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(54) METHOD OF OPERATING AN ELEVATOR ARRANGEMENT WITH AN EMERGENCY PRIORITY FUNCTION AND ELEVATOR ARRANGEMENT IMPLEMENTING SUCH METHOD

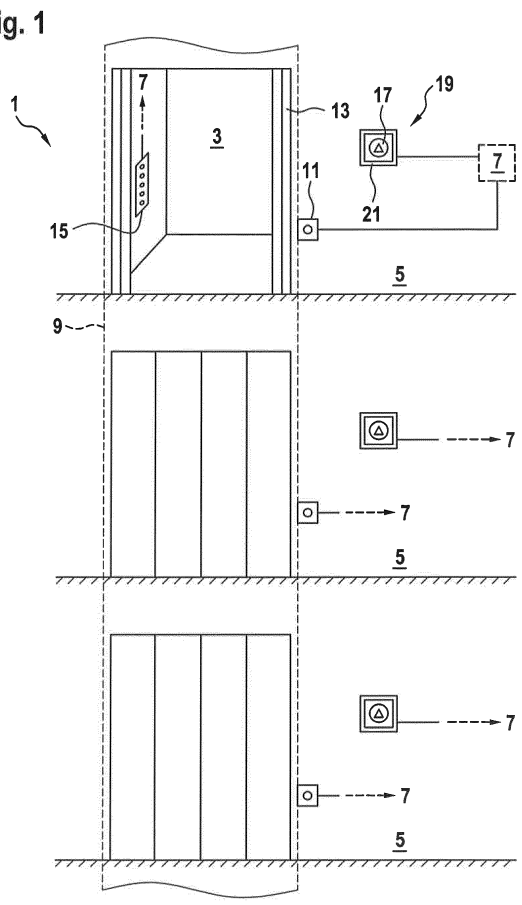
(57) A method of operating an elevator arrangement (1) with an emergency priority function is proposed. The elevator arrangement (1) comprises an elevator car (3) being movable between various floors (5) upon control by an elevator controller (7). The method comprises: monitoring an emergency call initiator (19) (e.g. emergency button 17), being configured to be actuated e.g. by an person waiting in an affected floor (5). Upon detecting actuation of the emergency call initiator (19), an operation mode of the elevator controller (7) is switched from a normal mode to an emergency priority mode. In such mode, car calls made with lower priority are generally ignored and following emergency actions are performed:

- the elevator car (3) is moved directly to the affected floor (5);
- passengers are alerted about the emergency;
- the passengers are allowed to exit at the affected floor (5) and the person is allowed to enter the elevator car (3);
- upon a single selection of a destination floor made by a person in the elevator car (3), the elevator car is moved directly to the destination floor and the person is allowed to exit the elevator car at the destination floor.

Upon completion of the emergency actions, the operation mode is switched from the emergency priority mode to a restricted mode in which at least some of functions available in the normal mode are restricted.

Resulting from a sum of measures proposed herein, fastest possible transportation may be provided by the elevator arrangement being in the emergency priority mode. However, inter alia due to the subsequent automatically attained restricted operation mode, misuse of the emergency priority function is discouraged.

Fig. 1



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Description

[0001] The present invention relates to a method of operating an elevator arrangement as well as to an elevator arrangement implementing such method. Furthermore, the invention relates to a computer program product for instructing or controlling such method and a computer-readable medium having stored thereon such computer program product.

[0002] Elevators are used in buildings for transporting passengers or items from one level to another level. Particularly, in modern buildings, elevator arrangements comprising one or in many cases several elevator cars being movable throughout hoistways are used to transport large numbers of passengers between floors of the building.

[0003] Therein, passengers may indicate a so-called hall call by actuating a landing operation panel (LOP) provided at one of the floors of the building. The LOP may be for example a button to be pressed by a person located in a floor. Upon actuating the LOP, a signal indicating the hall call may be transmitted to an elevator controller, thereby indicating to the elevator controller that the elevator car shall be moved to the respective floor such that the waiting passenger may enter. Other types of LOPs may be implemented such as LOPs to be actuated contactless, e.g. by RFIDs (Radio Frequency Identifiers), smartcards, mobile phones, etc.

[0004] Upon having entered the elevator car, the passenger may indicate a car call by suitably actuating a car operation panel (COP). For example, a button indicating a destination floor on the COP may be pushed and, thereupon, the COP may indicate to the elevator controller that according to the car call, the elevator car shall be moved to the indicated destination floor. Again, the COP may be implemented in other forms such as, for example, to be actuated by the passenger in a contactless manner.

[0005] In a normal mode of operation, the elevator controller accepts all of the transmitted hall calls and car calls and controls motions of the elevator car in accordance with specific motion strategies in order to fulfil all the indicated calls.

[0006] However, it has been found that under certain conditions, exceptions from such normal mode of operation might be admissible. For example, in some conventional elevator arrangements, a normal mode of operation may be overridden or replaced by an operation mode of higher priority thereby for example restricting functions of the elevator arrangement.

[0007] For example, in case of a fire in the building, firemen may initiate a fire priority mode in which the elevator may exclusively be controlled in accordance with the firemen's requirements. Typically, such fire priority mode is initiated upon actuating a specific key switch located for example in the elevator lobby where only authorized firemen possess the key and are therefore able to initiate the fire priority mode. During such fire priority mode, all hall calls are typically ignored by the elevator controller and only the car calls made by the firemen inside the elevator car are accepted and realized.

[0008] Other priority modes of operation have been implemented such as for example an earthquake operation mode adapted for evacuating a building in a fastest possible manner, a VIP operation mode adapted for allowing VIPs (Very Important Persons) prioritized use of the elevator arrangement, etc.

[0009] Generally, all such types of priority modes of operation may be initiated either by specific authorized persons such as firemen or VIPs, or by the elevator arrangement itself such as in the case of the earthquake operation mode.

[0010] There may be a need for a method for operating an elevator arrangement in which a specific mode of operation may be initiated by any not specifically authorized person in order to enable prioritized use of the elevator arrangement in specific circumstances. Furthermore, there may be a need for a method of operating an elevator arrangement with such prioritization option which method at least discourages misuse of the prioritization option. Furthermore, there may be a need for an elevator and a computer program product implementing such method as well as for a computer-readable medium having such computer program product stored thereon.

[0011] Such needs may be met with the subject-matter of the independent claims. Advantageous embodiments are defined in the dependent claims as well as in the following specification.

[0012] According to a first aspect of the invention, a method of operating an elevator arrangement with an emergency priority function is proposed. The elevator arrangement comprises at least one elevator car being movable between various floors within a building upon control by an elevator controller. The method comprises the following steps, preferably in the indicated order:

> Generally, an emergency call initiator is monitored, the emergency call initiator being configured to be actuated by a person in an affected one of the floors of the building upon an emergency person waiting in the affected floor.

[0013] Upon detecting an actuation of the emergency call initiator, an operation mode of the elevator controller is switched from a normal mode to an emergency priority mode. In such emergency priority mode, car calls made with lower priority are generally ignored. Furthermore, in the emergency priority mode, the following emergency actions are performed, preferably in the indicated order:

- the elevator car is moved directly to the affected floor;
- passengers in the elevator car are alerted about the emergency;
- the passengers are allowed to exit from the elevator car at the affected floor and the emergency person is allowed to enter the elevator car at the affected floor;

- upon a single selection of a destination floor made by a person in the elevator car, the elevator car is moved directly to the destination floor and the emergency person is allowed to exit the elevator car at the destination floor.

[0014] Finally, upon completion of the emergency actions, the operation mode is switched from the emergency priority mode to a restricted mode in which at least some of functions available in the normal mode are restricted.

[0015] According to a second aspect of the invention, an elevator arrangement with an emergency priority function is proposed. The elevator arrangement comprises an elevator controller controlling motions of at least one elevator car between various floors within a building. Therein, the elevator controller is adapted for performing the method according to an embodiment of the above first aspect of the invention.

[0016] According to a third aspect of the invention, a computer program product comprising computer readable instructions which, when performed by a processor of an elevator controller, instruct the elevator controller to perform the method according to an embodiment of the above first aspect of the invention is proposed.

[0017] According to a fourth aspect of the invention, a computer readable medium comprising a computer program product according to an embodiment of the above third aspect of the invention stored thereon is proposed.

[0018] Ideas underlying embodiments of the present invention may be interpreted as being based, inter alia, on the following observations and recognitions.

[0019] It has been observed that in elevator operation, waiting periods passengers have to wait before an elevator car comes to their floor after a hall call has been submitted and furthermore waiting periods until the passenger has been transported to a desired destination floor indicated with a car call may be very long. This may be particularly true in large buildings with heavy passenger traffic and potentially even more true for example in large buildings in which for example due to pricing pressure no excessive number of elevator cars has been provided in an elevator arrangement.

[0020] However, emergency situations may occur in which long waiting periods are not acceptable. For example, if a person in a crowded building is subject to an accident or to an acute disease, urgent operation of the elevator arrangement may be required for transporting such emergency person e.g. to a desired floor and/or for evacuating the emergency person from the building.

[0021] Accordingly, it may be beneficial to, upon operating an elevator arrangement, provide for a certain emergency priority mode or emergency priority function in which an emergency person may be transported from a current floor to a desired destination floor in a fastest possible manner.

[0022] It is assumed that emergency situations may occur in arbitrary conditions and that typically no specifically trained or authorized persons are available in such situations in order to suitably authorize conventional prioritization functions in the elevator arrangement. Therefore, it is assumed necessary that the emergency mode should be able to be initiated by anybody present at the affected floor near to the emergency person.

[0023] However, it may be suspected that a provision of such emergency priority mode may be misused also in conditions where there is no emergency. For example, impatient passengers could misuse such emergency priority function in order to shorten their waiting periods. It has therefore been found to be desirable to discourage any misuse of the emergency priority function.

[0024] In order to fulfil both requirements, providing an emergency priority function upon operating the elevator arrangement as well as discouraging its misuse, a method as described herein and an elevator arrangement operated in accordance with such method are proposed.

[0025] In such method, a so-called emergency call initiator is monitored. The monitoring may be performed permanently or in time intervals. The emergency call initiator may be a device which may be actuated by a person. Particularly, the person does typically not need to be specifically authorized and/or trained but any person shall be able to actuate the emergency call initiator.

[0026] For example, in accordance with an embodiment, an emergency call initiator may be provided at least at one of the floors of the building served by the elevator car.

[0027] For example, an emergency call initiator may be provided at or close to a landing door at one of the floors of the building such that a person being affected by an emergency or a person helping such emergency person may easily and quickly access and actuate such emergency call initiator. Preferably, an emergency call initiator is provided at each of the floors served by the elevator car of the elevator arrangement in the building or at least at those floors being most vulnerable to emergencies.

[0028] For example, the emergency call initiator may be implemented with a specific hardware switch which is provided additionally to a conventional landing operation panel (LOP) provided at the respective floor.

[0029] In other words, the emergency call initiator may be a switch which is implemented in hardware and which is provided at the respective floor in addition to the landing operation panel provided at the floor for initiating hall calls. Such additional hardware switch may be implemented in various manners and at various locations. For example, the hardware switch may be a mechanical switch which may be physically actuated by a person. Alternatively, such hardware switch may be provided with a hardware which allows other types of activation such as contactless activation, activation via sound, noise or voice, activation via optical means such as gesture activation, etc. The hardware switch may be provided at or near a landing door of the elevator arrangement in the respective floor, for example in close proximity of less

than 5m, preferably less than 1m, adjacent to the landing door. Preferably, the hardware switch may be eye-catching, i.e. for example provided with a remarkable colour such as red.

[0030] According to an alternative embodiment, the emergency call initiator may be implemented with a software instructing an emergency call function in a landing operation panel provided at the floor.

[0031] In other words, no hardware switch is necessarily to be provided but, instead, existing hardware such as the landing operation panel provided at the floor may be specifically modified in order to enable instructing the emergency call function by submitting e.g. an emergency indicative signal to the elevator controller. Accordingly, conventional operation of such existing LOP hardware may be modified entirely or at least in part by software measures.

[0032] Particularly, such modification may be implemented such that for example upon specifically actuating the LOP, the LOP will issue a coded signal indicative of an emergency. For example, the LOP may be adapted such that upon actuating its push button in a coded actuation pattern, the emergency indicative signal is issued and transmitted to the elevator controller. For example, such actuation pattern might be a Morse code representing for example the SOS signal (i.e. with a signal sequence short - short - short - long - long - long - short - short - short, i.e. "... _ _ _ ... "). Accordingly, in such configuration, the emergency call initiator does not need any additional hardware but may be purely implemented using existing hardware and modifying its function.

[0033] According to the proposed method, upon detecting the actuation of the emergency call initiator, an operation mode of the elevator controller shall be switched from its normal mode of operation to a specific emergency priority mode of operation. This emergency priority mode may be specifically adapted such that the emergency person waiting at the affected floor may be evacuated using the elevator arrangement in a fastest possible manner. For this purpose, it may be acceptable to temporarily ignore car calls and/or hall calls made with a lower priority. Particularly, such calls may be ignored independent of whether they have been submitted prior to initiating the emergency function or after such emergency function has been initiated. Accordingly, during the emergency priority mode, all elevator operation may be focused on evacuating the emergency person.

[0034] For such purpose, a sequence of emergency actions shall be performed.

[0035] First, the elevator car should be directly moved to the affected floor where the emergency person is waiting. In this context, "directly" may mean that no stops at other floors will be made. Particularly, at such direct moving of the elevator to the affected floor, other hall calls or car calls are ignored. By avoiding any additional stops, the elevator car may not only be moved to the affected floor in a fastest manner but it may also be avoided that passengers may block such car motion by hindering any closure of the car door upon stopping at another floor.

[0036] Furthermore, directly upon actuation of the emergency call initiator or shortly after such event, passengers in the elevator car shall be alerted about the occurred emergency. For example, an emergency bell may ring or an emergency sound may be issued by a loudspeaker. In a more convenient implementation, spoken information about the emergency is provided to the passengers and/or visual information is displayed. Thereby, the passengers may not only be informed about the fact that they will not be able to be transported to their desired destination floor but, more important, the passengers may be informed about the fact that they will have to leave the elevator car at the next stop, i.e. at the affected floor, in order to enable entering of the emergency person into the elevator car.

[0037] As soon as the elevator car reached the affected floor, car doors and landing doors may be opened thereby allowing the passengers in the elevator car to exit the elevator car and then allowing the emergency person (and possibly an attendant person) to enter the elevator car.

[0038] As soon as the emergency person is in the elevator car, a destination floor desired for example for evacuation of the emergency person may be selected. As, typically, only a single floor is necessary to be approached in such emergency situation, only a single selection of a destination floor shall be enabled to be made by the person in the elevator car. In other words, no multiple destination floors shall be selectable during the emergency priority mode. While selecting a single destination floor is typically sufficient during emergency conditions, preventing a multiple selection of destination floors may discourage any misuse of the emergency function.

[0039] When having arrived at the destination floor, the emergency person (and possibly the attendant person) may be allowed to exit the elevator car by opening the car and landing doors. Upon the emergency person having left the elevator car, the sequence of emergency actions is completed and the purpose of rapidly bringing the emergency person to a desired destination floor is fulfilled.

[0040] During the sequence of emergency actions, call cancellation might be enabled to ensure for example that if a wrong car call is pressed then the same may be disabled e.g. by pressing it again and a new call may be given. Alternately the last call pressed might be the one which is interpreted to be valid and an earlier call might be disabled. This might save time if a mistake is done in giving floor call.

[0041] In addition or alternatively, the use of the LOP might be restricted for about e.g. next 5 - 10 minutes and only car call in SAPB (single automatic push button) mode (sometimes also referred to as taxi mode) might be allowed. This is to ensure e.g. that if the patient has reached a wrong floor and it is discovered soon then the elevator is still available for going to the right floor. Again

this car call in SAPB mode should be made valid for 3-5 calls only.

[0042] After such completion of the emergency actions, the operation mode is automatically switched from the emergency priority mode to the so-called restricted mode of operation. In this restricted mode, no prioritized functions are realized anymore and hall calls and/or car calls may be accepted again in a normal or almost-normal manner. However, such restricted mode shall differ from the normal mode of operation in that at least some functions available in the normal mode are restricted or completely prevented. By restricting such normal functions, subsequent to the termination of the emergency priority mode, misuse of the emergency priority function shall be discouraged.

[0043] For example, according to an embodiment, in the restricted mode, the elevator controller accepts only a single elevator call at a time.

[0044] Such restricted operation mode is also sometimes referred to as taxi mode. Therein, either a single hall call or a single car call may be accepted by the elevator controller and the elevator car may be moved to a single desired floor, accordingly. Thereby, while some basic functioning of the elevator arrangement remain, a normal transportation capacity of the elevator arrangement is significantly reduced. Accordingly, such subsequent reduction of transportation capacity may discourage misuse of the emergency priority function.

[0045] Alternatively or additionally, according to an embodiment, a landing operation panel in the affected floor may be disabled in the restricted mode.

[0046] In other words, upon actuating the emergency call initiator in a specific floor, the emergency priority function may be initiated but it has then to be accepted that after completion of the emergency actions, the LOP at this affected floor is at least temporarily disabled such that no further hall calls may be initiated from this floor. Such measure may significantly discourage any misuse of the emergency priority function as all persons in the affected floor would be "penalized" for such misuse.

[0047] As a further measure to discourage misuse, according to an embodiment, the operation mode after completion of the emergency actions may be switched from the restricted mode to the normal mode only by authorized personnel.

[0048] In other words, while, upon completion of the emergency actions after having delivered the emergency person at a desired destination floor, the operation mode is automatically switched to the restricted mode, this restricted mode shall not be reset to the normal mode either automatically or by any non-authorized person. Instead, specifically authorized personnel shall be required to perform such reset to the normal mode thereby again enabling full functionality of the elevator arrangement. The knowledge that specific authorized personnel will be necessary to reset the elevator arrangement to normal operation may discourage any persons from misusing the emergency priority function.

[0049] Furthermore, according to an embodiment, during the emergency priority mode and/or during the restricted mode, a so-called call back signal may be transmitted to a remote control centre.

[0050] Therein, the call back signal shall be indicative of the emergency priority function having been initiated in the elevator arrangement and by sending the call back signal to the remote control centre, for example personnel remotely monitoring the functions of the elevator arrangement at the remote control centre may be informed about the occurrence of an emergency and/or of a necessity of resetting the elevator operation from its restricted mode to its normal mode. Accordingly, the persons at the remote control centre may initiate suitable further emergency steps such as for example calling an ambulance or an emergency doctor. Additionally or alternatively, the persons at the remote control centre may arrange for an authorized personnel to be sent to the elevator arrangement in order to reset it to its normal mode of operation.

[0051] Furthermore, according to an embodiment, an acoustical signal may be issued during the emergency priority mode and/or during the restricted mode.

[0052] Particularly, such acoustical signal may be such that it can be heard by passengers or other people in the building, particularly by people at the affected floor or at a reception of the building. The acoustical signal may be for example an alarm signal. On the one hand, by issuing such acoustical signal, people in the building may be alerted and informed about the emergency case and may for example initiate suitable emergency steps. On the other hand, as the acoustical signal may be continuously issued also after completion of the emergency actions, i.e. when the elevator arrangement is already switched in its restricted mode, issuing the acoustical signal may be slightly annoying and may encourage people in the building to call authorized personnel for switching the elevator operation back to its normal mode.

[0053] In order to further discourage misuse of the emergency priority function, according to an embodiment, the emergency call initiator may be adapted to permanently indicate an actuation thereof.

[0054] In other words, the emergency call initiator may include means which allow to track and/or trace its actuation. Such means may be adapted such that the actuation of the emergency call initiator is not only perceivable in the moment when the person actuates the initiator but also subsequently. Accordingly, for example upon inspection of the emergency call initiators in a building, it may be found out whether or not, and if so, which, emergency call initiator has been actuated. For example, the emergency call initiator may be provided with a seal or similar which is irreversibly modified or destroyed upon actuation of the emergency call initiator. Such traceability may further discourage people from misuse.

As a further measure to discourage misuse or avoid unintended use, the emergency call initiator may be provided at a position at which accidental actuation thereof is

impeded. For example, the emergency call initiator may be provided in the floor at a minimum height of e.g. 1,7m such that small children may not reach it. Alternatively or additionally, actuation of the emergency call initiator may require two or more separate steps. For example, first, the emergency call initiator may have to be unlocked before, then, being able to be actuated.

[0055] According to an embodiment, both the emergency priority mode as well as the restricted mode may be overridden by an operation mode having an even higher priority.

[0056] In other words, while, in the emergency priority mode, use of the elevator operations for transporting the emergency person may be prioritized compared to normal use of non-emergency passengers, circumstances may occur in which the elevator arrangement has to serve for even more important uses. For example, in case of a fire in the building, it should be possible to block the elevator function exclusively for firemen's use. In such cases, a fire operation mode having highest priority and being initiated for example by an authorized fireman actuating a fire key switch shall override the emergency priority functions. Same or similar may be true for other high priority functions such as an earthquake evacuation function, an emergency stop function, etc. Similarly, an inspection mode initiated for example by an authorized maintenance technician for example by actuating a corresponding key switch such that the maintenance technician may enter the hoistway and inspect the elevator arrangement may override the emergency priority function in order to avoid any harm to the maintenance technician.

[0057] As indicated further above, an elevator arrangement adapted for performing the proposed method including the emergency priority function may or may not be provided with additional hardware components. Inter alia, the emergency call initiator may be implemented with additional hardware or may be implemented by modifying functions of existing hardware using software means only. Similarly, the elevator controller may comprise additional hardware for establishing the functions necessary for implementing the emergency priority function or, alternatively, functions of the elevator controller may be modified by software means only or mainly.

[0058] Accordingly, embodiments of the computer program product also proposed herein may be implemented partly or entirely for modifying functions of the elevator controller and/or of existing other hardware in the elevator arrangement. The computer program product may comprise computer-readable instructions in any computer language which may be interpreted for example by a processor included in the elevator controller. The computer program product may completely control performing all of the method steps described herein or may be adapted to controlling only parts thereof.

[0059] A computer-readable medium comprising such computer program product stored thereon may be any medium enabling temporarily or permanently storing computer-readable instructions. For example, the computer-readable medium may be a DVD, a CD, a flash memory, a ROM (Read Only Memory), a PROM (Programmable ROM), an EPROM (Erasable PROM), a RAM (Random Access Memory) or similar. As a further alternative, the computer-readable medium may be included in a computer or server, being part for example in a network such as the Internet, such that the computer program product may be downloaded therefrom.

[0060] It shall be noted that possible features and advantages of embodiments of the invention are described herein partly with respect to a method for operating an elevator arrangement and partly with respect to an elevator arrangement being specifically configured to implementing such method. One skilled in the art will recognize that the features may be suitably transferred from one embodiment to another and features may be modified, adapted, combined and/or replaced, etc. in order to come to further embodiments of the invention.

[0061] In the following, an advantageous embodiment of the invention will be described with reference to the enclosed drawing. However, neither the drawing nor the description shall be interpreted as limiting the invention.

[0062] Fig. 1 shows an elevator arrangement according to an embodiment of the present invention.

[0063] The figure is only schematic and not to scale.

[0064] Fig. 1 shows an elevator arrangement 1 according to an embodiment of the present invention. The elevator arrangement 1 comprises an elevator car 3 which may be moved between various floors 5 throughout a hoistway 9 within a building upon control by an elevator controller 7. During normal operation, the elevator controller 7 controls motions of the elevator car 3 in order to fulfil hall calls indicated by persons waiting in one of the floors 5 by actuating landing operation panels 11 provided at each of the floors 5 next to landing doors 13 and/or to fulfill car calls indicated by persons having entered the elevator car 3 and actuated a car operation panel 15. In accordance with a normal mode motion strategy, the elevator car 3 may then be moved to each of the floors 5 for collecting and/or emitting passengers.

[0065] In order to enable an emergency priority function in the elevator arrangement 1, an additional hardware emergency button 17 forming an emergency call initiator 19 is provided at each of the floors 5 and is connected to the elevator controller 7. The switch may be located at an elevated position relative to the LOP 11 such that it is out of reach e.g. for children and may be protected against unintentional actuation e.g. by a protection cover 21.

[0066] The emergency priority function provided in the proposed elevator arrangement 1 is intended to overcome deficiencies of conventional elevator arrangements occurring upon emergencies such as extended delay and waiting periods until the elevator car 3 arrives at an affected floor 5 where an emergency person is waiting. Such delay or waiting period may be due to for example pending car calls and hall calls, due to a current

direction of travel of the elevator car 3, due to a possibility of full load, due to the elevator arrangement being in an attendant mode or in an independent mode and/or due to a person blocking an open elevator door 13 such as a landing door or a car door.

[0067] In accordance with the emergency priority function described herein, the elevator car 3 of the elevator arrangement 1 shall be available for emergency use in a shortest possible time. Furthermore, existing users such as current passengers of the elevator arrangement may be pre-informed of the emergency situation. The elevator operation may be brought into a kind of "ambulance mode" in which the elevator arrangement 1 (or, in cases where a multiplicity of displaceable elevator cars 3 are comprised in the elevator arrangement, at least one of the elevator cars 3) focuses its operation on most effectively helping or evacuating the emergency person. For example, elevator doors may be closed with priority and the elevator car 3 may be quickly brought to an effected floor 5.

[0068] A basic principle or working concept of an embodiment of the elevator operating method including the emergency priority function may be outlined as follows: In case of an emergency, the emergency person or an attendant person may press the emergency call initiator 19. Upon such actuation being detected by the elevator controller 7 monitoring the emergency call initiator 19, an announcement may be started inside the elevator car 3 in order to alert current passengers about the emergency requirement of the car 3. Approximately at the same time, the elevator car 3 is started to be moved directly to the affected floor 5. If necessary, a current travel direction of the car 3 is reversed for that purpose and the car 3 is then moved to the affected floor without stopping anywhere else. Upon opening the elevator doors 13, the current passengers may be evacuated from the car 3 at the affected floor 5 and the emergency person may be accommodated within the car 3. The car 3 is then made available for exclusive use of the emergency person and, possibly, its attendant until they reach a required destination floor 5. After completion of all emergency actions, the operation mode of the elevator arrangement 1 is switched from the emergency priority mode to a restricted mode in order to discourage misuse of the emergency priority function. From such restricted mode, the elevator arrangement 1 may be reset to allow the elevator to revert to normal operation only by an authorized/trained person.

[0069] Possible details of embodiments of the proposed operating method and the elevator arrangement 1 provided therewith will be explained in the following.

[0070] The emergency call initiators 19 may be provided at each of the floors 5 served by the elevator arrangement 1. They may be hardware buttons provided additionally to the LOPs 11 at the floor 5 or, alternatively, the LOP 11 at each floor may be modified such that by for example specifically actuating this LOP 11 it may serve as an emergency call initiator 19 and may issue an emergency call signal to the elevator controller 7. An acknowledgement may be displayed by the LOP in an audio/visual manner to inform the elevator user.

[0071] Upon initiating the emergency priority function, an ambulance siren may be switched within the affected car 3 cautioning the current passengers to be ready to evacuate to enable accommodating the emergency person.

[0072] Furthermore, in case the elevator arrangement 1 comprises a plurality of elevator cars 3, the elevator car 3 which shall fulfil the emergency priority function and its controller 7 may be taken out of a normal group operation. All hall calls and/or car calls assigned to this elevator car 3 may be cancelled or reassigned to other cars, as appropriate.

[0073] If the elevator car 3 was currently moving in a direction away from the affected floor 5, its motion direction is reversed. Otherwise, its motion is continued until it reaches the affected floor 5 from where the emergency call came. The elevator car 3 should not stop in between to drop passengers as someone could force the elevator door 13 to remain open after being dropped, thereby preventing further motion of the elevator car 3.

[0074] After halting at the affected floor 5, the elevator door 13 is opened and is kept open for current passengers to evacuate and allow the emergency person to use the elevator car 3. Then, preferably only one car call is allowed which will take the emergency person to the required floor by automatically closing the door 13 after the car call is submitted. A car call cancellation feature may be enabled so that if a mistake is done upon selecting the destination floor and actuating the COP 15 accordingly, such selection may be cancelled and a new car call can be given. No further calls, particularly no external hall calls, are served using this elevator car 3 until the given car call is completed.

[0075] After the emergency situation is completed, the emergency priority mode initiated earlier should be reset manually and/or by specific actions by a trained or authorized person for the elevator arrangement 1 to return to the normal operation (including for example joining the group operation in a group of elevators). Furthermore, a siren actuated together with the emergency priority mode shall stop only after such reset action is completed, thereby possibly prompting a quicker call back action.

[0076] Until the elevator operation is reset to the normal mode, the elevator arrangement 1 is switched from the emergency priority mode to the restricted mode in order to avoid misuse of the emergency priority function by irresponsible persons. In such restricted mode, the elevator operation may be set to a taxi mode (also called single automatic push button mode), where the elevator remains operational but only one car or hall call is taken at a time. Furthermore, a call back may be submitted for example to a remote monitoring centre. Thereby, it may be ensured that the call back is registered and the elevator operation is reset to normal mode by an authorized person. Optionally, the LOP 11 of the affected floor from where the emergency operation was initiated may be dis-

abled, again to create inconvenience to the customers of that floor to prevent unwanted or misusing operation of the emergency priority function.

[0077] A switching back to normal operation may be accomplished using various methods. For example, a switch inside the elevator car 3 which is accessible/switchable only by an authorized person may be reset. Alternatively, a code may be inserted using e.g. buttons of the COP 15, such code being understood by the controller 7 to reset to normal mode. Similarly, a code may be operated using one of the LOPs 11. As a further option, an entire power supply of the elevator arrangement 1 may be re-cycled, i.e. switched off and then on again.

[0078] The proposed emergency priority function may be particularly beneficial in hospitals or residential buildings where elevators are crowded, its uses are high and its timely availability is questionable.

[0079] Resulting from a sum of measures proposed herein, fastest possible transportation may be provided by the elevator arrangement 1 being in the emergency priority mode. However, inter alia due to the subsequent automatically attained restricted operation mode, misuse of the emergency priority function is discouraged.

[0080] Finally, it should be noted that the term "comprising" does not exclude other elements or steps and the "a" or "an" does not exclude a plurality. Also elements described in association with different embodiments may be combined. It should also be noted that reference signs in the claims should not be construed as limiting the scope of the claims.

List of reference signs

[0081]

1	elevator arrangement
3	elevator car
5	floor
7	elevator controller
9	hoistway
11	landing operation panel
13	elevator door
15	car operation panel
17	emergency button
19	emergency call initiator
21	protection cover

Claims

1. Method of operating an elevator arrangement (1) with an emergency priority function, the elevator arrangement comprising at least one elevator car (3) being movable between various floors (5) within a building upon control by an elevator controller (7), comprising:

   - monitoring an emergency call initiator (19) to be actuated by a person in an affected one of the floors (5) of the building upon an person waiting in the affected floor;
   - upon detecting an actuation of the emergency call initiator (19), switching an operation mode of the elevator controller (7) from a normal mode to an emergency priority mode, wherein in the emergency priority mode car calls made with lower priority are ignored and following emergency actions are performed:

     - moving the elevator car (3) directly to the affected floor (5);
     - alerting passengers in the elevator car (3) about the emergency;
     - allowing the passengers to exit from the elevator car (3) at the affected floor and allowing the person to enter the elevator car (3) at the affected floor;
     - upon a single selection of a destination floor (5) made by a person in the elevator car (3), moving the elevator car directly to the destination floor and allowing the person to exit the elevator car at the destination floor;

   - upon completion of the emergency actions, switching the operation mode from the emergency priority mode to a restricted mode in which at least some of functions available in the normal mode are restricted.

2. Method of claim 1, wherein, after completion of the emergency actions, the operation mode may be switched from the restricted mode to the normal mode only by authorized personal.

3. Method of claim 1 or 2, wherein during at least one of the emergency priority mode and the restricted mode, a call back signal is transmitted to a remote control centre.

4. Method of one of the preceding claims, wherein an acoustical signal is issued during at least one of the emergency priority mode and the restricted mode.

5. Method of one of the preceding claims, wherein in the restricted mode the elevator controller accepts only a single elevator call at a time.

6. Method of one of the preceding claims, wherein in the restricted mode a landing operation panel (11) in the affected floor is disabled.

7. Method of one of the preceding claims, wherein both the emergency priority mode and the restricted mode may be overridden by an operation mode having a

higher priority.

8. Elevator arrangement (1) with an emergency priority function, the elevator arrangement comprising an elevator controller (7) controlling motions of at least one elevator car (3) between various floors (5) within a building, the elevator controller (7) being adapted for performing the method according to one of claims 1 to 7.

9. Elevator arrangement of claim 8, further comprising an emergency call initiator (19) at least at one of the floors (5) served by the elevator car (3).

10. Elevator arrangement of claim 9, wherein the emergency call initiator (19) is implemented with a hardware switch additional to a landing operation panel (11) provided at the floor (5).

11. Elevator arrangement of claim 9, wherein the emergency call initiator (19) is implemented with a software instructing an emergency call function in a landing operation panel (11) provided at the floor (5).

12. Elevator arrangement of one of claims 8 to 11, wherein the emergency call initiator (19) is adapted to permanently indicate an actuation thereof.

13. Computer program product comprising computer readable instructions which, when performed by a processor of an elevator controller (7), instruct the elevator controller to perform the method according to one of claims 1 to 7.

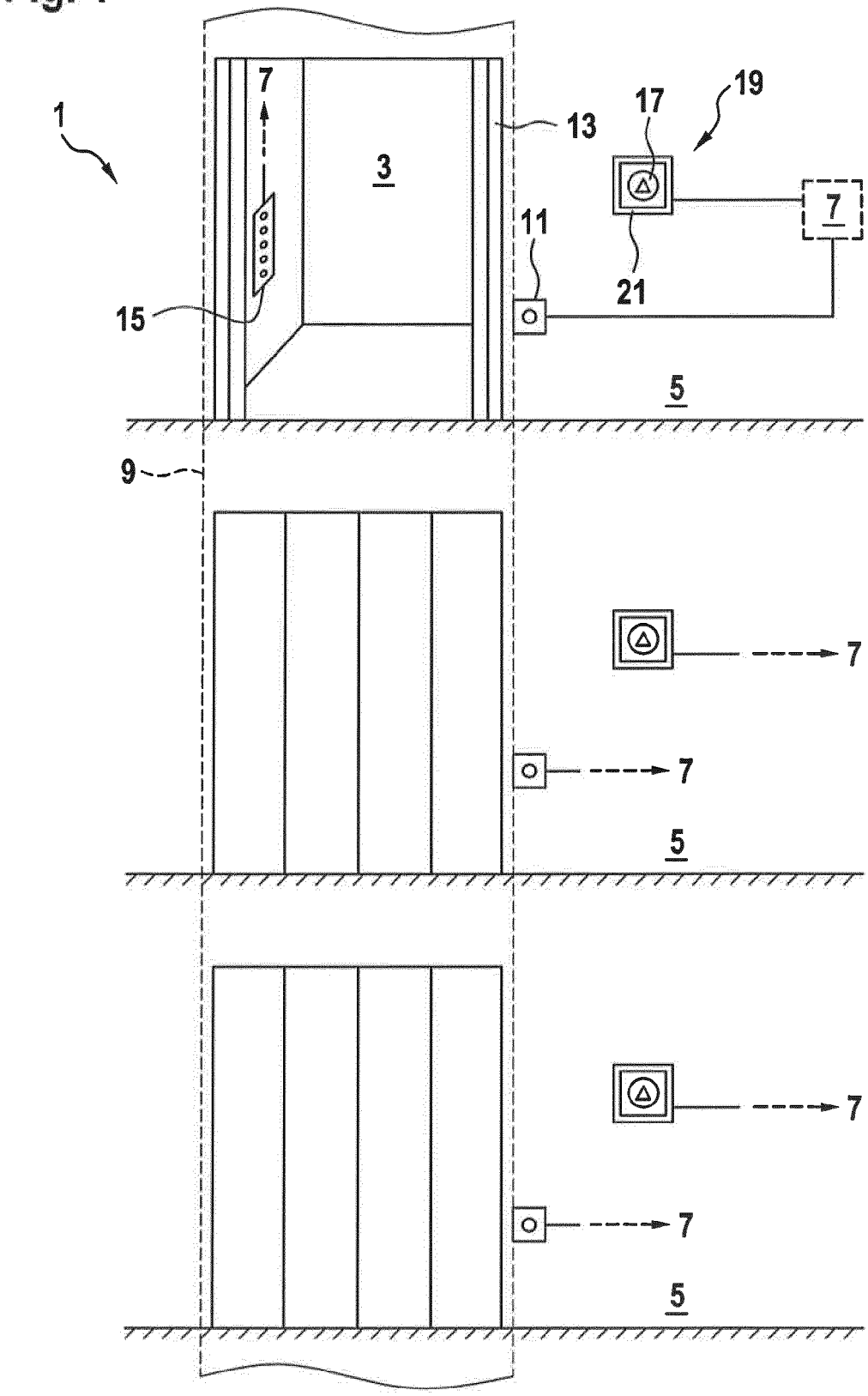
14. Computer readable medium comprising a computer program product according to claim 13 stored thereon.

15. Method according to claim 1,
wherein, upon completion of the emergency actions, the operation mode may be switched from the restricted mode to the normal mode only by authorized personal;
wherein during at least one of the emergency priority mode and the restricted mode, a call back signal is transmitted to a remote control centre;
wherein in the restricted mode, at least one of the following conditions apply:

- the elevator controller (7) accepts only a single elevator call at a time;
- a landing operation panel (11) in the affected floor (5) is disabled;

wherein both the emergency priority mode and the restricted mode may be overridden by an operation mode having a higher priority.

Fig. 1



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EUROPEAN SEARCH REPORT

Application Number
EP 16 18 6644

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 236 332 A (BURGY RAYMOND A ET AL) 22 February 1966 (1966-02-22) * column 1, line 45 - column 2, line 10 * * column 5, line 22 - line 46 * * column 8, line 28 - line 30 * * column 8, line 66 - line 72 * * column 9, line 52 - line 75 * -----	1-15	INV. B66B1/24

TECHNICAL FIELDS SEARCHED (IPC)

B66B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 February 2017	Fiorani, Giuseppe

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 18 6644

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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09-02-2017

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US 3236332 A	22-02-1966	NONE	

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