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(54) **APPARATUS TO MANAGE CONTAINERS**

(57) Apparatus to manage containers for the collection of articles that comprises a container (12) provided with a containing body (14) defining a containing compartment (13) in which to place the articles and having at least an introduction aperture (16) and a removal aperture (17) through which to introduce and respectively remove the articles. A door (18) is associated to the at least one removal aperture (17), configured to selectively close the containing compartment (13). The apparatus comprises a closing member (20) configured to assume at least an active condition, in which it constrains the positioning of the door (18) to close the removal aperture (17), and an inactive condition in which access to the containing compartment (13) is possible through the removal aperture (17); a first electronic unit (26), of the portable type, configured to selectively transmit at least an enabling signal to enable the opening of the door (18) and a second electronic unit (24), associated to the container (12), connected to the closing member (20) and configured to receive and recognize said enabling signal and to take the closing member (20) at least from its active condition to its inactive condition.

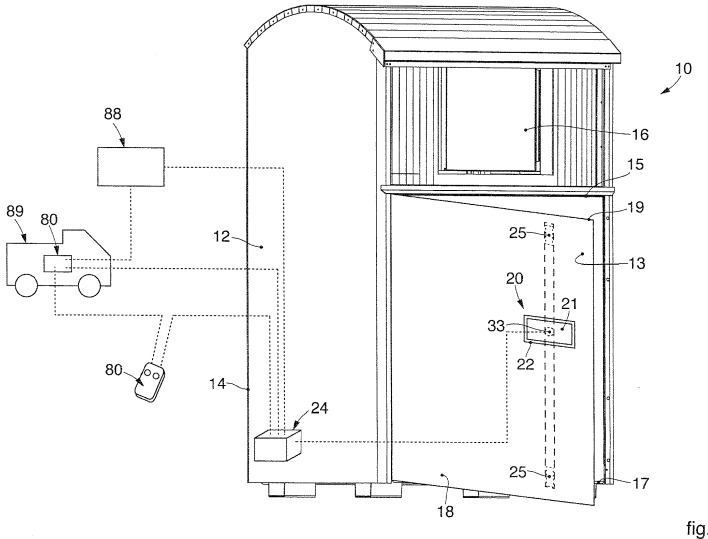

fig. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention concerns an apparatus to manage containers for the collection of different articles, for example, but not only, used clothing, shoes, blankets or suchlike.

[0002] In particular, the apparatus can be configured to carry out controls on the condition of the container and on the operators authorized to remove the articles, and also to guarantee the protection of the articles inside the container. The present invention also concerns a method to manage the containers.

BACKGROUND OF THE INVENTION

[0003] Containers are known, for collecting different articles such as, by way of example, used clothing, shoes, blankets or suchlike, which generally comprise a collection container in which the articles can be introduced by means of a suitable insertion aperture, located at a height such as to guarantee easy introduction.

[0004] The containers also comprise another removal aperture, usually made on one side of the containing compartment coupled with a door, so as to allow an operator to remove the articles in the container.

[0005] In particular, the removal of the articles is allowed by a closing device, for example an electric lock or a padlock, able to allow the door to assume a closed or open position, according to needs.

[0006] The closing device also has the function of preventing access to the container, and consequently preventing the articles contained therein from being removed by ill-intentioned or unauthorized persons.

[0007] Containers to collect articles are also known from documents EP-A-2.578.517, WO-A-00/69181 and DE-A-44.05.547, provided with a closing member suitable to selectively close a closing door of the removal aperture of the articles put in the container.

[0008] In order to activate the closing member, that is, to allow access inside the containing compartment, a first electronic unit is provided, which transmits a signal to enable the activation of the closing member. The first electronic unit is outside the container and is selectively driven by the operator to allow subsequent access to the articles put in the container.

[0009] The enabling signal is read by a second electronic unit which, depending on the enabling signal received, enables or does not enable the opening of the closing door.

[0010] However, this solution is not particularly effective because it allows ill-intentioned persons to clone the first electronic unit so that it produces an enabling signal identical to that of the first, original electronic unit.

[0011] In order to limit this, it is also known, from WO-A-00/69181, to carry out a double control on the enabling signal received. That is, once the second electronic unit receives the enabling signal, it sends a confirmation signal to the first electronic unit. The latter verifies whether the confirmation signal received is reliable, that is, comparable with data memorized in the first electronic unit, and enables the opening of the door.

[0012] This double control renders it more difficult to clone the first electronic unit, but it is not able to prevent an unauthorized person, in possession of the first electronic unit, from accessing the content of the articles contained in the containers. Another disadvantage of these known containers is that the closing device is easy to tamper with, consequently allowing free access to the articles present in the container, even to unauthorized persons.

[0013] Another disadvantage of these known containers is that it is difficult to monitor how full the container is, in real time, in order to optimize removal operations by authorized operators, and to thus reduce the frequency of collection using suitable vehicles.

[0014] Another disadvantage of these containers is that it is impossible to guarantee that the operator authorized to remove the articles will be recognized, so as to be able to carry out a control by a main, control and management operating unit.

[0015] One purpose of the present invention is to obtain a management apparatus for containers that is secure, in order to prevent free access to the articles present inside the container by unauthorized persons.

[0016] Another purpose of the present invention is to obtain a management apparatus for containers able to monitor in real time how full the container is, and to send information on this condition.

[0017] Another purpose of the present invention is to obtain a management apparatus for containers configured to allow to localize the container, if it is moved by an unauthorized person, and able to recognize the operator authorized to remove the articles contained therein, and also the vehicle with which removal is performed.

[0018] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0019] The present invention is set forth and characterized in the independent claims, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0020] In accordance with the above purposes, the present invention concerns an apparatus and the corresponding method to manage containers for the collection of different articles.

[0021] According to one feature of the present invention, the apparatus to manage containers comprises a container provided with a containing body defining a containing compartment in which to place said articles. The container has at least an introduction aperture and a re-

moval aperture through which to introduce and respectively remove said articles.

[0022] According to another feature of the present invention, at least one door is associated to the removal aperture, configured to selectively close the containing compartment.

[0023] According to another feature of the present invention, the apparatus to manage containers comprises a closing member configured to assume at least an active condition, in which it constrains the positioning of the door to close the removal aperture, and an inactive condition in which access to the containing compartment is possible through the removal aperture.

[0024] According to another feature of the invention, the apparatus to manage containers comprises a first electronic unit, of the portable type, configured to selectively transmit at least an enabling signal to enable the opening of the door.

[0025] According to another feature of the present invention, the apparatus to manage containers comprises a second electronic unit associated to the container, connected to the closing member and configured to drive the closing member at least from its active condition to its inactive condition.

[0026] According to another feature of the present invention, the apparatus comprises a third electronic unit stably associated to a vehicle adapted to the service of removing the articles present in the container and configured to receive the enabling signal from the first electronic unit and to supply, as a function of the enabling signal received, a confirmation signal.

[0027] Moreover, according to another feature of the present invention, the second electronic unit is configured to receive the enabling signal and the confirmation signal and, as a function of the two, command the selective drive of the closing member.

[0028] The apparatus to manage containers as described above can therefore advantageously be secure, preventing free access to the articles present in the container by unauthorized persons.

[0029] In particular, access to the containing compartment is permitted only to operators who are provided with the first electronic unit and the third electronic unit, or with the vehicle with which they are to remove the articles. As a function of the enabling signal and the confirmation signal sent to the second electronic unit, supplied for example following the drive of a button of the first electronic unit and automatically by the third electronic unit, the door is commanded to open.

[0030] This operating condition also prevents the operators themselves, without the vehicle, or ill-intentioned persons in possession of the first electronic unit alone, from being able to access the content of the articles in the container.

[0031] Forms of embodiment of the present invention also concern a method to manage containers that comprises at least removing articles located in the containing compartment defined by the containing body of the container, said articles having been previously introduced through the introduction aperture of the containing body and being removed by opening the door cited above, normally located to close said removal aperture.

[0032] The method to manage containers also provides to take the closing member at least into a first active condition in which it constrains the positioning of the door to close the removal aperture, and an inactive condition in which access to the containing compartment is possible through the removal aperture.

[0033] According to one feature of the present invention, the method to manage containers provides that the first electronic unit, of the portable type, selectively transmits at least an enabling signal to enable the opening of the door, and that the second electronic unit, associated to the container and connected to the closing member, commands the drive of the closing member to take it from its active condition to its inactive condition.

[0034] According to one feature of the present invention, a third electronic unit, stably associated to a vehicle adapted to the service of removing the articles present in the container, receives the enabling signal from the first electronic unit and, as a function of the enabling signal received, gives a confirmation signal.

[0035] The second electronic unit receives the enabling signal and the confirmation signal and, as a function of the two, for example following a comparison of those signals with data memorized in the second electronic unit, gives a command to selectively drive the closing member.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] These and other characteristics of the present invention will become apparent from the following description of some forms of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a schematic view of an apparatus to manage containers according to the present invention;
- fig. 2a is a section view of a detail of a container in a first position according to the present invention;
- fig. 2b is a section view of the detail in fig. 2a in a second position;
- fig. 2c is a section view of the detail in fig. 2a in a third position;
- fig. 3 is a circuit diagram of an electronic unit of an apparatus to manage containers according to the present invention;
- fig. 4a is a circuit diagram of a part of a first component of the first electronic unit in fig. 3;
- fig. 4b is a circuit diagram of a part of a second component of the first electronic unit in fig. 3;
- fig. 5 is a circuit diagram of another electronic unit of the apparatus to manage containers according to the present invention;
- fig. 6 is a circuit diagram of another electronic unit

of the apparatus to manage containers according to the present invention.

[0037] To facilitate comprehension, the same reference numbers have been used, where possible, to identify identical common elements in the drawings. It is understood that elements and characteristics of one form of embodiment can conveniently be incorporated into other forms of embodiment without further clarifications.

DETAILED DESCRIPTION OF SOME FORMS OF EMBODIMENT

[0038] We shall now refer in detail to the various forms of embodiment of the present invention, of which one or more examples are shown in the attached drawings. Each example is supplied by way of illustration of the invention and shall not be understood as a limitation thereof. For example, the characteristics shown or described insomuch as they are part of one form of embodiment can be adopted on, or in association with, other forms of embodiment to produce another form of embodiment. It is understood that the present invention shall include all such modifications and variants.

[0039] Forms of embodiment of the invention concern an apparatus 10 to manage containers 12 for the collection of different articles, such as for example, but not only, used clothing, shoes, blankets or suchlike.

[0040] In forms of embodiment described with reference to fig. 1, the container 12 comprises a containing body 14 defining a containing compartment 13 in which the articles are put.

[0041] The containing body 14 can be provided with an introduction aperture 16.

[0042] In particular, the introduction aperture 16 is configured to promote the introduction of the articles, preferably from the upper part of the container 12, so that they can fall toward the bottom of the containing compartment 13 without obstructing the introduction aperture 16.

[0043] The introduction aperture 16 can be selectively opened/closed, by introduction means, such as for example a rotary drum, to allow both the introduction of the articles into the containing compartment 13 and also the selective closing of the introduction aperture 16.

[0044] The containing body 14 can be provided with a removal aperture 17.

[0045] The removal aperture 17 can advantageously be located below the introduction aperture 16, to allow easier removal by the authorized operator of the articles present in the containing compartment 13.

[0046] The container 12 can comprise, for example on one of its sides, a door 18, associated with the removal aperture 17 and configured to selectively close the containing compartment 13.

[0047] According to one form of embodiment, a closing member 20 is at least partly associated with the door 18 and is configured to assume at least an active condition, in which it constrains the positioning of the door 18 to close the removal aperture 17, and an inactive condition in which access to the containing compartment 13 is possible through the removal aperture 17.

[0048] According to a possible solution, the closing member 20 can include a handle 21 and at least one bolt 25, in this case two bolts 25 mounted on the door 18 and connected to the handle 21.

[0049] The bolts 25 are configured to assume at least a position of interference with the containing body 14 corresponding with the active condition of the closing member 20, and a position of non-interference with the containing body 14, corresponding with the inactive condition of the closing member 20.

[0050] The handle 21 is attached to the door 18 by a pivoting element 33, around which the handle 21 is made to selectively rotate.

[0051] Driving the handle 21 allows to take the bolts 25 to the position of interference and the position of non-interference.

[0052] In possible solutions, it can be provided for example that, when the door 18 is closed, the bolts 25 protrude from a perimeter edge 19 of the door 18, interfering with the containing body 14, for example with a structure 15 of the container 12.

[0053] According to a possible solution, the closing member 20 can also include a frame 22 configured to contain the handle 21 when the closing member 20 is in its active condition. In particular, the frame 22 can be configured so as to intimately surround the handle 21 and prevent ill-intentioned persons from forcing the handle 21 and accessing the content of the containing compartment 13. The frame 22 defines a compartment 31 in which the handle 21 is completely contained.

[0054] In possible solutions, positioning means 23 are associated to the handle 21, configured to make the handle 21 assume at least a first operating position in which the handle 21 is contained inside the frame 22 and it is not possible to drive it, and a second operating position in which the handle 21 is disposed protruding from the frame 22, and it is possible to drive the handle 21.

[0055] In the first operating position of the handle 21, the closing member 20 is kept in its active condition, while in the second operating position of the handle 21, the closing member 20 is taken to its non-active condition.

[0056] In the solution shown in figs. 2a, 2b and 2c, the positioning means 23 comprise a first holding element 27 attached to the handle 21 and a second holding element 32 attached to the door 18.

[0057] At least one of either the first 27 or the second holding element 32 can be selectively activated to keep the handle 21 in its first operating position, contained inside the frame 22.

[0058] With reference to the forms of embodiment shown in figs. 2a, 2b and 2c, the first holding element 27 comprises an actuator 30, for example of the electric or magnetic type, which cooperates during use with the second holding element 32.

[0059] The actuator 30 can be mounted on the handle 21 facing toward the surface that is external, during use, of the door 18.

[0060] The second holding element 32 comprises a holding block attached inside the frame 22 and in which, when the handle 21 is in its first operating position, an end portion of the actuator 30 is constrained.

[0061] The cooperation between the actuator 30 and the holding block prevents the extraction of the handle 21 from the frame 22, and consequently prevents the handle 21 from being driven.

[0062] By activating the actuator 30 it can be de-constrained from the holding block, so as to take the handle 21 to its second operating position.

[0063] According to a possible form of embodiment, shown for example in figs. 2a, 2b and 2c, the positioning means 23 can comprise an elastic element 35 configured to automatically take the handle 21 from its first operating position to its second operating position when one of either the first holding element 27 or the second holding element 32 is deactivated, for example if the actuator 30 is driven.

[0064] According to a possible solution, the elastic element 35 is configured to make the handle 21 slide axially along an axis X that corresponds to the pivoting axis of the pivoting element 33 of the handle 21.

[0065] According to the solution shown in figs. 2a, 2b and 2c, the pivoting element 33 is mounted sliding in a through seating 86 made in the thickness of the door 18.

[0066] Between the through seating 86 and the pivoting element 33 a bushing can possibly be provided, suitable to facilitate the rotation and axial sliding of the pivoting element 33.

[0067] The elastic element 35 can be mounted coaxial to the pivoting element 33.

[0068] According to a possible solution, the elastic element 35 comprises a helical spring of the compression type.

[0069] A holding element 87 can be associated to the pivoting element 33, configured to limit the axial sliding of the pivoting element 33 and hence the expulsion action of the elastic element 35.

[0070] In forms of embodiment described with reference to fig. 1, the apparatus 10 can comprise a first electronic unit 26, of the portable type, configured to transmit at least an enabling signal to enable the opening of the door 18.

[0071] In particular, the first electronic unit 26 can be a remote control for example, which is provided to an operator authorized to empty the containers 12.

[0072] According to one form of embodiment, the apparatus 10 comprises a second electronic unit 24, associated to the container 12, connected to the closing member 20 and configured to take the closing member 20 at least from its active condition to its inactive condition.

[0073] According to a possible solution, the second electronic unit 24 is configured to receive and recognize the enabling signal.

[0074] According to possible solutions, the enabling signal can be for example the electric/electronic type.

[0075] The second electronic unit 24 can be configured to allow to control the container 12 in real time and to transmit information detected, concerning the container 12, to a main control and management operating unit 88 outside the container 12.

[0076] The information detected from the container 12 can comprise its position, how full it is, its overall weight, whether the door 18 is open/closed, or other information.

[0077] The main control and management operating unit 88 can be configured to receive the information from a plurality of containers 12 located in different zones.

[0078] Depending on the information received from each of the containers 12, the main control and management operating unit 88 allows to obtain a complete monitoring of all the containers 12 in a determinate zone, and in particular it is possible to know, substantially in real time, whether a container 12 has been emptied by the authorized operators, how many articles it contains, whether it is necessary to program an operation to empty it, whether it has been moved from its position, which operator emptied it or similar information.

[0079] According to one feature of the present invention, the apparatus 10 can also comprise a third electronic unit 80 (fig. 6) stably associated to a vehicle 89 adapted to the service of removing the articles present in the container 12.

[0080] The third electronic unit 80 is configured to receive the enabling signal from the first electronic unit 26 and to supply, as a function of the enabling signal received, a confirmation signal.

[0081] The confirmation signal can be supplied for example as a function of data memorized in the third electronic unit 80, and as a function of the comparison of the latter with the enabling signal.

[0082] According to the present invention, the second electronic unit 24 is configured to receive both the enabling signal and the confirmation signal and, as a function of the two, command the drive of the closing member 20.

[0083] This operating condition allows a double control before the closing member 20 is driven, preventing, for example, an operator having only the use of the first electronic unit 26 from being able to access the content of the articles in the container 12.

[0084] With this solution, the operator can access the articles only if he/she is provided with the first electronic unit 26 and the vehicle 89 enabled to remove the articles and on which the third electronic unit 80 is stably installed.

[0085] If both the signals - enabling and confirmation - are not verified by the second electronic unit 24, the opening of the container 12 can be prevented by sending a suitable signal, or by not sending a signal, to the second electronic unit 24 to subsequently open the container 12.

[0086] In this operating condition, the second electronic unit 24 can be configured to supply an alarm signal, for example to the main control and management operating unit 88.

[0087] The third electronic unit 80 is configured to communicate, that is, at least to receive information concerning the container 12 from the second electronic unit 24. This solution allows to supply the operator traveling on the vehicle 89 with information relating to the container 12 that he/she has to empty. In this way the operator can understand, without opening the container 12 or getting out of the vehicle 89, whether he/she needs to intervene or not.

[0088] According to another form of embodiment, the third electronic unit 80 can also send an alarm signal if an unauthorized person starts the vehicle 89.

[0089] The third electronic unit 80 traces the vehicle 89 and sends, to the main control and management operating unit 88, the information relating at least to the position of the vehicle 89, for example to detect positions of the latter outside the time periods provided for the collection service. In this way, from the main control and management operating unit 88, it is possible to know in real time the route of the vehicle 89.

[0090] According to another feature of the present invention, at least as a function of the information regarding the position of the vehicle 89, the main control and management operating unit 88 is configured to transmit a command to the third electronic unit 80, consenting or refusing to send the confirmation signal.

[0091] This solution allows a triple control before giving consent to opening the container 12, which must also be validated by the main control and management operating unit 88.

[0092] The main control and management operating unit 88 can be configured to memorize information relating to a removal program of the articles from the containers 12, which contains at least information relating to the position of the container 12 and the period of time in which a removal of the articles in each of the containers 12 is programmed, using a determinate vehicle 89. This information is compared at least with the information on the position of the vehicle 89 and, if the two do not correspond, the opening of the container is not enabled.

[0093] According to one formulation of the present invention, when the door 18 is closed and the closing member 20 is in its active condition, the first electronic unit 26, driven for example by an operator, sends an enabling signal to the second electronic unit 24.

[0094] The second electronic unit 24 compares the enabling signal to verify whether the operator, who has been issued with the first electronic unit 26, is enabled to open the door 18 of the container 12.

[0095] If the enabling signal is negative, the closing member 20 is not activated and so access to the containing compartment 13 is prevented.

[0096] If the enabling signal is positive, the second electronic unit 24 commands the activation of the closing member 20 to take it from its active to its inactive condition.

[0097] In particular, it can be provided that the second electronic unit 24 is connected to at least one of either the first holding element 27 or the second holding element 32, in this case the first holding element 27, to deactivate it and take the handle 21 to its second operating position.

[0098] However, it cannot be excluded that, in other forms of embodiment, the second electronic unit 24 directly commands the activation of the closing member 20, for example its bolts 25.

[0099] According to the form of embodiment shown in figs. 2a, 2b and 2c, the second electronic unit 24 commands the drive of the actuator 30, which is released from the holding block. Due to the effect of the elastic element 35, the handle 21 automatically moves to its second operating position (fig. 2b).

[0100] In this condition it is possible to rotate the handle 21 around the pivoting element 33, to take the bolts 25 to a position of non-interference with the containing body 14 (fig. 2c).

[0101] In this operating condition it is possible to open the door 18 and access the articles in the container 12 through the removal aperture 17.

[0102] After the articles in the containing compartment 13 have been removed, the operator can restore the initial closed condition of the container 12 by closing the door 18 in correspondence with the removal aperture 17 and rotating the handle 21 so as to return the bolts 25 to their position of interference with the containing compartment 13.

[0103] The handle 21 can be thrust manually by the operator, making it slide along axis X, to return it to its first operating position in which it is contained in the frame 22.

[0104] In this condition the first holding element 27 and the second holding element 32, cooperating with each other, keep the handle 21 in its first operating position and the closing member 20 assumes the active condition of constraining the door 18 to the container 12.

[0105] A circuit diagram, given by way of non-restrictive example, of the first electronic unit 26 is shown in fig. 5 and can comprise at least a microprocessor 44 or microcontroller, a buzzer 78 and a transceiver element 53, operating at a predefined frequency, for example about 2.4 GHz.

[0106] The microprocessor 44 can comprise an internal memory 79 suitable to memorize a management software of the first electronic unit 26, an identification code, able to identify the proprietor Company and/or the operator to which it is associated, and/or a possible enablement to one or more determinate services.

[0107] The first electronic unit 26 can comprise a feed device, such as for example, but not only, a primary lithium battery, and drivers, not shown in the attached drawings, which can comprise transistors and which are configured to signal possible relevant events or to send specific commands, for example using LEDs (Light Emitting Diodes).

[0108] In forms of embodiment described here, the second electronic unit 24 (fig. 3) can comprise an electronic circuit consisting of a feed device 36a, a control

device 43a and a communication device 52a, configured to allow the management and surveillance of the container 12 and the articles present therein, or to transmit the information relating to the state of the container 12 to the main control and management operating unit 88.

[0109] According to a possible solution, the communication device 52a is the wireless type to allow direct transmission of the information.

[0110] Fig. 3 shows, by way of example, a circuit diagram of the second electronic unit 24, in which the feed device 36a, the control device 43a and the communication device 52a can be made in different ways and with different technologies, while still keeping unchanged the function performed by them.

[0111] In particular, the feed device 36a can comprise an energy source 37, such as for example a solar panel; a non-restrictive example can provide to use a nominal 7.5 nominal Voltage panel at 60 mA.

[0112] The energy source 37 can be connected to a battery management element 38, configured to manage at least one accumulator 39, able to supply the necessary voltage to the activation/deactivation means 23; in a non-restrictive example the accumulators 39 can be the 6 V type.

[0113] In one form of embodiment, the battery management element 38 can comprise two accumulators 39 that can be connected in series or parallel. In particular, if in series, they can supply the voltage needed for the functioning of the activation/deactivation means 23, and if in parallel they can be recharged.

[0114] Recharging can be done using a supercapacitor 40, previously charged by the energy source 37 and subsequently discharged on the accumulators 39 located in parallel through, for example, at least one diode.

[0115] The voltage at which the supercapacitor 40 can be charged can be monitored by the control device 43a, which can disconnect it from the energy source 37 if it exceeds a maximum threshold, and can discharge it onto the accumulators 39 by means of a suitable switch, not shown in the attached drawings.

[0116] The accumulators 39 can feed a feed circuit 41a, comprising some voltage regulators, for example made by means of separate regulators or a PWM convertor with several outputs, not shown in the attached drawings, configured to adapt the voltage supplied by the feed device 36a to the voltage required by the other devices, such as the control device 43a and the communication device 52a.

[0117] Between the feed device 36a and the control device 43a a current reader 42 can be disposed, configured to identify the current absorbed by a control element 55 of the activation/deactivation means 23 and to guarantee protection if the latter should exceed a pre-fixed value.

[0118] The control element 55 can comprise two H bridges, configured to allow to control the positioning means 23, for example by monitoring solenoids and/or actuators that have reversible motors, not shown in the attached drawings.

[0119] The control device 43a can in turn comprise a microprocessor 44a, such as a microcontroller, configured to command a management software of the second electronic unit 24 and to control, by means of a direct connection, at least one surveillance element 45a, a time detector 46a, an accelerometer 47a, geographical localization elements 48a, a memory 49a and/or a telephone module 50a.

[0120] The software of the microprocessor 44a can send pulses to the surveillance element 45a, in a regular cadence. If some event occurs, such that the software is blocked or remains in stand-by too long due to an anomaly in a peripheral device, for example if there is too long a wait for the telephone connection, or due to absence of field or network anomalies, the pulses are not sent or are sent outside maximum time. In this case the surveillance element 45a can intervene by re-setting the microprocessor 44a and restarting the apparatus 10.

[0121] The time detector 46a is configured to supply date and time to the microprocessor 44a by means of an interface with a serial communication, in order to mark the events temporally.

[0122] The accelerometer 47a is configured to detect the possible lifting or movement of the container 12 and can have three axes, for example, or fewer than three if suitably positioned. In particular, the intervention thereof activates an alarm apparatus, by means of a serial connection line with the microprocessor 44a, which triggers the localization of the container 12.

[0123] The localization of the container 12 can be performed by means of the geographical localization elements 48a, for example GPS and/or suchlike, connected to the microprocessor 44a and configured to know the position of the container 12 in real time.

[0124] The memory 49a can be a flash memory configured to memorize the events registered by the second electronic unit 24 and can be the non-volatile type, serial and re-writable a great number of times.

[0125] The telephone module 50a, for example the GSM type, is configured to be connected to a SIM card 51a and to allow communication, for example by means of audio or digital tones, between the microprocessor 44a and the main control and management operating unit 88.

[0126] The control device 43a can also be connected to a communication device 52a to allow communication between the first electronic unit 26 and the second electronic unit 24, in order to allow recognition and enablement of the operator associated to the first electronic unit 26.

[0127] In one form of embodiment, the communication device 52a can also allow communication with other operating units, for example associated with a vehicle used to remove the articles in the container 12.

[0128] In particular, the communication device 52a can comprise a transceiver element 53a configured to achieve the communication in correspondence with a determinate frequency defined by needs, regulations

and/or standardizations, for example a frequency of 2.4 GHz, and an amplification element 54a, configured to guarantee greater security in communication, increasing the maximum power irradiated, for example up to about ten mW.

[0129] An interface of the photoelectric barrier 58 can also be associated with the control device 43a, and is configured to achieve a connection with a photoelectric barrier 59.

[0130] The photoelectric barrier 59 is mounted inside the containing compartment 13, and is configured to detect that the containing compartment 13 has been filled to at least a pre-fixed level.

[0131] The photoelectric barrier 59 can comprise at least a transmitter unit 60 (fig. 4a), configured to emit a pulsing infrared signal at a determinate frequency, and at least a reception unit 67 (fig. 4b), configured to detect this signal and consider only this signal as valid.

[0132] The transmitter unit 60 and the reception unit 67 are reciprocally associated and disposed on opposite internal sides of the containing compartment 13.

[0133] In particular, if the pulsing infrared signal emitted by the transmitter unit 60 were not detected by the reception unit 67, for example because intercepted by the articles in the containing compartment 13, the photoelectric barrier 59 signals to the microprocessor 44a that the established filling level has been reached, so as to know in real time whether the articles in the container 12 can be removed.

[0134] In a preferential form of embodiment, the photoelectric barrier 59 can comprise two transmitter units 60, associated respectively with two reception units 67, in order to monitor whether two distinct pre-established filling levels have been reached, modifiable according to the position where the units 60 and 67 are located.

[0135] A circuit diagram, given by way of non-restrictive example, of the transmitter unit 60 is shown in fig. 4a and can comprise at least a transmitter element 61, configured to stabilize the power voltage applied, and an pulse generator 62, to which the voltage is applied.

[0136] The transmitter unit 60 can also include a power amplifier 63, configured to receive the pulses arriving from the pulse generator 62; the power amplifier 63 can command at least one emitter diode 64, in this case two emitter diodes 64, infrared, located in series and fed by a filter circuit 65.

[0137] In particular, the filter circuit 65 can transfer a predefined current, for example 12A, to the emitter diodes 64, and is configured to filter the noise produced by the rapid variations in current with which the emitter diodes 64 are piloted, also limiting the current flowing in them.

[0138] A circuit diagram, given by way of non-restrictive example, of the reception unit 67 is shown in fig. 4b and can comprise at least one detector diode 68, in this case two detector diodes 68, infrared and located in parallel, the feed of which is filtered against the noise possibly conducted by the transmitter part, and an integrated circuit 69.

[0139] The integrated circuit 69 can comprise at least an amplifier 71, a band-pass filter 72, an integrator 73 and an output interface transistor 74.

[0140] The reception unit 67 can also comprise a photocell 76, configured to communicate the interruption of the pulsing infrared signal when the reception unit 67 does not detect the signal emitted by the transmitter unit 60, and in particular by the at least one emitter diode 64.

[0141] In one form of embodiment, shown for example in fig. 3, an end-of-travel interface 57 can also be associated with the control device 43a, when necessary, and is configured to connect with an end-of-travel of the activation/deactivation means 23, more particularly to detect their functioning, for example with regard to a possible forced entry; it therefore performs an anti-theft function.

[0142] According to possible forms of embodiment, a circuit diagram, given by way of non-restrictive example, of the third electronic unit 80, is shown in fig. 6 and can comprise, like the first electronic unit 24, a feed device 36b, which takes the necessary voltage, for example about 12V or 24V, from a battery of the vehicle enabled for removal.

[0143] The battery can be associated with a fixed positive pole, protected by a fuse wheel, configured to supply power to the third electronic unit 80, which can also comprise a positive pole of the key of the vehicle, configured to selectively activate or deactivate it.

[0144] The feed device 36b can comprise at least a feed circuit 41b, made for example with separate regulators or with a PWM convertor with several exits, a protection circuit 82 and an anti-disturbance filter 83.

[0145] The feed circuit 41b can be configured at least to adapt the voltage of the vehicle to the voltage needed by other devices of the third electronic unit 80, and to power a possible back-up battery, not shown in the attached drawings, able to allow to localize the vehicle if the main feed were to be disconnected.

[0146] The feed device 36b can be connected, by means of the feed circuit 41b, to a control device 43b, able to send a switch-off command to deactivate the third electronic unit 80 and a power failure signal, if the positive pole of the battery is disconnected.

[0147] In particular, the control device 43b can comprise a microprocessor 44b, such as for example a microcontroller, configured to command a management software of the third electronic unit 80, more in particular able to control, by means of a direction connection, at least a surveillance element 45b, a time detector 46b, geographical localization elements 48b, a memory 49b and/or a telephone module 50b.

[0148] The software of the microprocessor 44b can send pulses to the surveillance element 45b, in a regular cadence. If some event occurs, such that the software is blocked or remains in stand-by too long due to a peripheral anomaly, for example if there is too long a wait for the telephone connection, or due to no field or network

anomalies, the pulses are not sent or are sent outside maximum time. In this case the surveillance element 45b can intervene by re-setting the microprocessor 44b and restarting the apparatus 10.

[0149] The time detector 46b is configured to supply date and time to the microprocessor 44b by means of an interface with a serial communication, in order to mark the events temporally.

[0150] The localization of the vehicle can be performed by means of geographical localization elements 48b, for example GPS and/or suchlike, connected to the microprocessor 44b and configured to know the position in real time, without having recourse to other devices and/or external connections.

[0151] The memory 49b can be a flash memory configured to memorize the events registered by the third electronic unit 80 and can be the non-volatile type, serial and re-writable a large number of times.

[0152] The telephone module 50b, for example the GSM type, is configured to be connected to a SIM card 51b and to allow communication, for example by means of audio or digital tones, between the microprocessor 44b and the main control and management operating unit 88.

[0153] The control device 43b can also be connected to a communication device 52b to allow communication between the third electronic unit 80 and the other electronic units 24 and 26, in order to allow recognition and enablement to remove the articles.

[0154] According to a possible formulation of the invention, the communication device 52b is configured to send at least said confirmation signal to the second electronic unit 24, and to receive from it the information relating to the container 12.

[0155] According to another form of embodiment of the invention, the communication device 52b is configured to transmit to the main control and management operating unit 88 information relating at least to the position of the vehicle 89, for example based on the information detected by the geographical localization elements 48b.

[0156] In particular, the communication device 52b can comprise a transceiver element 53b configured to achieve the communication in correspondence with a defined determinate frequency, for example a channelized frequency in the 2.4 GHz band, and an amplification element 54b, configured to guarantee greater security in communication, increasing the maximum power irradiated, for example up to about ten mW.

[0157] In some forms of embodiment of the present invention, the third electronic unit 80 can also comprise some buttons, not shown in the attached drawings, which can be used for possible local or remote control functions.

[0158] It is clear that modifications and/or additions of parts may be made to the apparatus to manage containers as described heretofore, without departing from the field and scope of the present invention.

[0159] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of apparatus to manage containers, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Apparatus to manage containers for the collection of articles comprising:

   - a container (12) provided with a containing body (14) defining a containing compartment (13) in which to place said articles and having at least an introduction aperture (16) and a removal aperture (17) through which to introduce and respectively remove said articles, at least one door (18) being associated to said removal aperture (17), said door (18) being configured to selectively close said containing compartment (13);
   - a closing member (20) configured to assume at least an active condition, in which it constrains the positioning of the door (18) to close the removal aperture (17), and an inactive condition in which access to the containing compartment (13) is possible through the removal aperture (17);
   - a first electronic unit (26), of the portable type, configured to selectively transmit at least an enabling signal to enable the opening of the door (18);
   - a second electronic unit (24) associated to the container (12), connected to said closing member (20) and configured to drive said closing member (20) at least from its active condition to its inactive condition.

   characterized in that it comprises a third electronic unit (80) stably associated to a vehicle (89) adapted to the service of removing the articles present in said container (12) and configured to receive said enabling signal from said first electronic unit (26) and to supply, as a function of said enabling signal received, a confirmation signal, **and in that** said second electronic unit (24) is configured to receive said enabling signal and said confirmation signal and, as a function of the two, command the selective drive of said closing member (20).

2. Apparatus as in claim 1, **characterized in that** it comprises a main control and management operating unit (88) outside the container (12), **and in that** said second electronic unit (24) comprises a communication device (52a) configured to transmit, to said main control and management operating unit (88), information detected relating to the container (12).

3. Apparatus as in claim 2, **characterized in that** it comprises a plurality of said containers (12), **and in that** said main control and management operating unit (88) is configured to receive the information from said plurality of containers (12) positioned in different zones.

4. Apparatus as in claim 2 or 3, **characterized in that** said second electronic unit (24) comprises at least one of either a surveillance element (45a), a time detector (46a), an accelerometer (47a), geographical localization elements (48a) or a photoelectric barrier (59), suitable to detect said information.

5. Apparatus as in claims 2, 3 or 4, **characterized in that** said third electronic unit (80) comprises a communication device (52b) configured to send said confirmation signal to said second electronic unit (24) and to receive from the latter said information relating to the container (12).

6. Apparatus as in claim 2 and 5, **characterized in that** said communication device (52b) of said third electronic unit (80) is configured to transmit information relating at least to the position of said vehicle (89) to said main control and management operating unit (88).

7. Apparatus as in claim 6, **characterized in that**, at least as a function of the information of the position of said vehicle (89), said main control and management operating unit (88) is configured to transmit a command to said third electronic unit (80) to consent to or refuse to send said confirmation signal.

8. Apparatus as in any claim hereinbefore, **characterized in that** said closing member (20) comprises a handle (21) and at least one bolt (25) connected to said handle (21), said bolt (25) being configured to assume, by driving said handle (21), at least a position of interference with the containing body (14) corresponding with said active condition of the closing member (20), and a position of non-interference with said containing body (14), corresponding with the inactive condition of said closing member (20).

9. Apparatus as in claim 8, **characterized in that** said closing member (20) comprises a frame (22) configured to contain and intimately surround said handle (21) when said closing member (20) is in its active condition.

10. Apparatus as in claim 9, **characterized in that** positioning means (23) are associated to said handle (21) and are configured to make the latter assume at least a first operating position in which the handle (21) is contained inside said frame (22) and it is not possible to drive it, and a second operating position in which the handle (21) is disposed protruding from said frame (22), and it is possible to drive said handle (21).

11. Apparatus as in claim 10, **characterized in that** said positioning means (23) comprise a first holding element (27) attached to said handle (21) and a second holding element (32) attached to said door (18), **and in that** at least one of either said first (27) or said second holding element (32) can be selectively activated to keep said handle (21) in its first operating position.

12. Apparatus as in claim 11, **characterized in that** said second electronic unit (24) is connected to at least one of either said first holding element (27) or said second holding element (32) in order to deactivate it and take said handle (21) into its second operating position.

13. Apparatus as in claim 12, **characterized in that** said positioning means (23) comprise an elastic element (35) configured to automatically take said handle (21) from said first operating position to said second operating position when one of either said first holding element (27) or said second holding element (32) is deactivated.

14. Apparatus as in any of the claims from 11 to 13, **characterized in that** said first holding element (27) comprises an actuator (30) and said second holding element (32) comprises a holding block attached inside said frame (22) and in which, when said handle (21) is in its first operating position, an end portion of said actuator (30) is constrained.

15. Method to manage containers that provides at least to remove articles located in a containing compartment (13) defined by a containing body (14) of a container (12), said articles having been previously introduced through an introduction aperture (16) of said containing body (14) and being removed by opening a door (18) normally located to close said removal aperture (17), wherein said method provides to take a closing member (20) at least into a first active condition in which it constrains the positioning of said door (18) to close said removal aperture (17), and an inactive condition in which access to said containing compartment (13) is possible through said removal aperture (17), and wherein a first electronic unit (26) of the portable type selectively transmits at least an enabling signal to enable the opening of the door (18), and a second electronic unit (24), associated to the container (12) and connected to said closing member (20), commands the drive of the closing member (20) to take it from its active condition to its inactive condition, **characterized in that** a third electronic unit (80) stably asso-

ciated to a vehicle (89) adapted to the service of removing the articles present in the container (12) receives said enabling signal from the first electronic unit (26) and, as a function of the enabling signal received, gives a confirmation signal, **and in that** said second electronic unit (24) receives said enabling signal and said confirmation signal and, as a function of the two, gives a command to selectively drive said closing member (20).

16. Method as in claim 15, **characterized in that** a plurality of said containers (12) are provided **and in that** their second electronic unit (24) transmits information relating to said container (12) to a main control and management operating unit (88), outside the container (12).

17. Method as in claim 16, **characterized in that**, at least as a function of information concerning the position of said vehicle (89), said main control and management operating unit (88) transmits a command to said third electronic unit (80) to consent to or refuse to send said confirmation signal.

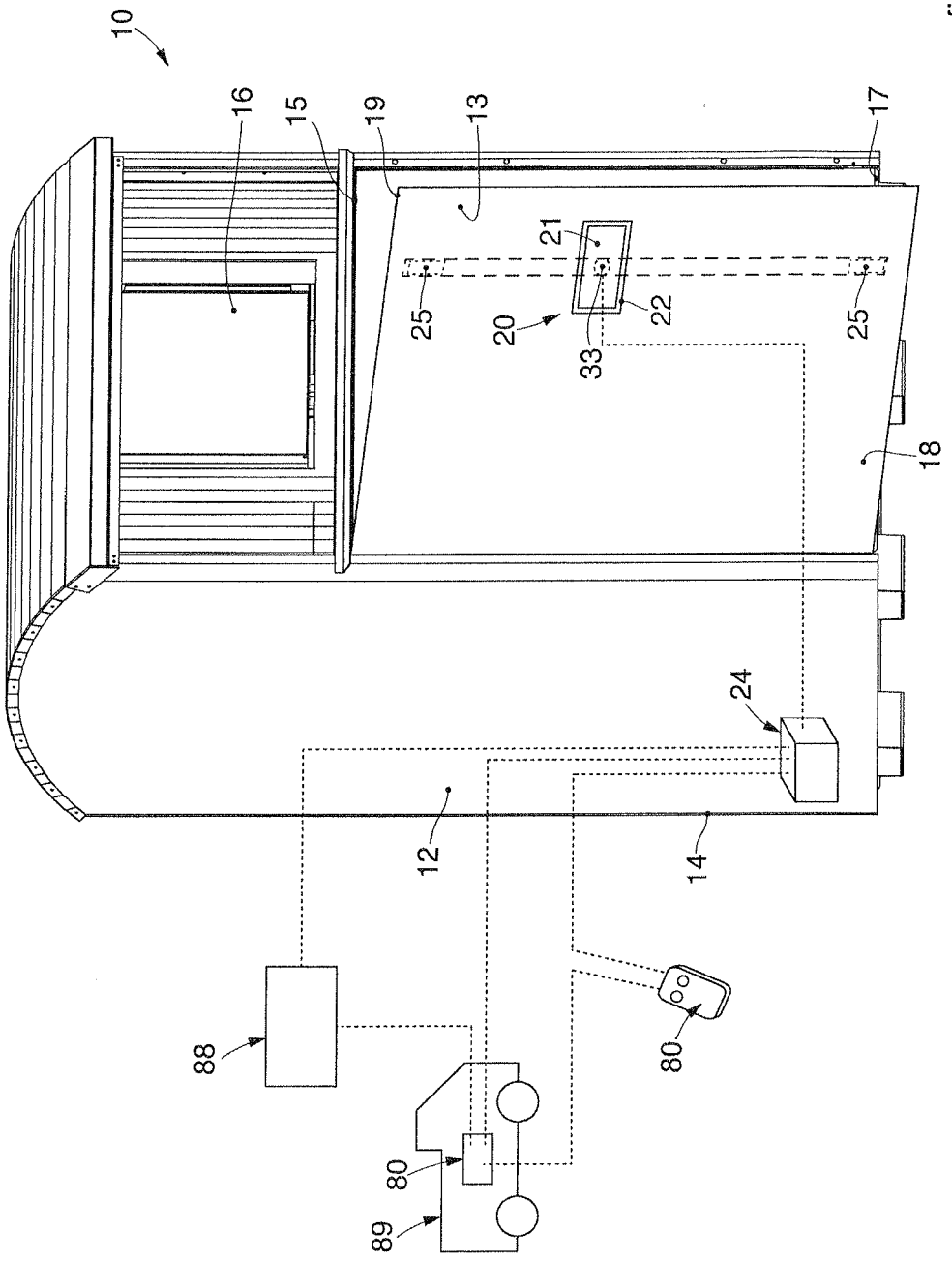

fig. 1

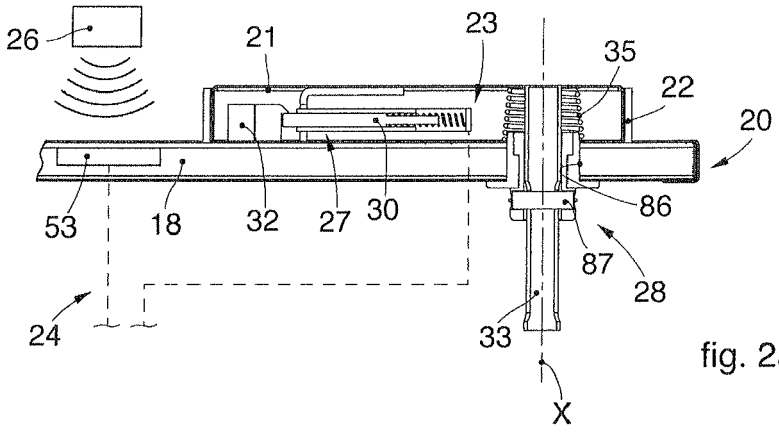

fig. 2a

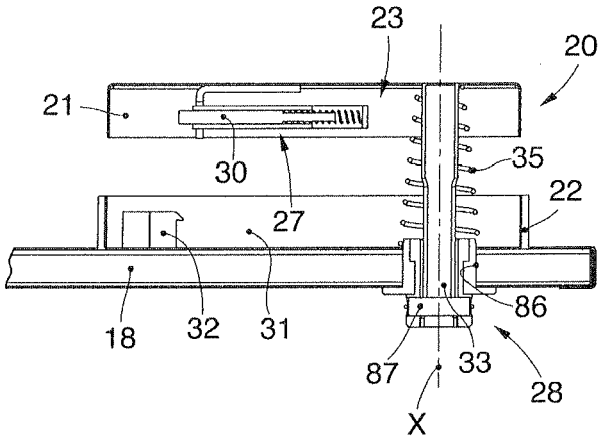

fig. 2b

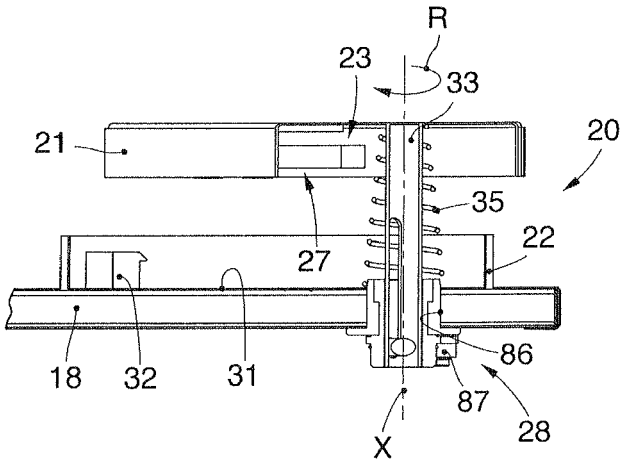

fig. 2c

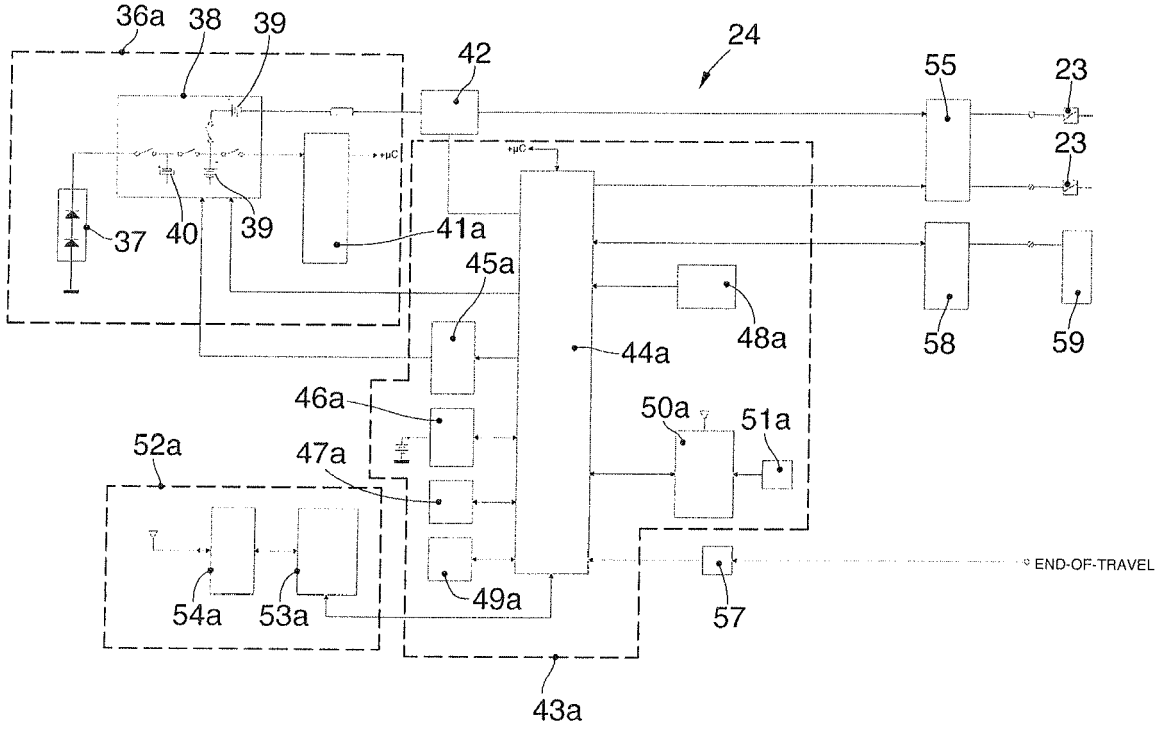

fig. 3

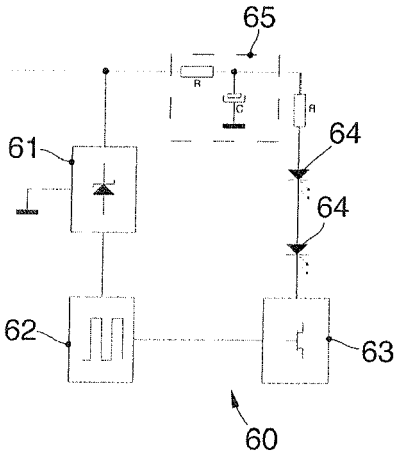

fig. 4a

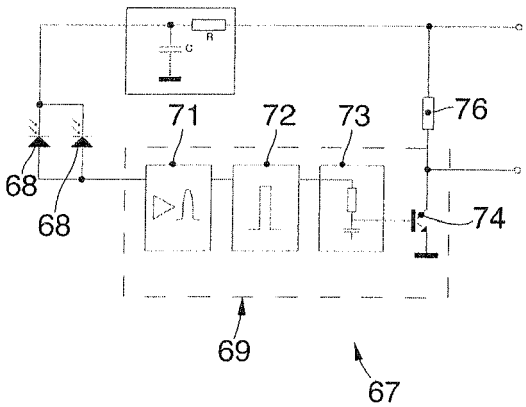

fig. 4b

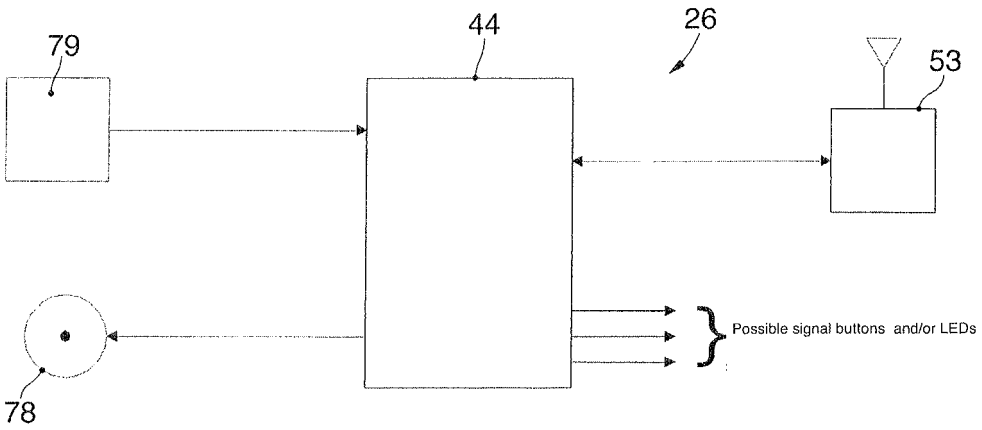
79
44
26
53
Possible signal buttons and/or LEDs
78

fig. 5

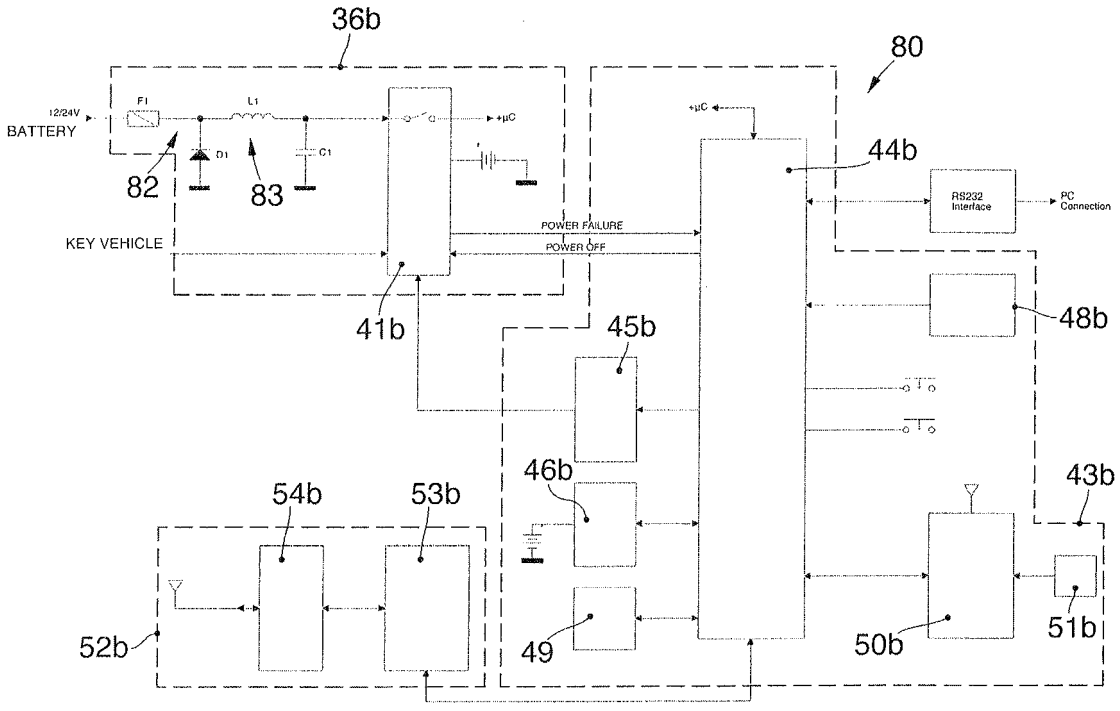
36b
80
12/24V
BATTERY
F1
L1
D1
C1
+µC
82
83
44b
RS232 Interface
PC Connection
KEY VEHICLE
POWER FAILURE
POWER OFF
41b
45b
48b
46b
43b
54b
53b
52b
49
50b
51b

fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 5089

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	21 August 2015	Pardo Torre, Ignacio

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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 5089

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

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