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(54) **AUTOMATED BIN FOR EMPTYING WASTE AND WASTE EMPTYING SYSTEM THEREOF**

(57) The present invention relates to an automated bin (1) for emptying waste, comprising a container (10) having an opening (100) for inserting waste, a supporting and moving assembly (2) to be coupled to a gripping member (O) of a compactor and to be moved, an opening/closing group (14) for said container (10) and a logic control unit (U).

Said supporting and moving assembly (2) comprises a switching device (23) to switch from a non-operating status to an operating status and vice versa; and a hooking/unhooking member (20) comprising a rod (21) having an end connected to said switching device (23) and an

actuating pin (202) connected to another end of said rod (21).

When said actuating pin (202) is pressed by said gripping member (O), said switching device (23) switches from said non-operating status to said operating status and said logic control unit (U) reads said operating status of said switching device (23) and opens said container (10), by means of said opening/closing group (14), for emptying waste.

The present invention relates also to a system (3) for emptying waste.

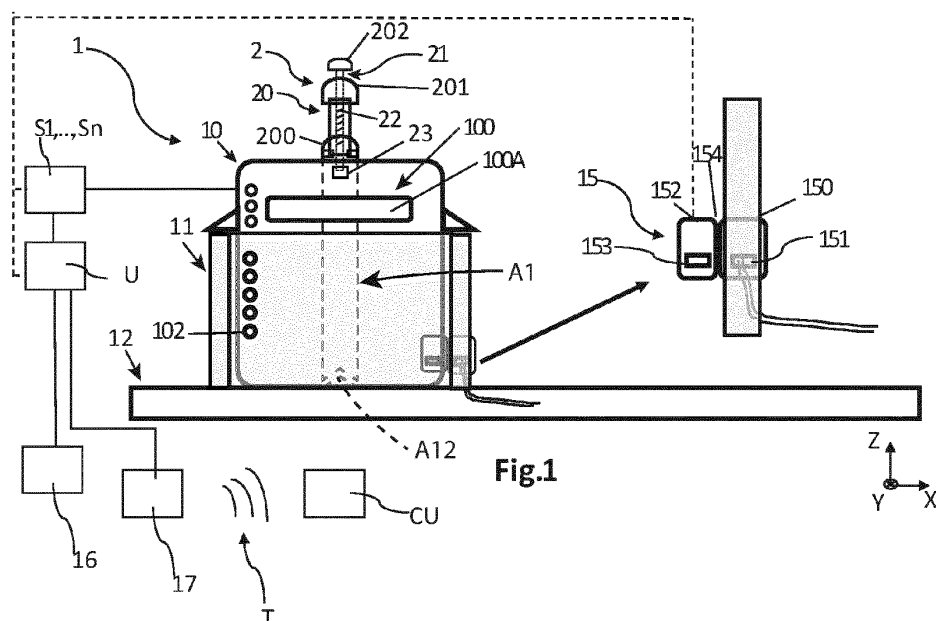


Fig.1

Description

[0001] The present invention relates to an automated bin for emptying waste.

[0002] The present invention also relates to a system for emptying waste.

Field of the invention

[0003] More specifically, the invention relates to an automated bin, intended for collecting waste, designed and made to optimize moving and emptying waste from said automated bin.

[0004] In the following the description refers to an automated bin provided with a supporting and moving assembly intended to be coupled to a gripping member of a vehicle, such as a compactor lorry for compacting waste.

[0005] However, it is clear that the same description should not be considered limited to this specific use.

Prior art

[0006] Currently, systems are known for moving one or more bins intended for the collection of waste such as, for example, municipal waste and the like and lying in collection areas arranged at the sides of the roadway.

[0007] Such known solutions generally provide for the use of vehicles for collecting waste such as, for example, compactor lorries and the like, provided with a hooking system (rear and/or front and/or side) of the bins.

[0008] In particular, the bin hooking system allows each bin filled with waste to be picked up from the collection area by means of one or more mechanical arms, empty its contents inside the compactor lorry and then release the empty bin in the same collection area.

[0009] However, a drawback of such known solutions is that they do not allow a stable and precise picking up/release of the bins inside the collection area.

[0010] In fact, during the operations of picking up or releasing the bin, the oscillations of the mechanical arm hooked to the bin due, for example, to unfavourable environmental conditions, make such operations complex, typically causing incorrect repositionings of the bins with respect to their original position.

[0011] Furthermore, another drawback of the known solutions is that they do not allow to properly empty the waste inside the compactor lorries.

[0012] In fact, the sudden opening of one or more doors or covers of the bin while picking the same up from the collection area can cause the escape of waste and, therefore, an incorrect collection by the compactor lorry, increasing environmental pollution as well as the waste collection time.

Aim of the invention

[0013] The aim of the present invention is to provide

an automated bin for emptying waste which allows to optimize the operations of picking the bin up and repositioning the bin, after having emptied it of the waste, as well as to facilitate the emptying of waste by a vehicle, such as a compactor lorry and the like.

[0014] A second aim of the invention is to provide an automated bin for emptying waste which is provided with one or more batteries to ensure operating continuity even when the automated bin is separated from a power supply network or, for example, when the supply of electrical energy undergoes an interruption.

[0015] A third aim of the invention is to provide an automated bin for emptying waste which allows to use the same power supply to power said automated bin before it is picked up to be emptied and after the automated bin has been emptied and repositioned to be used again.

[0016] A fourth aim of the invention is to provide an automated bin for emptying waste designed to be hooked and repositioned correctly, in its original position, i.e. in the position prior to the picking up step.

[0017] A further aim of the invention is to provide an automated bin for emptying waste which has a high reliability and is simple to make, so as to have a competitive cost with respect to a bin of the known type.

Object of the invention

[0018] Therefore, a specific aim of the present invention is an automated bin for emptying waste, comprising a container having an opening for inserting waste, a logic control unit, a supporting and moving assembly, associated with said container, wherein said supporting and moving assembly is intended to be coupled to a gripping member of a compactor and the like, so as to move it, an opening/closing group of said container, connected to said logic control unit, wherein said supporting and moving assembly comprises: a switching device, connected to said logic control unit and configured for switching between a non-operating status and an operating status; and a hooking/unhooking member comprising: a rod having an end connected to said switching device; an actuating pin connected to another end of said rod; wherein, when said actuating pin is pressed by said gripping member: said actuating pin actuates, by means of said rod, said switching device, so as to switch its status from said non-operating status to said operating status; and said logic control unit reads said operating status of said switching device and commands the opening of said container, by means of said opening/closing group, for emptying waste.

[0019] Advantageously according to the present invention, said hooking/unhooking member can comprise a first pin intended to be coupled to said gripping member and a second pin, fixed to said first pin, wherein said pins are slidably movable on said gripping member for stabilizing said container during its movement.

[0020] Still according to the present invention, said pins can be hollow, said rod can be slidably movable within

said pins between a resting position, in which it does not actuate said switching device, and an operating position, in which it actuates said switching device so that said switching device switches its status, and said bin can comprise elastic means arranged around said rod for facilitating the passage of said rod from said operating position to said resting position.

[0021] Still according to the present invention, said bin can comprise a main rod fixed to said container, wherein said main rod is hollow, and a housing structure for housing said container, wherein said housing structure comprises a repositioning pin, wherein said main rod is intended to be coupled, in use, to said repositioning pin.

[0022] Conveniently according to the present invention, said container can have a first side and a second side, opposite to said first side, said opening/closing group can comprise a first unloading door fixed to said first side by means of a first hinge arranged along a first rotation axis, and a second unloading door fixed to said second side by means of a second hinge arranged along a second rotation axis, wherein each rotation axis is perpendicular to said main rod, and wherein each unloading door is capable of passing from a closed position in which it does not allow waste to be unloaded to an open position in which it allows the waste to be unloaded by means of a respective rotation around said rotation axes.

[0023] Still according to the present invention, said first unloading door can comprise a first electric lock and said second unloading door can comprise a second electric lock, and said main rod can have one end and another end on which a first slot and a second slot are obtained, so that, when each electric lock is housed in the respective slot, each unloading door is locked in said closed position.

[0024] Also according to the present invention, each slot can be realized by means of polytetrafluoroethylene for reducing the stresses associated to the opening and closing of each unloading door by means of said respective electric locks.

[0025] Advantageously according to the present invention, said opening/closing group can comprise a first motor operatively connected to said first unloading door and a second motor operatively connected to said second unloading door, wherein said motors are connected to said logic control unit and are capable of moving said unloading doors around said rotation axes between said open position and said closed position and vice versa, respectively.

[0026] Conveniently according to the present invention, said housing structure can have a base, and each unloading door can comprise elastic means positioned on the external surface of said unloading doors and intended to reduce the impact between said unloading doors and said base during the moving of said container.

[0027] Still according to the present invention, said housing structure can comprise a first receiving structure for guiding said first unloading door towards said base and a second receiving structure for guiding said second

unloading door towards said base, and said bin can comprise a first LED arranged on said base and a second LED arranged on said end of said main rod, wherein said first LED is capable of emitting light radiation towards said second LED and said second LED is capable of detecting the position of said container with respect to said housing structure on the basis of the light radiation emitted by said first LED and received by said second LED.

[0028] Still according to the present invention, said bin can comprise power supply means connected to said logic control unit, wherein said power supply means comprise at least one battery for supplying electrical energy to said logic control unit.

[0029] Still according to the present invention, said bin comprises a covering that can be coupled to said container for reducing the action of sunlight on said container, wherein said covering has an opening in correspondence with said hooking/unhooking member, allowing the passage of an air flow around said container.

[0030] An aim of the present invention is also a system for emptying waste, comprising at least one first automated bin for emptying waste, at least one second automated bin for emptying waste, a supply column connected to said at least one first automated bin and to said at least one second automated bin, wherein said supply column is capable of providing electrical energy to said at least one first automated bin and said at least one second automated bin.

Brief description of the figures

[0031] The present invention will now be described, in an illustrative but nonlimiting manner, according to preferred embodiments thereof, with particular reference to the figures of the attached drawings, wherein:

figure 1 is a front schematic view of an embodiment of an automated bin for emptying waste, according to the present invention, comprising a container and a housing structure for housing said container;
figure 2A is a schematic view of a variant of the automated bin shown in figure 1;
figure 2B shows a hooking/unhooking member for allowing the automated bin to be hooked/unhooked to/from a compactor lorry, wherein said hooking/unhooking member is connected to a logic control unit;
figure 2C shows the hooking/unhooking member of figure 2B coupled to a gripping member (shown partially in section) of a compactor lorry;
figure 3A is a schematic view of an opening/closing group for opening/closing the unloading doors of said automated bin, wherein said unloading doors are connected to a main rod (arranged in the container) and said opening/closing group is connected to the logic control unit supplied by a power supply board;
figure 3B is a front schematic view showing a first unloading door and a second unloading door of the

opening/closing group of figure 3A in the closed position, in which said unloading doors are connected to the main rod;

figure 3C is a top view of the unloading doors in the closed position of figure 3B;

figure 3D is an exploded schematic view showing the unloading doors and the main rod;

figure 3E shows the main rod arranged in the container and a pin arranged in the housing structure for correctly positioning said main rod, wherein said pin is inside said main rod when said container is in the housing structure;

figure 4A shows a circuit diagram for obtaining a control voltage capable of opening an electric lock of an unloading door of the automated bin;

figure 4B shows a graph related to an unloading process of a capacitor present in the circuit diagram of figure 4A;

figure 4C shows a variant of the circuit diagram of figure 4A;

figure 5A is a perspective view of an embodiment of a pair of unloading doors of the opening/closing group of the automated bin;

figure 5B is a schematic view related to the moving means for moving the unloading doors of figure 5A;

figure 5C is a perspective view of a first variant of a pair of unloading doors of the opening/closing group of the automated bin;

figure 6A is a front view of a second variant of a pair of unloading doors of the opening/closing group of the automated bin;

figure 6B is a front view of a third variant of a pair of unloading doors of the opening/closing group of the automated bin;

figure 7A is a schematic view of a covering of the container of the bin;

figure 7B is a schematic view of a first variant of the covering of the automated bin;

figure 7C is a schematic view of a second variant of the covering of the automated bin;

figure 8 is a front view of a waste emptying system comprising a plurality of automated bins, in which each automated bin is according to the present invention.

[0032] In the various figures, similar parts will be indicated with the same numerical references.

Detailed description

[0033] Figure 1 shows an automated bin for emptying waste, indicated with the numerical reference 1.

[0034] Said automated bin 1 comprises:

- a container or collector 10,
- at least one sensor S1, ..., Sn, connected to said container 10, for detecting at least one filling parameter of said container 10,

- a logic control unit U, operatively connected to said at least one sensor S1, ..., Sn,
- power supply means 15, connected to said at least one sensor S1, ..., Sn and to said logic control unit U, for supplying electrical energy to said at least one sensor S1, ..., Sn and to said logic control unit U, and
- transceiving means 17, connected to said logic control unit U, wherein said transceiving means 17 can be connected, by a telematic communication network T, to a central unit CU.

Structure of the automated bin

[0035] In the present embodiment said container 10 of said bin 1 has the shape of a parallelepiped.

[0036] However, the shape of said container 10 can be different the shape mentioned above, without departing from the scope of protection of the present invention. By way of example, said container 10 can have a cylindrical shape.

[0037] Furthermore, the capacity of the container 10 can be between 660 and 2,400 litres, with the most widespread use of 1,100L. The total load supported by such a container 10 can be between 300 and 800 kg.

[0038] In an embodiment, the container 10 has a height between 1.20 and 1.50 m, with one or more inlet openings or inlet mouths 100 provided with one or more cut-resistant gaskets. The dimensions of each inlet opening can be: 133cm x36cm, or two circular inlet openings 100 of 45cm x26cm or 2cm x30cm, or a hopper front inlet opening 109cm x26cm, according to the required dimensions, different for the type of waste material. In an embodiment, said inlet openings 100 are present on two sides of the container 10.

[0039] The maximum internal volume of the container, and, therefore, the maximum weight when loaded, can be proportional to the type of compactor lorry intended to pick up the automated bin and to the gripping member with which said compactor lorry is provided.

[0040] Below, for the sake of brevity, the term "compactor" can be used to indicate a compactor lorry.

[0041] In particular, the container 10 comprises one or more covers 100A for covering a respective inlet opening. The covers 100A allow the container 10 to be watertight, and prevent insects and other animals from entering said container 10, as well as preventing the escape of bad odours. Furthermore, the upper outer surface of the container 10 can be tilted or rounded to prevent waste from being stably rested on said surface.

[0042] In more detail, the covers 100A can be provided with moving means (not shown in the figures) for being moved automatically. In such a case, the movement means are connected to the power supply means 15 and can comprise position sensors for detecting the approach of a user or his hands near the inlet openings 100. For safety reasons, the closure of the bin 1 is performed by means of shock absorbers, so that the closing occurs with a slow movement.

[0043] The covers 100A can be double hinged doors, inner and outer, controlled with geared motorisations and shock absorbers, complete with response sensors to the commands received, such as for example a microswitch, for the definition of the position.

Supporting and moving assembly

[0044] With particular reference to figures 1-2C, the automated bin 1 comprises a supporting and moving assembly 2 associated with said container 10.

[0045] As will be described in detail below, said supporting and moving assembly 2 is intended to be coupled, in use, to a gripping member O of a vehicle, such as for example a compactor lorry (not shown in the figures), so that said container 10 is moved by said vehicle in order to be emptied.

[0046] In particular, said supporting and moving assembly 2 allows the vehicle to pick up/release said container 10 from/in a housing structure 11 described below.

[0047] Said supporting and moving assembly 2 comprises a hooking/unhooking member 20 for hooking/unhooking said container 10 and a switching device 23 connected to said logic control unit U. Said hooking/unhooking member comprises three pins or mushrooms.

[0048] Said hooking/unhooking member 20 comprises a first pin 200 intended to be coupled, in use, to a hooking lever or hooking fork O2 of said gripping member O of the compactor lorry, and a second pin 201, fixed to said first pin 200.

[0049] As can be seen from figure 2D, said pins 200, 201 are capable of sliding, in use, in a cylinder O1 of said gripping member O, connected to said hooking lever O2, for eliminating the oscillations of the container 10.

[0050] Therefore, said second pin 201, solidly constrained to said first pin 200, allows to stabilize said container 10, during the movement of said container 10.

[0051] Said hooking/unhooking member 20 also comprises a rod 21 that extends along the direction of a Z axis of an XYZ Cartesian reference system. As can be seen from figures 1, 2A and 2B, said rod 21 has one end connected to said switching device 23.

[0052] Furthermore, said hooking/unhooking member 20 comprises a third pin or actuating pin 202 connected to another end of said rod 21 and free to slide, in use, in said gripping member O.

[0053] In the embodiment described, said first pin 200 and said second pin 201 are made as a single hollow central body 200, 201.

[0054] However, in other embodiments, the shape and structure of said first pin 200 and of said second pin 201 can be different from the shape and structure described above.

[0055] Said hooking/unhooking member 20 further comprises elastic means 22. For example, said elastic means comprise a cylindrical compression spring or the like.

[0056] Said elastic means 22 are arranged around said

rod 21 to facilitate its repositioning in the original resting position, following the pressure exerted on said third pin 202 by an element (not shown in the figures) of the gripping member O.

[0057] Furthermore, as better described below, said third pin 202 can act, when pressed by the gripping member O of the compactor lorry, on said switching device 23 following a specific opening command, coming from the compactor lorry, for opening said container 10.

[0058] As anticipated, the hooking/unhooking member 20 is shaped to be hooked by the gripping member O of the compactor lorry, such as a pick-up arm or the like. Consequently, the gripping member O of the compactor lorry is shaped to be hooked to the hooking/unhooking member 20 of the bin 1.

[0059] In particular, the gripping member O of the compactor lorry is capable of acting on said third pin 202, which, in turn, actuates said switching device 23. Said switching device 23 can be a microswitch, a relay or any mechanical, electrical, pneumatic or hydraulic device designed to open or close an electrical circuit.

[0060] In particular, in the embodiment described, said switching device 23 is a microswitch.

[0061] Said switching device 23 is configured to switch from a first status or non-operating status and a second status or operating status and vice versa.

[0062] As will be better described below, when said switching device 23 is in said first status, said logic control unit U does not control the opening of said container 10. When, on the other hand, said switching device 23 is in said second status, said logic control unit U controls the opening of said container 10 to allow to unload the waste.

[0063] In addition, in the embodiment described, said rod 21 is slidably movable inside said central body 200, 201 between a first position or resting position, in which it does not actuate said switching device 23, and a second position or operating position, in which it actuates said switching device 23, so that the latter switches its status.

[0064] In the collection step, the bin 1 is isolated from the power supply (in fact, the container 10 is separated from the housing structure 11). Therefore, said bin must be provided with one or more buffer batteries to provide energy to the electric components of the automated bin which need to be powered.

Opening/closing group

[0065] With reference to figures 3, 3A-3E and 4A-6B, said automated bin 1 comprises an opening/closing group 14 for opening/closing said container 10.

[0066] In particular, said opening/closing group 14 comprises a first unloading door 140, a first motor M1 operatively connected to said first unloading door 140, a second unloading door 141 and a second motor M2 operatively connected to said second unloading door 141.

[0067] In the embodiment described, each unloading door 140, 141 comprises a respective recess to be arranged around a main rod A1.

[0068] Said main rod A1 is arranged inside said container 10 and is parallel or substantially parallel to the direction of said Z axis of the Cartesian reference system XYZ, in a central area of said container 10.

[0069] In particular, as can be seen from figure 3E, said main rod A1 is hollow and is intended to be coupled, in use, to a repositioning pin A12 of said housing structure 11.

[0070] In the embodiment described, said main rod A1 has a first end A1' connected to said container 10 and a second end A1" connected to a secondary rod.

[0071] Said secondary rod extends along the direction of an X axis of said XYZ Cartesian reference system, or it is perpendicular or substantially perpendicular to said main rod A1, and is connected to the internal surface of said container 10 so as to reinforce the structure of said container 10.

[0072] Furthermore, as will be better explained below, two slots or seats A10, A11 are obtained on said second end A1" of said main rod A1 for housing respective electric locks E0, E1 of said unloading doors 140, 141.

[0073] Each unloading door 140, 141 is capable of passing from a first position or closed position, in which each unloading door 140, 141 is arranged on a plane parallel or substantially parallel to an XY plane of said XYZ Cartesian reference system and does not allow waste to be unloaded, to a second position or open position, in which each unloading door 140, 141 is arranged on a plane parallel or substantially parallel to a YZ plane of said XYZ Cartesian reference system (i.e., a plane perpendicular or substantially perpendicular to said XY plane) and allows waste to be unloaded.

[0074] In particular, the first unloading door 140 is fixed, by means of a first hinge (not shown in the figures), to a first side L1 of said container 10, so as to pass from said closed position to said open position by means of a rotation around a first rotation axis A2, along which said first hinge is arranged.

[0075] Similarly, the second unloading door 141 is fixed, by means of a second hinge (not shown in the figures), to a second side L2 of said container 10, opposite to said first side L1, so as to pass from said closed position to said open position by means of a rotation around a second rotation axis A3, along which said second hinge is arranged.

[0076] Each rotation axis A2, A3 is parallel or substantially parallel to the direction of said Y axis of the Cartesian reference system XYZ, and, therefore, perpendicular or substantially perpendicular to said main rod A1.

[0077] Furthermore, said motors M1, M2 are connected to said logic control unit U, which, in turn, is powered by a power supply board Ali provided with at least one battery Bat. In particular, figure 3A shows the connection terminal A+ for connecting the power supply board Ali to the logic control unit U and a terminal Msp for connecting said logic control unit U to the motors M1, M2. The logic control unit U is connected to the power supply board Ali. Said power supply board receives a voltage from the ter-

minal G of a secondary winding of a transformer.

[0078] Said power supply board Ali rectifies and stabilizes the electronic current by means of one or more further switching devices (not shown).

[0079] As can be seen from figures 3A-3E, each unloading door 140, 141 comprises a respective electric lock E0, E1 solidly constrained thereto and insertable in the respective slot A10, A11 of said central rod A1.

[0080] In particular, when each electric lock E0, E1 is housed in the respective slot A10, A11, each unloading door 140, 141 is locked in a respective closed position. Therefore, the container 10 is closed.

[0081] When each electric lock E0, E1 is not housed in the respective slot A10, A11, each unloading door 140, 141 is in a respective open position. Therefore, said container 10 is open (in other words, the unloading doors 140, 141 of said container 1 are open).

[0082] In an embodiment, each slot A10, A11 is made by dowels in plastic material, such as for example polytetrafluoroethylene (PTFE or Teflon), for reducing the stresses associated to the opening and closing of each unloading door 140, 141. However, each slot A10, A11 can be made differently from what has been described above. For example, each slot A10, A11 can be made by means of rotating elements or bearings.

[0083] After the container 10 of the automated bin 1 has been picked up by the gripping member O of the compactor lorry, the electric locks E0, E1 are controlled by the logic control unit U, which reads the status of said switching device 23, to open the unloading doors 140, 141 and allow the waste unloading step.

[0084] The energy provided by said one or more buffer batteries powers said logic control unit U, said switching device 23 and said electric locks E0, E1.

[0085] More in detail, the gripping member O of the compactor lorry actuates said third pin 202 of said hooking/unhooking member 20, held by the spring 22, pressing on said third pin 202.

[0086] Subsequently, said actuated third pin 202 acts on the underlying switching device 23, which in turn switches its status from said first status to said second status.

[0087] Said logic control unit U reads said status of said switching device 23 and thus generates an opening command of the electric locks E0, E1.

[0088] As described below, opening said electric locks E0, E1 allows to move said unloading doors 140, 141 from said closed position to said open position to unload the waste present inside said container 10 inside a compactor lorry.

[0089] Figure 4A shows an electrical circuit for opening an electric lock E0, E1.

[0090] Each electric lock E0, E1, comprises a respective internal resistor Ri.

[0091] The resistance of said internal resistor Ri has a value of some Ohms, based on the type and power of the electric lock E0, E1.

[0092] Although a single circuit is shown for both elec-

tric locks E0, E1, the automated bin 1 comprises a respective electrical circuit for each electric lock E0, E1.

[0093] Each electric lock E0, E1 is opened by an electric current pulse, generated by the unloading of a respective capacitor C.

[0094] The capacitor C is chosen so as to generate, while discharging, an electric current value capable of opening the respective electric lock E0, E1 based on the type of electric lock itself.

[0095] The aim is to open each unloading door 140, 141 in the shortest possible time. Consequently, the higher the electric current value, the less time will be necessary for opening the doors.

[0096] Said electrical circuit comprises a power supply A+, a voltage switch SW, a resistor R, as well as a switch I₁ connected with the electric lock E0, E1 (which as mentioned comprises a respective internal resistor Ri).

[0097] The voltage switch SW brings the supply voltage to a value of about 40V and generates an electric current that charges the capacitor C through said resistor R.

[0098] The switch I₁ is also connected to said logic control unit U and is controlled by a control signal cl₁ sent by said logic control unit U.

[0099] The principle is as follows: the capacitor C slowly charges by means of a reduced-value electric current which is generated by the voltage switch SW and crosses the resistor R and discharges quickly, on the internal resistor Ri of the electric lock E0, E1.

[0100] A high electric current, of the order of several tens of Ampere, reaches the electric lock E0, E1 and is sufficient for overcoming mechanical inertia and opening said lock.

[0101] By way of example, in the specific example, the electric lock E0, E1 is a 30W electric lock, supplied by a 12V direct current voltage and has an internal resistance of 1 Ω.

[0102] The capacitor C is a 50V isolated capacitor and the capacity is equal to 1,000 μF.

[0103] The resistor R has a resistance equal to 1,000 Ω. In this case, the time constant for charging the capacitor is equal to 1s.

[0104] In particular, the capacitor C can be discharged with an electric current with a peak of tens of Ampere with an average value of 8 ÷ 10A for times of the order of 300 μs, compatible with the sizing of an electric lock.

[0105] In this case, the time constant for discharging the capacitor is equal to 1ms.

[0106] In said further electrical circuit with the reference "Mser", a terminal is indicated for connecting the electric lock E0, E1 to the capacitor C4, through a first pole of the terminal Mser, and to the switch I₁, through a second pole.

[0107] Figure 4B shows a graph related to the discharging process of said capacitor C over time.

[0108] The dashed area represents the energy accumulated during the charging step of the capacitor C, and then used in the discharging step.

[0109] The graph shows the exponential trend of the discharging of the capacitor that up to the time t* uses all the accumulated energy, provided in terms of electric current, sufficient for safely opening the electric lock.

[0110] Figure 4C shows a further electrical circuit for opening an electric lock E0, E1.

[0111] In this further electrical circuit, a capacitor C3 and a capacitor C4 are arranged parallel. Consequently, the capacitor that charges and discharges to open the electric lock E0, E1 is the capacitor obtained from the parallel between said capacitor C3 and said capacitor C4.

[0112] The electric current with which said capacitor is charged is the electric current that flows in the resistor R7

[0113] Advantageously, it is possible to use more than two capacitors arranged in parallel to obtain a high electric current.

[0114] In said further electrical circuit with the reference "Mser", a terminal is indicated for connecting the electric lock E0, E1 to the capacitor C4, through a first pole of the terminal Mser, and to the switch I₁, through a second pole.

[0115] Furthermore, in said further electrical circuit, with the reference "Tes", a voltage generator is indicated for generating a test voltage for charging said capacitors C3, C4 used to verify correct operation. Said test voltage Tes is read by the logic control unit U.

[0116] A voltage switch SW provides a voltage of 40V. Such a voltage switch can be made in several ways. Furthermore, said voltage switch can take an F0 fuse (which is a resettable fuse) in order to limit any excess electric current if a fault requires a constantly charging electric current over time.

[0117] In said further electrical circuit, the control signal cl₁ sent by the logic control unit U to the switch I₁ leads to the conduction of a transistor TIP142 that grounds the second pole of the terminal Mser, allowing the application of a voltage at the ends of said electric lock E0, E1. The switch I₁ comprises a resistor R8 and a resistor R9 that adjust the voltage and therefore the electric current that flows in the transistor TIP142 and protect the base of the transistor itself.

Moving the unloading doors

[0118] Figures 5A-5C show an embodiment of the moving mechanisms of the unloading doors 140, 141.

[0119] The unloading doors 140, 141 can be moved by a respective motor M1, M2, preferably an electric motor. Using the motors M1, M2, it is possible to return the unloading doors to the closed position.

[0120] Each of said motors can work with a respective reducer so as to adapt speed and power and the limit stop will occur with the switching device 23.

[0121] Figure 5A shows the first unloading door 140 and the second unloading door rotating around the respective rotation axis A2 towards a plane Sa.

[0122] As mentioned, the motors M1, M2 cause a rotation of the unloading doors 140, 141 around the respec-

tive rotation axes A2, A3 to bring said unloading doors 140, 141 in the closed position. The closing step of said unloading doors 10, 141 ends with the closing of the electric locks E0, E1.

[0123] In an embodiment of the present invention, to reduce the stress of the motors M1, M2 and, therefore, the energy used for closing said unloading doors, each of said unloading doors 140, 141 can comprise two parts, respectively: a first part and a second part which extends from an end of said first part and forms a 90° angle with said first part.

[0124] In particular, in each second part a respective rack Cre is arranged that can be moved with a respective gearwheel motor MRd.

[0125] The displacement of the application point of the force from the hinge point to the position of the rack Cre, indicated with Bra, builds the lever for a strong reduction of the moment of the active force, of the movement of the unloading doors 140, 141.

[0126] Thereby, the unloading doors 140, 141 are moved when closing using a reduced energy. In fact, the bin 1 is electrically active since the buffer batteries are in use.

Non-motorized unloading doors

[0127] In an embodiment, the closing command of the unloading doors 140, 141 can be provided by said logic control unit by reading one or more pairs of LEDs Lt-Lr, arranged between said housing structure 11 and said container 10.

[0128] Each pair of LEDs comprises a first LED or transmitter LED Lt for transmitting a light radiation and a second LED or receiver LED Lr for receiving said light radiation.

[0129] Said second LED Lr can be of phototransistor type, in particular infrared phototransistor.

[0130] In particular, in the step of repositioning the automated bin 1, the container 10 must be correctly positioned inside the housing structure 11. Accordingly, it is necessary to acquire information on the position of the container 10 with respect to the housing structure 11.

[0131] The second LED is capable of detecting the position of said container with respect to said housing structure on the basis of the light radiation emitted by said first LED and received by said second LED.

[0132] The logic control unit U is configured to acquire the information related to the position of the container (with respect to the housing structure) by means of said second LED and start the process of closing the unloading doors 140, 141.

[0133] In another embodiment, the bin 1 can be free of motors and the unloading doors 140, 141 can be shaped so as to be closed when the container 10 is inserted in the housing structure 11, as represented in figure 6A.

[0134] The hinge point of the unloading doors 140, 141 is indicated with the reference letter d.

[0135] Furthermore, to ensure the closure of the unloading doors 140, 141, the external surface of said unloading doors 140, 141 can be provided with elastic means c.

[0136] Such elastic means c allow to cushion the impacts between said unloading doors 140, 141 and said housing structure 11 during the passage of said unloading doors 140, 141 from said open position to said closed position.

[0137] Although not shown in the figures, said bin 1 can comprise detection means for detecting the closure of said unloading doors 140, 141 and the logic control unit U is connected to said detection means and configured to acquire information on the closing status of the unloading doors. Furthermore, the correct positioning of the container 10 within the housing structure 11 can be verified by the correct coupling between the main rod A1 and the repositioning pin A12 and by the passage of energy to supply said automated bin 1.

[0138] As can be seen from figure 6B, in an embodiment, the housing structure 11 can be provided with receiving structures f1, f2 for facilitating the insertion of the container in the housing structure, such as for example one or more chutes having a surface shaped to facilitate the sliding of said unloading doors 140, 141 towards the base 110 of the housing structure 11.

[0139] Said receiving structures f1, f2 are made of a material chosen to minimize the friction force between each unloading door 140, 141 and said receiving structures f1, f2.

[0140] In an embodiment, said receiving structures f1, f2 are made of Teflon. However, in other embodiments of the present invention, the material of said receiving structures f1, f2 can be different from Teflon.

[0141] In particular, figure 6B shows a pair of LEDs Lt, Lr for signalling the correct position of the container 10 with respect to the housing structure 11.

[0142] Although not shown in the figures, a plurality of pairs of LEDs Lt, Lr can be present.

[0143] The first LED Lt is arranged on the base 110 of the housing structure 11 and said second LED Lr is arranged on the second end A1" of the main rod A1. The position of the container 10 with respect to the housing structure 11 can be visually communicated by means of a LED lamp to an operator.

[0144] Said first LED Lt is capable of emitting light radiation towards said second LED Lr and said second LED Lr is capable of detecting the position of said container 10 with respect to said housing structure 11 on the basis of the light radiation emitted by said first LED Lt and received by said second LED.

Repositioning the container in the housing structure

[0145] The repositioning of the container 10 in the housing structure 11 occurs in two steps.

[0146] The first step relates to the restoration of the resting position of said unloading doors 140, 141.

[0147] This occurs by means of the actuation of the two motors M1, M2 controlled by the logic control unit U and connected to a terminal Msp of said logic control unit U. By means of the motors M1, M2, each unloading door 140, 141 rotates around a respective rotation axis A2, A3.

[0148] In an embodiment, said motors M1, M2 provide for the movement of said unloading doors 140, 141, up to the click of the electric locks E0, E1 (each of which is solidly constrained to a respective unloading door), so that each unloading door 140, 141 is in the resting position with the electric locks E0, E1 inserted in the respective slots A10, A11.

[0149] The start time for closing the unloading doors 140, 141 can be timed.

[0150] As mentioned, said switching device 23 is actuated by said third pin 202 of said hooking/unhooking member 20 moved by the pick-up arm of the compactor lorry.

[0151] In an embodiment, the status of said switching device 23 is read by the logic control unit U.

[0152] In another embodiment, the waste emptying mode can be initiated by an operator, for example by means of a remote control (e.g., a radio frequency remote control or an infrared remote control) for communicating with the logic control unit U.

[0153] The second step relates to the positioning of the container 10 in its original position within the housing structure 11.

[0154] As mentioned, the main rod A1 is intended to receive a repositioning pin A12, arranged on the base 110 of the housing structure 11.

[0155] For example, said repositioning pin can have a conical or pyramidal shape and said main rod A1 can have an end portion shaped to be coupled to said repositioning pin A12.

[0156] In general, said main rod A1 can be provided with male/female coupling means and said housing structure 11 can be provided with female/male coupling means.

[0157] In other words, the main rod A1 and the repositioning pin A12 are shaped for obtaining a shape coupling.

The covering

[0158] With reference to figure 7A, the bin 1 comprises a covering or coating 18 for reducing the action of sunlight on said container 10.

[0159] Said covering 18 has an opening 180 to allow the passage of said hooking/unhooking member 20.

[0160] Furthermore, said covering 18 is spaced (by means of one or more spacers) from the upper surface of said container 10 so as to create a space between the covering 18 and the upper surface of the container 10 to allow a passage of an air flow Flu in said space.

[0161] In another embodiment, as seen in figure 7C, said covering 18 comprises a plurality of covering elements.

[0162] Said covering elements 18A are independent of each other and are called "thermal shields".

[0163] Advantageously, such covering elements are made by means of a metallic or insulating material, of a white colour to reflect sunlight. Furthermore, said plurality of covering elements allows the upper external surface of said container 10 to be circularly and entirely covered.

[0164] However, in other embodiments, the shape and material of said covering elements can be different from the shape and material described above, respectively.

[0165] In a further embodiment, as seen from figure 7B, one or more mechanical heat sinks Dis for dissipating heat are connected on the lower surface of the covering 18.

[0166] As mentioned, the bin 1 comprises a logic control unit U. Such a logic control unit U can be arranged on an electronic board having all the terminals dedicated to the actuation or data reading services, coming from the devices used in the automation functions.

[0167] In particular, in an embodiment, the electronic components are arranged inside the container 10, preferably in the upper part of said container 10. Furthermore, the box 1 comprises at least one fan (not shown in the figures), connected to the logic control unit U, for cooling one or more electrical or electronic circuits.

[0168] As can be seen from figure 1, in the embodiment described, said automated bin 1 comprises a base 12, on which a housing structure 11 is supported and mechanically connected. The housing structure 11 is shaped and sized to at least partially contain said container 10.

[0169] Said housing structure 11 is fixed to the base 12. Furthermore, the housing structure 11 can comprise a side opening for facilitating the emptying of the container 10.

[0170] The housing structure 11 can be provided with one or more manual buttons and at least one pedal for opening one or more covers 100A.

[0171] As will be better described in the following, said base 12 allows to position several automated bins 1 thereon.

[0172] In the present embodiment, said base 12 has a longitudinal extension along the direction of said axis X and a thickness of about 10-25 cm. However, the shape and dimensions of said base 12 can be different from that described, without departing from the scope of protection of the present invention.

[0173] In the embodiment described, the housing structure 11 is 1/3 to 2/3 the height of the container 10, so that any waste outside the bin 1 does not prevent the repositioning of the container 10 inside the housing structure 11.

[0174] In fact, the height of the housing structure 11 between 1/3 and 2/3 of the height of the container 10 allows to prevent the incorrectly deposited waste such as, for example, waste deposited outside the container 10, from affecting the insertion of the container 10 inside the housing structure 11.

[0175] The housing structure 11 also has the function of a heat shield since it is insulated.

[0176] In addition, in the present embodiment, the automated bin 1 comprises one or more signalling devices 102 such as, for example, one or more signalling LEDs arranged on said container 10, preferably in the upper part of said container 10.

[0177] Such signalling devices are capable of providing data and/or information on the filling, operation, efficiency/inefficiency, maintenance and alarms related to the status of the automated bin 1.

[0178] However, in other embodiments, the type and position of said signalling devices 102 can be different from that described. For example, the signalling devices can be positioned on the housing structure 11. When the signalling devices are signalling LEDs, said signalling LEDs can also be used as night lights.

[0179] In addition, the automated bin 1 can be provided with one or more receivers for voice commands, instructions and voice signals. The allocation of said receivers will be on the container 10 or on the housing structure 11, according to the automated bin model or needs.

[0180] Furthermore, said automated bin 1 comprises one or more electromechanical devices such as, for example, one or more hand or foot buttons to push by hand or by foot, one or more RFID readers (transponders), one or more electronic key readers, one or more body approach sensors or one or more hand sensors, and one or more further signalling devices (not shown in the figures).

[0181] In an embodiment, said housing structure 11 can be fixed and have a height such as to avoid obstruction in the manoeuvres for the removal of any waste on the ground.

[0182] One or more buttons, one or more sensors, a screen and one or more electronic devices can be arranged on the housing structure 11 and/or on the container 10.

[0183] Alternatively, the bin 1 can be designed to be partially or totally underground.

[0184] The base 12 can be stable and anti-slip, to provide the bin 1 with a power of the order of kW, in wireless mode.

[0185] In addition, the bin will have a suitable structure for being assembled, transported, inspected, performing ordinary or extraordinary maintenance and cleaning.

[0186] The choice of the material(s) with which to make the bin must take into account the actions of acids, moulds, etc. and the fact that it must be cleaned periodically.

Power supply means

[0187] As mentioned, the power supply means 15 are capable of providing electrical energy to said automated bin 1.

[0188] In an embodiment of the present invention, said power supply means 15 comprise a transformer 15.

Therefore, the transfer of electrical energy occurs wirelessly, by means of induction from a transformer.

[0189] However, in other embodiments, said power supply means 15 can comprise two or more transformers.

[0190] Said transformer 15 comprises two supports: a first support or first sheet 150 and a second support or second sheet 152.

[0191] In a first example, said first support can be "E" shaped and said second support can be "I" shaped for closing the magnetic flux generated by the first support.

[0192] In a second example, said second support 152 can be "E" shaped and opposite the first shaped support 150 (also "E" shaped).

[0193] In particular, the first support 150 supports the primary winding of the transformer and the second support 152 of the transformer supports the secondary winding. The primary winding is arranged on an inner wall of the housing structure 11 while the secondary winding is arranged on a wall of the container 10 facing said inner wall.

[0194] The two supports 150, 152 are facing and opposite each other and allow the magnetic circulation of the flux generated by the primary winding and linked to the secondary winding, allowing an energy transfer.

[0195] The energy transferred will be a function of the distance or air gap 154 between the two supports 150, 152.

[0196] Applying a voltage of 50Hz to the primary winding, by means of the first terminal or first clamp 151, the voltage necessary for the electromechanical and electronic components of the automated bin 1 on the second terminal or second clamp 153 of the secondary winding is obtained.

[0197] The dimensions of the transformer and the section of the windings depend on the amount of electric current required. The voltage level will still be below the limits of human safety.

[0198] The power supply means 15 can be connected, in addition to the power supply board Ali and to the logic control unit U, also to chargers, to motor means, such as for example jacks or actuators, as well as to electronic boards and electronic sensors, electronic controls, indicators, display devices, etc.

[0199] Naturally, in an embodiment, said power supply means 15 comprise a plurality of transformers 15, according to the needs of the automated bin 1.

[0200] However, the solution just described, with the use of ferrosilicon, is not particularly advantageous since the losses are high and the yield is poor. For example, with a 1mm air gap, the yield is less than 60%.

[0201] In the light of the foregoing, the most suitable solution for the purpose of the present invention is carried out.

[0202] In particular, a greater yield is obtained using working frequencies between 30kHz and 60kHz, since at such working frequencies, the losses due to the dispersed magnetic flux are reduced. There will be a strong reduction in the size of the devices, keeping the power

at a certain level, with a good yield.

[0203] In this case, ferrosilicon supports or sheets cannot be used due to the considerable losses, but an MnZn ferrite sheet must be used for each support of the transformer (i.e., each sheet), with high permeability, high saturation, low power losses. Such material is extremely useful for various electronic applications. Thereby a safe, repeatable and inexpensive approach is obtained.

Sensors

[0204] The sensors S1,...,Sn shown in figure 1 can comprise a weight sensor for weighing the waste inserted in said container 10.

[0205] Furthermore, said sensors S1,...,Sn can comprise a plurality of position sensors arranged inside the container 10 for detecting the level of waste filling in the container 10.

[0206] Such a measurement can then be transmitted to a central unit CU for the management of the compactor lorries.

[0207] In addition, one or more temperature sensors of the PTC or NTC type or other can be located at respective points of the bin 1. In particular, the temperature values detected by each temperature sensor are acquired by the logic control unit U by means of suitable interfaces and said temperature values will be managed by dedicated software.

[0208] For example, by means of said one or more temperature sensors it is possible to detect the maximum value and/or the minimum value of the temperature of the waste inside the container 10 by means of the logic control unit U. Such temperature values can be used as parameters indicative of the conservation status of the waste to verify the need for emptying the container 10.

[0209] The temperature values can be acquired by the central unit CU for the centralized management of the bins 1 to be emptied. Said temperature values can be displayed on a display. Accordingly, the logic control unit can send said temperature values to said display.

[0210] A value of the ambient temperature can also be detected by means of a further temperature sensor and acquired by said logic control unit U.

[0211] The ambient temperature value can also be displayed on said display. Accordingly, the logic control unit can also send said value referring to the ambient temperature to said display.

[0212] Each bin 1 can comprise one or more geolocation devices or GPS modules.

[0213] In particular, such GPS modules are capable of providing a data group comprising time, date, latitude, longitude and altitude and recording said data group for a predetermined time period. Such data can be sent to the central unit CU, for mapping and programming the emptying of the container 10.

Memory means

[0214] Said bin 1 comprises memory means 16. Such memory means 16, connected to said logic control unit U, allow to store a predetermined threshold for each filling parameter detected by said sensors S1,...,Sn.

[0215] Said memory means can comprise one or more memories.

[0216] In particular, a large amount of data can be stored in said memory means 16, such as, for example, elements referable to users, for the management of reports related to refunds, transit memory of the technical data to be transmitted outside of real time, such as filling of the bins or maintenance elements.

[0217] In an embodiment, said memory means 16 are arranged in a part of the bin 1 accessible only by an operator.

[0218] Furthermore, a reader of multiple memories can be allocated inside the container 10, also in an area easily reachable by said operator.

[0219] In the present embodiment, said reader is an interface reader or board.

[0220] The memory SD is read by the interface board and connected to the logic control unit U, which, with an adequate video interface, will provide all the information requested by the video screens.

System for emptying waste

[0221] With reference to figure 8, a system is shown bin for emptying waste, indicated with the numerical reference 3. Said system comprises a plurality of automated bins 1 for collecting and emptying waste and a supply column or pole or tower 30 connected to each automated bin 1. Said power supply means 15 are arranged inside the supply column 30 and connected to the bin 1.

[0222] The supply column is connected to the base 12 on which said plurality of automated bins are positioned.

[0223] The power from the supply column 30 arrives at the base 12 by means of a standard, low voltage connection.

[0224] The supply column 30 has the function similar to those of the car charging type.

[0225] In particular, there is a wired energy connection from the supply column 30 to the housing structure 11 for transferring energy, while between the housing structure 11 and the container 10 there is a wireless connection, with a "transformer" type, in which a first half of the transformer (comprising a primary winding) is on the housing structure 11 and a second half of the transformer (comprising a secondary winding) is on the container 10, with a minimization of the possible air gap. Furthermore, powers of the order of kW can be used.

[0226] The supply column 30 can be provided with one or more video surveillance cameras for monitoring an area around said base 12 and/or one or more light sources. Said supply column 30 can also comprise a contactless card reader, one or more buttons to be pressed with

a hand and with a foot, one or more level indicators, one or more displays, one or more recognition systems, etc.

[0227] Each bin 1 is provided with a Bluetooth module RNn therein, for example RN4870, which can communicate with a Bluetooth module Rnc of the supply column 30. Furthermore, the supply column 20 is provided with a further logic control unit configured to receive the data processed and transmitted by each logic control unit U of each bin 1.

[0228] Figure 8 also shows further Bluetooth modules RNn', which can be contained in the housing structure 11 of a respective bin 1.

[0229] In such a case, the Bluetooth modules RNn of each bin 1 will be interfaced to the Bluetooth modules RNn' of a respective housing structure 11. Said further Bluetooth modules RNn' will exchange data with the Bluetooth module Rnc of the supply column 30.

[0230] Such further Bluetooth modules RNn' allow to improve the data exchange between the supply column 30 and each bin 1, ..., 1n, even at considerable distances.

[0231] It will be the task of the supply column 20 to exchange data, for example through an internet connection, with the central unit CU, which governs the entire system 3. By way of example, such communication can occur with the current WiFi 802.11ac standard.

[0232] The supply means 15 are connected to the supply network (not shown in the figures) and to the base 12. The connection between said supply column 30 and said bin 1 can be underground or protected.

[0233] Furthermore, the supply column 30 can be provided with one or more solar panels for providing further energy to supply the electronic components of the automated bin 1. The bin 1 can also comprise one or more solar panels.

[0234] If the supply column 30 is not present, and the activities of the bin 1 are supported by the solar panel system, also reducing or rarefying the chosen functions over time, all the activities provided for the supply column 30 can be transferred directly to the 1 bin.

[0235] Furthermore, the supply column 30 can contain the connectivity elements to the internet for the connection to the central unit CU, and to the bins 1 in Bluetooth, for the data exchange of all the programmed functions, as already indicated.

Fans

[0236] In addition, the bin 1 can comprise one or more fans, each of which is positioned in a respective point of the bin 1, for example to cool a respective electric or electronic circuit.

[0237] Each fan is controlled by the logic control unit U by means of a respective electric switch. Said electric switch can be a relay, in particular a solid-state relay.

Connectivity

[0238] To connect the various devices or parts of the

electronic circuits to each other, according to needs, it is possible to use a Bluetooth connection (for example an RN4870 board) or a WiFi connection or one or more RS485 communication protocols or one or more MBus communication protocols, if the peripheral devices are not provided with supply means.

[0239] The MBus protocol allows to use two electric wires of any type, even if not intertwined. Unlike the RS485 communication protocol, the consumption of electric current will be practically negligible since the consumption of electric current is distributed over time. Small and constant recharges of the devices occur during the pulses of the transceiver.

[0240] The use of the RS485 communication protocol allows to place several devices which use the same communication protocol on the same bus, so as to allow the communication between said devices.

Advantages

[0241] A first advantage of the automated bin for emptying waste object of the invention is optimizing the operations of picking up waste from the bin and repositioning the bin, after emptying the waste, as well as facilitating the emptying of waste by a compactor lorry.

[0242] The bin is configured to be hooked by a compactor lorry and released (when the waste has been ejected from the bin) from said compactor lorry in its original position, i.e., in the position prior to the picking up operation by a compactor lorry.

[0243] A further advantage of the automated bin for emptying waste according to the present invention is using the same power supply before the bin is picked up to be emptied and after the bin has been emptied and repositioned inside the housing structure.

[0244] Another advantage of the automated bin for emptying waste is given by the possibility of ensuring operating continuity even when the automated bin is separated from a power supply network or, for example, when the supply of electrical energy undergoes an interruption.

[0245] A further advantage is the possibility of signalling the filling level of the automated bin, so as to allow a management of the emptying of the bins (by means of compactor lorries) based on the respective filling level and optimizing the route of said compactor lorries.

[0246] The present invention has been described, in an illustrative but nonlimiting manner, according to preferred embodiments thereof, but it is to be understood that variations and/or modifications may be made by those skilled in the art without thereby exiting from the relative scope of protection, as defined by the attached claims.

Claims

1. Automated bin (1) for emptying waste, comprising:

- a container (10) having an opening (100) for inserting waste,
- a logic control unit (U),
- a supporting and moving assembly (2), associated with said container (10), wherein said supporting and moving assembly (2) is intended to be coupled to a gripping member (O) of a compactor and the like, so as to move it,
- an opening/closing group (14) of said container (10), connected to said logic control unit (U),

wherein said supporting and moving assembly (2) comprises:

- a switching device (23), connected to said logic control unit (U) and configured for switching between a non-operating and an operating status; and
- a hooking/unhooking member (20) comprising:

- a rod (21) having an end connected to said switching device (23);
- an actuating pin (202) connected to another end of said rod (21);

wherein, when said actuating pin (202) is pressed by said gripping member (O):

- said actuating pin (202) actuates, by means of said rod (21), said switching device (23), so as to switch its status from said non-operating status to said operating status; and
- said logic control unit (U) reads said operating status of said switching device (23) and opens said container (10), by means of said opening/closing group (14), for emptying waste.

2. Automated bin (1) according to the preceding claim, wherein said hooking/unhooking member (20) comprises a first pin (200) intended to be coupled to said gripping member (O) and a second pin (201), fixed to said first pin (200), wherein said pins (200, 201) are slidably movable on said gripping member (O) for stabilizing said container (10) during its movement.

3. Automated bin (1) according to the preceding claim, wherein

- said pins (200, 201) are hollow,
- wherein
- said rod (21) is slidably movable within said pins (200, 201) between a resting position, in which it does not actuate said switching device (23), and an operating position, in which actuates said switching device (23) so that said switching device (23) switches its status, and
- wherein said automated bin (1) comprises elas-

tic means (22) arranged around said rod (21) for facilitating the passage of said rod (21) from said operating position to said resting position.

4. Automated bin (1) according to any one of the preceding claims, wherein

said automated bin (1) comprises a main rod (A1) fixed to said container (10), said main rod (A1) being hollow, and wherein

said automated bin (1) comprises a housing structure (11) for housing said container (10), wherein said housing structure (11) comprises a repositioning pin (A12), wherein said main rod (A1) is intended to be coupled, in use, to said repositioning pin (A12).

5. Automated bin (1) according to the preceding claim, wherein

said container (10) has a first side (L1) and a second side (L2), opposite to said first side (L1), wherein said opening/closing group (14) comprises:

- a first unloading door (140) fixed to said first side (L1) by means of a first hinge arranged along a first rotation axis (A2), and
- a second unloading door (141) fixed to said second side (L2) by means of a second hinge arranged along a second rotation axis (A3),

wherein

each rotation axes (A2, A3) is perpendicular to said main rod (A1), and

wherein

each unloading door (140, 141) is capable of passing from a closed position in which it does not allow waste to be unloaded to an open position in which it allows waste to be unloaded by means of a respective rotation around said rotation axes (A2, A3).

6. Automated bin (1) according to the preceding claim, wherein

said first unloading door (140) comprises a first electric lock (E0) and said second unloading door (141) comprises a second electric lock (E1), and wherein said main rod (A1) has one end (A1') and another end (A1'') on which a first slot (A10) and a second slot (A11) are obtained, so that, when each electric lock (E0, E1) is housed in the respective slot (A10, A11), each

unloading door (140, 141) is locked in said closing position.

7. Automated bin (1) according to the preceding claim, **characterized in that** each slot (A10, A11) is realized by means of polytetrafluoroethylene (PTFE) for reducing the stresses associated to the opening and closing of each unloading door (140, 141) by means of said respective electric locks (E0, E1).

8. Automated bin (1) according to any one of claims 5-7, wherein

said opening/closing group (14) comprises a first motor (M1) operatively connected to said first unloading door (140) and a second motor (M2) operatively connected to said second unloading door (141),
wherein

said motors (M1, M2) are connected to said logic control unit (U) and are capable of moving said unloading doors (140, 141) around said rotation axes (A2, A3) between said opening position and said closing position and vice versa, respectively.

9. Automated bin (1) according to any one of claims 4-8, wherein

said housing structure (11) has a base (110),
and
wherein

each unloading door (140, 141) comprises elastic means (c) positioned on the external surface of said unloading doors (140, 141) and intended to reduce the impact between said unloading doors (140, 141) and said base (e) during the moving of said container (10).

10. Automated bin (1) according to the preceding claim, wherein

said housing structure (11) comprises a first receiving structure (f1) for facilitating the sliding of said first unloading door (140) towards said base (110) and a second receiving structure (f1) for facilitating the sliding of said second unloading door (141) towards said base (110), and
wherein

said automated bin (1) comprises a first LED (Lt) arranged on said base (110) and a second LED (Lr) arranged on said end (A1") of said main rod (A1),
wherein

said first LED (Lt) is capable of emitting light radiation towards said LED (Lr) and a second LED (Lr) is capable of detecting the position of said container (10) with respect to said housing struc-

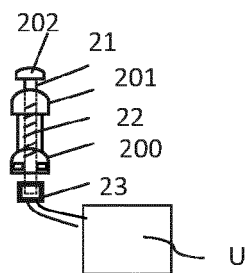
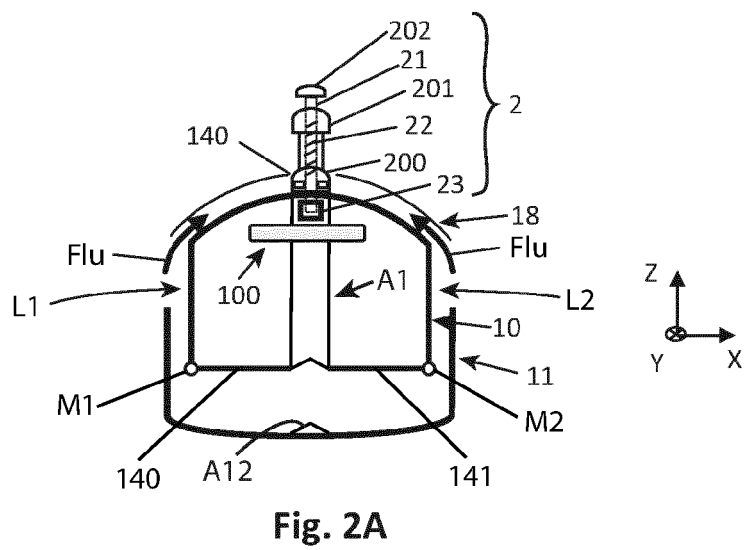
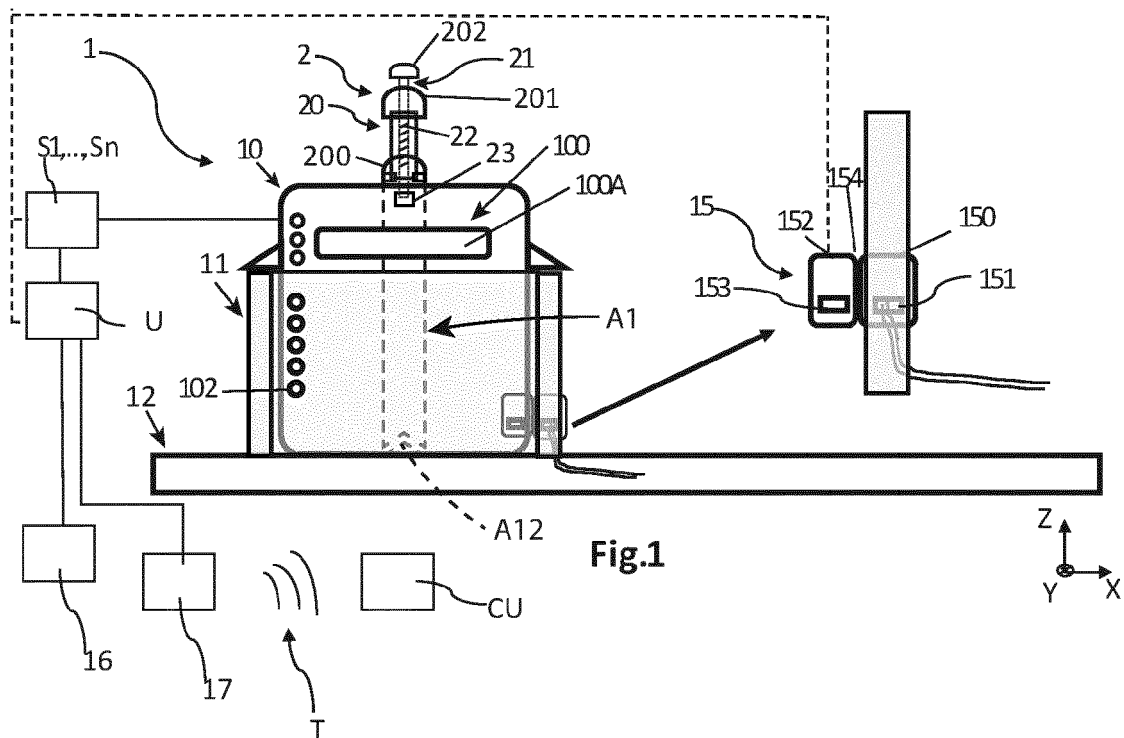
ture (11) on the basis of the light radiation emitted by said first LED (Lt) and received by said second LED (Lr).

11. Automated bin (1) according to any one of the preceding claims, wherein said automated bin (1) comprises power supply means (Ali) connected to said logic control unit (U), wherein said power supply means (Ali) comprise at least one battery (Bat) for supplying electrical energy to said logic control unit (U).

12. Automated bin (1) according to any one of the preceding claims, wherein said automated bin (1) comprises a covering (18) that can be coupled to said container (10) for reducing the action of sunlight on said container (10), wherein said covering (18) has an opening (180) in correspondence with said hooking/unhooking member (20), allowing the passage of an air flow (Flu) around said container (10).

13. System (3) for emptying waste, comprising:

- at least one first automated bin (1) for emptying waste according to any one of claims 1-12,
- at least one second automated bin (1) for emptying waste according to any one of claims 1-12,
- a supply column (30) connected to said at least one first automated bin (1) and said at least one second automated bin (1), wherein said supply column (30) is capable of supplying electrical energy to said at least one first automated bin (1) and said at least one second automated bin (1).



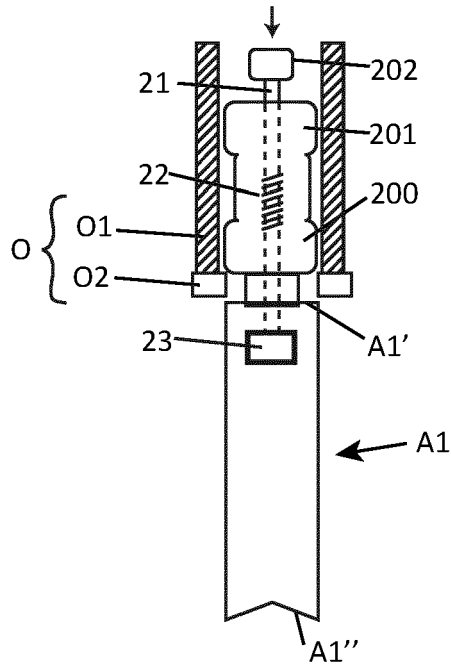


Fig. 2C

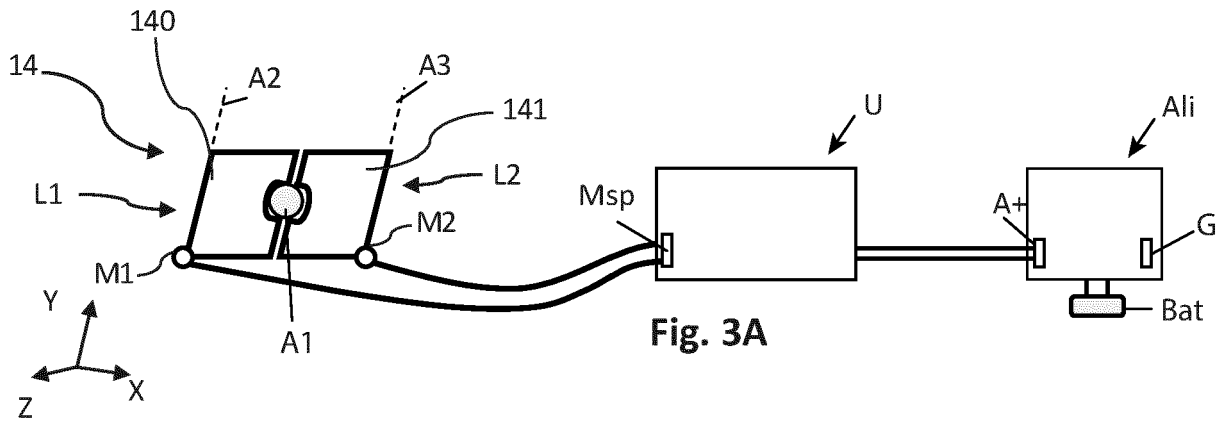


Fig. 3A

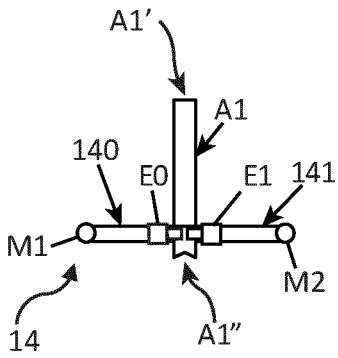


Fig. 3B

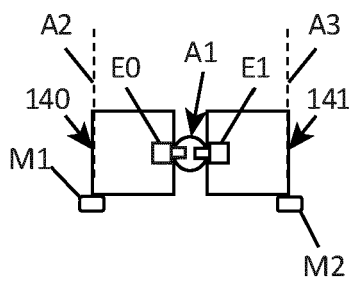


Fig. 3C

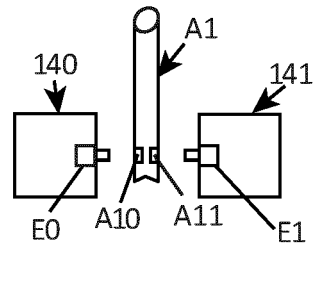


Fig. 3D

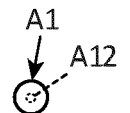
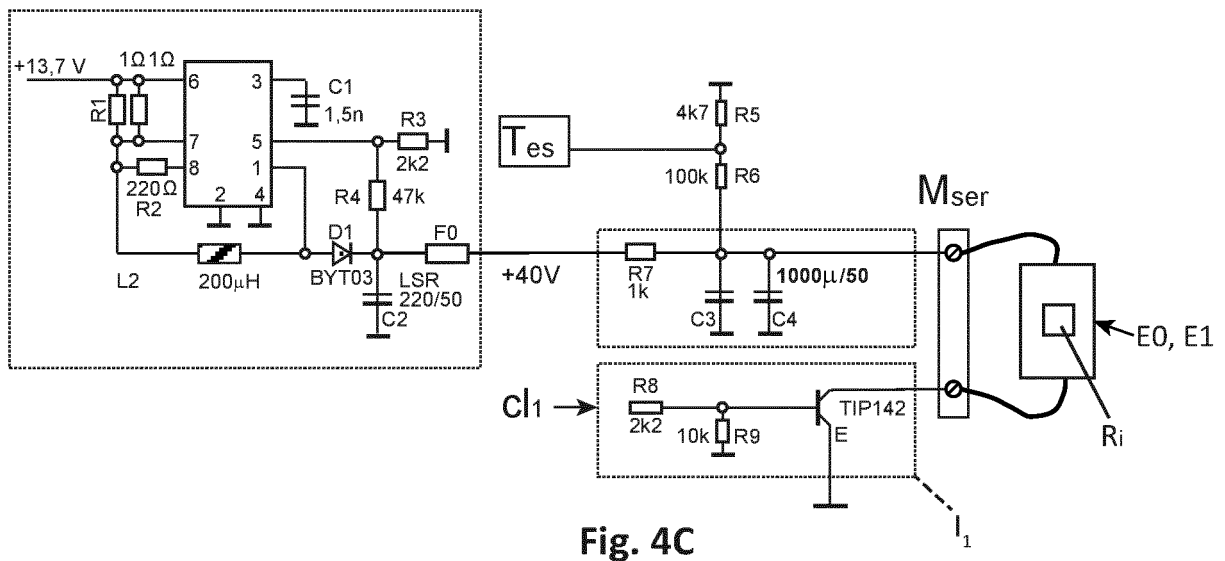
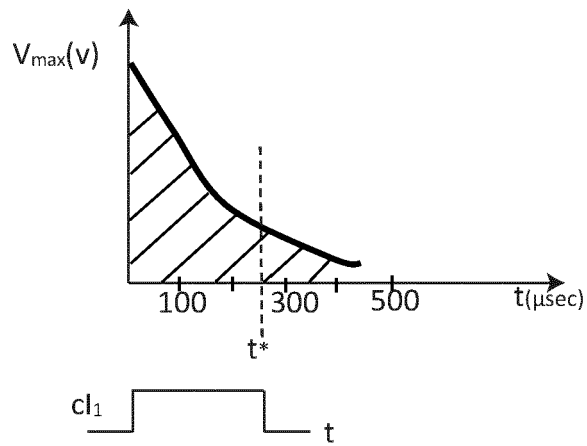
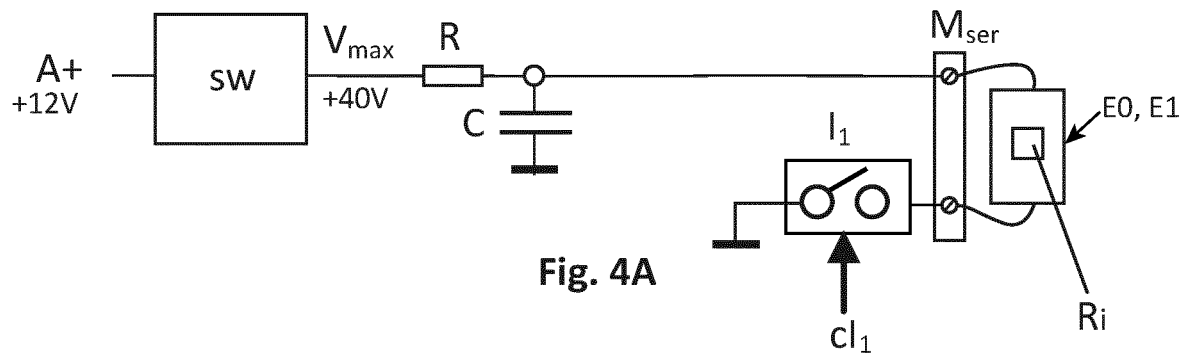


Fig. 3E



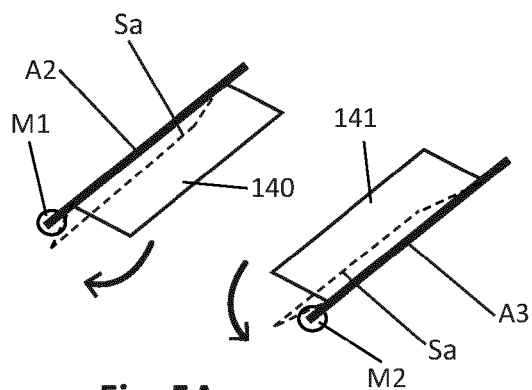


Fig. 5A

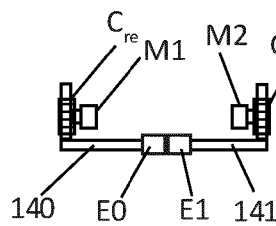


Fig. 5B

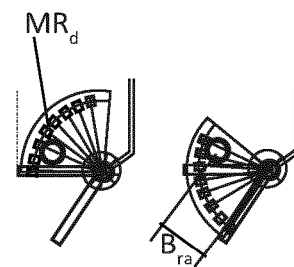


Fig. 5C

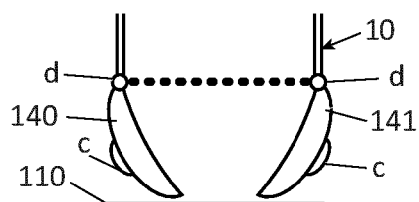


Fig. 6A

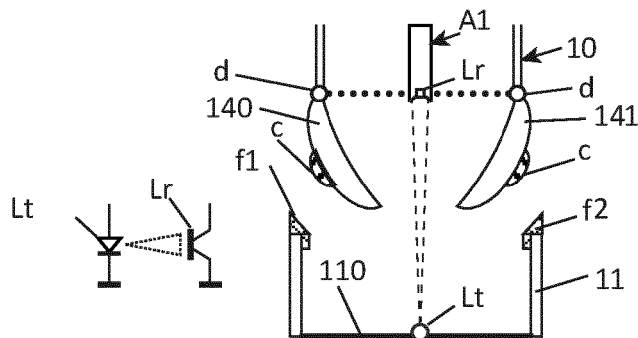


Fig. 6B

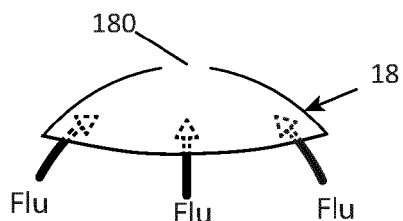


Fig. 7A



Fig. 7B

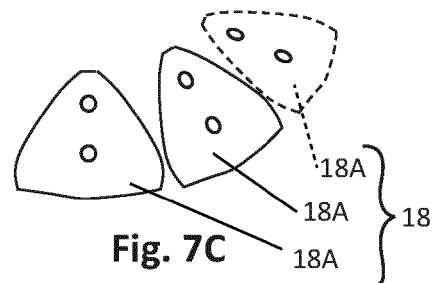


Fig. 7C

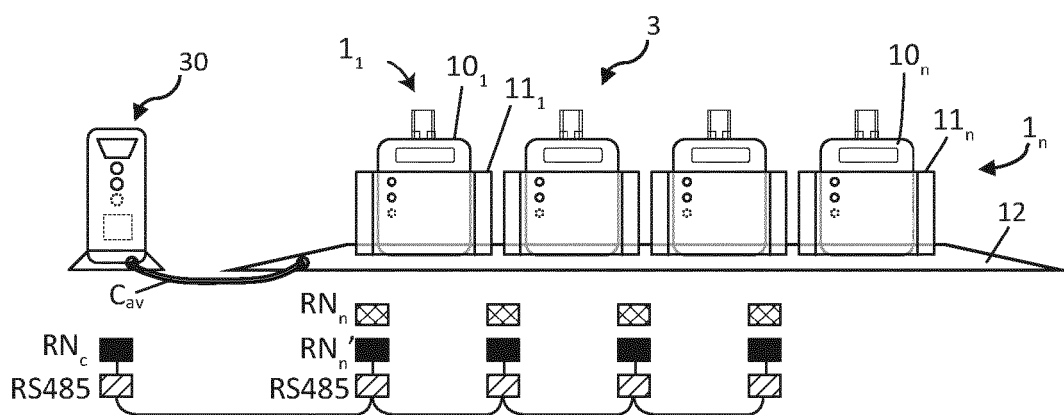


Fig. 8



EUROPEAN SEARCH REPORT

Application Number

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A	* figures 2A, 2B *	4-13	
A	DE 296 06 619 U1 (KLOETZER WIELAND DIPL ING [DE]) 8 August 1996 (1996-08-08) * figure 1 *	1	
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			B65F
Place of search		Date of completion of the search	Examiner
The Hague		1 December 2022	de Miscault, 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			

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