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(54) **SAFETY GEAR FOR ELEVATING DEVICES, ELEVATING DEVICES AND METHOD FOR ACTIVATING SAID DEVICE**

FALLSICHERUNG FÜR HUBVORRICHTUNGEN, HUBVORRICHTUNGEN UND VERFAHREN ZUM AKTIVIEREN DIESER VORRICHTUNG

DISPOSITIF DE PARACHUTE POUR DISPOSITIFS D'ÉLÉVATION, DISPOSITIFS D'ÉLÉVATION ET PROCÉDÉ D'ACTIVATION D'UN TEL DISPOSITIF

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## Description

### TECHNICAL FIELD OF THE INVENTION

**[0001]** A first aspect of the present invention refers to a parachute device for elevating devices, which is applied in the elevating device industry, and more specifically in the field of safety devices that act in emergency situations, allowing achieving a device involving low energy consumption, high reliability and very compact dimensions.

**[0002]** An embodiment of the invention refers to an elevating device comprising said device, a second aspect of the invention refers to a method for activating said device and a third aspect of the invention refers to a method for unwedging said device.

### BACKGROUND OF THE INVENTION

**[0003]** At present, elevating devices include emergency braking devices that are used to reduce the speed until the car of the elevating device is immobilized in emergency situations in which said car reaches speeds above predetermined values during its normal operation.

**[0004]** Among the emergency braking devices are those known as parachutes that prevent the free fall or uncontrolled movement of the car by immobilizing it on the guides through which it moves. Thus, the parachute, also commonly referred to in the sector as wedge, causes the car to stop by means of a friction force exerted by it when acting on the car guides, stopping it and keeping it immobilized on the guides.

**[0005]** An example of these parachute devices is found in the German utility model application no. DE-202019105584-U1, wherein a parachute device is described comprising a wheel that is linked to a movable block of a wedge in such a way that the movement of the wheel drags the movable block of the wedge to reach a braking position. The movement of the wheel is achieved by electronic activation means, which when deactivated brings the wheel in contact with the car guide of an elevator and a friction surface of an activator causing it to begin to roll between the car guide of the elevator and the friction surface itself, which ultimately causes that the movable block translates into a wedging position.

**[0006]** Among the disadvantages of this device, it is worth mentioning that the space occupied by the device is considerable and that it requires a large number of parts and moving elements. For example, the wheel is not kept in contact at all times rolling on the guide, so in addition to the movement of the friction surface, it is necessary to have mobile elements that allow the wheel to move along a certain path, for this reason, the device comprises a movable inclined element which is the one that brings the wheel into contact with the friction surface, wherein the necessary force is achieved to cause the dragging of the movable block. Additionally, its energy consumption is considerable.

### DESCRIPTION OF THE INVENTION

**[0007]** A first aspect of the present invention refers to a parachute device for elevating devices, as defined in claim 1, which makes it possible to achieve a more compact device than those currently available, which is simpler as it requires fewer moving parts and elements, and whose energy consumption is reduced. Specific embodiments of the first aspect are defined in claims 2 to 5.

**[0008]** The parachute device is activated by the rolling element, so that if the friction element is in contact with the rolling element and there is a relative movement between the car, to which the support plate is attached, usually by means of elastic means, and the guide, the parachute reaches the wedging position. The braking element is linked to the rolling element in such a way that there is no relative linear movement between both of them, basically it can be said that the vertical movement of both of them is synchronized.

**[0009]** Unlike the state of the art, the rolling element is kept in contact at all times rolling on the guide. The main advantage is that the entire device is much more compact, occupying less space, and simple, thereby significantly reducing the number of parts and moving elements in the device to perform its function.

**[0010]** Another difference is that, in the state of the art, a mobile inclined element is used, which is the one that brings the wheel into contact with the friction surface, wherein the necessary force is achieved to cause the wedging roller to drag.

**[0011]** The possibility that the device comprises activation means that act on the friction element is contemplated. In this way, the passage between the rest position and the wedging position is carried out by means of the activation means.

**[0012]** Starting from the rest position, the activation sequence is as follows.

**[0013]** In the rest position, the car can be moved normally to carry out rides. The elastic pushing means keep the support plate, and therefore the rolling element that is housed in its longitudinal guide, in contact with the guide, so as to ensure the rolling of the rolling element on the guide itself. The activation means keep the friction element separate from the rolling element.

**[0014]** The activation of the device is carried out by means of the activation means, according to an embodiment that will be explained later, in the case of an electromagnet, the electrical supply is interrupted, which causes the friction element to contact the rolling element. At this point, the wedge can be reset in the absence of movement by the car, so that by powering the electromagnet again, it returns to the rest position.

**[0015]** Once the device is activated, in the event that the car continues to move, the rolling element continues to roll between the guide and the friction element, so that the rolling element begins to move within the longitudinal guide. In the operation intended for the device, the car is lowered by the effect of gravity, so that the relative

movement of the guide with respect to the device, which is attached to the car, is upward, so that it produces an ascent of the rolling element, since it is rolling between the guide and the friction element.

**[0016]** Said movement of the rolling element along the longitudinal guide ends when the wedging position is reached, in which the braking element has moved to the position causing the maximum braking force of the wedging block. Thus, using the device of the invention, wear of the rolling element is avoided, since in the extreme position it can continue to roll with respect to the guide without the friction surface forcing the rolling element to slide, which can cause wear.

**[0017]** Thus, the braking element of the wedging block is dragged, given the connection between the rolling element and the braking element, which in one embodiment is connected by means of a plate, platen or a bar.

**[0018]** Starting from the wedging position, to return to the rest position, the movements of the elements and the sequence described above is reversed, with the difference that the device shall first be unwedged. The actuating means is first caused to move the friction element so that it does not contact the rolling element. Afterwards, the rolling element is free from its contact with the friction element and its descent occurs along the longitudinal guide under the effect of gravity.

**[0019]** The possibility of the friction element being pivotally mounted, at a pivot point, on the support plate is contemplated, thereby reducing movements and ensuring contact at the same point. The friction element can be constituted as a friction plate that is hinged to the top of the support plate at the pivot point.

**[0020]** It is contemplated that the activation means comprise an electromagnet and elastic compression means, also referred to as an activator spring. In this way, as noted above, in the rest position the electromagnet is kept powered, in turn, the friction element is actuated at all times by the elastic compression means, whose effect is counteracted by the activation means, so that when the activation means are deactivated the elastic compression means push the friction element against the rolling element.

**[0021]** An embodiment of the present invention refers to an elevating device comprising a parachute device as described above.

**[0022]** A second aspect of the present invention refers to a method for activating a parachute device as described above, as defined in claim 7, comprising:

- starting from the rest position,
- actuating on the friction element until it contacts the rolling element,
- maintaining contact between the friction element and the rolling element while said rolling element moves along the longitudinal guide until,
- reaching a wedging position in which the braking element is in the wedging position.

**[0023]** A third aspect of the present invention refers to a method for unwedging a parachute device as described above, as defined in claim 8, comprising:

- starting from the wedging position,
- releasing the braking element of the wedging block from the catch element,
- actuating on the friction element so that it stops contacting the rolling element, so that as a result of the gravitational force said rolling element descends along the longitudinal guide until,
- reaching a rest position.

## DESCRIPTION OF THE DRAWINGS

**[0024]** To complement the description that is being made and in order to help a better understanding of the features of the invention, according to a preferred example of a practical embodiment thereof, a set of drawings is attached as an integral part of said description. For illustrative and non-limiting purposes, the following has been represented:

Figures 1-4.- They show four cross sections that represent the activation sequence of the device, starting from a rest position represented in figure 1, showing the contact of the friction element with the rolling element, in figure 2, the subsequent movement of said rolling element in figure 3 and the wedging position in figure 4.

## PREFERRED EMBODIMENT OF THE INVENTION

**[0025]** In view of the figures outlined, it can be seen how, in one of the possible embodiments of the invention, the parachute device that the invention proposes comprises a wedging block (1) that is fixed to the car, not shown, of the elevating device. The wedging block (1) in turn comprises a catch element (2) located on a first side of a guide (A) of the elevating device, and a braking element (3) located on a second side, opposite to the first side, of the guide (A).

**[0026]** In a resting position of the device, the guide (A) is not in contact with the braking (3) and catch (2) elements, while in a wedging position the braking element (3) exerts a force on the guide (A) that keeps it in contact with the catch element (2).

**[0027]** Likewise, the parachute device comprises a rolling element (4) housed in a longitudinal guide (6) located, oriented parallel to the guide (A), on a support plate (7) that is actuated by elastic pushing means (8), which in the embodiment shown are pushing springs, which keep the rolling element (4) in contact, with the possibility of rolling, with the guide (A). The rolling element (4) is linked to the braking element (3) so that any linear relative movement between the rolling (4) and braking (3) elements is prevented. The pushing springs (8) are arranged in fixed bushings (8'), superiorly and inferiorly, and act permanently against the support plate (7), making the rolling element (4) be at all times in contact

with the guide (A), since said rolling element (4) is housed in the longitudinal guide (6).

**[0028]** Additionally, the device comprises a friction element (5) that can contact the rolling element (4), so that the transition from the rest position to the wedging position occurs when the friction element (5) contacts the rolling element (4) and there is relative movement between the support plate (7) and the guide (A), forcing the movement of the rolling element (4) along the longitudinal guide (6) of the support plate (7) while the rolling element (4) rolls on the friction surface (5) and the guide (A) itself.

**[0029]** In the embodiment represented, the device comprises activation means (9) that actuate on the friction element (5). In this way, the passage between the rest position and the wedging position is carried out by means of the activation means.

**[0030]** The device is activated by means of the activation means which, in the embodiment shown, comprise an electromagnet and elastic compression means (11), for which the electrical supply is interrupted. In this way, the action of elastic compression means (11) acting on the friction element (5) is no longer counteracted, which makes the friction element contact the rolling element. At this point, the wedge can be reset in the absence of movement by the car, so that by powering the electromagnet again, it returns to the rest position. The electromagnet is arranged in proximity to the friction element so that the consumption of the electromagnet, and therefore the energy required for resetting, are very low.

**[0031]** Starting from the wedging position, to return to the rest position, the movements of the elements and the sequence is reversed, when the wedging block locking is deactivated by separating the braking element from the guide, which results in little energy being needed to separate said friction element from the rolling element in its resetting given the proximity between both. Afterwards, the rolling element is free from its contact with the friction element and its descent occurs along the longitudinal guide under the effect of gravity.

**[0032]** The friction element (5) is pivotally mounted, at a pivot point (10), on the support plate (7).

**[0033]** For its part, as can be seen in the figures, the rolling element (4) is linked to the braking element (3) by means of a connecting plate (12).

**[0034]** The wedging block (1) comprises an inclined surface (13) with which it can contact the braking element (3) from rest position to the wedging position.

**[0035]** In view of this description and set of figures, the person skilled in the art will understand that the embodiments of the invention that have been described can be combined in multiple ways within the scope of the invention. The invention has been described according to some preferred embodiments thereof, but it will be apparent to those skilled in the art that multiple variations can be introduced in said preferred embodiments without exceeding the scope of the subject-matter of the appended claims.

## Claims

1. Parachute device for elevating devices comprising a wedging block (1) which in turn comprises a catch element (2), located on a first side of a guide (A) of the elevating device, and a braking element (3), located on a second side, opposite the first side, of the guide (A), so that in a rest position the guide (A) is not in contact with the braking (3) and catch (2) elements, while in a wedging position the braking element (3) exerts a force on the guide (A) that keeps it in contact with the catch element (2), wherein the parachute device comprises a rolling element (4) housed in a longitudinal guide (6) located, oriented parallel to the guide (A), on a support plate (7) which in turn is actuated by elastic pushing means (8), wherein said rolling element (4) is linked to the braking element (3) so that every linear relative movement between the rolling (4) and braking (3) elements is prevented, wherein the device comprises a friction element (5) that can contact the rolling element (4), so that the passage from the rest position to the wedging position occurs when the friction element (5) contacts the rolling element (4) and there is relative movement between the support plate (7) and the guide (A), forcing the movement of the rolling element (4) along the longitudinal guide (6) of the support plate (7) while the rolling element (4) rolls on the friction surface (5) and the guide (A) itself, **characterized in that** the means elastic pushing elements (8) keep the rolling element (4) in contact, with the possibility of rolling, with the guide (A).

2. Device according to claim 1, comprising activation means (9) that act on the friction element (5).

3. Device according to any one of the preceding claims, wherein the friction element (5) is pivotally mounted on the support plate (7).

4. Device according to any of claims 2 and 3, wherein the activation means (9) comprise an electromagnet and elastic compression means (11).

5. Device according to any of the preceding claims, wherein the rolling element (4) is linked to the braking element (3) by means of a connecting plate (12).

6. Elevating device comprising a parachute device according to any one of the preceding claims.

7. Method for activating a parachute device according to any of claims 1 to 5, comprising:

   - starting from the rest position,
   - actuating on the friction element (5) until it contacts the rolling element (4),
   - maintaining contact between the friction ele-

ment (5) and the rolling element (4) while said rolling element (4) moves along the longitudinal guide (6) until,
- reaching a wedging position in which the braking element (3) is in the wedging position.

**8.** Method for unwedging a parachute device according to any of claims 1 to 5, comprising:

- starting from the wedging position,
- releasing the braking element (3) from the wedging block (1) with respect to the catch element (2),
- actuating on the friction element (5) so that it stops contacting the rolling element (4), so that due to the gravitational force said rolling element (4) descends along the longitudinal guide (6) until,
- reaching a rest position.

**Patentansprüche**

**1.** Fangeinrichtung für Hubvorrichtungen, die einen Verkeilungsblock (1) aufweist, der wiederum ein Fangelement (2), das sich auf einer ersten Seite einer Führung (A) der Hubvorrichtung befindet, und ein Bremselement (3) aufweist, das sich auf einer zweiten Seiten, entgegengesetzt zu der ersten Seite, der Führung (A) befindet, so dass die Führung (A) in einer Ruheposition nicht mit dem Bremselement (3) und dem Fangelement (2) in Kontakt ist, während das Bremselement (3) in einer Verkeilungsposition eine Kraft auf die Führung (A) ausübt, die sie in Kontakt mit dem Fangelement (2) hält,
wobei die Fangvorrichtung ein Rollelement (4) aufweist, das in einer Längsführung (6) aufgenommen ist, die sich, parallel zu der Führung (A) orientiert, auf einer Trägerplatte (7) befindet, die wiederum mittels elastischer Drückeinrichtungen (8) betätigt wird, wobei das Rollelement (4) mit dem Bremselement (3) verbunden ist, so dass jede lineare relative Bewegung zwischen dem Rollelement (4) und dem Bremselement (3) verhindert wird, wobei die Vorrichtung ein Reibungselement (5) aufweist, welches das Rollelement (4) kontaktieren kann, so dass der Übergang von der Ruheposition zu der Verkeilungsposition erfolgt, wenn das Reibungselement (5) das Rollelement (4) kontaktiert und eine relative Bewegung zwischen der Trägerplatte (7) und der Führung (A) vorliegt, wodurch die Bewegung des Rollelements (4) entlang der Längsführung (6) der Trägerplatte (7) erzwungen wird, während das Rollelement (4) auf der Reibungsfläche (5) und der Führung (A) selbst rollt, **dadurch gekennzeichnet, dass** die elastischen Drückelemente (8) das Rollelement (4) mit der Möglichkeit des Rollens in Kontakt mit der Führung (A) halten.

**2.** Vorrichtung nach Anspruch 1, die Aktivierungseinrichtungen (9) aufweist, die auf das Reibungselement (5) wirken.

**3.** Vorrichtung nach einem der vorstehenden Ansprüche, wobei das Reibungselement (5) schwenkbar auf der Trägerplatte (7) gelagert ist.

**4.** Vorrichtung nach einem der Ansprüche 2 und 3, wobei die Aktivierungseinrichtungen (9) einen Elektromagnet und elastische Kompressionseinrichtungen (11) aufweisen.

**5.** Vorrichtung nach einem der vorstehenden Ansprüche, wobei das Rollelement (4) mittels einer Verbindungsplatte (12) mit dem Bremselement (3) verbunden ist.

**6.** Hubvorrichtung, die eine Fangvorrichtung nach einem der vorstehenden Ansprüche aufweist.

**7.** Verfahren zum Aktivieren einer Fangvorrichtung nach einem der Ansprüche 1 bis 5, das umfasst:

- Starten ausgehend von der Ruheposition,
- Betätigen des Reibungselements (5), bis es das Rollelement (4) kontaktiert,
- Kontakt beibehalten zwischen dem Reibungselement (5) und dem Rollelement (4), während sich das Rollelement (4) entlang der Längsführung (6) bewegt, bis zum
- Erreichen einer Verkeilungsposition, in der das Bremselement (3) in der Verkeilungsposition ist.

**8.** Verfahren zum Entkeilen einer Fangvorrichtung nach einem der Ansprüche 1 bis 5, das umfasst:

- Starten ausgehend von der Verkeilungsposition,
- Lösen des Bremselements (3) von dem Verkeilungsblock (1) in Bezug auf das Fangelement (2),
- Betätigen des Reibungselements (5), so dass es aufhört, das Rollelement (4) zu kontaktieren, so dass das Rollelement (4) aufgrund der Schwerkraft entlang der Längsführung (6) herunterfährt bis zum
- Erreichen einer Ruheposition.

**Revendications**

**1.** Dispositif de parachute pour dispositifs d'élévation comprenant un bloc de calage (1) qui, quant à lui, comprend un élément de prise (2), situé sur un premier côté d'un guide (A) du dispositif d'élévation, et un élément de freinage (3), situé sur un second côté, opposé au premier côté, du guide (A), de telle sorte

que dans une position de repos le guide (A) n'est pas en contact avec les éléments de freinage (3) et de prise (2), tandis que dans une position de calage l'élément de freinage (3) exerce une force sur le guide (A) qui le maintient en contact avec l'élément de prise (2),

dans lequel le dispositif de parachute comprend un élément de roulement (4) logé dans un guide longitudinal (6) situé, orienté parallèlement au guide (A), sur une plaque de support (7) qui, quant à elle, est actionnée par un moyen de poussée élastique (8),
dans lequel ledit élément de roulement (4) est lié à l'élément de freinage (3) de telle sorte que tous les déplacements relatifs linéaires entre les éléments de roulement (4) et de freinage (3) sont évités, dans lequel le dispositif comprend un élément de frottement (5) qui peut entrer en contact avec l'élément de roulement (4), de telle sorte que le passage de la position de repos à la position de calage se produit lorsque l'élément de frottement (5) est en contact avec l'élément de roulement (4) et il y a un déplacement relatif entre la plaque de support (7) et le guide (A), forçant le déplacement de l'élément de roulement (4) le long du guide longitudinal (6) de la plaque de support (7) tandis que l'élément de roulement (4) roule sur la surface de frottement (5) et le guide (A) lui-même, **caractérisé en ce que** le moyens de poussée élastique (8) maintient l'élément de roulement (4) en contact, avec la possibilité de rouler, avec le guide (A).

**2.** Dispositif selon la revendication 1, comprenant un moyen d'activation (9) qui agit sur l'élément de frottement (5).

**3.** Dispositif selon l'une quelconque des revendications précédentes, dans lequel l'élément de frottement (5) est monté de manière pivotante sur la plaque de support (7).

**4.** Dispositif selon l'une quelconque des revendications 2 et 3, dans lequel le moyen d'activation (9) comprend un moyen de compression élastique et électromagnétique (11).

**5.** Dispositif selon l'une quelconque des revendications précédentes, dans lequel l'élément de roulement (4) est lié à l'élément de freinage (3) à l'aide d'une plaque de liaison (12).

**6.** Dispositif d'élévation comprenant un dispositif de parachute selon l'une quelconque des revendications précédentes.

**7.** Procédé d'activation d'un dispositif de parachute selon l'une quelconque des revendications 1 à 5, comprenant :

- en partant de la position de repos,
- l'actionnement de l'élément de frottement (5) jusqu'à ce qu'il entre en contact avec l'élément de roulement (4),
- le maintien du contact entre l'élément de frottement (5) et l'élément de roulement (4) tandis que ledit élément de roulement (4) se déplace le long du guide longitudinal (6) jusqu'à,
- l'atteinte d'une position de calage dans laquelle l'élément de freinage (3) est dans la position de calage.

**8.** Procédé de dégagement d'un dispositif de parachute selon l'une quelconque des revendications 1 à 5, comprenant :

- en partant de la position de calage,
- la libération de l'élément de freinage (3) du bloc de calage (1) par rapport à l'élément de prise (2),
- l'actionnement de l'élément de frottement (5) de telle sorte qu'il arrête d'être en contact avec l'élément de roulement (4), de telle sorte qu'en raison de la force gravitationnelle ledit élément de roulement (4) descend le long du guide longitudinal (6) jusqu'à,
- l'atteinte d'une position de repos.

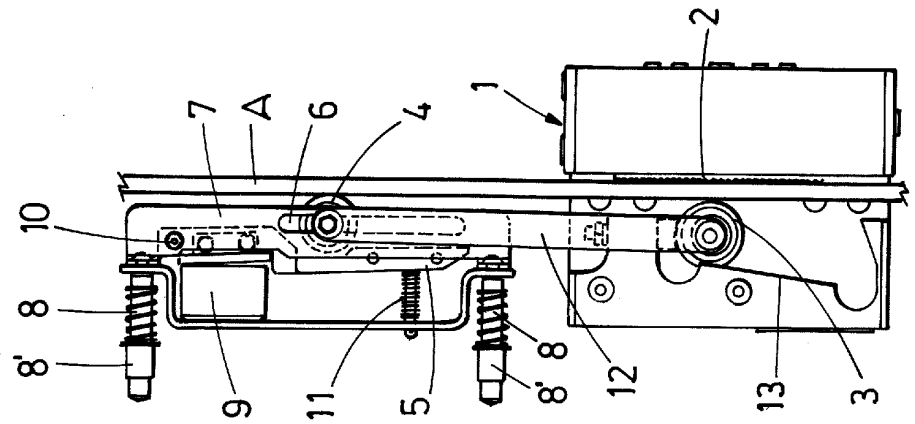


FIG.4

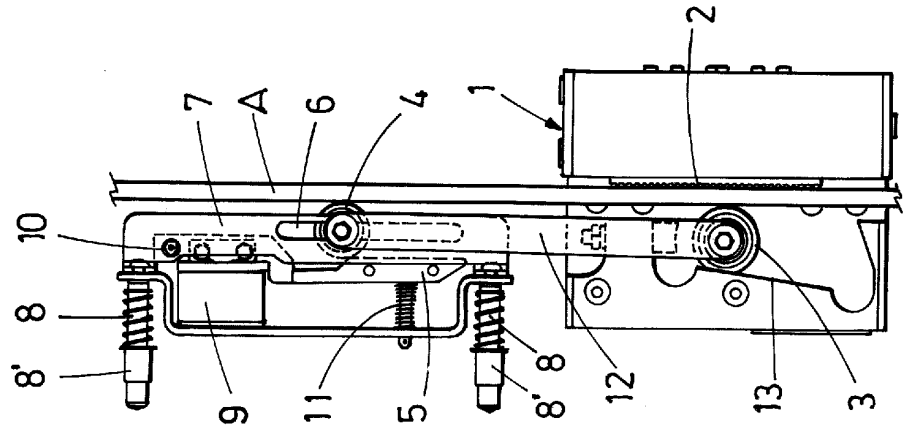


FIG.3

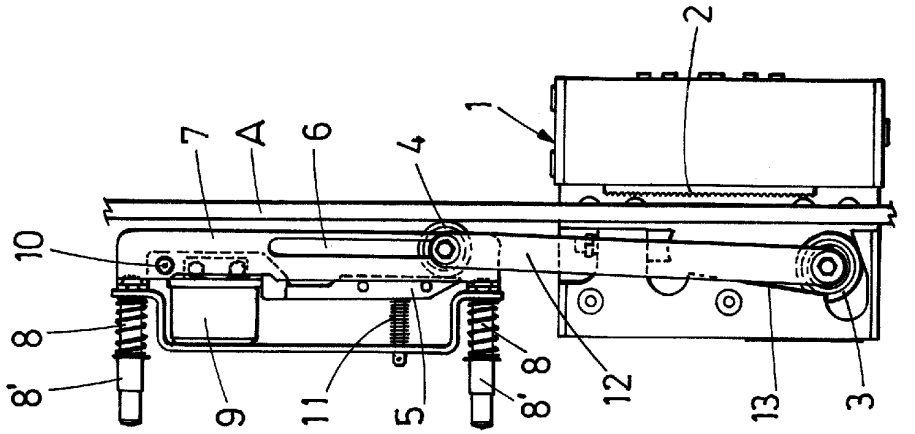


FIG.2

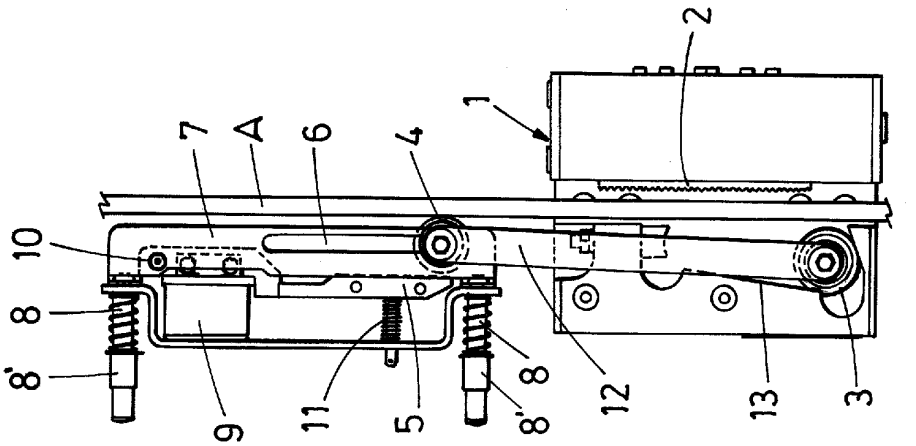


FIG.1

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


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