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(54) **Method and system for emergency evacuation of building occupants**

System und Verfahren für Notevakuierung des Personals eines Gebäudes

Système et procédé pour l'évacuation d'urgence des occupants d'un immeuble

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Description

[0001] The present invention relates to a method and a system for emergency evacuation of building occupants and to a method for modernisation of an existing building with said system that allows the use of an elevator as a means of reliable egress and evacuation during emergency of a multi-story building having a plurality of floors. This invention is defined in the patent claims.

[0002] Traditionally, an elevator is not considered as a reliable means of egress during a building fire. Notices like "Do not use elevator in case of fire" can be found commonly to notify the building occupants to refrain from using the elevator and to use instead a stairway.

[0003] European norm EN81-73 provides here a regulation for a safe and reliable egress and evacuation during fire in a building by using an elevator. The elevator comprises a fire alarm function, which is initiated by a fire alarm system. Dependent upon the fire alarm system and the management of the fire alarm, different reactions of the elevator are foreseen. For example, after sent into fire alarm condition, landing and car call buttons are rendered inoperative and the elevator car is automatically recalled to a designated floor of the building. The elevator is parked with the doors open and the elevator is temporarily taken out of service. Then, the fire department can override the fire alarm function by activating a fire department key switch to utilise the elevator car individually.

[0004] EN81-73, however, does not deal with the ongoing use of the elevator after a fire has been detected and will be fought. Especially in buildings with more than six floors, the fire department personnel must use also the stairway to advance on the fire and will be hindered by people, which escape by using the stairway. Also, EN81-73 does not refer to the generally unsafe environment for building occupants, such as smoke, heat and/or water in the building. In particular, the unsafe environment concerns the hoistway, the landing doors and the stairway. One significant reason that an elevator may not be used for emergency egress during a building fire is the danger presented by smoke. Smoke at the hoistway door will be interpreted by the elevator control as an obstacle, preventing thereby the door from closing properly. Smoke also contains toxic gases and combustion products, which create an untenable environment for people and expose them to increased risk. Water from automatic fire sprinklers or from fire department hoses can enter the hoistway and short circuit the car controls. Moreover, not only young and healthy but also non-ambulatory and disabled people search egress from the building. These building's occupants cannot use the stairway and are, therefore, forced to remain in the burning building until rescued by the fire department. Finally, EN81-73 does not consider the chaotic environment and irrational psychological reactions of the building occupants, which increases the time required to evacuate the building and results in panic and injury to themselves and others.

[0005] US 6,000,505 refers to a multiple level building

with an elevator operable as a means of emergency egress and evacuation during a fire accident, which overcomes some of the before-mentioned problems and provides benefits. US 6,000,505 discloses a system characterised by the use of smoke detectors, which is limited to the case of fire and does not consider other emergency situations requiring an evacuation with elevators, such as bomb scare, terrorist attack, hurricane, flood, earthquake. Furthermore, this system is automatic, but not intelligent and cannot take into account, how many people are waiting to be saved on a determined floor and whether among these people some are handicapped. Moreover, this system is not flexible and not capable to calculate special and faster strategies to evacuate all people in a building with the elevator. A further shortcoming of this system is that it does not consider the irrational psychological reactions of people submitted to a highly scaring emergency situation. Because an elevator is conceptualised as unsafe during emergencies, the use of an elevator during an emergency is likely to be perceived as high risk. People will, therefore, refrain from using the elevator because of being risky. Moreover, a sign placard located within the elevator car and at each elevator lobby, such as shown by Fig. 8 of US 6,000,505 is clearly insufficient to guide scared people into an elevator during an emergency situation.

[0006] Object of the present invention is to propose a method and system for emergency evacuation of building occupants, which does not exhibit the above-mentioned shortcomings, but allows an efficient and pondered evacuation even in panic situations.

[0007] This object is solved by the invention as defined in the patent claims.

[0008] In a first preferred variant of the invention, a multi-story building having a plurality of floors with at least one elevator being positionable at selected landings of the floors comprises first means for measuring persons in the building, second means for detecting an emergency condition in the building. At least one control unit is provided for determining a number of building occupants in the building and for defining at least one evacuation zone in the building during the emergency condition. Based on this information, the control unit defines at least one designated floor in the building during the emergency condition. Then the system evacuates the building occupants with the elevator car and/or stairway from the evacuation zone to the designated floor.

[0009] In a second preferred variant of the invention, a multi-story building having a plurality of floors, with at least two elevators being positionable at selected landings of the floors comprises second means for detecting an emergency condition in the building. At least one control unit is provided for defining at least one evacuation zone in the building during the emergency condition and for defining at least one designated floor in the building during the emergency condition. The system evacuates the building occupants with at least two elevator cars being positioned at one and the same floor in the evac-

uation zone having the doors opened.

[0010] It is an advantage of the present invention, that it allows in the first variant a precise determination of the number of building occupants and that in the second variant it uses an estimated determination of the number of building occupants. Preferably, according to the first variant, the first means may be a car load detector and/or destination call identification device wherein the entry location of a call is the starting floor, the call is fed into the control unit and allocated to an elevator, and the elevator user is then transported from the starting floor to the destination floor. The number of elevator users transported to destination floors is counted and stored in a memory. Of course, first means destination identification devices or car load detectors can be also installed at the accesses of stairways and escalators, allowing the control unit to count and identify also people not acceding to the building with the elevators. By assuming that all transportation within the building occurs by destination call identification, the control unit always knows exactly the number of building occupants present at each floor.

[0011] The destination call may be entered at a landing fixture or read from an identification medium, like a tag or card. This last option exhibits the advantage that personal identification codes can be stored in the identification card and transmitted to the control unit at the moment of the elevator call. In this way the control unit can detect and control the position in the building of disabled persons, vip, children and any other category of people and can use this information to calculate and prioritise the evacuation procedures.

[0012] In an advantageous embodiment of the invention the control unit can detect which kind of emergency has occurred, for example fire, bomb scare, terrorist attack, flood, earthquake, hurricane. It is an advantage of this embodiment of the invention that it allows to link the number of building occupants with the emergency condition detected in the building. It is therefore possible, to define an evacuation zone and a designated floor in accordance with the number of building occupants in each floor. Because the number of building occupants within the evacuation zone is known, the most suitable designated floor and the fastest emergency evacuation procedure using stairways and the elevator can be defined.

[0013] It is another advantage of the present invention, that it allows in the second variant to prevent problems originating from a situation of panic in a multitude of scared people. In this case, preferably all elevator cars open synchronously their doors at a floor in the evacuation zone, allowing the largest amount of people to enter into the elevators at the same time. This procedure avoids the well-known inconvenient occurring in panic situations, that people crowd together into an elevator car, preventing the elevator doors to close and preventing the elevator car to leave the floor and rescue the people. If one floor at a time is evacuated in this way, people waiting in the evacuation zone can be rescued with an efficiency and rapidity superior to other evacuation procedures.

[0014] This invention and its advantages and benefits will be better understood by reading the detailed description of the invention with reference to the following drawings, wherein:

FIG. 1 is a sectional view of a multi-story building with a preferred embodiment of a system according to the invention.

FIG. 2 is a schematic representation showing different building evacuation modes of the system of FIG. 1 under different emergency situations.

FIG. 3 is a schematic representation of a preferred embodiment of a fixture for use with the present invention.

FIG. 4 is a lay-out of a building floor with the representation of the signalling means used to alarm the building occupants in the case of an emergency situation as used in the present invention.

FIG. 5 is a dynamic floor lay-out signalisation located at a building floor for use with the present invention.

FIG. 6 is schematic flow chart illustrating an exemplary evacuation sequence in accordance with one embodiment of the present invention.

[0015] Fig. 1-depicts a multi-story building 1 with a preferred embodiment of a system according to the invention. The building users and occupants have access and egress to the building either by the stairways 2 or by the elevators 10 and 10'. The elevators 10, 10' may be a single one, one of an electrically interconnected group of elevators, or the cars may be multi-deck. The elevator car is positionable at selected landings 26 of the floors. Access from and to the elevator at the landing occurs via doors 3. The landing is a building zone being e.g. the ground floor lobby, a sky-lobby or a part of a floor passage. The elevator hoistway doors 3 give access to the different floors of the building, in which building doors 6 serve to the communication between different rooms and spaces. The elevators 10, 10' are controlled and driven by a control unit 5, which can consist, for instance, in a computer or a group of computers connected with the elevator drives and motors. The control unit 5 can be advantageously connected with a remote control unit 4 in a remote service centre, a police station, a fire station or a remote building management centre. In this case the elevators 10, 10' and even other elements of the building 1, such as the doors 6, the lights or the windows, can be remotely controlled in the case of an emergency via the public telephonic lines, personal computers, internet or handy mobile telephones. A remote building, where the real time remote supervision, control and activation of the required emergency category algorithms of the elevators in the building 1 can take place, increases strong-

ly the safety level of the proposed elevator evacuation system.

[0016] Second means 7 for detecting an emergency condition in the building are spread and mounted in each part and floor of the building 1 and connected to the control unit 5. These apparatuses are devices apt to detect the presence of fire, such as smoke, heat or temperature sensitive sensors. The sensors are placed preferably in each room and lobby of the building 1. They are also installed in the elevator car, in the elevator hoistway, in the elevator machine room, at the landings in each floor, and also preferably integrated in the elevator car doors and in the elevator hoistway doors, so that the presence of a danger in the elevator system can be immediately detected and neutralized.

[0017] In order to detect the emergency of an earthquake, devices sensitive to displacement and vibrations must be placed and distributed on the structural walls and elements of the building 1. In order to detect the emergency of a hurricane, devices sensitive to air displacements and wind must be placed and distributed on the outer walls of the building 1 and in the rooms of the building close to the windows. In order to detect the emergency of flood, devices sensitive to the presence of water must be mounted above all in the lower stories of the building 1 close to the floor surface. Means to detect crowd and people play also an important role in our invention and are placed at the landings and in the elevator cars.

[0018] When an emergency of bomb threat or terrorist attack occurs in the building 1, the elevator emergency evacuation is manually or remotely activated preferably by the input of a code number identifying to the emergency situation concerned. There are separate identification code numbers for each emergency situation. Several multi-media panels 8 are distributed in the building 1 and connected to the control unit 5, in order to collect the input of the identification code numbers concerning an emergency situation. The panels 8 incorporate audible and visual communication systems, such as loud speakers, blinking signs, direction arrows, illuminated indicators and pictograms, monitors, which have the function to guide and direct people into the elevator cars or to the stairways during an emergency evacuation procedure.

[0019] First means 9 are provided for measuring a number of persons acceding/leaving the elevator car. First means 9 are preferably devices for entering destination calls and are provided at each floor at the landings, in order to allow the passengers to place elevator calls for a predetermined floor. The control unit can in this way determine the number of building occupants in the building and in each floor of the building. A preferred embodiment of the destination call identification device consists of a fixture with a ten digit keypad or of a contactless identification system and is illustrated in Fig. 3. First means may be also identification devices situated in front of access/egress from/to stairways and escalators, al-

lowing therefore to count and to identify people taking the stairways or escalators. Instead of entering destination calls, the first means allow in this case access/egress of people from/to stairways and escalators and inform the control unit accordingly. First means 9, however, can be even a simple car load detector installed in the elevator car, which allows the number of people entering into an elevator and acceding to a determined building floor to be roughly estimated.

[0020] Following an emergency condition alarm, the elevator system is switched from a normal operation mode to an emergency evacuation mode via the control unit 5. The emergency condition alarm indicating an emergency condition in the building is generated either automatically by the second means 7, manually using the panels 8 or the first means 9 or remotely by remote means. Remote means are the control unit 4, a personal computer, internet, a telephone, a mobile telephone or a sms (short message). Each emergency condition like fire, earthquake, hurricane, flood, bomb scare or terrorist attack is identified by a code number and may be selectively activated by the dedicated identification code number manually via a keypad 19 (Fig. 3) or remotely by remote means.

[0021] In the emergency evacuation mode a ground floor 11 of the building 1 is defined, which allows people to reach easily the building exit on foot without the intervention of any mechanical or artificial means. The ground floor 11 can be the exit floor or represented also by a group of the lower floors of the building 1, from which the egress is very easy, as shown in Fig. 2.

[0022] The floor in which the alarm signal has been generated is defined as the emergency floor 12. Of course, the emergency floor can consist of many floors of the building 1, if the emergency condition is detected at several points in the building.

[0023] Basing on the type of emergency, on the people count, on the position of the ground floor 11 and on the position of the emergency floor 12, the control unit 5 establishes at least one evacuation zone 13, grouping all building floors where people are in danger and require to be rescued as soon as possible.

[0024] In the case of fire the evacuation zone 13 consists of all building floors above the emergency floor. In the case of flood the evacuation zone 13 consists of all building floors below the emergency floor. In the case of hurricane the evacuation zone 13 consists of all building floors above the ground floor. In the case of earthquake the evacuation zone 13 includes all building floors. In the case of bomb scare or terrorist attack the evacuation zone 13 is limited to a certain number of building floors above and below the emergency floor.

[0025] Basing on the type of emergency, on the people count, on the position of the ground floor 11 and on the position of the emergency floor 12, the control unit 5 establishes also an evacuation designated floor 14, where the building occupants must be transported in order to be considered in a safe location.

[0026] In the case of fire the evacuation designated floor 14 is situated some floors below the emergency floor. In the case of flood the evacuation designated floor 14 is situated some floors above the emergency floor. In the case of hurricane the evacuation designated floor 14 is situated some floors below the ground floor. In the case of earthquake the evacuation designated floor 14 is the ground floor. In the case of bomb scare or terrorist attack the evacuation designated floor 14 is situated a certain number of building floors below the emergency floor.

[0027] Depending on the people count, on the location of the ground floor 11, of the emergency floor 12, of the evacuation zone 13 and of the designated floor 14, the control unit can carry out different modes of building evacuation with elevators, as shown in Fig. 2:

- Full building evacuation, when all floors of the building must be evacuated, like in the emergency situation of an earthquake (Fig. 2a).
- Zone evacuation, when all floors of the building between two determined floors must be evacuated, like in the emergency situation of a bomb scare (Fig. 2b).
- Jump evacuation, when all floors of the building between two determined floors must be evacuated, and one danger zone of the evacuation zone is excluded from evacuation, like in the emergency situation of fire (Fig. 2c).
- Selective evacuation, when only some specific floors of the building are evacuated, like in the case of floors in the evacuation zone with disabled persons, vip or children.

[0028] During full evacuation, all building occupants being in the building are evacuated. During zone evacuation, only building occupants being within the evacuation zone are evacuated. During jump evacuation, at least one danger zone of the evacuation zone is excluded from evacuation. During selective evacuation, disabled people and/or children and/or vip persons and/or all other person having a special identification among the building occupants are evacuated with priority. This priority evacuation can be from the entry floor directly to a safe building exit floor to avoid disabled people and children from having to use the stairs. In particular, during selective evacuation, disabled people and/or children and/or vip persons and/or all other person having a special identification among the building occupants can be evacuated to a designated floor having a disabled-fair exit of the building, e.g. an exit without obstacles representing architectonic barriers for disabled people, like stairs or steps.

[0029] Fig. 3 illustrates a preferred embodiment of a fixture 15 comprising a destination call identification device used in this invention. The fixture 15 is located at each landing and incorporates e.g. a ten digit keypad 19 containing numbers, a sensor 16, a loud speaker 17, a microphone 18, a special key 20 for disabled persons and an identification medium reader 21.

[0030] The elevator users can place a destination call

either by typing in the ten digit keypad 19 the number of the floor, at which they want to land, or contactless by approaching an identification medium like a card, preferably without any contact, to the identification medium reader 21. The identification card stores an identification code. When the card approaches the identification medium reader 21, this code can be detected by the identification medium reader via optical, magnetic or electromagnetic means, and transmitted to a data base of the control unit 5, where personal data of the user, like name, access rights, evacuation priority rank in case of emergency, normal destination call floor are stored. The control unit 5 can in this way count and store in a memory the number of people landing and occupying a certain building floor. In the case of the use of the identification medium, the control unit 5 can even detect and control the presence of each singular individual in each of the building floors. This information is then used and processed in the case of an emergency evacuation with elevators. Fixtures 15 can be also located in front of access/egress from/to stairways and escalators, allowing therefore to count and to identify people taking the stairways or escalators.

[0031] The sensor 16 is typically a smoke or temperature sensor, which checks whether the access to the landing is safe or not. It can be also a crowd sensor. The loud speaker 17 informs the passengers waiting to be rescued at the landing, whether that elevator is safe or not. The microphone 18 is used by the passengers waiting in the landing to announce to the control unit 5 and/or to the remote control unit 4 that an emergency situation is occurring. The special key 20 is provided to communicate to the control unit 5 that a disabled person is acceding to the elevator car. The control unit 5 will therefore add in its memory a disabled person to the person counter of the destination call floor selected by the disabled person.

[0032] In the case of an emergency evacuation with elevators, it is important to alert the building occupants with the maximal rapidity, that they must leave the building immediately using the elevators. It is also important, that the evacuation takes place calmly, peacefully and smoothly, avoiding panic situations and crowding.

[0033] FIG. 4 is a lay-out of a building floor with the representation of the signalling means used to alarm the building occupants in the case of an emergency situation as used in a preferred embodiment of the present invention. The building occupants are alerted that they must leave the building with the elevators via the panels 8 and/or the telephones 27 and/or the televisions 29 and/or the personal computers 29. The signalling means can also report which kind of emergency occurs, when the building occupants must leave their rooms and offices and how they should behave. In order to avoid panic situation and in order to avoid dangerous crowding in the elevators 10, stairways 2 and landings 26, the evacuation signal is transmitted with a slight delay to the occupants of different building floors. The alarm can be sequential

and/or selective. The control unit 5 can also open and close automatically the building doors 6 and dose the transfer of people from their rooms and offices to the landing 26, preventing a dangerous crowding in the elevator 10 and landing 26.

[0034] The control unit can also dose, distribute and direct evacuating occupants of different building floors alternatively to the stairways 2 or to the elevators 10, in order to prevent crowding. Building occupants can be directed and guided by the stairway to a floor in the evacuation zone to be evacuated by elevators and/or building occupants can be directed and guided by a stairway or at least one escalator from the designated floor to the ground floor and/or to a building exit.

[0035] Audio and/or visual indicating means play a crucial role in directing and guiding people during an emergency evacuation, which has to be dosed and controlled.

[0036] Fig. 5 shows the audio and visual indicating means to direct and guide people to the elevators 10 or to the stairway doors 22 in the case of an emergency evacuation, as provided in an exemplary embodiment of the present invention.

[0037] A visual and, if necessary, an audible use status indicator 25 of the elevator, which points out whether the elevator is safe to use or not by passengers waiting for emergency evacuation is placed preferably above the elevator hoistway door frame. The indicator is able to constantly monitor the safety situation of the elevator system at all times, including being active when there is an electrical power failure. The indicator display is dynamic and clearly displays whether the elevator is safe to use or not, for emergency evacuation, i.e. it must display, as a minimum, the text "Do not use the elevator for evacuation" or "Do use the elevator for evacuation". The text can be displayed in the appropriate local language or in the form of a pictogram. The indication must be clearly visible and may flash. Audible indication may also be included to cater for any blind persons who may need to be rescued. An audible count-down keeping informed the building occupants waiting to be rescued by the elevators at the landings about the remaining time for elevator arrival contributes enormously to tranquillise the people.

[0038] If the control unit 5 detects a certain elevator as safe during an emergency condition, in order to direct and guide people, who are not at the landings, indication panels 24 will be lighted up or will blink in the building corridors and passages. These will point out where is the lobby of the elevator to be used for evacuation. If the control unit 5 detects certain elevators as unsafe during an emergency condition, in order to direct and guide people, indication panels 23 will be lighted up or will blink in the building corridors and passages. These will point out where are the doors 22 of the stairways to be used for evacuation.

[0039] In order to prevent crowding, the control unit doses, distributes and directs evacuating occupants of different building floors alternatively to the stairways 2 or

to the elevators 10 by using respectively the indication panels 23 for the stairway or the indication panels 24 for the elevator.

[0040] Fig. 6 shows a flow chart of an evacuation sequence comprising:

- A. Determining a number of building occupants in the building;
- B. Detecting an emergency condition in the building;
- C. Defining at least one evacuation zone 13 in the building during the emergency condition;
- D. Defining a number of building occupants in the evacuation zone;
- E. Defining at least one designated floor 14 in the building during the emergency condition;
- F. Evacuating with the elevator car and/or stairway the building occupants from the evacuation zone to the designated floor.

[0041] The steps A and D can be carried out precisely by means of a destination call identification device, e.g. with a ten digit keypad 19 or with an identification medium reader 21. The steps A and D can be carried out, however, also very simply by means of a car load detector installed in the elevator car, which allows the number of people entering into an elevator and acceding to a determined building floor to be roughly estimated. The car load can be measured for determining a number of building occupants in the building and/or the number of destination calls or identification codes requiring floor access are counted for determining a number of building occupants in the building.

[0042] The steps B, C and E have been already described above.

[0043] Concerning the step F, several strategies and dosing criteria are imaginable to evacuate with the elevator cars and/or stairways the building occupants from the evacuation zone to the designated floor.

[0044] If the emergency is, for example, that of fire, all elevators containing persons automatically travel to the designated floor 14. If even this floor is on fire, another floor is automatically selected. On arrival at the designated floor 14 passengers are allowed to leave the car.

[0045] Empty cars will automatically travel to the evacuation zone 13 and open their doors to collect people to be evacuated. In emergency situations, when a crowd in panic is supposed to fill up the elevator car and prevent the elevator doors to close, some expedients have been used, which allow nevertheless the elevator doors to close. Electrical shocks generated by the elevator and/or sudden mechanical movements of the elevator car scare people and permit the elevator doors to close.

[0046] In a preferred embodiment of the present invention the building occupants are evacuated from the evacuation zone to the designated floor by at least two elevators (10, 10'), elevator cars of said elevators being positioned at one and the same floor in the evacuation zone having the doors opened. In this way, people can be dis-

tributed in at least two elevator cars. This procedure avoids the inconvenient occurring in panic situations, that people crowd together into one elevator car, preventing the elevator doors to close and preventing the elevator car to leave the floor and rescue the people. This evacuation procedure exhibits advantages even if the steps A. and D. are not performed, and the number of building occupants is not determined.

[0047] This evacuation procedure can be optimized, if each floor in the evacuation zone to be evacuated by elevators is evacuated by a number of elevator cars having a total load capacity corresponding to an estimated load of the number of building occupants present in said floor. The floors in the evacuation zone to be evacuated by elevators can be evacuated sequentially, starting with the region in the emergency zone of high danger for building occupants. Preferably each floor in the evacuation zone to be evacuated by elevators is evacuated only once.

[0048] Audio and/or visual indicating means 23, 24, 25 clearly point out to waiting persons whether the elevator is safe or not to use and guide people to the elevators or stairways. Once the passengers have entered the elevator, it will travel through the fire emergency floor 12 to the safe designated floor 14 below the fire, to allow the passengers to exit and use the safety stairs 2 for the rest of the evacuation journey. The evacuation zone 13 and the designated floor 14 may be dynamically remotely adjusted according to how the emergency situation develops.

[0049] The elevators will then return to the evacuation zone 13 to collect more persons. Different strategies can be implemented to stop the elevators in the evacuation zone. All elevators can for example reach a floor in the evacuation zone, open at the same time the doors and evacuate sequentially each building floor only once. But an elevator can also stop at floors where persons have indicated that they are waiting, via an input request given at the respective floor control panel fixtures 15.

[0050] The fixtures 15 also contain a special key 20 for use by disabled persons, in conjunction with a password. When such a key is activated and the use status indicator 25 shows that the elevator is safe to use, the disabled person may enter and be safely evacuated by a direct travel of the elevator car to the ground floor 11 of the building. This saves the disabled person(s) from having to use the stairways 2 below the designated floor 14 for the evacuation journey.

[0051] Once all the persons in the evacuation zone 13 have been rescued, the elevators will automatically collect waiting persons at the highest floor below the fire and deliver them directly to the designated floor 14 or alternative ground floor 11.

[0052] The emergency evacuation mode may only be cancelled by the input of a password identity code or similar means by an authorised person.

[0053] During an emergency evacuation with elevators, it is possible that an elevator being used for evacuation becomes unsafe in consequence of the propagation of the catastrophic event.

uation becomes unsafe in consequence of the propagation of the catastrophic event.

[0054] If an elevator, whilst travelling towards a floor where people are waiting to be rescued, becomes unsafe, the indicators 25 will show "Do not use the elevator". Also, if the elevator is in the process of arriving at a floor where passengers are waiting and goes into the unsafe mode, the doors will remain closed to prevent entry of persons.

[0055] The indicator 25 is connected to various devices, which monitor the safety status of the elevator in the elevator car, hoistway, machine room and at the landings 26. The destination call system does not need any input station within the car. Various safety features may be overbridged during an emergency evacuation.

[0056] Destination floors, which become unsafe during an emergency may be taken out of service either automatically, manually or remotely, by the rescue or building management system or by the input of a respective floor code.

[0057] An existing elevator or elevator group in a multi-story building 1 can be easily modernised with a system for emergency evacuation of building occupants, such as that described in the present invention.

[0058] First means 9 for measuring a number of persons and second means 7 for detecting an emergency condition in the building must be installed, if they are not already available in the elevator system. A control unit 5 for determining a number of building occupants in the building must be provided, or an already existing control unit must be adapted accordingly. The necessary electrical connections and interfaces must be configured. The control unit is then defining at least one evacuation zone 13 and at least one designated floor 14 in the building during the emergency condition. The building occupants are being evacuated during the emergency condition with the elevator car and/or stairway from the evacuation zone to the designated floor.

Claims

1. A method for emergency evacuation of building occupants from a multi-story building (1) having a plurality of floors and at least one elevator (10, 10') with an elevator car being positionable at selected landings (26) of the floors and a control unit (5) for controlling and driving the elevator (10, 10'), and first means (9) for measuring persons in the building; comprising the steps of :

determining a number of building occupants in the building by the control unit (5) ;

detecting an emergency condition in the building by second means (7) connected to the control unit (5);

defining at least one evacuation zone (13) in the building during the emergency condition by the

- control unit (5);
 defining at least one designated floor (14) in the building during the emergency condition by the control unit (5); and
 evacuating with the elevator car and/or a stairway the building occupants from the evacuation zone to the designated floor.
2. The method of claim 1, wherein evacuation with elevator and/or stairway of building occupants from the evacuation zone to the designated floor is obtained by full evacuation and/or by zone evacuation and/or by jump evacuation and/or by selective evacuation.
 3. The method of claim 2, wherein during full evacuation, all building occupants being in the building are evacuated; or during zone evacuation, only building occupants being within the evacuation zone are evacuated; or during jump evacuation, at least one danger zone of the evacuation zone is excluded from evacuation; or during selective evacuation, disabled people and/or children and/or vip persons and/or all other person having a special identification among the building occupants are evacuated with priority and/or during selective evacuation, disabled people and/or children and/or vip persons and/or all other person having a special identification among the building occupants are evacuated to a designated floor having a disabled-fair exit of the building.
 4. The method of one of claims 1 to 3, wherein the car load is measured for determining a number of building occupants in the building and/or the number of destination calls or identification codes requiring floor access are counted for determining a number of building occupants in the building.
 5. The method of one of claims 1 to 4, wherein the evacuation of the building occupants from the evacuation zone to the designated floor takes place by at least two elevators (10, 10'), elevator cars of said elevators being positioned at one and the same floor in the evacuation zone having the doors opened.
 6. The method of claim 5, wherein each floor in the evacuation zone to be evacuated by elevators (10, 10') is evacuated by a number of elevator cars having a total load capacity corresponding to the load of the number of building occupants present in said floor and/or wherein the floors in the evacuation zone to be evacuated by elevators (10, 10') are evacuated sequentially and/or wherein each floor in the evacuation zone to be evacuated by elevators (10, 10') is evacuated only once.
 7. The method of one of claims 1 to 6, wherein building occupants are directed and guided by the stairway to a floor in the evacuation zone to be evacuated by elevators (10, 10') and/or building occupants are directed and guided by a stairway or at least one escalator from the designated floor to a building exit.
 8. The method of one of claims 1 to 7, wherein audio and/or visual indicating means (23, 24, 25) are directing and guiding building occupants to the elevator (10, 10') and/or stairway.
 9. The method according to claim 1, wherein building occupants are evacuated from the evacuation zone to the designated floor with at least two elevator cars being positioned at one and the same floor in the evacuation zone having the doors opened.
 10. The method of claim 9, wherein each floor in the evacuation zone to be evacuated by elevators (10, 10') is evacuated by a number of elevator cars having a total load capacity corresponding to an estimated load of the number of building occupants present in said floor and/or wherein the floors in the evacuation zone to be evacuated by elevators are evacuated sequentially, starting with the region in the emergency zone of high danger for building occupants, and/or wherein each floor in the evacuation zone to be evacuated by elevators (10, 10') is evacuated only once.
 11. The method of one of claims 9 or 10, wherein building occupants are directed and guided by the stairway to a floor in the evacuation, zone to be evacuated by elevators (10, 10') and/or building occupants are directed and guided by a stairway or at least one escalator from the designated floor to a building exit.
 12. The method of one of claims 9 to 11, wherein audio and/or visual indicating means (23, 24, 25) are directing and guiding building occupants to the elevators (10, 10') and/or stairway.
 13. System for emergency evacuation of occupants from a multi-story building (1) having a plurality of floors and at least one elevator (10, 10') with an elevator car being positionable at selected landings (26) of the floors and a control unit (5) for controlling and driving the elevator (10, 10'), comprising:
 - first means (9) for measuring a number of persons,
 - second means (7) for detecting an emergency condition in the building;
 - second means (7) being connected to the control unit (5);
 - the control unit (5) for determining a number of building occupants in the building;
 - the control unit (5) for defining at least one evacuation zone (13) in the building during the emergency condition;

- the control unit (5) for defining at least one designated floor (14) in the building during the emergency condition; and
the system evacuating with the elevator car and/or a stairway the building occupants from the evacuation zone to the designated floor. 5
14. The system of claim 13, wherein first means (9) are a car load detector and/or a digit keypad (19) and/or an identification medium reader (21). 10
15. The system of one of claims 13 or 14, wherein audio and/or visual indicating means (23, 24, 25) are provided to direct and guide people to the elevator (10, 10') or to the stairway. 15
16. The system of one of claims 13 to 15, wherein an emergency condition alarm indicating an emergency condition in the building is generated either automatically by the second means (7) and/or manually using the first means (9) and/or remotely and/or wherein each emergency condition like fire, earthquake, hurricane, flood, bomb scare or terrorist attack is identified by a code number. 20
17. A method for modernisation of an existing elevator in a multi-story building (1) with a system for emergency evacuation of building occupants capable to carry out a method according to claim 1, said building having a plurality of floors and at least one elevator (10, 10') with an elevator car being positionable at selected landings (26) of the floors, comprising: 30
- installing first means (9) for measuring a number of persons; 35
and providing a control unit (5) for determining a number of building occupants in the building; and installing second means (7) for detecting an emergency condition in the building;
connecting the second means (7) to the control unit (5); 40
the control unit (5) is defining at least one evacuation zone (13) in the building during the emergency condition;
the control unit (5) is defining at least one designated floor (14) in the building during the emergency condition; and 45
the building occupants are being evacuated during the emergency condition with the elevator car and/or a stairway from the evacuation zone to the designated floor. 50

Patentansprüche

1. Verfahren für eine Notevakuierung von Gebäudeinsassen aus einem mehrgeschossigen Gebäude (1), das mehrere Stockwerke und wenigstens einen

Aufzug (10, 10') mit einem Aufzugfahrzeug, das an ausgewählten Podesten (26) der Stockwerke positionierbar ist, und einer Steuereinheit (5) zum Steuern und Antreiben des Aufzugs (10, 10'), und erste Mittel (9) zum Messen von Personen in dem Gebäude besitzt; das die folgenden Schritte umfasst:

Bestimmen einer Anzahl von Gebäudeinsassen in dem Gebäude durch die Steuereinheit (5);
Detektieren eines Notfallzustands in dem Gebäude durch zweite Mittel (7), die mit der Steuereinheit (5) verbunden sind;
Definieren wenigstens einer Evakuierungszone (13) in dem Gebäude während des Notfallzustands durch die Steuereinheit (5);
Definieren wenigstens eines bezeichneten Stockwerks (14) in dem Gebäude während des Notfallzustands durch die Steuereinheit (5); und
Evakuieren der Gebäudeinsassen aus der Evakuierungszone mit dem Aufzugfahrzeug und/oder einer Treppe zu dem bezeichneten Stockwerk.

2. Verfahren nach Anspruch 1, wobei das Evakuieren von Gebäudeinsassen mit Aufzug und/oder Treppe aus der Evakuierungszone zu dem bezeichneten Stockwerk durch vollständige Evakuierung und/oder durch Zonenevakuierung und/oder durch Sprungevakuierung und/oder durch selektive Evakuierung erhalten wird.
3. Verfahren nach Anspruch 2, wobei während der vollständigen Evakuierung sämtliche Gebäudeinsassen, die sich in dem Gebäude befinden, evakuiert werden; oder während der Zonenevakuierung nur Gebäudeinsassen, die sich in der Evakuierungszone befinden, evakuiert werden; oder während der Sprungevakuierung wenigstens eine Gefahrenzone der Evakuierungszone von der Evakuierung ausgeschlossen wird; oder während der selektiven Evakuierung Behinderte und/oder Kinder und/oder sehr wichtige Personen und/oder alle anderen Personen mit einer speziellen Kennung unter den Gebäudeinsassen vorrangig evakuiert werden und/oder während der selektiven Evakuierung Behinderte und/oder Kinder und/oder sehr wichtige Personen und/oder alle anderen Personen mit einer speziellen Kennung unter den Gebäudeinsassen zu einem bezeichneten Stockwerk mit einem behindertengerechten Ausgang aus dem Gebäude evakuiert werden.
4. Verfahren nach einem der Ansprüche 1 bis 3, wobei die Fahrzeuglast gemessen wird, um eine Anzahl von Gebäudeinsassen in dem Gebäude zu bestimmen, und/oder die Anzahl von Zielanrufen oder Identifizierungscodes, die einen Stockwerkzugang anfordern, gezählt werden, um eine Anzahl von Ge-

bäudeinsassen in dem Gebäude zu bestimmen.

5. Verfahren nach einem der Ansprüche 1 bis 4, wobei die Evakuierung der Gebäudeinsassen aus der Evakuierungszone zu dem bezeichneten Stockwerk durch wenigstens zwei Aufzüge (10, 10') erfolgt, wobei Aufzugfahrzeuge der Aufzüge auf ein und demselben Stockwerk in der Evakuierungszone mit geöffneten Türen positioniert werden. 5
6. Verfahren nach Anspruch 5, wobei jedes Stockwerk in der durch Aufzüge (10, 10') zu evakuierende Zone durch eine Anzahl von Aufzugfahrzeugen evakuiert wird, die eine Gesamtlastkapazität haben, die der Last der Anzahl von Gebäudeinsassen entspricht, die in dem Geschoss vorhanden sind, und/oder wobei die Stockwerke in der durch Aufzüge (10, 10') zu evakuierenden Evakuierungszone sequentiell evakuiert werden und/oder wobei jedes Stockwerk in der durch Aufzüge (10, 10') zu evakuierenden Evakuierungszone nur einmal evakuiert wird. 10
7. Verfahren nach einem der Ansprüche 1 bis 6, wobei Gebäudeinsassen durch die Treppe zu einem Stockwerk in dem durch Aufzüge (10, 10') zu evakuierenden Evakuierungszone geleitet und geführt werden und/oder Gebäudeinsassen durch eine Treppe oder durch wenigstens eine Rolltreppe von dem bezeichneten Stockwerk zu einem Gebäudeausgang geleitet und geführt werden. 20
8. Verfahren nach einem der Ansprüche 1 bis 7, wobei hörbare und/oder sichtbare Anzeigemittel (23, 24, 25) die Gebäudeinsassen zu dem Aufzug (10, 10') und/oder der Treppe leiten und führen. 25
9. Verfahren nach Anspruch 1, wobei Gebäudeinsassen aus der Evakuierungszone zu dem bezeichneten Stockwerk mit wenigstens zwei Aufzugfahrzeugen, die auf ein und demselben Stockwerk in der Evakuierungszone mit geöffneten Türen positioniert sind, evakuiert werden. 30
10. Verfahren nach Anspruch 9, wobei jedes Stockwerk in der durch Aufzüge (10, 10') zu evakuierenden Evakuierungszone durch eine Anzahl von Aufzugfahrzeugen evakuiert wird, deren Gesamtlastkapazität einer geschätzten Last der Anzahl von Gebäudeinsassen, die in dem Stockwerk vorhanden sind, entspricht, und/oder wobei die Stockwerke in der durch Aufzüge zu evakuierenden Evakuierungszone sequentiell evakuiert werden, wobei mit der Region in der Notfallzone mit hoher Gefahr für Gebäudeinsassen begonnen wird und/oder wobei jedes Stockwerk in der durch Aufzüge (10, 10') zu evakuierenden Evakuierungszone nur einmal evakuiert wird. 35

11. Verfahren nach einem der Ansprüche 9 oder 10, wobei Gebäudeinsassen durch die Treppe zu einem Stockwerk in der durch Aufzüge (10, 10') zu evakuierenden Evakuierungszone geleitet und geführt werden und/oder wobei Gebäudeinsassen durch eine Treppe oder wenigstens eine Rolltreppe von dem bezeichneten Stockwerk zu einem Gebäudeausgang geleitet und geführt werden. 40

12. Verfahren nach einem der Ansprüche 9 bis 11, wobei hörbare und/oder sichtbare Anzeigemittel (23, 24, 25) Gebäudeinsassen zu den Aufzügen (10, 10') und/oder zu der Treppe leiten und führen. 45

13. System für eine Notfallevakuierung von Insassen aus einem mehrgeschossigen Gebäude (1), das mehrere Stockwerke und wenigstens einen Aufzug (10, 10') mit einem Aufzugfahrzeug, das an ausgewählten Podesten (26) der Stockwerke positionierbar ist, und einer Steuereinheit (5), um den Aufzug (10, 10') zu steuern und anzutreiben, besitzt, das Folgendes umfasst: 50

erste Mittel (9), um eine Anzahl von Personen zu messen,
 zweite Mittel (7), um einen Notfallzustand in dem Gebäude zu detektieren;
 wobei die zweiten Mittel (7) mit der Steuereinheit (5) verbunden sind;
 die Steuereinheit (5), um eine Anzahl von Gebäudeinsassen in dem Gebäude zu bestimmen;
 die Steuereinheit (5), um wenigstens eine Evakuierungszone (13) in dem Gebäude während des Notfallzustands zu definieren; und
 die Steuereinheit (5), um wenigstens ein bezeichnetes Stockwerk (14) in dem Gebäude während des Notfallzustands zu definieren;
 wobei das System mit dem Aufzugfahrzeug und/oder einer Treppe die Gebäudeinsassen aus der Evakuierungszone zu dem bezeichneten Stockwerk evakuiert. 55

14. System nach Anspruch 13, wobei die ersten Mittel (9) ein Fahrzeuglastdetektor und/oder ein Zahlen-Tastenfeld (19) und/oder ein Identifizierungsmedium-Leser (21) sind. 60

15. System nach einem der Ansprüche 13 bis 14, wobei hörbare und/oder sichtbare Anzeigemittel (23, 24, 25) vorgesehen sind, um Menschen zu dem Aufzug (10, 10') oder zu der Treppe zu leiten und zu führen. 65

16. System nach einem der Ansprüche 13 bis 15, wobei ein Notfallzustandsalarm, der einen Notfallzustand in dem Gebäude angibt, entweder automatisch durch die zweiten Mittel (7) und/oder manuell unter Verwendung der ersten Mittel (9) und/oder aus der Ferne erzeugt wird und/oder wobei jeder Notfallzu- 70

stand wie etwa Feuer, Erdbeben, Hurrikan, Flut, Bombenalarm oder Terrorismusangriff durch eine Codenummer identifiziert werden.

17. Verfahren zum Modernisieren eines vorhandenen Aufzugs in einem mehrgeschossigen Gebäude (1) mit einem System für eine Notfallevakuierung von Gebäudeinsassen, das ein Verfahren nach Anspruch 1 ausführen kann, wobei das Gebäude mehrere Stockwerke und wenigstens einen Aufzug (10, 10') mit einem Aufzugfahrzeug, das an ausgewählten Podesten (26) der Stockwerke positionierbar ist, besitzt, das Folgendes umfasst:

Installieren erster Mittel (9), um eine Anzahl von Personen zu messen; und
Vorsehen einer Steuereinheit (5), um eine Anzahl von Gebäudeinsassen in dem Gebäude zu bestimmen; und
Installieren zweiter Mittel (7), um einen Notfallzustand in dem Gebäude zu detektieren;
Verbinden der zweiten Mittel (7) mit der Steuereinheit (5);
wobei die Steuereinheit (5) wenigstens eine Evakuierungszone (13) in dem Gebäude während des Notfallzustands definiert;
wobei die Steuereinheit (5) wenigstens ein bezeichnetes Stockwerk (14) in dem Gebäude während des Notfallzustands definiert; und
wobei die Gebäudeinsassen während des Notfallzustands mit dem Aufzugfahrzeug und/oder einer Treppe aus der Evakuierungszone zu dem bezeichneten Stockwerk evakuiert werden.

Revendications

1. Procédé pour l'évacuation d'urgence des occupants d'un immeuble à plusieurs étages (1) comprenant une pluralité d'étages et au moins un ascenseur (10, 10') comprenant une cabine d'ascenseur qui peut être positionnée à des paliers sélectionnés (26) des étages, et une unité de commande (5) pour commander et entraîner l'ascenseur (10, 10'), et des premiers moyens (9) pour compter des personnes dans l'immeuble; comprenant les étapes suivantes:
- déterminer un nombre d'occupants de l'immeuble dans l'immeuble par l'unité de commande (5);
détecter une situation d'urgence dans l'immeuble par des deuxièmes moyens (7) connectés à l'unité de commande (5);
définir au moins une zone d'évacuation (13) dans l'immeuble pendant la situation d'urgence par l'unité de commande (5);
définir au moins un étage désigné (14) dans l'im-

meuble pendant la situation d'urgence par l'unité de commande (5); et
évacuer avec la cabine d'ascenseur et/ou une cage d'escalier les occupants de l'immeuble à partir de la zone d'évacuation vers l'étage désigné.

2. Procédé selon la revendication 1, dans lequel l'évacuation avec l'ascenseur et/ou la cage d'escalier des occupants de l'immeuble à partir de la zone d'évacuation vers l'étage désigné est obtenue par une évacuation complète et/ou par une évacuation de la zone et/ou par une évacuation à saut et/ou par une évacuation sélective.
3. Procédé selon la revendication 2, dans lequel, pendant l'évacuation complète, tous les occupants de l'immeuble qui se trouvent dans l'immeuble sont évacués; ou, pendant une évacuation de zone, seuls les occupants de l'immeuble qui se trouvent à l'intérieur de la zone d'évacuation sont évacués; ou, pendant une évacuation à saut, au moins une zone de danger de la zone d'évacuation est exclue de l'évacuation; ou, pendant une évacuation sélective, les personnes handicapées et/ou les enfants et/ou les personnes très importantes et/ou toutes les autres personnes présentant une identification spéciale parmi les occupants de l'immeuble sont évacués de façon prioritaire, et/ou pendant une évacuation sélective, les personnes handicapées et/ou les enfants et/ou les personnes très importantes et/ou toutes les autres personnes présentant une identification spéciale parmi les occupants de l'immeuble sont évacués vers un étage désigné qui possède une sortie de l'immeuble adaptée pour les handicapés.
4. Procédé selon l'une quelconque des revendications 1 à 3, dans lequel la charge de la cabine est mesurée afin de déterminer un nombre d'occupants de l'immeuble dans l'immeuble, et/ou le nombre d'appels de destination ou de codes d'identification qui nécessitent un accès aux étages sont comptés pour déterminer un nombre d'occupants de l'immeuble dans l'immeuble.
5. Procédé selon l'une quelconque des revendications 1 à 4, dans lequel l'évacuation des occupants de l'immeuble à partir de la zone d'évacuation vers l'étage désigné est effectuée par au moins deux ascenseurs (10, 10'), les cabines d'ascenseur desdits ascenseurs étant positionnées à un seul et même étage dans la zone d'évacuation dont les portes sont ouvertes.
6. Procédé selon la revendication 5, dans lequel chaque étage dans la zone d'évacuation à évacuer par les ascenseurs (10, 10') est évacuée par un nombre de cabines d'ascenseur qui présentent une capacité

- de charge totale qui correspond à la charge du nombre d'occupants de l'immeuble présents dans ledit étage, et/ou dans lequel les étages dans la zone d'évacuation à évacuer par les ascenseurs (10, 10') sont évacués de façon séquentielle, et/ou dans lequel chaque étage dans la zone d'évacuation à évacuer par les ascenseurs (10, 10') est évacué une seule fois.
7. Procédé selon l'une quelconque des revendications 1 à 6, dans lequel les occupants de l'immeuble sont dirigés et guidés par la cage d'escalier vers un étage dans la zone d'évacuation à évacuer par des ascenseurs (10, 10'), et /ou les occupants de l'immeuble sont dirigés et guidés par une cage d'escalier ou au moins un escalier roulant à partir de l'étage désigné vers une sortie de l'immeuble.
 8. Procédé selon l'une quelconque des revendications 1 à 7, dans lequel des moyens d'indication acoustiques et/ou visuels (23, 24, 25) dirigent et guident les occupants de l'immeuble vers l'ascenseur (10, 10') et/ou la cage d'escalier.
 9. Procédé selon la revendication 1, dans lequel les occupants de l'immeuble sont évacués à partir de la zone d'évacuation vers l'étage désigné avec au moins deux cabines d'ascenseur qui sont positionnées à un seul et même étage dans la zone d'évacuation dont les portes sont ouvertes.
 10. Procédé selon la revendication 9, dans lequel chaque étage dans la zone d'évacuation à évacuer par les ascenseurs (10, 10') est évacué par un certain nombre de cabines d'ascenseur qui présentent une capacité de charge totale qui correspond à la charge estimée du nombre d'occupants de l'immeuble présents dans ledit étage, et/ou dans lequel les étages dans la zone d'évacuation à évacuer par les ascenseurs sont évacués de façon séquentielle, en commençant avec la région dans la zone d'urgence où le danger est grand pour les occupants de l'immeuble, et/ou dans lequel chaque étage dans la zone d'évacuation à évacuer par les ascenseurs (10, 10') est évacué une seule fois.
 11. Procédé selon la revendication 9 ou 10, dans lequel les occupants de l'immeuble sont dirigés et guidés par la cage d'escalier vers un étage dans la zone d'évacuation à évacuer par les ascenseurs (10, 10'), et/ou les occupants de l'immeuble sont dirigés et guidés par une cage d'escalier ou au moins un escalier roulant à partir de l'étage désigné vers une sortie de l'immeuble.
 12. Procédé selon l'une quelconque des revendications 9 à 11, dans lequel des moyens d'indication acoustiques et/ou visuels (23, 24, 25) dirigent et guident les occupants de l'immeuble vers les ascenseurs (10, 10') et/ou la cage d'escalier.
 13. Système d'évacuation d'urgence des occupants d'un immeuble à plusieurs étages (1) comprenant une pluralité d'étages et au moins un ascenseur (10, 10') comprenant une cabine d'ascenseur qui peut être positionnée à des paliers sélectionnés (26) des étages, et une unité de commande (5) pour commander et entraîner l'ascenseur (10, 10'), comprenant:
 - des premiers moyens (9) pour compter un nombre de personnes;
 - des deuxièmes moyens (7) pour détecter une situation d'urgence dans l'immeuble, les deuxièmes moyens (7) étant connectés à l'unité de commande (5);
 - l'unité de commande (5) pour déterminer un nombre d'occupants de l'immeuble dans l'immeuble;
 - l'unité de commande (5) pour définir au moins une zone d'évacuation (13) dans l'immeuble pendant la situation d'urgence;
 - l'unité de commande (5) pour définir au moins un étage désigné (14) dans l'immeuble pendant la situation d'urgence; et
 - le système évacuant avec la cabine d'ascenseur et/ou une cage d'escalier les occupants de l'immeuble à partir de la zone d'évacuation vers l'étage désigné.
 14. Système selon la revendication 13, dans lequel les premiers moyens (9) sont un détecteur de charge de cabine et/ou un clavier numérique (19) et/ou un lecteur de support d'identification (21).
 15. Système selon la revendication 13 ou 14, dans lequel des moyens d'indication acoustiques et/ou visuels (23, 24, 25) sont prévus pour diriger et guider les personnes vers l'ascenseur (10, 10') ou vers la cage d'escalier.
 16. Système selon l'une quelconque des revendications 13 à 15, dans lequel une alarme de situation d'urgence indiquant une situation d'urgence dans l'immeuble est générée soit automatiquement par les deuxièmes moyens (7), et/ou manuellement en utilisant les premiers moyens (9), et/ou à distance, et/ou dans lequel chaque situation d'urgence telle qu'un incendie, un tremblement de terre, un ouragan, une inondation, une alerte à la bombe ou une attaque terroriste est identifiée par un numéro de code.
 17. Procédé de modernisation d'un ascenseur existant dans un immeuble à plusieurs étages (1) comprenant un système d'évacuation d'urgence des occu-

pants d'un immeuble capable d'exécuter le procédé selon la revendication 1, ledit immeuble comprenant une pluralité d'étages et au moins un ascenseur (10, 10') comprenant une cabine d'ascenseur qui peut être positionnée à des paliers sélectionnés (26) des étages, comprenant les étapes suivantes: 5

installer des premiers moyens (9) pour compter un nombre de personnes; et
 prévoir une unité de commande (5) pour déterminer un nombre d'occupants de l'immeuble dans l'immeuble; et 10
 installer des deuxièmes moyens (7) pour détecter une situation d'urgence dans l'immeuble;
 connecter les deuxièmes moyens (7) à l'unité de commande (5); 15
 l'unité de commande (5) définissant au moins une zone d'évacuation (13) dans l'immeuble pendant la situation d'urgence;
 l'unité de commande (5) définissant au moins un étage désigné (14) dans l'immeuble pendant la situation d'urgence; et 20
 les occupants de l'immeuble étant évacués pendant la situation d'urgence avec la cabine d'ascenseur et/ou une cage d'escalier à partir de la zone d'évacuation vers l'étage désigné. 25

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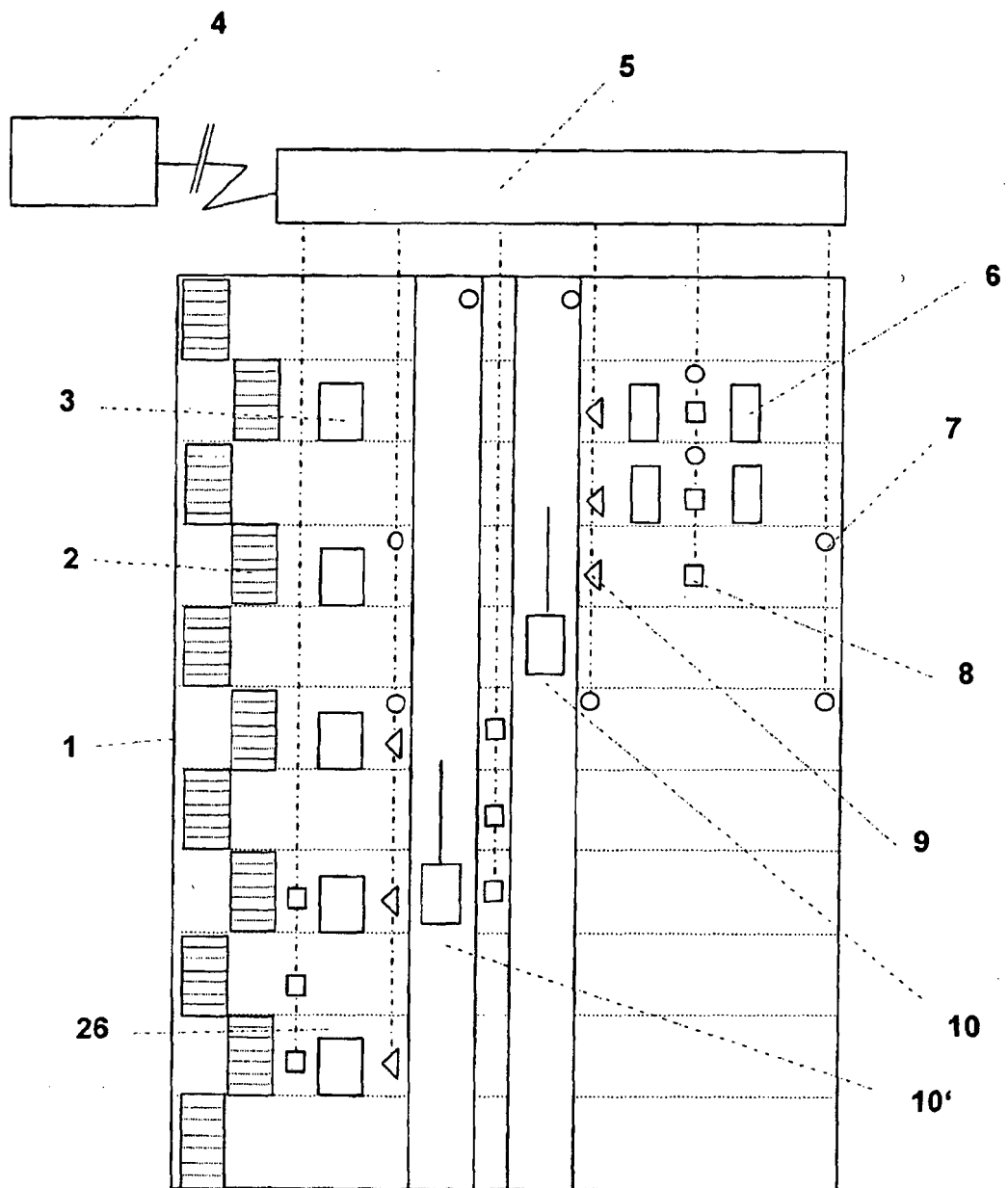


Fig. 1

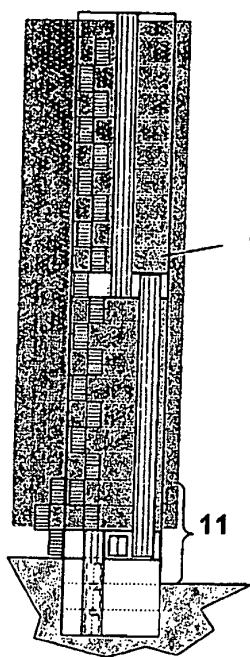


Fig. 2a

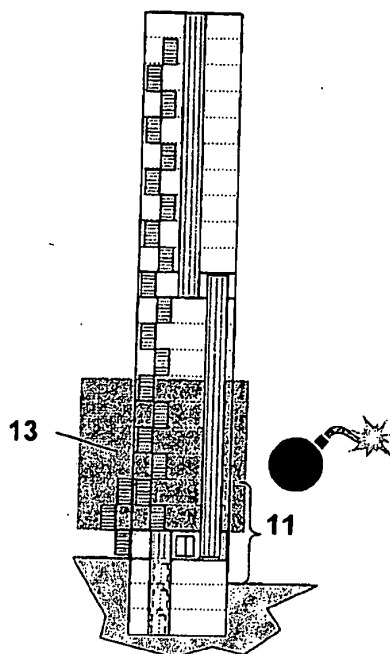


Fig. 2b

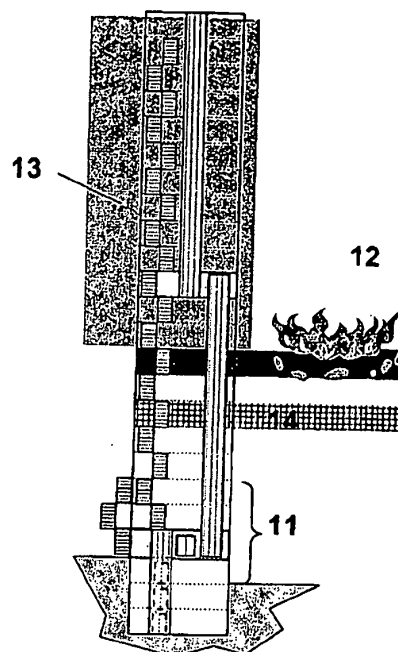


Fig. 2c

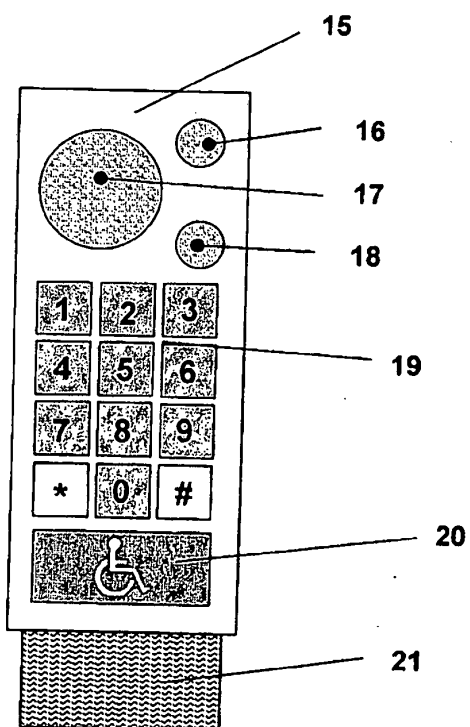


Fig. 3

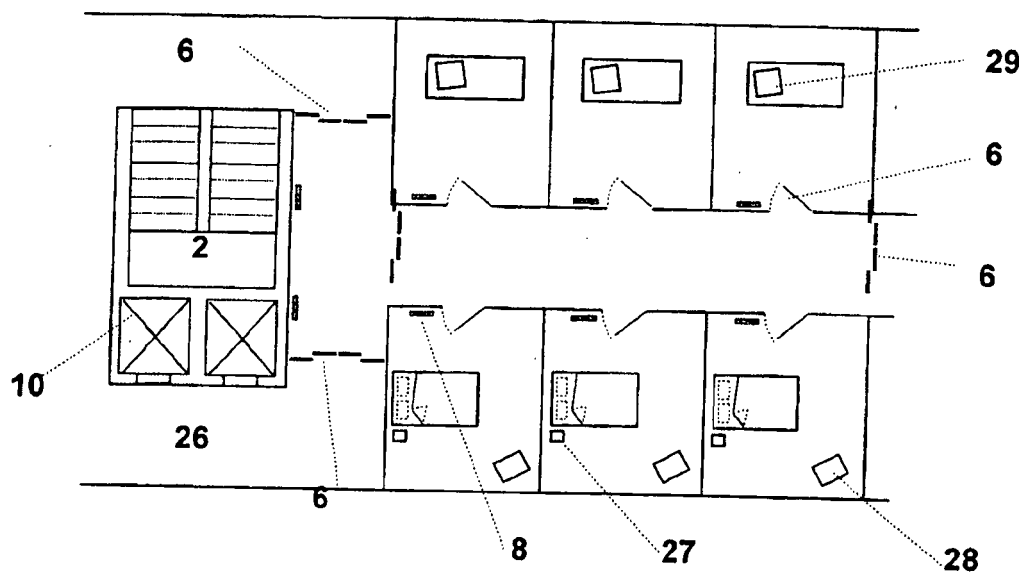


Fig. 4

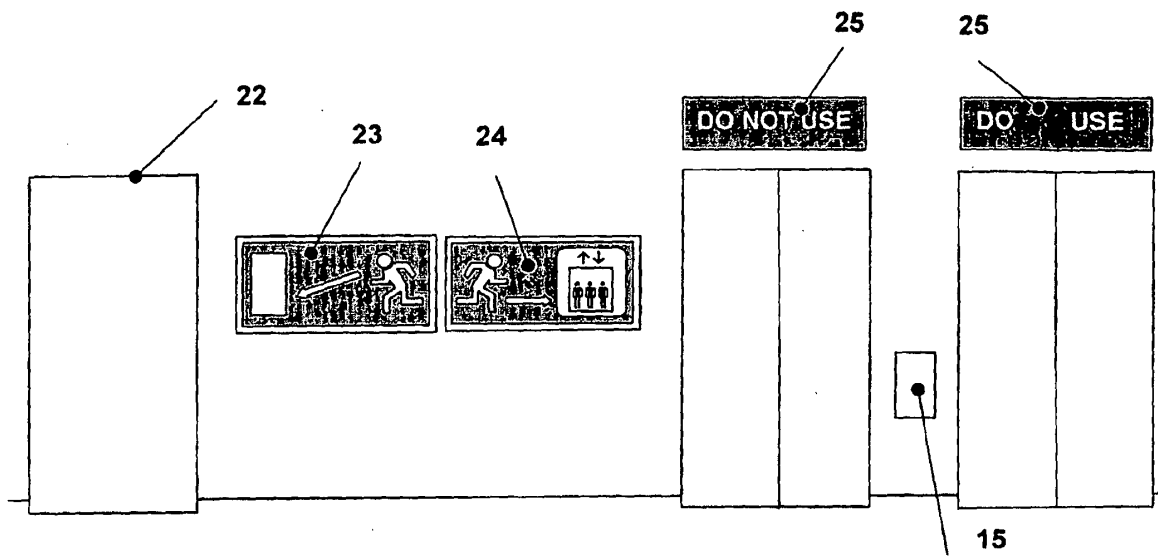


Fig. 5

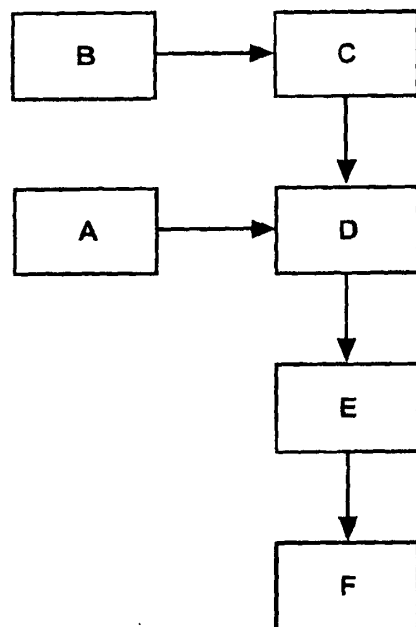


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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