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(71) Applicant: **Aplicaciones Electromecanicas Gervall, S.A.**
08800 Barcelona (ES)

(72) Inventor: **ESCOFET ESTEVE, Marti**
E-08800 Vilanova I La Geltrú (ES)

(74) Representative: **Isern-Jara, Nuria**
Avda. Diagonal 463 Bis 2°
08036 Barcelona (ES)

(54) METHOD FOR OPERATING A DEVICE TO PREVENT UNCONTROLLED MOVEMENT OF A LIFT CAR

(57) The invention relates to a method for operating a device for protection against uncontrolled movement of a lift car, in particular with a control module configured such as to actuate the device in order to block the lift car whenever the latter is halted at a floor level.

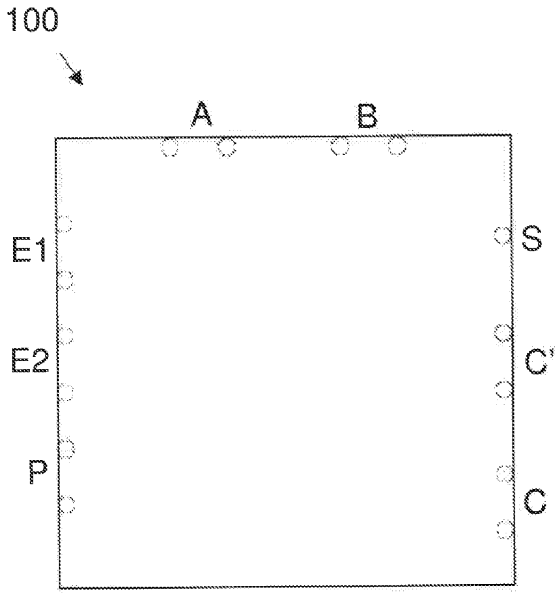

FIG. 5

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Description

[0001] The object of the invention herein is a method for operating a device for protecting against uncontrolled movement of a lift car. In particular, a control module configured such as to actuate the device in order to block the lift car whenever the latter is halted at a floor level.

BACKGROUND OF THE INVENTION

[0002] Speed limiters intended for operating transport means suspended by a cable, such as lifts, cable cars, etc. are well known. Examples of speed limiters are described in patent ES 2306623, the patent holder being the same as that of the present application.

[0003] Due to regulatory changes and updates in respect of the safety components in lifts, component manufacturers have developed new components that, when incorporated to speed limiters, increase the safety measures of a lift. The devices to prevent uncontrolled movement of the car are found between these components.

[0004] However, because there are different types and manufacturers of speed limiters, each one requires a different device to prevent the uncontrolled movement of the car.

DESCRIPTION OF THE INVENTION

[0005] The invention herein relates to a method for operating a particular device to prevent uncontrolled movement of a lift car, such that the device blocks the movement of said car only when it is necessary to maintain the safety of people inside the car.

[0006] Although there are different types of speed limiters on the market, they almost all have common elements: a pulley installed on a shaft on which a cable or the like slides, and retaining means connected to the pulley to halt or control the movement of the car whenever necessary. The particular device to prevent the uncontrolled movement of the lift car to be controlled by the method of the invention is configured such as to be coupled to one of such speed limiters, and comprises an electromagnetic actuator whose deactivation causes the lift car to lock by means of a mechanism which will be described in greater detail in the document hereinbelow. By contrast, when the electromagnetic actuator is activated, namely it is receiving power, the car can move.

[0007] Thus, in order to operate the device to prevent the uncontrolled movement of the car, the method of the invention comprises the following operations:

1) Monitoring a first signal indicating whether the car is at a floor level and a second signal indicating whether the car door is open. These two signals can be acquired by using a variety of acquisition means, for example inductive, ultrasonic, infrared proximity sensors, etc.

2) Supplying the electromagnetic actuator whenever it is detected that the door is closed. Indeed, in principle, when the door is closed, it can be assumed that the lift is operating normally. It is not necessary to cut off power via the system to the electromagnetic actuator in order to block the car.

3) When the first signal indicates that the door is open and the second signal further indicates that the car is at a floor level, the power supply to the electromagnetic actuator is halted. This is the case where there are possibly people entering or exiting the lift, and therefore it is advisable to lock the car to prevent any possible upward or downward movement.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Figure 1 shows a front elevation view of a speed limiter for a lift which includes the device for protecting against uncontrolled movement.

Figure 2 shows a front elevation view of the speed limiter with the protection device.

Figure 3 shows a cross-sectional side elevation exploded view of the speed delimiter and protection device.

Figure 4 shows a cross-sectional side elevation view of the limiter with the protection device.

Figure 5 shows a diagram of a module that can carry out the method of the invention herein.

DESCRIPTION OF A PREFERRED EMBODIMENT

[0009] First, a speed limiter (1) and a sample device (20) to prevent the uncontrolled movement of the lift car that can be operated by the control module of the invention are described in detail. Once these elements have been described, an example of the method of the invention will be described.

[0010] Figures 1 and 2 show a speed limiter, generally indicated by the reference (1), comprising a pulley (2) on a shaft (3) on which a cable or the like slides (C), and retaining means connected to the pulley (2). A bedplate body (4), with two fins facing each other, serves as a support for the shaft (3). The retaining means of this speed limiter (1) can operate in the same way as that described in Spanish patent No. ES 2306623. This speed limiter is further provided with a device for detecting the movement of a lift car.

[0011] The device (20) to prevent uncontrolled movement, which has been shown separately to the speed limiter in Fig. 3, comprises a ring gear (5) which is fixedly secured to the pulley (2) of the limiter (in an alternative,

embodiment this can be an integral part of the pulley itself), a pivoting support (6) that can be coupled to the shaft (3) of the speed limiter (1) such that it performs a tilting movement with respect to said shaft (3), as indicated by the arrow(a) in Fig. 2, and includes a blocking mechanism which acts on the ring gear (5) and an electrical detector (7) which is connected to the blocking mechanism and the movement trajectory of the pivoting support means (6). As shown, the pivoting support means (6) consists of an elongated body which is fixed on the upper part thereof by means of an orifice through which the shaft passes (3).

[0012] When the pivoting support means (6) has carried out a predetermined angular movement caused by the movement of the pulley (2) and therefore the lift car, such as a distance defined by a maximum angle, it sends a motion detection signal through an electric switch (7) and subsequently causes a mechanical interlocking of the speed limiter, which causes the pull of the cable or the like of the speed limiter and therefore the wedging of the safety device on the lift (retaining means) that is provided.

[0013] The pivoting support means (6) may optionally include tensioning means that are coupled to the housing body (4) of the speed limiter (1).

[0014] In respect of the blocking mechanism, it mainly comprises a locking insert (10) which can be coupled to the ring gear (5) for blocking, a release (11) connected to the electromagnetic actuator (8) (electromagnet, coil or the like) which is attached to the locking insert (10).

[0015] The release (11) has a shaft which is externally provided with a helicoidal spring (not shown for clarity).

[0016] Guide means are provided in the pivoting support means by which the locking insert linearly moves. In particular, two grooved portions are provided (12), formed in alignment in the body of the pivoting support means(6) through which a guide body (13) attached to the locking insert (10) passes along each one. This guide body (13) in the present embodiment consists of a metallic cylindrical body attached by means of bolting elements.

[0017] The pivoting support means (6) further has an elongated section (60), attached thereto by means of bolting elements, which has an arcuate recess centred on the upper edge thereof (61), wherein the elongated section (60) can abut a switch (70) protruding from the bottom of the electric switch (7). This elongated section (60) has two mechanical stops (14) that are attached to the pivoting support means (6).

[0018] The aforementioned tensioning means can be coupled to the elongated section (60) of the pivoting support means(6).

[0019] The end (101) of the locking insert (10) facing. the ring gear (5) has sawtooth-shaped teeth that facilitates coupling in the existing space between the ring gear teeth (5).

[0020] In respect of the bedplate body (4) it is composed of two fins (4a, 4b) which are facing each other between which the shaft (3) is supported, comprising stop means for limiting the angular path of the pivoting support means (6), which consist of a groove (40) following an arcuate path formed in one of the fins of the bedplate body. The two mechanical stops (14) define the maximum path of the pivoting support means in respect of a groove (40).

[0021] The fin (4a) that has the groove (40) mentioned above may include a pin or the like on which the tensioning means are secured, in the case of being present.

[0022] The detection device according to the invention and described in the speed limiter (1) is operated as follows:

[0023] When a lift car halts at a floor level, the flow of electric current to the coil is cut such that it pushes the locking element upwards, by the action of a spring, until it abuts with the ring gear (5) (position shown in figure 1). In the event the car moves when the device is in this position, the ring gear (5) rotates by the rotation of the pulley (2), pulling the pivoting support means with its (10) built-in blocking mechanism. In this situation, the switch (70) moves upwards such that it causes the electric switch (7) to send a signal which reports a sliding movement that is received by the control unit of the lift to actuate the means which are suitable for halting the lift car. In the event that this movement of the car, either with the doors open or closed, does not halt, the pivoting support means (6) will collide at one end of the groove (40) causing the pulley (2) of the speed limiter to halt against the stop (14) by the action of the locking insert (10) and the ring gear (5) and, therefore, to pull on the cable of the speed limiter. This pull on the cable of the limiter actuates the safety device causing the car to halt and to halt permanently.

[0024] Finally, figure 5 shows a diagram of a control module (100) designed to carry out the method of the invention. This control module (100) has the following inputs/outputs:

E1 Input signal indicating that the car is at a floor level.

E2 Input signal indicating that the car door is open.

S Output power to the electromagnetic actuator (8) of the device to prevent the previously described uncontrolled movement.

A Power input to the control module (100).

B Power input to the control module (100) via batteries.

C Control output of the status of the electromagnetic actuator (8).

C Input connected to the electric switch (9) indicating that the electromagnetic actuator (8) is activated. This switch (9) is connected to the control module (100) and from this to the

"control unit" or the elevator control panel. Only when this contact is activated, and the limiter can therefore rotate freely, can the lift move.

[0025] Therefore, when the input (E1) indicates that the car is at a floor level and, simultaneously, the input (E2) indicates that the car door is open, there may be people entering and exiting the car. The control module (100) automatically cuts off the power supplied via the output (0) to the electromagnetic actuator (8). Consequently, the force exerted by the spring (not shown) causes the locking insert (10) to ascend, introducing the end (101) between the gear teeth (5) in order to block the car, thereby preventing possible accidents.

[0026] Once the door has been closed, the control module (100) resupplies power to the electromagnetic actuator (8), such that the electromagnetic force exceeds the force exerted by the spring and the locking insert (10) descends once again, releasing the ring gear (5) and thereby enabling the movement of the lift car.

[0027] The power for the control module (100) can be supplied through the inlet (A), or batteries may be used (not shown) through the inlet (B).

[0028] The control module (100) input (C) indicates the current status of the electromagnetic actuator (8) via the corresponding contact.

[0029] Finally, the pushbutton (P) can temporarily supply power to the electromagnetic actuator (8) in order to unblock the car in cases of a voltage drop.

[0030] This control module (100) can, in principle, be formed by a microcontroller, a microprocessor, a DSP, an FPGA, or others, although in this particular example it is an electronic board. In any case, the control module (100) is designed to carry out the method of the invention or, in the case of a programmable device, the necessary instructions for carrying out the method of the invention will be stored therein.

Claims

1. Method for operating a device (20) to protect against the uncontrolled movement of the lift car, wherein the protection device (20) is suitable for being coupled to a speed limiter (1) comprising a pulley (2) on a shaft (3), along which a cable or the like slides, and retaining means connected to the pulley (2), and comprising the device (20) for protecting an electromagnetic actuator (8), whose deactivation causes the interlocking of the lift car, the method being **characterised in that** it comprises the following operations:

    - monitoring a first signal (E1) indicating whether the car is at a floor level and a second signal (E2) indicating whether the car door is open;
    - supplying the electromagnetic actuator (8) when the second signal (E2) indicates that the door is closed; and
    - when the first signal (E1) indicates that the car is at a floor level and the second signal (E2) further indicates that the door is open, the supply to the electromagnetic actuator (8) is halted.

FIG. 1

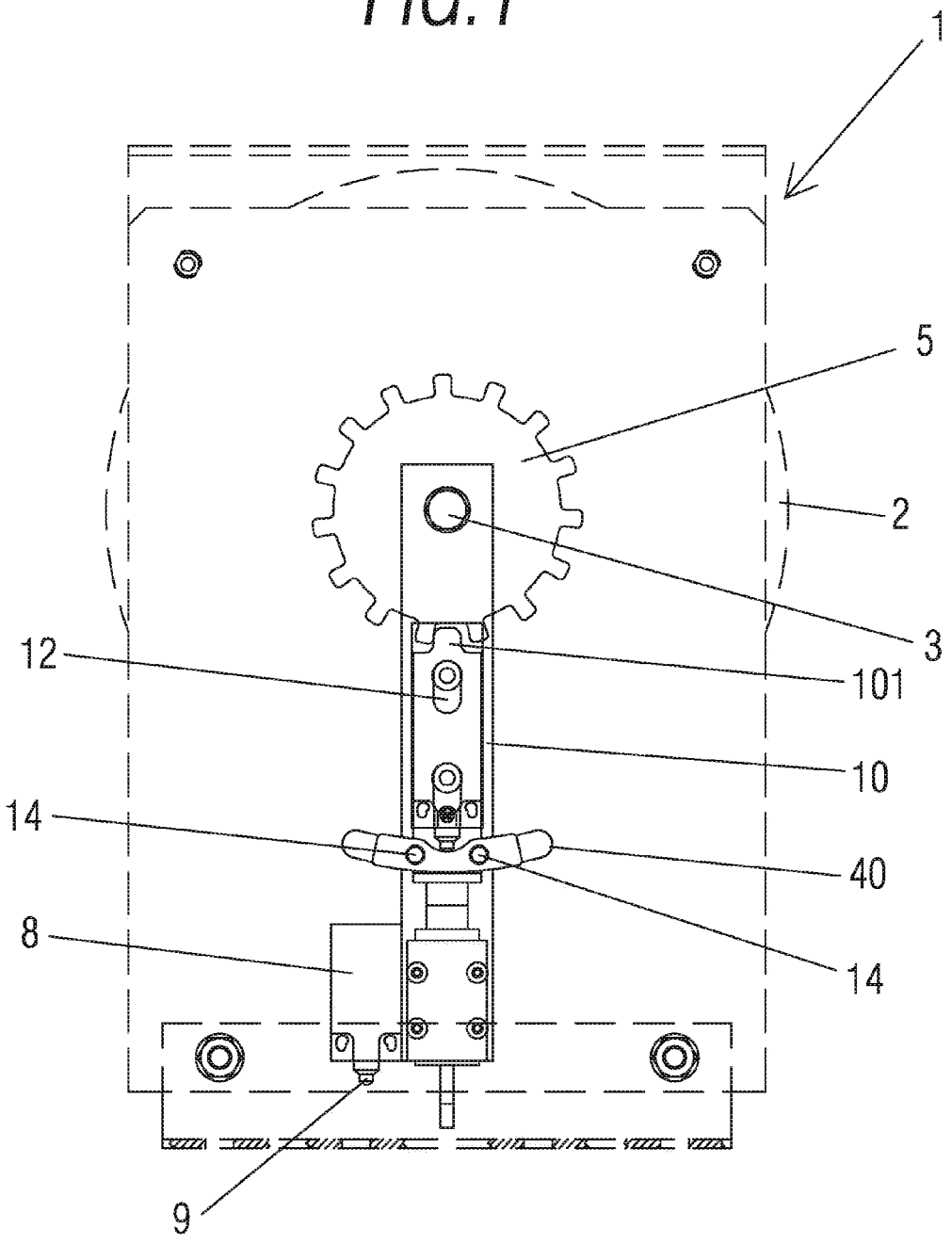


FIG.2

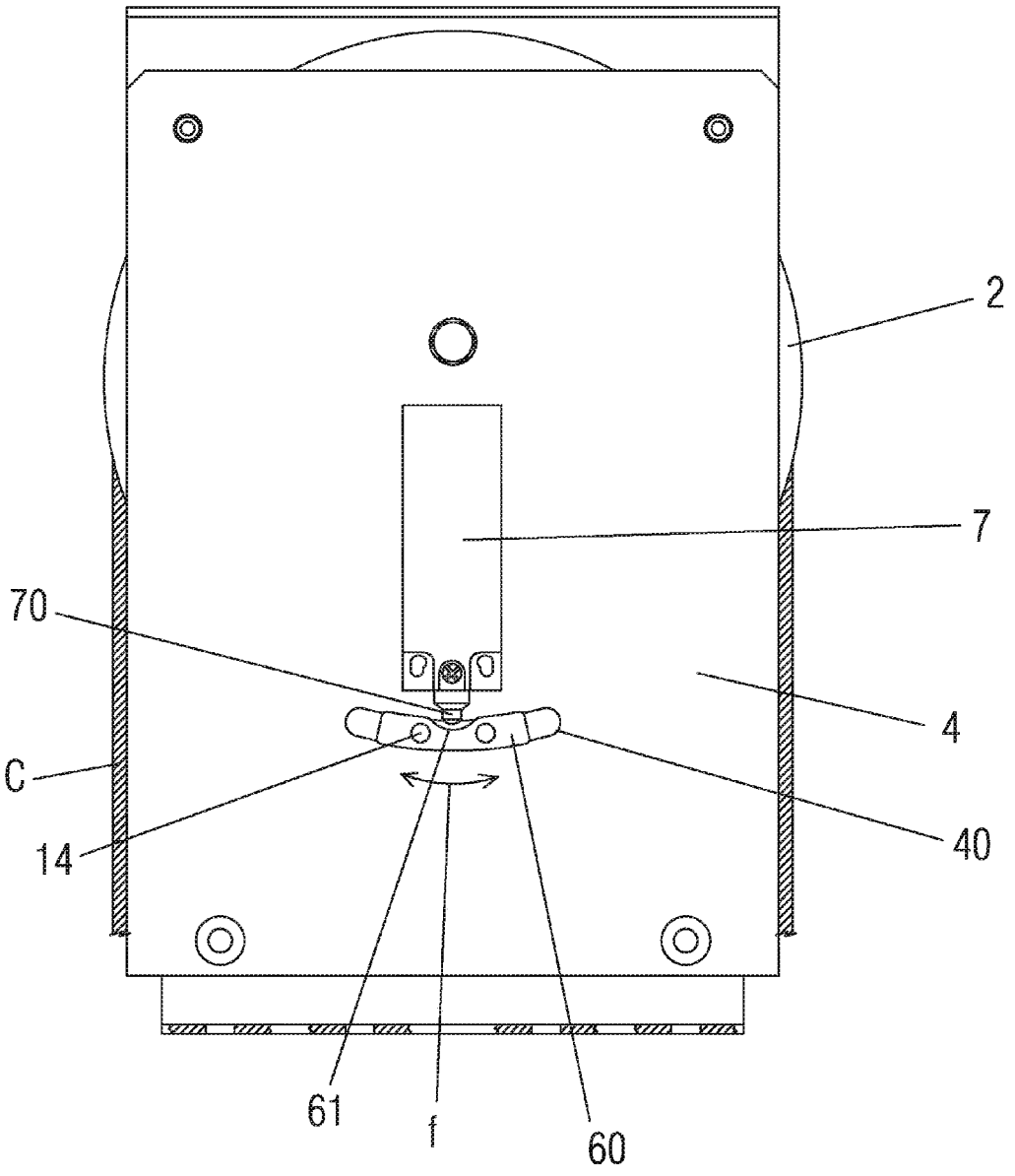


FIG.3

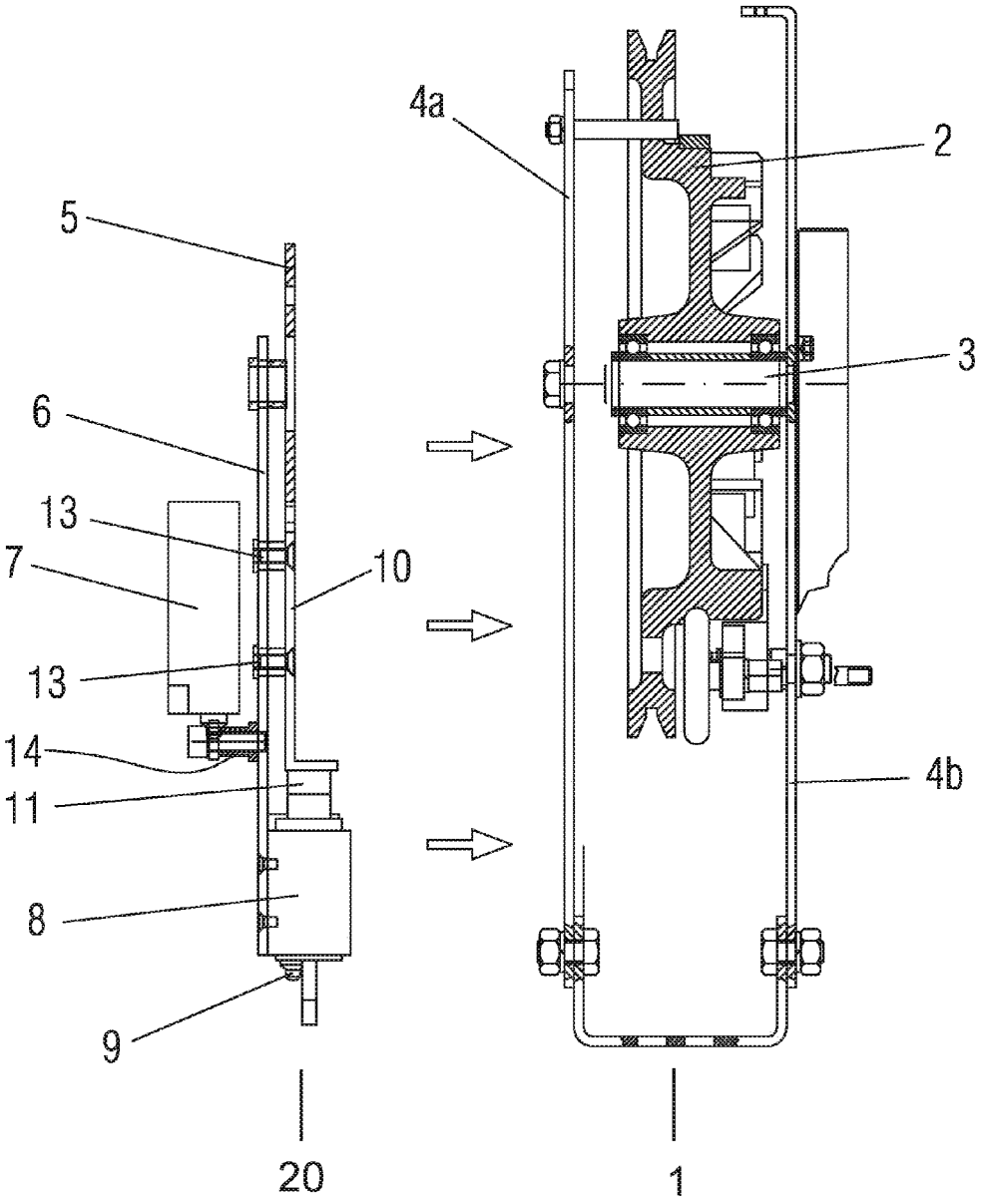
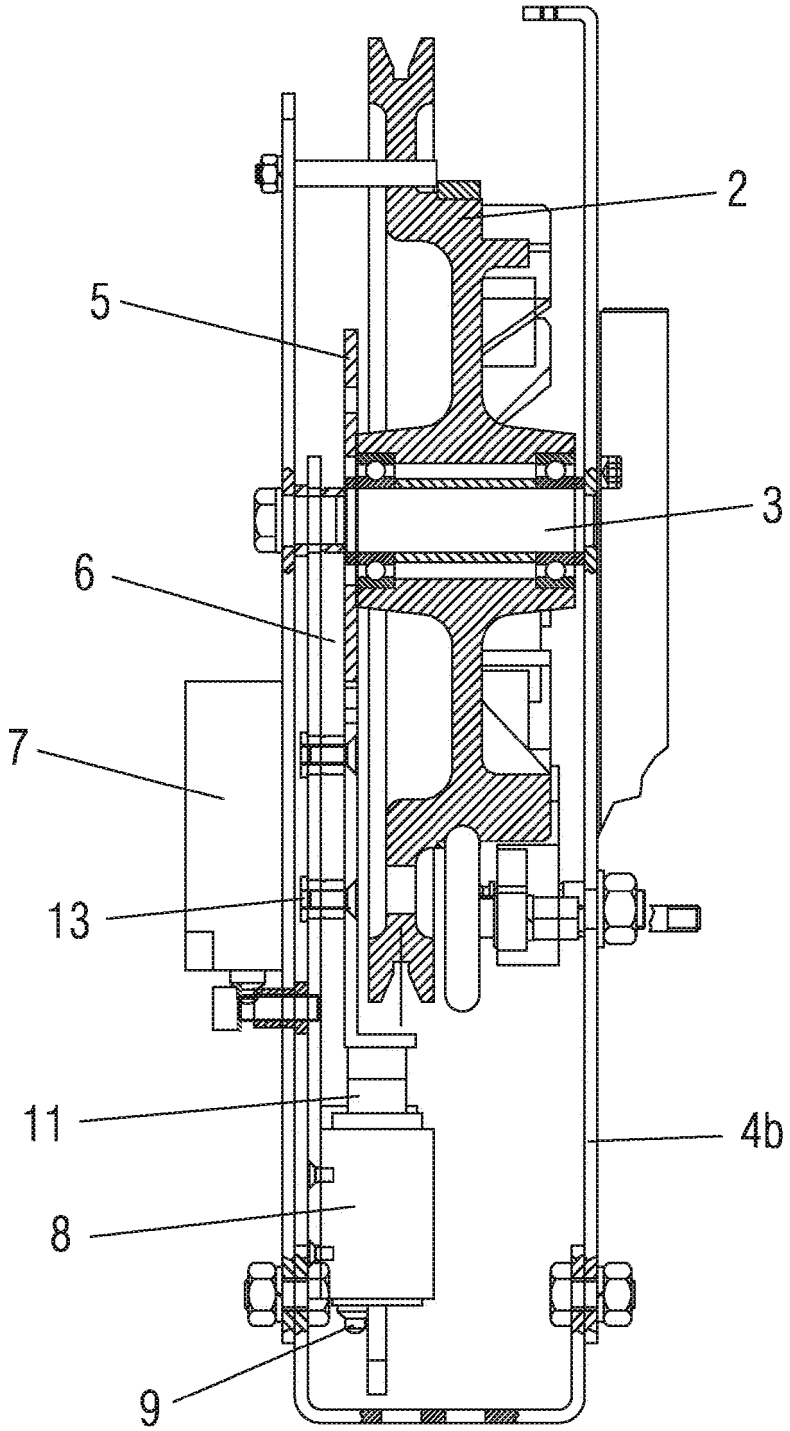


FIG.4



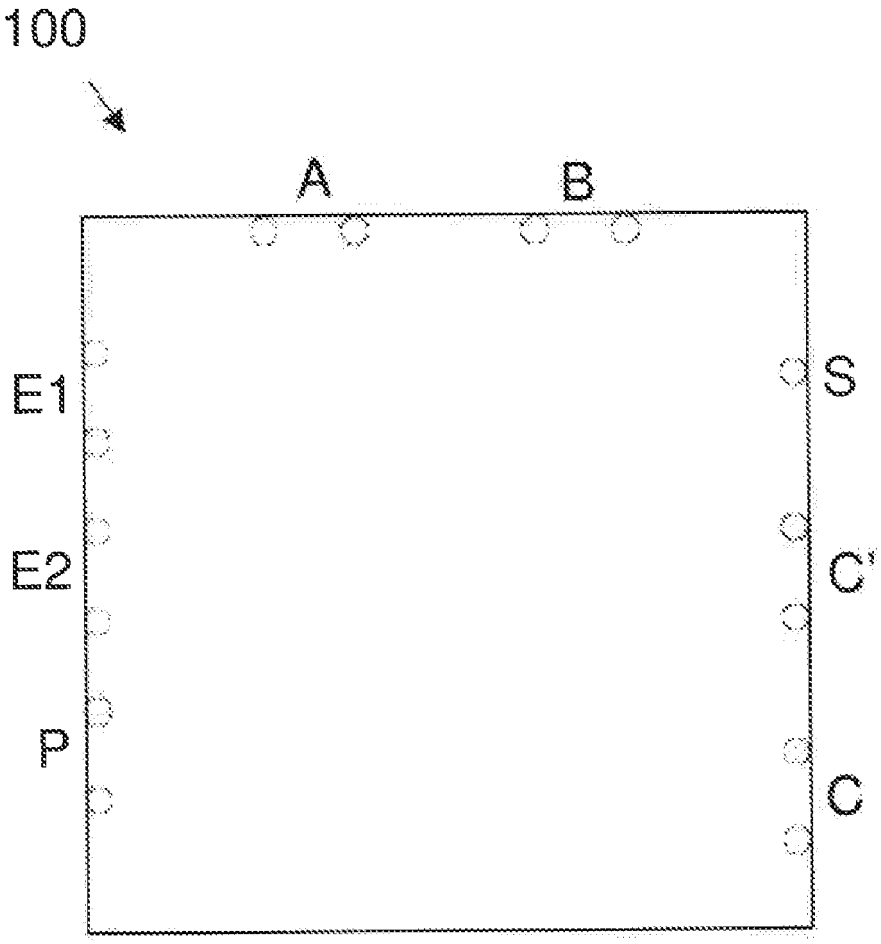


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2012/070232

A. CLASSIFICATION OF SUBJECT MATTER

B66B5/00 (2006.01)
B66B5/02 (2006.01)
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)
B66B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	EP 1780160 A1 (MITSUBISHI ELECTRIC CORP) 02/05/2007, figures & Abstract from DataBase WPI. Retrieved from EPOQUE; AN 2005-796878.	1
A	GB 1436742 A (WESTINGHOUSE ELECTRIC CORP) 26/05/1976, figures & Abstract from base of datos of WPI. Retrieved from EPOQUE; AN 1976-F0291X.	1
A	US 5509505 A (STEGER RUDOLPH ET AL.) 23/04/1996, figures & Abstract from DataBase WPI. Retrieved of EPOQUE; AN 1995-289943.	1

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
25/05/2012	**(28/05/2012)**
Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer M. Castañón Chicharro Telephone No. 91 3493261

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

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
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REFERENCES CITED IN THE DESCRIPTION

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