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(54) **Trigger device for the end positions of an elevator and operating procedure thereof**

(57) The invention trigger device which, once activated, operates a wedging mechanism of the elevator by a mechanical connection when the car exceeds a certain position in the shaft. It is formed by a gear motor and a lever or hook which is deployed when it passes to active state; there is a series of door micros associated to the

trigger device which inform the system, as well as a control station which has, among other elements, a system reset key, and finally a safety relay. It has the purpose of protecting people who may be in both the pit and the escape.

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Description**OBJECT OF THE INVENTION**

[0001] The object of the present invention is both a trigger device for the end positions of an elevator, i.e. for the roof of the car and for the shaft pit, and the operating procedure of the same device to achieve the desired purpose. It is a device designed to protect people who may be both in the pit and in the escape (car roof), against possible accidents, based on a trigger device, which once activated, acts on the wedging system of the elevator, stopping it.

[0002] The present device is characterized in that the present trigger device, in addition to the purpose for which it is intended, is automatically activated in maintenance operations, as well as in situations of absence of power supply, it not being necessary for the trigger device to be activated manually in certain situations.

[0003] Therefore, the present invention is included within the scope of safety systems associated to elevation systems such as elevators and particularly among the means of safety aimed at avoiding a possible crushing of the people who may be in the escape or in the pit.

BACKGROUND OF THE INVENTION

[0004] The design of an elevator installation should consider the possibility of leaving free spaces in the shaft, both in the upper part and in the lower part. Nevertheless, on many occasions it is not possible to achieve this. Until now, in the cases where it is not possible to leave free spaces, mechanical manual operation locking devices are usually placed.

[0005] Devices are known which enable regulating the positioning of the car in its position within the elevator shaft such as that disclosed in patent EP 1174381, for this having a series of buttons arranged above the car, suitably arranged to avoid its involuntary action, as well as a pushbutton station concealed in the button panel beside the access door to the last level. Although the system described permits obtaining an improvement in the safety of the workers who may be in the shaft or in the pit, it is not without difficulties.

[0006] Firstly, the system disclosed in said patent EP 1174381 cannot be considered an automatic operation safety system; secondly, it does not mention any protection for situations of reduced free height of the elevator pit. On the other hand, the system described does not operate the stopping or wedging mechanism of the elevator by a mechanical connection, when it passes a certain position within the elevator shaft. Furthermore, it does not guarantee its operation at any speed and its adjustment is fairly complex.

[0007] Therefore, an object of the present invention is a safety system for elevator shafts, which has an automatic operation in maintenance operations or in the absence of power supply, that said operation acts on the

elevator wedging mechanism, where the operation is guaranteed at any speed, and where the position adjustment in the elevator run is very simple and exact.

5 **EXPLANATION OF THE INVENTION**

[0008] The invention trigger device for the end positions of an elevator consists of a device which, once activated, operates the elevator stopping mechanism by a mechanical connection when the car exceeds a certain position in the shaft.

10 [0009] The trigger device is formed by a gear motor and lever assembly which jam the elevator wedging system, specifically on the linkage, to produce the emergency stop and which comprises:

- Gear motor
- Attachment system to the guides.
- Operating lever with catch system
- 20 ■ Safety micros to detect the active and resting positions
- Damping system.
- Safety micro associated to the run of the damping system spring.

25 [0010] The trigger device is integrated in a safety system which also has:

- A series of door micros, which inform the system that a door or trap has been opened by manual unlocking so that the control acts on the motors and causes the activation of the stopping system in the event the car jams the trigger system.
- Control station which has:
 - 35 ■ Control card with microprocessor
 - Reserve battery
 - Battery charger
 - Power supply
 - 40 ■ Reset key
- A safety relay, so that when inactive the elevator cannot move.

45 [0011] The trigger device is positioned so that it can be easily accessed for checks, tests and maintenance, and its handling is totally safe from the pit, car roof or outside the shaft.

[0012] The trigger device is attached to the guides and is positioned in the place after which it is not desired, for any reason, that the car exceeds said position, applying this criterion both for the escape and for the pit.

[0013] The trigger device has two basic states, activation or rest, and it is only in the activation position, and after the elevator exceeds a certain point, that the elevator stopping or wedging mechanism is operated, by actuation on the elevator linkage.

55 [0014] On the other hand, the trigger device is such

that if it acts as run stop in the escape and the elevator is in a position above the device, and the elevator were to move downward and jam the device, this would retract so that the descent is not prevented, but automatically resetting without suffering any damage by said operation.

[0015] In the event that the device were to act as run stop in the pit, and with the device active, the car being in a position below the device, if the car were to move in upward direction jamming the trigger device, this would retract not preventing the upward movement of the car, automatically resetting without suffering any damage by said operation.

[0016] The trigger device is such that:

- It is activated on opening a door or trap by release key,
- It is also activated when the general power supply of the manoeuvre is cut off and any door is opened by the manual unlocking device
- Another possibility of activation is when, in the absence of power supply, and without opening any doors, the voltage of the equipment reserve battery drops below a determined threshold.

[0017] The trigger device has a manual electric resetting device which causes the system to reset and return to normal operations if:

- The elevator is not in inspection manoeuvre, for this there should exist a communication from the manoeuvre general to the control system of the trigger device which informs of said situation.
- The doors and traps which give access to the escape and pit are closed and locked.
- The mechanical devices which act on the stopping system are in resting position.

[0018] It must be borne in mind that a failure in the power supply does not cause the system to reset. The resetting device is formed by an operation button with key and should be positioned in the control box, outside the shaft and only accessible to authorized persons. Whilst the system is being reset, the safety series opens to prevent the normal operation of the elevator.

[0019] The safety system works in combination with a safety relay so that the operation of the elevator in normal manoeuvre is only possible if the trigger device is at rest and the safety relay is activated. The safety system opens the safety relay and, therefore, the elevator cannot move, in the following conditions:

- The step to active or at rest of the trigger device is being performed.
- A door is opened by the manual unlocking system
- The power supply is cut off and any door is opened using the manual unlocking device.
- In the absence of power supply, when the reserve battery charge drops below a determined threshold.

[0020] The safety system activates the safety relay in the above conditions only when the inspection manoeuvre is activated in one of them. At the point when the inspection manoeuvre is deactivated, the safety system opens the safety relay and does not return it to its closed state until it acts on the resetting system.

[0021] The trigger device has a pilot light which is illuminated when the system is active and identifies the locations of said devices.

EXPLANATION OF THE FIGURES

[0022] To complement the description that will be made below and in order to aid towards a better understanding of its characteristics, a set of plans is attached to the present specification, in whose figures, illustratively and non-limitatively, the most significant details of the invention are represented. Figure 1, shows a representation of the trigger device which forms part of the safety device object of the invention. Figure 2, shows the same above piece whereon a support piece for wedges has been positioned.

PREFERRED EMBODIMENT OF THE INVENTION

[0023] A preferred embodiment of the proposed invention will be described in the light of the figures. The invention of the trigger device for the end positions of an elevator has the purpose of protecting operators when the escape or the pit do not have sufficient dimensions to avoid the operator from being crushed.

[0024] The trigger device, as represented in figure 1, is integrated within a safety system which, in addition to having the trigger device, has:

- A series of door micros, which inform the system when a door or trap opens by manual unlocking so that the control acts on the motors and causes the activation of the stopping system in the event the car jams the trigger system.
- Control station, which has:
 - Control card with microprocessor
 - Reserve battery
 - Battery charger
 - Power supply
 - Reset key
- A safety relay, so that when inactive the elevator cannot move.

[0025] The trigger device has the necessary elements so that, in active position, it can act on the elevator wedging system causing it to stop, once this exceeds a determined position.

[0026] For this, the trigger device has a gear motor (7) in charge of deploying a hook, pendulum or lever (1) when it is in active position. Said hook or pendulum (1) acts on

the elevator linkage for the wedging thereof.

[0027] The hook or pendulum (1) is associated to a spin axis (2), which at the opposite end to that of the hook or pendulum (1), has a first crankshaft (3) which transmits the rotation of the gear motor (7). Associated to the gear motor (7), there is a second crankshaft (4) which indicates the status of the trigger device, so that when the gear motor (7) turns, said second crankshaft (4) acts on the micros (5).

[0028] The trigger device represented has two springs (8) positioned between two support plates, an upper one (9) and another lower one (10) so that said springs (8) absorb the possible stresses to which the trigger device may be subjected when performing the contact with the elevator linkage.

[0029] The trigger device also has a third micro (11) associated to the run of the damping system spring which may be connected to the safety series of the elevator.

[0030] It should finally be indicated that the trigger device has a pilot or light source (13) which is illuminated when the system is active so that it clearly identifies the locations of said devices and their status.

[0031] All elements of the trigger device are housed in a casing (6) which is conveniently closed, firstly by a support piece (12) (figure 2), and also covered by other guide support plates, which have not been represented.

[0032] The essential nature of this invention is not altered by variations in materials, shape, size and arrangement of the component elements, described non-limitatively, this being sufficient for its reproduction by a person skilled in the art.

Claims

1. Trigger device for the end positions of an elevator, which seeks to protect the people who may be both in the pit and in an escape of the elevator shaft, from possible accidents, acting on a wedging of the elevator, **characterized in that** it is formed by a gear motor and lever assembly and a hook, lever or pendulum which jam the elevator wedging system, specifically on a linkage, to produce the emergency stop, the trigger device having two states, one active and another of rest.
2. Trigger device for the end positions of an elevator according to claim 1, **characterized in that** the lever, hook or pendulum (1) is associated to a spin axis (2), which at the opposite end to that of the hook or pendulum (1), has a first crankshaft (3) which transmits the rotation of the gear motor (7) and **in that** associated to the gear motor (7), there is a second crankshaft (4) which indicates the status of the trigger device, so that when the gear motor (7) turns, said second crankshaft (4) acts on micros (5).
3. Trigger device for the end positions of an elevator

according to claim 1 or 2, **characterized in that** the trigger device is integrated within a safety system which, in addition to having the trigger device, has:

- A series of door micros, which inform the system when a door or trap opens by manual unlocking so that the control acts on the motors and causes the activation of the stopping system in the event the car jams the trigger system.
- Control station, which has:

- Control card with microprocessor
- Reserve battery
- Battery charger
- Power supply
- Reset Key

- A safety relay, so that when inactive the elevator cannot move.

4. Operating procedure of the trigger device previously claimed, **characterized in that** the trigger device has two states, one of rest and another active, the activation occurring:

- on opening a door or trap by release key,
- when the general power supply of the manoeuvre is cut off and any door is opened by the manual unlocking device.
- in the absence of power supply, and without opening any doors, the voltage of the equipment reserve battery drops below a determined threshold.

5. Operating procedure of the trigger device according to claim 4, **characterized in that** the trigger device is integrated within a safety system, which in addition to the trigger device has a series of door micros, a control station which has a control card, battery, charger, reset key and safety relay.

6. Operating procedure of the trigger device according to claim 5, **characterized in that** the operation of the elevator in normal manoeuvre is only possible if the trigger device is at rest and the safety relay is activated,

7. Operating procedure of the trigger device according to claim 5, **characterized in that** the safety relay is opened by the trigger device so that the elevator cannot move, said relay opening in the following conditions:

- The step to active or at rest of the trigger device is being performed.
- A door is opened by the manual unlocking system

- The power supply is cut off and any door is opened using the manual unlocking device.
- In the absence of power supply, when the reserve battery charge drops below a determined threshold.

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8. Operating procedure of the safety system according to claim 7, **characterized**

in that the safety system activates the safety relay in the previous conditions only when the inspection manoeuvre is activated in one of them, on the other hand at the point when the inspection manoeuvre is deactivated, the safety system opens the safety relay and does not return it to its closed state until it acts on the resetting system.

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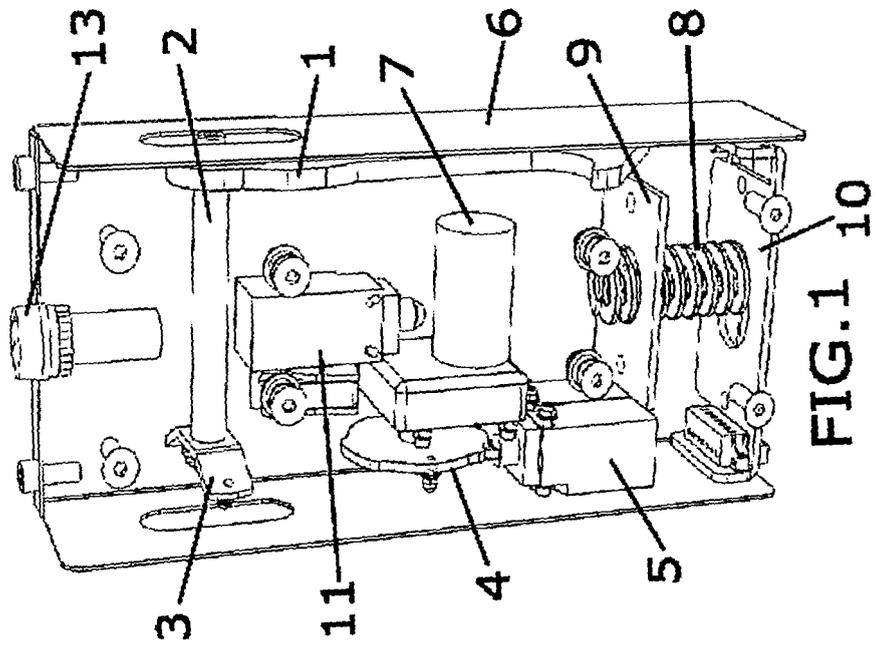
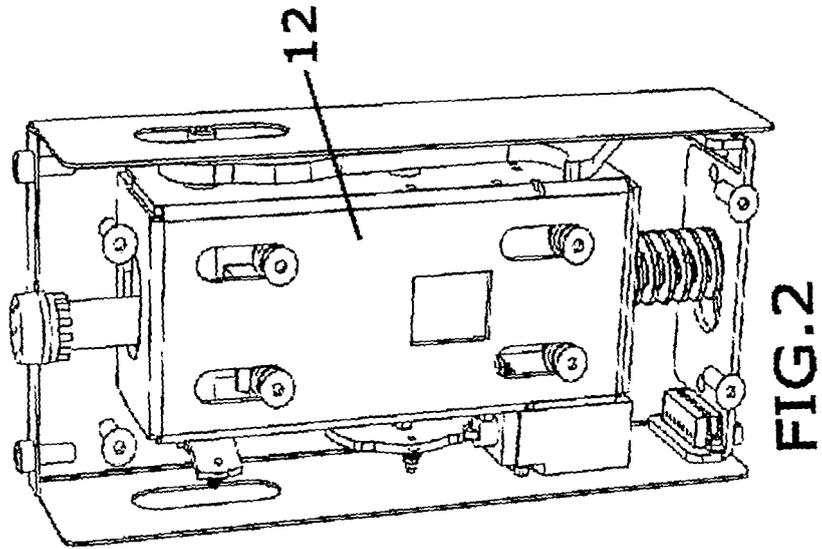
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The present search report has been drawn up for all claims

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EPO FORM 1503 03.82 (P04C01)

Place of search The Hague	Date of completion of the search 15 April 2008	Examiner Oosterom, Marcel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document



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Place of search		Date of completion of the search	Examiner
The Hague		15 April 2008	Oosterom, Marcel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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ANNEX TO THE EUROPEAN SEARCH REPORT
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