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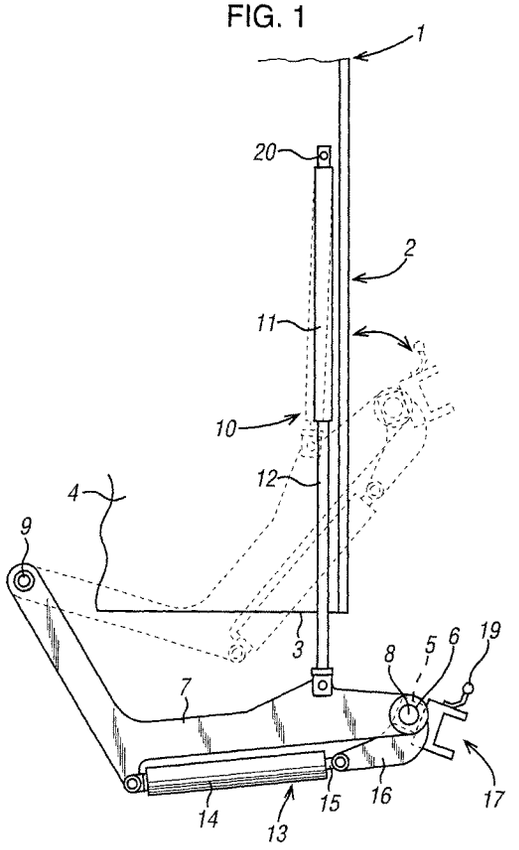
## (54) Device for emptying containers into a truck cart

(57) A device for emptying containers into a truck cart (1), comprising a prehensile bar (5), two lateral support arms (7) each of which is mounted in rotation on one of the side walls (4) of the truck cart and which support the prehensile bar (5) in such a manner as to permit it to turn on an axis of rotation (8), a means (10) for raising at least one lateral support arm which controls the elevation of the support arm and the prehensile bar between a low position and a high position, and a means of rotation (13, 16) mounted on at least one lateral support arm, which controls the rotation of the prehensile bar on its axis of rotation (8).

FIG. 1

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## Description

**[0001]** The present invention relates to a device for emptying containers into a truck cart which presents a hopper opening delimited by a back wall and two side walls.

**[0002]** Common truck carts are carts for removing waste and refuse, which are supported on or built onto a transport vehicle. These truck carts are generally provided with a device which can grasp containers and tip them into the opening of the hopper situated at the rear of the truck cart, with a view to emptying the containers.

**[0003]** It would be desirable to be able to empty containers of different capacities and heights with different prehensile systems using the same emptying mechanism. The emptying device should ideally be capable of emptying them completely in a single phase, while ensuring correct prehension of the container whatever the height of the hopper from the ground and from the container. A maximum tipping angle should ideally be provided, if possible.

**[0004]** In accordance with the present invention, there is provided an emptying device as indicated at the beginning, which comprises a prehensile bar provided with prehensile elements capable of gripping a container and placing it in front of the hopper opening at the foot in a low position, two lateral support arms which are each mounted to rotate on one of the side walls of the cart and which support the prehensile bar in such a manner as to permit it to turn on an axis of rotation, a means for raising at least one lateral support arm, which controls the elevation of the support arms and the prehensile bar between the said low position and a high position above the back wall of the hopper opening, and the inverse descent of the said arms, and a means of rotation mounted on at least one lateral support arm, which controls the rotation of the prehensile bar on its axis of rotation.

**[0005]** This device therefore permits a first raising movement of the prehensile bar that is approximately vertical. This movement allows the container to be coupled whatever its position with respect to the prehensile element of the prehensile bar. Indeed, even if the container is in a raised position, on a pavement for example, the prehensile elements can still grasp the coupling device of the container. The prehensile elements of the prehensile bar can be for example a harness, side hooks or Bammens type elements, and they can, depending on the containers, grasp a particular edge of the container, handles on its sides, or similar elements.

**[0006]** The first raising movement of the device further permits the container to be carried at a certain height before being tipped, in such a manner that the depth of the hopper is sufficient for the container to be emptied at one go, during the rotating or tipping movement.

**[0007]** According to one embodiment of the invention, the prehensile bar is mounted immovably and concentrically on a shaft of rotation, connected at its two ends to the two support arms in a manner permitting them to turn on the said axis of rotation, forming thereby a rigid pivoting U-shaped support frame. Advantageously, this rigid frame is removable and therefore can be easily and rapidly mounted and replaced. The concentric arrangement of the bar on its shaft is, in particular, advantageously compact.

**[0008]** According to another embodiment of the invention, each support arm is mounted in a removable manner on a fulcrum pin provided on the corresponding side wall, at a distance of at least one metre from the hopper opening. Because of this distance, the raising movement, which is effected by pivoting the support arms, follows an arc of a circle of large radius which can be similar to a vertical elevation between the low position and the high position of the prehensile bars.

**[0009]** According to a preferred embodiment of the invention, each means of elevation is a raising actuator mounted between one of the side walls of the truck cart and a lateral support arm, and the support frame is thus supported at two points on each side wall. Advantageously, these two points are at one end of the support arm where it is fixed to the side wall so as to be able to pivot around this end and at one end of the actuator which controls the raising and lowering of the support arm. This arrangement enormously facilitates mounting the emptying device to the truck cart.

**[0010]** According to a particular embodiment of the invention, each means of rotation comprises a link rod connected at one end to an end of the shaft of rotation and at the other end to an actuator of rotation supported by one of the support arms. In this way, the means of rotation are themselves supported by the support frame and do not need to be mounted separately on the truck cart. Advantageously, they are fitted in such a manner as to permit a minimum tipping angle of 45° of the container.

**[0011]** Other embodiments of the invention are indicated in the claims appended.

**[0012]** Other details and features of the invention will become clearer from the description given below, by way of a non-limiting example, and by reference to the appended drawings, wherein:

Figure 1 shows a side view of the back of a refuse cart provided with a device according to the invention; and

Figure 2 shows a view of the rear of the prehensile bar.

**[0013]** On the various drawings, identical or similar elements have the same references.

**[0014]** In Figure 1, one can see the rear part of a refuse cart 1. It has at the back an opening 2 of a hopper which is, in the example illustrated, limited by a back wall 3 and two side walls one of which 4 is visible on the drawing. Advantageously, a roof can cover the top of the

cart, or at least part of it.

**[0015]** This cart is provided with a prehensile bar 5 which, in the example illustrated, is a square hollow section which is mounted in an immovable manner on a shaft of rotation 6. The bar 5 is, in the example illustrated, shown in solid lines in the low position, at the back of the cart, below the opening 2, so as to extend transversally and horizontally relative to this opening.

**[0016]** The shaft of rotation 6 is supported at its two ends at one end of a support arm 7, in such a manner as to be able to pivot concentrically around its axis of rotation 8.

**[0017]** On the drawings, only one side of the cart is shown, the prehensile bar support and actuating system being, in the example illustrated, identical to the other side.

**[0018]** The support arm 7 is mounted, at its other end, on a fulcrum pin 9 which is situated approximately 0.95 m from the bottom of the opening of the hopper, on the side wall 4, in such a manner as to be able to pivot around that axis.

**[0019]** A lifting actuator 10, comprising a cylinder 1 and a piston rod 12, is fixed to the cylinder side to the side wall 4 on an axis 20, and on the piston side to support arm 7. When the piston is in the extended position, the support arm 7 and the prehensile bars 5 are in the low position; with the piston retracted, they are in the high position, as outlined in dotted lines in figure 1.

**[0020]** The support arm 7 further supports an actuator of rotation 13 the cylinder 14 of which is connected in an articulated manner to the arm 7 and the piston rod 15 of which is connected in an articulated manner to a crank link 16. The link 16 is moreover connected immovably to an end of the shaft of rotation 6 (see figure 2).

**[0021]** As can be seen, the whole device is very simple. It consists in fact of a U-shaped frame, the web of which is formed by the prehensile bar 5 and the flanges by the support arms 7. This frame is fixed at two points only on each side wall 4, at 9 and 20. One can imagine without difficulty the simplicity and speed with which it can be mounted or replaced.

**[0022]** Finally, in the example illustrated, the prehensile bar is provided with a harness 17 which can be fixed in a detachable manner on the prehensile bar 5 by any appropriate system. This harness 17 is provided with hooks 19 which grip beneath the rim of certain types of containers to lift them.

**[0023]** As can be seen, the actuators 10 and 13 can be activated independently, which allows the device to be activated in two stages.

**[0024]** From the lower position of the prehensile bar, illustrated in solid lines in figure 1, the lifting actuator can, by retracting the piston rod 12, raise the bar 5 to the high position shown in dotted lines, through an arc of a circle. Given the large radius of the arc of the circle (approximately 1.2 m), this movement is almost the same as a vertical lift. The result of this is great ease of prehension of the containers, even when they are at an unusual height relative to the truck cart.

**[0025]** With the prehensile bar in the high position, it is subjected to rotation around axis 6 under the action of the actuator 13 and the container is tipped at an angle greater than 45°.

**[0026]** It should be understood that the present invention is in no way limited to the embodiment described above and that modifications can be made to it without exceeding the scope of the appended claims.

## Claims

1. A device for emptying containers into a truck cart (1), which has a hopper opening (2) delimited by a back wall (3) and two side walls (4), the device comprising:

   a prehensile bar (5) provided with prehensile elements (17, 19) capable of grasping a container and placing it in front of the hopper opening (2), at the foot of it in a relatively low position;
   two lateral support arms (7) which are each arranged to be rotatably mounted in use on one of the side walls (4) of the truck cart and which support the prehensile bar (5) in such a manner as to permit it to turn about an axis of rotation (8);
   means (10) for raising at least one of the lateral support arms (7) and for controlling the elevation of the support arm and the prehensile bars between the relatively low positioned and a relatively high position above the back wall (3) of the hopper opening (2), and an inverse descent of the arm; and
   means for rotation (13, 16) mounted on at least one of the lateral support arms (7) for controlling the rotation of the prehensile bar (5) about its axis of rotation (8).

2. A device as claimed in claim 1, further comprising a respective raising means (10) as aforementioned and a respective rotation means (13, 16) as aforementioned for each lateral support arm (7).

3. A device as claimed in claim 1 or claim 2, wherein the prehensile bar (5) is mounted immovably and concentrically on a rotation shaft (6) connected at its two ends to the two support arms (7) in such a manner as to be able to turn about the said axis of rotation (8), thus forming a U-shaped rigid pivoting support frame.

4. A device as claimed in any one of claims 1 to 3, wherein each support arm (7) is removably mounted on a fulcrum pin (9) provided on the corresponding side wall (4), at a distance of at least one metre

from the hopper opening (2).

**5.** A device as claimed in claim 3 or claim 4, wherein the or each raising means (10) comprises lifting actuator (10) mounted between one of the side walls (4) of the truck cart and a lateral support arm (7) and in that the support frame is thus supported on two points (9, 20) on each side wall.

**6.** A device as claimed in any one of claims 3 to 5, wherein the or each rotation means (13, 16) comprises a link rod (16) connected at one end to an end of the shaft of rotation (8) and at the other end to an actuator of rotation (13) supported by one of the support arms (7).

**7.** A device as claimed in any one of claims 1 to 6, wherein the or at least one or said rotation means (13, 16) is fitted so as to permit, with the prehensile bars (5) in a relatively high position, a tipping angle of at least 45 degrees of the container grasped by the said prehensile elements (17, 19).

**8.** A device as claimed in any one of claims 1 to 7, wherein the raising means (10) can be activated independently due to the rotation means (13, 16).

FIG. 1

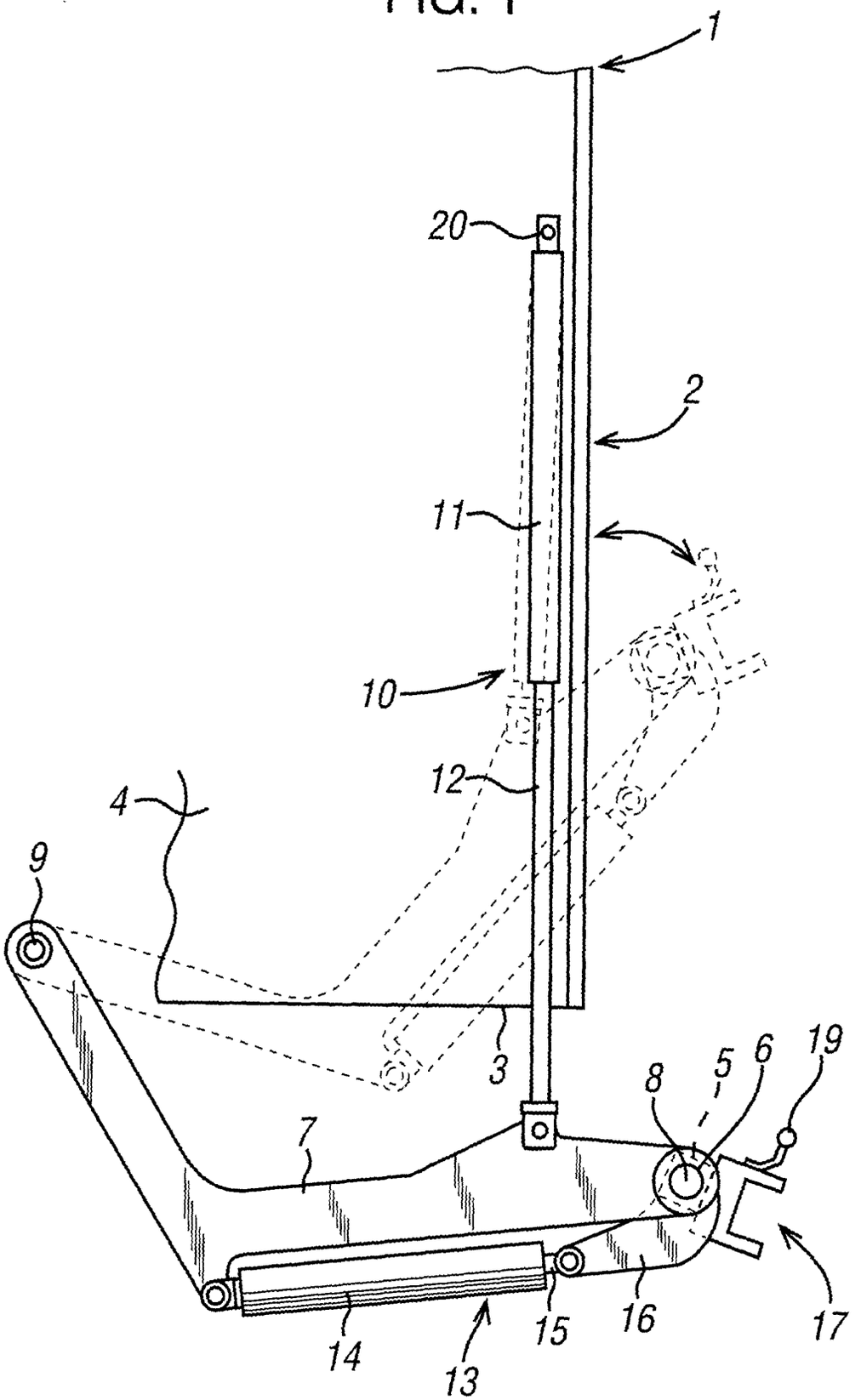
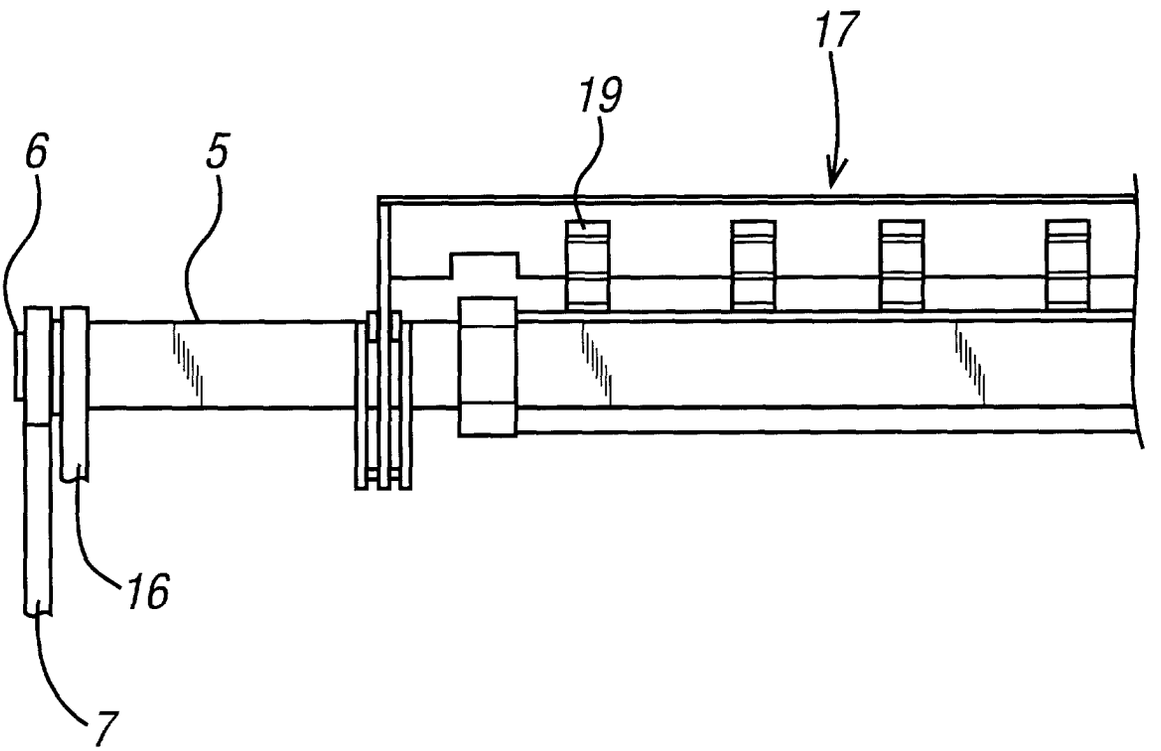


FIG. 2



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# EUROPEAN SEARCH REPORT

Application Number
EP 00 31 1665

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
|---|---|---|---|
| Y | AP 523 A (AGRICULTURAL AND IND MECHANISA) 5 September 1996 (1996-09-05)<br>* page 5, line 16 - line 26 *<br>* page 7, line 20 - page 8, line 8; figure 4 * | 1-8 | B65F3/04 |
| Y | GB 2 224 261 A (ROACHGATE LIMITED ;ALLEN JACK (GB)) 2 May 1990 (1990-05-02)<br>* page 5, line 18 - line 20 *<br>* page 5, line 29 - line 36 *<br>* page 7, line 9 - line 15; figures 1,2 * | 1-8 | |
| A | WO 98 08756 A (KANN MFG CORP) 5 March 1998 (1998-03-05)<br>* page 5, line 14 - line 26; figures 1,2,9 * | 1 | |
| A | US 5 639 201 A (CUROTTO JOHN D) 17 June 1997 (1997-06-17)<br>* column 3, line 55 - line 67; figure 1 * | 1 | |

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65F

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 29 October 2001 | Wartenhorst, F |

CATEGORY OF CITED DOCUMENTS

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 31 1665

This annex lists the patent family membersrelating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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29-10-2001

| Patent document cited in search report | | Publication date | Patent family member(s) | | Publication date |
|---|---|---|---|---|---|
| AP 523 | A | 05-09-1996 | ZA | 9309689 A | 29-08-1994 |
| GB 2224261 | A | 02-05-1990 | NONE | | |
| WO 9808756 | A | 05-03-1998 | US | 5829944 A | 03-11-1998 |
| | | | AU | 4236397 A | 19-03-1998 |
| | | | WO | 9808756 A1 | 05-03-1998 |
| US 5639201 | A | 17-06-1997 | NONE | | |

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