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(54) Elevator door safety device

(57) A lift with a communication device between the cabin doors and the floor doors (1) comprising a cabin (2), provided with cabin doors (3) running inside a special lift-shaft (4), provided with floor doors (5) on each floor (6) reached and a control board wherein the cabin doors (3) and the floor doors (5) are provided with operators comprising at least an electronic control device (7) provided at least with one communication device (8,9) and they are severally provided with at least one engine, preferably an electric engine, operated by said electronic control device (7).

The communication device (8) associated to the cabin doors (3) sends the information coming from the control board to the floor doors (5) so that their opening or closing is synchronized in a way which is not conditioned by the alignment accuracy between the cabin doors (3) and the floor doors (5) for their running without the need of mechanical couplings.

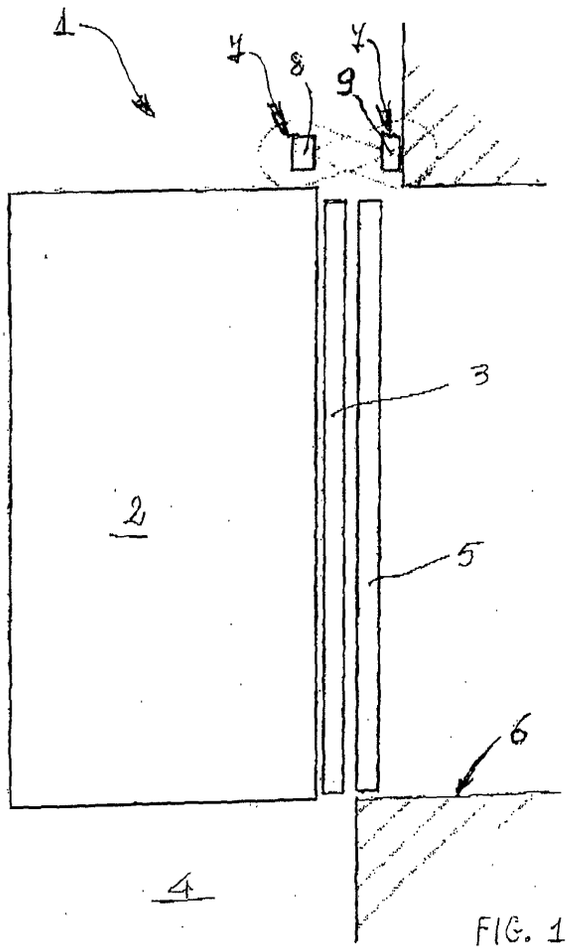

FIG. 1

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Description

[0001] The present invention refers to a lift provided with communication device between the cabin doors and the lift doors.

[0002] As it is known, the floor doors and the cabin doors of a lift are equipped with mechanical coupling devices. In particular, the floor doors are equipped with a locking device and the cabin ones with a sliding block acting on the floor doors to open them when it matches the level of the same floor. These mechanical coupling devices allow the cabin doors detecting the opening of the door floors on each floor. These devices are equipped with engines activating the sliding block of the cabin side doors and the floor doors, while the sliding block engages the locking device of the floor doors.

[0003] Even though this kind of lifts is largely used in some conditions, such as in the inclined lifts or in the highspeed lifts, they are not free from drawbacks, such as the coupling between the cabin doors and the floor ones which can become critical from the security point of view. These mechanical coupling devices require narrow alignment tolerances between the cabin doors and the floor doors in order to fix, in combination, the opening of the same doors. These are burdensome tolerances to be guaranteed particularly in the above-mentioned cases.

[0004] In order to remedy these drawbacks, the replacement of the mechanical coupling devices with independent opening devices of the cabin doors and of the floor doors, basically engines, operating in a synchronised way have been proposed. This solution remits both the control of the cabin doors and of the floor doors to the control board together with the control of their opening only when they are facing each other. This solution had obviously to meet the security regulations and therefore it was very expensive to carry out. In fact, as the safe operation and control of the synchronization and opening of the doors is remitted to the control board, this solution requires a very complex and expensive wiring as, in order to guarantee all the functions, a high number of wires is involved.

[0005] Even though this solution solves the alignment problem, it is not free from drawbacks such as, in addition to the wiring complexity, the manufacturing complexity and the installation difficulties that are generally due to the availability of narrow spaces with an increase in costs.

[0006] Object of the present invention is to provide a lift with a communication device between the cabin doors and floor ones in order to eliminate the above-mentioned drawbacks connected to the prior art.

[0007] A further object of the present invention is to provide a lift with a communication device between the cabin doors and the floor ones that can be easily installed in narrow spaces. According to the present invention, these and other objects, resulting from the following description, are reached by a lift with a communication device between the cabin doors and the floor doors according to claim 1.

[0008] The manufacturing and functional features of the lift with a communication device between the cabin doors and floor doors of the present invention will be better understood from the following description wherein reference is made to the figures of the enclosed drawings that represent an embodiment of said lift with a communication device between the cabin doors and the floor doors which is given only by way of illustrative and non-limitative example, wherein:

- Figure 1 is a schematic view of the lift with a communication device between the cabin and the floor doors of the present invention.

[0009] With reference to the attached figure, the lift with a communication device between the cabin doors and floor doors of the present invention, marked with 1 in its whole, comprises a cabin 2 provided with cabin doors 3 running inside a special lift-shaft 4 provided with floor doors 5 on each door 6 which is reached and with a control board.

[0010] Both the cabin doors 3 and the floor doors 5 are provided with operators comprising mechanical security locking devices as contemplated by the regulations related to the manufacturing of lifts and of electronic control devices 7. Both the cabin doors 3 and the floor ones 5 are severally provided with at least one engine, preferably an electric one, which is operated by said electronic control devices 7, for their independent activation when they open or close.

[0011] Preferably, and for security purposes, the electronic control device 7 of the engine determines, among the other functions, the disconnection of the engine when the cabin 2 does not open onto the floor 6 independently from the fact that the cabin 2 is running or stationary. Both the cabin doors 3 and the floor doors 5 can be equipped with all the security devices according to the regulations, such as pull ropes, keys, batteries or other suitable means to evacuate the lift.

[0012] The electronic control devices 7 both of the cabin doors 3 and of the floor doors 5 are provided with at least one communication device respectively 8 and 9. This at least one communication device 8 and 9 is bidirectional and asymmetric of the Master/Slave type and, particularly, the communication device 8 associated to the cabin doors 3 operates as a Master and the communication device 9 associated to the floor doors 5 operates as a Slave.

[0013] Each communication device 8 and 9 is preferably provided with transceivers modules of the infrared type for the data exchange. These modules are advantageously of small sizes and well protected from the external environment, particularly from the atmospheric agents. These communication devices 8 and 9 allow the exchange of signals without the need of connections by wires between the cabin doors 3 and the floor doors 5.

In particular, the communication device 8 associated to the cabin doors 3 can send all the information about the main signals of the lift to the floor doors 5. In turn, the communication device 9 of the floor doors 5 can send its signals to the cabin door 3 through the communication device 8. Moreover, the at least one communication device 8 and 9 can allow determining the relevant position between the cabin 2 and the floor 6 and therefore control the engine circuit shutdown.

[0014] Alternatively, both the cabin doors 3 and the floor doors 5 can be provided with at least one proximity sensor that can detect the presence of the cabin 2. In other words, when the cabin 2 opens onto a floor 6, the proximity sensor that is present on its doors 3 interacts with the proximity sensor that is present on the floor doors 5 thus detecting the presence of the same cabin 2. This proximity sensor is advantageously manufactured in such a way to control the shutdown operation engine circuits of the doors; in other words when the cabin reaches the stop position the physical connection between the electronic control device of the door engines and the relevant engine is activated.

[0015] The control board is known in itself, therefore it is not described in detail. It comprises the call, control and security functions and it is connected to the cabin 2 by a common wiring system. In particular, between the control board and the cabin 2 the communication is kept as it happens for the traditional applications.

[0016] During the operation, when a call takes place, both from a floor 6 and from the cabin 2, the control board orders the cabin to move to the desired floor 6 in the usual way. When the cabin 2 reaches the stop position, the sensors detect its presence and order the reactivation of the physical connection between the electronic control device 7 of the engine of the doors and the relevant engine. Now the control device sends the opening signal of the doors to the electronic control device 7 of the cabin doors 3 that, through the communication device 8, sends the same signal to the electronic control device 7 of the floor doors 5. In this way, receiving the same signal, the electronic control devices 7 of the cabin doors 3 and of the floor doors 5 order their opening or closing which is synchronized but independent. The coupling of the cabin doors 3 and of the floor doors 5, for their synchronized movement, takes place without the need of mechanical couplings and in a way that is not conditioned by the alignment accuracy.

[0017] The at least one bi-directional communication device 8, 9, besides the opening and closing signal, advantageously sends also the other signals such as the ones generated by the devices detecting obstacles when the doors close. In this case, independently from the side (cabin or floor) wherein the obstacle signal has been generated, the closing cycle is interrupted and the synchronized opening of both the doors is ordered.

[0018] In this case, it is enough to advantageously equip only the cabin doors 3 (or the floor doors 5) with devices detecting obstacles as the reopening signal is sent to the floor doors 5 (or to the cabin doors 3) by the communication device respectively 8 or 9.

[0019] The communications of the communication devices 8 and 9 are advantageously limited only to the doors when face one to the other.

[0020] The mechanical locking devices advantageously ensure that the floor doors 5 (unless special keys are used) cannot open if the cabin 2 is not in the unlocking area; in other words if it is not present.

[0021] As it can be seen from the above-mentioned description, the lift with a communication device between the cabin doors and the floor doors 1 of the present invention revealed to be user-friendly and versatile; moreover it is easy and inexpensive to manufacture thus allowing to reach its object and overcome the above-mentioned drawbacks with reference to the prior art.

[0022] Even though the present invention has been described and illustrated here with reference to an embodiment, which is given only by way of illustrative and non-limitative example, it is clear that the technicians skilled in the art can make various changes and variants. It is therefore clear that the present invention is meant to include all the changes and variants falling within the spirit and the scope of the following claims.

Claims

1. A lift with a communication device between the cabin and the floor doors (1) comprising a cabin (2), provided with cabin doors (3), running in a special lift-shaft (4) provided with floor doors (5) at each door (6) reached and with a control board, **characterised by** the fact that said cabin doors (2) and said floor doors (3) are provided with operators comprising at least one electronic control device (7) provided with at least one communication device (8, 9) and they are severally provided with at least one engine, preferably an electric one, operated by said electronic control device (7).

2. The lift (1) according to claim 1 wherein the operators comprise at least one mechanical locking device.

3. The lift (1) according to any of the previous claims wherein the electronic control device (7) makes the disconnection of the engine when the cabin (2) does not open onto the floor (6).

4. The lift (1) according to any of the previous claims wherein the at least one communication device (8, 9) is bi-directional and asymmetric of the so-called Master/Slave type.

5. The lift (1) according to claim 4 wherein the communication device (8) associated to the cabin doors

(3) operates as a Master and the communication device (9) associated to the floor doors (5) operates as a Slave.

6. The lift (1) according to any of the previous claims wherein the at least one communication device (8, 9) is provided with transceivers modules of the infrared type for the data exchange.

7. The lift (1) according to any of the previous claims wherein the communication device (8) associated to the cabin doors (3) sends all the information about the main signals of the lift to the floor doors (5).

8. The lift (1) according to any of the previous claims wherein the communication device (9) of the floor doors (5) sends its signals through the communication device (8) to the cabin door (3).

9. The lift (1) according to any of the previous claims wherein the at least one communication device (8, 9) allows the detection of the relevant position between the cabin (2) and the floor (6) and it controls the engine circuit shutdown.

10. The lift (1) according to any of the previous claims wherein the cabin doors (3) and the floor doors (6) are provided with at least one proximity sensor which is able to detect the presence of the cabin (2) in a way that is not conditioned by the alignment accuracy between the cabin (2) and the floor (6).

11. The lift (1) according to claim 10 wherein the proximity sensor is manufactured in such a way to control the reactivation of the physical connection between the electronic control device (7) of the engine of the doors and the relevant engine.

12. The lift (1) according to any of the previous claims wherein the opening or closing of the cabin doors (3) and of the floor doors (5) is synchronized but independent.

13. The lift (1) according to any of the previous claims wherein the coupling of the cabin doors (3) and of the floor doors (6), for their synchronized movement, takes place without the need of mechanical couplings and independently from the accuracy of their alignment.

14. The lift (1) according to any of the previous claims wherein at least one bidirectional communication device (8, 9), in addition to the opening and closing signal, sends the signals generated by the devices detecting obstacles when the doors close.

15. The lift (1) according to any of the previous claims wherein the communications of the communication devices (8, 9) are limited only to the doors when they face each other.

16. The lift (1) according to any of the previous claims wherein the mechanical locking devices ensure that the floor doors (5) cannot open if the cabin (2) is not in the unlocking area; in other words if it is not present.

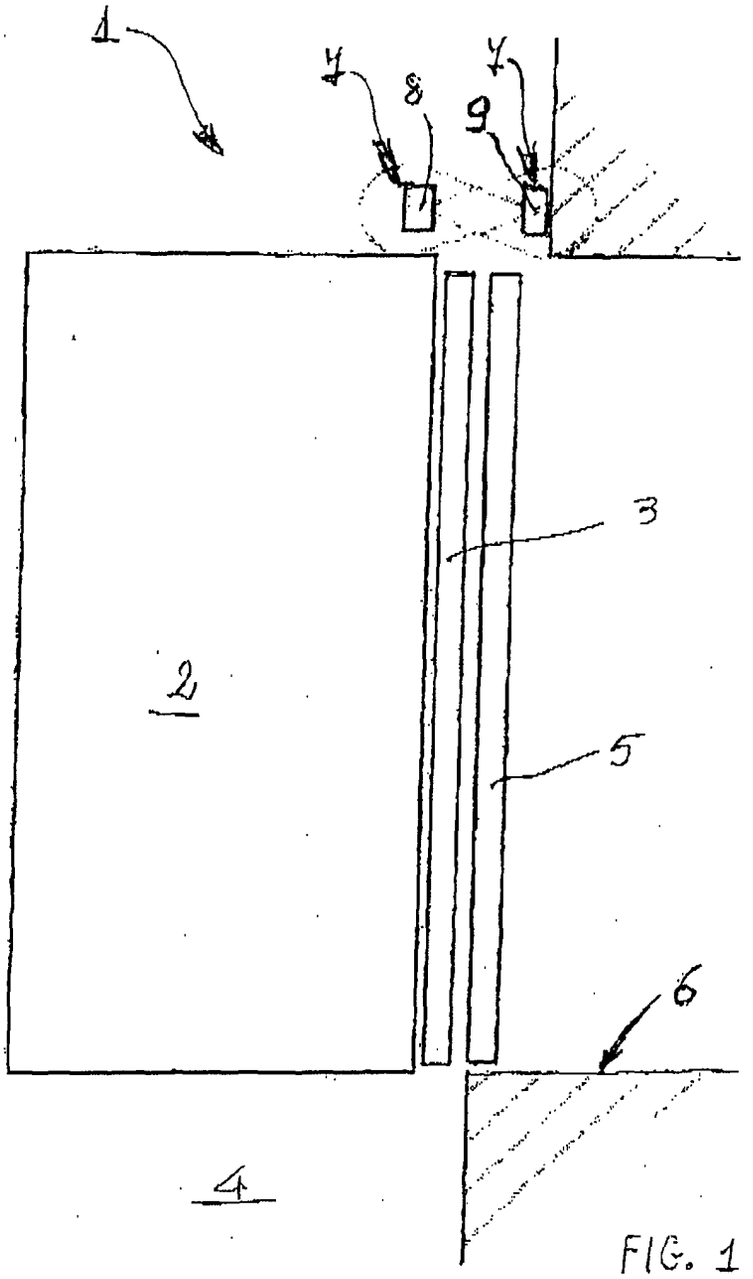

FIG. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 02 02 4854

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15 April 2003	Nelis, Y

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