(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 795 511 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
17.09.1997 Bulletin 1997/38

(51) Int Cl.[6]: **B66B 13/22**, B66B 3/00

(21) Application number: **97600002.6**

(22) Date of filing: **27.02.1997**

(84) Designated Contracting States:
DE ES FR GB IT NL

(30) Priority: **07.03.1996 GR 96010076**

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(54) Security elevator door system

(57) The invention refers to a system of securing shaft doors for elevators. The system is characterised from the fact that it can be placed on the flaps of the shaft-doors of the elevators and consist of (Fig.1) a base (1) where two micro-switches (5) are attached and which are placed in the interior of every flap of a shaft-door in a way that the hole existing in them is exactly aligned with the stroke of the safety linchpin of the lock, as well as from an electronic device (6) in the shape of a monitor with two indicative lights (8) and a beeper (9) which are placed on the outside of every shaft-door. This system on one hand does not allow the set-out of the lift-cage if the shaft-door is not closed and secured, even if there is a malfunction of the mechanism of latching and/or if the electric and electronic parts of the elevator or even if there is a deliberate by-pass of the safety mechanisms of the elevator; and on the other hand, does not allow the opening of the shaft if the cagelift is not behind it and, last, the new system warns audiovisually for the arrival of the lift-cage, only when the cages arrives and has stopped behind the door. With this invention within the framework of an economical solution the thus greater safety of the elevators users is acheived from probable installation deficiencies due to bad manufacture, maintenance or even mechanisms' ageing and can also be used by people with special needs.

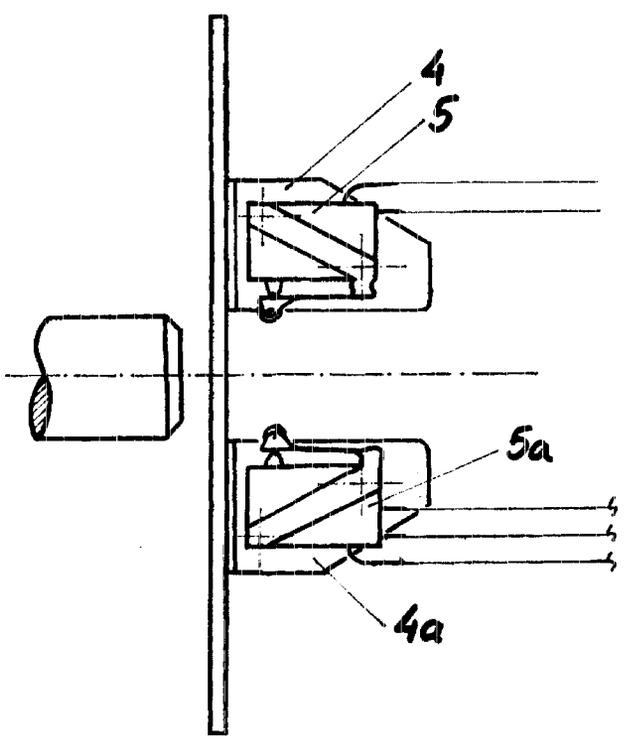

FIG. 1

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Description

This invention refers to a system of securing the doors of an elevator's shaft which is placed in the door-flaps of the shaft and with which we attain their absolute safety excluding the possibility of any part of the door being opened if the lift-cage is not exactly behind it, or the possibility of the lift-cage starting with open door even if there is a deliberate human intention of such kind, where, in the meantime, the user of the elevator is warned for the appropriate or not position of the lift-cage in what has to do with the shaft-door.

The continuously higher buildings in the modern cities along with the immense increase of the human activities in those buildings lead to the much greater use of the elevators by people, at the same time creating increasing demands on the safety of people using them. A basic requirement for the safe function of an elevator is the securing of the doors of the shaft in a way that firstly, only if the lift-cage is right behind it can the door open, and secondly, only if the shaft-door is closed can the lift-cage operate.

The up-to-now technical knowledge refers to systems of forelatching-latching of the shaft-doors, which are placed in the frame of every shaft-door. Only when the mechanism of latching of a certain door operates and only if the lift-cage is right behind it does this mechanism allow this particular door to open. On the other hand, the mechanisms of latching of the rest of the doors keep them closed. The most usual sequence of opening one semi-automatic door is the electromagnetic, which on the lift-cage an electromagnetic mechanism is placed which secures the unlatching of the shaft-doors of the elevator. During start-up and travel of the lift-cage, the electromagnet is fed with electricity and coils a vertical foil on the left of every latching-unlatching mechanism, in a way that when the lift-cage passes through the shaft-doors of every floor, the foil does not strike to the unlatching locks and so, the doors remain safely closed. When the lift-cage approaches the floor in which it must stop, the supply of the electromagnet is interrupted, the mechanism protrudes and the foil attracts the safety linch-pin of the unlatching lock so as the linch-pin stops connecting the contacts of the circuit that makes the lift-cage move, and so succeeds in making the lift-cage stop and, at the same time unlatches of the door of the selected floor. The circuit of the lift-cage does not close even when the door of the floor, where the lift-cage is stopped, is open, because it includes two contacts on both-sides of the door, which are connected to the conductor existing inside the door.

In those types of systems, there is a disadvantage which is that if something does not operate properly, no warning is sent to the people waiting for the elevator, thus endangering their lives.

One second drawback is that the lift-cage may operate with an open door in any floor if someone connects the two contacts of the door.

A third disadvantage is in case of internal malfunction of the latching mechanism; then it is possible that the linch-pin or any other metallic substance of the mechanism can create a circuit and thus operate the lift-cage of the elevator, having as a result the lift-cage move without the linch-pin having secured the door of the floor where the malfunction exists.

A fourth drawback is that in case of sort-circuit of the electronic parts of the installation of the elevator if the grounding relay does not operate it is possible that the elevator operates with an open door at the point of its start.

A fifth disadvantage is that it is possible the lift-cage operates due to either remaining magnetism or to human deliberate intervention to the converters (shuntings).

Lastly, due to the weaknesses of the present system, special and more firm - if compared with the existing - systems of latching have been created which have multiple cost without solving all the above described drawbacks.

The new system of securing the doors of the elevator, which is now presented in an improved form, consists of one metal base where the micro-switches are placed and which has a hole of 20 millimetres and is placed in every flap of the shaft door, in a way that the hole of entry of the safety linch-pin of the door's lock is identified with that of the metal base, as well as from an electronic component in a form of monitor that has two indicative lights and a beeper and which is placed in an appropriate position of the external surface of the shaft-door's flap.

This system, on one hand, does not allow the movement of the lift-cage if the shaft-door is not closed and secured, even if there is a malfunction of the latching mechanism and/or the electrical and electronic parts of the elevator or even if a deliberate by-pass of the security mechanism of the elevator is attempted, and on the other hand does not allow the opening of the shaft, if the lift-cage is not placed exactly behind it, and, last, the new system warns audiovisually for the arrival of the lift-cage, only when the lift-cage has properly arrived and has stopped behind the door.

The invention is described below using the help of an example and references to attached drawings in which:

In Fig.1 the metallic base is shown with the micro-switches of double action, the electronic device as well as the joint among them.

The invention is further described below using the help of an example and referring to the drawing, where the same serial numbers symbolise components.

In Fig.1 the metallic base is depicted (1) which has in its centre a hole (2) of 20 millimetres of diameter and two smaller supporting holes (3) 3 millimetres of diameter each. On the top of the metal base two additional metallic bases have been attached (4) and (4a) of equal distances in both sides of the hole (2), in which two sim-

ple power micro-switches are placed (5) and one double function transporter (5a). One of the micro-switches (5) is connected in sequence to the electric circuit of operation of the lift-cage of the elevator, while the second (5a) feeds the electronic device (6) with power. The micro-switches are in such an order that, at the point of entry of the lock's safety linch-pin from the hole (2) the terminals should come into contact. If the latching system of all shaft-doors functions properly, all the micro-switches (5) are closed and accordingly, the circuit for the movement of the lift-cage of the elevator is fed with power and the lift-cage can move. If even one latching door-shaft has a problem, then the circuit responsible for the movement of the lift-cage of the elevator cannot be closed and so the operation is impossible. The same happens if any door of any lift-cage is open, even if someone uses cable for the connection of the two contacts of the door. The movement of the lift-cage is allowed only if all the shaft-doors are closed and secured with the linch-pin of the lock. Simultaneously, the micro-switch (5a) supplies power to the red indicative light (7) of the electronic device. For as long as the lift-cage moves, all micro-switches (5a) will be closed and accordingly, in all electronic devices of the shaft-doors, the red indicative light will be turned on. When the shaft reaches its destination, exactly behind the door of the selected floor, then the safety linch-pin of the security lock withdraws, the connection of the micro-switch (7) opens and the shaft will not be able to start moving, unless the latching of the door is reactivated. At the same time the micro-switch (5a) of the floor is turned on, the red light (7) turns off and through one contact composure the green light (8) of the electronic devices turns on and the announcement beeper (9) sounds for the arrival of the cage-lift behind the door.

By the economical solution presented through this invention, an increased safety for the users of elevators is attained, saving from problems stemming from installation deficiencies due to bad manufacture, maintenance or even ageing of the mechanism and can be used by people with special needs.

Claims

1. Safety system for securing the doors of elevators (Fig.1) which is placed entirely on the flap of the shaft-door and which comprises of one metallic base (1) which has in its centre a hole (2) of 20 millimetres of diameter and two smaller holes (3) supporting it on the flap of the shaft-door and which has two additional metallic bases placed on both sides of the hole of 20 millimetres each, in which we adjust two micro-switches (5) and (5a), which the first (5) allows the movement of the lift-cage only if the safety linchpins of the latch lock on the shaft-doors of all floors have entered to the hole of 20 millimetres and have, thus, stimulated the micro-switch (5), while postponing the movement of the cage-lift; if whatever shaft-door is opened, the second micro-switch (5a) feeds with power the electronic device (6) and when the cage-lift is not behind the shaft-door the red indicative light turns on (7), while when the cage-lift arrives to one floor behind the door, then the green indicative light (8) turns on in the electronic device (6) and at the same time the beeper (9) sounds the warning to the user that the cage-lift has arrived behind the shaft-door of the particular floor and about the unlatching of the door.

2. Safety system of the doors of the elevators according to requirement 1, where the monitor can be attached at whatever place except on the flap of the shaft-door.

3. Safety system of the elevators' doors according to requirements 1 and 2, where instead of micro-switches other types of switches are used.

4. Safety system for the elevators' doors according to requirements 1, 2 and 3 where the electronic device can warn for the arrival of the cage-lift and the unlock of the doors through written indication or some other way.

5. Safety system for elevators' doors according to requirements 1,2, 3 and 4. Where the holes of the metallic base can be of whatever dimensions and shapes, in order that the safety linch-pin of the latching lock can enter.

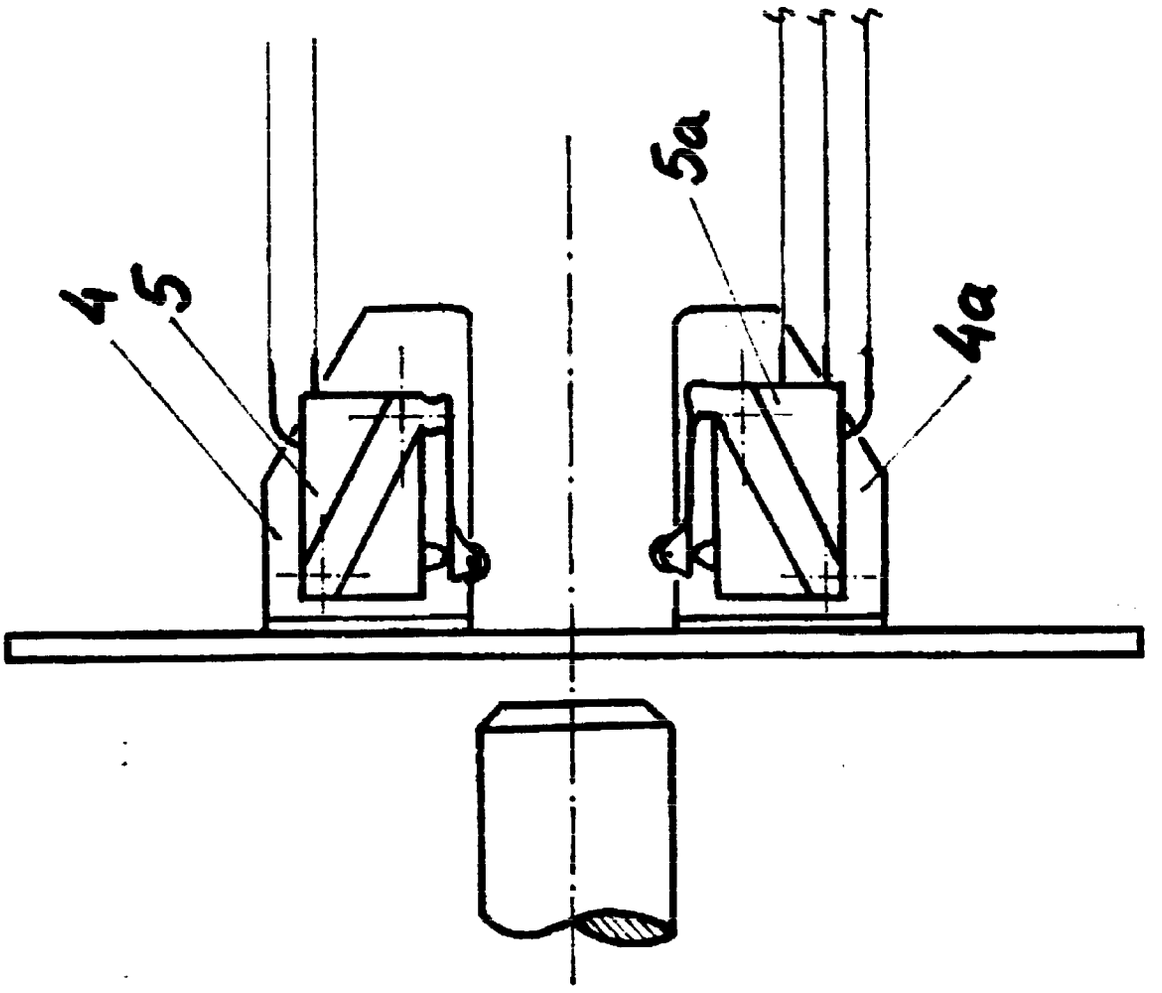

FIG. 1

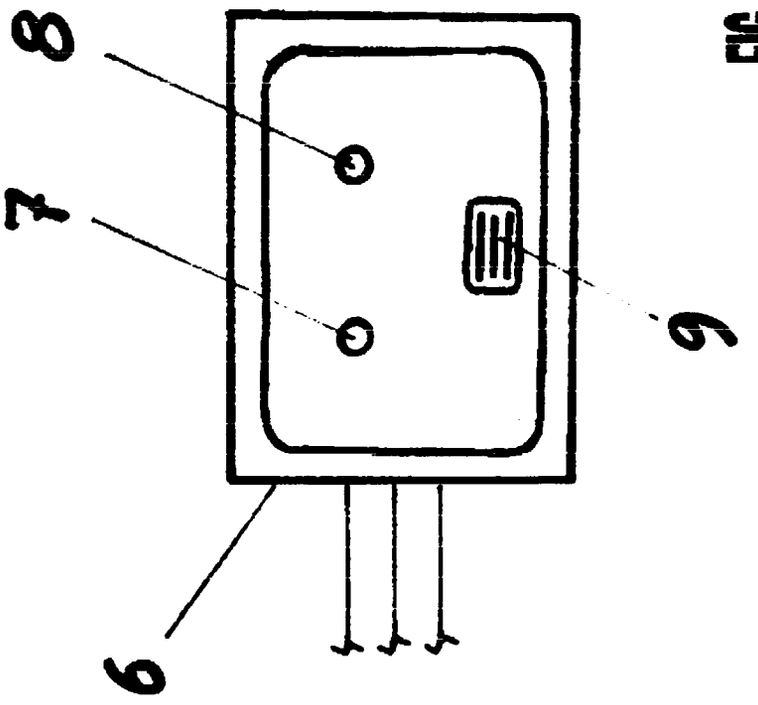

FIG. 1a

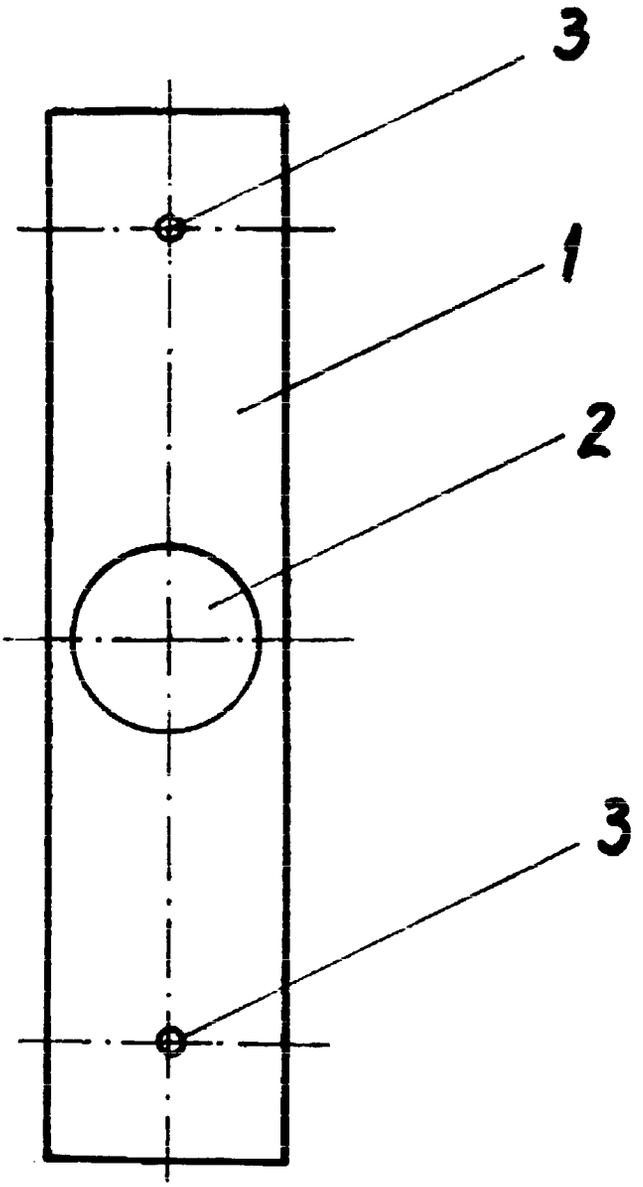

FIG. 1b

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EUROPEAN SEARCH REPORT

Application Number
EP 97 60 0002

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	US 1 949 245 A (DUGAN) 27 February 1934 * page 1, line 85 - page 2, line 134; figures 1-3 *	1-5	B66B13/22 B66B3/00
Y	DE 731 720 C (POELMANN) 13 February 1943 * page 2, line 30 - line 110; figures 1-3 *	1-5	
A	US 4 832 157 A (KITANO MAMORU) 23 May 1989 * column 2, line 41 - column 4, line 2 *	1-5	
A	CH 278 707 A (INVENTIO) 1 February 1952 * the whole document *	1-5	
A	US 4 483 420 A (BYRNE FRANCIS J) 20 November 1984 * abstract *	1-5	
A	US 4 094 266 A (ARTT DONALD P) 13 June 1978 * abstract *	1-5	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	US 4 491 199 A (SHEA HENRY J ET AL) 1 January 1985 * abstract *	1-5	B66B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	5 June 1997	Sozzi, R

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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