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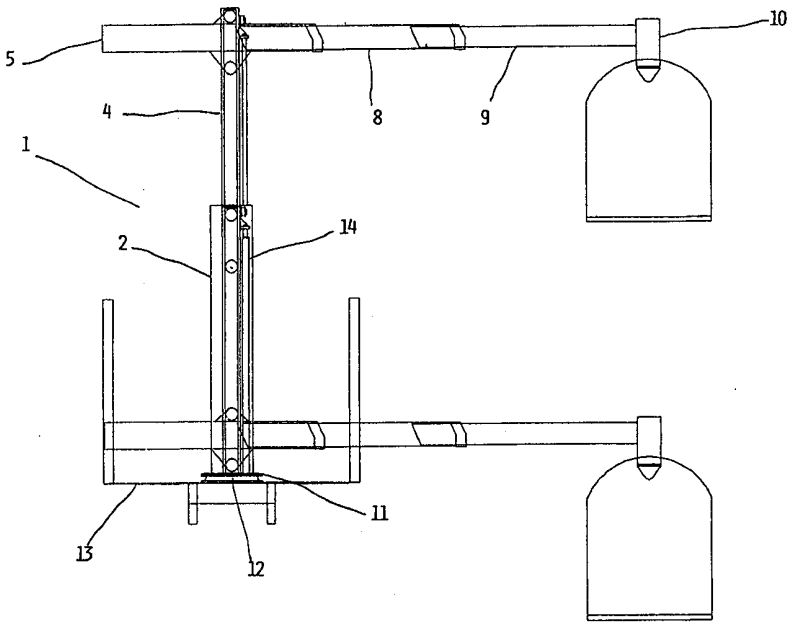

(57) Abstract

A system and/or device for handling waste collection containers and emptying their content, particularly for differentiated waste collection, characterized in that there are provided: first means (5, 8, 9) for the horizontal translation and the support of a hooking member (10; 33) for a waste container (23); second means (4, 4', 6, 6', 7) for the vertical translation of said hooking member (10; 33); third means (2, 2', 4, 4') for housing said vertical translation means (4, 4', 6, 6', 7); fourth means (11, 12) for producing the rotation of said hooking member (10; 33) in a horizontal plane.

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SYSTEM AND/OR DEVICE FOR HANDLING WASTE COLLECTION CONTAINERS

DESCRIPTION

The present invention relates to a system and/or a device for handling waste collection containers, and emptying their contents, particularly for differentiated waste collection.

Waste collection containers, particularly for differentiated waste collection, such as glass, paper, plastic, etc., are made with their loading openings substantially in their upper part, whereas their emptying is performed through an opening provided on their lower part.

In general, they are shaped like a bell or essentially with a square and/or rectangular section.

Handling and emptying the contents of such containers is performed using motor vehicles comprising a stack body to contain the refuses and an articulated multi-axis mechanical swing arm, being hydraulically controlled, which is usually positioned between the stack body and the cab of the motor vehicle, for hooking the container, transfer it above the stack body and have the refuses unloaded into it.

In order to perform this operation, the collecting operator, in the specific case the motor-vehicle driver, has to leave the motor vehicle after parking it close to the container, to actuate the arm.

Mechanical arm controls are in fact located outside the motor vehicle, for the operator to check the correct positioning of the mechanical arm on the container and provide for its hooking.

For its hooking to the mechanical arm, the container has a hook on its upper part.

After having hooked the container to the mechanical arm and placed it above the motor-vehicle stack body, the operator can empty the contents from the container into the body.

This emptying operation is done by hooking a second hook to the mechanical

arm, also located on the upper part of the container and connected to the closure device of the lower part of the container.

The closure device on the lower section of the container is deactivated exerting a pull on said hook, thus causing the refuses to fall inside the motor-vehicle stack body.

The operator, after connecting the first hook to the mechanical arm again, can now lift the empty container, put it back on the ground and return the arm to its correct rest position on the motor-vehicle, to then drive further on to a next container to be emptied.

This operation is considerably time consuming and entails high costs for each container to be emptied.

A semi-automatic handling for waste containers, in particular for differentiated waste collection, is also disclosed in patent application WO 96/39347; according to such a solution, a plurality of containers is provided, whose configuration allows to place them directly adjacent one to the other; to this purpose, the housings of such side-by-side containers are shaped for defining suitable wall portions apt to be reciprocally coupled and obtain a certain restraint between one side of a container and the side of another container.

This solution leaves no free space from one container to the other, so improving the whole appearance of the waste collection area; in particular, it eliminates the possibility of depositing waste outside, between one container and the other, as this would actually hinder a semi-automatic waste collection.

According to patent application WO 96/39347 a multi-axis articulated mechanical arm is provided between the motor-vehicle stack body and the cab for the handling of such containers.

However, as experienced in the practice, due to the particular configuration of the coupled containers, for the purposes of emptying the refuses, each container has to be picked up and returned to its original position operating most possibly a vertical movement; this is to avoid excessive interference

between the containers and consequent mechanical stresses on them.

However, this is not easily obtained through the handling solution disclosed in WO 96/39347, since the motion of the articulated arm described by it causes oscillations to the container being handled and interfere to an excessive extent with the adjacent containers, with the ensuing problems mentioned above.

Moreover, the articulated arm used according to the known state of the art is expensive and complicated for its manufacture and use.

It is the aim of the present invention to provide a system and/or device for handling waste collection containers and emptying their contents, in particular for differentiated waste collection, which has not the drawbacks of the known state of the art, but has operating advantages and is easy to use.

In order to achieve such aim, it is the object of the present invention to provide a system and/or device for handling waste collection containers and emptying their contents, in particular for differentiated waste collection, incorporating the features of the annexed claims, which form an integral part of the present description.

Further objects, features and advantages of the present invention will become apparent from the following detailed description and annexed drawings, which are supplied by way of non limiting example, wherein:

- Figure 1 shows schematically a view of the handling device, represented in two different operating positions, according to the teachings of the present invention;
- Figure 2 shows a plan view of the device according to the present invention;
- Figure 3 shows schematically a side view of the motor-vehicle with the handling device in two different emptying positions of a container according to the present invention;
- Figure 4 shows schematically a rear view of the motor-vehicle incorporating the device with its arm in different loading and/or unloading positions of a container according to the present invention;

- Figure 5a, 5b and 5c show side views of three configurations of the hooking member for the handling device according to the present invention;
- Figures 6 and 7 show schematically a cross section of a waste collection container in its closed position and opening position, with the hooking element of the handling device inserted inside the container, according to the present invention;
- Figures 8 and 9 show schematically a length-wise section of a waste collection container in its closed position and opening position, with the hooking element of the handling device inserted inside the container, according to the present invention;
- Figures 10, 11,12 and 13 show schematically a variant embodiment of the hooking element apt for handling containers for non differentiated waste collection, in its hooking position and released position for two different containers widths, according to the present invention;
- Figure 14 shows schematically a vertical section of the variant embodiments of the hooking element represented in the Figures 10-13, according to the present invention;
- Figures 15 and 16 show schematically a side view of the emptying operation of the container, according to the present invention, as for the variant embodiment represented in Figures 10-13.

In the Figures 1 and 2, which show schematically a view of the device in two different operating positions, and a plan view of the device according to the present invention, reference number 1 indicates the device in general.

Said device 1 comprises two fixed sturdy "C"-profiles indicated with 2 and 2', with two semicircular plates 3 welded on their external side and having about the same height as said profiles 2 and 2', whose function is to strengthen and cover the device 1 outside.

Reference numbers 4 and 4' indicate two "I"-shaped guides sliding vertically between profiles 2 and 2', by means of bearings 6 fastened to said profiles 2 and 2', and bearings 6' fastened below said guides 4 and 4' and sliding within said profiles 2 and 2'.

Moreover, an extendable arm 5 is provided, which is located across the ends of plates 3.

The arm 5 is provided for moving vertically within the guides 4 and 4'.

Said arm 5 slides on guides 4 and 4' over bearings 7 fastened to the arm 5.

Said arm 5 is extendable through a telescopic end, i.e. obtained through several sections sliding one inside the other, indicated with 8 and 9, so as to extend the arm length; motion of sections 8 and 9 is obtained hydraulically as commonly known.

On the end of arm 5 an interchangeable hooking member for a container is indicated with 10.

The above profiles 2 and 2' with their respective semicircular plates 3 are fastened vertically and integrally to a base 11. This base 11 is fastened to a swiveling platform 12 mounted on the flatbed 13 of the motor-vehicle carrying the device.

Said swiveling platform 12 allows rotation of the arm 5 when it is lifted in its work position, so as to position the end of the arm carrying the hooking member 10 both in its coupling position for a container located on one side of the motor-vehicle, in the coupling position for a container located on the opposite side of the motor-vehicle and also for positioning the container above the motor-vehicle stack body, to empty its contents as represented in the Figures 3 and 4.

Rotation of the swiveling platform 12 is obtained by means commonly known, such as a motor and reduction gear.

When the telescopic elements 8 and 9 of the arm 5 are retracted, the length of the latter is shorter than the width of the motor-vehicle; thus, there will be no protrusions hindering the drive of the motor-vehicle itself.

Reference numbers 14 and 14' indicate two oil-dynamic cylinders for the lifting of guides 4 and 4', one for each guide (the figure shows the oil-dynamic cylinder 14 only, since the cylinder 14' is mounted in a symmetric position to the cylinder 14 and is not visible in the figure).

The arm 5 slides inside the guides 4 and 4' and is motioned by a toothed

gearing and chain drive not shown in the figure, being commonly known, connected to the guides 4 and 4', so that the vertical displacement produced by the oil-dynamic cylinders 14 and 14' on the guides 4 and 4', determines a vertical displacement of the arm 5 nearly twice the displacement of said guides.

In fact, the arm 5 is positioned in its rest position in the lower part of profiles 2 and 2', whereas the heads of the guides 4 and 4' is about aligned with the upper end of said profiles 2 and 2'.

When the arm 5 has to be lifted to its maximum height, guides 4 and 4' are vertically displaced by the oil-dynamic cylinders 14 and 14', until they reach their maximum height.

At the same time, the arm 5 is lifted up to reach the end of said guides, so making a longer path (about twice the path of the guides 4 and 4'), i.e. from the base of profiles 2 and 2' up to the upper end of said profiles and up to reach the upper end of said guides.

In the Figures 5a, 5b and 5c, which represent side views of three different working position of the interchangeable hooking member for a container according to the device of the present invention, the hooking member as a whole is indicated with 10 and the terminal telescopic part of the extendable arm 5 of the device is indicated with 9.

Figure 5a shows the hooking member in its rest position, figure 5b the hooking member is represented in its coupling position of the waste container, figure 5c the hooking member is represented in its released position from the closure mechanism of the container.

Said hooking member consists of an external body 15, an internal part 16 capable of sliding inside the external body and a head 17 connected to the internal part.

Levers indicated with 18 are pivoted on the external part 15.

Said levers have a tooth 19, which protrudes from the body 15 when the levers 18 are in an upright position, i.e. in their working position.

Said levers 18 are kept in a vertical position by torsion springs, not shown for

simplicity's sake.

Said teeth 19 are provided for hooking the container for its lifting up and relevant displacement in order to realize the emptying operation.

Reference number 20 indicates two slides, which are shown in rest position flush with the body 15 (see Figure 5a).

Said slides 20, by means of a pneumatic cylinder 21, can slide horizontally and protrude outside the overall dimensions of body 15 in order to support and lift an opening/closure device of the container, as further described.

Moreover said slides 20, when are moved outside, release the levers 18 from their rest position, so that said levers, by means of the torsion springs, reach their working position, i.e. with teeth 19 being outside the overall dimensions of the body 15.

By means of an oil-dynamic cylinder indicated with 22, the internal part 16 bearing the head 17 can be vertically moved downwards.

The downwards displacement of the head 17 determines the release of the closure device of the container, as it will be further described.

In Figures 6, 7, 8 and 9, which show schematically a cross section and a length-wise section of a waste container in its closed position and open position, with the hooking of the head of the device for the handling and opening of the container to empty it according to the present invention, reference number 23 indicates a container.

Number 24 indicates the top opening to let the hooking member 10 go through.

The size of this opening is large enough to let the hooking member 10 go through.

Within the container 23, an external cylinder 25 is fixed to the upper wall of the same container, in a position being coaxial with the opening 24; a second internal cylinder 31 can slide within the cylinder 25.

Said cylinder 25 has an edge 30 in its upper part, which is turned to the inside of the cylinder to form a hooking step for the teeth 19 of the levers 18 of the hooking member.

Number 26 indicates the container lower wall that can be opened, which is usually split in two equal parts indicated with 59 and 59', each one for the closure of half the lower opening, respectively.

The closure of said lower wall 26 is obtained when placing the container on the ground, since the wall 26 is free to open by its own weight.

Inside the container a device 47 provides for the opening and/or closure of the container lower wall, as it will be further described.

Said device 47 comprises two frames, such as tubular frames, indicated with 27 and 27', respectively.

Said frames 27 and 27' have two vertical sections 28 and 28', each one being connected in an articulated way to a respective half the lower opening wall.

Both vertical sections 28 and 28' are articulated between them by a horizontal section 29, the whole substantially forming an upturned "U".

Said horizontal sections 29 are rigidly connected each one with an inclined section 58 on the upper end of the internal cylinder 31.

For the connection of said sections 58 to the cylinder 31 and for allowing their vertical motion, the cylinder 25 has two notches.

Said internal cylinder 31 has its lower part closed by a wall with a central hole 51, while its upper part is open.

Said lower part of the internal cylinder 31 is integral to the device 47 through elements 48 and 48', which connect it rigidly to both inclined sections 58.

The size of said internal cylinder 31 allows it to slide inside the cylinder 25; its length is also shorter than said cylinder 25.

In the connection with the cylinder 31, said inclined sections 58 have two teeth 32 protruding inside the cylinder, which have to be set apart a distance to let the hooking member 10 pass through.

Inside the cylinder 31 a box 52 open on its lower side and consisting of two cylindrical sections 53 and 54 with a different diameter.

Said cylindrical section 53 has an outside diameter being smaller than the inside diameter of the cylinder 31, so as to slide inside it.

The diameter of the cylindrical section 54 is substantially equal to the diameter of the opening 24 of the container 23.

Inside said box 52 a pin 55 is centrally fastened to said cylindrical section 54, which is inserted in the hole 51 on the lower wall of the cylinder 31, whose function is to center and guide the box 52.

Between the lower wall of the cylinder 31 and the inside of the box 52 is inserted a spring 56 on the pin 55.

The function of said box 52 is to close the opening 24 of the container 23 when the container rests on the ground, so as to prevent the opening 24 to be used for refuses introduction and cause problems in the hooking of the container for its emptying.

The container 23 is coupled and opened for its emptying as follows.

The hooking member 10 is inserted in the opening 24 of the container, down to a depth where the slides 20 of the head 17 are below the teeth 32 protruding in the cylinder 31.

Insertion of the hooking member 10 pushes the box 52 downwards, overcoming the resistance of spring 56.

Through the pneumatic cylinder 21 the slides 20 exit the head 17 and position themselves under the teeth 32.

Displacement of slides 20 releases the levers 18 for motion, which by means of the torsion springs position themselves with the tooth 19 under the edge 30 of the cylinder 25.

Then, the container hooked with the head 17 through the teeth 19 is lifted.

Moreover, by means of the slides 20, the device 47 for the opening and/or closure of the lower wall is locked in position.

When the container is positioned above the motor-vehicle stack body, in order to perform the emptying operation, it will be enough to actuate the oil-dynamic cylinder 22 for exiting the internal part 16 of the hooking member.

In this way, the head 17 connected to the internal part 16 is lowered; this causes the lowering of the opening device 47 of the lower wall 26, since the latter is supported by the slides 20 being present on the head 17; this allows

for performing the emptying operation.

Should the device 47, in fact, not be coupled with the slides 20, the lower wall 26 would open when the container is lifted from the ground, with a consequent discharge of its contents over the road.

The downwards displacement of the head 17 also cause the opening device 47 to be lowered by the weight of the contents inside the container, pressing on the lower wall 26, until the lower wall opens completely, with the relevant emptying of the container.

After emptying the container, a reverse operation is performed, i.e. the internal part 16 is made to retracted, so bringing the head 17 back to its initial position; the head 17 with the slides 20 also move the opening device 47 upwards with a consequent closure of the lower wall.

The container is placed back to its original position on the ground and the hooking member 10 is released from the container.

Release of the hooking member 10 is obtained by producing the retraction of slides 20 by means of the pneumatic cylinder 21; the slides 20 cause the levers 18 to rotate and release the tooth 19 from the edge 30 of the cylinder 25.

Now the hooking device can be lifted for disconnecting it from the container and bring the extendable arm 5 to its rest position on the motor-vehicle, after having also retracted both sliding sections 8 and 9 of the arm.

When the hooking device is removed from the container opening, the box 32 closes the opening 24 with the cylindrical section 53 through the spring 55.

The entire operation of positioning the motor-vehicle with respect to the container, hooking, moving and emptying the container is performed automatically through a computerized system located inside the motor-vehicle cab.

This system detects the positioning parameters for the motor-vehicle in its running direction with respect to the container, the distance between the motor vehicle and the container and positioning of the hooking member in the container.

After positioning the motor vehicle in line with the container with respect to its running direction, the driver only has to enable the computerized system for automatic performance of the whole operation.

Motor-vehicle positioning in its running direction with respect to the container to be emptied, is done by a miniaturized video-camera located on the motor-vehicle.

Said video-camera is used for transmitting the image of a reference sign, arranged on the container, to a monitor placed inside the cab, and consequently to the driver; when this reference sign coincides with that of the video-camera, then the motor vehicle has reached its optimal position to perform both load and emptying operations.

Distance detection of the motor-vehicle body is obtained by ultrasound sensors, through which the computerized system can determine what extension of the arm 5 is needed to place the vertical axis of the hooking member 10 on the vertical axis of the container opening.

Detection of the lowering extension of the arm 5, and consequently of the hooking member 10 for reaching the coupling position for the container, is obtained through a proximity sensor located on the head 17, which stops the run of the head 17 when a certain insertion depth in the container is reached.

The computerized system is not described in detail as it is commonly known.

As it can be noticed from the above description, both the hooking, emptying and release of the container is performed with a simple and fast operation.

Representation in some annexed figures of the device positioned between the motor-vehicle cab and body is purely indicative and unbinding, since the device can be positioned on the motor vehicle in any appropriate position for the function to be performed, such as on the rear side.

The features of the system and/or device for handling waste collection containers and emptying their contents, specifically for differentiated waste collection, are clear from the above description and annexed drawings.

Also the advantages of the system and/or device for handling waste collection containers and emptying their contents, specifically for

differentiated waste collection, according to the present invention, are clear from the above description.

In particular they consist in that:

- manufacture of the device is simple and inexpensive,
- all movements of the device are realized in a Cartesian way and the various working positions can be easily determined with consequent time saving,
- the motion for the lifting and repositioning of the container occur with a linear movement, avoiding container oscillations and interference with other containers in an array,
- the operator can execute all operations without having to leave the motor vehicle,
- the hooking member is interchangeable, so that different hooking members can be used, suitable for different types of container,
- it is possible to handle containers located on both sides of the motor vehicle,
- the hooking opening of the container is closed when the container rests on the ground for waste collection.

It is obvious that many changes and applications are easily possible for the man skilled in the art to the system and/or device for handling waste collection containers and emptying their contents, particularly for differentiated waste collection, described by way of example, without departing from the novelty spirit of the innovative idea.

For instance, if containers fitted with conventional side hooks have to be emptied, it will be enough to replace the hooking member 10 with another type, such as represented in the Figures 10 to 14.

With reference to Figures 10, 11, 12 and 13, which show schematically a variant embodiment of the hooking member of a waste container in its coupling position and release position, for two containers having different widths, indicated with 49 and 50, according to the present invention, number 33 indicates a hooking member.

A head of the hooking member for connection to the end of arm 9 is indicated with 34.

Reference 35 indicates a first horizontal arm welded to the head 34, a second and third equal horizontal arms sliding on said first arm 35 are indicated with 36 and 37.

Two vertical arms connected to said second horizontal arm 36 and to the third horizontal arm 37, respectively, are indicated with 38 and 39, which are used for hooking laterally a container.

Two opposite oil-dynamic cylinders indicated with 40 and 40' have the operating stem in common; the end of the cylinder 40 is fastened to the arm 36 and the end of the cylinder 40' is fastened to the arm 35.

Two other opposite oil-dynamic cylinders 41 and 41' also have the operating stem in common, where the end of the cylinder 41 is fastened to the arm 37 and the end of the cylinder 41' is fastened to the arm 35.

The length of the operating stem of both pairs of opposite cylinders equals twice the travel it would be able to run with one cylinder alone.

Said oil-dynamic cylinders 40, 40', 41 and 41' are used for displacing the arm 36 and the arm 37 respectively, either to approach or spread apart the respective vertical arms 38 and 39.

When the vertical arms 38 and 39 have to be spread apart to their maximum possible distance, both oil-dynamic cylinders of each pair are activated in expansion, whereas if they have to be approached, the operation is inverted and both oil-dynamic cylinders of each pair are made to closed.

In order to have an intermediate distance between the arm 38 and 39, only one of the two oil-dynamic cylinders of each pair will be activated.

These distance variations between the arm 38 and 39 are dependent on the width of the waste container.

As represented in the Figure 10, arms 38 and 39 are fully spread apart for the hooking of a given container size; Figure 12 shows them with an intermediate distance between them, since hooking is provided for a container having a smaller width dimension.

In Figure 11, where the hooking of a container with the size of the container 49 of Figure 10 is shown, only one oil-dynamic cylinder out of each pair is activated, whereas Figure 13, representing the hooking of a container with the size of the container 50 of Figure 12, shows both oil-dynamic cylinders of each pair activated.

Two hooking elements 42 and 42' are used for the hooking of the container through pins located externally on the container side.

With reference to Figure 14, where the element 42 is shown in detail, the element 42' being similar and symmetric to the element 42; number 43 indicates a semicircular seat appropriate for receiving a container hooking pin; said seat 43 has two inclined sections 44 forming a "V", to lead the pin into said semicircular seat to compensate likely positioning errors.

A semicircular element is indicated with 45, which can rotate and place itself above the pin inserted in the seat 43, in order to avoid that the container pin may come out of said seat during the emptying operation.

Said semicircular element 45 is controlled by a lever 46 used for rotating the container for emptying its contents into the motor-vehicle stack body (as represented in Figure 15).

The rotation of the lever 46 is obtained by an oil-dynamic cylinder and chain, not shown as being commonly known.

Numbers 57 and 57' indicate two protrusions, one on the vertical arm 38, the other on the vertical arm 39.

The height of said protrusions 57 and 57' equals the height of the elements 42 and 42'; these protrusions are used to stop the cover of the container during its rotation for emptying its contents, in such a way that when the container is in its emptying position, the cover is completely open and cannot hinder the emptying operation.

When the container is on the ground and rotated by 180° with respect to the right position for its hooking, the operator should have to leave the motor vehicle, to rotate the container manually to its correct position, since a rotation would no longer be possible after its hooking.

To avoid such a loss of time, the container is hooked as positioned.

The rotation of the container for emptying its contents into the motor-vehicle stack body is performed by a second lever 57 arranged on the side of the vertical arms 38 and 39 which is opposite to the side where the lever 46 is arranged.

Said lever is rotated in an opposite direction with respect to the lever 46, so as to realize the rotation of the container in a way being symmetrical with respect to the previous one (as represented in Figure 16).

It is obvious that many other changes and applications are easily possible for the man skilled in the art to the system and/or device for handling waste collection containers and emptying their contents, particularly for differentiated waste collection, described above by way of example, and it is also clear that in practical actuation of the invention the components may often differ in form and size from the ones described and be replaced with technical equivalent elements.

CLAIMS

1. A system and/or device for handling waste collection containers and emptying their content, particularly for differentiated waste collection, characterized in that there are provided:

- first means (5,8,9) for the horizontal translation and the support of a hooking member (10;33) for a waste container (23);
- second means (4,4',6,6',7) for the vertical translation of said hooking member (10;33);
- third means (2,2',4,4') for housing said vertical translation means (4,4',6,6',7);
- fourth means (11,12) for producing the rotation of said hooking member (10;33) in a horizontal plane.

2. A system and/or device, according to claim 1, characterized in that said first translation means (5,8,9) are linearly movable.

3. A system and/or device, according to claim 1, characterized in that said second translation means (4,4',6,6',7) are linearly movable, wherein said second translation means (4,4',6,6',7) provide in particular for changing the height position of said first translation means (5,8,9).

4. A system and/or device, according to claim 1, characterized in that said fourth means (11,12) provides for changing the position of said first translation means (5,8,9) in a horizontal plane (11,12)

5. A system and/or device, according to claim 1, characterized in that said fourth means (11,12) provides for changing the position of said second translation means (4,4',6,6',7) around a vertical axis, said fourth means (11,12) being in particular angularly rotatable.

6. A system and/or device, according to claim 1, characterized in that said first horizontal translation and support means (5,8,9) for a hooking member (10;33) comprise a horizontal telescopic arm (5) with a plurality of extensions (8,9).

7. A system and/or device, according to claim 1, characterized in that said second vertical translation means (4,4',6,6',7) for said hooking member (10;33) comprise "I" shaped guides (4,4') and sliding means (6,6',7).

8. A system and/or device, according to claim 1, characterized in that said third housing means (2,2') for said second vertical translation means (4,4',6,6',7) comprise a "C" shaped profile (2,2') on which semicircular plates (3) are integrally welded, whose height is substantially similar to that of the reinforcing and covering "C" shaped profiles (2,2').

9. A system and/or device, according to claim 1, characterized in that said fourth means for producing the rotation of said hooking member (10;33) in a horizontal plane (11,12) comprise a base (11), on which said housing means (2,2') are located, and a swiveling platform (12).

10. A system and/or device, according to claim 7, characterized in that said sliding means (6,6',7) consist of bearings (6) anchored to said "C" shaped profiles (2,2'), of bearings (7) anchored to said telescopic arm (5), of bearings (6') anchored to said "I" shaped guides (4,4').

11. A system and/or device, according to claim 1, characterized in that said hooking member (10) has an external body (15), an internal body (16) and a head (17) fastened to said internal body (16), where in particular said internal body (16) can slide inside said external body (15) by means of an oil-dynamic cylinder (22).

12. A system and/or device, according to claim 11, characterized in that said external body (15) has revolving means (18) pivoted on said external body (15), said revolving means (18) having in particular e a tooth (19) for the hooking of a container.

13. A system and/or device, according to claim 11 e 12, characterized in that said head (17) has sliding means (20) for the hooking of an opening device (47) of a container, wherein, in particular, said sliding means (20) control said revolving means (18) and said sliding means (20) are controlled by a pneumatic cylinder (21).

14. A system and/or device, according to claim 1, characterized in that said hooking member (10;33) is interchangeable.

15. A system and/or device, according to claim 1, characterized in that said hooking member (33) has a head (34) for fixing said hooking member (33) on the end (9) of said horizontal telescopic arm (5) having a plurality of extension (8,9).

16. A system and/or device, according to claim 15, characterized in that a first horizontal arm (35) is integrally connected to said head (34), where in particular said first horizontal arm (35) has a second (36) and third horizontal arm (37), which are equal to each other and able to slide on said first arm (35).

17.A system and/or device, according to claim 16, characterized in that said second (36) and third horizontal arm (37) have each one a vertical arm (38;39) on their end for hooking a container laterally.

18.A system and/or device, according to one or more previous claims, characterized in that said hooking member (33) has a first pair of opposite oil-dynamic cylinders (40,40'), one of said cylinder (40') being fixed to said first arm (35) and the other one of said cylinder (40) being fixed to said second arm (36), for the horizontal displacement of said second arm (36) on said first arm (35).

19. A system and/or device, according to one or more previous claims, characterized in that said hooking member (33) has a second pair of opposite oil-dynamic cylinders (41,41'), one of said cylinder (41') being fixed to said first arm (35) and the other one of said cylinder (41) being fixed to said third arm (37), for the horizontal displacement of said third arm (36) on said first arm (35).

20. A system and/or device, according to claims 18 and 19, characterized in that the opposite oil-dynamic cylinders (40,40') of said first pair are connected between them by means of a same operating stem and that the opposite oil-dynamic cylinders (41,41') of said first pair are connected between them by means of a same operating stem.

21. A system and/or device, according to claim 20, characterized in that the length of said operating stem is twice the run of each one of said oil-dynamic cylinders (40,40';41,41').

22. A system and/or device, according to claim 20, characterized in that each oil-dynamic cylinder of said first pair and second pair of opposite oil-dynamic cylinders (40,40',41,41') can be activated independently from the other one.

23. A system and/or device, according to claims 22, characterized in that the activation of one and/or two oil-dynamic cylinders of said first pair (40,40') and said second pair (41,41') of opposite oil-dynamic cylinders is in function of the external dimensions of the waste container.

24.A system and/or device, according to claim 17, characterized in that said vertical arm (38;39) for the lateral coupling of a container has a semicircular seat (43), which is suitable to house a hooking pin of the container, where in particular said semicircular seat (43) has two inclined sections (44), which essentially form a "V" for allowing the container pin to slide into said semicircular seat (43).

25. A system and/or device, according to claims 24, characterized in that a semicircular element (45) is provided, which is apt to position itself over the container pin for closing said semicircular seat (43).

26. A system and/or device, according to one or more of the previous claims, characterized in that said vertical arm (38;39) has a lever (46), which is apt to rotate the container for the emptying of its content and the semicircular element (45) for keeping the container pin, where in particular .

27. A system and/or device, according to claim 1, characterized in that said container (23) has an upper opening (24) for the passage of a hooking member (10), a bottom opening wall (26) the for emptying the content of said container, hooking means (30) for its lifting, hooking means (32) of an opening and/or closure device (47) of the bottom wall of said container (23).

28. A system and/or device, according to claim 27, characterized in that said hooking means (30) consist of an edge of a first cylinder (25) fixed inside said container (23) around said upper opening (24).

29. A system and/or device, according to claims 27 and 28, characterized in that said first cylinder (25) has a second cylinder (31) inside, which can slide within said first cylinder (25), where in particular said second cylinder (31) is integral with said opening and/or closure device (47) of the bottom wall (26) of said container (23), by means of elements (48,48') of said device (47).

30. A system and/or device, according to claims 27 and 29, characterized in that said hooking means (32) of an opening and/or closure device (47) of the bottom wall (26) of said container (23) consist of teeth being integral with said second cylinder (31).

31. A system and/or device, according to claim 27, characterized in that said closing wall (26) of the container bottom is formed by two equal sections (59, 59').

32. A system and/or device, according to claim 27, characterized in that said opening and/or closure device (47) of the bottom wall (26) of said container (23) has two frames (27,27') having substantially the shape of an upturned "U", where in particular said frames (27,27') are made with a plurality of elements (28,28',29), which are connected to each other in an articulated way and rigidly connected through an inclined element (58) to the upper end of said second cylinder (31) and are integrally connected through a horizontal element (48,48') to said second cylinder (31).

33. A system and/or device, according to claim 32, characterized in that said frames (27,27') are connected through the vertical elements (28,28') in an articulated way to both sections (59,59') forming the closure wall (26) of the container bottom.

34. A system and/or device, according to claim 29, characterized in that said second cylinder (31) has an open end and a central hole (51) on its opposite end.

35. A system and/or device, according to claim 29, characterized in that inside said second cylinder (31) a box (52) is present for the closure of said opening (24) of the container (23), said box (52) being open on its bottom, where in particular said box (52) has two cylindrical sections (53,54) of different diameter.

36. A system and/or device, according to claim 35, characterized in that one of said cylindrical sections (53) has a outside diameter being smaller than the inside diameter of said second cylinder (31).

37. A system and/or device, according to claim 35, characterized in that one of said cylindrical sections (54) has an outside diameter substantially equal to the diameter of the opening (24) of the container (23).

38. A system and/or device, according to claim 35, characterized in that inside said box (52) a pin (55) is present, being centrally fastened to a cylindrical section (54) and inserted into said hole (51) of the lower wall of said second cylinder (31), where in particular, between the lower wall of said cylinder (31) and the internal of the box (52) a spring (56) is inserted on said pin (55).

39. A method for handling waste collection containers and emptying their contents, particularly for differentiated waste collection, according to one or more of the previous claims.

40. A method according to the previous claim, characterized in that it comprises the following steps:

- positioning of the motor vehicle in line with the container to be emptied,
- vertical lifting of the arm (5) through oil-dynamic cylinders (14,14') which control the "I" shaped guides (4,4'),
- a likely 180° rotation of the telescopic arm (5), should the container be located on the opposite side of the rest position of the telescopic arm (5),
- extraction of the elements (8,9) forming the arm (5) for a length which allows to position the hooking member (10;33) on the vertical axis of the opening (24) of the container (23),

- lowering the arm (5) until the hooking member (10) is correctly positioned inside the opening (24) of the container (23),
- actuation of the oil-dynamic cylinder (21) of the hooking member (10), which makes the slides (20) to slide out of the hooking member (10), so that the slides (20) result in being positioned under the hooking teeth (32) of the opening device (47) of the lower wall (59,59') of the container (23), whereby the motion of the slides (20) releases the levers (18) which take a vertical position and the tooth (19) inserts itself under the hooking edge (30) of the container (23),
- lifting up of the container (23;33) through a vertical lifting of the arm (5) until it reaches a height from the ground which is higher than the height of the edge of the motor-vehicle stack body,
- rotation of the arm (5) by means of the swiveling platform (12), for bringing the container (23) above the motor-vehicle stack body,
- adjustment, through the extraction or retraction of the elements (8,9) forming the telescopic arm (5), of the emptying position of the container (23) with respect to the length of the motor-vehicle stack body,
- once the emptying position is reached, activation of the oil-dynamic cylinder (22) of the hooking member (10) which lowers the internal part (16) of the hooking member (10) connected to the opening device (47) of the container, so that the opening device (47) is lowered under the weight of the waste inside the container and thus allowing the opening of the lower wall (59,59') of the container (23) and a consequent emptying of the contents into the motor-vehicle stack body,
- retraction through the oil-dynamic cylinder (22) of the internal part (16) in the hooking member (10), so that also the closure device (47) and the internal part (16), being connected between them, are lifted together and close the bottom wall (59,59') of the container,
- rotation of the telescopic arm (5) to bring the container out of the overall dimensions of the motor-vehicle stack body towards the operation start position,

- vertical positioning of the container in its original position by means of the elements (8,9),
- lowering the arm (5) until the container rests on the ground,
- retraction, by means of the pneumatic cylinder (21), of the slides (20) from the hooking teeth (32) of the device (47), wherein the slides (20), during their retraction, act on the levers (18) for releasing the teeth (19) from the hooking edge (30) of the container (23), so releasing the hooking member (10) from the container and thus allowing the box (52) located inside the cylinder (31) to close the opening (24) of the container (23),
- vertical lifting of the arm (5) for extracting the hooking member (10) from the opening (24) of the container, so that the box (52) inside the cylinder (31) closes the opening (24) of the container (23),
- retraction of the elements (8,9) of the telescopic arm (5),
- lowering the telescopic arm (5) to its final rest position,
- driving eventually the motor vehicle to a next container for emptying it.

41. A method, according to the previous claim, characterized in that it comprises the following steps:

- extraction of the elements (8,9) forming the arm (5) for a length which allows the axis of the hooking member (33) to be found on the vertical axis of the center line of the container (49;50),
- lowering of the arm (5) until the hooking member (33) is positioned with the horizontal axis of the semicircular seat (43) on a level being lower than the horizontal axis of the coupling pins of the container (33),
- actuation of the oil-dynamic cylinders (40,40',41,41'), which cause a sliding, on a first horizontal arm (35), of a second (36) and a third arm (37), so as to approach the vertical arms (38,39) to the container (49;50) and insert the coupling pins of the container (49;50) in their semicircular seat (43),
- lifting of the container (49;50) through the vertical lifting of the arm (5) until a height from the ground is reached, which is higher than the height of the edge of the motor-vehicle stack body,

- rotation of the arm (5) by means of the swiveling platform (12) until the container (49;50) is brought above the motor-vehicle stack body,
- adjustment, by means of the extraction or retraction of the elements (8,9) forming the telescopic arm (5), of the emptying position of the container (49;50) with respect to the length of the motor-vehicle stack body,
- actuation, upon reaching the emptying position, of the lever (46;46') which causes the container (49;50) to rotate for emptying the content of the container into the motor-vehicle stack body, wherein the container cover is blocked by stop devices (57,57') located on the vertical arms (38,39), so as not to interfere with the emptying operation, and wherein the motion of the lever (46;46'), besides rotating the container, also activate a semicircular element (45) which reaches a positions above the hooking pin of the container, so as to hinder the unhooking of the container from the hooking semicircular seat (43) of the pins,
- deactivation of the lever (46;46') in order to return the container to its vertical position,
- rotation of the telescopic arm (5) to bring the container outside the overall dimensions of the motor-vehicle stack body to its original position,
- lowering of the arm (5) until the container rests on the ground,
- actuation of the oil-dynamic cylinders (40,40',41,41') to spread the vertical arms (38,39) apart and free the hooking member (33) from the hooking pins of the container,
- retraction of the elements (8,9) of the telescopic arm (5),
- lowering of the telescopic arm (5) to its final rest position,
- driving eventually the motor vehicle to a next container for emptying it.

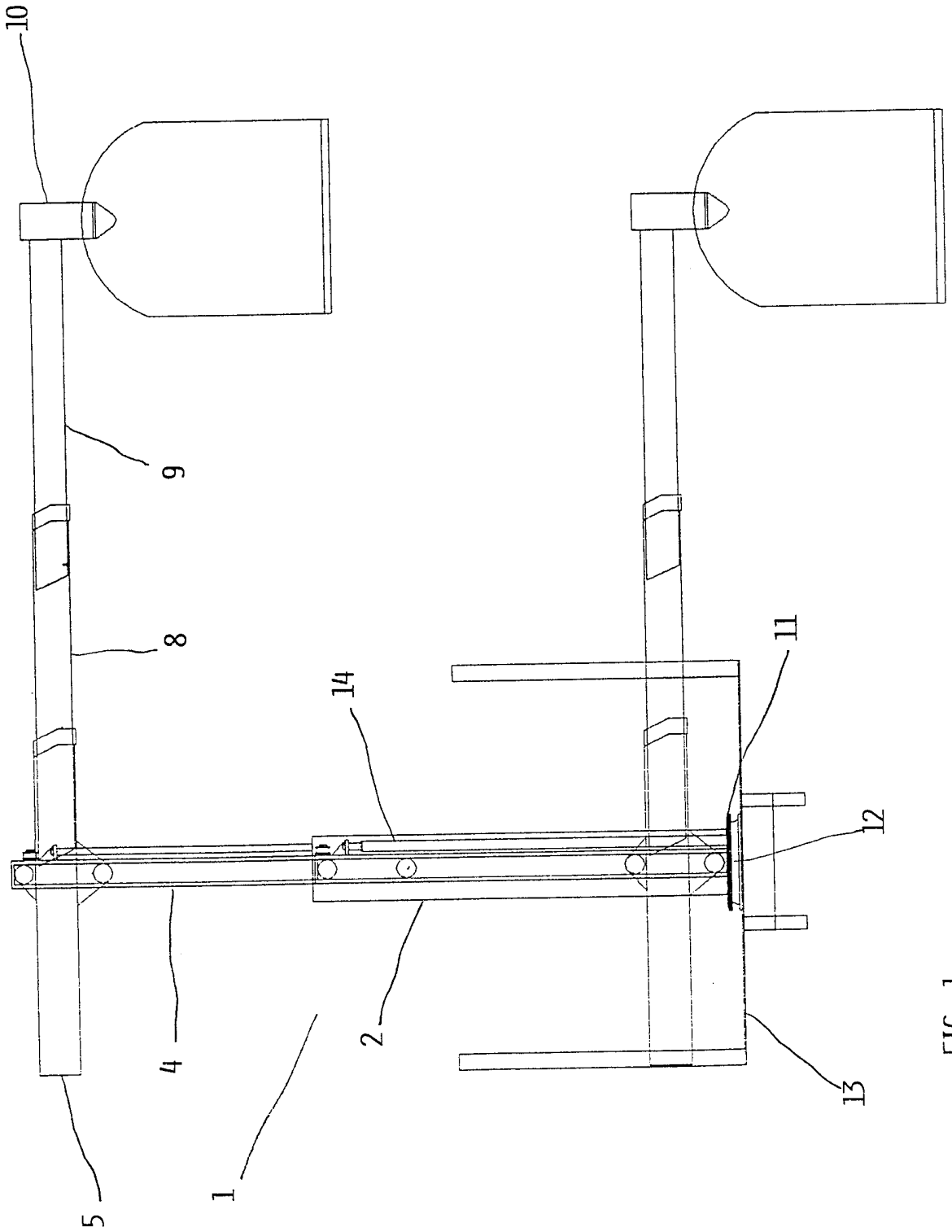

FIG. 1

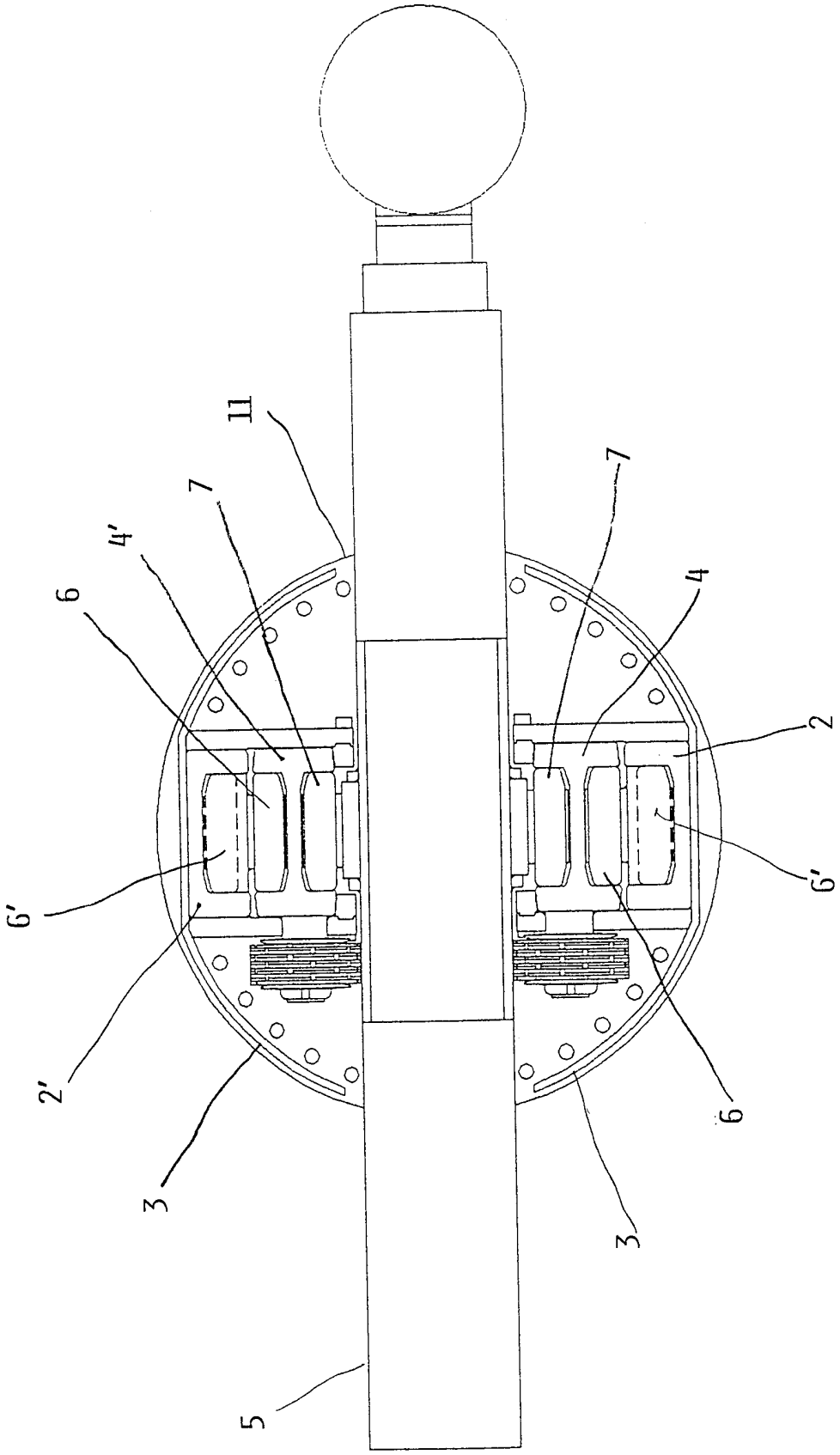

FIG. 2

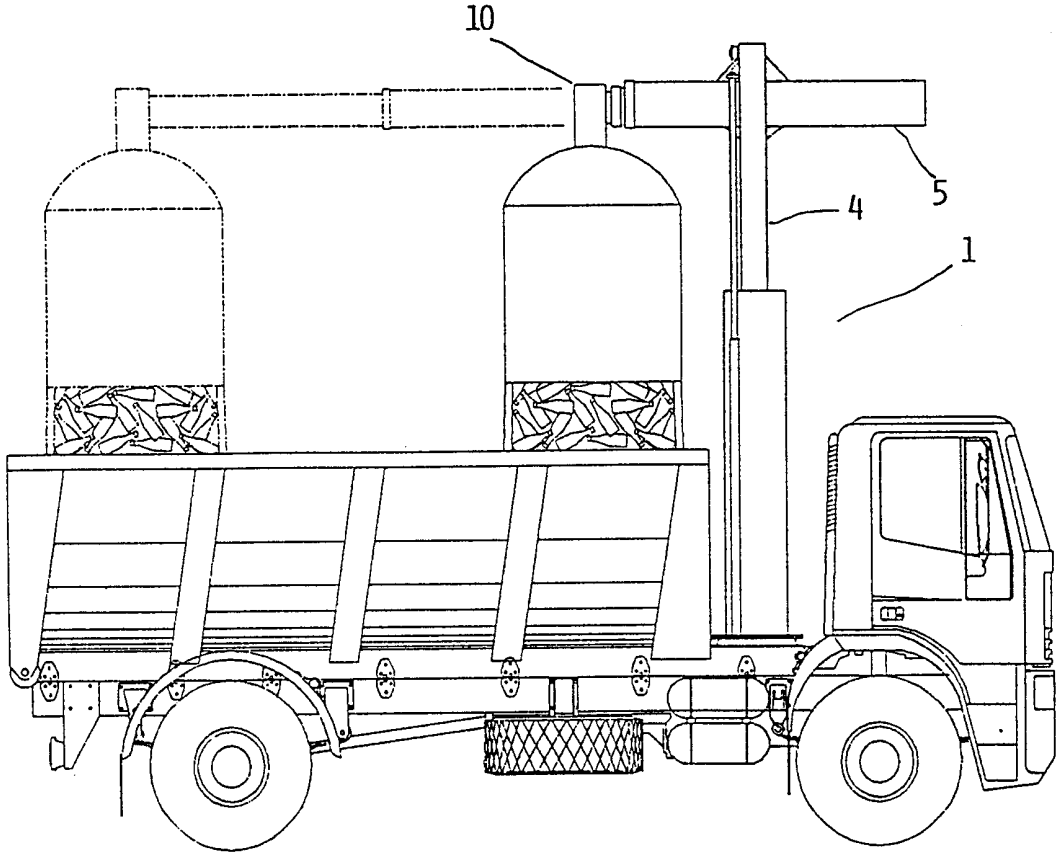

FIG. 3

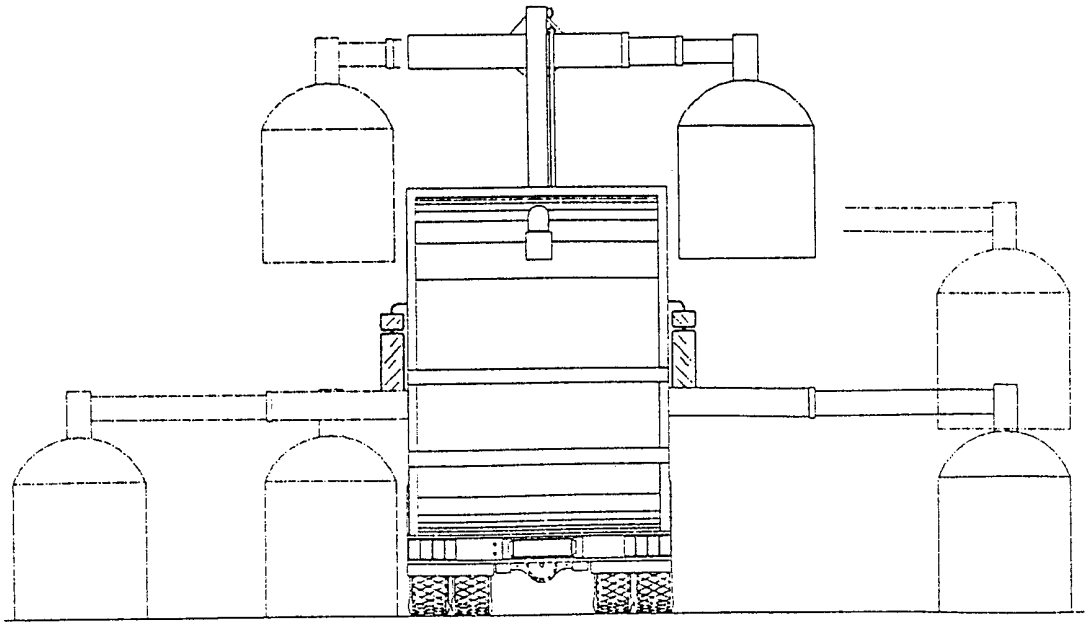

FIG. 4

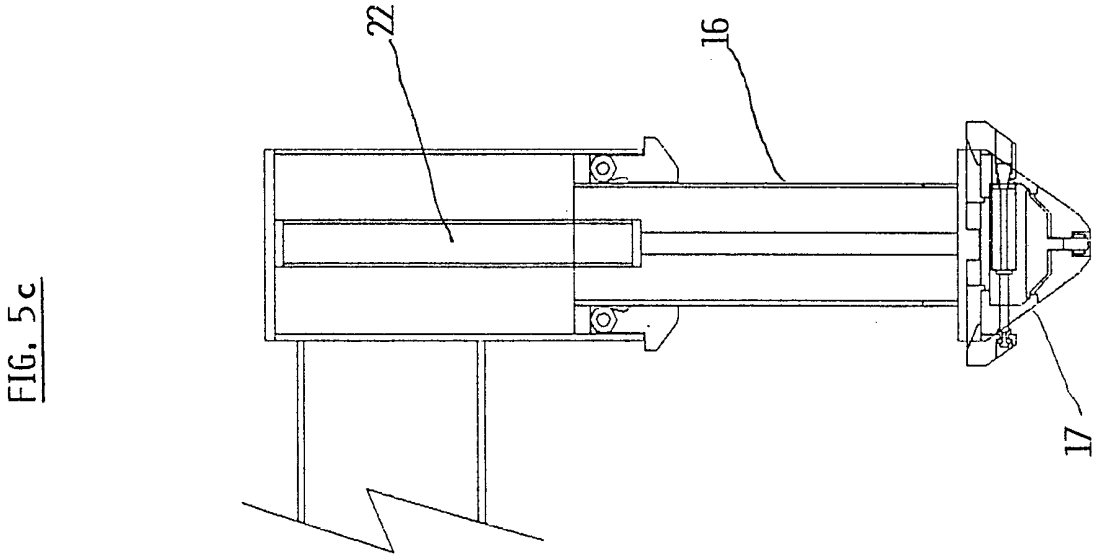

FIG. 5c

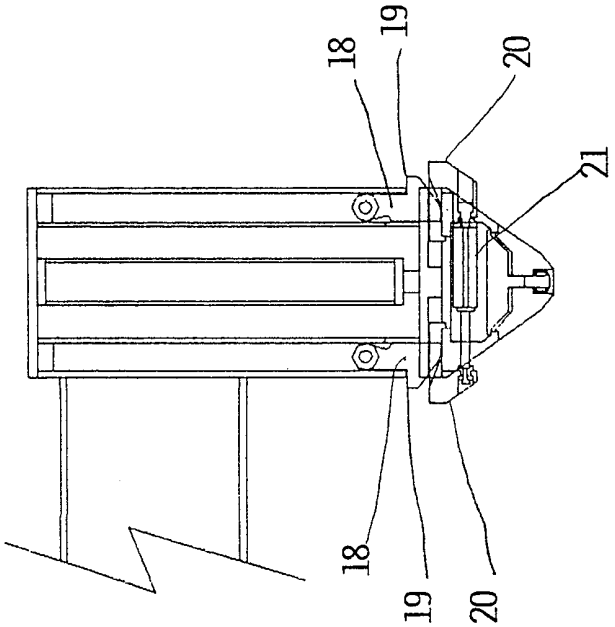

FIG. 5b

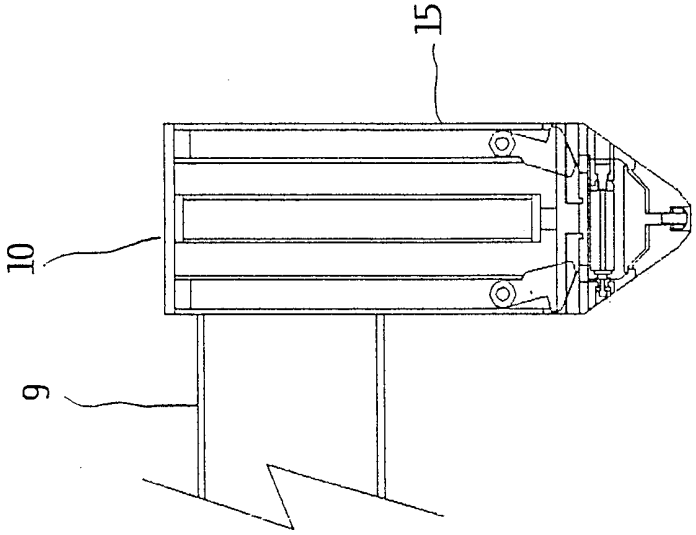

FIG. 5a

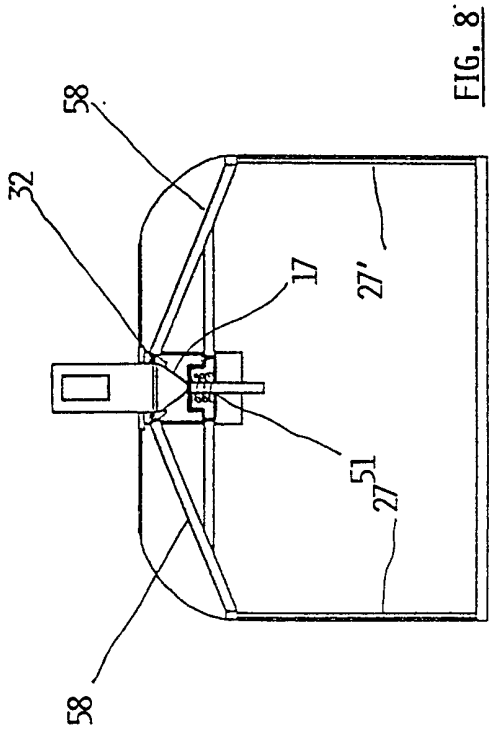

FIG. 8

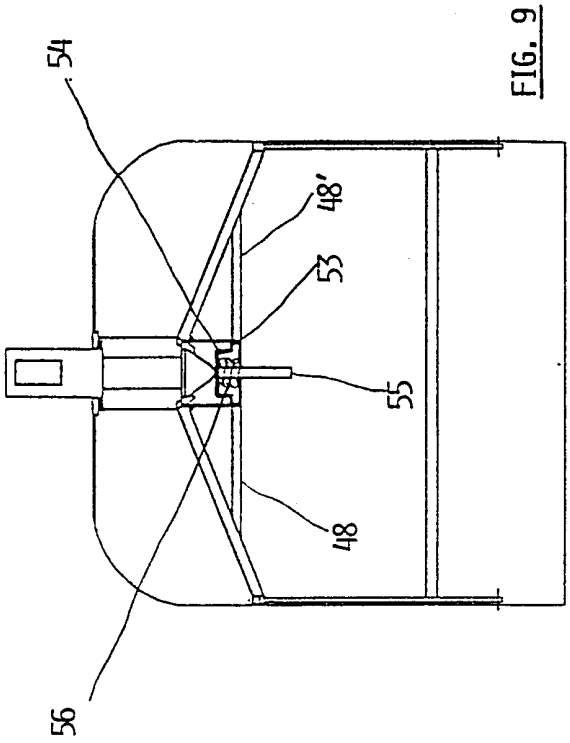

FIG. 9

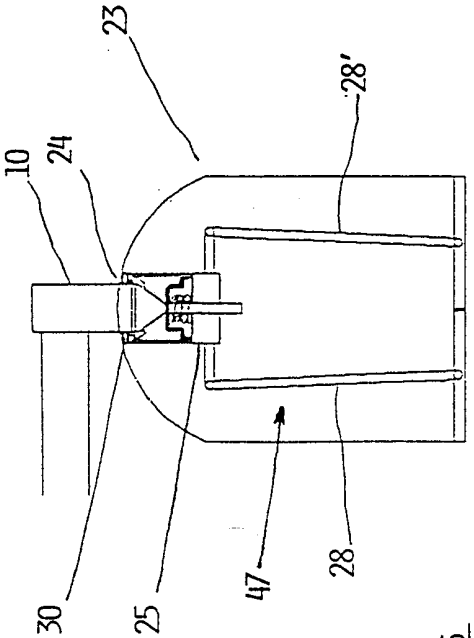

FIG. 6

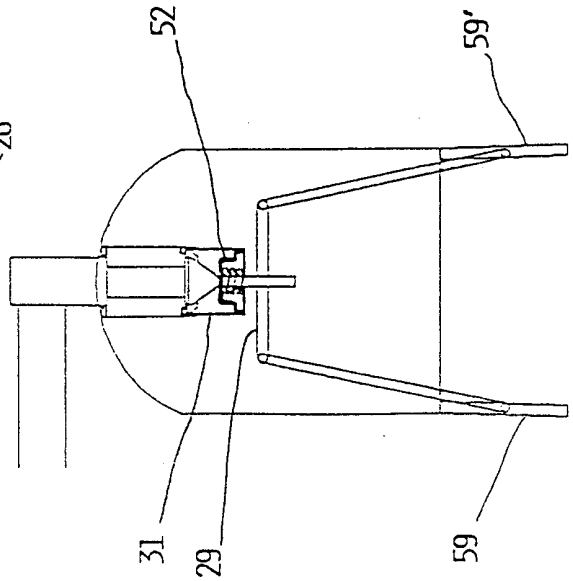

FIG. 7

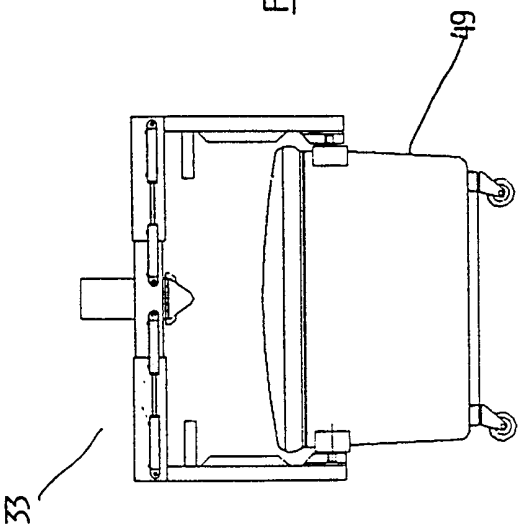

FIG. 11

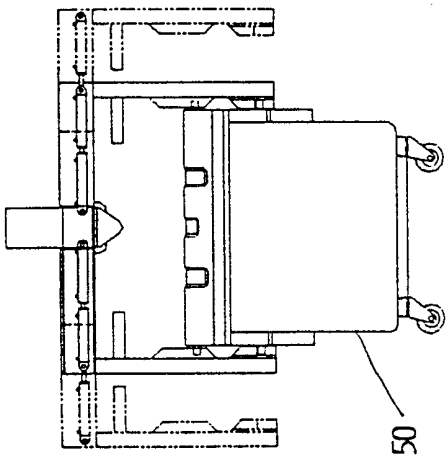

FIG. 13

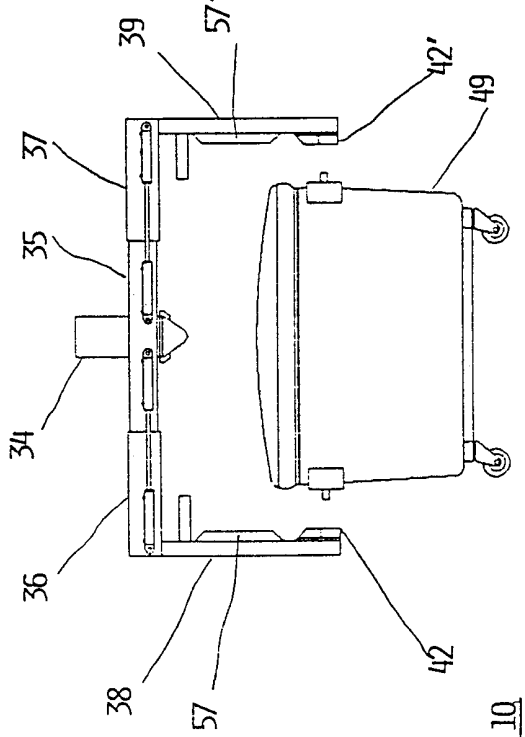

FIG. 10

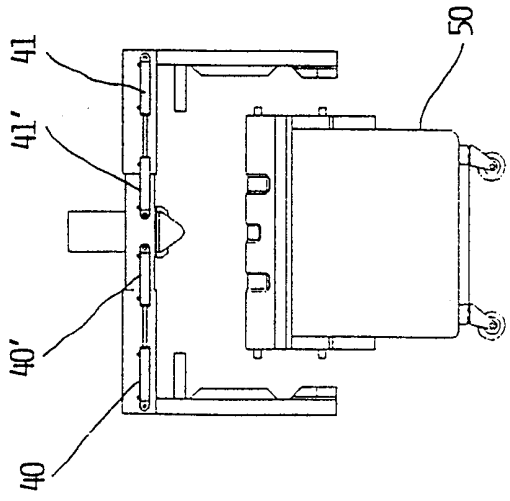

FIG. 12

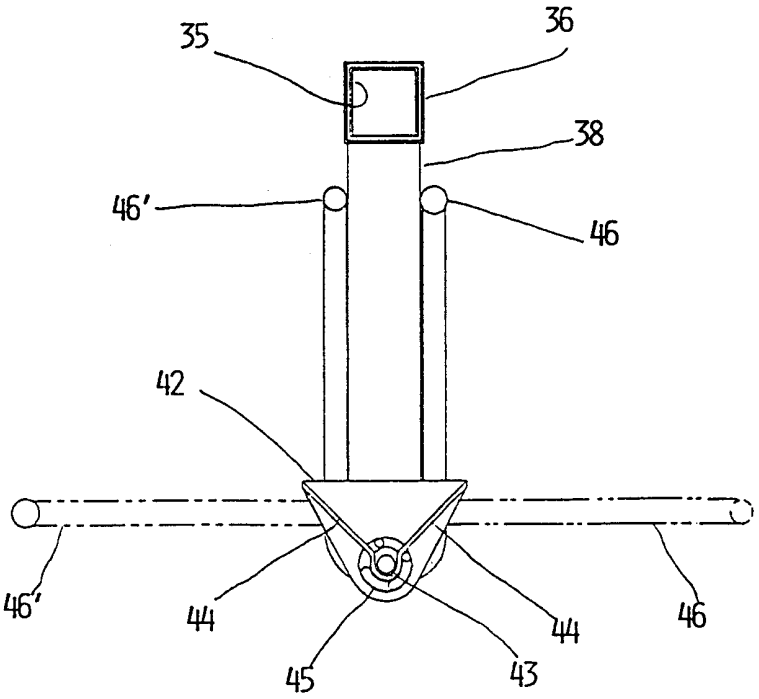

FIG. 14

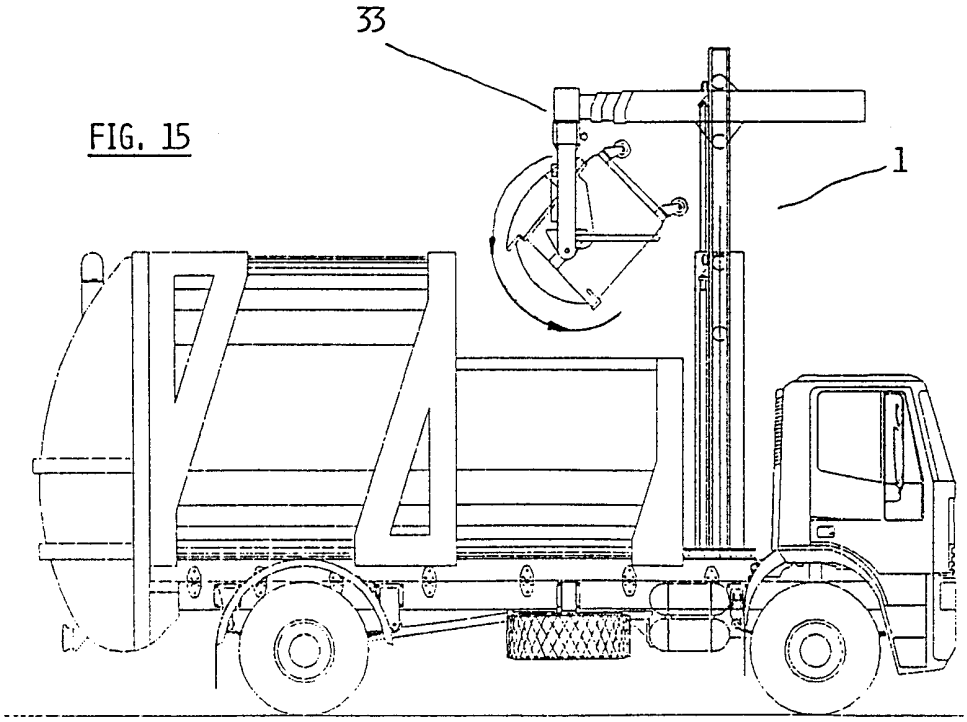

FIG. 15

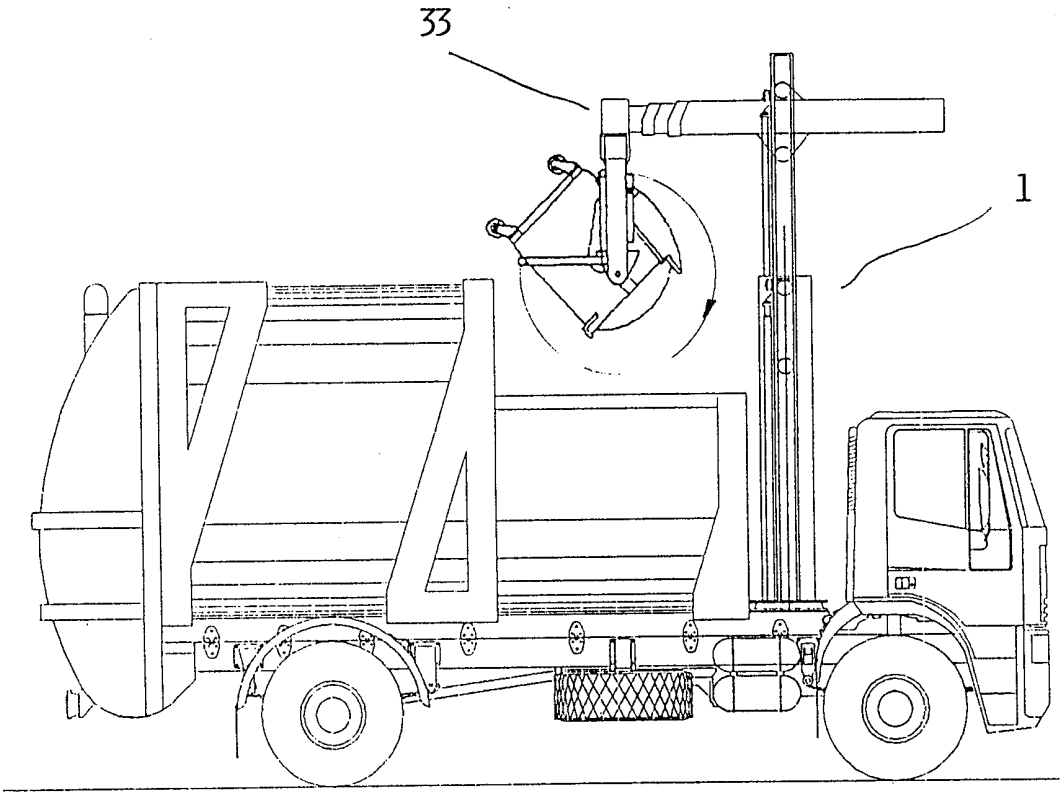

FIG. 16