



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
08.02.2023 Bulletin 2023/06

(51) International Patent Classification (IPC):
B65F 1/12 (1968.09) **B65F 1/14** (1968.09)
B65F 3/02 (1968.09)

(21) Application number: **22382670.2**

(52) Cooperative Patent Classification (CPC):
B65F 1/125; B65F 1/1452; B65F 3/02;
B65F 2003/0223

(22) Date of filing: **14.07.2022**

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

(71) Applicant: **Palvi, S.L.**
25310 Agramunt (Lleida) (ES)

(72) Inventor: **PADULLES OMEDES, Albert**
25310 Agramunt (ES)

(74) Representative: **Torner, Juncosa I Associats, SL**
C / Pau Claris, 108, 1r 1a
08009 Barcelona (ES)

(30) Priority: **05.08.2021 EP 21382737**

(54) **METHOD AND DEVICE FOR HANDLING WASTE COLLECTION CONTAINERS**

(57) The present invention discloses a device for handling waste collection containers, the device comprising a coupling head 1 which comprises a head structure 30 comprising: a first holding member 10 having first movable elements 14, said first movable elements being movable between a handle gripping position and a handle release position and for being coupled to a mushroom-shaped handle 2,2' fixed on an outer surface of a container 3; wherein at least part of the first movable elements 14 is movable from the handle gripping position to an overload position, in which the first movable elements are into geometric interference with the mushroom-shaped handle 2,2'; and wherein the first holding member 10 comprise resilient elements configured to move at least part of the first movable elements 14 from the handle gripping position to the overload position when a force exerted by the container handle exceeds a threshold. The present invention also discloses a method for handling waste collection containers.

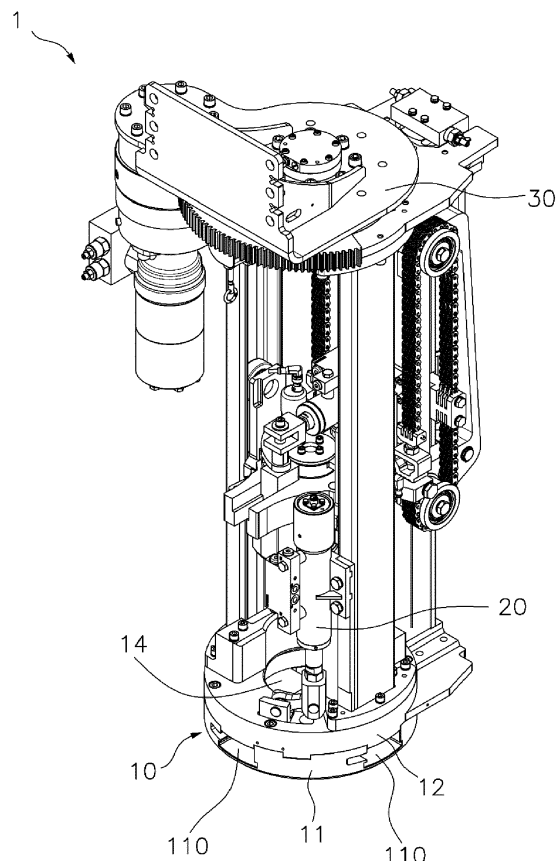


Fig. 1

DescriptionTechnical field

[0001] The present invention relates to the field of devices for handling waste collection containers, and to methods for performing said operations. In particular, the present invention relates to a device for handling waste collection containers, and to a method for performing said operation, by means of a coupling head attached to a crane arm of a waste collection vehicle, said coupling head allowing holding a container and lifting it. Particular embodiments of the device and method of the present invention also allow emptying the container into a container discharge area.

State of the Art

[0002] Devices for handling waste collection containers capable of being coupled to a handle of the container are known in the state of the art. In the state of the art are also known devices for handling and emptying waste collection containers which besides being capable of being coupled to a handle of the container, are also capable of interacting with a gate operator of the container for causing the opening and/or closing of the gates of the container.

[0003] For example, patent document EP 3115317 A1 discloses a device and a method for handling and emptying waste collection containers. In the device disclosed in EP 3115317 A1 a holding member comprises a central opening for the insertion of the handle of the container and a plurality of jaws, which move in a radial and coordinated manner to close the same around the handle of the container. Although said holding member provides a firm and secure attachment of the device to the container, it can be damaged if the container and/or its handle are not properly placed or aligned, in which case the misalignment of the handle and/or its container can cause an overload to one or more of the jaws that can damage them as the device lacks a mechanism to avoid overloads in the jaws. Said misalignment of the handle and/or its container can be caused, for example, due to an uneven resting surface of the container.

[0004] It is important to mention that a fully loaded waste collection container can be considerably heavy and, thus, the forces that a device for handling containers has to withstand are considerably high.

[0005] Other devices for handling waste collection containers known in the art, as for example, the ones disclosed in patent documents DE29905551U1, EP 1916218 A1 and EP 1172308 A1, also lack means to avoid overloads in the jaws that could damage, or even break, them.

[0006] None of the known prior art documents disclose a device for handling waste collection containers comprising means to avoid overloading the jaws that secure the container.

Brief description of the invention

[0007] The present invention is directed towards a device for handling waste collection containers.

[0008] In order to provide a device for handling waste collection containers which comprises means to avoid damaging or even breaking the gripping means of the container due to overloads caused by, for example, a misalignment or misplacement of the container handle in said gripping means, according to a first aspect it is disclosed a device for handling waste collection containers, the device comprising a coupling head which comprises a head structure arranged to be attached to the distal end of a crane arm comprised in a waste collection vehicle, said head structure comprising: a first holding member having first movable elements operated by means of first operating means, said first movable elements being movable between a handle gripping position and a handle release position and for being coupled to a mushroom-shaped handle fixed on an outer surface of a container and for holding up said container through said handle, each of said first movable elements having a flat surface adapted for being placed in contact with a corresponding flat surface of the mushroom-shaped handle in their handle gripping position; said first operating means being controlled by means of a control unit; wherein at least part of the first movable elements is movable from the handle gripping position to an overload position, in which the first movable elements are into geometric interference with the mushroom-shaped handle; and wherein the first holding member comprise resilient elements configured to move at least part of the first movable elements from the handle gripping position to the overload position when a force exerted by the container handle exceeds a threshold.

[0009] According to the present invention, it is understood that a mushroom-shaped handle is a handle having a tubular section and a head protruding transversally with respect to said handle. Said head is preferably shaped like a semi ellipsoid or a semi sphere, although it can have any other suitable shape. Said tubular section is preferably of a polygonal cross-section.

[0010] According to the present invention, in said overload position the flat surface of the first movable element is not in contact with a corresponding flat surface of the mushroom-shaped handle of the container. However, in said overload position the first movable element still interferes with the mushroom-shaped handle, and in particular, the upper surface of the first movable element still interferes with the protruding head of the handle.

[0011] According to the first aspect of the present invention, the first movable elements may comprise a sliding element having a first end having a flat surface for being placed in contact with the mushroom-shaped handle in the container handle position and a second end operatively attached to a first end of a resilient element operatively fixed to the corresponding first movable element.

[0012] According to the first aspect of the present invention, the sliding element may be partly housed in a chamber of the corresponding first movable element, the corresponding resilient element being housed in said chamber.

[0013] According to the first aspect of the present invention, the second end of the resilient element may operatively abut against a cap of the corresponding chamber.

[0014] According to the first aspect of the present invention, the sliding element may be configured to slide along the corresponding chamber to move from the handle gripping position to the overload position, and vice versa.

[0015] According to the first aspect of the present invention, the resilient element may comprise at least one spring. If the resilient element comprises a plurality of springs, said springs are preferably arranged to work in parallel.

[0016] According to the first aspect of the present invention, the first holding member may comprise a lower plate for housing the first movable elements, and an intermediate plate for simultaneously actuating the first movable elements, said intermediate plate being arranged between the lower plate and an upper plate for being attached to the head structure.

[0017] According to the first aspect of the present invention, an end of each first movable elements may be operatively connected to the intermediate plate by a link member.

[0018] According to the first aspect of the present invention, at least part of the link members may slide along a groove matching the shape of the link. For example, if the link is shaped as a circular arc, the groove is also shaped as a circular arc.

[0019] According to the first aspect of the present invention, the first operating means may comprise an actuator and the intermediate plate may comprise a protruding part for being operatively connected to said actuator.

[0020] According to the first aspect of the present invention, said protruding part may protrude from the first holding member through an aperture in the upper plate.

[0021] According to the first aspect of the present invention, the actuator may be configured to rotate the intermediate plate relative to the head structure.

[0022] According to the first aspect of the present invention, said actuator may be a hydraulic cylinder.

[0023] According to the first aspect of the present invention, each first movable element may comprise two lateral faces perpendicular to its flat surface.

[0024] According to the first aspect of the present invention, each first movable element may comprise chamfered edges between the flat surface and the lateral faces.

[0025] According to the first aspect of the present invention, the first holding member may comprise at least a pair of movable elements facing each other.

[0026] According to the first aspect of the present invention, the first holding member may comprise four first movable elements arranged in a cross shaped manner.

[0027] According to the first aspect of the present invention, said head structure may further comprise a second holding member having second movable elements arranged to be operated by means of second operating means, said second movable elements being movable between a gate operator release position and a position of interaction with the gate operator and allowing said second movable elements to come into geometric interference with the gate operator, preventing its free movement, the first holding member being adapted to be attached to the handle and the second holding members being adapted to be arranged in the position of interaction, and the gate operator being arranged in the container in a position adjacent and/or concentric to said handle and mechanically linked to lower gates of the container for controlling their opening and closing; a displacing mechanism arranged to be operated by a third operating means envisaged for axially moving said second holding member with respect to said first holding member between gate closing and gate opening positions, by means of the relative axial movement between the handle and the gate operator of the mentioned container linked to the first and second holding members, causing the closing and/or opening of said lower gates of the container mechanically linked to the gate operator; and the second movable elements may be movable between the gate operator release position and the position of interaction with the gate operator; and the first, second and third operating means may be controlled by means of the control unit. Embodiments of the present invention comprising these features can also empty the waste container.

[0028] According to the first aspect of the present invention, the control unit may be provided with at least a first and second handling configuration, which are adapted, respectively, for handling a container containing a gate operator of a first type and for handling a container containing a gate operator of the second type, the first and second configurations differing at least in the predetermined handle gripping and release positions, and/or in the operator release and interaction positions; and/or in the gate opening and closing positions.

[0029] According to the first aspect of the present invention, the displacing mechanism for axially moving the second holding member with respect to the first holding member, may comprise at least a guide arranged in an axial direction of the coupling head and the third operating means may comprise at least a roller chain.

[0030] According to the first aspect of the present invention, the third operating means may further comprise a hydraulic cylinder.

[0031] According to a second aspect of the present invention, it is also disclosed a method for handling waste collection containers by means of a device for handling waste collection containers according to the present in-

vention, comprising the following steps: placing the coupling head in a position such that the first holding member is located adjacent to, aligned with and at least partially around the handle of a container; operating the movement of the first movable elements to the handle gripping position, firmly securing the handle; lifting the container, placing it such that it is superposed on a discharge area; moving at least part of one movable element to its overload position when a force exerted by the container handle exceeds a threshold; returning said at least part of one movable element to its handle gripping position from its overload position when the force exerted by the container handle is inferior to the threshold.

[0032] According to the second aspect of the present invention, the method may further comprise the steps of operating the movement of the second movable elements to the position of interaction with the operator; moving the second holding member to the gate closing position by means of the displacing mechanism, allowing the second movable elements to support a vertical load produced by the weight of the waste located on the gates of the container and transmitted through the gate operator; operating the displacing mechanism until placing the second holding member in the gate opening position, causing the movement of the second holding member and the gate operator, causing the opening of the gates mechanically linked to said gate operator; and operating the displacing mechanism again until placing the second holding member in the gate closing position, causing the closing of said gates, putting the container back in its original location and releasing the first and second holding members.

[0033] According to the second aspect of the present invention, the first, second and third operating means may be controlled by means of a programmable control unit provided with at least a first and a second handling configuration, which are adapted, respectively, for handling a container containing a gate operator of a first type and for handling a container containing a gate operator of a second type, the first and second configurations differing at least in the predetermined handle gripping and release positions, and/or in the gate opening and closing positions; and wherein the programmable control unit may implement the following steps: determining if the container to be handled integrates a gate operator of a first type or a gate operator of the second type based on the information obtained by means of sensors or by means of information entered by an operator through an interface; applying a first handling configuration if the container to be handled integrates a gate operator of the first type or a second handling configuration if the container to be handled integrates a gate operator of the second type.

[0034] According to the second aspect of the present invention, a camera and/or a lidar sensor may be integrated in the coupling head for providing information of the handle and the gate operator, and in that the programmable control unit uses said information of the han-

dle and the gate operator to guide the coupling head to the handle and the gate operator and/or to determine if the gate operator is of the first type or of the second type.

[0035] It will be understood that references to geometric position, such as parallel, perpendicular, tangent, etc. allow deviations up to $\pm 5^\circ$ from the theoretical position defined by this nomenclature.

[0036] It will also be understood that any range of values given may not be optimal in extreme values and may require adaptations of the invention to these extreme values are applicable, such adaptations being within reach of a skilled person.

[0037] Other features of the invention appear from the following detailed description of an embodiment.

Brief description of the Figures

[0038] The foregoing and other advantages and features will be fully understood from the following detailed description of an embodiment with reference to the accompanying drawings, to be taken in an illustrative and non-limitative manner, in which:

FIG. 1 shows a top perspective view of an exemplary embodiment of a device for handling waste collection containers according to the present invention.

FIG. 2 shows a bottom perspective view of the first holding member of the exemplary embodiment of a device for handling waste collection containers shown in FIG. 1 with the first movable elements in the handle release position.

FIG. 3 shows a bottom perspective view of the first holding member of the exemplary embodiment of a device for handling waste collection containers shown in FIG. 1 with the first movable elements in the handle gripping position.

FIG. 4 shows a schematic front view of two different handles of waste collection containers.

FIG. 5 shows a perspective view of the first holding member of the exemplary embodiment of a device for handling waste collection containers shown in FIG. 1.

FIG. 6 shows an exploded perspective view of a first movable element of the exemplary embodiment of a device for handling waste collection containers shown in FIG. 1.

FIG. 7 shows a front view of a first movable element of the exemplary embodiment of a device for handling waste collection containers shown in FIG. 1, in its overload position.

FIG. 8 shows a section view along the cut line VIII-

VIII of the first movable element shown in FIG. 7.

FIG. 9 shows a side view of a first movable element of the exemplary embodiment of a device for handling waste collection containers shown in FIG. 1.

FIG. 10 shows a sectioned perspective view along the cut line X-X of the first movable element shown in FIG. 9.

Detailed description of an embodiment

[0039] The foregoing and other advantages and features will be fully understood from the following detailed description of an embodiment with reference to the accompanying drawings, to be taken in an illustrative and not limitative way.

[0040] FIG. 1 shows a top perspective view of an exemplary embodiment of a device for handling waste collection containers according to the present invention. The device comprises a coupling head 1 which comprises a head structure 30 arranged to be attached at a distal end of a crane arm in a waste collection vehicle (not shown). Said head structure 30 further comprises a first holding member 10 having first movable elements 14 operated by first operating means.

[0041] In the exemplary embodiment shown, the first holding member 10 comprises a lower plate 11 for housing the first movable elements 14 and an upper plate 12 attached to the head structure 30. Between said upper and lower plates 12, 11, the first holding member 10 comprises an intermediate plate (in this view is hidden). Said intermediate plate is driven by an actuator 20, which in the exemplary embodiment shown is a hydraulic cylinder, which rotates said intermediate plate around a longitudinal axis of the head structure 30.

[0042] In this view can be seen a channel 110 that houses and guides a corresponding first movable element 14, which slides or moves along said channel 110.

[0043] In this exemplary embodiment, the linear travel of the first movable elements 14 along their corresponding channel 110 is limited by the actuator 20, and in particular, by the rotation that the actuator 20 imparts to the intermediate plate by the protruding part 132.

[0044] FIGS. 2 and 3 show a bottom perspective view of the first holding member 10 of the exemplary embodiment of a device for handling waste collection containers shown in FIG. 1, with the movable elements in its handle release position and in its handle gripping position, respectively.

[0045] As can be seen, the exemplary embodiment shown comprises four first movable elements 14 arranged in a cross shaped manner. However, other embodiments can have a different number of first movable elements 14, for example, a pair of them facing each other.

[0046] In this exemplary embodiment, the lower plate 11 defines a circular opening 112 for the passage there-

through of the handle 2, 2' of a waste collection container 3 (see FIG. 4) to be handled by the device object of the present invention.

[0047] In these figures can be seen the link member 141 that, in this exemplary embodiment, operatively connects each first movable element 14 to the intermediate plate of the first holding means 10.

[0048] In this exemplary embodiment, the intermediate plate is at least partly guide by a corresponding circular groove or housing in the lower plate 11 and in the upper plate 12.

[0049] In this exemplary embodiment, each first movable element 14 is operatively connected to a link member 141 that is also operatively connected to the intermediate plate, so that the rotation of the intermediate plate simultaneously drives all first movable elements 14. The connection between the first movable element 14, the link member 141 and the intermediate plate is preferably done using non-permanent attachment means, such as, bolts and nuts, screws, etc. This particular embodiment also comprises a plate for each first movable element 14, placed between the lower plate 11 and the intermediate plate 13 that can, among other benefits, ease the movement, and in particular, ease the rotation of the intermediate plate relative to the head structure 30 and the first holding member 10 by easing the sliding of the intermediate plate 13 relative to the upper and lower plates 12, 11 that are fixed.

[0050] In the embodiment shown, the upper plate 12 is attached to the lower plate 11 using threaded fasteners, however other types of fastening means can also be used.

[0051] FIG. 4 shows a schematic front view of two different handles 2, 2' of a waste collection container 3.

[0052] The device object of the present invention can be used for handling containers 3 having gates on its lower face, filling openings in its upper half, a handle 2, 2' firmly attached to the container 3 on its upper face, which allows holding the entire container and its waste load through said handle 2, 2'. Certain containers 3 can have a handle 2, 2' comprising a gate operator 201, 201' arranged in a position adjacent or concentric to said handle 2, 2', which is mechanically linked to the gates of the container 3, for example, by means of an articulated bar mechanism or a cable and pulley mechanism. Said mechanical link allows the axial movement of the gate operator 201, 201' to cause the opening and closing of said gates and to cause at least a part of the weight of the waste deposited on the lower gates of the container 3 to be transmitted through the mentioned mechanical link to the gate operator 201, 201' while lifting the container 3. In embodiments of the device of the present invention comprising a second holding member having second movable elements, said transmitted loads are supported by said second holding member.

[0053] As can be seen, both handles 2, 2' comprise a tubular section 202 and a head 200 protruding from said tubular sections 202. In both handles 2, 2' shown, the

tubular section 202 has a squared cross-section, although other handles 2, 2' can have tubular sections having different cross-sections.

[0054] In the gate operator 201 of the first type, the gate closing position will be the position in which said operator 201 is completely inserted into the handle 2, without projecting above the same, whereas the gate opening position will be the position in which said gate operator 201 of the first type projects a predetermined distance from the handle 2. In FIG. 3 the gate operator 201 of the first type is shown in the gate opening position. However, in other embodiments, the gate opening position can be the position in which the operator is completely inserted into the handle, without projecting above the same, whereas the gate closing position can be the position in which said gate operator projects a predetermined distance from the handle.

[0055] In the gate operator 201' of the second type, said gate operator 201' comprises a flange and the gate opening position will be the position in which said gate operator 201' is in the lower point of its vertical travel, the mentioned flange being close to and superposed to the handle.

[0056] This one will also be the resting position of the gate operator 201' of the second type, the container 3 being supported on the ground, and the opening of the lower gates therefore being prevented as they are supported on the ground. In the case shown in FIG. 3, although the gate operator 201' of the second type is in the gate opening position, the gates will remain closed as they are supported on the ground, which means that the mechanical link between the gate operator 201' of the second type and the gate must allow that position, for example, by integrating cables or chains that can stay loose in this resting position.

[0057] The gate closing position of the gate operator 201' of the second type will be the position in which the flange of the gate operator 201' of the second type is arranged at a predetermined distance from the head 200 greater than the distance existing in the gate opening position, in the upper limit of its vertical travel.

[0058] The two types of handles 2, 2' depicted in FIG. 4 have been shown for illustrative purposes, as other types of handles 2, 2' of waste collection containers 3 can also be used with the device of the present invention.

[0059] FIG. 5 shows a perspective view of the first holding member 10 of the exemplary embodiment of a device for handling waste collection containers shown in FIG. 1. In this view can be seen a channel 110 that houses and guides a corresponding first movable element 14, which slides or moves along said channel 110. Sliding or moving along their corresponding channel 110, the first movable elements 14 move in a radial manner from the handle release position to the handle gripping position, and vice versa. In the handle release position, the first movable elements 14 are placed so that they do not interfere with the container handle 2, 2' of the container 3 (see FIG. 4) and the device of the present invention

can be uncoupled from the container 3. In the handle gripping position, a flat or planar surface of the first movable elements 14 is placed in contact with a corresponding flat surface of the container handle 2, 2', and in particular, with a corresponding flat surface of the tubular section 202 of the container handle 2, 2', firmly securing the container handle 2, 2' to the device of the present invention. In said handle gripping position the first movable elements 14 interfere geometrically with the head 200 of the container handle 2, 2', thus providing a more secure coupling between the container handle 2, 2' and the device for handling waste container of the present invention.

[0060] This figure clearly depicts the protruding part 132 of the intermediate plate protruding from the upper plate 12 through the aperture 120. Although in the embodiment shown the aperture 120 is in the upper face of the upper plate 12, in other embodiments, said aperture can be in the side face of said upper plate 12, as the protruding part 132 in other embodiments can also protrude radially instead of longitudinally with respect to a longitudinal axis of the head structure 30 (see FIG. 1).

[0061] In the exemplary embodiment shown, in order to allow a tilting motion of the link member 141 with respect to its corresponding first movable element 14, each first movable element 14 comprises an indentation. A groove 111 aids in allowing and guiding the movement of the first movable element 14 by guiding a pin that slides along a corresponding groove.

[0062] FIG. 6 shows an exploded perspective view of a first movable element 14 of the exemplary embodiment of a device for handling waste collection containers shown in FIG. 1. The first movable element 14 of the exemplary embodiment shown comprises a sliding element 143 having a first end having a flat surface for being placed in contact with the handle 2, 2' of the container 3 (see FIG. 4). Said sliding element 143 has a second end operatively connected to a resilient element, which in the case of the exemplary embodiment shown is a spring 145, which is operatively fixed to the first movable element 14.

[0063] In other embodiments, the resilient element can comprise two or more springs 145 arranged to work in parallel.

[0064] In this exemplary embodiment, the sliding element 143 is partially housed in a chamber 144, which guides the movement of the corresponding sliding element 143, among other functions.

[0065] In the handle gripping position and in the handle release position, said sliding element 143 protrudes from the chamber 144 (see FIGS. 9 and 10). However, when the container handle 2, 2' applies a force to said sliding element 143 greater than a certain threshold, the spring 145 is compressed and the sliding element 143 moves into the chamber 144, thereby reaching an overload position of the first movable element 14. When said excess force disappears, i.e., the force that the first movable element 14 receives comes back to the normal or regular

values, the spring 145 pushes the sliding element 143 back to its resting or working position.

[0066] When the sliding element 143 moves the overload position of the first movable element 14, the container handle remains secured as the upper face of the first movable element 14 still interferes with the head 200 of the handle 2, 2'.

[0067] In the exemplary embodiment shown, the sliding element 143 is operatively attached to the spring 145 by a washer 148 and a connection pin 147. However, in other embodiments said connection may be deferent. Said connection is preferably non-permanent, so that the first movable element 14 can be disassembled for maintenance, for example. However, said connection can also be made using permanent attaching means.

[0068] In this exemplary embodiment, the spring 145 operatively abuts against a cap 146 of the first movable element. Said cap allows for easy access to the inside of the first movable element 14, and in particular, to the chamber 144 and the elements housed therein. However, other embodiments can lack of such cap 146. In other embodiments, there can be intermediate elements between the resilient element and the cap 146.

[0069] In this embodiment, the first movable element 14 comprises a protrusion 149 in one of its lateral faces for sliding along a groove of matching shape in the lower plate 11, thus aiding in the guidance of the first movable element. Other embodiments can lack of such protrusion 149, and the counterpart groove, or can have a protrusion 149 on each lateral face, and thus, the lower plate has a corresponding groove on each lateral face of the channel 110 (see, for example, FIG. 5).

[0070] In order to further increase the guidance of the first movable element 14, in this exemplary embodiment, the first movable element defines a groove or channel 150 for receiving a corresponding protrusion in the lower plate 11. As can be seen in greater detail in FIG. 9, the first movable element 14 of the embodiment shown comprises a groove or channel 150 on each lateral face, an in particular, on the lower portion of each lateral face. However, the first movable element 14 can only comprise a channel in one of its lateral faces, or even lack of it.

[0071] FIG. 7 shows a front view of a first movable element 14 of the exemplary embodiment of a device for handling waste collection containers shown in FIG. 1. As can be seen, in this figure the first movable element 14 is in its overload position as the sliding element 143 is completely housed in the body of the first movable element 14. This can be seen in greater detail in the section view of FIG. 8 along the cut line VIII-VIII depicted in FIG. 7.

[0072] FIG. 8 shows a section view of the first movable element shown in FIG. 7 along the cut line VIII-VIII. This section view clearly shows the sliding element 143 completely housed in the body of the first movable element 14. In order to reach its overload position, it is not necessary that the sliding element 143 is completely inserted in the chamber 144, as a slight insertion therein may suffice to reduce the force applied by the container handle

2, 2' that a particular first movable element 14 has to withstand.

[0073] This sectional view shows the arrangement of the sliding element 143, the washer 148, the connection pin 147, the spring 145 and the cap 146.

[0074] FIG. 9 shows a side view of a first movable element 14 of the exemplary embodiment of a device for handling waste collection containers shown in FIG. 1. Contrary to what is shown in FIGS. 7 and 8, in this figure the first movable element 14 is in its resting or working position, that is to say, in the handle gripping or in the handle release position, with the sliding element 143 protruding from the body of the first movable element 14.

[0075] In the handle release position and in the handle gripping position, the sliding element 143 protrudes substantially the same. Only when a force applied to said sliding element 143 exceeds a certain threshold, said threshold being determined by the spring 145, the sliding element moves to the overload position by moving inside the chamber 144, wholly or in part.

[0076] The side view of FIG. 9 allows the clearly see the protrusion 149 in a side face and both grooves or channels 150 of the first movable element 14. As each first movable element 14 has to withstand considerable forces when lifting a container that is full, it is advantageous that the first movable element 14 is properly guided.

[0077] In FIG. 9 is also depicted the cut line X-X

[0078] FIG. 10 shows a sectioned perspective view along the cut line X-X of the first movable element shown in FIG. 9. This view shows the internals of a first movable element 14 of the exemplary embodiment of the present invention shown.

[0079] Certain embodiments of the device according to the present invention can comprise a second holding member having second movable elements arranged to be operated by means of second operating means, said second movable elements being movable between a gate operator release position and a position of interaction with the gate operator 201, 201' and allowing said movable elements to come into geometric interference with the gate operator 201, 201', preventing its free movement, the first holding member being adapted to be attached to the handle 2, 2' and the second holding members being adapted to be arranged in the position of interaction. Said embodiments according to the present invention also comprise a displacing mechanism arranged to be operated by third operating means envisaged for axially moving said second holding member with respect to said first holding member between gate closing and gate opening positions, by means of the relative axial movement between the handle 2, 2' and the gate operator 201, 201' of the mentioned container 3, causing the closing and/or opening of the lower gates of the container 3. That is to say, said embodiments besides handling the waste collection container 3, can also empty their content in a discharge area. In embodiments lacking such features, the containers 3 can be emptied, for example, by

an operator manually activating a discharge mechanism of the containers 3. Embodiments of the device according to the present invention which are able to discharge the content of the container 3 are preferred, but as previously stated, are not necessary.

[0080] In the exemplary embodiment shown, each first movable element 14 comprises two lateral faces perpendicular to its flat surface and chamfered edges between the flat surface and the lateral faces. However, in other embodiments the first movable elements 14 can have a different shape than the one described.

[0081] In the exemplary embodiment shown, the first movable elements 14 comprise a sliding member 143 that moves along a longitudinal axis of the corresponding first movable element to move to the overload position when a force exerted by the container handle 2, 2' exceeds a certain threshold. However, in other embodiments, for example, an end of the first movable element can be attached to the rest, or body, of the first movable element via a resilient element, so that part of said first movable element, in particular, said end, moves to the overload position. Other arrangements or configurations of the first movable elements are also possible and within the scope of the present invention.

[0082] It will be understood that various parts of one embodiment of the invention can be freely combined with parts described in other embodiments, even being said combination not explicitly described, provided that such combination is within the scope of the claims and that there is no harm in such combination.

Claims

1. Device for handling waste collection containers, the device comprising a coupling head (1) which comprises a head structure (30) arranged to be attached to the distal end of a crane arm comprised in a waste collection vehicle, said head structure comprising:

a first holding member (10) having first movable elements (14) operated by means of first operating means, said first movable elements (14) being movable between a handle gripping position and a handle release position and for being coupled to a mushroom-shaped handle (2, 2') fixed on an outer surface of a container (3) and for holding up said container (3) through said handle (2, 2'), each of said first movable elements (14) having a flat surface adapted for being placed in contact with a corresponding flat surface of the mushroom-shaped handle (2, 2') in their handle gripping position;
said first operating means being controlled by means of a control unit;
characterized in that at least part of the first movable elements (14) is movable from the handle gripping position to an overload position, in

which the first movable elements (14) are into geometric interference with the mushroom-shaped handle (2, 2'),
and **in that** the first holding member (10) comprise resilient elements configured to move at least part of the first movable elements (14) from the handle gripping position to the overload position when a force exerted by the container handle (2, 2') exceeds a threshold.

2. Device, according to claim 1, wherein the first movable elements (14) comprise a sliding element (143) having a first end having a flat surface for being placed in contact with the mushroom-shaped handle (2, 2') in the container handle position and a second end operatively attached to a first end of a resilient element operatively fixed to the corresponding first movable element (14).
3. Device, according to claim 2, wherein the sliding element (143) is partly housed in a chamber (144) of the corresponding first movable element (14), the corresponding resilient element being housed in said chamber.
4. Device, according to claim 3, wherein the second end of the resilient element operatively abuts against a cap (146) of the corresponding chamber (144).
5. Device, according to claim 3 or 4, wherein the sliding element (143) is configured to slide along the corresponding chamber (144) to move from the handle gripping position to the overload position, and vice versa.
6. Device, according to any one of the preceding claims, wherein the first holding member (10) comprises a lower plate (11) for housing the first movable elements (14), and an intermediate plate for simultaneously actuating the first movable elements (14), said intermediate plate being arranged between the lower plate (11) and an upper plate (12) attached to the head structure (30).
7. Device, according to claim 6, wherein an end of each first movable elements (14) is operatively connected to the intermediate plate by a link member (141).
8. Device, according to claim 7, wherein at least part of the link member (141) slides along a groove matching the shape of the link.
9. Device, according to any one of claims 6 to 8, wherein the first operating means comprise an actuator (20) and wherein the intermediate plate comprises a protruding part (132) for being operatively connected to said actuator (20).

10. Device, according to claim 9, wherein the actuator (20) is configured to rotate the intermediate plate relative to the head structure (30).

11. Device, according to any one of the preceding claims, wherein each first movable element (14) comprises two lateral faces perpendicular to its flat surface. 5

12. Device, according to any one of the preceding claims, wherein the first holding member (10) comprises at least a pair of movable elements (14) facing each other. 10

13. Device, according to any one of the preceding claims, wherein said head structure (30) further comprises: 15

- a second holding member having second movable elements arranged to be operated by means of second operating means, said second movable elements being movable between a gate operator (201, 201') release position and a position of interaction with the gate operator (201, 201') and allowing said second movable elements to come into geometric interference with the gate operator, preventing its free movement, the first holding member being adapted to be attached to the handle and the second holding members being adapted to be arranged in the position of interaction, and the gate operator (201, 201') being arranged in the container (3) in a position adjacent and/or concentric to said handle (2, 2') and mechanically linked to lower gates of the container (3) for controlling their opening and closing; 20 25 30 35

- a displacing mechanism arranged to be operated by a third operating means envisaged for axially moving said second holding member with respect to said first holding member between gate closing and gate opening positions, by means of the relative axial movement between the handle and the gate operator (201, 201') of the mentioned container (3) linked to the first and second holding members, causing the closing and/or opening of said lower gates of the container mechanically linked to the gate operator (201, 201'); and 40 45

wherein the second movable elements are movable between the gate operator (201, 201') release position and the position of interaction with the gate operator (201, 201'); and the first, second and third operating means are controlled by means of the control unit. 50 55

14. Method for handling waste collection containers by means of a device for handling waste collection con-

tainers according to any one of claims 1 to 13, comprising the following steps:

- placing the coupling head (1) in a position such that the first holding member (10) is located adjacent to, aligned with and at least partially around the handle (2, 2') of a container (3);
- operating the movement of the first movable elements (14) to the handle gripping position, firmly securing the handle (2, 2');
- lifting the container (3), placing it such that it is superposed on a discharge area;
- moving at least part of one movable element (14) to its overload position when a force exerted by the container handle (2, 2') exceeds a threshold;
- returning said at least part of one movable element (14) to its handle gripping position from its overload position when the force exerted by the container handle (2, 2') is inferior to the threshold.

15. Method, according to claim 14, further comprising the steps of:

- operating the movement of the second movable elements to the position of interaction with the operator (201, 201');
- moving the second holding member to the gate closing position by means of the displacing mechanism, allowing the second movable elements to support a vertical load produced by the weight of the waste located on the gates of the container (3) and transmitted through the gate operator (201, 201');
- operating the displacing mechanism until placing the second holding member in the gate opening position, causing the movement of the second holding member and the gate operator (201, 201'), causing the opening of the gates mechanically linked to said gate operator (201, 201'); and
- operating the displacing mechanism again until placing the second holding member in the gate closing position, causing the closing of said gates, putting the container back in its original location and releasing the first and second holding members.

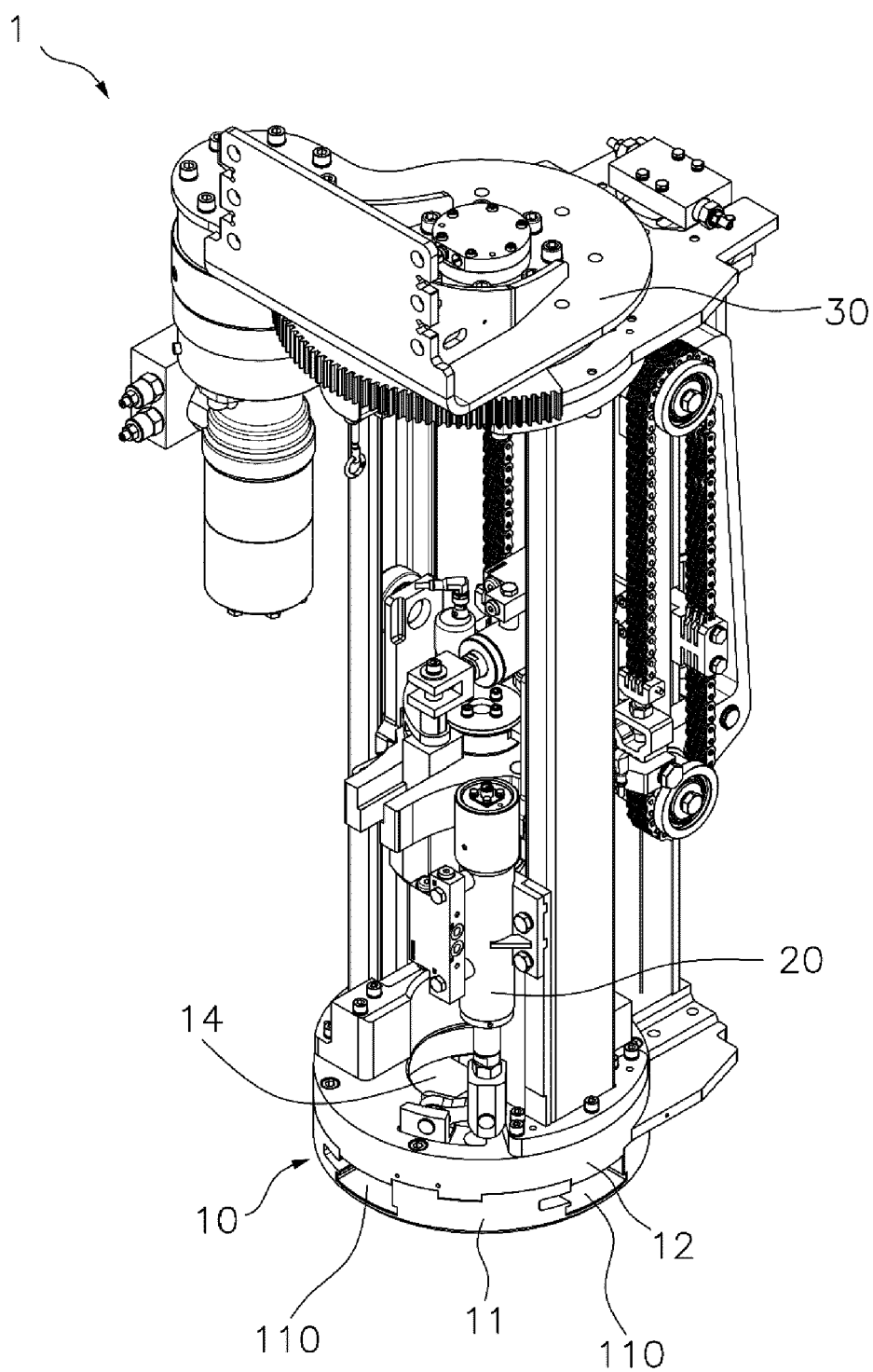


Fig. 1

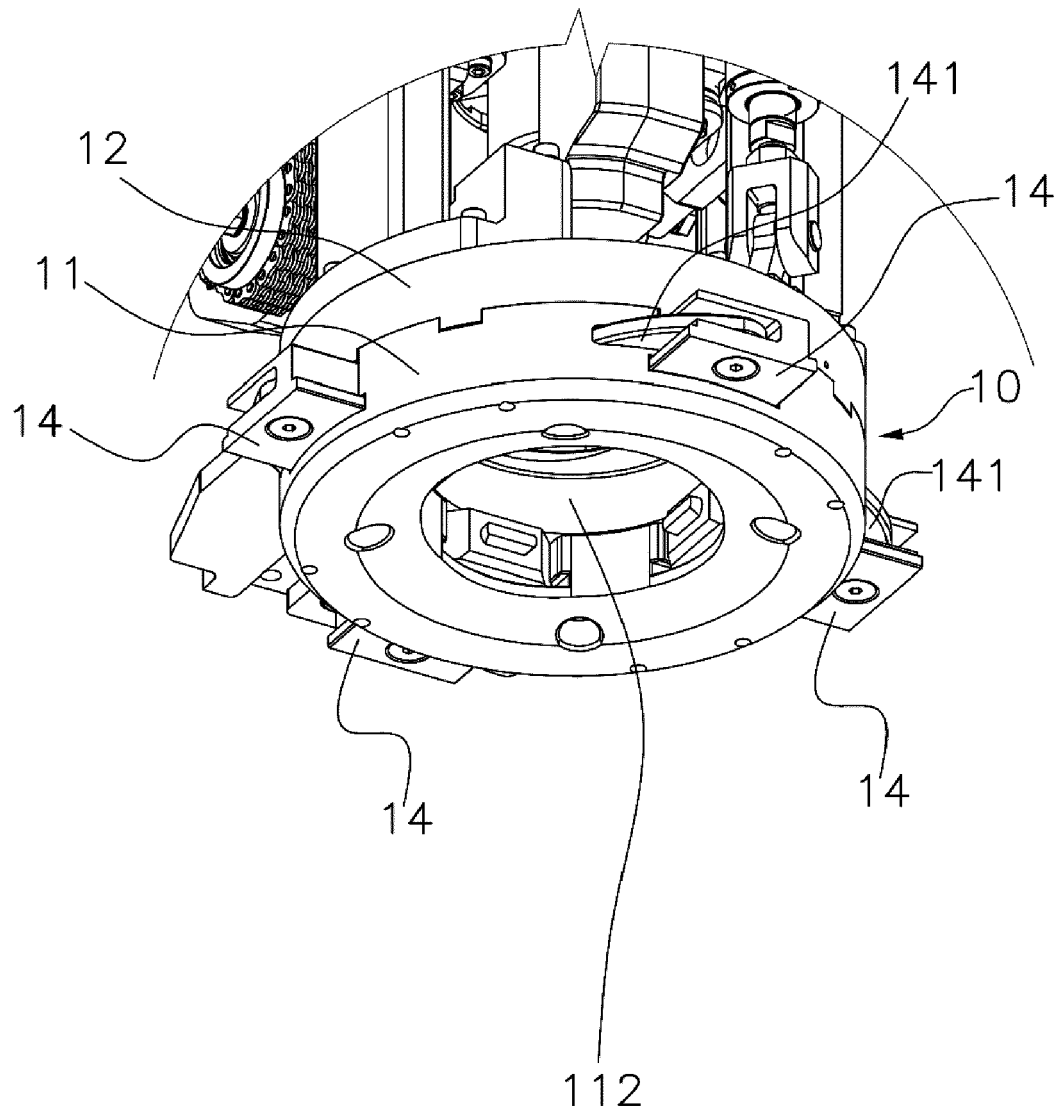


Fig.2

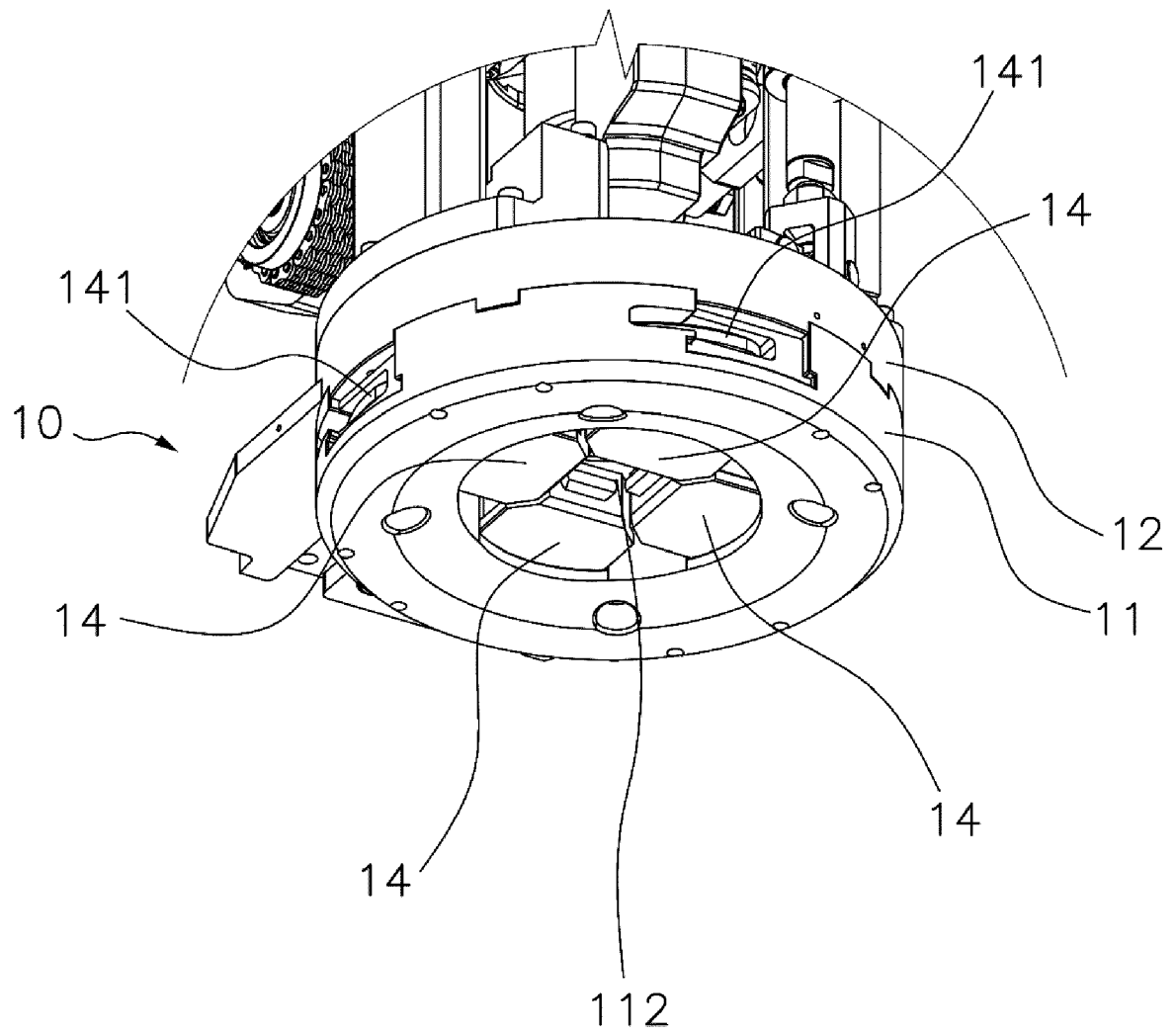


Fig.3

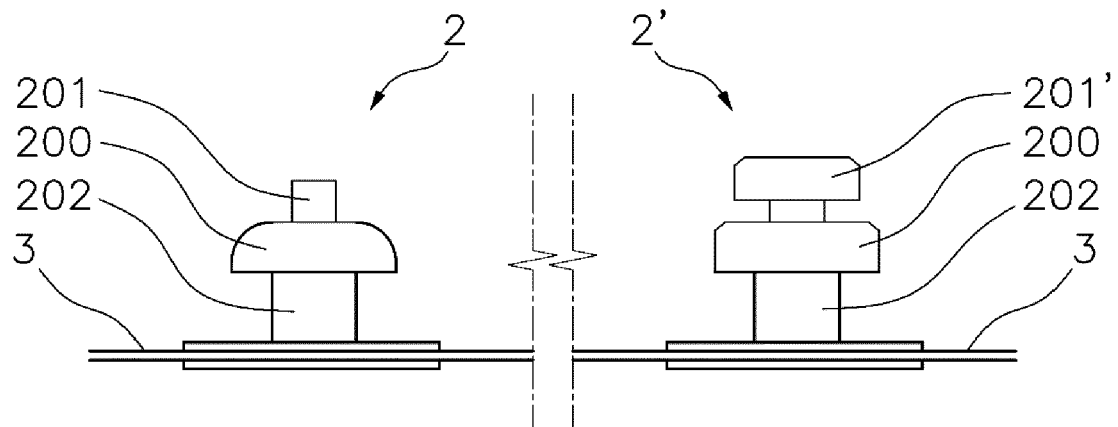


Fig. 4

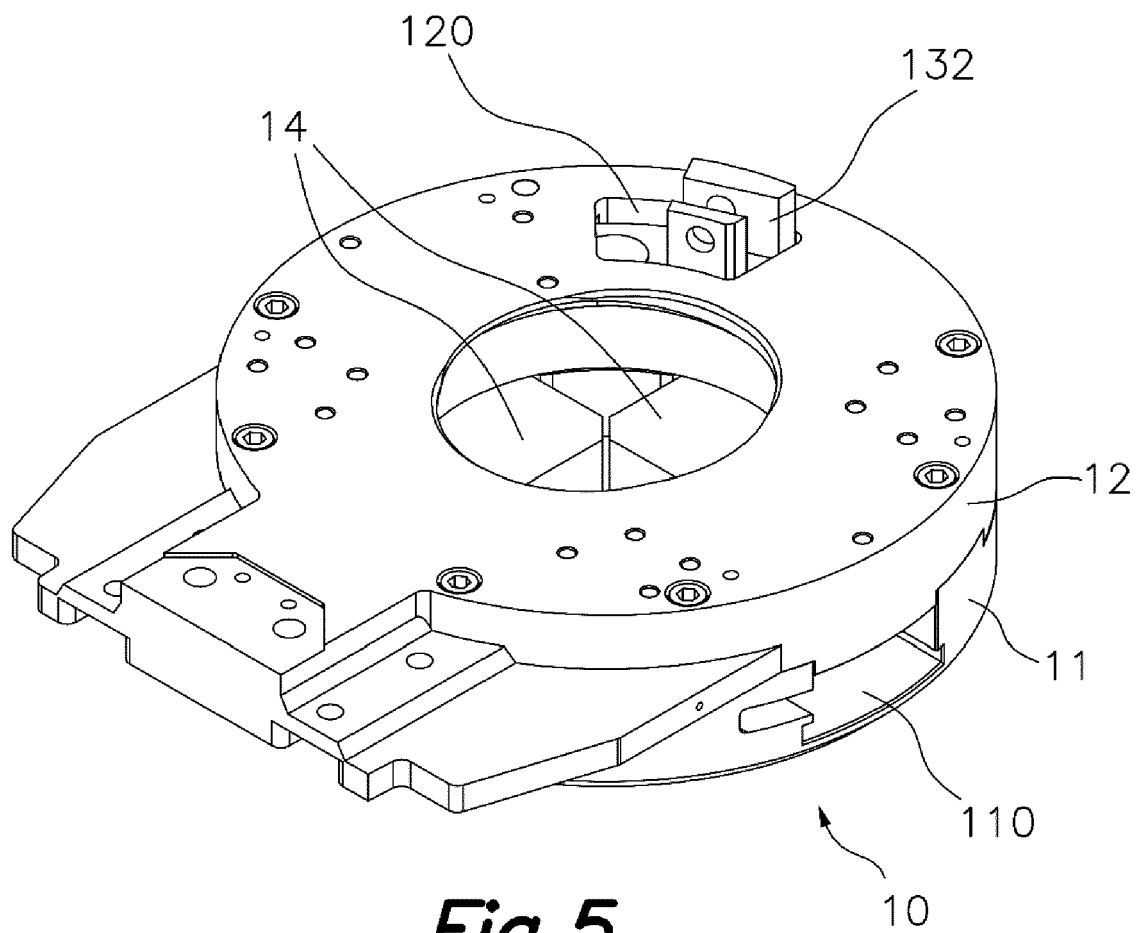


Fig. 5

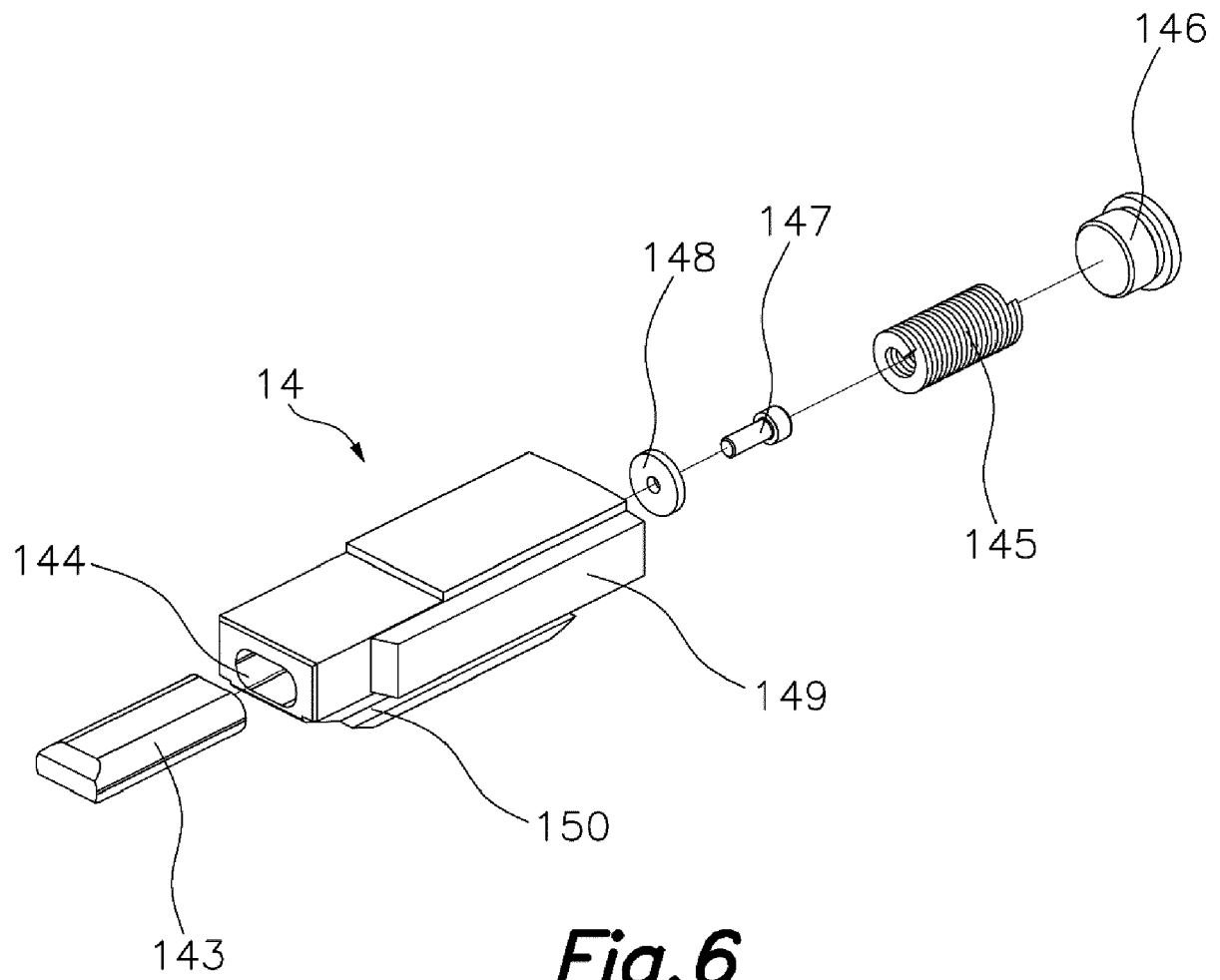


Fig. 6

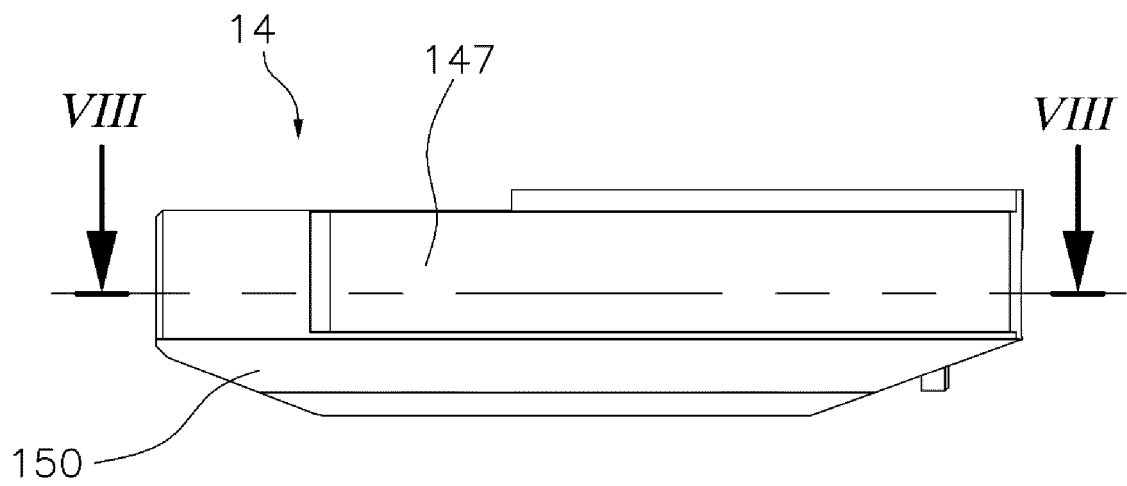


Fig. 7

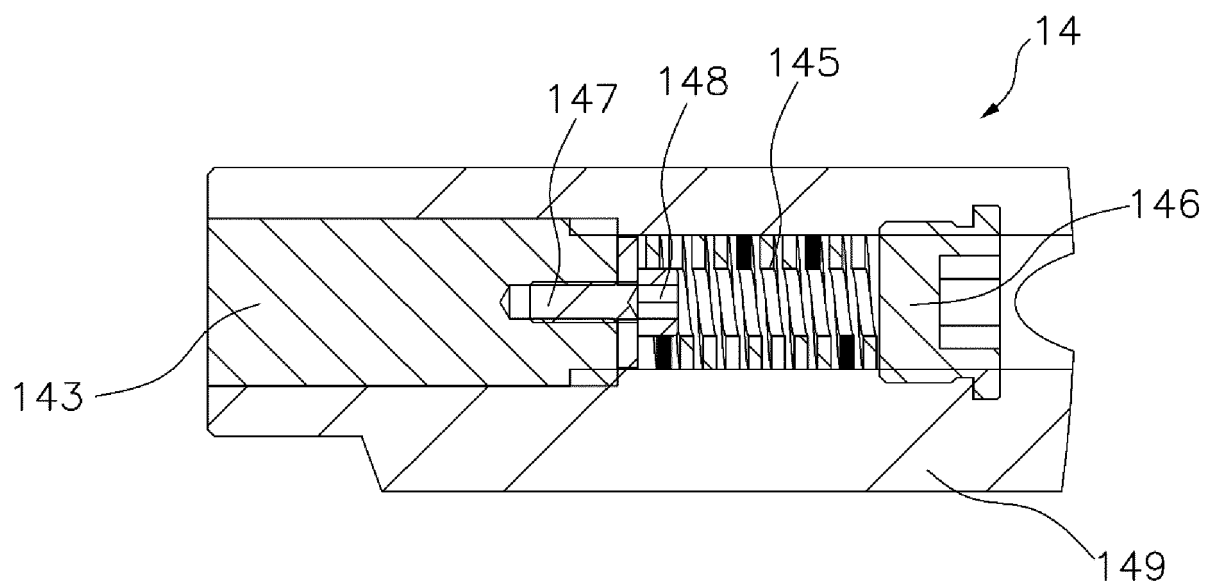


Fig. 8

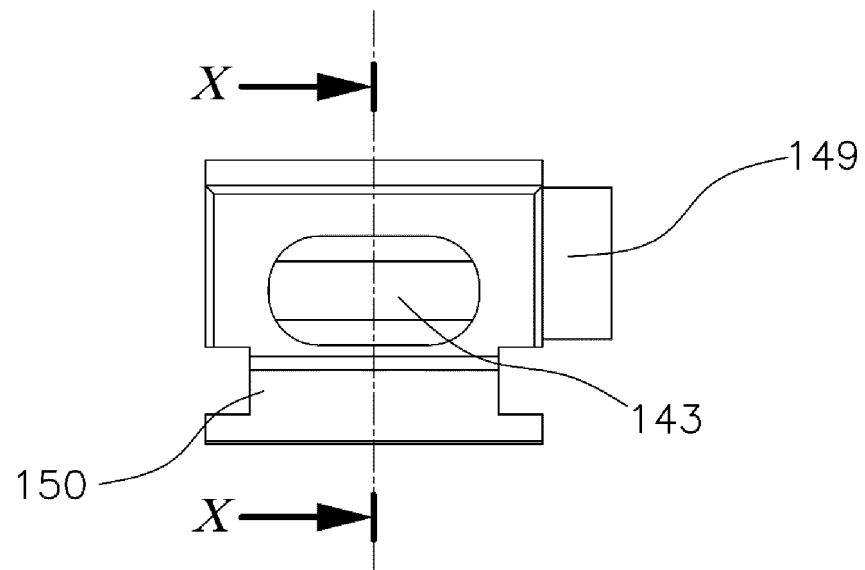


Fig. 9

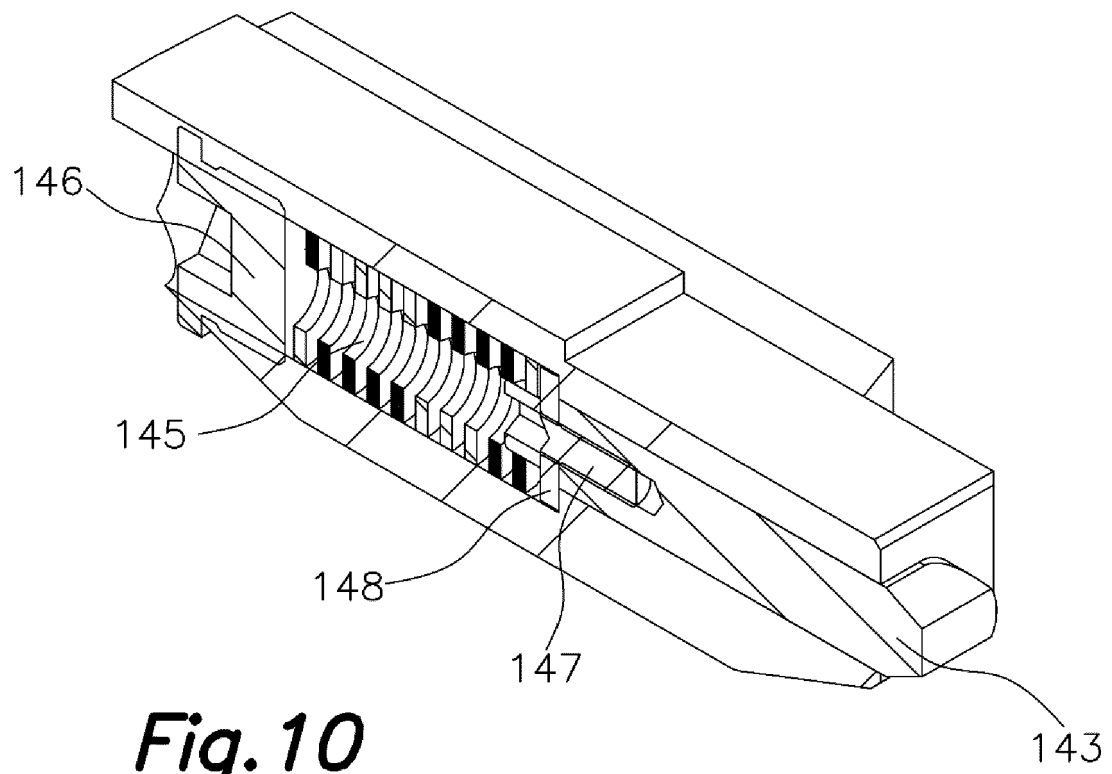


Fig. 10



EUROPEAN SEARCH REPORT

Application Number

EP 22 38 2670

5

10

15

20

25

30

35

40

45

50

55

1

EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 014 870 A (KINSHOFER ALFRED [DE]) 14 May 1991 (1991-05-14) * column 4, line 59 - column 7, line 3; figures 1-4 *	1-15	INV. B65F1/12 B65F1/14 B65F3/02
A	DE 44 41 551 C1 (KINSHOFER GREIFTECHNIK [DE]) 1 February 1996 (1996-02-01) * page 11, last paragraph - page 13, last paragraph; figures 4,5 *	1-15	
A	EP 2 868 599 A1 (PALVI S L [ES]) 6 May 2015 (2015-05-06) * paragraph [0014]; figures *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 December 2022	Examiner Serrano Galarraga, J
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	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 38 2670

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-12-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5014870 A	14-05-1991	AT 81486 T	15-10-1992
		DE 3915580 A1	15-11-1990
		EP 0399280 A2	28-11-1990
		US 5014870 A	14-05-1991
DE 4441551 C1	01-02-1996	DE 4441551 C1	01-02-1996
		DE 9418696 U1	29-02-1996
EP 2868599 A1	06-05-2015	EP 2868599 A1	06-05-2015
		ES 2581566 T3	06-09-2016
		PL 2868599 T3	31-10-2016

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 3115317 A1 [0003]
- DE 29905551 U1 [0005]
- EP 1916218 A1 [0005]
- EP 1172308 A1 [0005]