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

(11) EP 3 620 418 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
11.03.2020 Bulletin 2020/11

(51) Int Cl.:
B66B 3/00 *(2006.01)*

(21) Application number: **18193238.5**

(22) Date of filing: **07.09.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

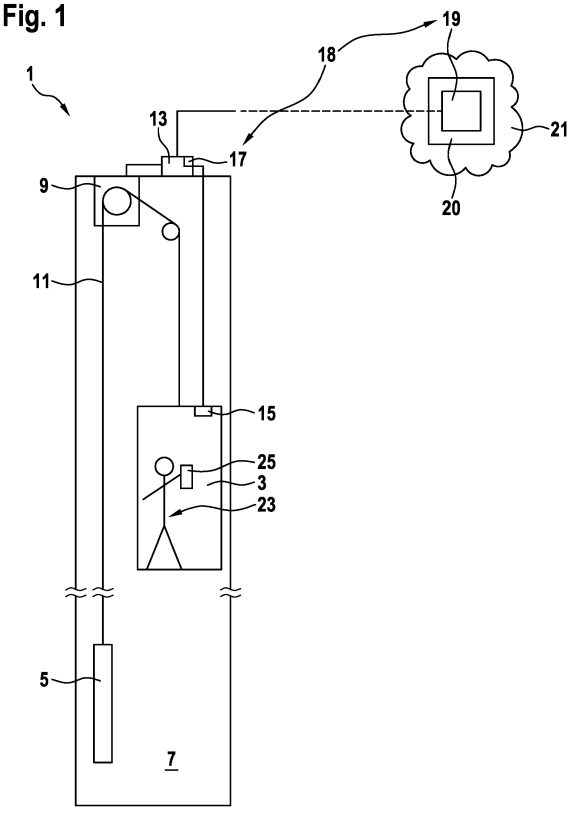
(71) Applicant: **Inventio AG**
6052 Hergiswil (CH)

(72) Inventors:
- **ARNOLD, Daniel**
  6462 Seedorf UR (CH)
- **FREY, David**
  6004 Luzern (CH)
- **SAGER, Martin**
  6208 Oberkirch LU (CH)
- **BÜRGISSER, Patrick**
  6344 Meierskappel (CH)

(54) METHOD FOR INFORMING A PASSENGER ABOUT A MALFUNCTION IN AN ELEVATOR ARRANGEMENT

(57) A method for informing a passenger (23) about a malfunction in an elevator arrangement (1) and an elevator arrangement (1) implementing such method are described. The method comprises forwarding an information about the malfunction from an elevator control unit (18) via a femtocell cellular base station (15) provided in the elevator arrangement (1) to a dedicated communication device (25) such as a mobile phone of the passenger (23) connected to the femtocell cellular base station (15). Thereby, information about the occurrence of a malfunction in the elevator may be reliably submitted to the passenger (23) via his dedicated communication device (25).

Fig. 1



EP 3 620 418 A1

Description

[0001] The present invention relates to a method for informing a passenger about a malfunction in an elevator arrangement. Furthermore, the invention relates to an elevator arrangement and to a computer program product being configured for implementing such method and to a computer readable medium comprising such computer program product stored thereon.

[0002] Elevators serve for transporting passengers within an elevator cabin by displacing the elevator cabin vertically through an elevator shaft within a building.

[0003] During elevator operation, malfunctions may occur for example due to excessive wear or damages in elevator components. Such malfunction may result in passengers being stuck in the elevator cabin and/or passengers unavailingly waiting at a floor for the elevator cabin to come.

[0004] Conventionally, information exchange between passengers and for example an elevator call centre in case of malfunctions in an elevator was usually established via a voice connection from an elevator panel to the call centre. For example, such elevator panel was provided within the elevator cabin and, upon pushing an emergency button, the passenger was able to communicate with the call centre via the voice connection. However, quality of such voice connection may be quite poor for example due to a location of a speaker and/or a microphone and/or due to ambient noise in general.

[0005] There may be a need for an improved option of informing a passenger about a malfunction in an elevator arrangement. Particularly, there may be a need for an option of informing a passenger about such malfunction enabling a reliable information exchange and/or requiring minimal hardware and/or software equipment.

[0006] Such needs may be met with the subject-matter of the independent claims. Advantageous embodiments are defined in the dependent claims and in the following specification. According to a first aspect of the present invention, a method for informing a passenger about a malfunction in an elevator arrangement is proposed, wherein the method comprises forwarding an information about the malfunction from an elevator control unit via a femtocell cellular base station provided in the elevator arrangement to a dedicated communication device such as a mobile phone of the passenger connected to the femtocell cellular base station.

[0007] According to a second aspect of the invention, an elevator arrangement is proposed, the elevator arrangement comprising a femtocell cellular base station locally included in the elevator arrangement and further comprising an elevator control unit for detecting malfunctions in the elevator arrangement. Therein, the elevator arrangement is configured for performing or controlling the method according to an embodiment of the first aspect of the invention.

[0008] According to a third aspect of the invention, a computer program product is proposed, the computer program product comprising computer readable instructions which, when performed by a processor in an elevator arrangement, instruct the elevator arrangement to performing or controlling the method according to an embodiment of the first aspect of the invention.

[0009] According to a fourth aspect of the invention, a computer readable medium comprising stored thereon a computer program product according to the third aspect of the invention is proposed.

[0010] Ideas underlying embodiments of the present invention may be interpreted as being based, inter alia, on the following observations and recognitions.

[0011] In modern societies, almost every elevator passenger carries a portable dedicated communication device for example in the form of a mobile phone, a smart phone, a portable computer, etc. with him or her. Such dedicated communication device may be used for communicating with other people's dedicated communication devices via e.g. a cellular network of a cell phone network provider.

[0012] However, within buildings and particularly within an elevator cabin in an elevator shaft, signals from a cellular network may be hardly available as such signals may substantially be blocked by building structures and/or a metallic cage surrounding an interior space of the elevator cabin.

[0013] In order to enable using dedicated communication devices such as mobile phones also within an elevator and particularly within an elevator cabin, one or more femtocell cellular base stations may be provided in an area of the elevator.

[0014] Such femtocell cellular base station (sometimes briefly referred to as "femtocell" or femto AccessPoint (AP)) is a small, low-power cellular base station which is typically designed for home or small business applications. Generally, it connects to a network of a cell phone network provider for example via broadband such as DSL or cable. The femtocell may allow service providers to extend service coverage for example in indoor applications where access would otherwise be limited or unavailable. Femtocells may be available for various types of telecommunication systems and standards such as WCDMA, GSM, CDMA2000, TD-SCDMA, WiMAX or LTE.

[0015] Normally, femtocells are used in elevators only for enabling establishing a data and/or voice communication transmission between a passenger's dedicated communication device and a cell phone network.

[0016] It is proposed herein to additionally use the one or more femtocells provided in an elevator arrangement for forwarding information about the malfunction of the elevator arrangement to the dedicated communication device of the passenger. In other words, while, conventionally, an alarm system or malfunction information system in an elevator, on the one side, and a cellular network, on the other side, are not yet connected in a meaningful way, it is suggested herein to improve a quality of an emergency information exchange by connecting these

two systems.

[0017] Therein, the information about an occurrence of a malfunction in the elevator arrangement may be available at an elevator control unit. Upon occurrence of the malfunction, various types of information about the malfunction may be helpful for a passenger being e.g. enclosed in the elevator cabin. For example, the information about the malfunction may include a current status of the elevator, an emergency phone number, an identification information indicating an identity of the malfunctioning elevator and/or a maintenance status.

[0018] Therein, the current status of the elevator may indicate for example whether the elevator, despite the occurrence of a malfunction, is still operating, is operating in a limited mode or operation is completely interrupted.

[0019] The emergency phone number may be a telephone number which can be contacted by a passenger in order to acquire emergency help. The identification information may indicate an identity of the elevator in which a passenger is for example blocked, such information including for example an address of the building housing the malfunctioning elevator and/or, in cases where there are more than one elevator in a building, information about a location of the elevator within this building.

[0020] The maintenance status may indicate for example whether maintenance staff is already alerted, which maintenance actions are planned, when these actions are planned, whether any support or action by the blocked passenger is required, etc.

[0021] The elevator control unit may be located within the elevator. For example, the elevator control unit may be part of an elevator controller controlling normal functioning of elevator components such as a drive engine. Typically, such elevator controller has access to feedback of elevator components and/or sensors indicating any malfunctions within the elevator arrangement.

[0022] As an alternative, the elevator control units may be located remote from the elevator and may be part for example of a remote control centre controlling normal functioning of elevator components. As such, the elevator control unit may directly receive feedback from elevator components about any malfunctions.

[0023] Based on these feedbacks, the elevator control unit may decide whether these malfunctions may affect the operation of the entire elevator and, in a worst-case, may result in a temporary interruption or breakdown of the elevator operation. In such case, the elevator control unit may decide that information about the malfunction may have to be transmitted to the elevator passengers.

[0024] In reaction to such decision, the elevator control unit may issue a triggering signal. Upon receiving such triggering signal, the femtocell cellular base station may be triggered to transmit the information about the malfunction to the passenger's dedicated communication device.

[0025] In other words, upon detecting any malfunctions in the elevator, the elevator control unit may issue a simple triggering signal and the femtocell cellular base station receiving this triggering signal may automatically transmit the information about the malfunction to the dedicated communication devices in its coverage range.

[0026] More specifically, upon being triggered, the femtocell cellular base station may identify the dedicated communication device of the passenger connected to the femtocell cellular base station and may then transmit a short message based on the information about the malfunction to the identified dedicated communication device. Accordingly, the passenger being stuck in the elevator cabin or unavailingly waiting for the elevator cabin may receive this short message via his communication device and may thereby be informed about the occurrence of the malfunction.

[0027] Particularly, the short message may be sent as a special priority message. Such special priority messages may be prioritised messages which are output on the passenger's communication device even when this device is in a mode in which normal short messages are not output. For example, special priority messages may be displayed on a display of the communication device while another application or program is currently displaying its information or, in case the display is currently switched-off, it may be temporarily switched-on for displaying the prioritised message. Alternatively or additionally, the prioritised short message may be output acoustically or displaying the message may be accompanied by an acoustic alert. Generally, such special priority message may be output similar to so-called AMBER alerts. Accordingly, even when a passenger is not aware that he might receive information about the elevator operation via his communication device, he will be informed via the special priority message output by his communication device.

[0028] The short message received by the communication device may comprise various types of information such as a confirmation information confirming the malfunction, a plan description describing planned actions, a time information about an estimated time of evacuation or of resuming of service, contact details of an emergency call center and/or-an incident number for cross-referencing the malfunctioning elevator.

[0029] Receiving the short message with the confirmation information, the passenger may be informed about the occurrence of a significant malfunction within the elevator. With the plan description, the passenger may be informed about actions planned for example for evacuating the elevator cabin and/or restoring normal operation of the elevator. With the time information, the passenger may be informed about a point in time at which an evacuation is planned or resuming of normal service operation of the elevator is planned. Receiving the contact details of an emergency call centre may enable the passenger to personally contact the emergency call centre for receiving further information or help. Subsequently, upon calling the emergency call centre, the passenger may submit the incident number included in the short mes-

sage for cross-referencing the elevator in which he is waiting due to the malfunction.

[0030] According to an embodiment, the elevator control unit may be directly connected to the femtocell cellular base station via a direct data transmission channel. In such configuration, upon occurrence of the malfunction, the elevator control unit may forward the information about the malfunction via the direct data transmission channel directly to the femtocell cellular base station.

[0031] In other words, the elevator control unit and the femtocell cellular base station may be directly interconnected such that the elevator control unit may directly send data or signals to the femtocell cellular base station. For such purpose, the elevator control unit may for example be directly wired to an interface provided at the femtocell cellular base station. Alternatively, the elevator control unit may directly communicate with the femtocell cellular base station via a wireless communication path. Accordingly, the elevator control unit may transmit a triggering signal directly to the femtocell cellular base station which, in reaction to receiving such triggering signal, may send for example a short message to all dedicated communication devices in its coverage range.

[0032] Particularly, in such embodiment, the direct data transmission channel may be unidirectional from the elevator control unit to the femtocell cellular base station. With such unidirectional data transmission channel, the elevator control unit may send data or signals such as the triggering signal to the femtocell cellular base station, but no data or signals may be transmitted via the unidirectional data transmission channel in the opposite direction, i.e. from the femtocell cellular base station to the elevator control unit. Using such unidirectional data transmission channel, it may be guaranteed that no for example privacy-invading data, such as data regarding an identity of an owner of a mobile phone, may be transmitted from the femtocell cellular base station to the elevator control unit.

[0033] As an alternative to the preceding embodiment, the elevator control unit may be connected to a telephone network of a service provider operating the femtocell cellular base station via an indirect data transmission channel. In such configuration, upon occurrence of the malfunction, the elevator control unit may forward the information about the malfunction together with an information about the malfunctioning elevator via the indirect data transmission channel to the telephone network and the telephone network then may forward the information about the malfunction to the femtocell cellular base station.

[0034] In other words, the elevator control unit and the femtocell cellular base station may not be directly interconnected, i.e. there may be no direct wiring or other data transmission channel between both components. Instead, only an indirect data transmission channel may exist between both components. Such indirect data transmission channel may comprise other computers, servers, a data cloud or other types of data relay devices from which data or signals received from the elevator control unit may be forwarded to the femtocell cellular base station.

[0035] For example, the indirect data transmission channel may include data transmission via the internet as a type of publicly accessible computer network.

[0036] The elevator control unit may then submit the information about the malfunction to the Internet. Additionally, an information about the identity of the elevator in which the malfunction has been detected may be submitted. Both pieces of information may reach the telephone network such that the service provider may determine which dedicated communication devices are within the coverage range covered by the femtocell cellular base station provided in the elevator identified to be malfunctioning. Using the telephone network and the Internet, the information about the malfunction may then be forwarded to this femtocell cellular base station and further on to the dedicated communication devices of the passengers located in the malfunctioning elevator.

[0037] An embodiment of the elevator arrangement according to the second aspect of the invention may comprise the femtocell cellular base station, the elevator control unit as well as other typical elevator components such as the elevator cabin, a counterweight, suspension means suspending the elevator cabin and the counterweight, a drive engine driving the suspension means and an elevator controller controlling the operation of the drive engine. Therein, the femtocell cellular base station shall be arranged locally within the elevator, i.e. for example within the elevator shaft or even at or within the elevator cabin. The elevator control unit may also be comprised locally within the elevator and may for example form part of the elevator controller. Alternatively, the elevator control unit may be located remotely from the elevator, such as for example in a remote control centre. As such, the elevator control unit may be implemented for example in a data cloud. In both alternatives, the elevator control unit may detect any malfunctions within the elevator arrangement and may then forward information about the malfunction via the femtocell cellular base station to the dedicated communication device of the passenger.

[0038] For such purpose, the elevator arrangement may comprise a processor or central processing unit (CPU) which may for example process data or signals from elevator components or sensors for detecting the malfunction and which may, furthermore, decide whether any information about a detected malfunction shall be forwarded to a passenger's dedicated communication device. The processor or CPU may be for example part of the elevator control unit or of the femtocell cellular base station or of any other elevator component. The processor or CPU may be instructed to perform or control embodiments of the above-mentioned method using suitable computer readable instructions comprised in a computer program product. The computer program product may be in any computer language. The computer program product may be stored on any computer readable

means such as a flash memory, a CD, a DVD, ROM, EPROM, etc. Alternatively, the computer program product may be stored within a computer, a server or a data cloud from which it may be downloaded via a network such as the Internet.

[0039] It shall be noted that possible features and advantages of embodiments of the invention are described herein partly with respect to a method for informing a passenger about malfunctions in an elevator and partly with respect to an elevator arrangement 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.

[0040] In the following, advantageous embodiments of the invention will be described with reference to the enclosed drawings. However, neither the drawings nor the description shall be interpreted as limiting the invention.

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

Fig. 2 visualises a direct data transmission channel between an elevator control unit and a passenger's dedicated communication device in an elevator arrangement according to an embodiment of the present invention.

Fig. 3 visualises an indirect data transmission channel between an elevator control unit and a passenger's dedicated communication device in an elevator arrangement according to an alternative embodiment of the present invention.

[0041] The figures are only schematic and not to scale. Same reference signs refer to same or similar features.

[0042] Fig. 1 shows an elevator arrangement 1 according to an embodiment of the present invention. The elevator arrangement 1 comprises an elevator cabin 3 and a counterweight 5 arranged in an elevator shaft 7. The elevator cabin 3 and the counterweight 5 are suspended by suspension means 11 which may be driven by a drive engine 9. The drive engine 9 is controlled by an elevator controller 13.

[0043] The elevator cabin 3 is equipped with a small cellular network using a femtocell cellular base station 15. The femtocell cellular base station 15 may communicate with a dedicated communication device 25 such as a mobile phone of a passenger 23. Accordingly, the passenger 23 may use his dedicated communication device 25 for example for telephone calls or Internet access while riding in the elevator cabin 3.

[0044] An operation status of the elevator arrangement 1 may be monitored using an elevator control unit 18. The elevator control unit 18 may detect any malfunctions occurring within components of the elevator arrangement 1. The elevator control unit 18 may be implemented as an integral elevator control unit 17 for example locally integrated into the elevator controller 13. Alternatively, the elevator control unit 18 may be implemented as an external elevator control unit 19 for example remotely established in a remote control centre 20 or a data cloud 21. As such, the external elevator control unit 19 and the elevator arrangement 1 communicating therewith may be part of the so-called Internet of elevators and escalators (IoEE).

[0045] Upon detecting any malfunction within the elevator arrangement 1, the elevator control unit 18 may forward and information about the malfunction via the femtocell cellular base station 15 to the dedicated communication device 25 of the passenger 23. For example, the elevator control unit may generate a triggering signal and transmit this triggering signal to the femtocell cellular base station 15. Upon receiving this triggering signal, the femtocell cellular base station 15 may then transmit the information about the malfunction to all communication devices 25 in its coverage range.

[0046] Fig. 2 visualises a first example of a data communication between the elevator controller unit 18 and the dedicated communication device 25.

[0047] Normally, the dedicated communication device 25 communicates with a telephone network 29 connected to the femtocell cellular base station 15 forming a cellular access point via a network such as the Internet 27 in order to exchange for example data packages of a telephone communication. In other words, in normal operation, the femtocell cellular base station 15 acts as a normal cellular access point.

[0048] However, in case a malfunction is detected within the elevator arrangement 1, the femtocell cellular base station 15 may temporarily be used for transmitting information about the malfunction to the passenger 23 using his dedicated communication device 25. In other words, if the elevator experiences for example a technical problem or power outage that stops it from operating, the femtocell cellular base station 15 may be used to inform the passenger 23.

[0049] Therein, the elevator controller unit 18 communicates directly with the femtocell cellular base station 15 via a direct data transmission channel 31. The direct data transmission channel 31 may be unidirectional such that data may be transferred from the elevator controller unit 18 to the femtocell cellular base station 15 but not in the opposite direction.

[0050] In the emergency mode, the elevator control unit 18 may send information to the gateway of the femtocell cellular base station 15 which may include for example information about a current status of the elevator, an emergency phone number to connect to a service provider's call centre, an identification number of the elevator for the service provider's support, a maintenance status indicating for example whether support is on the way and/or other information. The cellular gateway may then identify the dedicated communication devices 25 being within the cellular gateway's coverage range and

that are connected to the cellular gateway. Then, a short message may be sent to all of these dedicated communication devices 25. Optionally, a special priority message as for example used for Amber alerts may be sent. Such message may include for example information such as a confirmation of the problem or malfunction, a description of planned actions (e.g. service technician alerted, etc.), an estimated time of evacuation or resuming service, contact details of a call centre and/or an incident number for cross-reference. Optionally, the phone numbers of the identified dedicated communication devices 25 may be sent to a telemonitoring system, which may relay them for example to the remote control centre 20.

[0051] Fig. 3 visualises a second example of a data communication between the elevator controller unit 18 and the dedicated communication device 25.

[0052] Therein, instead of connecting the elevator control unit 18 directly to the femtocell cellular base station 15, an indirect data transmission channel 33 may be established between the elevator control unit 18 and the femtocell cellular base station 15.

[0053] Particularly, the elevator control unit 18 may be connected to a network such as the Internet 27. Optionally, the elevator control unit 18 may first provide its signals regarding the information about a detected malfunction to a remote control centre 20 which then forwards this information to the Internet 27. Via the Internet 27, the telephone network 29 may be informed about the occurrence of the malfunction. Together with the information about the malfunction, an information about an identity of the elevator in which the malfunction occurred may be transmitted. Based on this information, the telephone network 29 may determine which of its femtocell cellular base stations 15 has to be addressed for communicating with the passengers 23 in the identified malfunctioning elevator. In other words, in this configuration, the information about the malfunction is not sent directly from the elevator control unit 18 to the femtocell cellular base station 15, but instead it is relayed to the telephone network 29 by an existing remote monitoring device in a remote control centre 20 having access to a network such as the Internet 27.

[0054] By applying the approach described herein, several advantages may be realised. For example, a mobile phone reception quality in the elevator may be drastically improved. Furthermore, targeted information may be submitted to affected passengers in emergency situations. Particularly, no custom applications, i.e. no mobile phone apps to be specifically installed, are needed on the passenger's mobile device.

[0055] 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

[0056]

1	elevator arrangement
3	elevator cabin
5	counterweight
7	elevator shaft
9	drive engine
11	suspension means
13	elevator controller
15	femtocell cellular base station
17	integrated elevator control unit
18	elevator control unit
19	external elevator control unit
20	remote control centre
21	data cloud
23	passenger
25	dedicated communication device
27	Internet
29	telephone network
31	direct data transmission channel
33	indirect data transmission channel

Claims

1. Method for informing a passenger (23) about a malfunction in an elevator arrangement (1), the method comprising:
   forwarding an information about the malfunction from an elevator control unit (18) via a femtocell cellular base station (15) provided in the elevator arrangement (1) to a dedicated communication device (25) of the passenger (23) connected to the femtocell cellular base station (15).

2. Method of claim 1, wherein the femtocell cellular base station (15) is triggered to transmit the information about the malfunction upon receiving a triggering signal issued by the elevator control unit (18).

3. Method of claim 2, wherein, upon being triggered, the femtocell cellular base station (15) identifies the dedicated communication device (25) of the passenger (23) connected to the femtocell cellular base station (15) and transmits a short message based on the information about the malfunction to the identified dedicated communication device (25).

4. Method of claim 3, wherein the short message is sent as a special priority message.

5. Method of one of claims 3 and 4, wherein the short message comprises at least one of:

   - a confirmation information confirming the malfunction;

- a plan description describing planned actions;
- a time information about an estimated time of evacuation or of resuming of service;
- contact details of an emergency call center; and
- an incident number for cross-referencing the malfunctioning elevator.

6. Method of one of the preceding claims, wherein the elevator control unit (18) is directly connected to the femtocell cellular base station (15) via a direct data transmission channel (31) and wherein, upon occurrence of the malfunction, the elevator control unit (18) forwards the information about the malfunction via the direct data transmission channel (31) directly to the femtocell cellular base station (15).

7. Method of claim 6, wherein the direct data transmission channel (31) is unidirectional from the elevator control unit (18) to the femtocell cellular base station (15).

8. Method of one of the preceding claims, wherein the elevator control unit (18) is connected to a telephone network (29) of a provider operating the femtocell cellular base station (15) via an indirect data transmission channel (33) and wherein, upon occurrence of the malfunction, the elevator control unit (18) forwards the information about the malfunction together with an information about the malfunctioning elevator via the indirect data transmission channel (33) to the telephone network (29) and the telephone network (29) then forwards the information about the malfunction to the femtocell cellular base station (15).

9. Method of claim 8, wherein the indirect data transmission channel (33) includes data transmission via the internet (27).

10. Method of one of the preceding claims, the information about the malfunction includes at least one of:

a current status of the elevator;
an emergency phone number;
an identification information indicating an identity of the malfunctioning elevator; and
a maintenance status.

11. Elevator arrangement (1) comprising a femtocell cellular base station (15) locally included in the elevator arrangement (1) and further comprising an elevator control unit (18) for detecting malfunctions in the elevator arrangement (1), wherein the elevator arrangement (1) is configured for one of performing and controlling the method according to one of claims 1 to 10.

12. Computer program product comprising computer readable instructions which, when performed by a processor in an elevator arrangement (1), instruct the elevator arrangement (1) to one of performing and controlling the method according to one of claims 1 to 10.

13. Computer readable medium comprising a computer program product according to claim 12 stored thereon.

Fig. 1

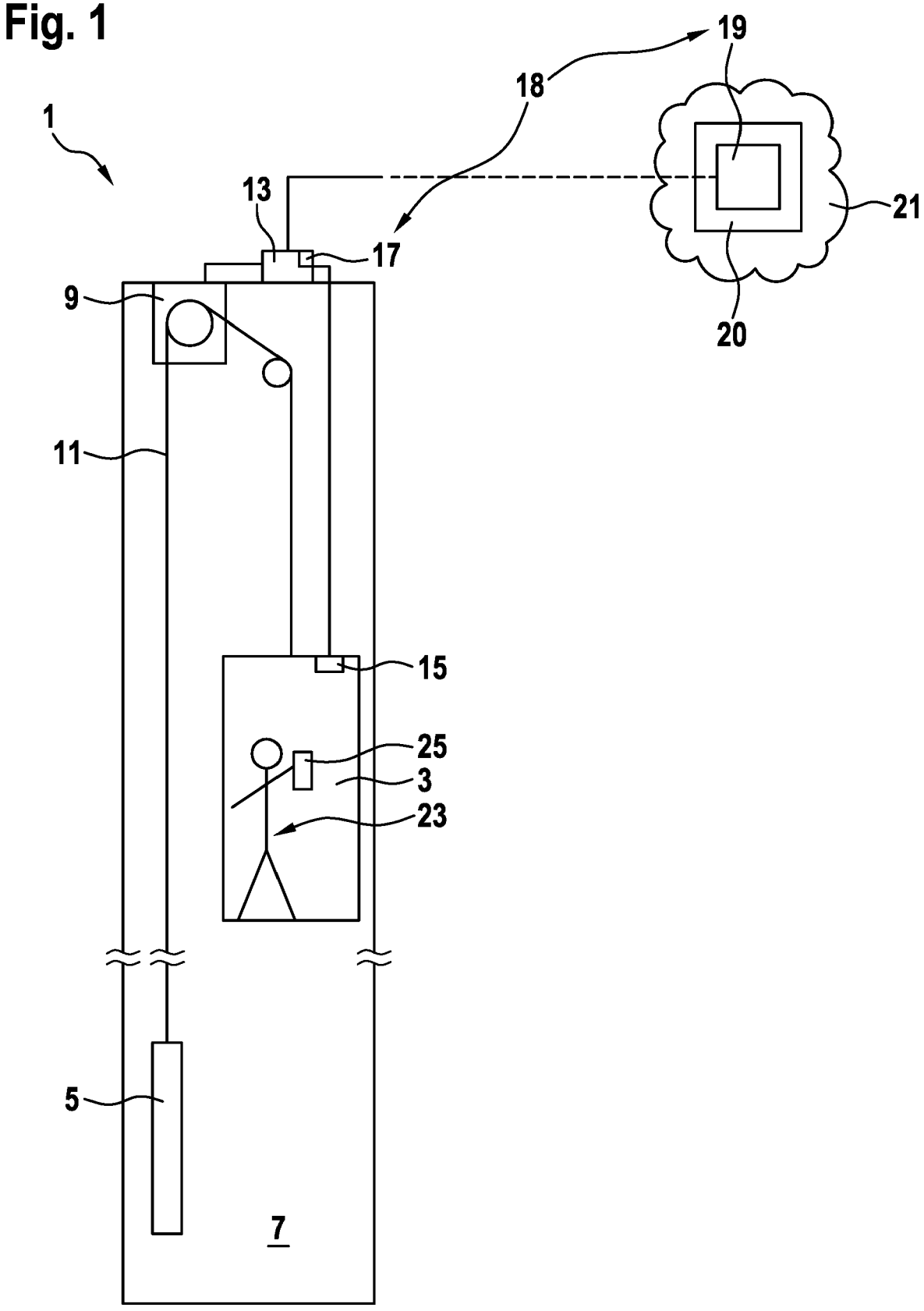


Fig. 2

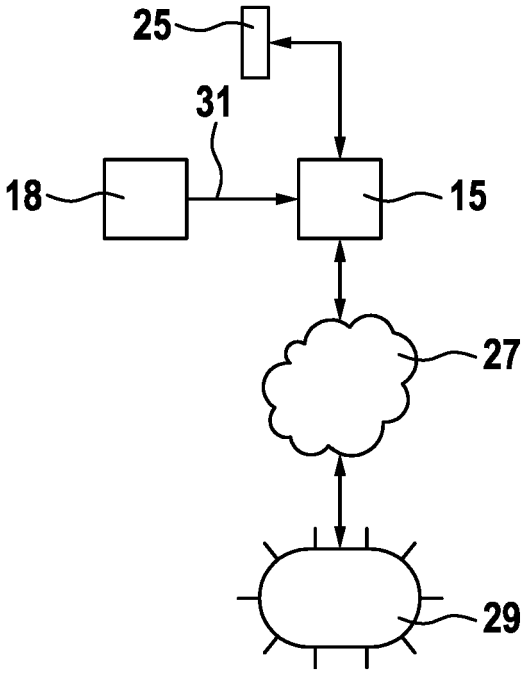
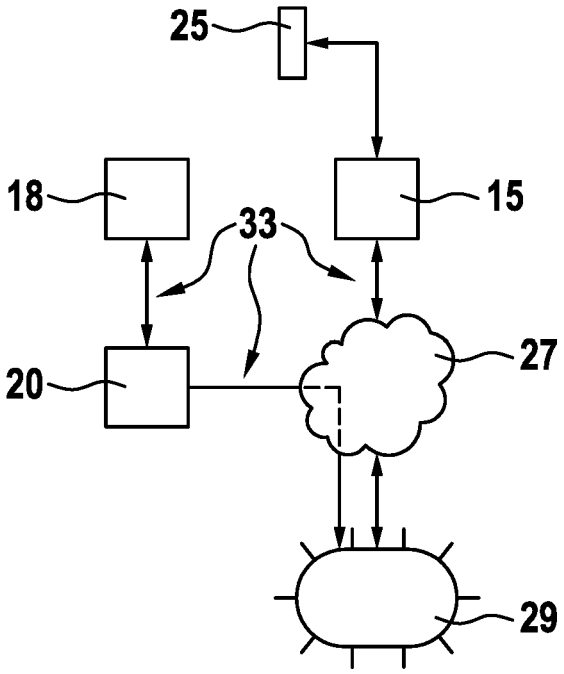


Fig. 3



Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 18 19 3238

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	JP 2015 202916 A (HITACHI LTD) 16 November 2015 (2015-11-16) * figure 1 *	1-13	INV. B66B3/00
Y	JP 2007 186273 A (MITSUBISHI ELEC BUILDING TECHN) 26 July 2007 (2007-07-26) * paragraph [0021] *	1,6-13	
Y	US 2014/045479 A1 (SHINADA YUKI [JP] ET AL) 13 February 2014 (2014-02-13) * paragraphs [0003] - [0005] *	1,6-13	

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	13 March 2019	Lenoir, Xavier

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 19 3238

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

13-03-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2015202916 A	16-11-2015	JP 6161565 B2	12-07-2017
		JP 2015202916 A	16-11-2015
JP 2007186273 A	26-07-2007	NONE	
US 2014045479 A1	13-02-2014	JP 5942684 B2	29-06-2016
		JP 2014036265 A	24-02-2014
		US 2014045479 A1	13-02-2014

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82