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(54) **ELECTROMECHANICAL PARACHUTE ACTIVATION SYSTEM FOR AN ELEVATOR APPARATUS**

ELEKTROMECHANISCHE AKTIVIERUNGSVORRICHTUNG EINES ARRETIERUNGSSYSTEMS FÜR HUBVORRICHTUNGEN

SYSTÈME ÉLECTROMÉCANIQUE D'ACTIVATION DE PARACHUTES POUR DISPOSITIFS D'ÉLEVATION

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Description

OBJECT OF THE INVENTION

[0001] The present invention belongs to the technical field of elevator safety. More specifically, the invention relates to an activation system for electronically activated parachutes.

BACKGROUND OF THE INVENTION

[0002] Among the emergency braking devices for elevating devices, those known as parachutes prevent the free fall and/or uncontrolled movement of the car by immobilizing it on the guides through which it moves. The parachute is in charge of stopping and securing the car or counterweight on the guides by means of a friction force that is generated when said parachute acts on the guides. Traditionally, parachute activation has been carried out by means of a speed limiting element of a mechanical type which, in the event of excess speed of the car, is blocked and causes said activation.

[0003] There are variants prepared to work without a mechanical speed limiter, instead using electronic safety devices to detect emergency situations and electronically activate parachutes. An example can be found in application EP1902993A1, which describes a braking device for an elevator car guided in a gap along guides, in which a roller is the braking element that is placed between the guide and a wedging block for immobilizing the car. This roller (in other examples it can be a shoe) is kept away from the guide by virtue of the action of an electromagnet and an activation plate provided with a guide element for the roller. When the electromagnet is deactivated, an activation spring brings the plate and therefore the roller towards the guide. In the active position the activation plate brings the roller into contact with the guide to cause wedging, while in the non-active position the electromagnet keeps the braking element separate from the guide.

[0004] The main disadvantage of the braking devices disclosed in EP1902993 or US2011226560 is their high energy consumption.

SUMMARY OF THE INVENTION

[0005] The object of the invention consists of a system for activating the parachute of elevating devices being electromechanically actuated and involving lower energy consumption, since it can be maintained in a stand-by or holding condition in which the electromagnet consumption is zero. The parachute is attached to a car or counterweight and is located in proximity to an elevator guide. On one side of the guide there is a shoe, while on the other side there is a braking system that includes a braking element such as a roller or shoe, the function of which is to wedge itself into the shoe, trapping in this movement of wedging to the guide located between the braking element and another shoe and thereby securing the car or

counterweight against the guide. The activation system is provided with a roller activation plate and an electromagnet to activate and deactivate the system. Unlike the state of the art, the electromagnet does not act on the activation plate directly, but on a trigger associated with the activation plate.

[0006] The operation of the device is based on the displacement of the activation plate to produce the movement of the roller and therefore the wedging. When the elevator is operating normally, with the car moving along the guides, the electromagnet is powered, acting on the trigger and causing the activation plate to stay away from the guide and therefore also the roller. On the contrary, when the system is activated, the electromagnet is deactivated, the trigger releases the plate by the action of a spring and the plate moves towards the guide by means of its activation spring (element known from the state of the art) causing the roller to approach it and the so-called wedging occurs. By the action of a cam whose movement is synchronized with the trigger, there is also a stand-by position in which the trigger pivots, but does not completely release the plate. In this way it can be kept in this state without any consumption and it is possible to reset the system simply by powering the electromagnet again. If there were a movement of the car during rest, the cam and therefore the trigger would pivot, totally releasing the plate, thus causing the movement of the roller and wedging.

[0007] In a second particular implementation, the braking system comprises two rollers joined by a connecting plate. The activation plate does not act directly on the parachute roller, but it does so through another roller and a plate connecting both rollers.

[0008] In a third implementation, the connecting plate between rollers is in turn connected to a synchronization mechanism between parachutes.

DESCRIPTION OF THE DRAWINGS

[0009] 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, wherein with an illustrative and non-limiting nature, the following has been represented:

Figure 1.- Shows a view of the electromechanical parachute device of the invention in a first implementation.

Figures 2a-2e.- Show a front view of the device during rest, stand-by and wedging.

Figure 3.- Is a view of a second implementation in which the braking element comprises two rollers joined by a connecting plate.

Figure 4.- Is a perspective view of a third implementation.

Figure 5.- Shows an implementation in which the movement of the activation plate with respect to the guide is linear instead of pivoting.

DESCRIPTION OF THE INVENTION

[0010] A detailed explanation of various embodiments of the present invention is provided below, with the aid of the aforementioned figures.

[0011] The activation system described is designed to carry out an emergency braking of a car or counterweight that can be moved longitudinally along at least one vertical guide (1), securing it on said guide (1) to avoid uncontrolled movements or falls due to the action of gravity.

[0012] In a first implementation shown in figure 1, the invention comprises:

- a system for activating a parachute 10 provided with a braking element, which can be a shoe or, as shown in the drawings, a wedging roller 3, wherein the activation system comprises:
- an activation plate 2 of the roller 3, movable with respect to the guide of the elevating device;
- an electromagnet 8
- a trigger 5 that cooperates with the activation plate 2 through a protruding element (4) of said plate (a notch, hook or shaft, for example), wherein the electromagnet 8 is adapted to act on the trigger 5 and hold the trigger in the position in which said trigger keeps the activation plate away from the guide when the electromagnet is powered,
- a first spring 6, which exerts a force opposite to that of the electromagnet 8 on the trigger 5
- a cam 7 connected at one end to the trigger 5 and provided with means, for example, a second spring or ring, or a magnet 9, which act on the cam, keeping it in a horizontal position at all times, except when it is in contact with the guide, at which time the cam pivots by friction with said guide.

[0013] With reference to the figures, the activation plate 2 moves with respect to the guide 1. In some implementations it does so in a pivotal manner around an articulation perpendicular to the plane of the figure at a first end. In other implementations, this displacement can be linear (Figure 5). At one end the plate 2 comprises a protruding element, for example a shaft 4 that cooperates with the trigger 5. The trigger 5 in turn is provided with the first spring 6. When the elevating device moves normally along the guide 1, the electromagnet 8 remains powered and in this way the braking system is at rest. The electromagnet exerts a force such that, despite the force of the spring 6, it allows the trigger 5 to be held in a position that holds the activation plate 2 through the shaft 4, separating it from the guide and therefore also

separating the roller 8. The braking system is therefore inactive.

[0014] Figures 2a-2c illustrate an operating sequence of the device described above. In figure 2a the braking system is in the rest position, with the car moving normally along the guide 1 and the electromagnet 8 being powered.

[0015] Once the stop of the elevating device or an emergency has been detected, the electromagnet is deactivated and the trigger 5, as a consequence, pivots by the action of the spring 6 as seen in figure 2b. In turn, the cam 7 impacts with its end on the guide 1 but is kept horizontal by means of the action of another spring 9. At this moment, the braking system is in the "stand-by" or holding position, wherein the haft 4 is not fully released.

[0016] In figure 2c it can be seen how, at the moment in which a movement of the car occurs, the cam 7 pivots in contact with the guide. The force exerted by the second spring or elastic ring 9 is overcome and the cam 7 pivots, dragging the trigger 5, allowing the shaft 4 to be completely released. At this time the activation plate 2 is free, so it approaches the guide 1 pushing the roller 3. The elevating device is therefore safe because wedging occurs. Said wedging occurs as described in the state of the art section and can be seen in Figures 2d and 2e.

[0017] Trigger reset occurs easily when electromagnet 8 is powered again after wedging has occurred.

[0018] In a second implementation shown in Figure 3, the parachute 10 is in another position. The activation plate 2 is in contact with a roller 3' attached to the parachute roller 3 through a connecting plate 11. The operation of the trigger and the cam are the same as in the previous implementation.

[0019] In a third implementation, in the event that the apparatus has more than one parachute, the connecting plate between rollers 11 is adapted to be connected to a synchronization mechanism between parachutes (Figure 4).

Claims

1. Electromechanical parachute activation system for elevating devices equipped with a braking element (3), wherein the activation system further comprises:

- an activation plate (2) for said braking element (3), movable with respect to a guide of the elevating device (1);
- an electromagnet (8);

wherein the activation system is further provided with:

- a trigger (5) adapted to cooperate with the electromagnet (8) and with the activation plate (2) through a protruding element of the activation plate (4), **characterized in that** the activating

system further comprises:

- a first spring (6) adapted to exert a force opposite to that of the electromagnet (8) on the trigger,
- a cam (7) attached to one end of the trigger (5) and provided with actuation means (9) that hold the cam in a horizontal position at all times, except when it is in contact with the guide;
- wherein the trigger (5), the first spring (6), the cam (7) and the actuation means (9) cooperate so that when the electromagnet (8) is activated, the trigger blocks the movement of the protruding element (4) separating the plate (2) from the guide, when the electromagnet is not activated, the first spring (6) exerts a force such that the trigger (5) pivots on the protruding element (4) causing the cam (7) to contact the guide but without releasing the protruding element (4) and when there is a movement of the car, the cam (7) pivots on the guide so that the trigger (5) releases the protruding element (4).

2. Electromagnetic parachute activation system according to claim 1, **characterized in that** the plate is pivotal and the protruding element (4) is a shaft arranged at an end opposite to an axis on which the activation plate (2) pivots.
3. Electromagnetic parachute activation system according to any of claims 1 or 2, **characterized in that** the braking element is a first roller (3).
4. Electromagnetic parachute activation system according to claim 3, **characterized in that** the parachute comprises a second roller (3') joined to the first roller (3) by a connecting plate (11), the second roller (3') being joined to the activation plate (2).
5. Electromagnetic parachute activation system according to claim 4, **characterized in that** the connecting plate (11) between the first and the second roller is adapted to be connected to a synchronization mechanism between parachutes of the elevating device.
6. Parachute comprising the electromagnetic parachute activation system according to claims 1-3.
7. Elevating device comprising the electromechanical parachute activation system according to claims 1-5.

Patentansprüche

1. Elektromechanisches Fangvorrichtungsaktivierungssystem für Hubvorrichtungen, welches versehen ist mit:

einem Bremsselement (3), wobei das Aktivierungssystem ferner aufweist:

- eine Aktivierungsplatte (82) für das Bremsselement (3), die in Bezug auf eine Führung der Hubvorrichtung (1) bewegbar ist;
- einen Elektromagneten (8);

wobei das Aktivierungssystem ferner versehen ist mit

- einem Auslöser (5), der geeignet ist, mit dem Elektromagneten (8) und mit der Aktivierungsplatte (2) durch ein vorstehendes Element der Aktivierungsplatte (4) zusammenzuwirken, **dadurch gekennzeichnet, dass** das Aktivierungssystem ferner aufweist:
- eine erste Feder (6), die geeignet ist, eine Kraft auf den Auslöser (5) auszuüben, welche derjenigen des Elektromagneten (6) entgegengesetzt ist,
- einen Nocken (7), der an einem Ende des Auslösers (5) angebracht ist und mit Betätigungseinrichtungen (9) versehen ist, welche den Nocken zu jeder Zeit in einer horizontalen Position halten, außer, wenn er in Kontakt mit der Führung ist;
- wobei der Auslöser (6), die erste Feder (6), der Nocken (7) und die Betätigungseinrichtungen (9) derart zusammenwirken, dass, wenn der Elektromagnet (8) aktiviert ist, der Auslöser die Bewegung des vorstehenden Elements (4) blockiert, wodurch die Platte (2) von der Führung getrennt ist, wobei, wenn der Elektromagnet nicht aktiviert ist, die erste Feder (6) eine derartige Kraft ausübt, dass der Auslöser (5) an dem vorstehenden Element (4) schwenkt, wodurch bewirkt wird, dass der Nocken (7) die Führung berührt, jedoch ohne das vorstehende Element (4) freizugeben, und wobei, wenn eine Bewegung der Kabine erfolgt, der Nocken (7) auf der Führung schwenkt, so dass der Auslöser (5) das vorstehende Element (4) freigibt.

2. Elektromagnetisches Fangvorrichtungsaktivierungssystem nach Anspruch 1, **dadurch gekennzeichnet, dass** die Platte schwenkbar ist und das vorstehende Element (4) eine Welle ist, die an einem Ende angeordnet ist, das eine Achse, um welche die Aktivierungsplatte (2) schwenkt, entgegengesetzt ist.
3. Elektromagnetisches Fangvorrichtungsaktivierungssystem nach einem der Ansprüche 1 oder 2, **dadurch gekennzeichnet, dass** das Bremsselement

ment une erste Rolle (3) ist.

4. Elektromagnetisches Fangvorrichtungsaktivierungssystem nach Anspruch 3, **dadurch gekennzeichnet, dass** die Fangvorrichtung eine zweite Rolle (3') aufweist, die über eine Verbindungsplatte (11) mit der ersten Rolle (3) verbunden ist, wobei die zweite Rolle (3') mit der Aktivierungsplatte (2) verbunden ist. 5
5. Elektromagnetisches Fangvorrichtungsaktivierungssystem nach Anspruch 4, **dadurch gekennzeichnet, dass** die Verbindungsplatte (11) zwischen der ersten und der zweiten Rolle geeignet ist, mit einem Synchronisierungsmechanismus zwischen Fangvorrichtungen der Hubvorrichtung verbunden zu werden. 10
6. Fangvorrichtung mit dem elektromagnetischen Fangvorrichtungsaktivierungssystem nach den Ansprüchen 1 - 3. 20
7. Hubvorrichtung mit dem elektromagnetischen Fangvorrichtungsaktivierungssystem nach den Ansprüchen 1 - 5. 25

Revendications

1. Système d'activation de parachute électromagnétique pour des dispositifs élévateurs équipés d'un élément de freinage (3), dans lequel le système d'activation comprend en outre : 30
 - une plaque d'activation (2) pour ledit élément de freinage (3), déplaçable par rapport au guide du dispositif élévateur (1) ; 35
 - un électroaimant (8) ;

dans lequel le système d'activation est en outre doté de : 40

 - un déclencheur (5) adapté pour coopérer avec l'électroaimant (8) et avec la plaque d'activation (2) à travers un élément saillant de la plaque d'activation (4), **caractérisé en ce que** le système d'activation comprend en outre : 45
 - un premier ressort (6) adapté pour exercer une force opposée à celle de l'électroaimant (8) sur le déclencheur ; 50
 - une caméra (7) attachée à une extrémité du déclencheur (5) et dotée d'un moyen d'actionnement (9) maintenant la caméra dans une position horizontale à tout moment, excepté lorsqu'elle est en contact avec le guide ; 55
 - dans lequel le déclencheur (5), le premier ressort (6), la caméra (7) et le moyen d'actionnement (9) coopèrent de sorte que lorsque l'élec-

troaimant (8) est activé, le déclencheur bloque le mouvement de l'élément saillant (4) séparant la plaque (2) du guide, lorsque l'électroaimant n'est pas activé, le premier ressort (6) exerce une force de sorte que le déclencheur (5) pivote sur l'élément saillant (4), amenant la caméra (7) à entrer en contact avec le guide mais sans relâcher l'élément saillant (4), et lorsqu'il y a un mouvement de la cabine, la caméra (7) pivote sur le guide de sorte que le déclencheur (5) relâche l'élément saillant (4).

2. Système d'activation de parachute électromagnétique selon la revendication 1, **caractérisé en ce que** la plaque pivote et que l'élément saillant (4) est un arbre disposé à une extrémité opposée à un axe sur lequel la plaque d'activation (2) pivote.
3. Système d'activation de parachute électromagnétique selon la revendication 1 ou la revendication 2, **caractérisé en ce que** l'élément de freinage est un premier rouleau (3).
4. Système d'activation de parachute électromagnétique selon la revendication 3, **caractérisé en ce que** le parachute comprend un deuxième rouleau (3') joint au premier rouleau (3) par une plaque de connexion (11), le deuxième rouleau (3') étant joint à la plaque d'activation (2).
5. Système d'activation de parachute électromagnétique selon la revendication 4, **caractérisé en ce que** la plaque de connexion (11) entre le premier et le second rouleau est adaptée pour être connectée à un mécanisme de synchronisation entre parachutes du dispositif élévateur.
6. Parachute comprenant le système d'activation de parachute électromagnétique selon les revendications 1-3.
7. Dispositif élévateur comprenant le système d'activation de parachute électromagnétique selon les revendications 1-5.

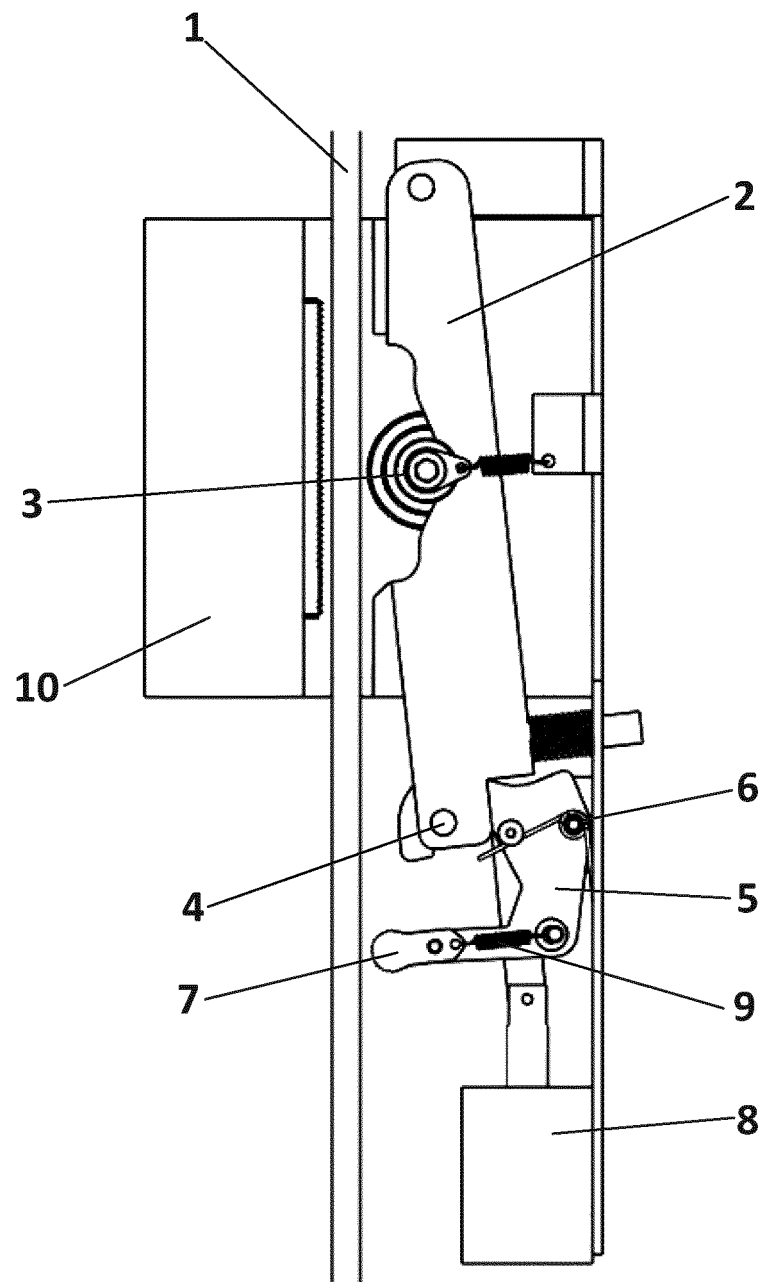


FIG. 1

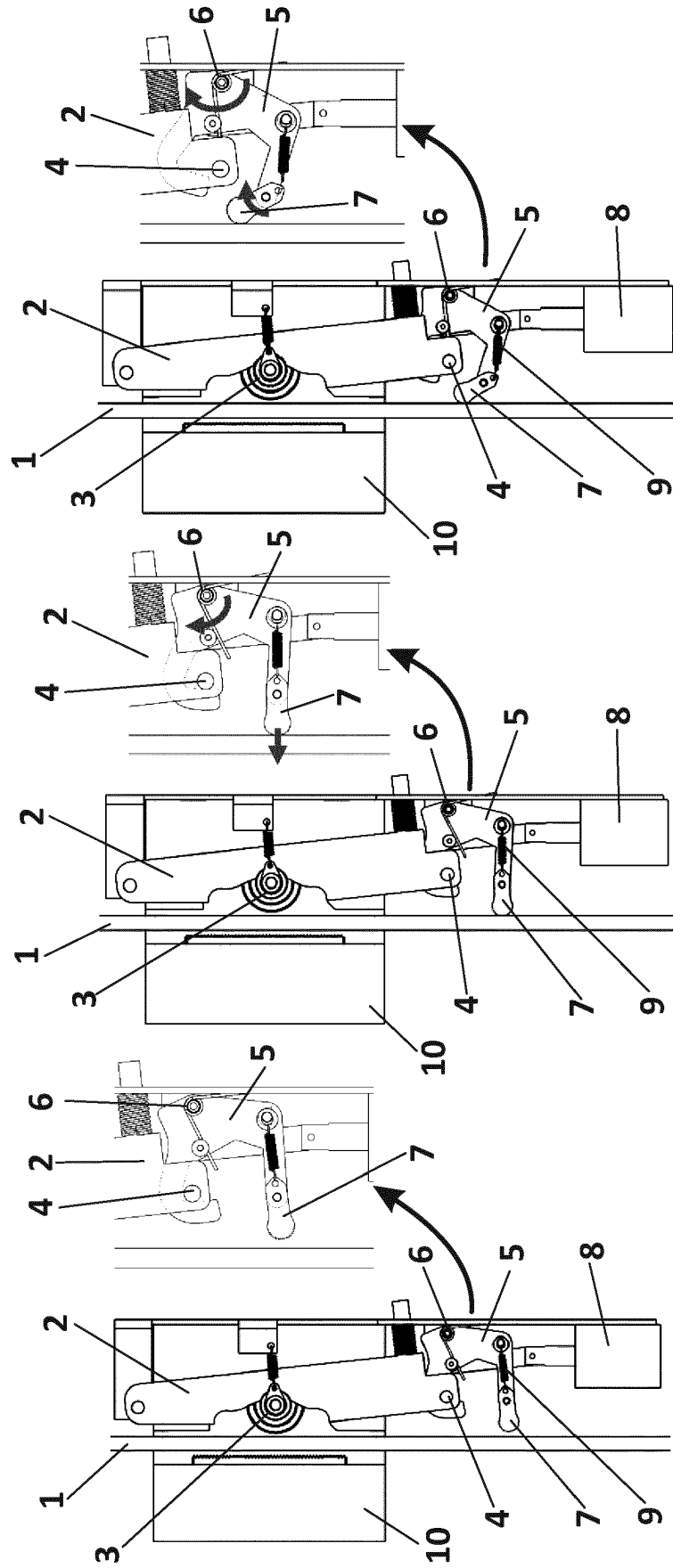


FIG. 2C

FIG. 2B

FIG. 2A

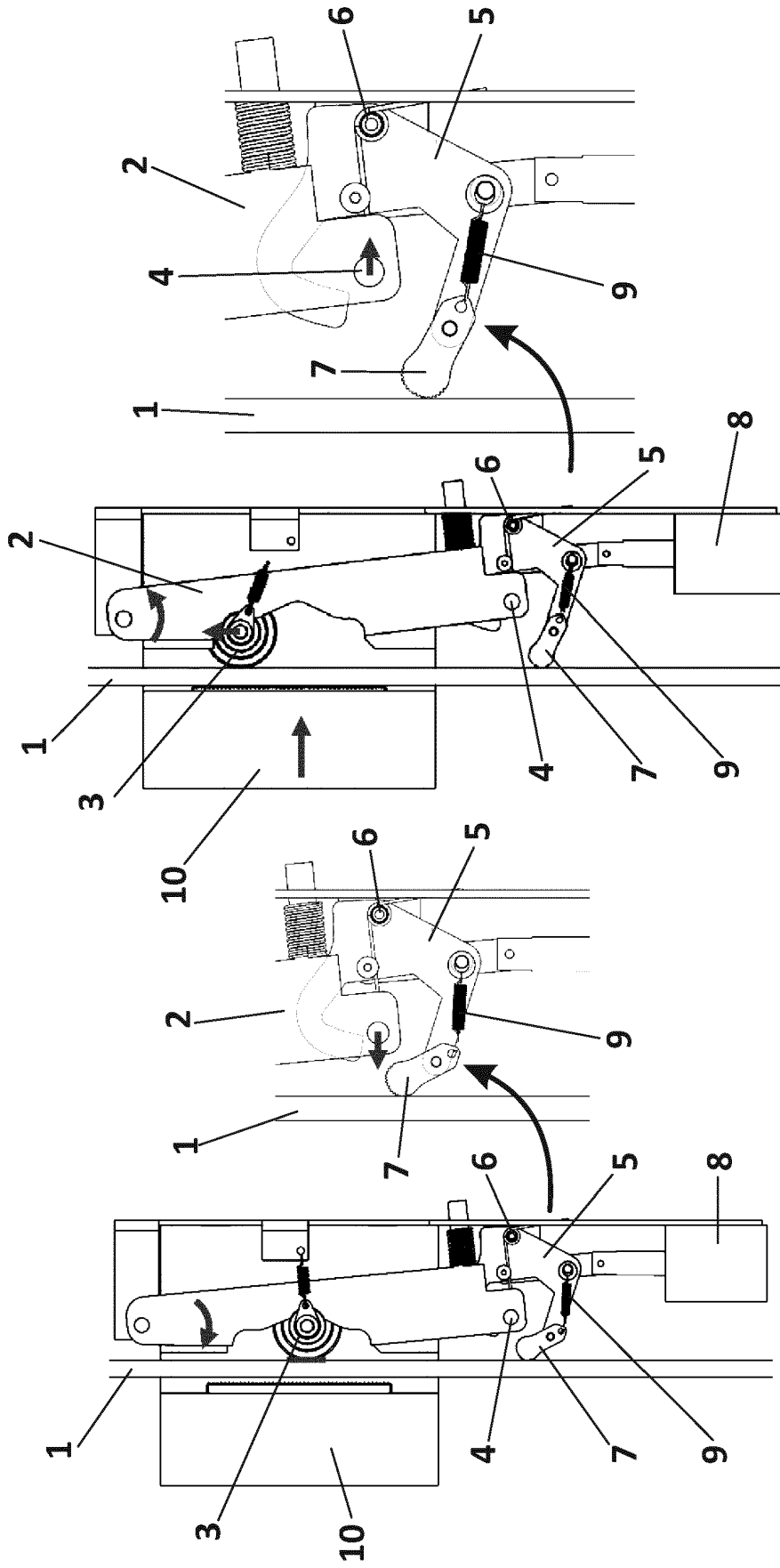


FIG. 2E

FIG. 2D

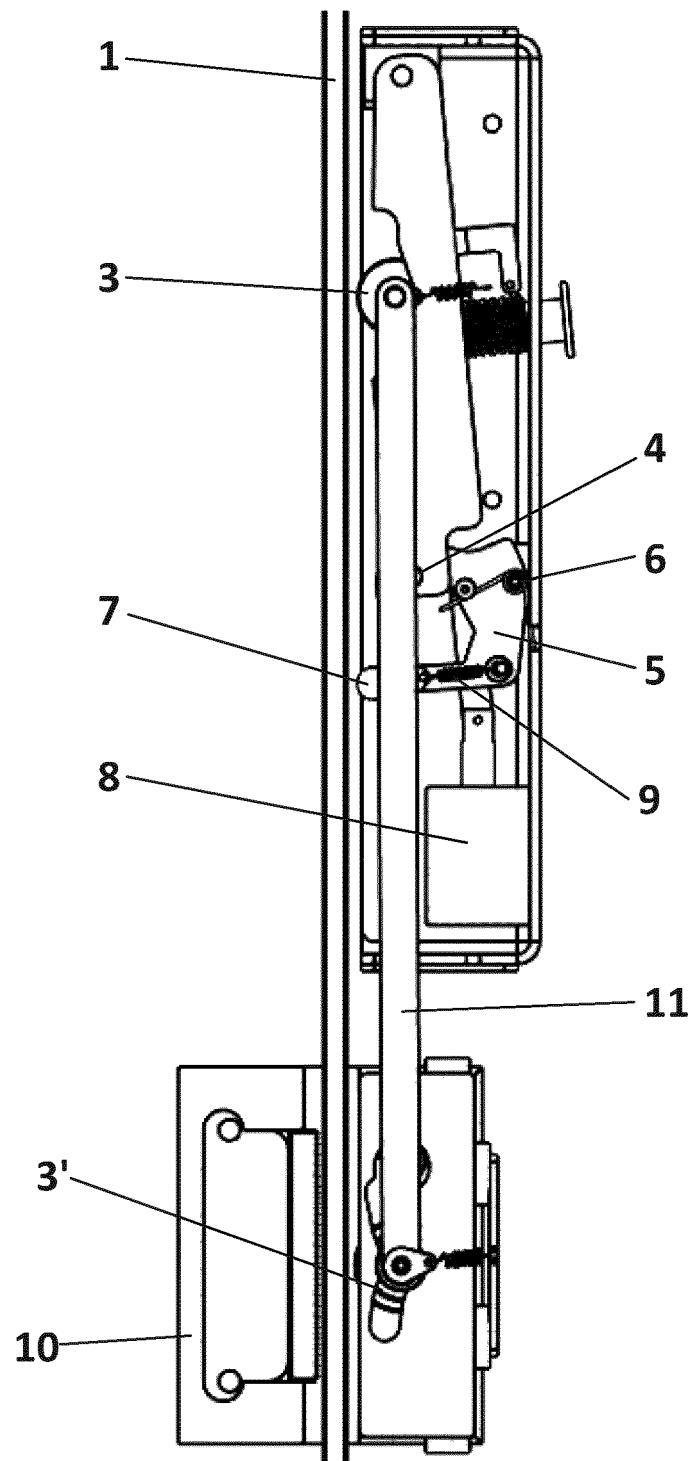


FIG. 3

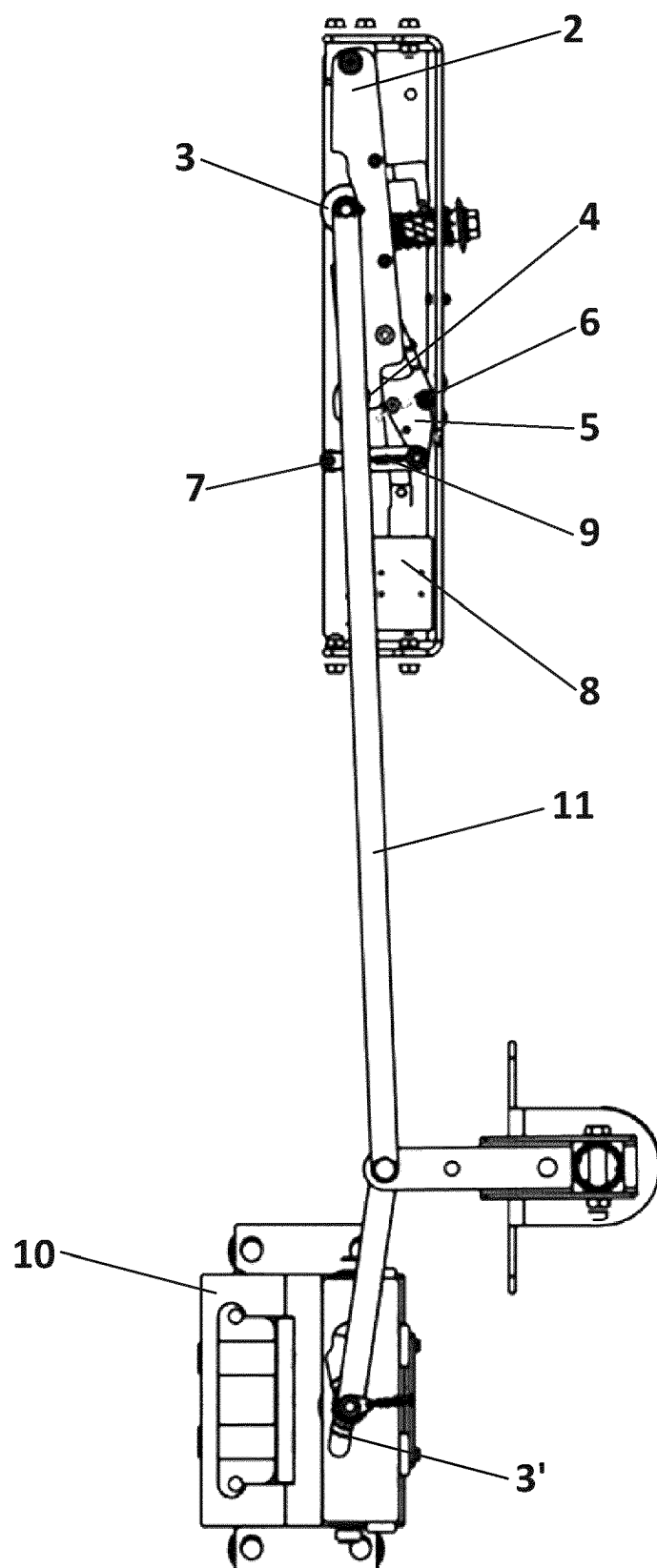


FIG. 4

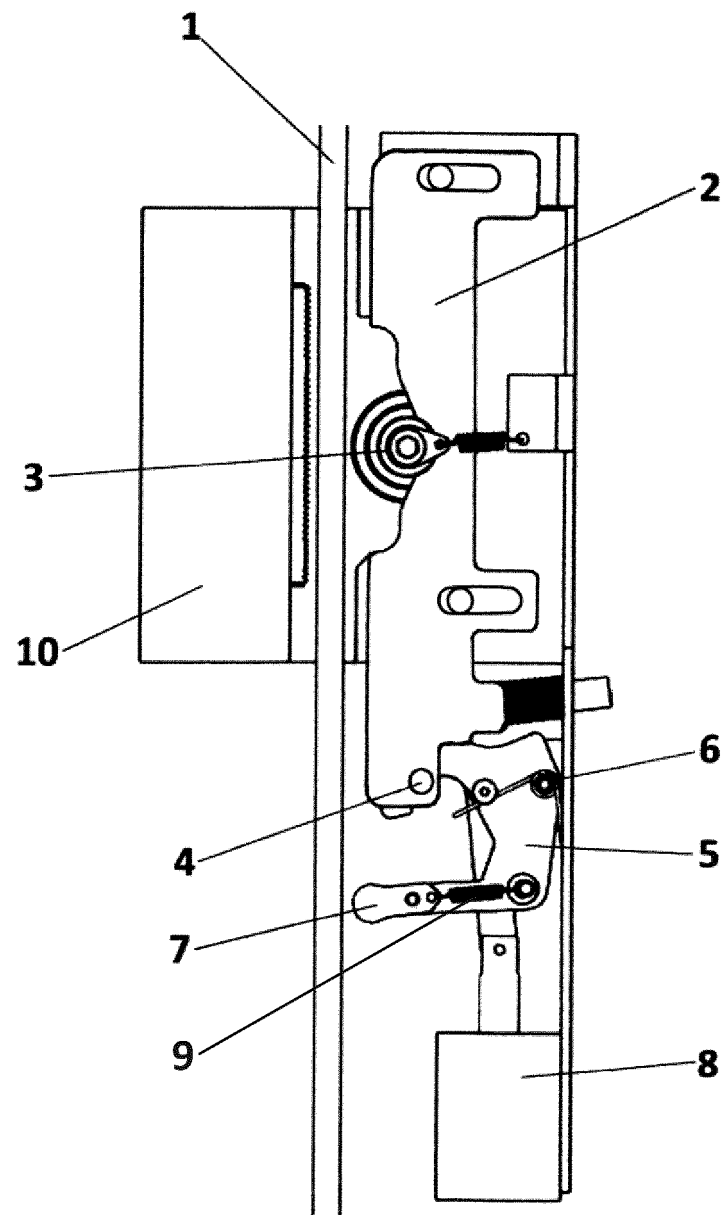


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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