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(54) **Device for opening lids of containers, in particular refuse containers, suitable for disabled users**

(57) A device for opening lids of containers, in particular refuse containers, comprising at least one contact element (1, 7) on which pressure/thrust is exerted with the foot of the user or via a mobility aid, such as a stick, crutch or wheelchair, the contact element (1, 7) being

designed to transmit motion to at least one component constrained to translate in the direction parallel to that of the resting surface of the container itself or perpendicular thereto, there being provided a kinematic chain designed to convert the translational motion of said component into a movement of opening of the lid/lids of the container.

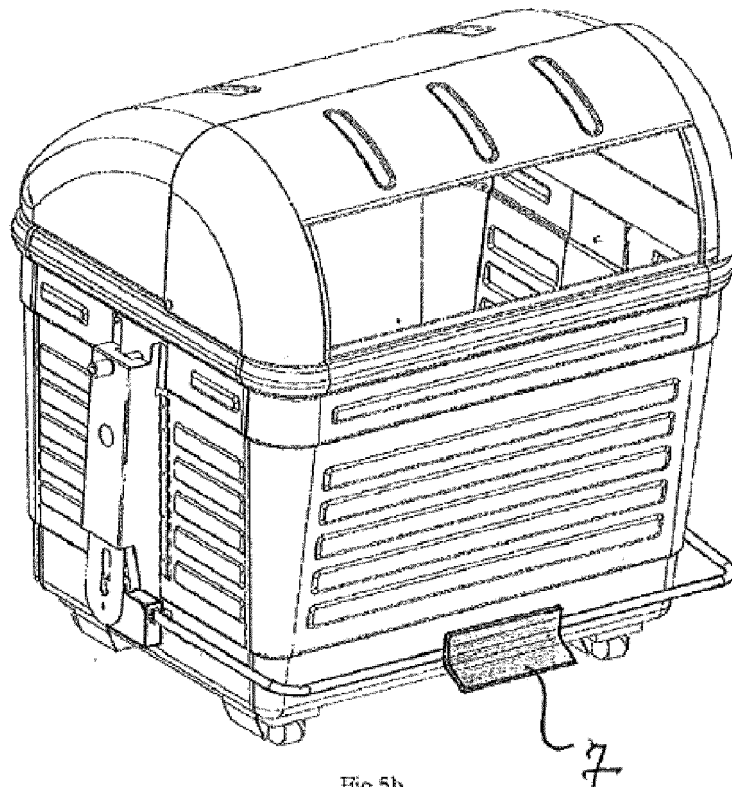


Fig.5b

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Description

[0001] The present invention relates to a device for opening lids of containers, which can find a specific application preferably in the field of containers for refuse and is **characterized in that** it comprises at least one contact element operated by the users, on which the pressure/thrust (possibly amplified by a mechanical and/or hydraulic system) is exerted directly with the foot and/or via means of aid to mobility (stick, crutch, wheelchair, etc.), said contact element enabling control of raising of the lid/lids of the container via an appropriate kinematic chain connected thereto containing at least one component, which translates in the direction parallel to that of the resting surface of the container itself or perpendicular thereto and the movement of which is obtained by means of a constructional arrangement that can be represented schematically as a double constraint of the slider-crank-mechanism type or articulated-parallelogram type or linear-slide-block type, the further components of said device being designed to convert the translational motion of said component into a movement of opening of the lid/lids of the container.

[0002] Recourse to a double constraint of the slider-crank-mechanism type or articulated-parallelogram type or linear-slide-block type, which allows for the component of the device that transmits the thrust exerted by the user only the movement of translation in the direction parallel to that of the resting surface of the container itself or perpendicular thereto, constitutes an altogether innovative solution as compared to the currently existing systems (commercially or generically referred to as "pedals" or "external pedal mechanisms") used by the containers available on the market. These, in fact, for opening lid/lids, use devices that exploit the known principle of the lever (above all of the first and/or second class) and can be schematically represented as a double constraint but of a hinge type, which enables the device to turn about the point of constraint of the device applied to the container itself.

[0003] Advantageously, the innovative solution forming the subject of the present invention can find application both in a new model of refuse container and/or bin to be produced *ex novo* and in a device/kit that enables modification of current containers already in use. In either case, it makes it possible to:

1. allow all users, and above all persons that find it problematical or even impossible to walk on account of pathological conditions, injuries, disabilities, or handicaps that entail (also temporary) reduction in mobility or total impediment and/or dependence upon the use of aids to mobility (sticks, crutches or wheeled devices, such as wheelchairs) that to some extent make up for the inability to use their lower limbs, the possibility of carrying out opening of a lid of a container also for refuse without the aid of their hands by actuating the pedal by means of the

thrust/pressure exerted on the pedal itself either directly or even using the means of aid to walking themselves;

2. eliminate the problem of the kind of dangers facing the user when he uses the pedal arrangements of a traditional type currently available on the market, which are foot-operated by applying a thrust with vertical action (from above downwards) and which use for transmission of the motion/force the principle of the lever (chiefly first-class and/or second-class levers), said dangers arising in the following cases:

- in the precarious equilibrium in which the user comes to find himself when he has to act on the pedal and has to raise his knee and his leg at the same time to be able to exert a downward force on the pedal with a movement from above downwards, with the potential risk of him falling over backwards (a situation that is rendered even more dangerous when the loading mouth of the container faces the road); and
- when the user is standing on the pavement and the container is at road level so that the user has to lean forward and is thus unbalanced, with the risk of falling forwards in the direction of the loading mouth, and with the possibility of banging his face against the lid when it opens;

3. facilitate the use of the container also by users with less physical strength, for example, disabled persons, elderly persons, small children, etc.;

4. improve hygiene in the use of the container by disabled users in so far as there are eliminated the current manually operated devices for opening lids with which the containers for refuse collection that are already available on the market are equipped;

5. facilitate positioning of the container, especially in the proximity of the edge of the pavement, by eliminating the downward vertical stroke of the pedal;

6. improve the ergonomics of the container as a result of the elimination of the pedal with opening by downward vertical action in so far as:

- there is a reduction in the height from the ground at which the pedal arrangement has to be set to take into account both the stroke necessary for opening and the height of the possible pavement where the container is positioned;
- the container can be positioned in the proximity of the edge of the pavement, with consequent reduction of the effort of thrust required and improvement of the equilibrium of the user;

7. reduce as far as possible the likelihood of failure of the container and its components, simplifying the constructional and maintenance aspects thereof by eliminating the devices for manual opening referred to in point 4) above;

8. improve tidiness of the urban environment by maintaining the original state of the container;
9. improve the appearance of the container;
10. increase the structural resistance, lengthening the average technical service life.

[0004] It should be pointed out that the constructional solution forming the subject of the invention can be applied on all the types of containers used also for (differentiated or undifferentiated) refuse collection, irrespective of their capacity, their constructional solution (domed lid, plane lid, symmetrical lid, asymmetrical lid, external pedal mechanism, central pedal, etc.), the material of which they are made, their mobility or otherwise, and the presence or otherwise of the traditional opening devices, which may also coexist alongside the proposed innovative solution.

[0005] For a better understanding of the present invention, further characteristics and advantages will be described hereinafter with reference to the attached plates of drawings, which illustrate merely by way of example some preferred embodiments thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] In the drawings:

Figures 1, 2a, 2b, 3a, 3b, 4a, and 4b show various types of bins/containers of a traditional type in compliance with the norm UNI EN 12754-2006;

Figures 5a and 5b are, respectively, a side view and a perspective view of bins/containers with a lid-opening mechanism of the external-pedal type that runs along the outside of the container, which comprises the device according to the invention;

Figures 5c and 5d are, respectively, a side view and a front view of a bin/container with a lid-opening mechanism of the central-pedal type that runs underneath the tank of the container, which comprises the device forming the subject of the invention;

Figure 5e is a side view of a bin/container with lid-opening mechanism of the central-pedal type, which comprises the device according to the invention, highlighted in which is the movement of translation of said pedal;

Figure 6 shows a bin/container, in perspective from the user-access side, with both of the lid-opening mechanisms installed: the central one of a known type already available on the market, and the opening mechanism according to the present invention, in a further embodiment, i.e., where it is applied on one and the same side of the bin/container (namely, the loading side), set to one side of the traditional mechanism of a known type;

Figure 7a shows a possible constructional solution of the invention that can be applied, for example, to the bin/container in the constructional solution illustrated in Figures 5c and 5d, highlighted in which is

the detail of the device (plate/pedal) on which pressure is exerted by the user, said device being firmly connected to a second rod-shaped component: both translate fixedly with rectilinear motion parallel to the resting surface of the container, a movement that is obtained by adopting a constructional arrangement that provides a constraint of the linear-slide-block type, and then governs tie-rods and/or linkages to enable opening of the lid/lids;

Figure 7b shows the constructional solution of the invention illustrated in Figure 5c, in top-plan and cross-sectional view;

Figure 8 is a representation of the bin/container in the constructional solution illustrated in Figure 5c, highlighted in which is the solution according to the invention, operated by a user with limited physical strength, namely, an elderly person;

Figure 9 is a representation of the bin/container in the constructional solution illustrated in Figure 5c, highlighted in which is the solution according to the invention operated by a user with limited physical strength, namely, a user who uses mobile wheeled devices, such as a wheelchair;

Figure 10 shows the bin/container in the embodiment where both of the lid-opening mechanisms are installed: one of a known type and already available on the market, and one according to the invention, in a further constructional solution, i.e., where it is applied on the opposite side of the bin/container;

Figure 11 shows a possible constructional solution of the invention that can be applied, for example, to the bin/container in the constructional solution illustrated in Figure 5a or Figure 5b, highlighted in which is the detail of the device on which pressure is exerted by the user, which translates with rectilinear motion in the direction parallel to that of the resting surface of the container itself, a movement that is obtained by adopting a constructional arrangement that provides a constraint of the linear-slide-block type, and then governs tie-rods, pulleys, and linkages to enable opening of the lid;

Figure 12 shows a possible constructional solution of the invention that can be applied, for example, to the bin/container in the constructional solution illustrated in Figure 5a or Figure 5b, highlighted in which is the detail of the device on which pressure is exerted by the user, which translates with rectilinear motion in the direction parallel to that of the resting surface of the container itself, a movement that is obtained by adopting a constructional arrangement that provides a constraint of the linear-slide-block type, and then governs tie-rods, racks, gears, and linkages to enable opening of the lid;

Figure 13 shows a possible constructional solution of the invention that can be applied, for example, to the bin/container in the constructional solution illustrated in Figure 5c or Figure 5d, highlighted in which is the detail of the device on which pressure is ex-

erted by the user, which translates in a plane perpendicular to that of the resting surface of the container itself, a movement that is obtained by adopting a constructional arrangement that provides a constraint of the articulated-parallelogram type, and then governs tie-rods, pulleys, and linkages to enable opening of the lid;

Figures 14a, 14b and 14c show three possible known constructional solutions of components of the invention for conversion of translational motion into rotational motion designed to govern tie-rods, racks, gears, crank-and-slotted-link mechanisms, and linkages to enable opening of the lid;

Figures 15a and 15b show two possible constructional solutions of components of the invention that can be applied, for example, to the bin/container in the constructional solution illustrated in Figure 5c, highlighted in which is the detail of the shaped plate of the device that is hinged to the structure of the container at the top (Figure 15a) and at the bottom (Figure 15b); present on the back of the plate is a slider-crank mechanism on which, connected via a sliding block provided with a sliding hinge is a rod forming part of the mechanism for opening the container, said rod moving with translational motion either in the direction parallel to that of the resting surface of the container itself or in the direction perpendicular thereto and governing the other members of the opening mechanism;

Figure 16 shows the rear part of the component/plate, highlighted in which is the slider-crank mechanism in which the hinged rod illustrated in Figures 15a and 15b slides.

PRIOR ART

[0007] One of the basic rights internationally recognized in regard to disabled persons or persons with impediments of some nature is that of equal opportunities and equal rights, i.e., that of being able to use structures and equipment that, both from the architectural standpoint and from the functional standpoint, are accessible and do not present barriers.

[0008] It is known that containers in general and, in particular, those for refuse - also referred to as "bins" - pre-arranged for mechanized collection of refuse and currently available on the market are unified as regards the characteristics of design and construction (see the norm UNI-EN 12754:2006), such as:

- capacity;
- dimensions;
- materials of which they are made;
- type of lid (flat lid, flap lid, or domed lid, whether rocking or otherwise) equipped with a single opening or with multiple openings;
- presence or otherwise of wheels, identifying containers as "mobile" or "stationary";

- devices for opening the lid/lids by users (via an external pedal mechanism, central pedal, and/or manual devices) and for emptying the container into the refuse-collection vehicle (whether controlled by the vehicle or exploiting gravity), etc.

[0009] In all of the above cases, irrespective of the capacity of the containers/bins and the material of which they are made, they are basically made up of two main components/assemblies: a tank and a cover/lid.

[0010] Usually, opening of the lid/lids is governed by an external-pedal device, which, being operated by the foot of the user and exploiting the principle of the lever (in particular, first-class and second-class levers), by means of a system of rods, levers, and/or tie-rods governs opening of the lid/lids.

[0011] The purpose of the present invention is to provide an innovative solution for a new device for opening lids of containers, which can find specific application preferably in the field of bins/containers for refuse collection, **characterized in that** it envisages a component of the device (plate/pedal) that is appropriately shaped and can be governed by the direct pressure (possibly amplified by a mechanical and/or hydraulic system) of the foot and/or of a means of aid to mobility of the disabled user (stick, crutch, wheelchair, etc.), and at least one second component that translates in a direction parallel or perpendicular to the resting surface of the container itself and the constructional arrangement of which may be represented schematically as a double constraint of the slider-crank-mechanism type or articulated-parallelogram type or linear-slide-block type, which enables the component itself to perform just the movement of translation in the direction parallel to that of the resting surface of the container or perpendicular thereto. Said second component forms an integral part of an appropriate mechanism, which is more or less complex (made up of cables, rods, crank-and-slotted-link mechanism, levers, tie-rods, springs, pulleys, gears, etc.) and enables conversion of its own translational motion in order to enable opening of the lid of the container.

DETAILED DESCRIPTION OF THE INVENTION

[0012] Described hereinafter are some embodiments of the device for opening the lid or lids of a refuse-collection container/bin, which, according to the peculiar characteristic of the invention, comprises:

a device with an actuation element constituted by an appropriately shaped plate/pedal that is able to receive the action exerted by the user either directly via the foot or via means of aid to mobility (stick, crutch, wheelchair, etc.);

a component, operated by said element of interface with the user and rigidly connected or kinematically connected thereto, which is forced to move with just translational motion, normally in a direction parallel

or perpendicular to the resting surface of the container itself, a movement that is obtained by means of a constructional arrangement that may be represented schematically as a double constraint of the slider-crank-mechanism type or articulated-parallelogram type or linear-slide-block type, which, being connected to the remaining components, will enable opening of the lid/lids for depositing the refuse via the pressure exerted by the foot and/or by the means of aid to walking of the disabled person (see Figures 8, 9, 10).

[0013] With reference to Figures 7a, 7b, one of the embodiments of the device, which can be activated by the user, is the one constituted by a component/pedal 1 that moves with translational motion and is appropriately shaped to enable ease of operation both for a disabled person having a handicap (using his foot and/or some means of aid to mobility - see Figures 8, 9, 10) and for a non-disabled user. Said pedal 1 is connected to a rod 2, which moves with rectilinear translational motion in a direction parallel to the resting surface of the container itself and slides in a guide 3, connected to the end of which is a tie-rod 4, which is connected at the other end 5 to a series of components of the device for opening the lid even of a traditional type.

[0014] The device may or may not be equipped with systems 6 for damping in the opening/closing step, such as springs (mechanical springs, gas-operated springs, etc.) that guarantee return of the device itself into the resting position upon closing of the lid after the opening step.

[0015] The component 1 of the device 1 envisages the presence of an appropriately shaped plate 7 that guarantees the possibility of being operated by the user either directly with his or her foot or using means of aid to mobility (stick, crutch, wheelchair, etc.), guaranteeing the user a secure resting surface. One of the embodiments of said component is the one constituted by a sufficiently wide plate, bent to form an obtuse angle.

[0016] A further embodiment of the device forming the subject of the invention, which can also coexist alongside a lid-opening system of a commercially available/traditional type, is the one constituted by the device according to the invention installed in the side wall of the bin/container (see Figure 6) and set on the same side as that on which the traditional lid-opening system is present.

[0017] A further embodiment of the device forming the subject of the invention, which can also coexist alongside a lid-opening system of a commercially available/traditional type, is the one (illustrated in Figure 10) constituted by device according to the invention set on the side opposite to that of the traditional lid-opening device.

[0018] A further embodiment of the device, which can also coexist alongside a lid-opening device of a commercially available/traditional type, is the one illustrated in Figure 15a, constituted by a pedal hinged at the top to the structure of the container, connected to which, by

means of a hinge that slides on a slider-crank mechanism provided in the rear part of the plate, is a rod forming part of the mechanism for opening the container, said rod moving with translational motion either in the direction parallel to that of the resting surface of the container itself or in the direction perpendicular thereto and governing the other members of the opening mechanism.

[0019] A further embodiment of the device, which can also coexist alongside a lid-opening device of a commercially available/traditional type, is the one illustrated in Figure 15b, which comprises a pedal hinged at the bottom to the structure of the container, connected to which, by means of a hinge that slides on a slider-crank mechanism provided in the rear part of the plate, is a rod forming part of the mechanism for opening the container, said rod moving with translational motion either in the direction parallel to that of the resting surface of the container itself or in the direction perpendicular thereto and governing the other members of the opening mechanism.

[0020] A further embodiment of the device, which can also coexist alongside a lid-opening device of a commercially available/traditional type, is the one illustrated in Figure 13, highlighted in which is the detail of the device on which pressure is exerted by the user, which translates in a plane perpendicular to that of the resting surface of the container itself, a movement that is obtained by adopting a constructional arrangement that envisages a constraint of an articulated-parallelogram type and then governs tie-rods, pulleys, and linkages to enable opening of the lid.

[0021] In the device for opening the lid of a bin/container forming the subject of the present invention there may also be present gas-operated cylinders or springs that facilitate opening of the lid/lids and serve, moreover, to slow down the step of closing thereof, thus preventing free fall of the lid/lids and fast repositioning of the device into the resting position and also reducing, at the same time, the noise.

[0022] In conclusion, with the solution proposed, the following advantages are achieved:

depositing of the refuse by the user is facilitated; all users, and above all those who have problems of walking or are unable to walk on account of pathological conditions, injuries, disabilities, or handicaps that entail (also temporary) reduction in mobility or total impediment and/or dependence upon the use of aids to mobility (sticks, crutches or wheeled devices, such as wheelchairs) that to some extent make up for the inability to use their lower limbs, are enabled to carry out opening of a lid of a container also for refuse without the aid of their hands by actuating the pedal by means of the thrust/pressure exerted on the pedal itself either directly or even using the means of aid to walking themselves; the ergonomic aspect of the step of depositing refuse is improved by reducing the effort that the user has to exert on the pedal arrangement, thus facilitating

the operations of depositing refuse in so far as the user no longer has to bother about movement of the lid and can concentrate on the operation even using both hands; and finally, any direct contact of the user with the container is reduced.

Claims

1. A device for opening lids of containers preferably for refuse, **characterized in that** it comprises at least one contact element operated by the users, on which the pressure/thrust is exerted directly with the foot and/or via means of aid to mobility (stick, crutch, wheelchair, etc.), said contact element enabling control of raising of the lid/lids of the container via at least one component kinematically connected thereto that translates in the direction parallel to that of the resting surface of the container itself or perpendicular thereto, said movement of translation being obtained by means of a constructional arrangement representable schematically as a double constraint of the slider-crank-mechanism type or articulated-parallellogram type or linear-slide-block type; there being further provided means to convert the translational motion of said component into a movement of opening of the lid/lids of the container. 5
2. The device as per Claim 1, **characterized in that** the pressure of the foot is amplified by mechanical and/or hydraulic means. 10
3. The device as per the preceding claims, **characterized in that** the device is equipped with damping systems such as gas-operated springs or cylinders that guarantee, as soon as the device is released, return thereof into the resting position upon closing of the lid after the opening step. 15
4. The device as per the preceding claims, **characterized in that** the contact element on which the thrust is exerted is set on the long/front side of the container/bin at the centre of a fork-like arrangement, the two side arms of which are both constrained to translate along the short sides of the container/bin, with a direction parallel to that of the resting surface of the container/bin itself or perpendicular thereto. 20
5. The device as per the preceding claims, **characterized in that** the contact element on which the thrust is exerted is set at one end of one of the two long sides of the container/bin and governs the movement of just one arm that is constrained to translate along one of the short side faces of the container/bin itself, integrating or replacing altogether the traditional opening device. 25
6. The device as per the preceding claims, **characterized in that** the contact element is constituted by a plate, appropriately bent to form an obtuse angle, inserted in order to guarantee both a secure rest for a means of aid to walking, such as a stick or the like, and the possibility of use by persons who are not disabled, and **in that** said plate forms an integral part of, or is kinematically connected to, the component that translates in a direction parallel to that of the resting surface of the container/bin itself or perpendicular thereto. 30
7. The device as per the preceding claims, **characterized in that** the contact element on which the thrust is exerted by users is set centrally on the long/front side of the container/bin and forms an integral part of, or is kinematically connected to, a rod-shaped component that translates in a direction parallel to that of the resting surface of the container itself or perpendicular thereto, being positioned under the tank bottom of the container/bin, integrating or replacing altogether the traditional opening device. 35
8. The device as per Claim 1, **characterized in that** the contact element is constituted by a plate appropriately shaped to form an obtuse angle, there being connected thereto a rod-shaped component forming part of the mechanism for opening the container, which, by means of a hinge that can slide on a slider-crank mechanism, translates in the direction parallel to that of the resting surface of the container itself or perpendicular thereto, and **in that** said inclined plate, on which the thrust is exerted by the user, is alternatively hinged at its own top end or at its own bottom end to the structure/tank of the container/bin. 40

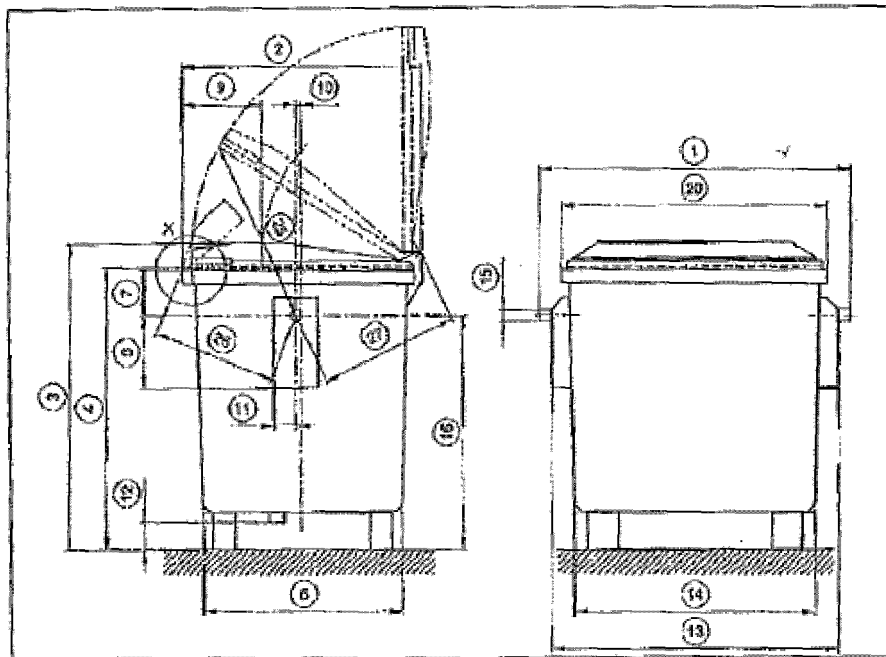


Fig. 1 - UNI EN 12754 - 1

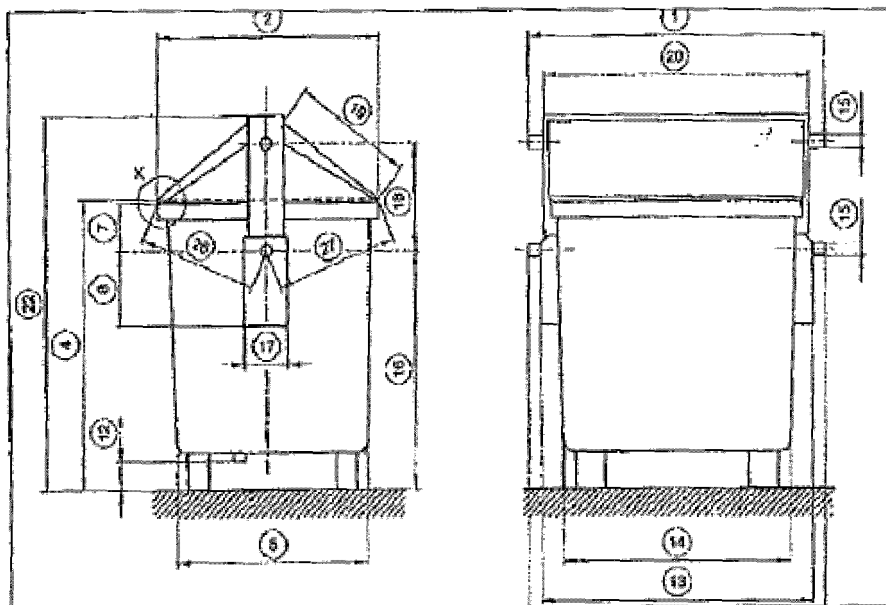


Fig. 2a - UNI EN 12754 - 1

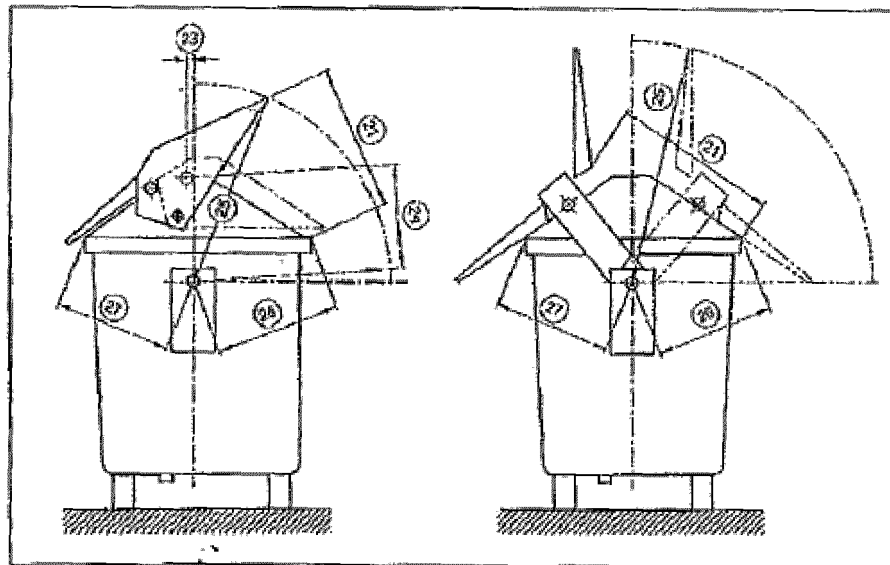


Fig. 2b - UNI EN 12754 - 1

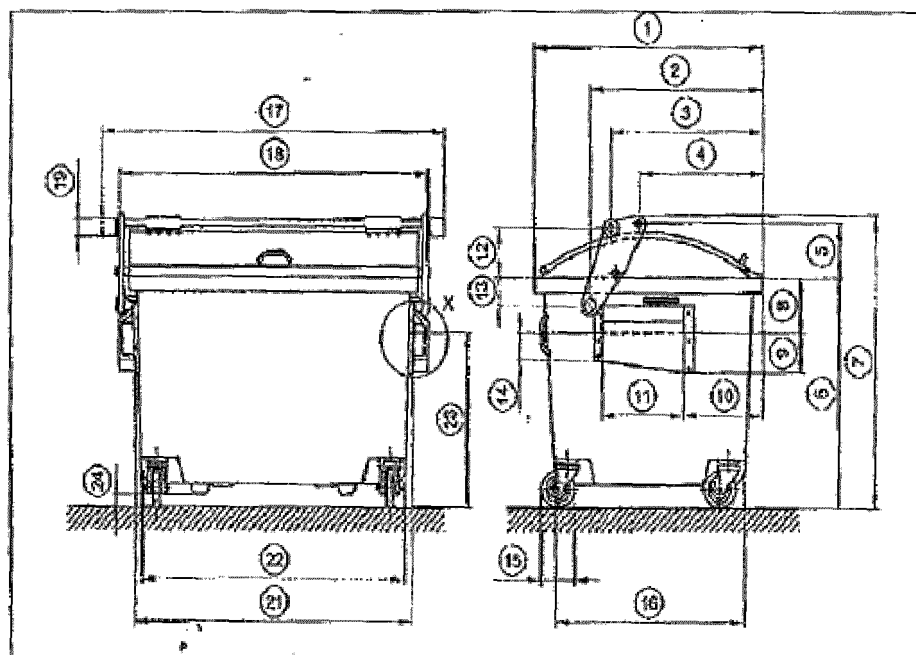


Fig. 3a - UNI EN 12754 - 1

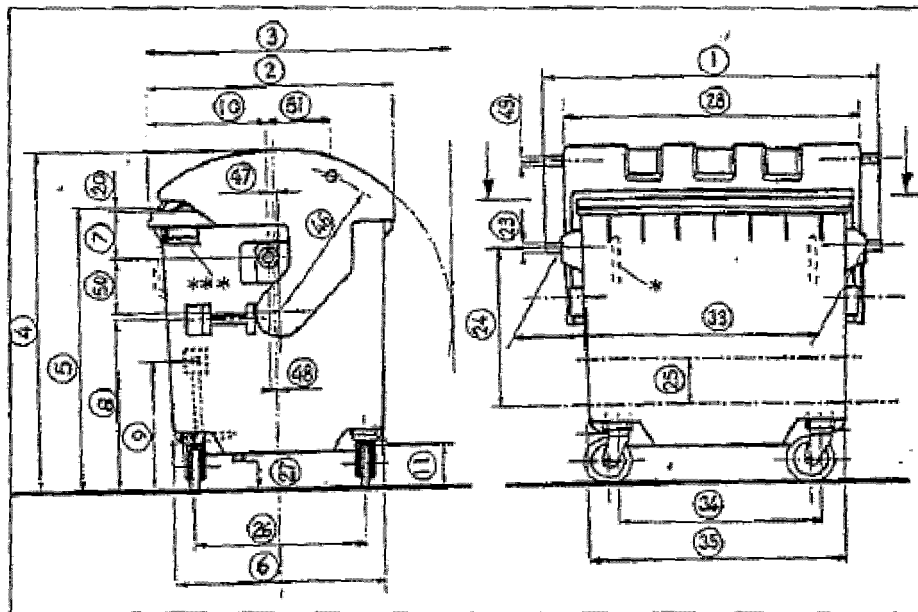


Fig. 3b - UNI EN 12754 - 1

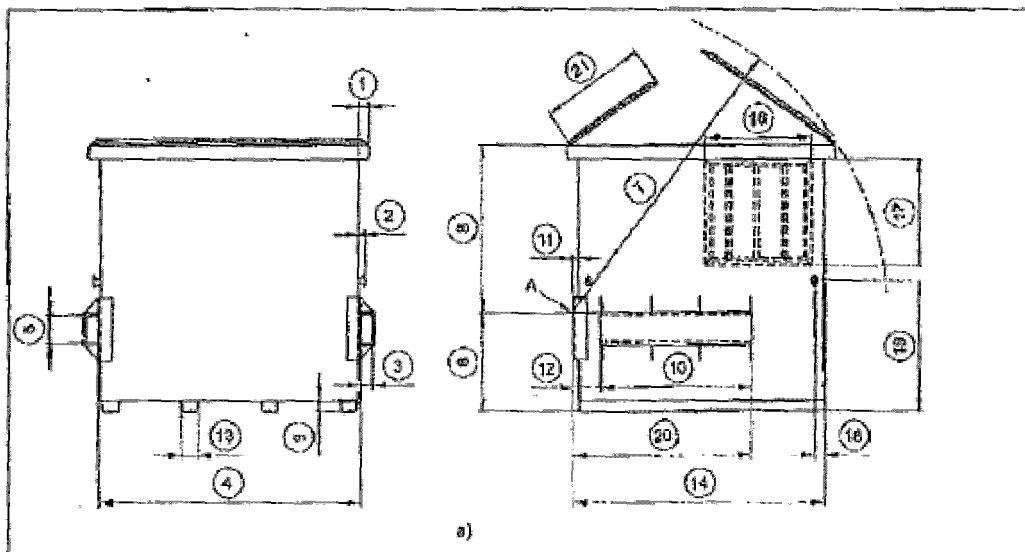


Fig. 4a - UNI EN 12754 - 1

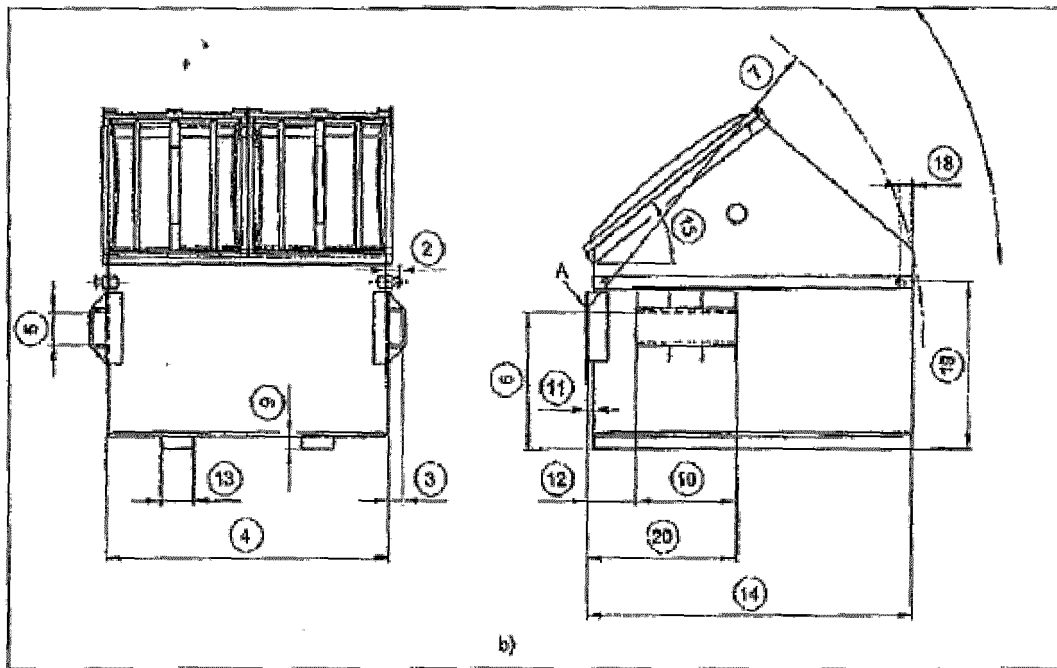


Fig. 4b - UNI EN 12754 - 1

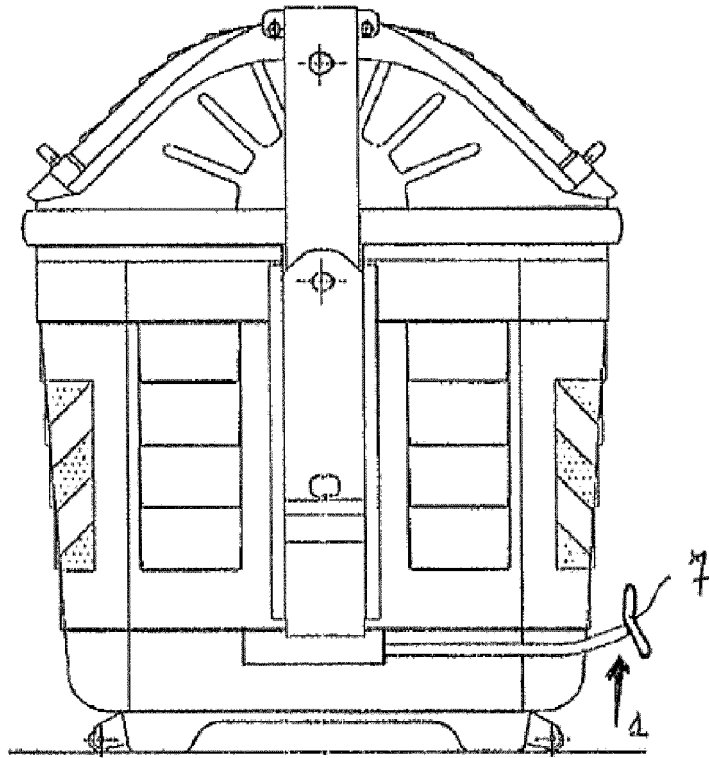


Fig. 5a

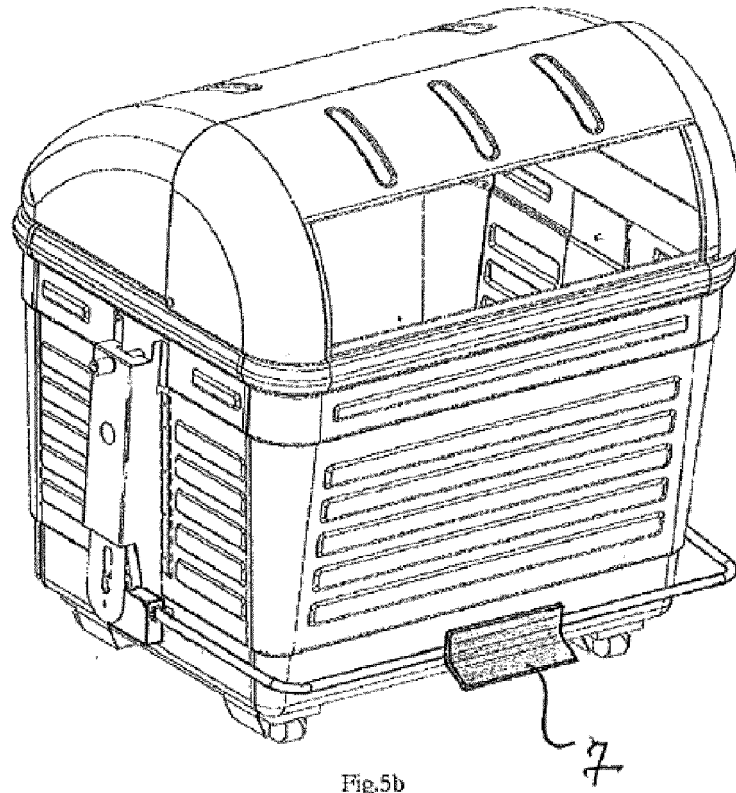


Fig. 5b

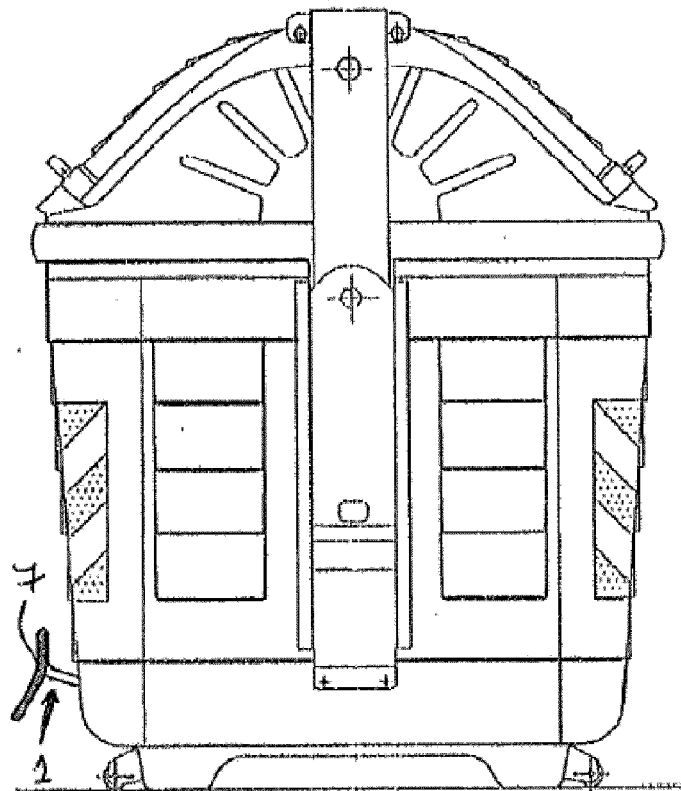


Fig. 5c

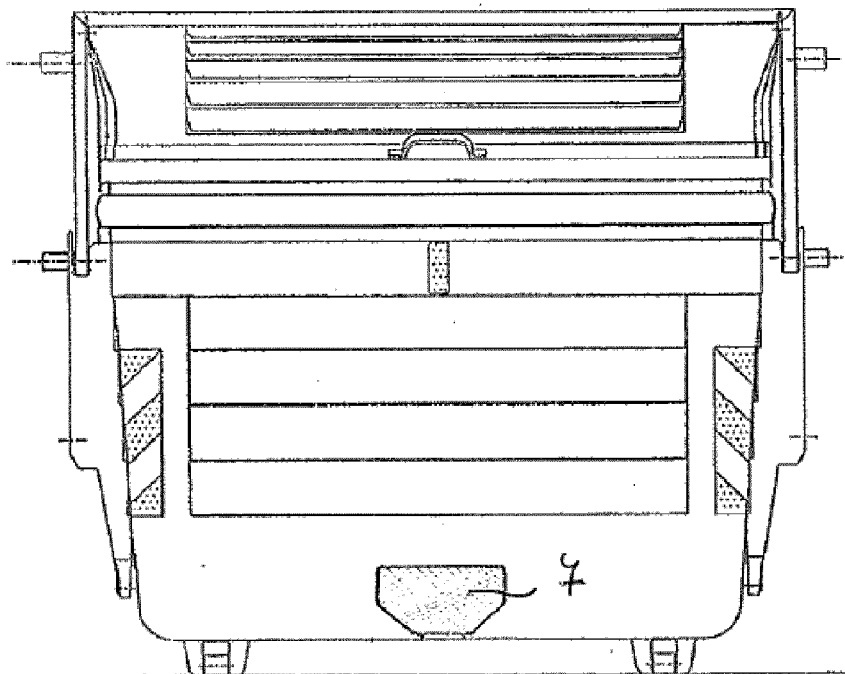


Fig. 5d

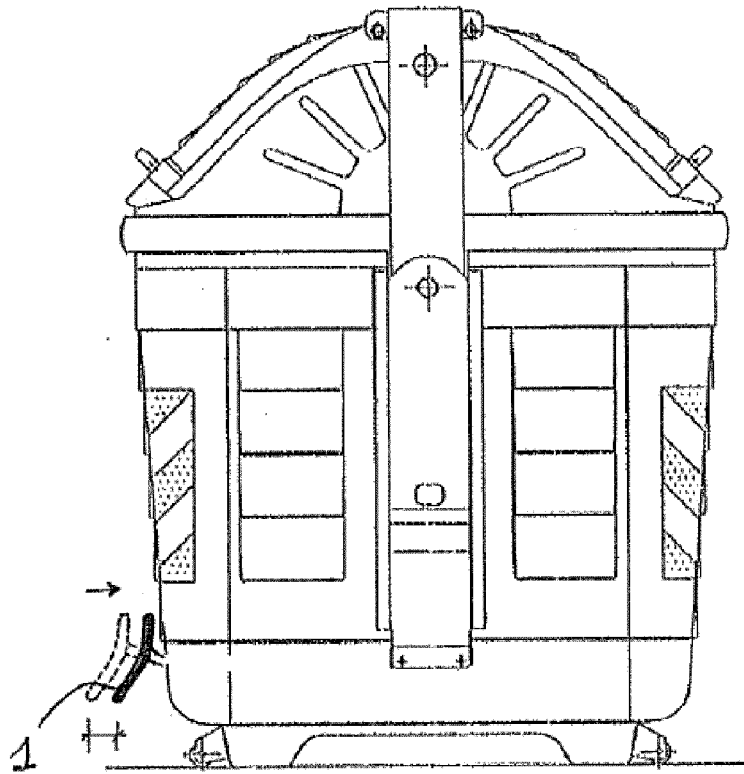


Fig. 5e

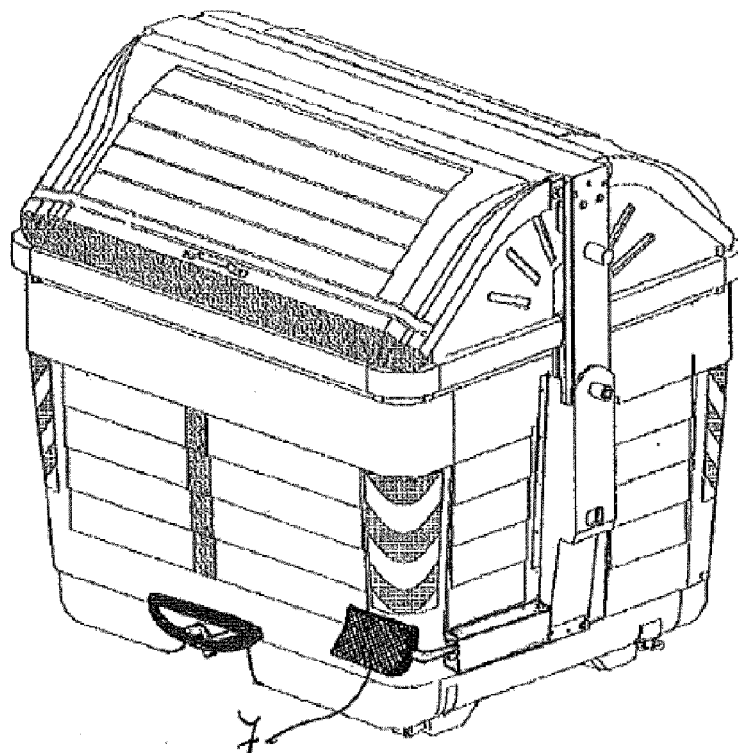


Fig. 6

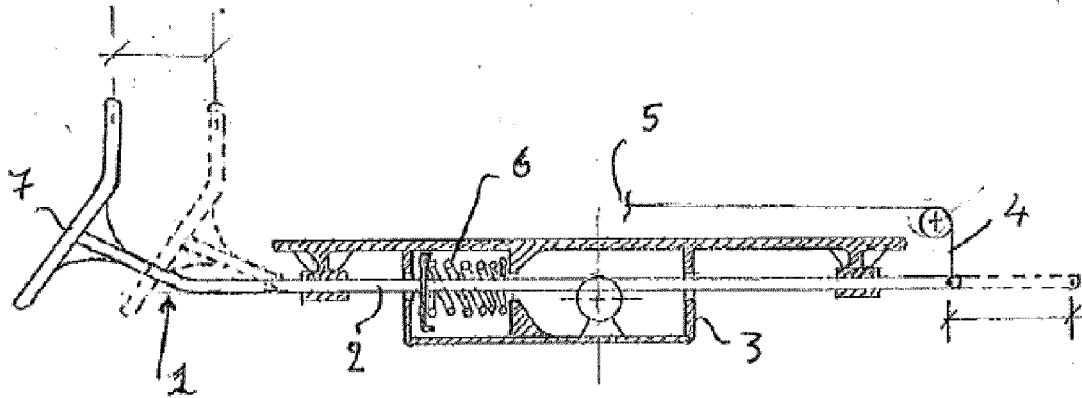


Fig. 7a

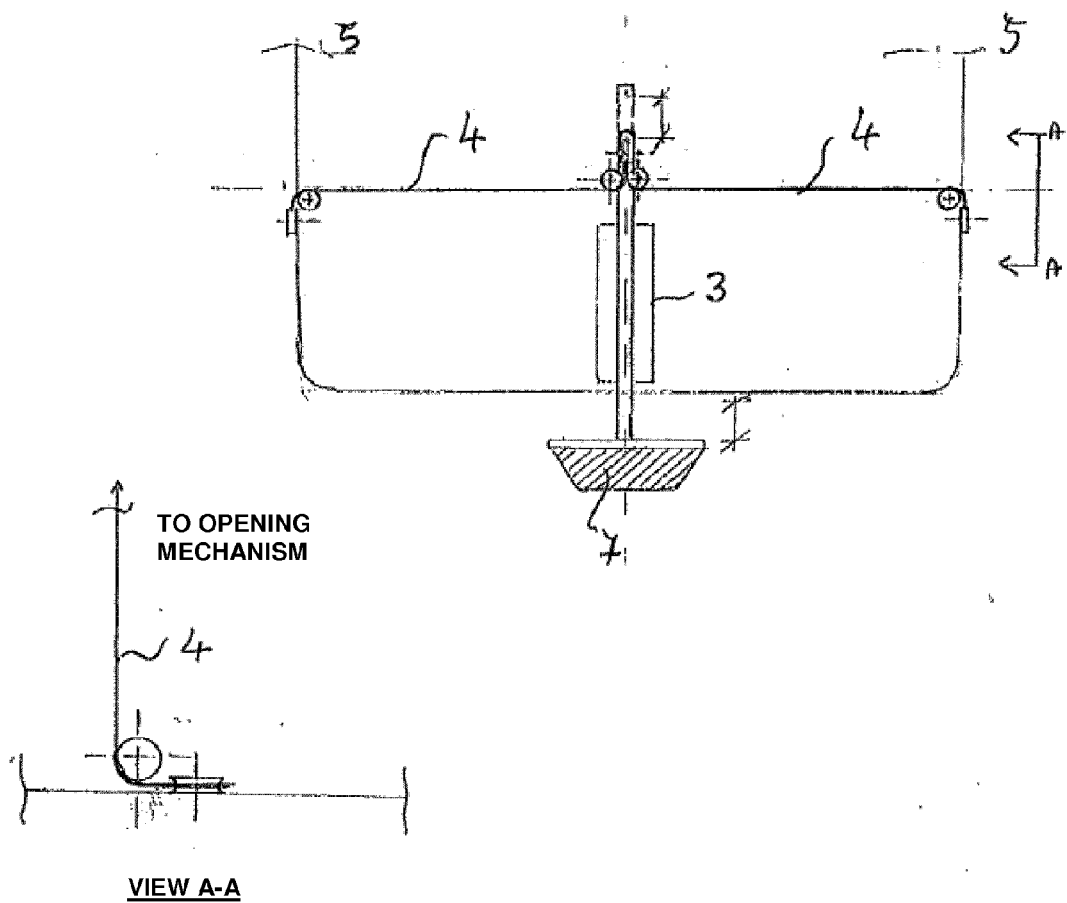


Fig. 7b

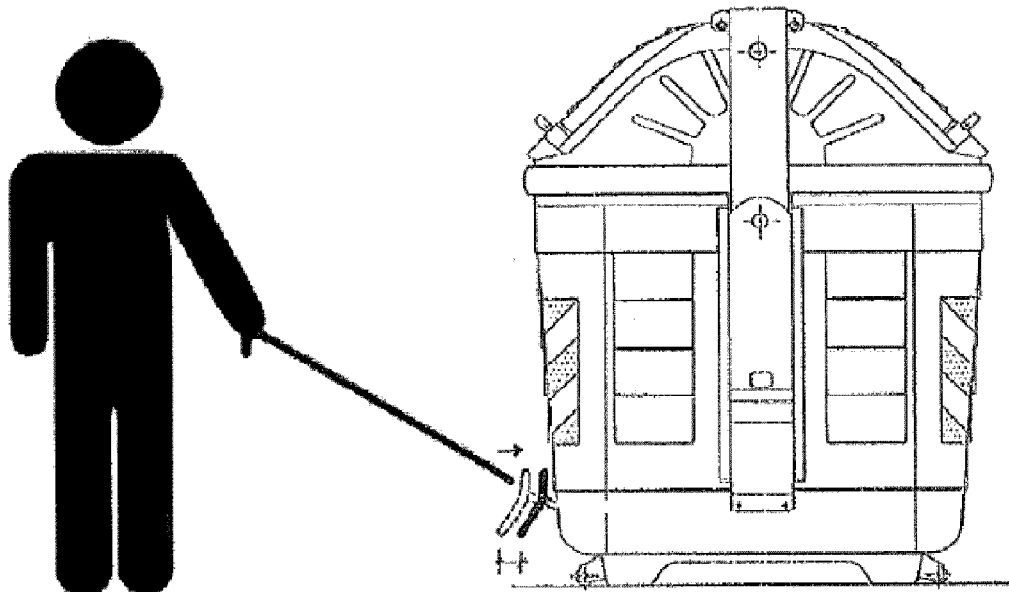


Fig. 8

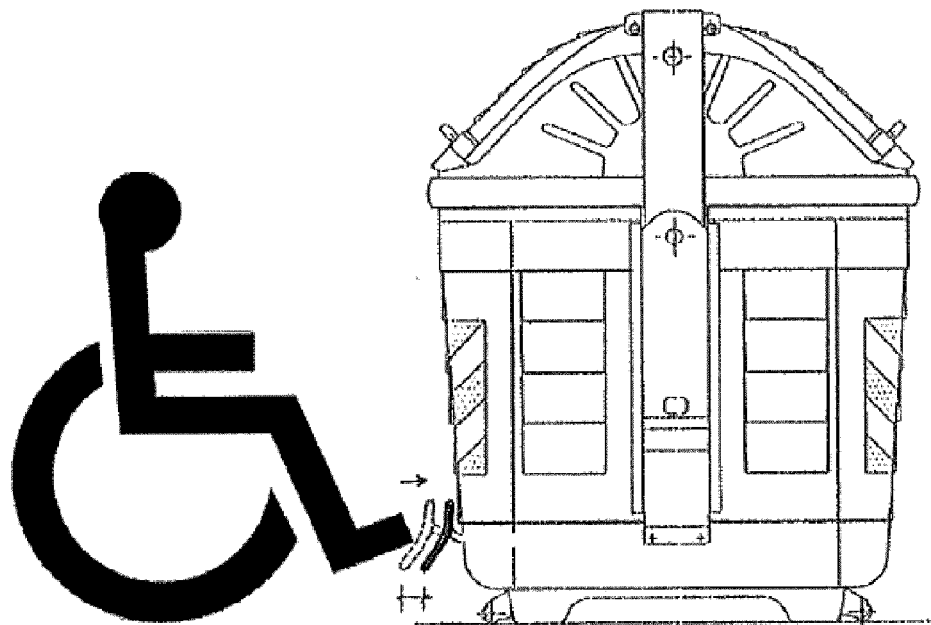


Fig. 9

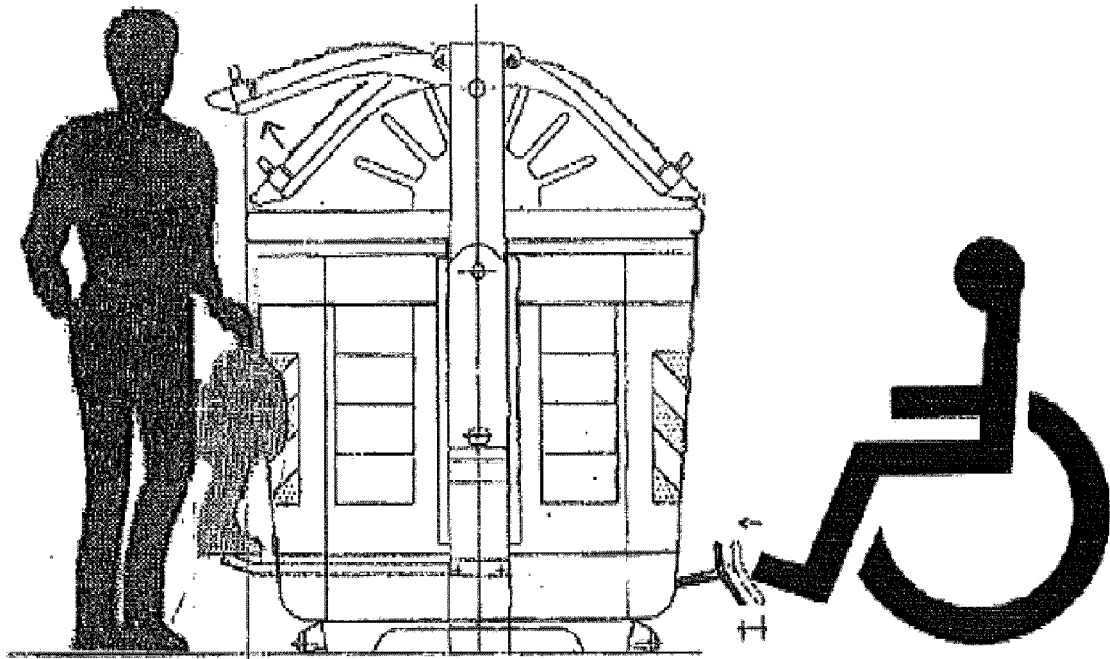


Fig. 10

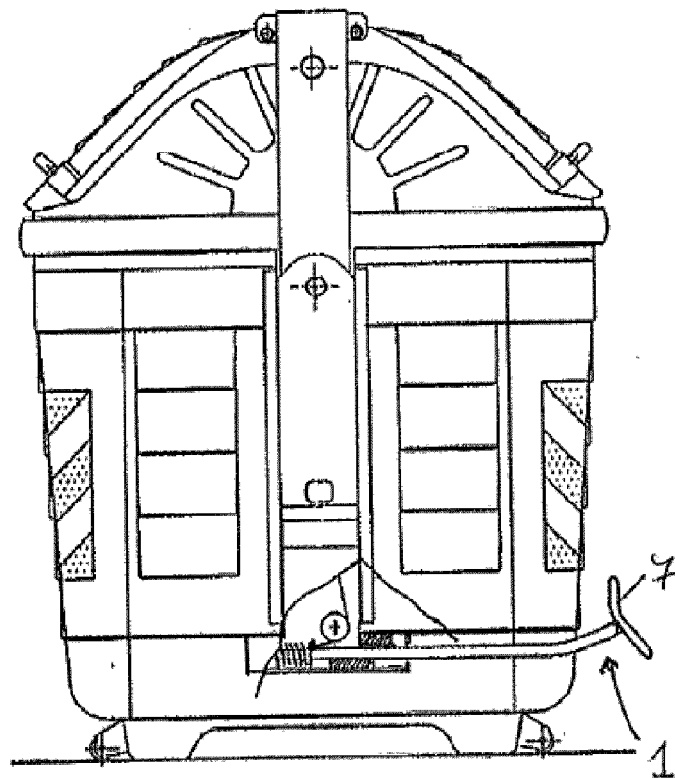


Fig. 11

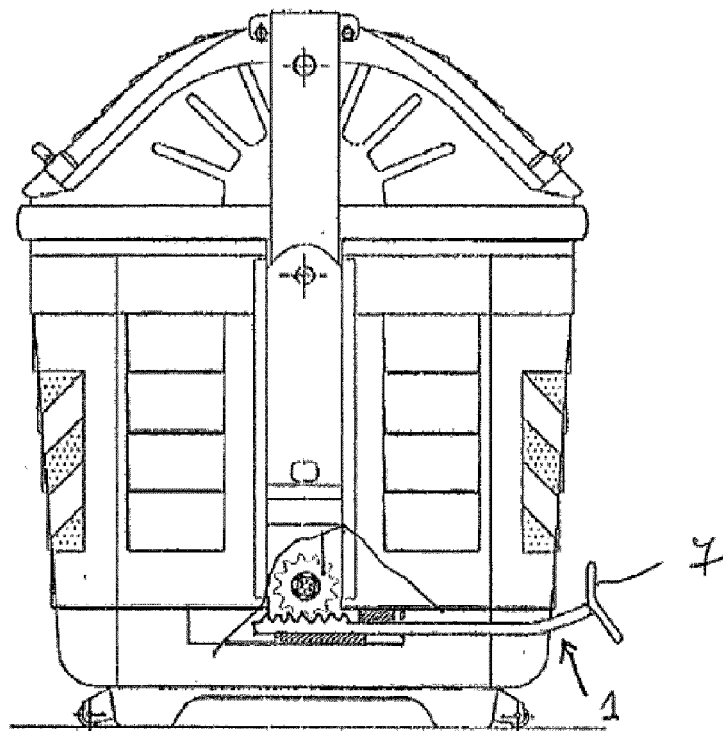


Fig. 12

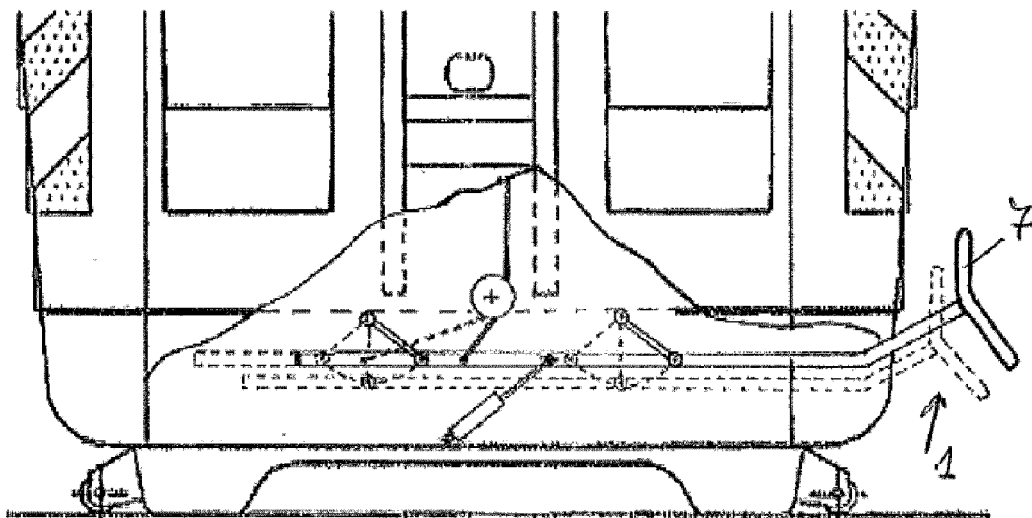


Fig. 13

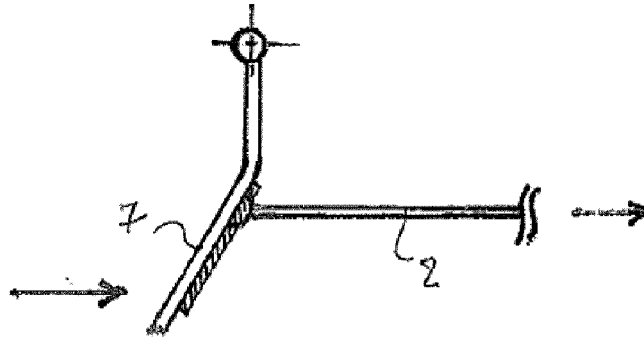


Fig. 15a

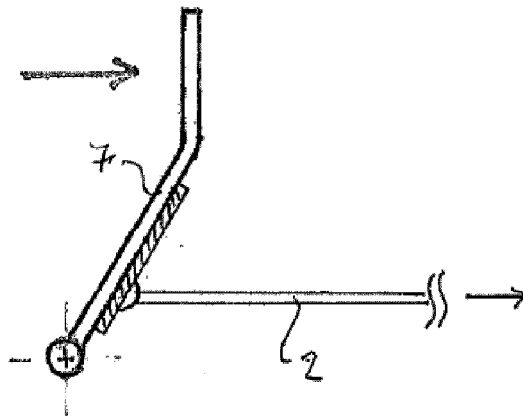


Fig. 15b

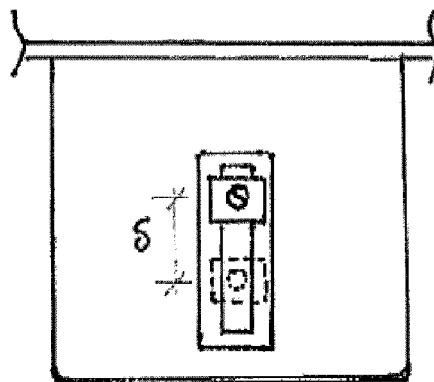


Fig. 16

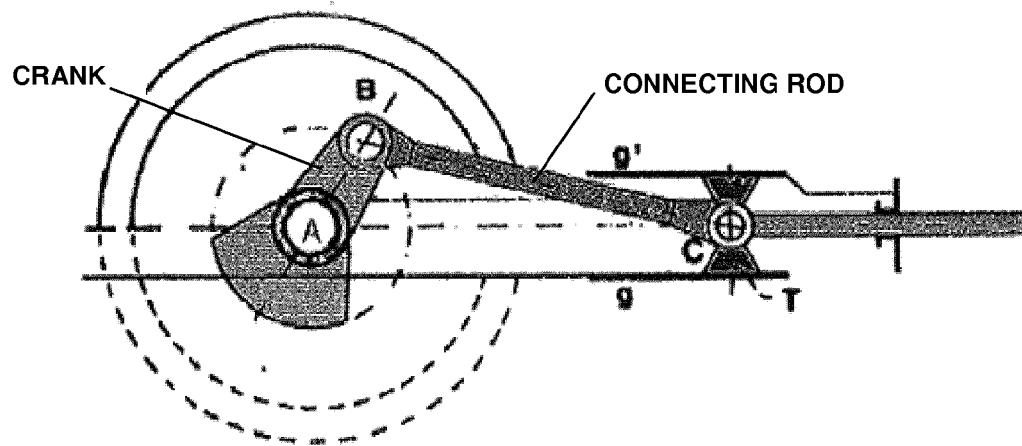


Fig. 14 a

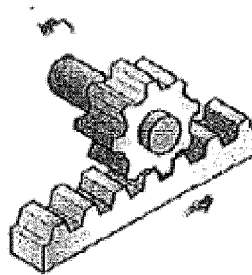


Fig. 14 b

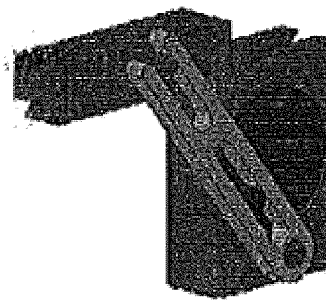


Fig. 14 c



EUROPEAN SEARCH REPORT

Application Number
EP 12 19 8931

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Place of search The Hague		Date of completion of the search 28 March 2013	Examiner Smolders, Rob
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