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(54) Safety device for elevators and elevator comprising said device

Sicherheitsvorrichtung für Aufzüge und Aufzug

Dispositif de securité pour ascenseurs et ascenseur

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Description

[0001] The present invention relates to a safety device for elevators which allows performing safety gear and pit buffer functions.

[0002] The present invention also relates to an elevator comprising said device.

Background of the Invention

[0003] An elevator installation has at least one car and generally one counterweight which are arranged such that they can travel in a guided manner in guide rails essentially in a vertical direction. The car and counterweight are connected through suspension and traction means (cables). The car and, when needed, the counterweight as well are protected by means of safety elements.

[0004] Two of the main safety elements are the safety gear, which prevents the free fall or uncontrolled movement of the car or of the counterweight such that it stops and immobilizes the car or the counterweight on its guides, and pit buffers which act if the car or the counterweight exceed specific course of travel limits.

[0005] The safety gear (also known as wedging) is responsible for stopping the car by means of the frictional force it exerts when acting on the guides of the car or the counterweight, and it must be capable of stopping the counterweight and/or the fully loaded car and keeping it stopped on the guides.

[0006] Furthermore, elevators must be equipped with pit buffers limiting the travel at the ends of the course of travel of the car or counterweight, thereby forming a final emergency device. The function of these pit buffers is to stop both the car and the counterweight when needed.

[0007] Pit buffers are designed such that the buffer is capable of converting the kinetic energy of the car or of the counterweight at the time of impact into heat and potential energy due to deformation.

[0008] Pit buffers are usually located in the pit below the car and the counterweight as a safety element. They can also be arranged in the bottom part of the car and/or counterweight, although such solution is less common.

[0009] The requirements in the case of safety gear are more repetitive and less intense than those produced in the event of an impact against the pit buffer. High accelerations produced during the impact of the pit buffer make it necessary to oversize the structure of the car and/or counterweight and the area of impact.

[0010] The proprietor of this application has designed different safety devices for elevators. In this sense, document EP 2 020 395 B1 describes the use of a variable braking force, and document ES 1 072 741 describes the use of a fixed element in the shaft to activate the safety gear at a point of the course of travel. However, neither of these documents describes a device which allows performing the dual safety gear and pit buffer function.

[0011] CN101979298 discloses an elevator safety stop trigger device. The device comprises a support, a first swing arm shaft, a second swing arm shaft, a first swing arm, a second swing arm and a transmission mechanism, wherein the first swing arm and the second swing arm are hinged with pulling rods of a first safety tong and a second safety tong; the device also comprises an ascending trigger block and/or a descending trigger block and an ascending trigger rod and/or descending trigger rod, wherein the ascending trigger block and/or the descending trigger block are/is fixed on the inner wall of a shaft way or a guide rail.

[0012] It must be indicated that when the terms "safety gear" and "pit buffer" are used in the present description and in the attached claims, they must be interpreted as follows:

> Safety gear: Device to prevent the free fall or the uncontrolled movement of the car or of the counterweight.
>
> Pit buffer: Device for absorbing the energy of the elevator if a malfunction causes the car (or the counterweight) to surpass the end stop positions.

Description of the Invention

[0013] The aforementioned drawbacks are solved with the safety device for elevators and with the elevator of the invention, having other advantages that will be described below.

[0014] The safety device for elevators of the present invention comprises braking means of the elevator car or counterweight located in the car or in the counterweight and acting on guides of the elevator,
and said braking means comprise a switching element that can be arranged in at least:

> a first position in which said braking means can function as a safety gear to prevent the free fall or the uncontrolled movement of the car or of the counterweight; and
>
> a second position in which said braking means function as a pit buffer to absorb the energy of the car or of the counterweight if a malfunction causes the car or the counterweight to surpass end stop positions, or as a pit buffer and as a safety gear.

[0015] Advantageously, said braking means exert more force in said second position of the switching element.

[0016] Said switching element travels to its second position preferably by means of an operating element envisaged in an area of the elevator shaft around the pit as the elevator car or counterweight approaches the ends of the course of travel.

[0017] According to a preferred embodiment, said operating element is a flange, although it must be indicated that it could be any suitable operating element.

[0018] Said switching element is preferably associated

with a swiveling element swiveling about an axis of rotation, such that in said second position, said switching element causes an additional travel of said swiveling element, said braking means exerting more force.

[0019] Furthermore, said swiveling element advantageously comprises an elastic element for pressing the swiveling element against said switching element, and said switching element advantageously comprises an elastic element for pressing the switching element towards its first position.

[0020] According to a preferred embodiment, said switching element comprises a rotating end and a free end, wherein said rotating end of the switching element comprises a flat portion and a curved portion, said flat portion being in contact with a contact area associating said swiveling element and the switching element in the first position of said switching element, and said curved portion being in contact with said contact area in the second position of the switching element, causing the additional travel of said swiveling element.

[0021] Said free end of the switching element preferably comprises a disc which contacts the operating element of the elevator shaft in the second position of said switching element.

[0022] According to a preferred embodiment, said swiveling element is a wedge provided with a ramp, and said braking means comprise a roller which in the braking position pushes the guide of the elevator against a braking element provided with elastic elements to cause the braking of the elevator car or counterweight.

[0023] Advantageously, said roller slides along said ramp, causing said pushing against the guide of the elevator upon reaching a stop arranged at one of the ends of said ramp.

[0024] The following advantages are achieved with the safety device for elevators of the present invention:

- Possibility of performing safety gear and pit buffer functions with the device of the present invention, which allows eliminating conventional pit buffers;
- Reducing acceleration peaks upon impact against the pit buffer, which allows reducing the accelerations that passengers feel and reducing the thicknesses and sizes of the sections used for building the body of the elevator car, which results in a cost reduction and an improvement in assembly ergonomics;
- Reducing costs because there are no pit buffers;
- Leaving more available surface and requiring less height in the pit.

[0025] Furthermore, the present invention also relates to an elevator comprising the safety device as described above.

Brief Description of the Drawings

[0026] To better understand the preceding description, drawings in which a practical embodiment is schematically depicted only by way of non-limiting example are attached.

Figure 1 is a schematic elevational view of the safety device for elevators of the present invention, in the position in which the braking means function as a safety gear; and

Figure 2 is a schematic elevational view of the safety device for elevators of the present invention, in the position in which the braking means function as a pit buffer.

Description of a Preferred Embodiment

[0027] The safety device for elevators of the present invention comprises braking means of the elevator car or counterweight comprising a switching element 1 that can be arranged in at least two positions:

- a first position in which said braking means can function as a safety gear, depicted in Figure 1 ; and
- a second position in which said braking means also function as a pit buffer, depicted in Figure 2 .

[0028] The device of the present invention also comprises a swiveling element 3, for example a wedge, which is associated with said switching element 1 through a contact area 6, as will be described below, and which can also be arranged in said first and second positions.

[0029] Said swiveling element 3 swivels about an axis of rotation 13, such that in said second position, said switching element exerts greater pressure against said swiveling element, and comprises a ramp 7 provided with a stop 12 in the top part. A roller 8 can slide along said ramp 7 depending on the speed of the elevator car and counterweight.

[0030] Furthermore, said switching element 1 and said swiveling element 3 comprise respective elastic elements 4, 5 pressing said elements into their first positions in which the braking means can function as a safety gear.

[0031] Said switching element 1 comprises a rotating end 1 a and a free end 1 b, and said rotating end 1 a has a flat area which is in contact with said contact area 6 in the first position of the switching element 1, and one of the edges defined by said flat area is in contact with said contact area 6 in the second position of the switching element 1, pressing against the swiveling element 3.

[0032] In turn, said free end 1b of the switching element 1 comprises a disc 14 which, in the second position of said switching element 1, contacts an operating element 2, for example a flange, located in an area of the elevator shaft around the pit as the elevator car approaches the pit.

[0033] The safety device for elevators of the present invention also comprises a braking element 10 or shoe associated with elastic elements 11, the braking element 10 acting on the guide 9 of the elevator.

[0034] When the safety device is in the position depicted in Figure 1 , with the roller 8 placed in its highest position in contact with the stop 12, said roller pushes the guide 9 towards the elastic elements 11, producing a known deformation therein. In this manner there is a known normal force in the braking element 10, and the braking force that is exerted by chip removal is therefore known.

[0035] It must be indicated that for the sake of clarity the roller 8 has been depicted in the drawings in its two positions, i.e., the device of the present invention does not comprise two rollers but only one, which can be arranged in the depicted positions, as indicated in the present description.

[0036] When the elevator car approaches the area of the elevator shaft where said operating element 2 is located, the disc 14 at the free end 1 b of the switching element 1 contacts said flange and causes the switching element 1 to go into the second position, depicted in Figure 2 , in which the braking means function as a pit buffer.

[0037] When the switching element 1 rotates into its second position against the action of the elastic element 4, one of the edges of the flat area of the rotating end 1 a pushes against the contact area 6 of the swiveling element 3, causing it to swivel into its second position against the action of the elastic element 5.

[0038] This swiveling varies the angle of said ramp 7, such that the stroke of the roller along the axis perpendicular to the guide 9 is increased. Compression of the elastic elements 11 and accordingly the braking force increase.

[0039] The safety gear and pit buffer functions are thus achieved by means of the same safety device for elevators.

[0040] Despite having made reference to a specific embodiment of the invention, it is obvious for a person skilled in the art that the safety device for elevators and the elevator described can be the subject of a number of variations and modifications, and that all the mentioned details can be replaced with others that are technically equivalent, without departing from the scope of protection defined by the attached claims.

Claims

1. Safety device for elevators, comprising braking means of the elevator car or counterweight located in the car or in the counterweight and acting on guides (9) of the elevator,
   said braking means comprising a switching element (1) that can be arranged in at least:

   - a first position in which said braking means can function as a safety gear to prevent the free fall or the uncontrolled movement of the car or of the counterweight; and
   - a second position in which said braking means function as a pit buffer to absorb the energy of the car or of the counterweight if a malfunction causes the car or the counterweight to surpass end stop positions, or as a pit buffer and as a safety gear,

   characterized in that said braking means exert more force in said second position of the switching element (1).

2. Safety device according to claim 1, wherein said switching element (1) travels to its second position by means of an operating element (2) envisaged in an area of the elevator shaft around the pit as the elevator car or counterweight approaches the ends of the course of travel.

3. Safety device according to claim 2, wherein said operating element (2) is a flange.

4. Safety device according to claim 1, wherein said switching element (1) is associated with a swiveling element (3) swiveling about an axis of rotation (13), such that in said second position, said switching element (1) causes an additional travel of said swiveling element (3), said braking means exerting more force.

5. Safety device for elevators according to claim 4, wherein said swiveling element (3) comprises an elastic element (5) for pressing the swiveling element (3) against said switching element (1).

6. Safety device for elevators according to claim 1, wherein said switching element (1) comprises an elastic element (4) for pressing the switching element (1) towards its first position.

7. Safety device for elevators according to claim 4, wherein said switching element (1) comprises a rotating end (1a) and a free end (1 b), wherein said rotating end (1a) of the switching element (1) comprises a flat portion and a curved portion, said flat portion being in contact with a contact area (6) associating said swiveling element (3) and the switching element (1) in the first position of said switching element (1), and said curved portion being in contact with said contact area (6) in the second position of said switching element (1), causing the additional travel of said swiveling element (3).

8. Safety device for elevators according to claim 7, wherein said free end (1 b) of the switching element (1) comprises a disc (14) which contacts the operating element (2) of the elevator shaft in the second position of said switching element (1).

9. Safety device for elevators according to claim 4,

wherein said swiveling element (3) is a wedge provided with a ramp (7).

10. Safety device for elevators according to claim 1, wherein said braking means comprise a roller (8) which in the braking position pushes the guide (9) of the elevator against a braking element (10) provided with elastic elements (11) to cause the braking of the elevator car or counterweight.

11. Safety device for elevators according to claim 10, wherein said roller (8) slides along said ramp (7), causing said pushing against the guide (9) of the elevator upon reaching a stop (12) arranged at one of the ends of said ramp (7).

12. Elevator, **characterized in that** it comprises a safety device according to any one of the preceding claims.

Patentansprüche

1. Sicherheitsvorrichtung für Aufzüge, die eine Bremseinrichtung der Aufzugskabine oder des Gegengewichts aufweist, die in der Kabine oder in dem Gegengewicht angeordnet ist und auf Führungen (9) des Aufzugs wirkt,
wobei die Bremseinrichtung ein Schaltelement (1) aufweist, das in zumindest einer der folgenden angeordnet sein kann:

einer ersten Position, in der die Bremseinrichtung als eine Fangvorrichtung wirken kann, um den freien Fall oder die unkontrollierte Bewegung der Kabine oder des Gegengewichts zu verhindern; und
einer zweiten Position, in der die Bremseinrichtung als ein Grubenpuffer wirkt, um die Energie der Kabine oder des Gegengewichts zu absorbieren, falls eine Fehlfunktion bewirkt, dass die Kabine oder das Gegengewicht Anschlagpositionen überschreitet, oder als ein Grubenpuffer und als eine Fangvorrichtung,
dadurch gekennzeichnet, dass die Bremseinrichtung in der zweiten Position des Schaltelements (1) mehr Kraft ausübt.

2. Sicherheitsvorrichtung gemäß Anspruch 1, bei der sich das Schaltelement (1) zu seiner zweiten Position bewegt durch ein Betätigungselement (2), das in einem Bereich des Aufzugschachtes um die Grube herum vorgesehen ist, während sich die Aufzugskabine oder das Gegengewicht den Enden des Bewegungsverlaufs nähert.

3. Sicherheitsvorrichtung gemäß Anspruch 2, bei der das Betätigungselement (2) ein Flansch ist.

4. Sicherheitsvorrichtung gemäß Anspruch 1, bei der das Schaltelement (1) einem Schwenkelement (3) zugeordnet ist, das um eine Drehachse (13) schwenkt, so dass das Schaltelement (1) in der zweiten Position eine zusätzliche Bewegung des Schwenkelements (3) verursacht, wobei die Bremseinrichtung mehr Kraft ausübt.

5. Sicherheitsvorrichtung für Aufzüge gemäß Anspruch 4, bei der das Schwenkelement (3) ein elastisches Element (5) aufweist zum Drücken des Schwenkelements (3) gegen das Schaltelement (1).

6. Sicherheitsvorrichtung für Aufzüge gemäß Anspruch 1, bei der das Schaltelement (1) ein elastisches Element (4) zum Drücken des Schaltelements (1) zu seiner ersten Position hin aufweist.

7. Sicherheitsvorrichtung für Aufzüge gemäß Anspruch 4, bei der das Schaltelement (1) ein Drehende (1a) und ein freies Ende (1b) aufweist, wobei das Drehende (1a) des Schaltelements (1) einen flachen Abschnitt und einen gebogenen Abschnitt aufweist, wobei der flache Abschnitt in Kontakt mit einem Kontaktbereich (6) ist, der das Schwenkelement (3) und das Schaltelement (1) in der ersten Position des Schaltelements (1) in Verbindung bringt, und der gebogene Abschnitt in der zweiten Position des Schaltelements (1) in Kontakt mit dem Kontaktbereich (6) ist, was die zusätzliche Bewegung des Schwenkelements (3) bewirkt.

8. Sicherheitsvorrichtung für Aufzüge gemäß Anspruch 7, bei der das freie Ende (1 b) des Schaltelements (1) eine Scheibe (14) aufweist, die das Betätigungselement (2) des Aufzugschachts in der zweiten Position des Schaltelements (1) kontaktiert.

9. Sicherheitsvorrichtung für Aufzüge gemäß Anspruch 4, bei der das Schwenkelement (3) ein Keil ist, der mit einer Rampe (7) versehen ist.

10. Sicherheitsvorrichtung für Aufzüge gemäß Anspruch 1, bei der die Bremseinrichtung eine Rolle (8) aufweist, die in der Bremsposition die Führung (9) des Aufzugs gegen ein Bremselement (10) drückt, das mit elastischen Elementen (11) versehen ist, um das Bremsen der Aufzugskabine oder des Gegengewichts zu bewirken.

11. Sicherheitsvorrichtung für Aufzüge gemäß Anspruch 10, bei der die Rolle (8) entlang der Rampe (7) gleitet, und dadurch das Drücken gegen die Führung (9) des Aufzugs auf das Erreichen eines Anschlags (12) hin, der an einem der Enden der Rampe (7) angeordnet ist, bewirkt.

12. Aufzug, **dadurch gekennzeichnet, dass** derselbe

eine Sicherheitsvorrichtung gemäß einem der vorhergehenden Ansprüche aufweist.

Revendications

1. Dispositif de sécurité pour des ascenseurs comprenant des moyens de freinage de la cabine ou d'un contrepoids de l'ascenseur placés dans la cabine ou dans le contrepoids et agissant sur des glissières (9) de l'ascenseur,
les moyens de freinage comprenant un élément (1) de commutation, qui peut être mis dans au moins :

   - une première position, dans laquelle les moyens de freinage peuvent servir de mécanisme de sécurité, pour empêcher la chute libre ou le déplacement incontrôlé de la cabine ou du contrepoids et
   - une deuxième position, dans laquelle les moyens de freinage servent de tampon de cuvette pour absorber l'énergie de la cabinet ou du contrepoids, si un disfonctionnement fait que la cabine ou le contrepoids dépasse des positions de butée de fin de course ou comme tampon de cuvette et/ou comme mécanisme de sécurité,

   caractérisé en ce que les moyens de freinage appliquent plus de force dans la deuxième position de l'élément (1) de commutation.

2. Dispositif de sécurité suivant la revendication 1, dans lequel l'élément (1) de commutation passe à la deuxième position au moyen d'un élément (2) de fonctionnement placé dans une région de la cage de l'ascenseur autour de la cuvette, alors que la cabine ou le contrepoids de l'ascenseur s'approche de la fin de la course de déplacement.

3. Dispositif de sécurité suivant la revendication 2, dans lequel l'élément (2) de fonctionnement est une bride.

4. Dispositif de sécurité suivant la revendication 1, dans lequel l'élément (1) de commutation est associé à un élément (3) de pivotement pivotant autour d'un axe de rotation (13), de manière à ce que, dans la deuxième position, l'élément (1) de commutation provoque un déplacement supplémentaire de l'élément (3) de pivotement, les moyens de freinage appliquant plus de force.

5. Dispositif de sécurité pour des ascenseurs suivant la revendication 4, dans lequel l'élément (3) de pivotement comprend un élément (5) élastique pour presser l'élément (3) de pivotement sur l'élément (1) de commutation.

6. Dispositif de sécurité pour des ascenseurs suivant la revendication 1, dans lequel l'élément (1) de commutation comprend un élément (4) élastique pour presser l'élément (1) de commutation en direction de la première position.

7. Dispositif de sécurité pour des ascenseurs suivant la revendication 4, dans lequel l'élément (1) de commutation comprend une extrémité (1a) tournante et une extrémité (1b) libre, l'extrémité (1a) tournante de l'élément (1) de commutation comprenant une partie plane et une partie incurvée, la partie plane étant en contact avec une zone (6) de contact associant l'élément (3) de pivotement et l'élément (1) de commutation dans la première position de l'élément (1) de commutation et la partie incurvée étant en contact avec la zone (6) de contact dans la deuxième position de l'élément (1) de commutation, provoquant le déplacement supplémentaire de l'élément (3) de pivotement.

8. Dispositif de sécurité pour des ascenseurs suivant la revendication 7, dans lequel l'extrémité (1b) libre de l'élément (1) de commutation comprend un disque (14) qui est en contact avec l'élément (2) de fonctionnement de la cage de l'ascenseur dans la deuxième position de l'élément (1) de commutation.

9. Dispositif de sécurité pour des ascenseurs suivant la revendication 4, dans lequel l'élément (3) de pivotement est un coin pourvu d'une rampe (7).

10. Dispositif de sécurité pour des ascenseurs suivant la revendication 1, dans lequel les moyens de freinage comprennent un galet (8), qui, dans la position de freinage, pousse la glissière (9) de l'ascenseur sur un élément (10) de freinage pourvu d'éléments (11) élastiques pour provoquer le freinage de la cabine ou du contrepoids de l'ascenseur.

11. Dispositif de sécurité pour des ascenseurs suivant la revendication 10, dans lequel le galet (8) glisse le long de la rampe (7), en provoquant la poussée sur la glissière (9) de l'ascenseur, après avoir atteint une butée (12) prévue à l'une des extrémités de la rampe (7).

12. Ascenseur, **caractérisé en ce qu'**il comprend un dispositif de sécurité suivant l'une quelconque des revendications précédentes.

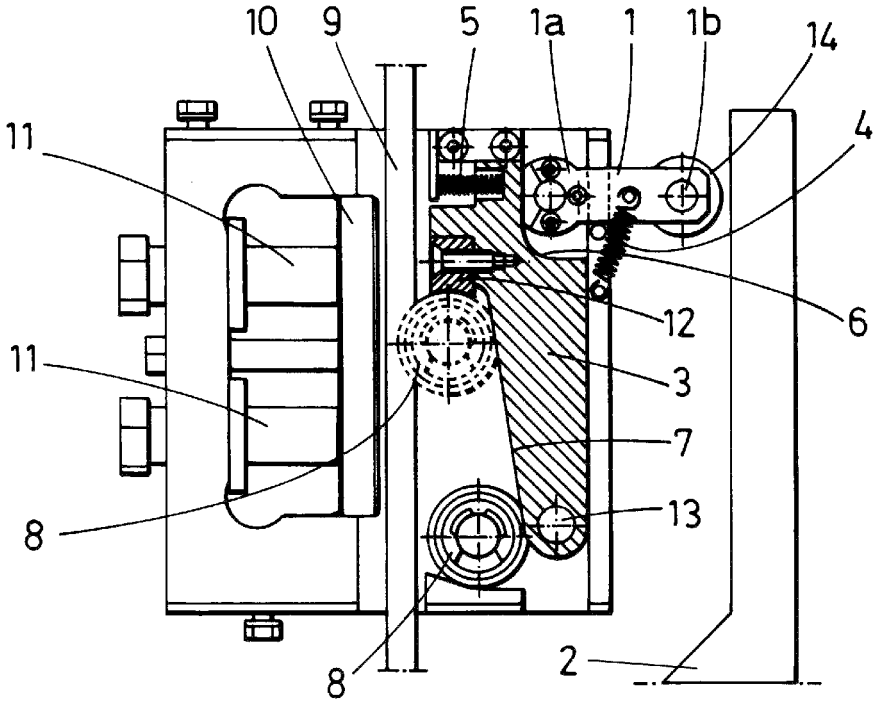

10
9
5
1a
1
1b
14
4
11
6
12
11
3
7
13
8
8
2

FIG.1

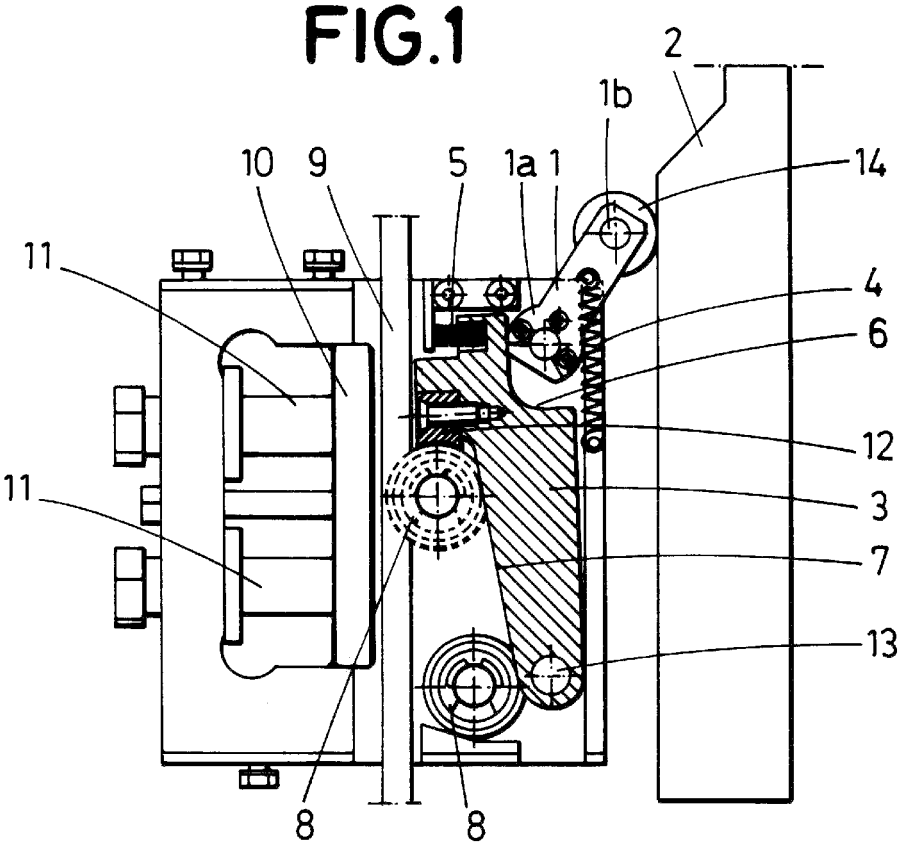

2
1b
10
9
5
1a
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14
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4
6
12
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3
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13
8
8

FIG.2

REFERENCES CITED IN THE DESCRIPTION

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- ES 1072741 **[0010]**
- CN 101979298 **[0011]**