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(54) REFUSE COLLECTION VEHICLE COMPRISING A CONTROL PANEL WITH BUTTONS

(57) The refuse collection vehicle lifting device (5) comprises actuators for performing actions related to the lifting device; a control panel (30) provided with multiple buttons (31) for invoking the actions, and multiple lights (32); and a controller configured to control the actuators. Each light is associated with one button and provided next to this button. The control panel sends an actuation signal to the controller upon actuating a said button. The controller generates, depending on the actuation signal received, control signals transmitted to the actuator systems associated to the button actuated. The controller generates and transmits to the control panel an information signal associated to one or more of the button(s) and containing information about the action operated with these respective button(s). The control panel drives the light(s) associated to these one or more buttons to emit a lightening characteristic depending on the information in the information signal.

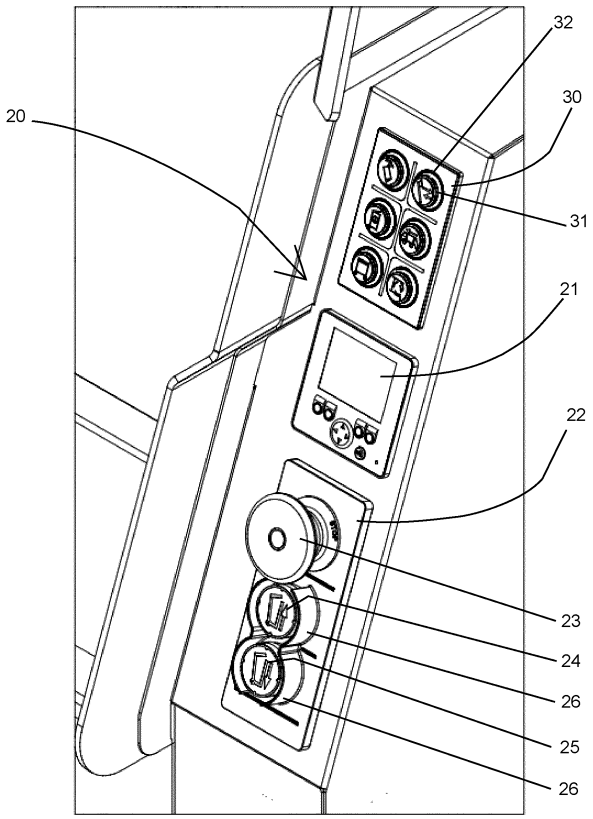

Fig 4

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Description

FIELD OF THE INVENTION

[0001] The invention relates to the field of refuse collection, in particular to refuse collection vehicles .

BACKGROUND OF THE INVENTION

[0002] The present invention relates to refuse collection, in particular to a refuse collection vehicle comprising a control panel with buttons. In general, refuse collection vehicles, like the ones according to the invention, are operated by one or more operators accompanying the vehicle on foot while there is a driver in the cab driving the vehicle. The operators take the refuse bins offered along the road and empty them into the collection body provided on the refuse collection vehicle. Once the collection body is full, the refuse collection vehicle drives to a refuse collection station to empty the collection body, after which the refuse collection vehicle is ready again for collecting refuse that is offered along the road.

[0003] These type of refuse collection vehicles typically offer a number of functionalities for refuse collection, such as the lifting of the refuse bins and tilting them for emptying into the collection body on the vehicle, shaking of refuse bins to facilitate emptying them into the collection body of the vehicle, and transporting and/or compacting of refuse in the collection body. These operations are performed by a plurality of actuator systems provided on the vehicle and are typically invoked by the operators by pushing buttons that are located on the vehicle. The buttons are electrically connected to an actuator of the refuse collection vehicle and their pressing results in activation of a respective actuator. Operators can get an idea of the process of the operation that is being performed by the refuse vehicle by watching its behaviour; for example, seeing the refuse bin be lifted, shaken a number of times, and returned to its original (ground-level) location. This manner of getting an idea of the process of operation is not reliable and may easily result in false perceptions, due to which lifting device is operated inefficient and from time to time errors in the operation of the lifting device may occur. Further, if an erroneous situation occurs it is for the operator not easy to determine whether this is due to incorrect operation of the buttons or due to another error, such as for example an object being stuck in the lifting device. It may further be difficult for the operator to diagnose the error. It may further be difficult for the operator to view the status of an operation or to view information related to the process of the operation.

SUMMARY OF THE INVENTION

[0004] It is an object of the invention to provide an improved refuse collection vehicle. It is a further object of the invention to provide a refuse collection vehicle overcoming one or more of the above problems.

[0005] In a first aspect of the invention, one or more of the above objects are achieved by providing a refuse collection vehicle, wherein the vehicle comprises

- a chassis,
- a driver's cab provided on the chassis, at the front of the chassis,
- a collection body for collecting refuse, provided on the chassis, behind the diver's cab, and
- a lifting device;

wherein the lifting device comprises actuator systems configured for performing actions related to a lifting device, such as one or more of:

- moving the lifting device from a transport condition to a working condition, or vice versa,
- gripping one or more refuse bins at a reception location,
- lifting the gripped refuse bin(s),
- emptying the lifted refuse bin(s),
- transferring refuse, emptied from the bins, into the collection body,
- lowering the emptied refuse bin(s) back to the reception location, and
- releasing the gripped bin(s) at the ground level;

wherein the vehicle further comprises:

- a control panel provided with:
  - a number of buttons - such as a multiple of buttons - for invoking the actions, and
  - a number of lights - such as a multiple of lights -,

  each button being associated with a said action, and each light being associated with one of the buttons;
- and

wherein the vehicle is characterized, in that each light is associated with one of the buttons and provided next to its associated button, in that the controller and control panel are configured for transferring actuating signals from the control panel to the controller and information signals from the controller to the control panel, in that the control panel is configured to generate and send a said actuation signal to the controller upon actuating a said button, which actuation signal is representative for and optionally may depend the button actuated, in that the controller is configured to generate, depending on the actuation signal received, control signals and to transmit the control signals to one or more of the actuator systems associated to the button actuated for controlling these actuator systems; in that the controller is configured to generate and transmit a said information signal to the control panel, which information

signal is associated to one or more of the button(s) and contains information about the action operated with these respective button(s); and in that the control panel is configured to drive the light(s) associated to these one or more buttons to emit a lightening characteristic, which characteristic depends on the information in the information signal.

[0006] In a second aspect of the invention, one or more of the above objects are achieved by providing a lifting device for a refuse collection vehicle, wherein the lifting device comprises:

- actuator systems configured for performing actions related to the lifting device, such as one or more of:
  - moving the lifting device from a transport condition to a working condition, or vice versa,
  - gripping one or more refuse bins at a reception location,
  - lifting the gripped refuse bin(s),
  - emptying the lifted refuse bin(s),
  - transferring refuse, emptied from the bins, into the collection body,
  - lowering the emptied refuse bin(s) back to the reception location, and
  - releasing the gripped bin(s) at ground level;
- a control panel provided with:
  - a number of buttons - such a multiple of buttons - for invoking the actions, and
  - a number of lights - such as a multiple of lights -,

  each button being associated with a said action;
- a controller configured to control the actuator systems; and

  wherein the lifting device is characterized, in that each light is associated with one of the buttons and provided next to the associated button; in that the controller and control panel are configured for transferring signals between each other; in that the control panel is configured to send an actuation signal to the controller upon actuating a said button, which actuation signal is representative for and optionally may depends the button actuated; in that the controller is configured to generate, depending on the actuation signal received, control signals and to transmit the control signals to one or more of the actuator systems associated to the button actuated for controlling these actuator systems; in that the controller is configured to generate and transmit an information signal to the control panel, which information signal is associated to one or more of the button(s) and contains information about the action operated with these respective button(s); and in that the control panel is configured to drive the light(s) associated to these one or more buttons to emit a lightening characteristic which depends on the information in the information signal.

[0007] According to both aspects of the invention, the number of buttons and number of lights may be any number, like one, two, three, four, five, six, seven, eight, nine, ten etcetera. The number of lights may be the same as the number of buttons.

[0008] The controller may according to both aspects of the invention comprise a multiple of sub-controllers, for example one sub-controller for each action to be performed by the lifting device and/or for each actuator to be controlled.

[0009] In relation to a signal, the term 'contain', 'contains', 'containing', etcetera, is - in both aspects of the invention - used non-limitative in relation to the content of the information signal. For example in case of 'the information signal containing information about the status of some action', the information signal may contain other information of any type as well.

[0010] In case of a rear loader the lifting device may be provided at the rear of the chassis with the collection body arranged between the lifting device and the driver's cab. In case of a side-loader the lifting device may be provided at the right and/or left side of the chassis.

[0011] In both aspects of the invention, the term button used in this application comprises a type of control button or control knob suitable for operation by a refuse collection operator. Taking into account that these operators usually carry gloves, buttons subjected to a movement when operated - such as push-buttons, turning-knobs, rocker-buttons - may be most suitable.

[0012] In both aspects of the invention, the buttons are used by the operator(s) for invoking and/or setting of lifting device operations associated to the respective button(s). Further, the controller is configured to send one information signal (or more information signals) to the control panel. This information signal contains information about the action associated to the respective buttons of the control panel. Each button is associated with a light or a combination of lights. Each light is configured to emit an illumination characteristic, which informs the operator about the action associated to the button. An illumination characteristic may be a colour, a light intensity, a light pattern, etcetera.

[0013] According to a further embodiment of the first and second aspect of the invention, one or more of these lights, such as all these lights, may be configured to emit a plurality of illumination characteristics, such as colour, light intensity, light pattern, etcetera. The illumination characteristic emitted by such a light then may depend on the information contained in the information signal.

[0014] With the vehicle according to the first aspect of the invention and the lifting device according to second aspect of the invention, the light next to each button on the control panel for operating the actions gives the operator of the lifting device visual information - in the form of an illumination characteristic - about the action asso-

ciated to each respective button. As this visual information originates from the controller controlling the actions of the lifting device and is visible next to each button on the panel, this visual information is easily accessible for the operator of the lifting device and assists the operator in better and more efficient operating the actions. The operator(s) can receive feedback on the process of an operation that was invoked by actuating a button associated to said operation by observing the illumination characteristic of the light associated to said button. For example, a green light may convey to the operator that the process is being successfully executed, while a red light may convey to the operator that an error occurred during the process.

[0015] According to a further embodiment of the first and second aspect of the invention, the controller further is configured:

- to determine, in response to receipt of a said actuation signal from a said actuated button, whether the actuator system associated to the actuated button is available for performing an said action, and subsequently
- to generate and transmit,
    - in case the controller determined that the action associated to the actuated button is available,
        - the control signal to the actuator system associated with the actuated button, and
        - a confirmative said information signal to the control panel,
          or
    - in case the controller determined that the actuator system associated to the actuated button is not available, a refusing said information signal to the control panel;

wherein the control panel is configured to drive, upon receipt of the information signal, the light associated to the actuated button to emit a confirmative illumination characteristic in case the information signal is confirmative or to emit a refusing illumination characteristic in case the information signal is refusing, the confirmative and refusing illumination characteristic being mutually different. This provides the operator of the lifting device feedback on whether the action he intended to invoke by actuating the button will be carried out or not and also ensures the operator that the controller received the actuation signal. This reduces errors or inefficiencies in the operation of the lifting device. It also prevents unnecessary continued actuation of the buttons - as happens with prior art refuse collection vehicles - because the operator does not see any process starting, which may result in the button mechanism getting damaged and malfunctioning.

[0016] According to a further embodiment of the first and second aspect of the invention - called the different manners of actuating embodiment -, one or more of said buttons are configured for being actuated in more than one manner; and the controller is further configured to determine the manner of actuation and to generate the information signal to contain information about the manner of actuation. The control panel being configured to drives the light associated to the button operated in different manners, then emits a lightening characteristic depending on the manner in which the button has been actuated. The operator than receives feedback allowing the operator to be sure that the intended manner of actuating the button has been performed correctly. For example , in case of a button for adjusting the number of times that the bin is shaken for emptying, this allows the operator to know that the correct number of shaking has been entered.

[0017] According to a further embodiment of 'different manners of actuation' embodiment according to the first and second aspect of the invention, the controller may be configured for accepting a chronological series of said actuation signals from a said actuated button; and may be configured to determine from the chronological series of actuation signal(s) the manner of actuating the button and to generate the information signal to contain information about the chronological series of said activation signals.

[0018] According to another further embodiment of 'different manners of actuation' embodiment according to the first and second aspect of the invention, the control panel may be configured to generate the actuation signal to contain further information representative for the manner of actuating the button. This may for example be achieved by means of a multi-position button, such as a multi-position rotary knob or multi-position rocker button.

[0019] According to another further embodiment of the first and second aspect of the invention, the controller is configured to generate the information signal to contain information about the progress of one or more action(s). The control panel being configured to drives the light associated to the button in different manners, then emits a lightening characteristic depending on the progress of the action associated to the button or a lightening characteristic indicating that the action is in progress, like the busy sign of the windows ® operating system - its turning (arrow) wheel - indicating that a process is busy.

[0020] According to another further embodiment of the first and second aspect of the invention, the controller is configured to generate the information signal to contain information about a setting associated to one or more action(s) associated to a said button. This setting may for example be a pre-programmed setting or otherwise a setting determined by something else but associated to a action associated to a said button. The operator then is informed about the setting avoiding unnecessary ac-

tuation actions.

[0021] According to another further embodiment of the first and second aspect of the invention, the control panel is further configured to drive, upon receipt of the information signal, the light associated to the actuated button to emit, depending on the information contained in the information signal, different illumination characteristics. The difference in illumination characteristics may for example be a difference in colour - for example red versus green, white, or any other colour -, a difference in intensity, a difference in pattern - for example a continuous pattern (like a continuous line) versus a discontinuous pattern (like a discrete line) -, a difference over time - for example a continuous signal versus a blinking signal -, etcetera.

[0022] According to another further embodiment of the first and second aspect of the invention, the light of one or more of said buttons is subdivided into light segments, such as 2, 3, 4 or more segments, the light segments being configured to be operated, by the control panel in dependence of the information signal, in mutually different manner. For example, the more segments emit light, the further the progress of the action associated to the button is. These segments may according to a further embodiment of this embodiment be arranged in a line, such as a line with two ends or a ring-shaped line.

[0023] According to another further embodiment of the first and second aspect of the invention, wherein the light of one or more of said buttons is a ring-shaped light extending outside and around the associated button. Ring-shaped may according to the invention a continuous or discontinuous ring of ring segments separated by a small but visible distance. Ring-shaped may according to the invention be any circular, oval, square, rectangular, polygonal or other shape having a closed - continuous or discontinuous - loop configuration. According to a further embodiment of this embodiment, the ring-shape of a light may correspond to the circumferential shape of the associated button around which the ring-shaped light is arranged. The association between a ring-shaped light and the button around which it is provided is easily recognisable without errors. Further a ring-shaped light may be better visible as also during actuation of the respective button or other buttons as it is less likely to be fully obstructed by the hand or fingers of the operator. According to another further embodiment of this embodiment, a spacing is provided between the ring-shaped light and its associated button. A spacing positions the ring-shaped light at some distance from the button surrounded by the ring-shaped light, which further improves its visibility.

[0024] According to another further embodiment of the first and second aspect of the invention, one or more of said lights is/are configured to emit light of different colours - such as red, green, blue, yellow, white, or any mixture of one or more of these colours - depending on the information signal received.

[0025] According to another further embodiment of the first and second aspect of the invention,
the control panel is configured to drive the light associated to one or more or all the buttons in flashing manner. A flashing light, for example a red flashing light. will in general draw the attention of the operator more efficiently, making a flashing light useful for warning purposes.

[0026] According to another further embodiment of the first and second aspect of the invention, the controller is configured to transmit a warning signal, associated to one or more of the lights, to the control panel in case of:

- dysfunction or malfunctioning of a said action performed by one or more actuator systems associated to the button(/s) to which the respective light(/s) is(/are) associated, or
- an emergency stop of the lifting device; and

wherein the control panel is configured to drive the respective lights to emit a warning illumination characteristic. The warning illumination characteristic may for example be the respective light emitting red light in flashing manner.

[0027] According to another further embodiment of the first and second aspect of the invention, the controller is configured to transmit an emergency signal to the control panel associated to all lights in case of a severe malfunctioning of the vehicle or part of the vehicle, and
wherein the control panel is configured to drive all the lights to emit an emergency illumination characteristic, such as emitting a red colour in flashing manner.

[0028] According to another further embodiment of the first and second aspect of the invention, the lifting device comprises:

- a left lifting device and a right lifting device; and
- two said control panels, one being arranged at the left side of the lifting device and the other being arranged at the right side of the lifting device;

wherein each button on one of the two control panels has a corresponding button on the other of the two control panels to provide paired buttons; wherein, in a paired mode of use, the right and left lifting device are operated as one unit, and, in a non-paired mode of use, the right and left lifting device are operated independently from one another by the right control panel respectively the left control panel; and wherein the controller is configured to transmit, in the paired mode of use, signals for one or more of the paired buttons simultaneously to both the control panels. Providing a button panel on the left side and on the right side, allows two operators to use the lifting device for two bins to be emptied at the about the same time and both having adequate feedback information from the controller by means of illumination characteristics. Then in a mode for emptying two relatively smaller bins at about the same time, i) buttons associated with the lifting and emptying actions of one bin may during such mode of operation not be connected in a paired

configuration to similar buttons associated with lifting and emptying the other bin so that they receive information signals from the controller which belong to either the button on the right or the button on the left panel, whilst ii) buttons associated to actions involving the entire lifting device instead of only an action of the left or right part of the lifting device are connected in paired configuration. However, in a mode for emptying a relatively large, wide bin requiring use of the left and right part of the lifting device, each button on the right panel may be paired with a corresponding button on the left panel.

[0029] According to another further embodiment of the first and second aspect of the invention, the controller is connected to the control panel(s) by a CAN-bus. CAN stands for Controller Area Network. A CAN-bus is a bus system designed to allow micro-controllers and devices to communicate with each other's applications without a host computer. It is a message-based protocol designed for multiplex electrical wiring. For each device the data in a frame is transmitted sequentially but in such a way that if more than one device transmits at the same time the receivers are able to distinguish between the frames to act on the basis of the frame intended for the respective receiver. Frames are received by all devices, in general including also the transmitting device. A CAN bus system allows to use so to say a single wire connecting all devices instead of requiring a multiple of wire connections for each signal transfer connection to be established.

[0030] According to another further embodiment of the first and second aspect of the invention, the buttons comprise buttons to be subjected to a movement when actuated - such as one or more buttons of the group of buttons comprising: push-buttons, turning-knobs, and/or rocker-buttons.

[0031] According to another further embodiment of the first aspect of the invention, the lifting device is provided at the rear of the chassis with the collection body arranged between the lifting device and the driver's cab.

BRIEF DESCRIPTION OF THE DRAWING

[0032] The invention will be explained further with reference to the drawings. In these drawings:

Figure 1 shows a refuse collection vehicle according to the first aspect of the invention provided with a lifting device according to the second aspect of the invention and depicts the possible movement of its different components.

Figure 2 shows the rear side of the refuse collection vehicle of figure 1, with the lifting device of figure 1 in the inactive (lowermost) position, and a refuse bin ready to be lifted.

Figure 3 shows the rear side of the refuse collection vehicle of figure 1, with the lifting device of figure 1 gripping and lifting a refuse bin, where the lifting device is in its uppermost position with the refuse bin tilted for emptying.

Figure 4 shows the operator panel of the vehicle respectively lifting device of figures 1-3, which operator panel comprises a control panel with a plurality of buttons with associated lights, as well as a display with buttons to operate the display functions and a lower panel with buttons.

Figure 5 shows in more detail the control panel of figure 4.

Figures 6-9 illustrate 4 examples of illumination characteristics which may be emitted by the lights of the control panel of figures 4-5, figure 6 visualizing a ring-shaped green light, figure 7 visualizing a rotating orange light, figure 8 visualizing a ring-shaped red light, and figure 9 visualizing a ring-shaped red flashing light.

Figure 10 shows as a further example of an illumination characteristic how a light, subdivided into four segments can indicate the progress of an action or the number of times a an action will be repeated, figure 10A showing one quadrant emitting light, figure 10B showing two quadrants emitting light, figure 10C showing three quadrants emitting light, and figure 10D showing four quadrants emitting light.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0033] Fig. 1 shows a refuse collection vehicle 1 according to the first aspect of the invention. The vehicle comprises a chassis 2 with four or more wheels, a driver's cab 3, a collection body 4 for collecting refuse, and a lifting device 5 according to the second aspect of the invention. The driver's cab 3 is provided on the chassis 2, at the front of the chassis 2. The collection body 4 for collecting refuse is provided on the chassis 2, behind the diver's cab 3. The lifting device 5 is, in this example, provided at the rear of the chassis with the collection body 4 arranged between the lifting device 5 and the driver's cab 3. A tailgate unit 6 with a hopper 15 is provided, between the lifting device 5 and the collection body 4, for feeding refuse received from emptied bins into the hopper 15 and collection body 4.

[0034] The vehicle 1 is driven by a driver in the driver's cab 3, and stops frequently to collect refuse offered along the road. Refuse comes in many forms, including loose and bulky refuse, refuse collected in bags, and refuse collected in bins of different sizes and comprising a plurality of wheels, typically 2 or 4. Refuse bins - in practise called bins - up to about 400 litres - such as a 60 litres, a 80 litres, a 140 litres, a 240 litres, and a 360 litres refuse bin - have in general two wheels, two corners of the bottom each having one wheel. Refuse bins - in practise in general called containers - from about 500 litres to about 1300 litres - such as 660 litres, 770 litres, and 1100 litres refuse bins - have in general 4 wheels, one at each corner of the bottom. These bins are in practise standardized, at least per region, and the refuse collection vehicles in a region are provided with handling adapters in correspondence with the 'standardized' bins used in that re-

gion. These handling adapters especially concern the so called lifting chair and clamp.

[0035] Referring to the above paragraph, it is noted that that the term 'bin' as used in this application comprises containers as well, in other words the term 'bin' of this application comprises the term 'bin' as used in practise as well as the term 'container' as used in practise.

[0036] The refuse collection vehicle is operated by operators accompanying the vehicle on foot. These operators perform manual tasks, such as moving the containers towards the lifting device, picking up loose and bulky refuse and throwing the refuse in the hopper, etc. They also invoke the operations of the lifting device of the refuse collection vehicle, including gripping one or more refuse bins at a reception location, lifting the gripped refuse bin(s), emptying the lifted refuse bin(s) into the hopper 15, transferring the refuse from the hopper 15 into the collection body 4, lowering the emptied refuse bin(s) back to the reception location, and releasing the gripped bin(s) at ground level. Some or all of these operations may be operated (semi-)automatically by the lifting device of the refuse collection vehicle and require minimal manual intervention of the operators.

[0037] The operations of the lifting device of the refuse collection vehicle are performed by one or more actuator systems, which are controlled by a central control unit (controller). To invoke the operations of the lifting device of the refuse collection vehicle, an operator interface is provided at the lifting device, comprising a plurality of buttons with which the operators can interact. Such buttons may according to the invention comprise one or more of the following: pushbuttons, turning knobs (also called differently like rotary switches), joysticks, rocker-buttons, etc. Interacting with these buttons causes a signal to be sent from the control panel to the controller, which then drives the actuator systems that are responsible for performing the operation.

[0038] Fig. 2 shows the rear side of the refuse collection vehicle of figure 1, with the lifting device 5 in an inactive (lowermost) position, and a refuse bin 7 - in this example 360 litres bin with two wheels - ready to be lifted. To get to this state, the operator has moved the refuse bin into a reception location 9 for the lifting device 5 to be able to grab the refuse bin 7 and lift the bin 7 to empty it. Fig. 3 shows the same rear side of the refuse collection vehicle 1, but now with the lifting device 5 is in its uppermost position with the refuse bin 7 tilted for emptying, In this tilted position the bottom 8 of the refuse bin faces upward as shown in figure 3.

[0039] The lifting device according to the invention comprises actuator systems, such as 10, 11, 12, 13, 14 and 15 as indicated in figure 3. These actuator systems are configured for performing actions, such as one or more of: moving the lifting device 5 from a transport condition to a working condition, or vice versa (actuator system 10), gripping one or more refuse bins at a reception location (actuator systems 13, 14), lifting the gripped refuse bin(s) (actuator systems 11, 12), emptying the lifted refuse bin(s) into the collection body (actuator systems 10, 11, 12), lowering the emptied refuse bin(s) back to the reception location (actuator systems 11, 12), and releasing the gripped bin(s) at the reception location (actuator systems 13, 14).

[0040] The lifting device according to the invention further comprises an operator panel 20, in this example two operator panels 20, one on the left side of the lifting device 5 and one on the right side of the lifting device 5. Figure 1 shows this operator panel 20 with hardly visible details, figures 2 and 3 shows it schematically by a plate, and figure 4 shows the right operator panel enlarged and with details. The left operator panel may be about the same as the right operator panel of figure 4, although the display 21 - see below - with its associated display buttons may be absent in the left operator panel.

[0041] The operator panel 20 comprises an optional display 21, an optional lower panel 22, and - according to the invention - a control panel 30. The display 21 and lower panel 22 are optional in relation to the first and second aspect of the invention, but may be mandatory due to requirements by law or other regulations for refuse collection vehicles.

[0042] The display 21 may be used for resetting errors, setting or adjusting default values for actions to be performed by for example the lifting device.

[0043] The lower panel comprises a red emergency stop button 23 for stopping all actions in case of emergency. The lower panel further comprises an up button 24 for manually starting an upward movement of the lifting device and a down button 25 for manually starting a downward movement of the lifting device. These buttons 24 and 25 are both shielded by a side shield 26 to prevent erroneous use of these buttons.

[0044] The control panel 30 comprises a plurality of push buttons 31 - in this example six push buttons - each with an associated light 32, in this example a ring-shaped light 32 extending outside and around the button 31 associated to it. This control panel 30 of figure 4 is shown on larger scale, more detailed in figure 5.

[0045] Figure 5 shows the six buttons 31 and associated lights 32 more detailed. In figure 5 each of the button 31 and associated light 32 is associated to a different action of the lifting device as picturized on each respective button, these buttons and associated lights are indicated in pairs as 31a and 32a; 31b and 32b; 31c and 32c; 31d and 32d; 31e and 32e; and 31f and 32f.

[0046] As can be seen in figure 5, each light is ring-shaped, in this example each light is a circular ring. Further, it can be seen in figure 5 that each ring-shaped light comprises sectors 34a, 34b, 34c, and 34d separated by a gap of for example 1-3 mm. In this example, each light has four sectors, each sector covering about one quadrant of a circle. It will be clear that one or more lights or all lights may also have fewer - such as one, two or three sectors - and/or more sectors - such as five, six or eight sectors -. Further one or more of the lights or all lights may be configured to emit, depending on how the re-

spective light is driven, one or more different colours. For example the colours red, green and orange may be used. These colours may, in case useful, be supplemented by a white/yellow and blue/purple colour. These lights may be realized by use of LED-lights which can be driven to emit different colours depending on how it is driven. Each sector 34a, 34b, 34c, and 34d of each light 31 may be regarded as a light in itself (or a sub-light) as each sector may be driven to emit independently from the other sectors.

[0047] Figures 6-9 illustrate 4 examples of illumination characteristics which may be emitted by the lights of the control panel of figures 4-5.

[0048] Comparing figures 6, 7 and 8, it is shown that a light 32 is configured for emitting 3 different colours of light. The light grey of figure 7 is assumed to represent the colour orange being emitted by the light 32, the darker grey of figure 6 is assumed to represent the colour green being emitted by the light 32, and the black of figure 8 is assumed to represent the colour red being emitted. For example, red may be used as a warning illumination characteristic, green may be used as an illumination characteristic indicating in use or a setting, and orange may be used for indicating something being in progress.

[0049] Referring to figure 7, the circular arrow 33 itself will in practise not be present but is a visualisation of the orange light of figure 7 being a rotating light, meaning that the quadrants 34a, 34b, 34c and 34d sequentially and from 34a to 34d emit light and do not emit light, so that so to say a quadrant of light (or two quadrants of light) move clockwise around by sequentially emitting and not emitting, which may be repeated a multiple of times. For example starting at quadrant 34a, quadrant 34a emits and quadrants 34b, 34c, 34d do not emit, followed by quadrant 34b emitting and quadrants 34c, 34d, 34a not emitting, followed by quadrant 34c emitting and quadrants 34d, 34a, 34b not emitting, followed by quadrant 34d emitting and quadrants 34a, 34b, 24c not emitting, followed by quadrant 34a emitting and quadrants 34b, 34c, 34d not emitting, etcetera, will create a kind of turning wheel effect. As will be clear, such a turning wheel effect may also be realised with another colour like green or red or purple/blue.

[0050] Referring to figure 9, the with dot-line encircled symbol 35 itself will in practise not be present but is a visualisation of red light of figure 9 being a flashing red light, meaning the light goes repeatedly on and off. As will be clear, such a flashing light effect may also be realised with another colour like green or orange or purple/blue.

[0051] Figure 10 shows as a further example of an illumination characteristic how a light, subdivided into segments, in this example four segments each representing a quadrant of a circle, can indicate the progress of an action or the number of times an action will be repeated. Figure 10A shows that quadrant 34a is emitting light whilst quadrants 34b, 34c and 34d do not emit light, which may for example represent that an action will be done once or that an action is completed for about 25%. Figure 10B shows that quadrants 34a and 34b are emitting light whilst quadrants 34c and 34d do not emit light, which may for example represent that an action will be done twice or that an action is completed for about 50%. Figure 10C shows that quadrants 34a, 34b and 34c are emitting light whilst quadrant 34d does not emit light, which may for example represent that an action will be done three times or that an action is completed for about 75%. Figure 10D shows that all four quadrants 34a, 34b, 34c and 3dc are emitting light, which may for example represent that an action will be done four times or that an action is completed for about 100%. The lights in figure 10 are assumed to be green, but it will be clear that these lights may also be any other colour.

[0052] Now returning to figure 5, the buttons 31a-f and associated lights 32a-f, will be discussed to explain some further examples.

[0053] Button 31a and light 32a are configured for selecting the number of times a bin is shaken when in the uppermost position of figure 3. In case one quadrant emits light, for example green light, this indicates that one time shaking has been selected. In case two quadrants emit light, for example green light, this indicates that two times shaking has been selected. In case three quadrants emit light, for example green light, this indicates that three times shaking has been selected. In case four quadrants emit light, for example green light, this indicates that four times shaking has been selected. The shaking functionality as such is known. The shaking is done when the bin is in its highest position tilted with its bottom facing upwardly, as shown in figure 3. Button 31a may be used to select between one time shaking, two times shaking, three times shaking and four times shaking. For example three times may be selected by pressing the button sequentially three times with in a predetermined period of time.

[0054] Button 31b and light 32b are configured for selecting the correct position for the bin catch. The bin catch position is defined by the comb 18 at the upper end of the so called lifting chair 17 (see figure 1). These may for example have been configured to allow selection between two positions, a 'down' position for 2-wheel bins and small 4-wheel bins and an 'upper' position for large 4-wheel bins. In case of more different catch positions due to more types of bins to de handled, the button 31b and light 32b may be configured for more than 2 catch positions. Here, all quadrants emitting light may represent for example the bin catch being in the low position and no quadrants emitting light may represent the bin catch being in the high position. The lightening characteristic may also be chosen more intuitively by configuring the light 32b such that the light sectors of the two upper quadrants emit when the bin catch is in the high position whilst the lower two quadrants do not emit, and that the light sectors of the two lower quadrants emit when the bin catch is in the low position whilst the upper two quadrants do not emit. The button 31b may be used to switch

between the up and down position of the bin catch, and vice versa.

[0055] Button 31c and light 31c may be configured to select between automatic transport operation and manual transport operation. In case of automatic transport operation, actuator system to move the lifting device between transport condition and working condition is coupled to the gearbox of the vehicle drive. When the gearbox of the vehicle is shifted into neutral, the lifting device is lowered to its working condition. When the gearbox of the vehicle is shifted out of neutral to drive the vehicle, the lifting device is raised to transport position to increase the ground clearance during driving. For example, when in automatic transport operation, the light 31c may be a rotating orange light - as shown in figure 7- to indicate so; and when in manual transport operation, the light may be green - as shown in figure 6 - to indicate that the lifting device is in working condition and the light may optionally be red - as shown in figure 8 - or it may be off to indicate the lifting device is in raised, transport condition. Pressing of the button 31c may be used to switch between the automatic transport operation and the manual transport operation, and vice versa.

[0056] Button 31d and light 31d may be configured for requesting a compaction cycle upon request. For example, the light 31d may be a rotating orange light - as is shown in figure 7 - to indicate that a compaction cycle of for example three seconds is in progress after requesting such a compacting cycle with button 31d, the light 31d may be a green light - as shown in figure 6 - to indicate that a automatically activated compaction cycle is in progress, and the light 31d may be a red flashing light - as shown in figure 9 - to indicate that the lifting devices are stopped due to the compacting mechanism experiencing an obstacle or other malfunctioning.

[0057] Button 31e and light 32e may be configured to select between operation for the smaller 2-wheel bins requiring use of only the right or left part of the lifting device and for the wider 4-wheel bins requiring use of both the left and right part of the lifting device 5. The button 31e may be used to switch between 2-wheel bin operation and 4-wheel been operation and vice versa.

[0058] Button 31f and light 32f are configured for selecting a bin mode, amongst which a bin assist mode. Bin assist means that the upward movement of the lift is activated by means of a proximity sensor, for example an ultrasonic sensor. This sensor sees the bin approaching the comb 18 and starts moving the lifting device, in particular the comb, upwards before the bin touches the comb 18. This results in a smooth pick up of the bin on the comb 18. There may for example be four bin modes:

- a fully manual mode, in which the proximity sensor is not used and in which the lifting device is to be operated manually by means of its up button 24 and down button 25; in fully manual operation the light 32f may for example be off (not emitting) to indicate this condition;
- a manual mode with bin assist, in which the proximity sensor activates the lifting device to raise the comb to a predefined position and in which the lifting device must further be operated by means of the up button 24 and down button 25; the light 32f may for example be an orange rotating light - such as the lightening characteristic of figure 7 - to give feedback, upon pressing the button 31f - that a change of this function is being activated; the upper two quadrants of the light 32f may for example emit orange light whilst the lower two quadrants are off to indicate that this function is in 'manual mode with bin assist'
- an automatic mode for 2-wheel containers, in which the proximity sensor activates the lifting device and in which the bin will automatically make one full lifting cycle comprising first going upwards to the upper position, followed by emptying the bin, and returning the bin to ground level and releasing the bin; the light 32f may for example be an orange rotating light - such as the lightening characteristic of figure 7 - to give feedback, upon pressing the button 31f - that a change of this function is being activated; and all quadrants may emit orange light to indicate that this function is in 'automatic mode for 2-wheel bins;.
- A semi-automatic mode for 4-wheel bins, in which the proximity sensor activates the right and left lifting device to raise the combs and 4-wheel bin to a predetermined position and in which the up button 24 is to be activated next to continue the lifting cycle with going upwards to the upper position, followed by emptying the bin and returning the bin to ground level or slightly - for example 10 cm - above ground level. In case the bin is returned to slightly above ground level, the down button 25 is to be activated to release the 4-wheel container; the light 32f may for example be an orange rotating light - such as the lightening characteristic of figure 7 - to give feedback, upon pressing the button 31f - that a change of this function is being activated; the light 32f may for example be a flashing orange light to indicate that 'the semi-automatic mode for 4-wheel containers is active, and the light may for example be a flashing green light to indicate that the bin is ready for semi-automatic lifting by pushing button 26.

[0059] In case the emergency button 23 has been activated or in case of a severe malfunctioning, the controller may send emergency signals to all quadrants 34a, 34b, 34c and 34d of all lights 32a, 32b, 32c, 32d, 32e, and 32f to drive all these lights to flash in red.

[0060] Embodiments and further embodiments of the present invention may be expressed in words as set out in the following clauses:

Clause 1: Refuse collection vehicle, wherein the vehicle comprises:

- a chassis,

- a driver's cab provided on the chassis, at the front of the chassis,
- a collection body for collecting refuse, provided on the chassis, behind the diver's cab, and
- a lifting device;

wherein the lifting device comprises actuator systems configured for performing actions related to a lifting device or lifting device actions, such as one or more of:

- moving the lifting device from a transport condition to a working condition, or vice versa,
- gripping one or more refuse bins at a reception location,
- lifting the gripped refuse bin(s),
- emptying the lifted refuse bin(s),
- transferring refuse, emptied from the bins, into the collection body,
- lowering the emptied refuse bin(s) back to the reception location, and
- releasing the gripped bin(s) at ground level;

wherein the vehicle further comprises:

- a control panel provided with:
  - a number of buttons for invoking the actions, and
  - a number of lights,

  each button being associated with a said action;
- a controller configured to control the actuator systems;

  wherein each light is associated with one of the buttons and provided next to the associated button;
  wherein the controller and control panel are configured for transferring signals between each other;
  wherein the control panel is configured to send an actuation signal to the controller upon actuating a said button, which actuation signal is representative of the button actuated;
  wherein the controller is configured to generate, depending on the actuation signal received, control signals and to transmit the control signals to one or more of the actuator systems associated to the button actuated for controlling these actuator systems;
  wherein the controller is configured to generate and transmit an information signal to the control panel, which information signal is associated to one or more of the button(s) and contains information about the action operated with these respective button(s); and
  wherein the control panel is configured to drive the light(s) associated to these one or more buttons to emit a lightening characteristic which depends on the information in the information signal.

Clause 2: Lifting device for a refuse collection vehicle,
wherein the lifting device comprises:

- actuator systems configured for performing actions related to a lifting device or lifting device actions, such as one or more of:
  - moving a lifting device from a transport condition to a working condition, or vice versa,
  - gripping one or more refuse bins at a reception location,
  - lifting the gripped refuse bin(s),
  - emptying the lifted refuse bin(s),
  - transferring refuse, emptied from the bins, into the collection body,
  - lowering the emptied refuse bin(s) back to the reception location, and
  - releasing the gripped bin(s) at ground level;
- a control panel provided with:
  - a number of buttons for invoking the actions, and
  - a number of lights,

  each button being associated with a said action;
- a controller configured to control the actuator systems;

  wherein each light is associated with one of the buttons and provided next to the associated button;
  wherein the controller and control panel are configured for transferring signals between each other;
  wherein the control panel is configured to send an actuation signal to the controller upon actuating a said button, which actuation signal is representative of the button actuated;
  wherein the controller is configured to generate, depending on the actuation signal received, control signals and to transmit the control signals to one or more of the actuator systems associated to the button actuated for controlling these actuator systems;
  wherein the controller is configured to generate and transmit an information signal to the control panel, which information signal is associated to one or more of the button(s) and contains information about the action operated with these respective button(s); and
  wherein the control panel is configured to drive

the light(s) associated to these one or more buttons to emit a lightening characteristic which depends on the information in the information signal.

Clause 3: Vehicle according to clause 1 or lifting device according to clause 2,
wherein the controller further is configured:

- to determine, in response to receipt of a said actuation signal from a said actuated button, whether the actuator system associated to the actuated button is available for performing a said action, and subsequently
- to generate and transmit,
  - in case the controller determined that the action associated to the actuated button is available,
    - the control signal to the actuator system associated with the actuated button, and
    - a confirmative said information signal to the control panel,
      or
  - in case the controller determined that the actuator system associated to the actuated button is not available, a refusing said information signal to the control panel;

wherein the control panel is configured to drive, upon receipt of the information signal, the light associated to the actuated button to emit a confirmative illumination characteristic in case the information signal is confirmative or to emit a refusing illumination characteristic in case the information signal is refusing, the confirmative and refusing illumination characteristic being mutually different.

Clause 4: Refuse collection vehicle,
wherein the vehicle comprises:

- a chassis,
- a driver's cab provided on the chassis, at the front of the chassis,
- a collection body for collecting refuse, provided on the chassis, behind the diver's cab,
  and
- a lifting device;

wherein the lifting device comprises actuator systems configured for performing actions related to a lifting device or lifting device actions, such as one or more of:

- moving the lifting device from a transport condition to a working condition, or vice versa,
- gripping one or more refuse bins at a reception location,
- lifting the gripped refuse bin(s),
- emptying the lifted refuse bin(s),
- transferring refuse, emptied from the bins, into the collection body,
- lowering the emptied refuse bin(s) back to the reception location, and
- releasing the gripped bin(s) at ground level;

wherein the vehicle further comprises:

- a control panel provided with:
  - a number of buttons for invoking the actions, and
  - a number of lights,

  each button being associated with a said action;
- a controller configured to control the actuator systems;

wherein each light is associated with one of the buttons and provided next to the associated button;
wherein the controller and control panel are configured for transferring signals between each other;
wherein the control panel is configured to send an actuation signal to the controller upon actuating a said button, which actuation signal is representative of the button actuated;
wherein the controller is configured to generate, depending on the actuation signal received, control signals and to transmit the control signals to one or more of the actuator systems associated to the button actuated for controlling these actuator systems;
wherein the controller is configured to generate and transmit an information signal to the control panel, which information signal is associated to one or more of the button(s) and contains information about the action operated with these respective button(s); and
wherein the control panel is configured to drive the light(s) associated to these one or more buttons to emit a lightening characteristic which depends on the information in the information signal.
wherein the controller further is configured:

- to determine, in response to receipt of a said actuation signal from a said actuated button, whether the actuator system associated to the actuated button is available for performing an action associated to the actuated button, and subsequently
- to generate and transmit,

- in case the controller determined that the action associated to the actuated button is available,
  - the control signal to the actuator system associated with the actuated button, and
  - a confirmative said information signal to the control panel,
    or
  - in case the controller determined that the actuator system associated to the actuated button is not available, a refusing said information signal to the control panel; and

wherein the control panel is configured to drive, upon receipt of the information signal, the light associated to the actuated button to emit a confirmative illumination characteristic in case the information signal is confirmative or to emit a refusing illumination characteristic in case the information signal is refusing, the confirmative and refusing illumination characteristic being mutually different.

Clause 5: Lifting device for a refuse collection vehicle,
wherein the lifting device comprises:

- actuator systems configured for performing actions related to a lifting device or lifting device actions, such as one or more of:
  - moving the lifting device from a transport condition to a working condition, or vice versa,
  - gripping one or more refuse bins at a reception location,
  - lifting the gripped refuse bin(s),
  - emptying the lifted refuse bin(s),
  - transferring refuse, emptied from the bins, into the collection body,
  - lowering the emptied refuse bin(s) back to the reception location, and
  - releasing the gripped bin(s) at ground level;
- a control panel provided with:
  - a number of buttons for invoking the actions, and
  - a number of lights,

  each button being associated with a said action;
- a controller configured to control the actuator systems;

  wherein each light is associated with one of the buttons and provided next to the associated button;
  wherein the controller and control panel are configured for transferring signals between each other;
  wherein the control panel is configured to send an actuation signal to the controller upon actuating a said button, which actuation signal is representative of the button actuated;
  wherein the controller is configured to generate, depending on the actuation signal received, control signals and to transmit the control signals to one or more of the actuator systems associated to the button actuated for controlling these actuator systems;
  wherein the controller is configured to generate and transmit an information signal to the control panel, which information signal is associated to one or more of the button(s) and contains information about the action operated with these respective button(s); and
  wherein the control panel is configured to drive the light(s) associated to these one or more buttons to emit a lightening characteristic which depends on the information in the information signal.
  wherein the controller further is configured:

  - to determine, in response to receipt of a said actuation signal from a said actuated button, whether the actuator system associated to the actuated button is available for performing an action associated to the actuated button, and subsequently
  - to generate and transmit,
    - in case the controller determined that the action associated to the actuated button is available,
      - the control signal to the actuator system associated with the actuated button, and
      - a confirmative said information signal to the control panel,
        or
      - in case the controller determined that the actuator system associated to the actuated button is not available, a refusing said information signal to the control panel; and

  wherein the control panel is configured to drive, upon receipt of the information signal, the light associated to the actuated button to emit a confirmative illumination characteristic in case the information signal

is confirmative or to emit a refusing illumination characteristic in case the information signal is refusing, the confirmative and refusing illumination characteristic being mutually different.

Clause 6: Vehicle respectively lifting device according to one of the preceding clauses, wherein one or more of said buttons are configured for being actuated in more than one manner and

wherein the controller is further configured to determine the manner of actuation and to generate the information signal to contain information about the manner of actuation. Clause 7: Vehicle respectively lifting device according to one of the preceding clauses, wherein the controller is configured for accepting a chronological series of said actuation signals from a said actuated button;
wherein the controller is further configured to determine from the chronological series of actuation signal(s) the manner of actuating the button and to generate the information signal to contain information about the chronological series of said activation signals.

Clause 8: Vehicle respectively lifting device according to one of the preceding clauses, wherein the control panel is configured to generate the actuation signal to contain further information representative for the manner of actuating the button.

Clause 9: Vehicle respectively lifting device according to one of the preceding clauses, wherein the controller is configured to generate the information signal to contain information about the progress of one or more action(s).

Clause 10: Vehicle respectively lifting device according to one of the preceding clauses, wherein the controller is configured to generate the information signal to contain information about a setting associated to one or more action(s).

Clause 11: Vehicle respectively lifting device according to one of the clauses 6-10, wherein the control panel is further configured to drive, upon receipt of the information signal, the light associated to the actuated button to emit, depending on the information contained in the information signal, different illumination characteristics.

Clause 12: Vehicle respectively lifting device according to one of the preceding clauses, wherein the light of one or more of said buttons is subdivided into light segments, such as 2, 3, 4 or more segments, the light segments being configured to be operated, by the control panel in dependence of the information signal, in mutually different manner.

Clause 13: Vehicle respectively lifting device according to one of the preceding clauses, wherein the light of one or more of said buttons is a ring-shaped light extending outside and around the associated button.

Clause 14: Vehicle respectively lifting device according to clause clause 13,
wherein a spacing is provided between the ring-shaped light and its associated button. Clause 15: Vehicle respectively lifting device according to one of the preceding clauses, wherein one or more of said lights is/are configured to emit light of different colours - such as red, green, blue, yellow, white, or any mixture of one or more of these colours - depending on the information signal received.

Clause 16: Vehicle respectively lifting device according to one of the preceding clauses, wherein the control panel is configured to drive the light associated to one or more or all the buttons in flashing manner.

Clause 17: Vehicle respectively lifting device according to one of the preceding clauses, wherein the controller is configured to transmit a warning signal, associated to one or more of the lights, to the control panel in case of:

- dysfunction or malfunctioning of a said action performed by one or more actuator systems associated to the button(/s) to which the respective light(/s) is(/are) associated; or
- an emergency stop of the lifting device; and

wherein the control panel is configured to drive the respective lights to emit a warning illumination characteristic.

Clause 18: Vehicle respectively lifting device according to one of the preceding clauses, wherein the controller is configured to transmit an emergency signal to the control panel associated to all lights in case of a severe malfunctioning of the vehicle or part of the vehicle, and
wherein the control panel is configured to drive all the lights to emit an emergency illumination characteristic, such as emitting a red colour in flashing manner.

Clause 19: Vehicle respectively lifting device according to one of the preceding clauses, wherein the lifting device comprises:

- a left lifting device and a right lifting device; and
- two said control panels, one being arranged at the left side of the lifting device and the other being arranged at the right side of the lifting device;

wherein each button on one of the two control panels has a corresponding button on the other of the two control panels to provide paired buttons,
wherein, in a paired mode of use, the right and left lifting device are operated as one unit, and, in a non-paired mode of use, the right and left lifting device are operated independently from one another by the right control panel respec-

tively the left control panel; and wherein the controller is configured to transmit, in the paired mode of use, signals for one or more of the paired buttons simultaneously to both the control panels.

Clause 20: Vehicle respectively lifting device according to one of the preceding clauses, wherein the one or more buttons comprise buttons to be subjected to a movement when actuated, such as one or more of the group of buttons comprising: push-buttons, turning-knobs, joysticks and rocker-buttons.

Clause 21: Vehicle respectively lifting device according to one of the preceding clauses, wherein the controller is connected to the control panel(s) by a CAN-bus.

Clause 22: Vehicle according to one of the clauses 1 or 4 or 6-21,
wherein the lifting device is provided at the rear of the chassis with the collection body arranged between the lifting device and the driver's cab.

Claims

1. Refuse collection vehicle,
wherein the vehicle comprises:

- a chassis,
- a driver's cab provided on the chassis, at the front of the chassis,
- a collection body for collecting refuse, provided on the chassis, behind the diver's cab, and
- a lifting device;

wherein the vehicle further comprises actuator systems configured for performing actions related to a lifting device, such as one or more of:

- moving the lifting device from a transport condition to a working condition, or vice versa,
- gripping one or more refuse bins at a reception location,
- lifting the gripped refuse bin(s),
- emptying the lifted refuse bin(s),
- transferring refuse, emptied from the bins, into the collection body,
- lowering the emptied refuse bin(s) back to the reception location, and
- releasing the gripped bin(s) at ground level;

wherein the vehicle further comprises:

- a control panel provided with:
  - a number of buttons for invoking the actions, and
  - a number of lights,

each button being associated with a said action;

- a controller configured to control the actuator systems;

characterized,
in that each light is associated with one of the buttons and provided next to the associated button;
in that the controller and control panel are configured for transferring signals between each other;
in that the control panel is configured to send an actuation signal to the controller upon actuating a said button, which actuation signal is representative of the button actuated;
in that the controller is configured to generate, depending on the actuation signal received, control signals and to transmit the control signals to one or more of the actuator systems associated to the button actuated for controlling these actuator systems;
in that the controller is configured to generate and transmit an information signal to the control panel, which information signal is associated to one or more of the button(s) and contains information about the action operated with these respective button(s); and
in that the control panel is configured to drive the light(s) associated to these one or more buttons to emit a lightening characteristic which depends on the information in the information signal.

2. Lifting device for a refuse collection vehicle, wherein the lifting device comprises:

- actuator systems configured for performing actions related to the lifting device, such as one or more of:
  - moving the lifting device from a transport condition to a working condition, or vice versa,
  - gripping one or more refuse bins at a reception location,
  - lifting the gripped refuse bin(s),
  - emptying the lifted refuse bin(s),
  - transferring refuse, emptied from the bins, into the collection body,
  - lowering the emptied refuse bin(s) back to the reception location, and
  - releasing the gripped bin(s) at ground level;

- a control panel provided with:
  - a number of buttons for invoking the actions, and
  - a number of lights,

each button being associated with a said action;
• a controller configured to control the actuator systems;
characterized,
in that each light is associated with one of the buttons and provided next to the associated button;
in that the controller and control panel are configured for transferring signals between each other;
in that the control panel is configured to send an actuation signal to the controller upon actuating a said button, which actuation signal is representative of the button actuated;
in that the controller is configured to generate, depending on the actuation signal received, control signals and to transmit the control signals to one or more of the actuator systems associated to the button actuated for controlling these actuator systems;
in that the controller is configured to generate and transmit an information signal to the control panel, which information signal is associated to one or more of the button(s) and contains information about the action operated with these respective button(s); and
in that the control panel is configured to drive the light(s) associated to these one or more buttons to emit a lightening characteristic which depends on the information in the information signal.

3. Vehicle according to claim 1 or lifting device according to claim 2, wherein the controller further is configured:

- to determine, in response to receipt of a said actuation signal from a said actuated button, whether the actuator system associated to the actuated button is available for performing a said action, and subsequently
- to generate and transmit,

  - in case the controller determined that the action associated to the actuated button is available,

    - the control signal to the actuator system associated with the actuated button, and
    - a confirmative said information signal to the control panel,
    or
    - in case the controller determined that the actuator system associated to the actuated button is not available, a refusing said information signal to the control panel;

wherein the control panel is configured to drive, upon receipt of the information signal, the light associated to the actuated button to emit a confirmative illumination characteristic in case the information signal is confirmative or to emit a refusing illumination characteristic in case the information signal is refusing, the confirmative and refusing illumination characteristic being mutually different.

4. Vehicle according to one of the claims 1 or 3 or lifting device according to one of the claims 2-3,

wherein one or more of said buttons are configured for being actuated in more than one manner and
wherein the controller is further configured to determine the manner of actuation and to generate the information signal to contain information about the manner of actuation.

5. Vehicle according to one of the claims 1 or 3-4 or lifting device according to one of the claims 2-4,

wherein the controller is configured for accepting a chronological series of said actuation signals from a said actuated button;
wherein the controller is further configured to determine from the chronological series of actuation signal(s) the manner of actuating the button and to generate the information signal to contain information about the chronological series of said activation signals.

6. Vehicle according to one of the claims 1 or 3-5 or lifting device according to one of the claims 2-5,
wherein the control panel is configured to generate:

- the actuation signal to contain further information representative for the manner of actuating the button,

and/or

- the information signal to contain information about the progress of one or more action(s),

and/or

- the information signal to contain information about a setting associated to one or more action(s).

7. Vehicle or lifting device according to one of the claims 4-6,
wherein the control panel is further configured to drive, upon receipt of the information signal, the light associated to the actuated button to emit, depending on the information contained in the information sig-

nal, different illumination characteristics.

8. Vehicle according to one of the claims 1 or 3-7 or lifting device according to one of the claims 2-7, wherein:

- the light of one or more of said buttons is subdivided into light segments, such as 2, 3, 4 or more segments, the light segments being configured to be operated, by the control panel in dependence of the information signal, in mutually different manner;

and/or

- the light of one or more of said buttons is a ring-shaped light extending outside and around the associated button, optionally a spacing being provided between the ring-shaped light and its associated button;

and/or

- one or more of said lights is/are configured to emit light of different colours - such as red, green, blue, yellow, white, or any mixture of one or more of these colours - depending on the information signal received.

9. Vehicle according to one of the claims 1 or 3-8 or lifting device according to one of the claims 2-8, wherein the control panel is configured to drive the light associated to one or more or all the buttons in flashing manner.

10. Vehicle according to one of the claims 1 or 3-9 or lifting device according to one of the claims 2-9, wherein the controller is configured to transmit a warning signal, associated to one or more of the lights, to the control panel in case of:

- dysfunction or malfunctioning of a said action performed by one or more actuator systems associated to the button(/s) to which the respective light(/s) is(/are) associated; or
- an emergency stop of the lifting device; and

wherein the control panel is configured to drive the respective lights to emit a warning illumination characteristic.

11. Vehicle according to one of the claims 1 or 3-10 or lifting device according to one of the claims 2-10,

wherein the controller is configured to transmit an emergency signal to the control panel associated to all lights in case of a severe malfunctioning of the vehicle or part of the vehicle, and wherein the control panel is configured to drive all the lights to emit an emergency illumination characteristic, such as emitting a red colour in flashing manner.

12. Vehicle according to one of the claims 1 or 3-11 or lifting device according to one of the claims 2-11, wherein the lifting device comprises:

- a left lifting device and a right lifting device; and
- two said control panels, one being arranged at the left side of the lifting device and the other being arranged at the right side of the lifting device;

wherein each button on one of the two control panels has a corresponding button on the other of the two control panels to provide paired buttons,

wherein, in a paired mode of use, the right and left lifting device are operated as one unit, and, in a non-paired mode of use, the right and left lifting device are operated independently from one another by the right control panel respectively the left control panel; and

wherein the controller is configured to transmit, in the paired mode of use, signals for one or more of the paired buttons simultaneously to both the control panels.

13. Vehicle according to one of the claims 1 or 3-12 or lifting device according to one of the claims 2-12, wherein the one or more buttons comprise buttons to be subjected to a movement when actuated, such as one or more of the group of buttons comprising: push-buttons, turning-knobs, joysticks and rocker-buttons.

14. Vehicle according to one of the claims 1 or 3-13 or lifting device according to one of the claims 2-13, wherein the controller is connected to the control panel(s) by a CAN-bus.

15. Vehicle according to one of the claims 1 or 3-14, wherein the lifting device is provided at the rear of the chassis with the collection body arranged between the lifting device and the driver's cab.

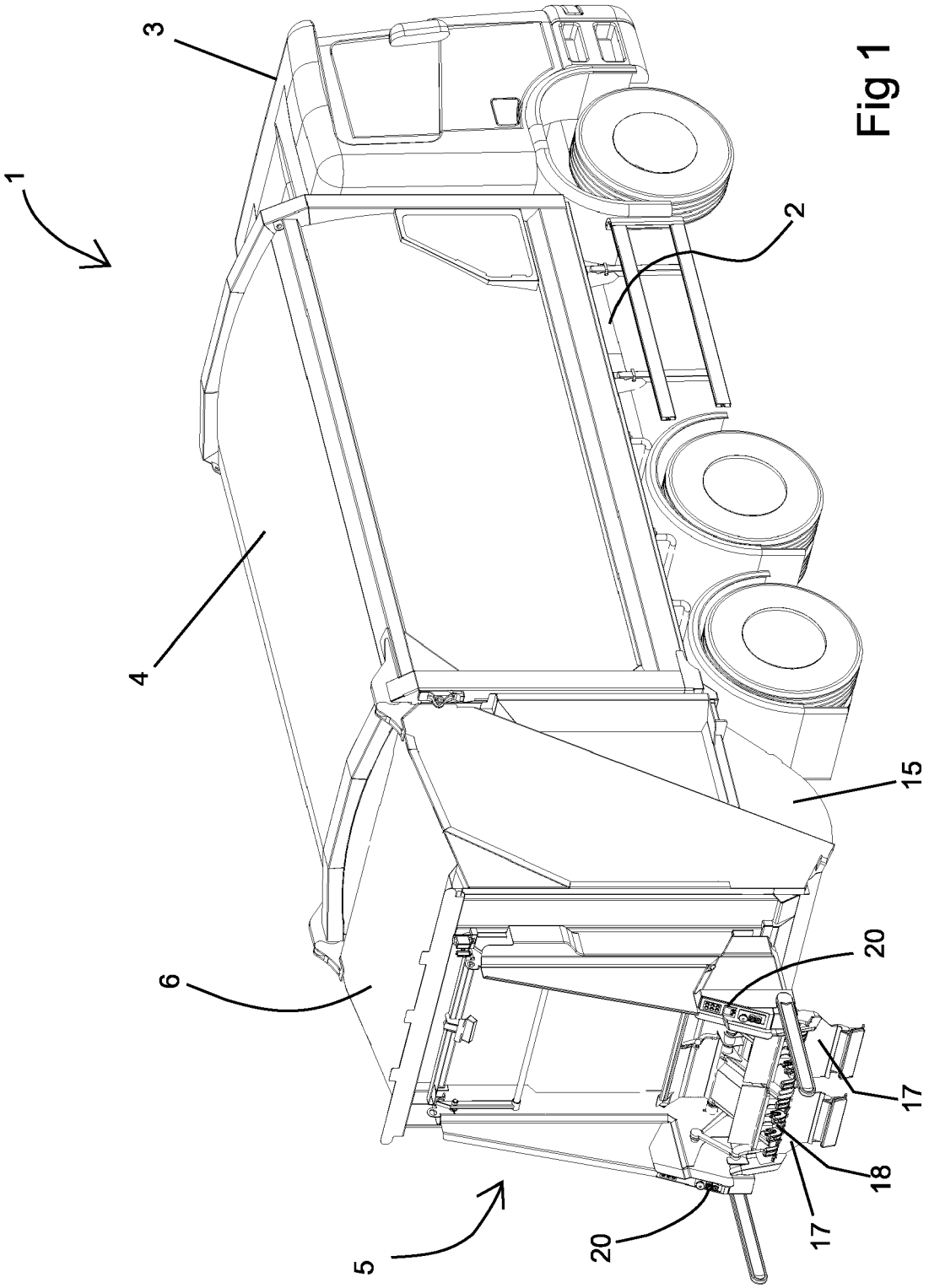


Fig 1

Fig 2

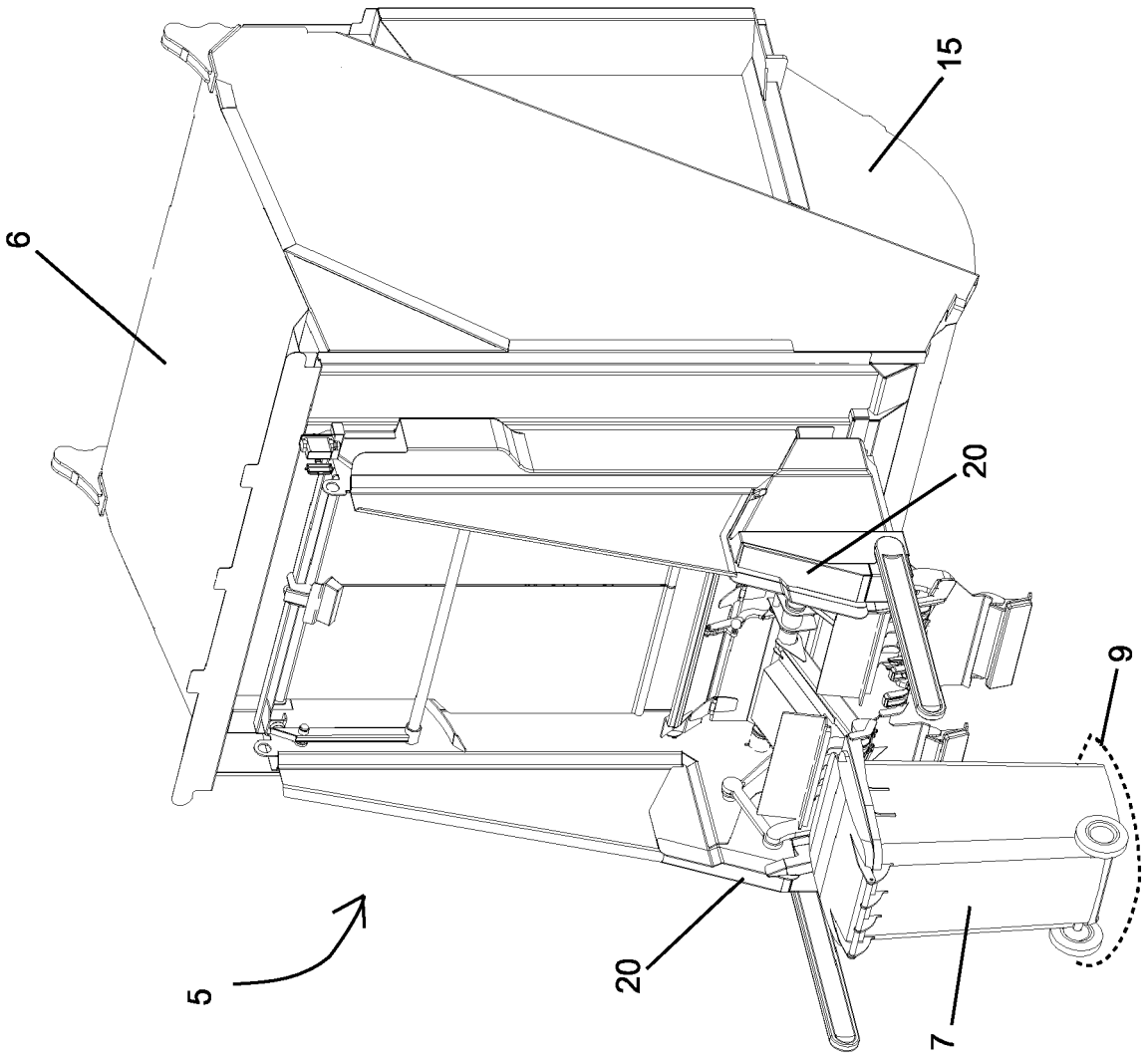
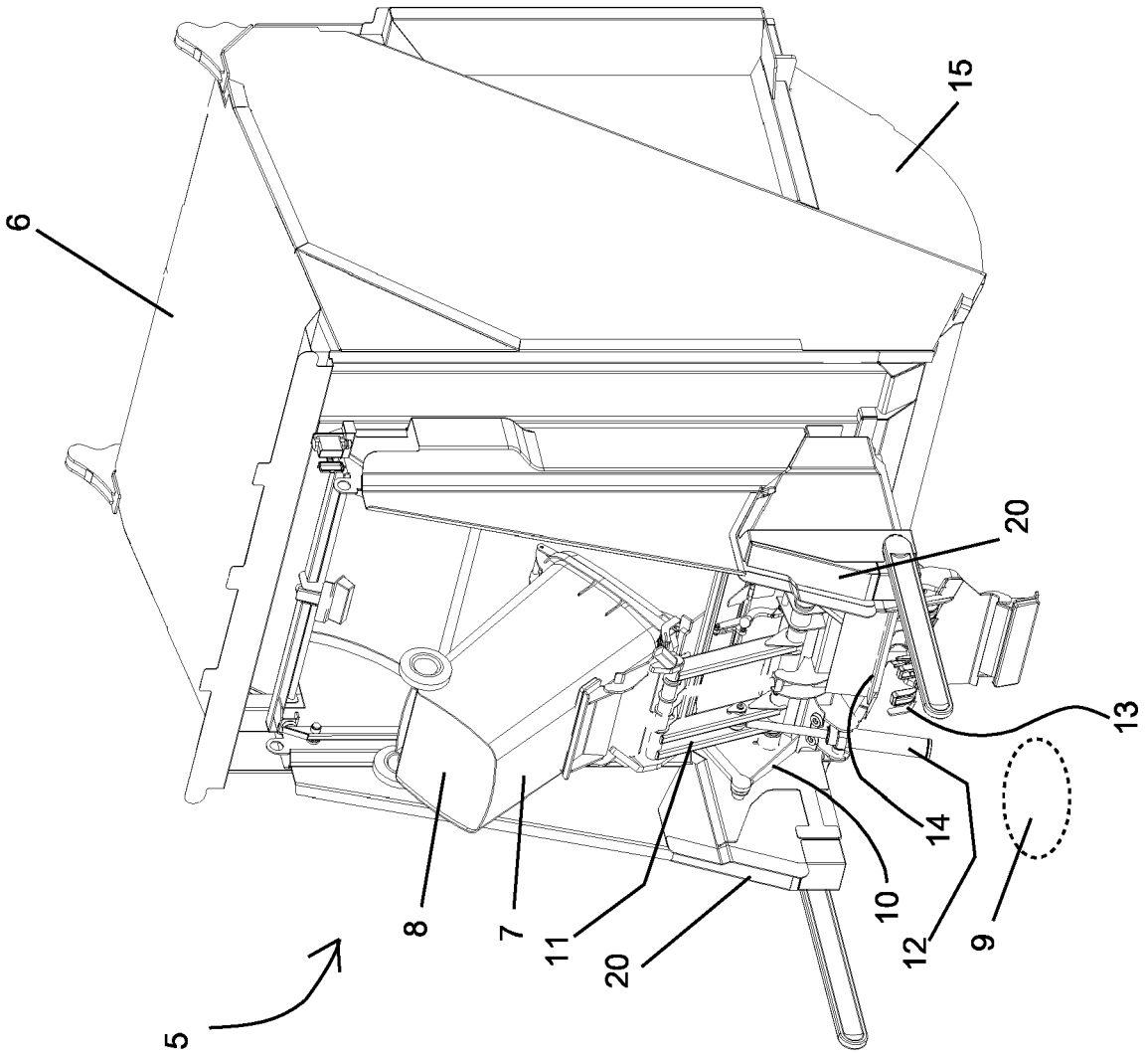


Fig 3



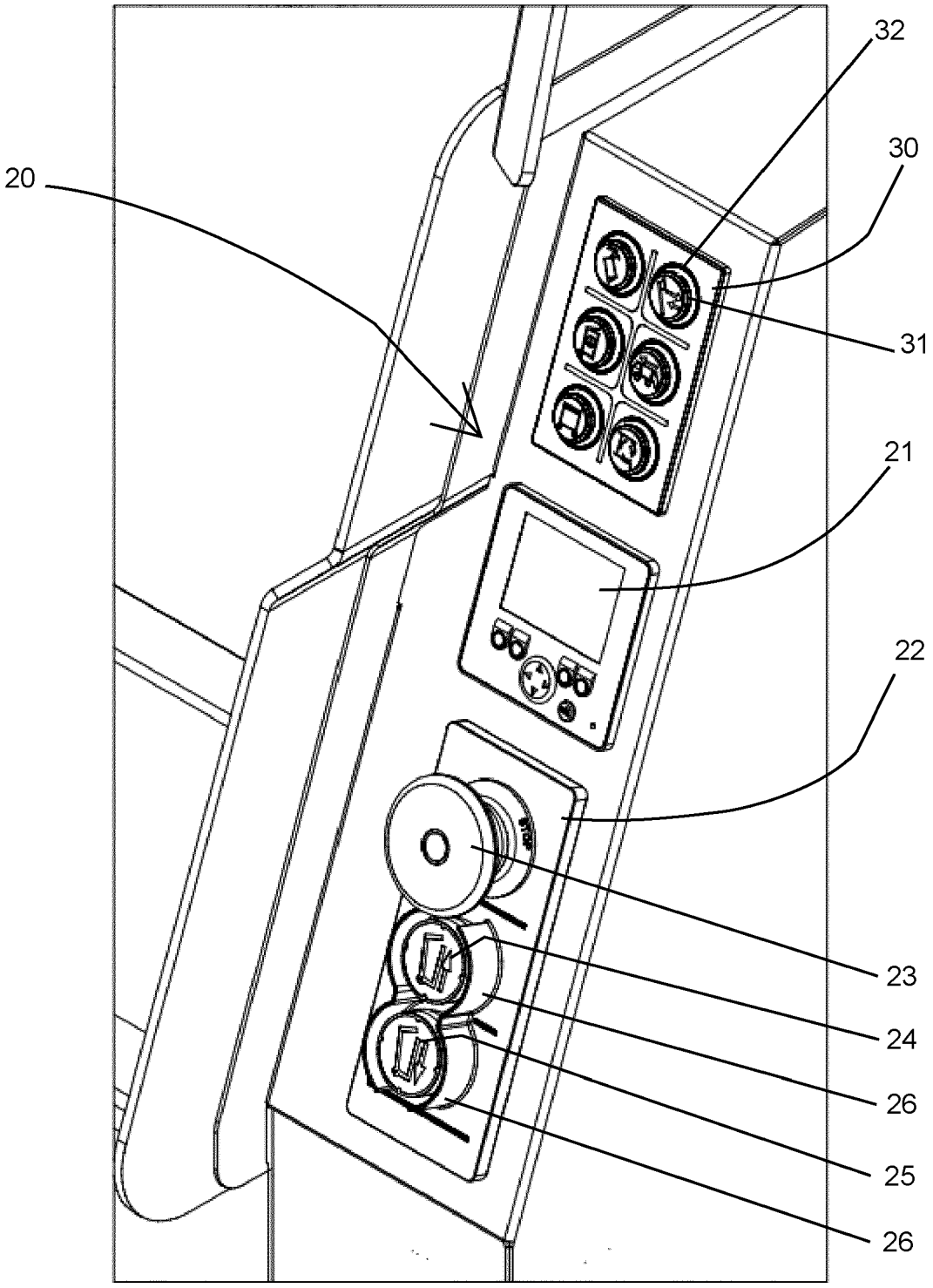
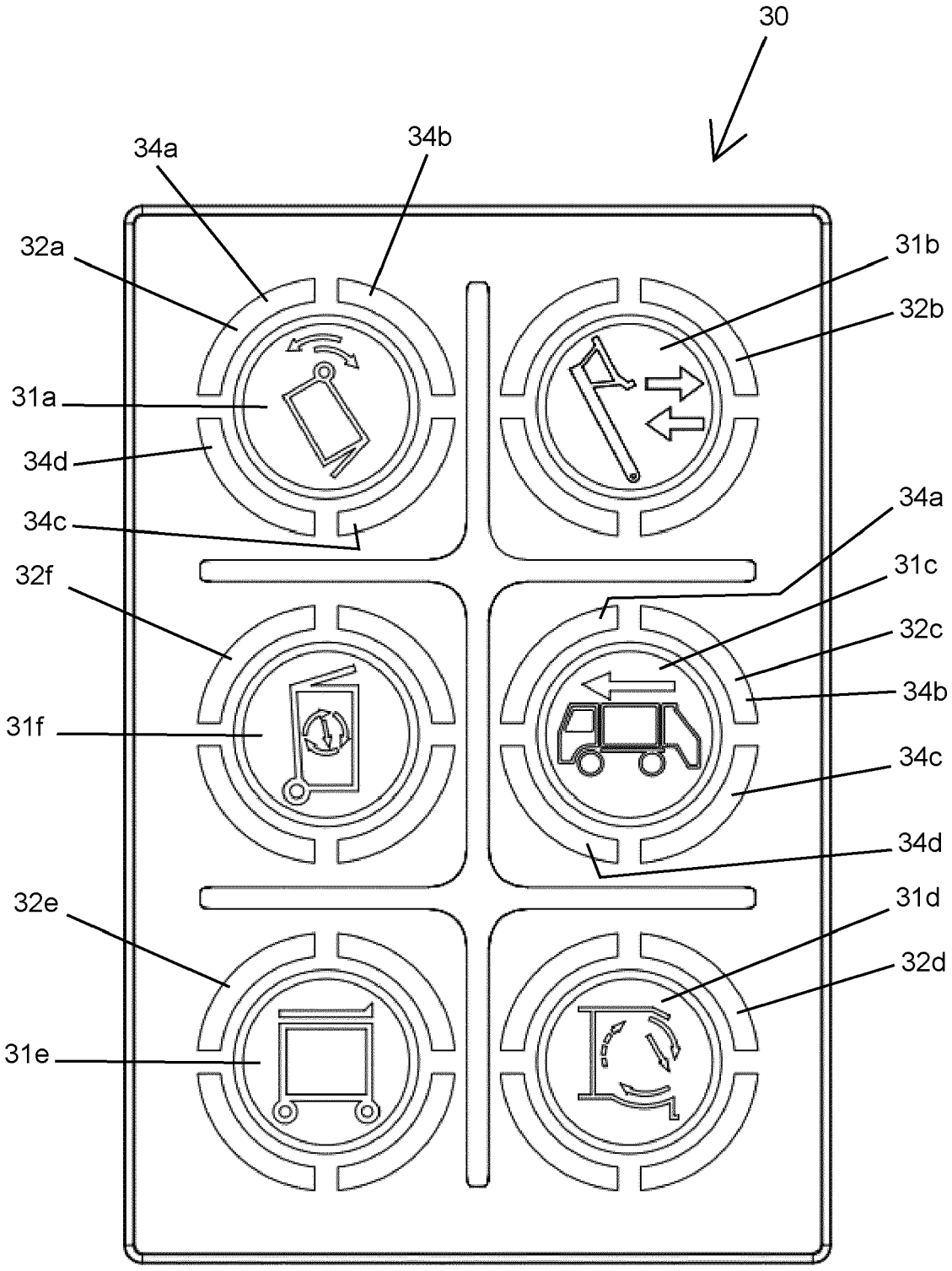


Fig 4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32e
31d
32d
31e

Fig 5

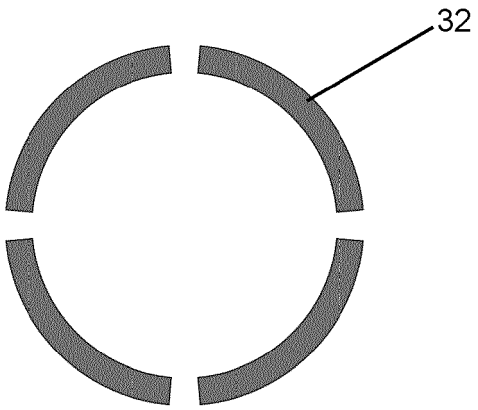

Fig 6

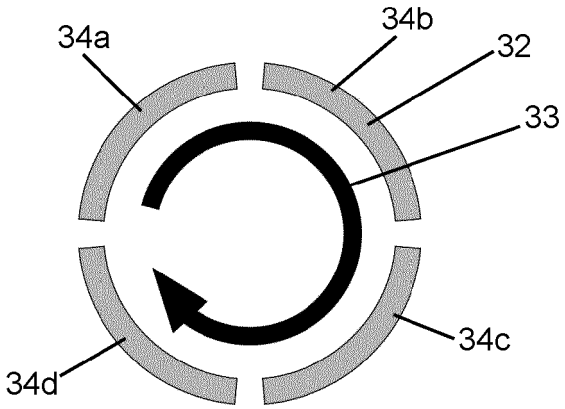

Fig 7

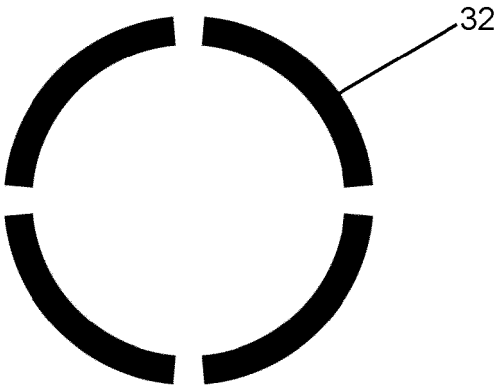

Fig 8

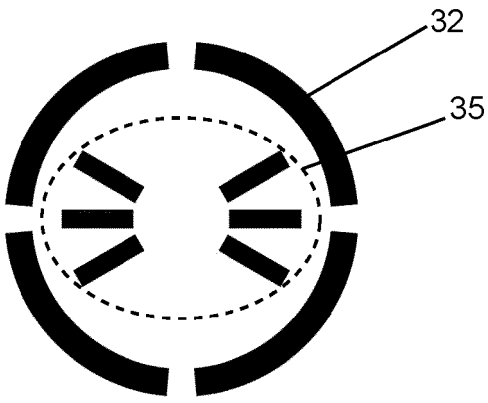

Fig 9

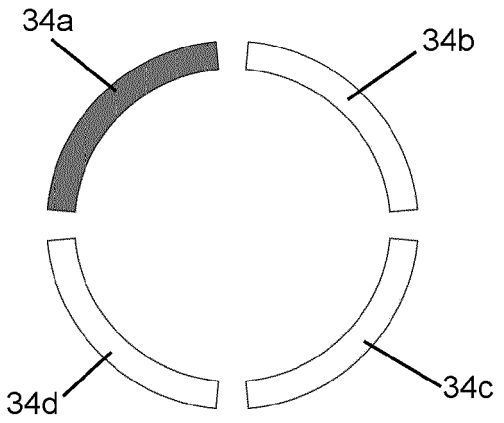

Fig 10A

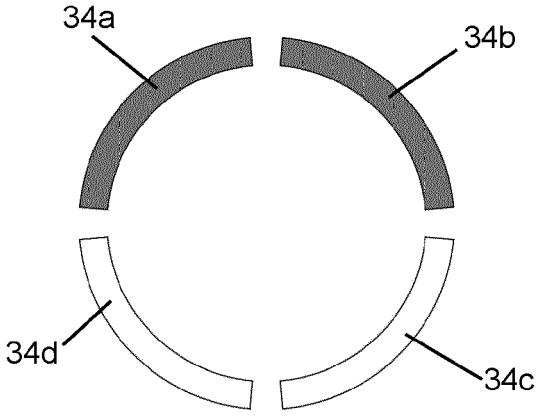

Fig 10B

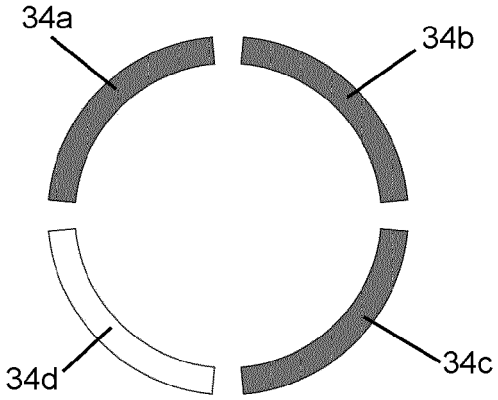

Fig 10C

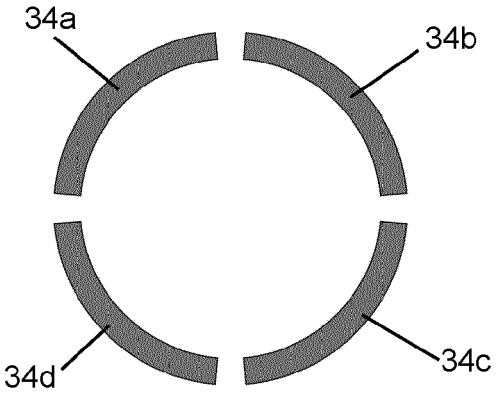

Fig 10D

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EUROPEAN SEARCH REPORT

Application Number
EP 21 21 0253

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	DE 297 18 103 U1 (SCHNEIDER SYSTEMTECHNIK GMBH [DE]) 11 February 1999 (1999-02-11) * page 5, paragraph 3; figure 1 *	1-15	
X	EP 2 803 604 A1 (HEIL CO [US]) 19 November 2014 (2014-11-19) * paragraph [0036] - paragraph [0040]; figures 1, 6 *	1-15	
A	NN: "MSM 30, Metal Switch Medium Stroke", , 1 June 2017 (2017-06-01), XP055825387, schurter.com Retrieved from the Internet: URL:https://eu.mouser.com/pdfdocs/Schurtertyp_MSM_30.pdf [retrieved on 2021-07-19] * page 1 - page 8 *	1-14	

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B65F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 March 2022	Luepke, Erik

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16-03-2022

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