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

VORRICHTUNG ZUR HANDHABUNG VON MÜLLSAMMELBEHÄLTERN

DISPOSITIF DE MANUTENTION DE POUBELLES

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Description

[0001] The present invention relates to a device and a method for handling waste collection containers, and emptying their contents, particularly for differentiated waste collection.

[0002] 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.

[0003] In general, they are shaped like a bell or essentially with a square and/or rectangular section.

[0004] 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.

[0005] 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.

[0006] 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.

[0007] For its hooking to the mechanical arm, the container has a hook on its upper part.

[0008] 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.

[0009] 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.

[0010] 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.

[0011] 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.

[0012] This operation is considerably time consuming and entails high costs for each container to be emptied.

[0013] 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 cou-

pled and obtain a certain restraint between one side of a container and the side of another container.

[0014] 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.

[0015] 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.

[0016] 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.

[0017] 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.

[0018] Moreover, the articulated arm used according to the known state of the art is expensive and complicated for its manufacture and use.

[0019] From US-A-5,228,591, onto which the preamble of the annexed claim 1 is based, a device is also known for handling waste collection containers and emptying their content; this known device comprises an articulated mechanical arm supporting a hooking member; for picking up a waste container, discharging its content, and repositioning the same in the original place.

[0020] It is the object of the present invention to provide a device and a method 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.

[0021] In order to achieve the object of the present invention, the device for handling waste collection containers and emptying their contents, in particular for differentiated waste collection, incorporates the characterising features of claim 1.

[0022] 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.

[0023] 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.

[0024] 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.

[0025] 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'.

[0026] Moreover, an extendable arm 5 is provided, which is located across the ends of plates 3.

[0027] The arm 5 is provided for moving vertically within the guides 4 and 4'.

[0028] Said arm 5 slides on guides 4 and 4' over bearings 7 fastened to the arm 5.

[0029] 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.

[0030] On the end of arm 5 an interchangeable hooking member for a container is indicated with 10.

[0031] 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.

[0032] 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.

[0033] Rotation of the swiveling platform 12 is obtained by means commonly known, such as a motor and reduction gear.

[0034] 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.

[0035] 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).

[0036] 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.

[0037] 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'.

[0038] 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.

[0039] 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.

[0040] 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.

[0041] 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.

[0042] 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.

[0043] Levers indicated with 18 are pivoted on the external part 15.

[0044] 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.

[0045] Said levers 18 are kept in a vertical position by torsion springs, not shown for simplicity's sake.

[0046] Said teeth 19 are provided for hooking the container for its lifting up and relevant displacement in order to realize the emptying operation.

[0047] Reference number 20 indicates two slides, which are shown in rest position flush with the body 15 (see Figure 5a).

[0048] 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.

[0049] 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.

[0050] By means of an oil-dynamic cylinder indicated with 22, the internal part 16 bearing the head 17 can be vertically moved downwards.

[0051] The downwards displacement of the head 17 determines the release of the closure device of the container, as it will be further described.

[0052] 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.

[0053] Number 24 indicates the top opening to let the hooking member 10 go through.

[0054] The size of this opening is large enough to let the hooking member 10 go through.

[0055] 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.

[0056] 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.

[0057] 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.

[0058] 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.

[0059] Inside the container a device 47 provides for the opening and/or closure of the container lower wall, as it will be further described.

[0060] Said device 47 comprises two frames, such as tubular frames, indicated with 27 and 27', respectively.

[0061] 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.

[0062] Both vertical sections 28 and 28' are articulated between them by a horizontal section 29, the whole substantially forming an upturned "U".

[0063] Said horizontal sections 29 are rigidly connected each one with an inclined section 58 on the upper end of the internal cylinder 31.

[0064] For the connection of said sections 58 to the cylinder 31 and for allowing their vertical motion, the cylinder 25 has two notches.

[0065] Said internal cylinder 31 has its lower part closed by a wall with a central hole 51, while its upper part is open.

[0066] 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.

[0067] The size of said internal cylinder 31 allows it to slide inside the cylinder 25; its length is also shorter than said cylinder 25.

[0068] 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.

[0069] 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.

[0070] Said cylindrical section 53 has an outside diameter being smaller than the inside diameter of the cylinder 31, so as to slide inside it.

[0071] The diameter of the cylindrical section 54 is substantially equal to the diameter of the opening 24 of the container 23.

[0072] 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.

[0073] Between the lower wall of the cylinder 31 and the inside of the box 52 is inserted a spring 56 on the pin 55.

[0074] 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 hook-

ing of the container for its emptying.

[0075] The container 23 is coupled and opened for its emptying as follows.

[0076] 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.

[0077] Insertion of the hooking member 10 pushes the box 52 downwards, overcoming the resistance of spring 56.

[0078] Through the pneumatic cylinder 21 the slides 20 exit the head 17 and position themselves under the teeth 32.

[0079] 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.

[0080] Then, the container hooked with the head 17 through the teeth 19 is lifted.

[0081] Moreover, by means of the slides 20, the device 47 for the opening and/or closure of the lower wall is locked in position.

[0082] 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.

[0083] 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.

[0084] 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.

[0085] 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.

[0086] After emptying the container, a reverse operation is performed, i.e. the internal part 16 is made to retract, 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.

[0087] The container is placed back to its original position on the ground and the hooking member 10 is released from the container.

[0088] 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.

[0089] 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.

[0090] 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.

[0091] 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.

[0092] 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.

[0093] 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.

[0094] 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.

[0095] 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.

[0096] 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.

[0097] 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.

[0098] 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.

[0099] 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.

[0100] The features of the device for handling waste collection containers and emptying their contents, specifically for differentiated waste collection, are clear from the above description and annexed drawings.

[0101] Also the advantages of the 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.

[0102] 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.

[0103] It is obvious that many changes and applications are easily possible for the man skilled in the art to the device for handling waste collection containers and emptying their contents, particularly for differentiated waste collection.

[0104] 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.

[0105] 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.

[0106] A head of the hooking member for connection to the end of arm 9 is indicated with 34.

[0107] 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.

[0108] 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.

[0109] 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.

[0110] 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.

[0111] 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.

[0112] 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.

[0113] 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.

[0114] 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.

[0115] These distance variations between the arm 38 and 39 are dependent on the width of the waste container.

[0116] 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.

[0117] 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.

[0118] Two hooking elements 42 and 42' are used for the hooking of the container through pins located externally on the container side.

[0119] 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.

[0120] 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.

[0121] 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).

[0122] The rotation of the lever 46 is obtained by an oil-dynamic cylinder and chain, not shown as being commonly known.

[0123] Numbers 57 and 57' indicate two protrusions, one on the vertical arm 38, the other on the vertical arm 39.

[0124] 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.

[0125] 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.

[0126] To avoid such a loss of time, the container is hooked as positioned.

[0127] 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.

[0128] 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).

[0129] It is obvious that many other changes and applications are easily possible for the man skilled in the art to the 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. Device mounted on a motor vehicle for handling waste collection containers and emptying their content, particularly for differentiated waste collection, comprising:

- 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 first means (5,8,9);
- third means (2,2'), for housing said second means (4,4',6,6',7);
- fourth means (11,12), for producing the rotation of said third means (2,2') in a horizontal plane;

characterized in that

- said second means (4,4',6,6',7) can slide in a vertical direction with respect to said third means (2,2'), so that said second means (4,4',6,6',7) are capable of assuming, with respect to said third means (2,2'), at least

- a first position, in which a substantial portion of said second means (4,4',6,6',7) is housed within said third means (2,2'), and
- a second position, in which a substantial portion of said second means (4,4',6,6',7) protrudes out of said third means (2,2'),
- said first means (5,8,9) are mounted for sliding along said second means (4,4',6,6',7)
 - from a position in which said first means (5,8,9) are at a lower part of said second means (4,4',6,6',7) when the second means (4,4',6,6',7) are in said first position,
 - to a position in which said first means (5,8,9) are at an upper part of said second means (4,4',6,6',7) when said second means (4,4',6,6',7) are in said second position.

2. Device, according to claim 1, **characterized in that** said first means (5,8,9) lays horizontally when said second means (4,4',6,6',7) are in said first position.

3. Device, according to claim 1, **characterized in that** said first means (5,8,9) lays horizontally when said second means (4,4',6,6',7) are in said second position.

4. Device, according to claim 1, **characterized in that** said first means (5,8,9) are linearly movable.

5. Device, according to claim 1, **characterized in that** said first means (5,8,9) comprises a horizontal telescopic arm (5) with a plurality of extensions (8,9).

6. Device, according to claim 1, **characterized in that** said second means (4,4',6,6',7) comprise "I" shaped guides (4,4') and sliding means (6,6',7).

7. Device, according to claim 1, **characterized in that** said third means (2,2') comprise one or more substantially "C" shaped profiles (2,2').

8. Device, according to claim 7, **characterized in that** semicircular plates (3) are fixed on said "C" shaped profiles (2,2'), whose height is substantially similar to that of said "C" shaped profiles (2,2').

9. Device, according to claim 1, **characterized in that** said fourth means (11,12) comprise a base (11), on which said third means (2,2') are located, and a swiveling platform (12).

10. Device, according to claims 5 to 7, **characterized in that** said sliding means (6,6',7) consist of bearings (6) fastened to said "C" shaped profiles (2,2'), of bearings (7) fastened to said telescopic arm (5),

of bearings (6') fastened to said "I" shaped guides (4,4').

11. Device, according to claim 1, **characterized in that** said hooking member (10) is interchangeably assembled on one end of said first means (5,8,9). 5
12. Device, according to claim 1 or 11, **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). 10
13. Device, according to claim 12, **characterized in that** said external body (15) has revolving means (18) pivoted on said external body (15), said revolving means (18) having in particular a tooth (19) for the hooking of a container. 15 20
14. Device, according to claims 12 and 13, **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) of said head (17) control said revolving means (18) and are controlled by a pneumatic cylinder (21). 25
15. Method for handling waste collection containers and emptying their contents, particularly for differentiated waste collection, using the device according to one or more of the previous claims, **characterized in that** it comprises the following steps: 30

- a) positioning the motor vehicle in line with a container (23) to be emptied; 35
- b) vertically lifting said first means (5,8,9), through said second means (4,4',6,6',7);
- c) likely rotation of said third means (2,2'), through said fourth means (11,12); 40
- d) positioning said hooking member (10;33) above said container (23), through said first means (5,8,9);
- e) lowering said first means (5,8,9), through said second means (4,4',6,6',7), for hooking said container (23) through said hooking member (10;33); 45
- f) once said container (23) has been hooked through the hooking member (10;33), lifting up of said first means (5,8,9) through said second means (4,4',6,6',7), until said container (23) reaches a height from the ground which is higher than the height of the edge of the motor-vehicle stack body; 50
- g) rotation of said third means (2,2'), through said fourth means (11,12), for bringing said container (23) above the motor-vehicle stack body; 55

h) emptying the contents of said container (23) into the motor-vehicle stack body.

16. Method, according to claim 15, **characterized in that** it further comprises the following steps:
 - i) rotating said third means (2,2'), through said fourth means (11,12), for bringing said container (23) out of the overall dimensions of the motor-vehicle stack body;
 - l) lowering said first means (5,8,9), through said second means (4,4',6,6',7), until said container (23) rests on the ground;
 - m) releasing said hooking member (10;33) from said container (23);
 - n) vertically lifting said first means (5,8,9) above said container (23), through said second means (4,4',6,6',7);
 - o) retracting said hooking member (10;33), through said first means (5,8,9);
 - p) lowering said first means (5,8,9) to the respective rest position, through said second means (4,4',6,6',7);
 - q) driving eventually the motor vehicle to a next container for emptying it.
17. Method, according to claim 15, **characterized in that** of providing, between steps g) and h), the horizontal adjustment, through said first means (5,8,9), of the emptying position of said container (23) with respect to the length of the motor-vehicle stack body.

Patentansprüche

1. Auf einem Kraftfahrzeug montierte Vorrichtung zum Handhaben von Abfallsammelbehältern und zum Entleeren ihres Inhaltes, insbesondere für eine getrennte Abfallsammlung, enthaltend:

- erste Mittel (5, 8, 9) für die horizontale Verschiebung und die Halterung eines Hakenelements (10; 33) für einen Abfallbehälter (23);
- zweite Mittel (4, 4', 6, 6', 7) für die vertikale Verschiebung der ersten Mittel (5, 8, 9);
- dritte Mittel (2, 2') zum Aufnehmen der zweiten Mittel (4, 4', 6, 6', 7);
- vierte Mittel (11, 12) zum Erzeugen der Drehung der dritten Mittel (2, 2') in einer horizontalen Ebene;

dadurch gekennzeichnet, dass

- die zweiten Mittel (4, 4', 6, 6', 7) in vertikaler Richtung gegenüber den dritten Mitteln (2, 2') verschoben werden können, so dass die zweiten Mittel (4, 4', 6, 6', 7), bezogen auf die dritten

Mittel (2, 2'), zum Einnehmen wenigstens der folgenden Positionen in der Lage sind

- einer ersten Position, in der ein wesentlicher Teil der zweiten Mittel (4, 4', 6, 6', 7) innerhalb der dritten Mittel (2, 2') aufgenommen ist, und
 - einer zweiten Position, in der ein wesentlicher Teil der zweiten Mittel (4, 4', 6, 6', 7) aus den dritten Mitteln (2, 2') hervorsteht,
- die ersten Mittel (5, 8, 9) angebracht sind, um entlang der zweiten Mittel (4, 4', 6, 6', 7)
- aus einer Position, in der sich die ersten Mittel (5, 8, 9) an einem unteren Teil der zweiten Mittel (4, 4', 6, 6', 7) befinden, wenn die zweiten Mittel (4, 4', 6, 6', 7) die erste Position einnehmen,
 - in eine Position verschoben zu werden, in der sich die ersten Mittel (5, 8, 9) an einem oberen Teil der zweiten Mittel (4, 4', 6, 6', 7) befinden, wenn die zweiten Mittel (4, 4', 6, 6', 7) die zweite Position einnehmen.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die ersten Mittel (5, 8, 9) horizontal ausgerichtet sind, wenn sich die zweiten Mittel (4, 4', 6, 6', 7) in der ersten Position befinden.
3. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die ersten Mittel (5, 8, 9) horizontal ausgerichtet sind, wenn sich die zweiten Mittel (4, 4', 6, 6', 7) in der zweiten Position befinden.
4. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die ersten Verschiebemitel (5, 8, 9) linear bewegbar sind.
5. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die ersten Mittel (5, 8, 9) einen horizontal verlaufenden Teleskoparm (5) mit mehreren Verlängerungen (8, 9) enthalten.
6. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die zweiten Mittel (4, 4', 6, 6', 7) eine I-förmige Führung (4, 4') und Gleitmittel (6, 6', 7) enthalten.
7. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die dritten Mittel (2, 2') ein oder mehrere im Wesentlichen C-förmige Profile (2, 2') enthalten.
8. Vorrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** halbkreisförmige

Platten (3) an den C-förmigen Profilen (2, 2') befestigt sind, deren Höhe im Wesentlichen gleich der der C-förmigen Profile (2, 2') ist.

9. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die vierten Mittel (11, 12) eine Basis (11), auf der die dritten Mittel (2, 2') angeordnet sind, und eine Schwenkplattform (12) enthalten.
10. Vorrichtung nach den Ansprüchen 5 bis 7, **dadurch gekennzeichnet, dass** die Gleitmittel (6, 6', 7) aus Lagern (6), die an den C-förmigen Profilen (2, 2') befestigt sind, aus Lagern (7), die an dem Teleskoparm (5) befestigt sind, und aus Lagern (6') bestehen, die an den I-förmigen Führungen (4, 4') befestigt sind.
11. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Hakenelement (10) austauschbar an einem Ende der ersten Mittel (5, 8, 9) angeordnet ist.
12. Vorrichtung nach Anspruch 1 oder 11, **dadurch gekennzeichnet, dass** das Hakenelement (10) einen außenliegenden Körper (15), einen innenliegenden Körper (16) und einen Kopf (17), der an dem innenliegenden Körper (16) angebracht ist, aufweist, wobei insbesondere der innenliegende Körper (16) innerhalb des außenliegenden Körpers (15) mittels eines öldynamischen Zylinders (22) gleiten kann.
13. Vorrichtung nach Anspruch 12, **dadurch gekennzeichnet, dass** der außenliegende Körper (15) Drehmittel (18) aufweist, die auf dem außenliegenden Körper (15) drehbar angeordnet sind, wobei die Drehmittel (18) insbesondere einen Zahn (19) für das Anhängen eines Behälters besitzen.
14. Vorrichtung nach den Ansprüchen 12 und 13, **dadurch gekennzeichnet, dass** der Kopf (17) Gleitmittel (20) für das Anhängen einer Öffnungseinrichtung (47) eines Behälters aufweist, wobei insbesondere die Gleitmittel (20) des Kopfes (17) das Drehmittel (18) steuern und durch einen pneumatischen Zylinder (21) gesteuert werden.
15. Verfahren zum Handhaben von Abfallsammelbehältern und zum Entleeren ihres Inhaltes, insbesondere für eine getrennte Abfallsammlung, wobei das Verfahren die Vorrichtung nach einem oder mehreren der vorstehenden Ansprüche verwendet, **dadurch gekennzeichnet, dass** das Verfahren die folgenden Schritte enthält:

- a) Positionieren des Kraftfahrzeuges in Linie

mit einem Behälter (23), der zu leeren ist;
 b) vertikales Anheben der ersten Mittel (5, 8, 9) durch die zweiten Mittel (4, 4', 6, 6', 7);
 c) geeignetes Drehen der dritten Mittel (2, 2') durch die vierten Mittel (11, 12)
 d) Positionieren des Hackenelements (10; 33) über dem Behälter (23) durch die ersten Mittel (5, 8, 9);
 e) Absenken der ersten Mittel (5, 8, 9) durch die zweiten Mittel (4, 4', 6, 6', 7), um den Behälter (23) durch das Hackenelement (10; 33) anzuhängen;
 f) Anheben der ersten Mittel (5, 8, 9) durch die zweiten Mittel (4, 4', 6, 6', 7), sobald der Behälter (23) durch das Hackenelement (10; 33) angehängt worden ist, bis der Behälter (23) eine Höhe über Grund erreicht, die höher ist als die Höhe der Kante des Kraftfahrzeugaufbaus;
 g) Drehen des dritten Mittels (2, 2') durch die vierten Mittel (11, 12), um den Behälter (23) über den Kraftfahrzeugaufbau zu bringen;
 h) Entleeren des Inhaltes des Behälters (23) in den Aufbau des Kraftfahrzeuges.

16. Verfahren nach Anspruch 15, **dadurch gekennzeichnet, dass** es weiterhin die folgenden Schritte enthält:

i) Drehen der dritten Mittel (2, 2') durch die vierten Mittel (11, 12), um den Behälter (23) aus den Gesamtabmessungen des Aufbaus des Kraftfahrzeuges herauszubringen;
 l) Absenken der ersten Mittel (5, 8, 9) durch die zweiten Mittel (4, 4', 6, 6', 7), bis der Behälter (23) auf dem Erdboden ruht;
 m) Freigeben des Hackenelements (10; 33) von dem Behälter (23);
 n) vertikales Anheben der ersten Mittel (5, 8, 9) über den Behälter (23) durch die zweiten Mittel (4, 4', 6, 6', 7);
 o) Zurückziehen des Hackenelements (10; 33) durch die ersten Mittel (5, 8, 9);
 p) Absenken der ersten Mittel (5, 8, 9) auf die entsprechende Ruheposition durch die zweiten Mittel (4, 4', 6, 6', 7);
 q) anschließendes Fahren des Kraftfahrzeuges zu dem nächsten Behälter zu dessen Entleerung.

17. Verfahren nach Anspruch 15, **dadurch gekennzeichnet, dass** zwischen den Schritten g) und h) durch die ersten Mittel (5, 8, 9) die horizontale Einstellung der Entleerungsposition des Behälters (23) gegenüber der Länge des Aufbaus des Kraftfahrzeuges vorgesehen ist.

Revendications

1. Dispositif monté sur un véhicule automobile pour la manutention de poubelles et le vidage de leur contenu, en particulier pour la collecte d'ordures différenciées comprenant:

- des premiers moyens (5, 8, 9) pour la translation horizontale et le support d'un élément d'accrochage (10; 33) pour une poubelle (23);
- des seconds moyens (4, 4', 6, 6', 7) pour la translation verticale desdits premiers moyens (5, 8, 9);
- des troisièmes moyens (2, 2') servant à loger lesdits seconds moyens (4, 4', 6, 6', 7);
- des quatrièmes moyens (11, 12) pour produire la rotation desdits troisièmes moyens (2, 2') dans un plan horizontal;

caractérisé en ce que

- lesdits seconds moyens (4, 4', 6, 6', 7) peuvent glisser dans une direction verticale par rapport auxdits troisièmes moyens (2, 2') de sorte que lesdits seconds moyens (4, 4', 6, 6', 7) peuvent prendre, par rapport auxdits troisièmes moyens (2, 2'), au moins
 - une première position, dans laquelle une partie substantielle desdits seconds moyens (4, 4', 6, 6', 7) est logée à l'intérieur desdits troisièmes moyens (2, 2'), et
 - une seconde position, dans laquelle une partie substantielle desdits seconds moyens (4, 4', 6, 6', 7) fait saillie hors desdits troisièmes moyens (2, 2'),
 - lesdits premiers moyens (5, 8, 9) sont montés de manière à glisser le long desdits seconds moyens (4, 4', 6, 6', 7),
 - depuis une position dans laquelle lesdits premiers moyens (5, 8, 9) sont situés dans une partie inférieure desdits seconds moyens (4, 4', 6, 6', 7) lorsque les seconds moyens (4, 4', 6, 6', 7) sont dans ladite première position,
 - pour venir dans une position dans laquelle lesdits premiers moyens (5, 8, 9) sont situés dans une partie supérieure desdits seconds moyens (4, 4', 6, 6', 7) lorsque les seconds moyens (4, 4', 6, 6', 7) sont dans ladite seconde position.
2. Dispositif selon la revendication 1, **caractérisé en ce que** lesdits premiers moyens (5, 8, 9) s'étendent horizontalement lorsque lesdits seconds moyens (4, 4', 6, 6', 7) sont dans ladite première position.

3. Dispositif selon la revendication 1, **caractérisé en ce que** lesdits premiers moyens (5, 8, 9) sont disposés horizontalement lorsque lesdits seconds moyens (4, 4', 6, 6', 7) sont dans ladite seconde position. 5
4. Dispositif selon la revendication 1, **caractérisé en ce que** lesdits premiers moyens (5, 8, 9) sont déplaçables linéairement. 10
5. Dispositif selon la revendication 1, **caractérisé en ce que** lesdits premiers moyens (5, 8, 9) comprennent un bras télescopique horizontal (5) comportant une pluralité de prolongements (8, 9). 15
6. Dispositif selon la revendication 1, **caractérisé en ce que** lesdits seconds moyens (4, 4', 6, 6', 7) comprennent des guides en forme de "I" (4, 4') et des moyens coulissants (6, 6'). 20
7. Dispositif selon la revendication 1, **caractérisé en ce que** lesdits troisièmes moyens (2, 2') comprennent un ou plusieurs profilés sensiblement en forme de "C" (2, 2'). 25
8. Dispositif selon la revendication 7, **caractérisée** que lesdites plaques semi-circulaires (3) sont fixées sur lesdits profilés en forme de "C" (2, 2') dont la hauteur est sensiblement similaire à celle desdits profilés en forme de "C" (2, 2'). 30
9. Dispositif selon la revendication 1, **caractérisé en ce que** lesdits quatrièmes moyens (11, 12) comprennent une base (11) sur laquelle lesdits troisièmes moyens (2, 2') sont situés et une plateforme pivotante (12). 35
10. Dispositif selon les revendications 5 à 7, **caractérisé en ce que** lesdits moyens coulissants (6, 6', 7) sont constitués par des paliers (6) fixés auxdits profilés en forme de "C" (2, 2'), par des paliers (7) fixés audit bras télescopique (5), et par des paliers (6') fixés auxdits guides en forme de "I" (4, 4'). 40
11. Dispositif selon la revendication 1, **caractérisé en ce que** ledit élément d'accrochage (10) est assemblé d'une manière interchangeable sur une extrémité desdits premiers moyens (5, 8, 9). 45
12. Dispositif selon la revendication 1 ou 11, **caractérisé en ce que** ledit élément d'accrochage (10) possède un corps externe (15), un corps interne (16) et une tête (17) fixés audit corps interne (16), ledit corps interne (16) notamment pouvant glisser à l'intérieur dudit corps externe (15) sous l'action d'un vérin (22) actionné de par de l'huile. 50
13. Dispositif selon la revendication 12, **caractérisé en ce que** ledit corps externe (15) possède des moyens rotatifs (18), qui pivotent sur ledit corps externe (15), lesdits moyens rotatifs (18) possédant notamment une dent (19) pour l'accrochage d'une poubelle. 55
14. Dispositif selon les revendications 12 et 13, **caractérisé en ce que** ladite tête (17) possède des moyens coulissants (20) pour l'accrochage d'un dispositif d'ouverture (47) d'une poubelle, et en particulier lesdits moyens coulissants (20) de ladite tête (17) commandent lesdits moyens rotatifs (18) et sont commandés par un vérin pneumatique (21).
15. Procédé de manutention de poubelles et de vidage de leurs contenus, notamment pour la collecte différenciée d'ordures moyennant l'utilisation du dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce qu'il** comprend les étapes suivantes consistant à:
- a) positionner le véhicule automobile en ligne avec une poubelle (23) devant être vidée;
 - b) soulever verticalement lesdits premiers moyens (5, 8, 9) à l'aide desdits seconds moyens (4, 4', 6, 6', 7);
 - c) de façon analogue faire tourner lesdits troisièmes moyens (2, 2') à l'aide desdits quatrièmes moyens (11, 12);
 - d) positionner ledit élément d'accrochage (10; 33) au-dessus de ladite poubelle (23) au par l'intermédiaire desdits premiers moyens (5, 8, 9);
 - e) abaisser lesdits premiers moyens (5, 8, 9), à l'aide desdits seconds moyens (4, 4', 6, 6', 7) pour accrocher ladite poubelle (23) au moyen dudit élément d'accrochage (10; 33);
 - f) une fois que ladite poubelle (23) a été accrochée au moyen de l'élément d'accrochage (10; 33) soulever lesdits premiers moyens (5, 8, 9) à l'aide desdits seconds moyens (4, 4', 6, 6', 7) jusqu'à ce que ladite poubelle (23) atteigne une hauteur au-dessus du sol, qui est supérieure à la hauteur du bord de la benne du véhicule automobile;
 - g) faire tourner lesdits troisièmes moyens (2, 2') par l'intermédiaire desdits quatrièmes moyens (11, 12) pour amener ladite poubelle (23) au-dessus de la benne du véhicule automobile;
 - h) vider le contenu de ladite poubelle (23) dans la benne du véhicule automobile
16. Procédé selon la revendication 15, **caractérisé en ce qu'il** comporte en outre les étapes suivantes consistant à:
- i) faire tourner lesdits troisièmes moyens (2, 2')

par l'intermédiaire desdits quatrièmes moyens (11, 12) pour amener ladite poubelle (23) à l'extérieur des dimensions hors-tout de la benne du véhicule automobile;

l) abaisser lesdits premiers moyens (5, 8, 9) par l'intermédiaire desdits seconds moyens (4, 4', 6, 6', 7), jusqu'à ce que ladite poubelle (23) soit en appui sur le sol; 5

m) libérer ledit élément d'accrochage (10; 33) à partir de ladite poubelle (23); 10

n) soulever verticalement lesdits premiers moyens (5, 8, 9) au-dessus de ladite poubelle (23) par l'intermédiaire desdits seconds moyens (4, 4', 6, 6', 7);

o) rétracter ledit élément d'accrochage (10; 33) par l'intermédiaire desdits premiers moyens (5, 8, 9); 15

p) abaisser lesdits premiers moyens (5, 8, 9) dans la position de repos respective par l'intermédiaire desdits seconds moyens (4, 4', 6, 6', 7); 20

q) déplacer éventuellement le véhicule automobile jusqu'à une poubelle suivante pour la vider.

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17. Procédé selon la revendication 15, **caractérisé en ce qu'il** est prévu, entre les étapes g) et h), l'ajustement horizontal, à l'aide desdits premiers moyens (5, 8, 9), de la position de vidage de ladite poubelle (23) par rapport à la longueur de la benne du véhicule automobile. 30

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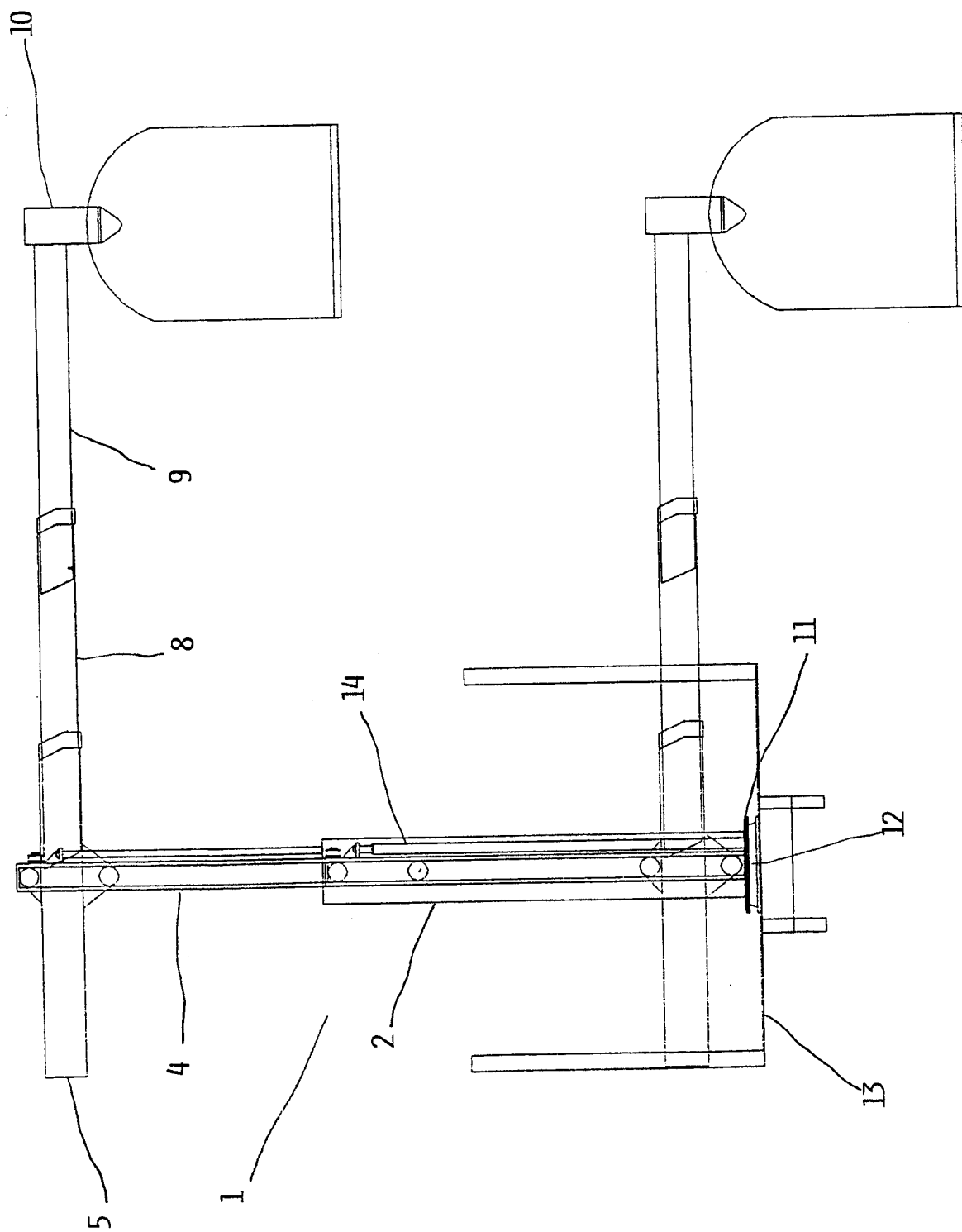


FIG. 1

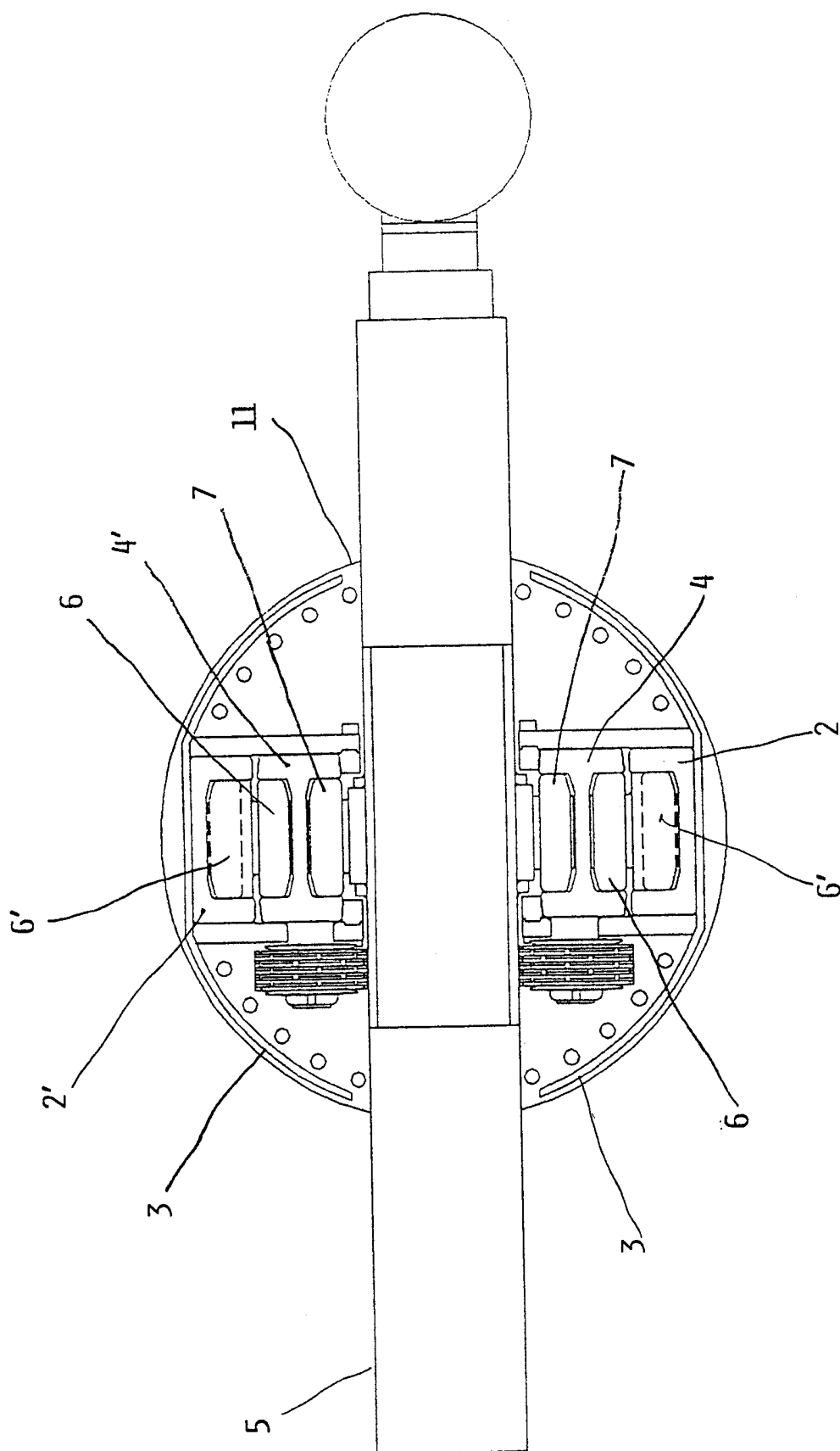


FIG. 2

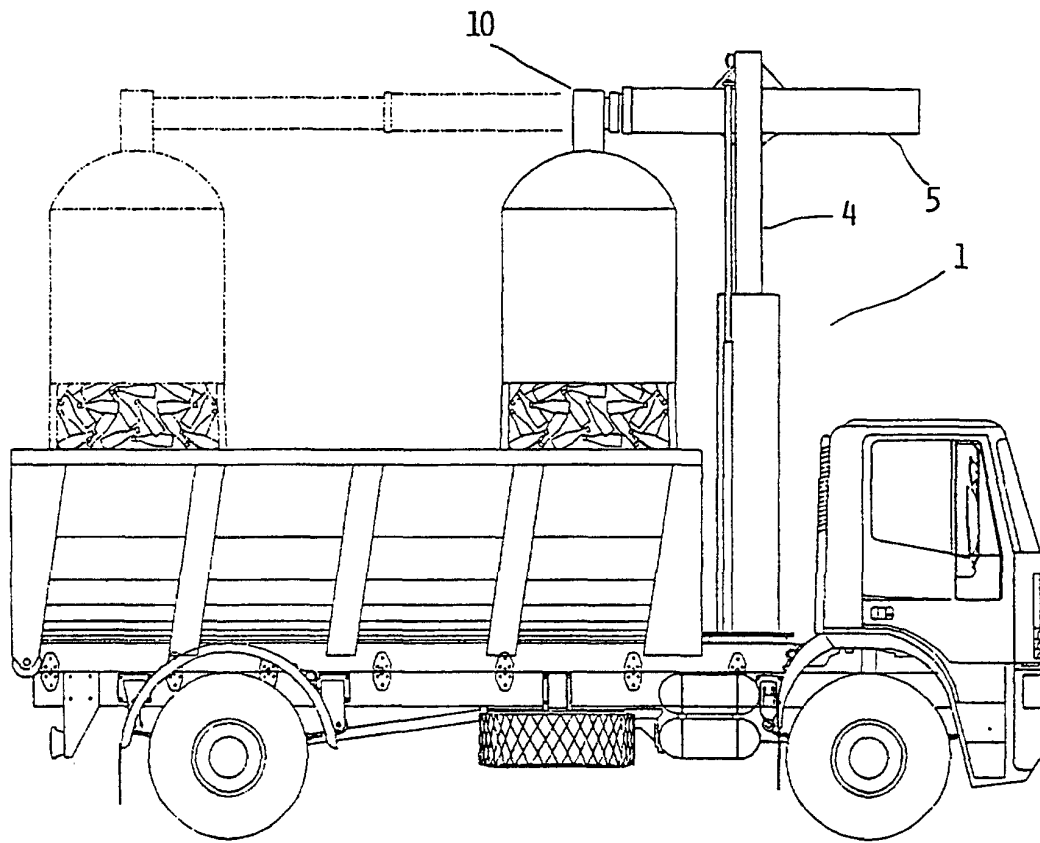


FIG. 3

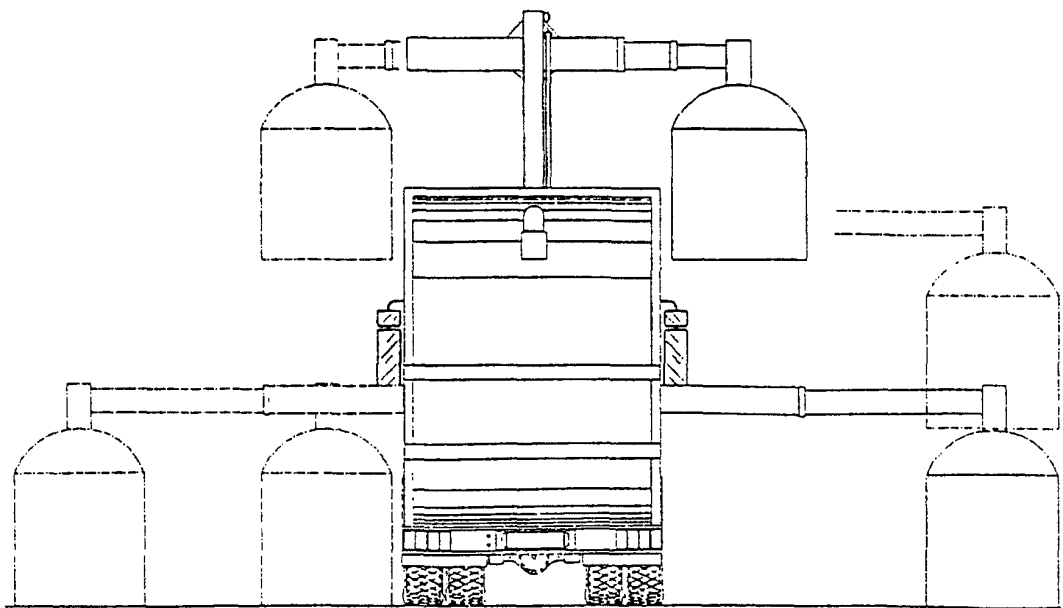


FIG. 4

FIG. 5c

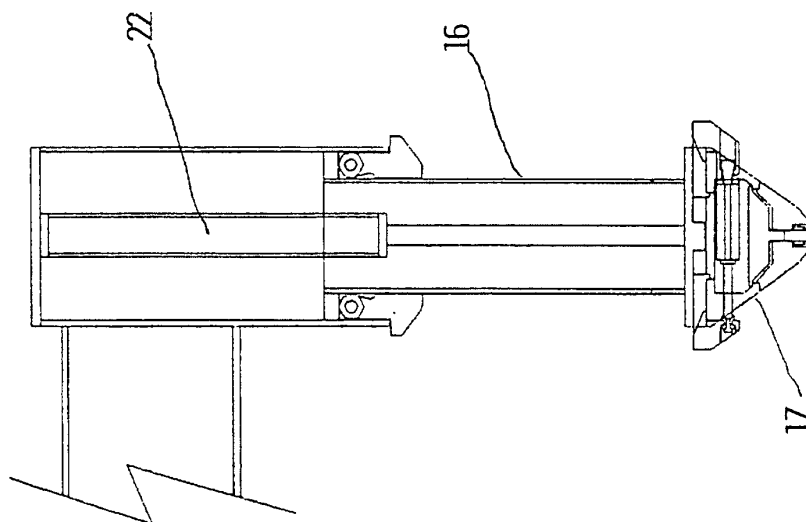


FIG. 5b

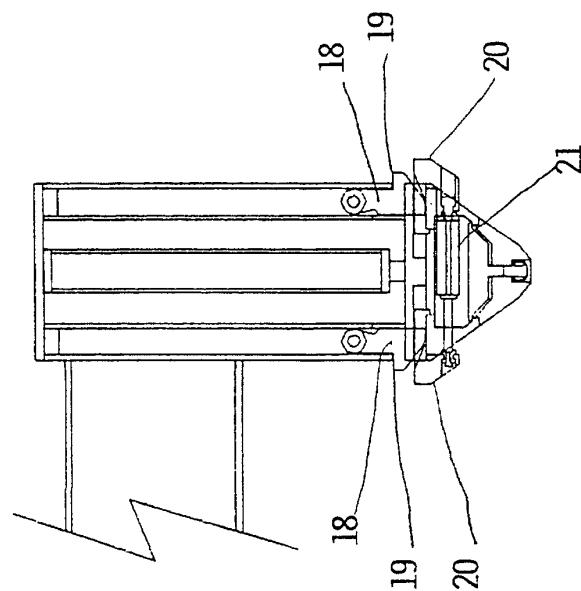
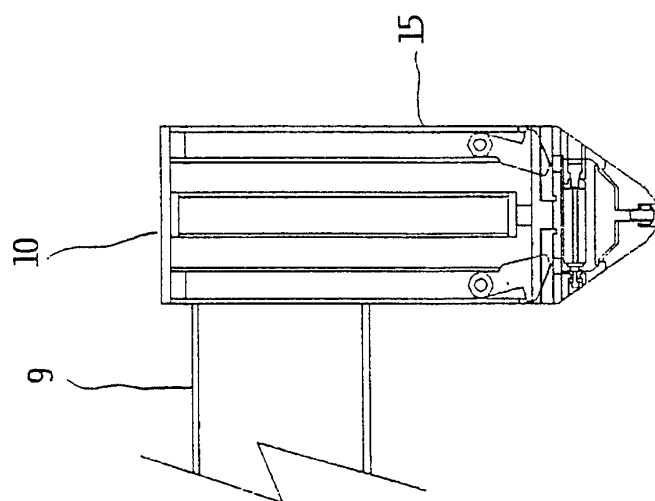
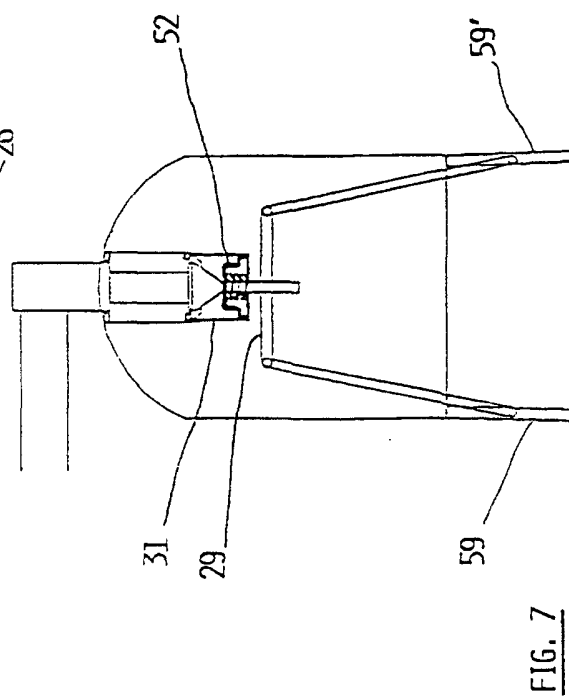
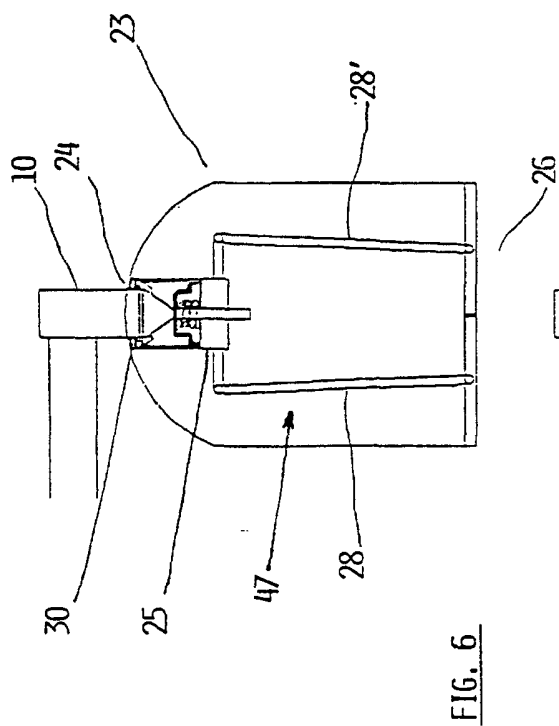
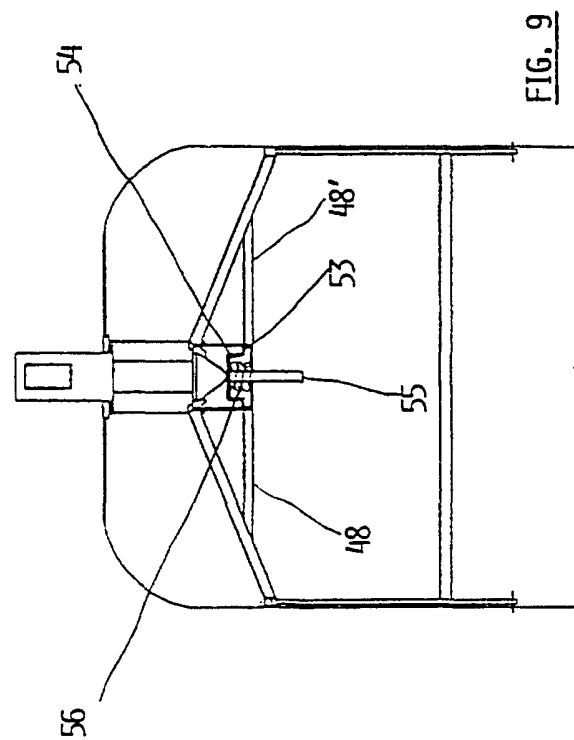
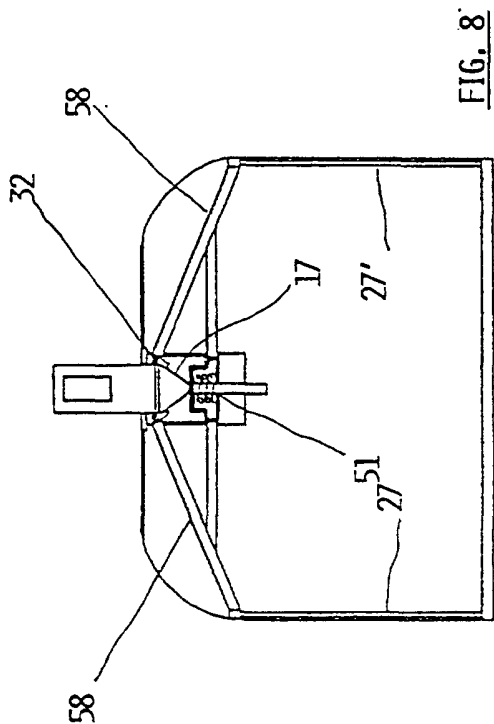
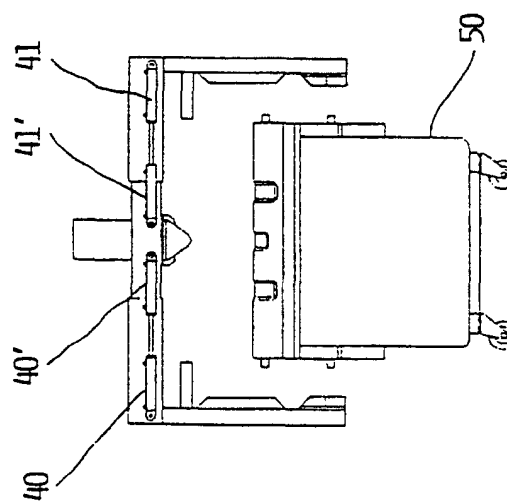
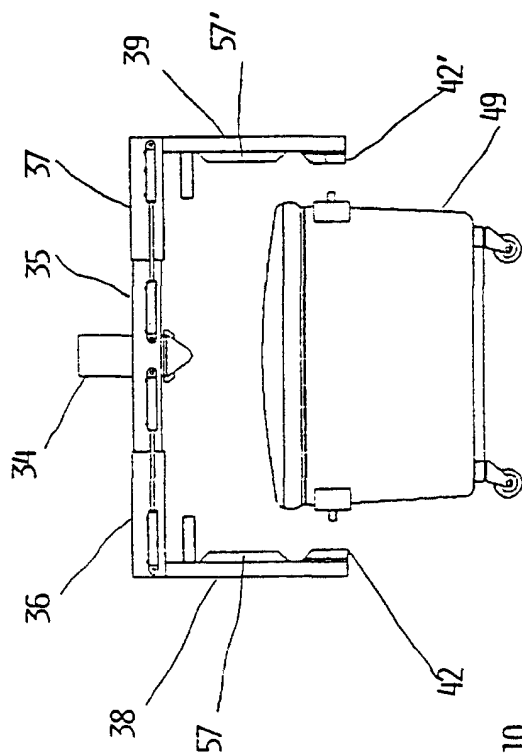
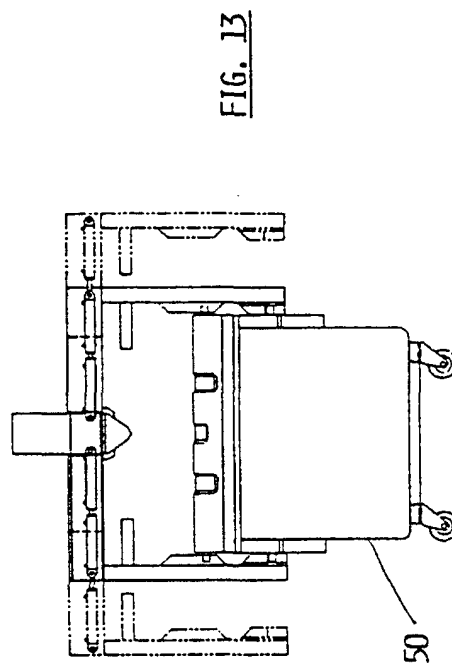
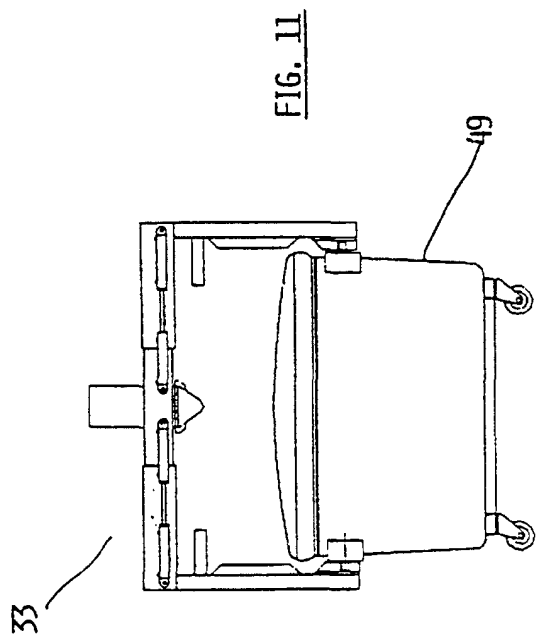


FIG. 5a







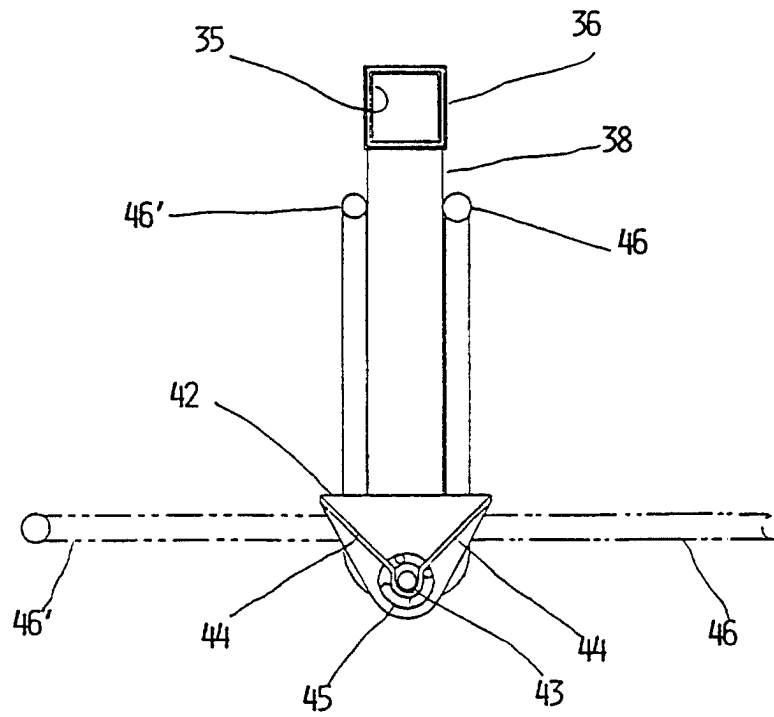


FIG. 14

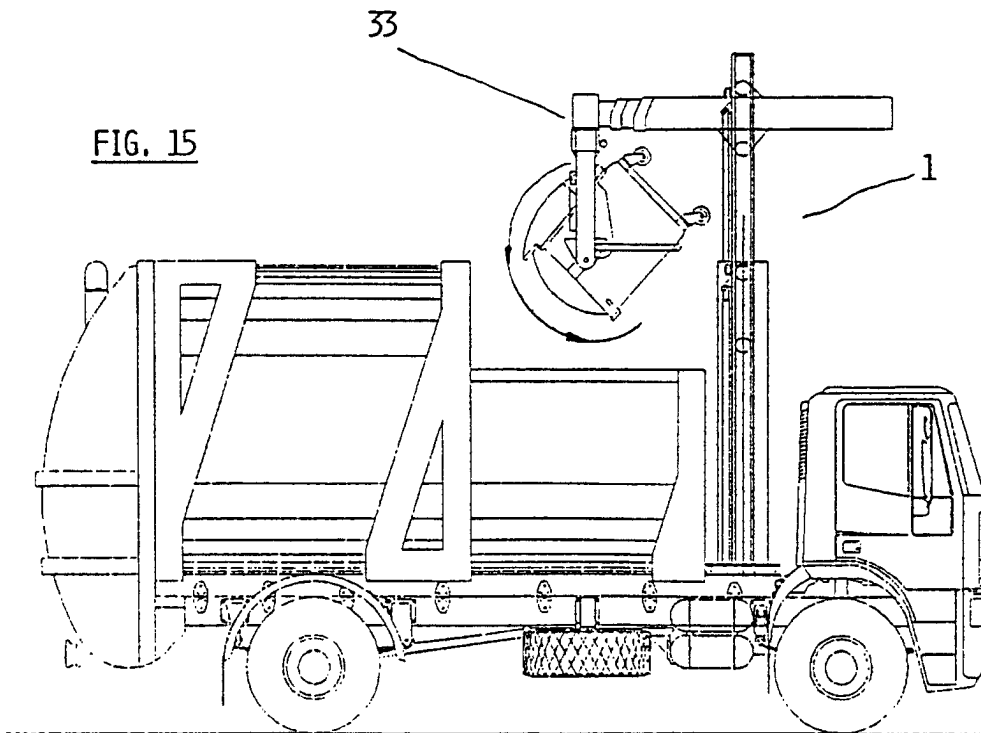


FIG. 15

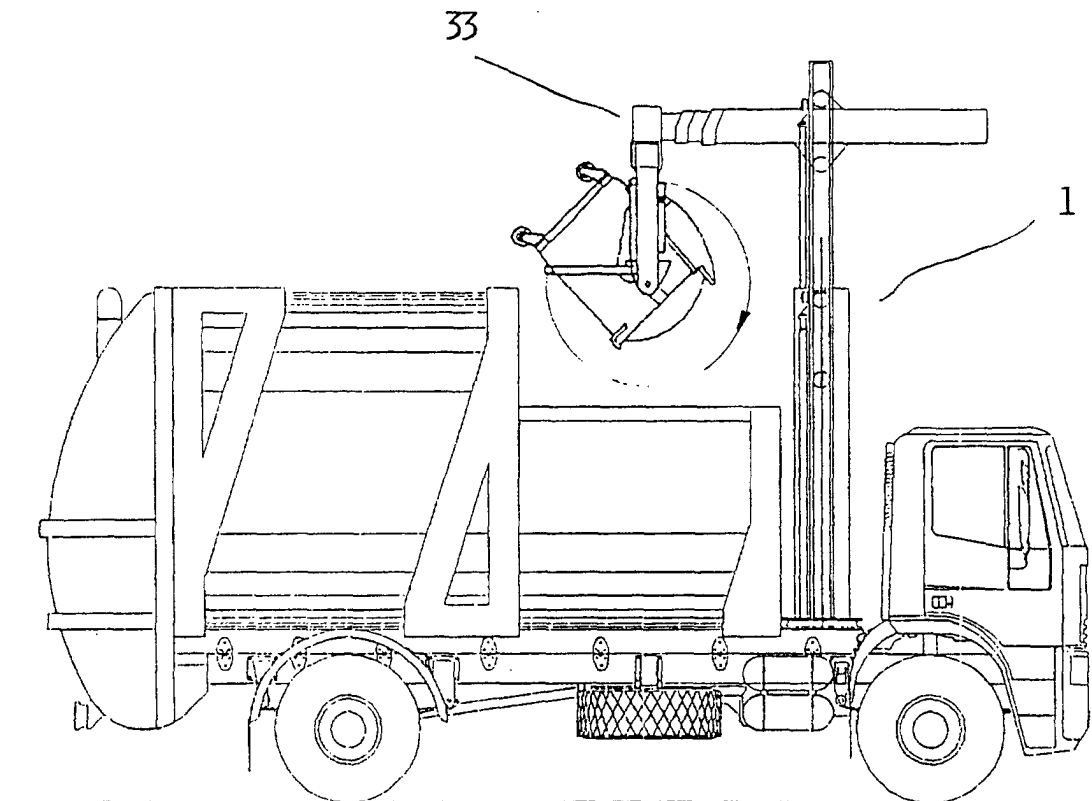


FIG. 16