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(54) **Elevator door safety device**

Aufzugstürensicherheitseinrichtung

Dispositif de sécurité pour porte d'ascenseur

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(73) Proprietor: **Schürmann, Daniel**
6314 Unterägeri (CH)

(72) Inventor: **Schürmann, Daniel**
6314 Unterägeri (CH)

(74) Representative: **Lecce, Giovanni**
Studio Nord Brevetti,
Via Verdi, 14
24121 Bergamo (IT)

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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] A lift according to the preamble of claim 1 is already known e.g. from WO-A-0196226.

[0003] 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.

[0004] 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.

[0005] 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.

[0006] 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.

[0007] 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.

[0008] 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 de-

scription, are reached by a lift with a communication device between the cabin doors and the floor doors according to claim 1.

[0009] 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.

[0010] 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.

[0011] 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.

[0012] 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.

[0013] 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 bi-directional 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.

[0014] 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.

[0015] 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.

[0016] 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.

[0017] 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.

[0018] 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.

[0019] 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.

[0020] The communications of the communication devices 8 and 9 are advantageously limited only to the doors when face one to the other.

[0021] 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.

[0022] 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.

[0023] 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 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 floor (6) reached and with a control board, wherein said cabin doors (3) and said floor doors (5) are provided with operators comprising at least one electronic control device (7) provided with at least one communication device (8, 9), **characterized in that** said cabin doors (3) and said floor doors (1) are severally provided with at least one engine, preferably an electric one, operated by said electronic control devices (7), for their independent activation when they open or close.
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 commu-

nication 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 infra-red type for the data exchange.
7. The lift (1) according to any of the previous claims wherein each 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.

- 5 16. The lift (1) according to any of the previous claims 2 - 15 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.

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Patentansprüche

- 15 1. Ein Aufzug mit einer Kommunikationseinrichtung zwischen der Kabine und den Stockwerkstüren (1), der eine Kabine (2) umfasst, die mit Kabinentüren (3) ausgestattet ist, der in einem speziellen Aufzugschacht (4) läuft, der mit Stockwerkstüren (5) in jedem erreichten Stockwerk ausgestattet ist (6), wobei die besagten Kabinentüren (3) und die besagten Stockwerkstüren (5) mit Bedienvorrichtungen versehen sind, die mindestens ein elektronisches Steuergerät (7) umfassen, das mit mindestens einer Kommunikationsvorrichtung (8, 9) versehen ist, wobei der Aufzug **dadurch gekennzeichnet ist, dass** die besagten Kabinentüren (3) und die besagten Stockwerkstüren (1) jeweils mit mindestens einem Motor, vorzugsweise einem Elektromotor, ausgestattet sind, der von den besagten elektronischen Steuergeräten (7) zu deren unabhängigen Betätigung, wenn sie geöffnet oder geschlossen werden, betrieben wird.
- 20 2. Der Aufzug (1) nach Anspruch 1, wobei die Bedienvorrichtung mindestens eine mechanische Verriegelungsvorrichtung umfasst.
- 25 3. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, wobei das elektronische Steuergerät (7) das Abschalten des Motors vornimmt, wenn sich die Kabine (2) nicht zum Stockwerk hin öffnet (6).
- 30 4. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, wobei mindestens eine der Kommunikationsvorrichtungen (8, 9) bidirektional und asymmetrisch vom Master / Slave-Typ ist.
- 35 5. Der Aufzug (1) nach Anspruch 4, wobei die Kommunikationsvorrichtung (8), die mit den Kabinentüren (3) verbunden ist, als Master und die Kommunikationsvorrichtung (9), die mit den Stockwerkstüren (5) verbunden ist, als Slave fungiert.
- 40 6. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, wobei mindestens eine der Kommunikationsvorrichtungen (8, 9) (8, 9) mit Transceivermodulen des Infrarot-Typs für den Datenaustausch ausgestattet ist.
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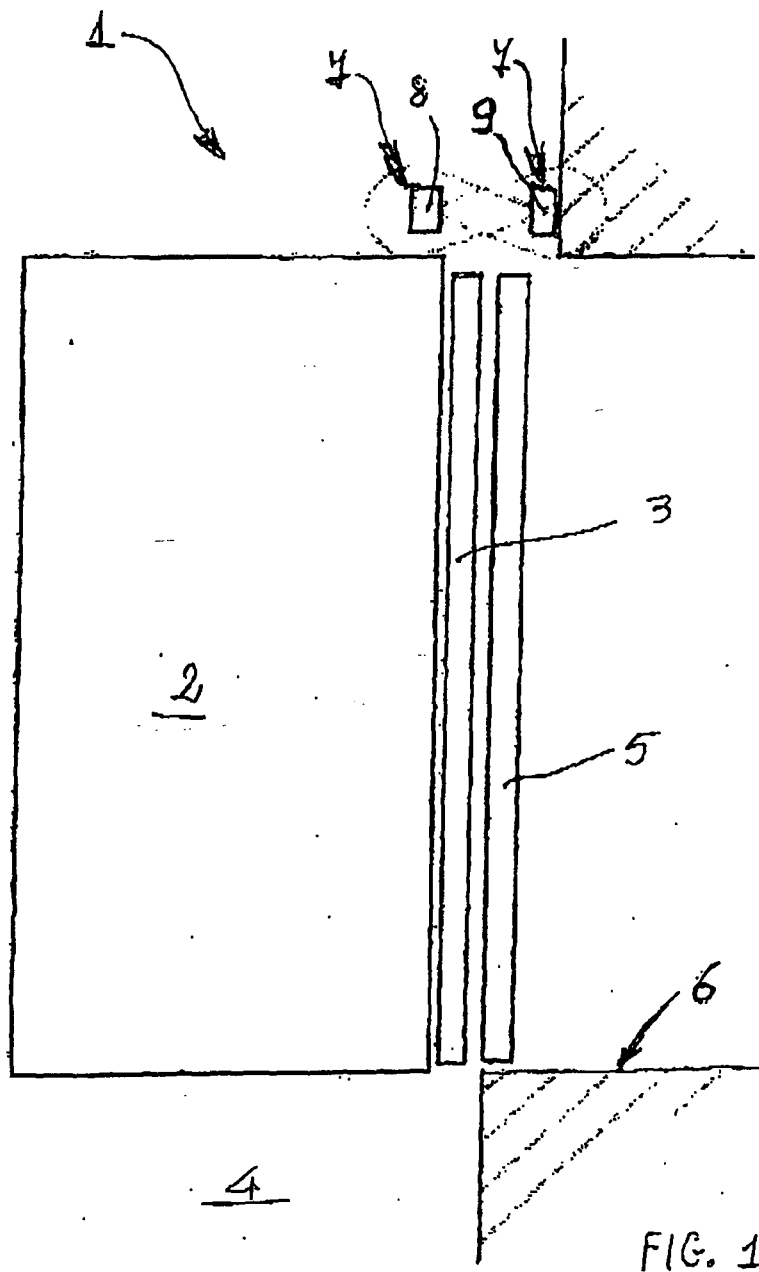
7. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, wobei jede Kommunikationsvorrichtung (8), die mit den Kabinentüren (3) verbunden ist, alle Informationen über die Hauptsignale des Aufzugs an die Stockwerkturen (5) sendet. 5
8. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, wobei die Kommunikationsvorrichtung (9) der Stockwerkturen (5) ihre Signale über die Kommunikationsvorrichtung (8) an die Kabinentür (3) sendet. 10
9. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, wobei mindestens eine der Kommunikationsvorrichtungen (8, 9) die Feststellung der jeweiligen Position zwischen der Kabine (2) und dem Stockwerk (6) ermöglicht und das Abschalten des Motorkreislaufs steuert. 15
10. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, wobei die Kabinentüren (3) und die Stockwerkturen (6) mit mindestens einem Näherungssensor versehen sind, der in der Lage ist, die Anwesenheit der Kabine (2) in einer Weise zu erkennen, die nicht durch die Ausrichtungsgenauigkeit zwischen der Kabine (2) und dem Stockwerk (6) bedingt ist. 20 25
11. Der Aufzug (1) nach Anspruch 10, wobei der Näherungssensor dergestalt hergestellt ist, dass die Reaktivierung der direktleitenden Verbindung zwischen dem elektronischen Steuergerät (7) des Motors der Türen und des jeweiligen Motors gesteuert wird. 30
12. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, wobei das Öffnen oder Schließen der Kabinentüren (3) und der Stockwerkturen (5) synchronisiert, aber unabhängig ist. 35
13. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, wobei die Kopplung der Kabinentüren (3) und der Stockwerkturen (6) auf Grund ihrer synchronisierten Bewegung ohne mechanische Verbindungen und unabhängig von der Richtigkeit ihrer Ausrichtung erfolgt. 40 45
14. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, wobei mindestens eine der bidirektionalen Kommunikationsvorrichtungen (8, 9) zusätzlich zu den Öffnungs- oder Schließsignalen die Signale sendet, die von den Einrichtungen zur Erfassung von Hindernissen erzeugt werden, wenn sich die Türen schließen. 50
15. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, wobei die Kommunikationen der Kommunikationsvorrichtungen (8, 9) nur auf die Türen beschränkt sind, wenn sie einander gegenüber stehen. 55

16. Der Aufzug (1) nach einem der vorhergehenden Ansprüche 2-15, wobei die mechanischen Verriegelungsvorrichtungen gewährleisten, dass sich die Stockwerkturen (5) nicht öffnen können, wenn sich die Kabine (2) nicht im Entriegelungsbereich befindet, mit anderen Worten, wenn sie nicht angekommen ist.

10 Revendications

1. Un ascenseur avec un dispositif de communication entre la cabine et les portes palières (1) comprenant une cabine (2), avec des portes de cabine (3), coulissantes sur un arbre d'ascenseur spécial (4) avec des portes palières (5) à chaque étage (6) desservi et avec un tableau de contrôle, dans lequel lesdites portes de cabine (3) et lesdites portes palières (5) sont équipées d'opérateurs comprenant au moins un dispositif électronique de contrôle (7) équipé avec au moins un dispositif de communication (8, 9), **caractérisé par le fait que** lesdites portes de cabine (3) et les dites portes palières (1) sont individuellement équipées avec au moins un moteur, de préférence électrique, actionné par lesdits dispositifs de contrôle électroniques (7), pour leur mouvement indépendant lors de l'ouverture et la fermeture.
2. L'ascenseur (1) conformément à la revendication 1 dans lequel les opérateurs comprennent au moins un dispositif mécanique de blocage.
3. L'ascenseur (1) conformément à chacune des précédentes revendications dans lequel le dispositif électronique de contrôle (7) effectue la déconnexion du moteur lorsque la cabine ne doit pas s'ouvrir à l'étage (6).
4. L'ascenseur (1) conformément à chacune des précédentes revendications dans lequel au moins un dispositif de communication (8, 9) est bidirectionnel et asymétrique du type appelé Maître / Esclave.
5. L'ascenseur (1) conformément à la revendication 4 dans lequel le dispositif de communication (8) associé aux portes de cabine (3) opère comme Maître et le dispositif de communication (9) associé aux portes palières (5) opère comme Esclave.
6. L'ascenseur (1) conformément à chacune des précédentes revendications dans lequel au moins un dispositif de communication (8, 9) est fourni avec des modules émetteur de type à infrarouges pour l'échange des données.
7. L'ascenseur (1) conformément à chacune des précédentes revendications dans lequel chaque dispositif de communication (8) associé aux portes de ca-

- bine (3) envoie toutes les informations concernant les signaux principaux de l'ascenseur aux portes palières (5).
8. L'ascenseur (1) conformément à chacune des précédentes revendications dans lequel le dispositif de communication (9) des portes palières (5) envoie ses signaux par le biais d'un dispositif de communication (8) aux portes de cabine (3). 5
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9. L'ascenseur (1) conformément à chacune des précédentes revendications dans lequel au moins un dispositif de communication (8, 9) permet la détection de la position relative de la cabine (2) par rapport à l'étage (6) et contrôle la coupure du circuit moteur. 15
10. L'ascenseur (1) conformément à chacune des précédentes revendications dans lequel les portes de cabine (3) et les portes palières (6) sont fournies avec au moins un capteur de proximité lequel est capable de détecter la présence de la cabine (2) dans une manière qui n'est pas influencée par la précision de l'alignement entre la cabine (2) et le palier (6). 20
- 25
11. L'ascenseur (1) conformément à la revendication 10 dans lequel le capteur de proximité est fabriqué de telle manière qu'il contrôle la réactivation de la connexion physique entre le dispositif de contrôle électronique (7) du moteur des portes et le moteur concerné. 30
12. L'ascenseur (1) conformément à chacune des précédentes revendications dans lequel l'ouverture et la fermeture des portes de cabine (3) et des portes palières (5) sont synchronisées mais indépendantes. 35
13. L'ascenseur (1) conformément à chacune des précédentes revendications dans lequel le couplage des portes de cabine (3) et des portes palières (6), pour leur mouvement synchronisé, se réalise sans qu'il soit nécessaire le couplage mécanique et indépendamment de la précision de leur alignement. 40
- 45
14. L'ascenseur (1) conformément à chacune des précédentes revendications dans lequel au moins un dispositif de communication bidirectionnelle (8, 9), en plus du signal d'ouverture et de fermeture, envoie les signaux générés par les dispositifs qui détectent des obstacles lorsque les portes sont en train de se fermer. 50
15. L'ascenseur (1) conformément à chacune des précédentes revendications dans lequel les communications des dispositifs de communication (8, 9) sont limitées seulement aux portes lorsqu'elles sont face à face. 55
16. L'ascenseur (1) conformément à chacune des précédentes revendications 2-15 dans lequel les dispositifs de blocage mécanique garantissent que les portes palières (5) ne peuvent pas s'ouvrir si la cabine (2) n'est pas dans la zone débloquée ; en autres termes si elle n'est pas présente.



REFERENCES CITED IN THE DESCRIPTION

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