.

[0044] In the above example, the number of layers in the emergency stopping mechanism portion is two layers, i.e., the upper emergency stopping mechanism portion 8 and the lower emergency stopping mechanism portion 9, but the number of layers in the emergency stopping mechanism portion may also be greater than or equal to three layers.

[0045] In the above example, the emergency stopping apparatus 5 is disposed on the car 2, but the emergency stopping apparatus 5 may also be disposed on the counterweight. In that case, a braking force is applied to the counterweight by the emergency stopping apparatus 5 gripping a counterweight guide rail.

EXPLANATION OF NUMBERING

[0046] 1 CAR GUIDE RAIL (GUIDE RAIL); 2 CAR (HOISTED BODY); 5 EMERGENCY STOPPING APPARATUS; 8 UPPER EMERGENCY STOPPING MECHANISM PORTION (FIRST EMERGENCY STOPPING MECHANISM PORTION); 9 LOWER EMERGENCY STOPPING MECHANISM PORTION (SECOND EMERGENCY STOPPING MECHANISM PORTION); 12 UPPER WEDGES (FIRST BRAKING BODIES); 16 LOWER WEDGES (SECOND BRAKING BODIES); 20, 22 WEDGE MAIN BODIES (BRAKING BODY MAIN BODIES); 21, 23 FRICTION PADS.

Claims

1. An elevator emergency stopping apparatus that is disposed on a hoisted body that is guided by a guide rail, for applying a braking force to the hoisted body, the elevator emergency stopping apparatus comprising:

   a first emergency stopping mechanism portion that comprises a first braking body that can contact with and separate from the guide rail, and that applies a braking force to the hoisted body by placing the first braking body in contact with the guide rail; and
   a second emergency stopping mechanism portion that comprises a second braking body that can contact with and separate from the guide rail, that is disposed below the first emergency stopping mechanism portion, and that applies a braking force to the hoisted body by placing the second braking body in contact with the guide rail,
   the elevator emergency stopping apparatus being **characterized in that** a contacting position of the first braking body on the guide rail and a contacting position of the second braking body on the guide rail are offset from each other in a horizontal direction.

2. An elevator emergency stopping apparatus according to Claim 1, wherein at least one of the first braking body and the second braking body comprises:

   a braking body main body; and
   a ceramic friction pad that is disposed on the braking body main body, and that contacts with and separates from the guide rail.

FIG. 1

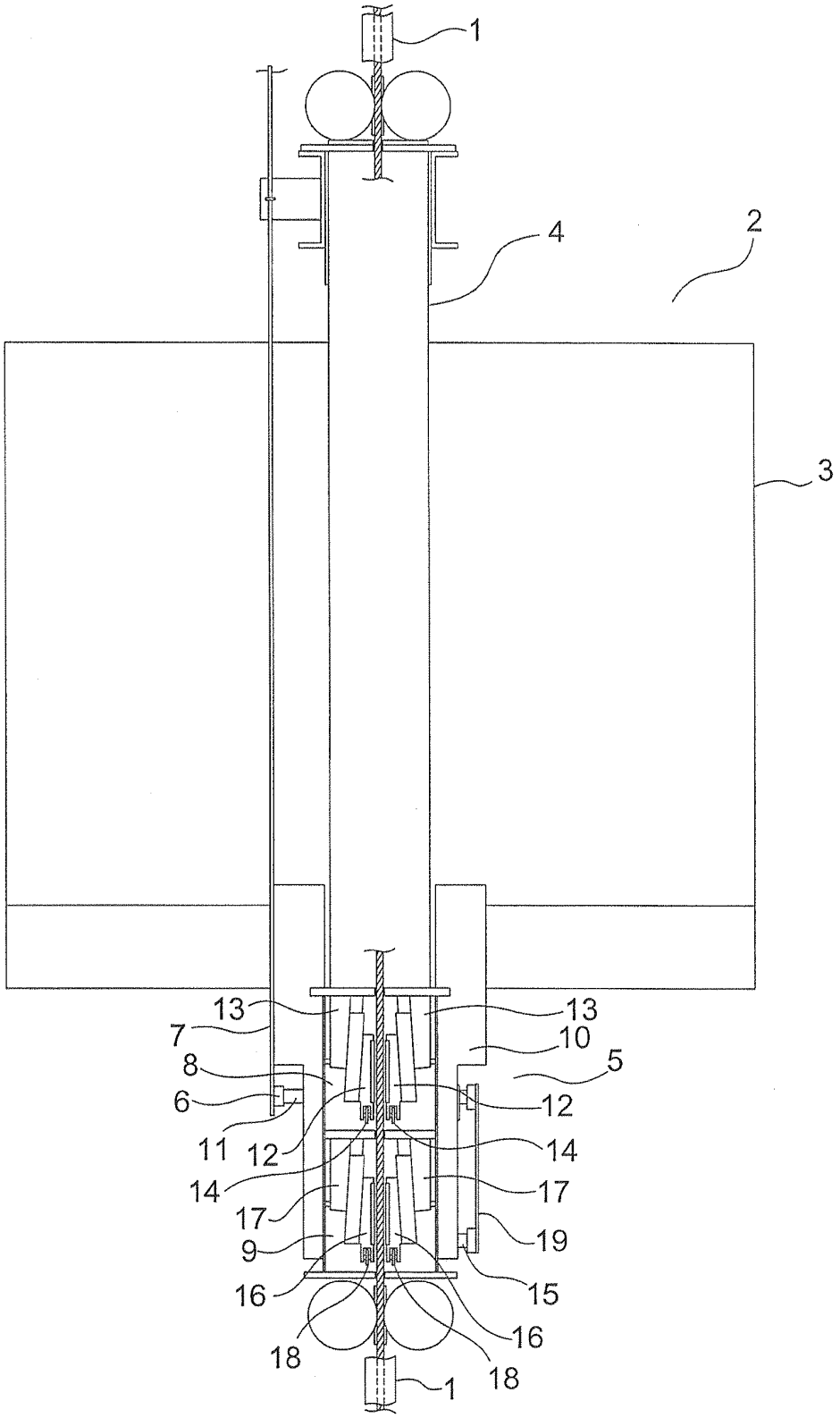


FIG. 2

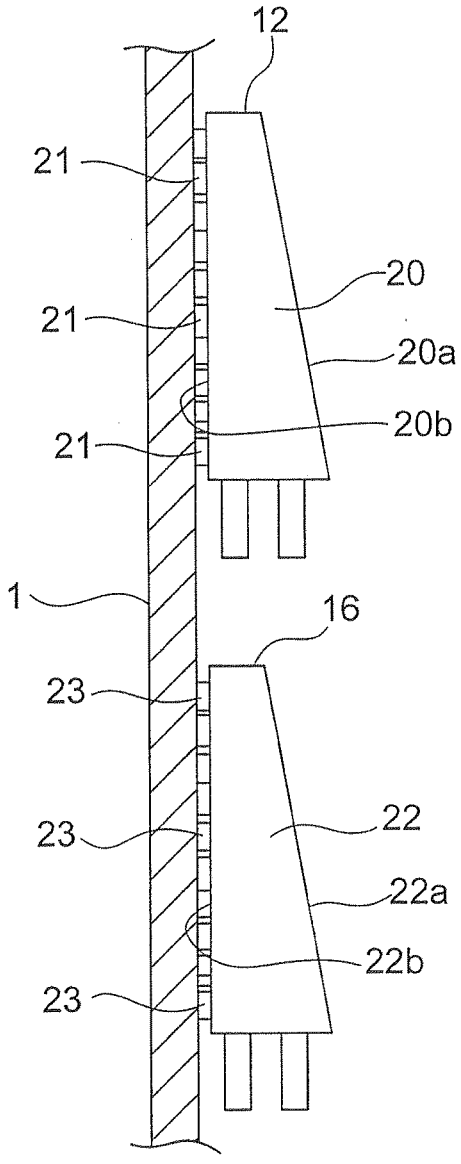


FIG. 3

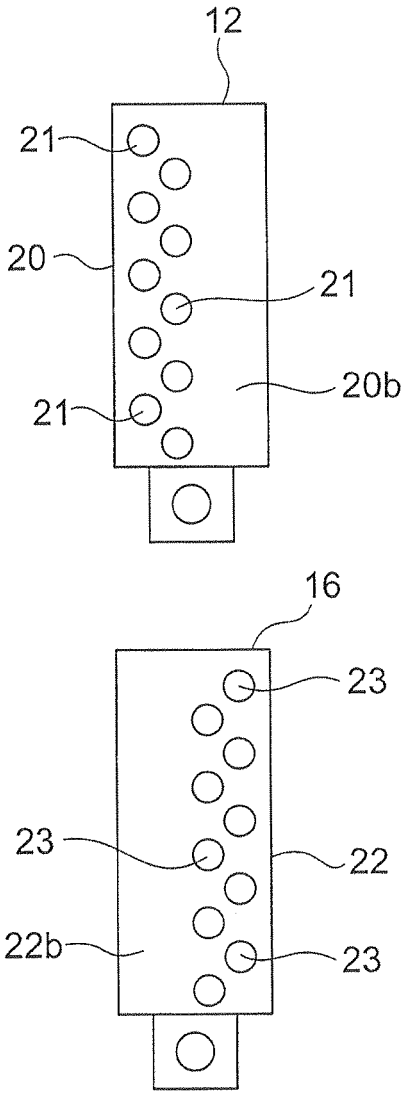
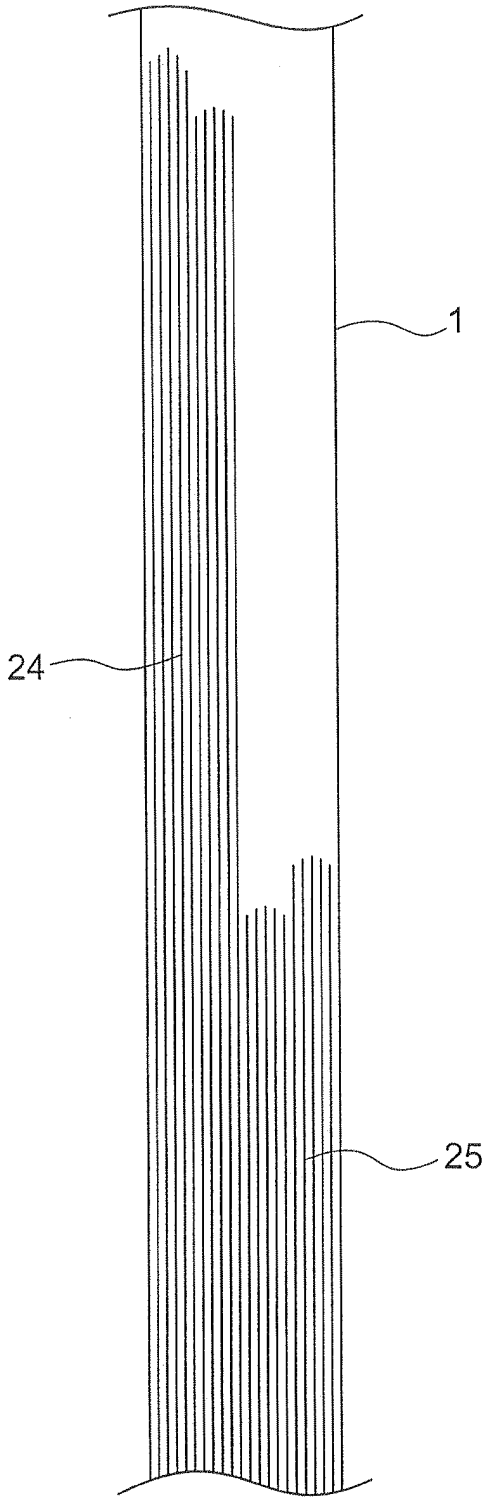


FIG. 4



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2010/068486

A. CLASSIFICATION OF SUBJECT MATTER
B66B5/22(2006.01)i

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)
B66B5/22

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 1996-2011
Kokai Jitsuyo Shinan Koho 1971-2011 Toroku Jitsuyo Shinan Koho 1994-2011

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.
X Y	JP 2-295873 A (Mitsubishi Electric Corp.), 06 December 1990 (06.12.1990), page 2, lower right column, line 12 to page 3, upper left column, line 18; fig. 3 (Family: none)	1 2
Y	JP 10-258977 A (Toshiba Corp.), 29 September 1998 (29.09.1998), claim 1; fig. 15 to 16 (Family: none)	2

☐ 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
"E" earlier application or patent but published on or after the international filing date
"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
"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
"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
"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
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 January, 2011 (14.01.11)	25 January, 2011 (25.01.11)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2010/068486

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

"An emergency stopping device for an elevator wherein the contact position of a braking piece 13 in a guide rail 1 and the contact position of a braking piece 15 in the guide rail 1 are deviated from each other in a horizontal direction" is described in the document 1 (JP 2-295873 A (Mitsubishi Electric Corp.), 6 December 1990 (06.12.1990), page 2, lower right column, line 12 - page 3, upper left column, line 18, fig. 3).

Therefore, the invention in claim 1 cannot be considered to be novel in the light of the invention described in the document 1, and does not have a special technical feature.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2001354373 A **[0004]**
- JP HEI741272 B **[0004]**
- JP SHO597682 B **[0004]**