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(72) Inventor: **Ivars, Hans Erik**
64200, Närpes (FI)

(74) Representative: **Niemi, Hakan**
Kolster Oy Ab,
Iso Roobertinkatu 23,
P.O. Box 148
00121 Helsinki (FI)

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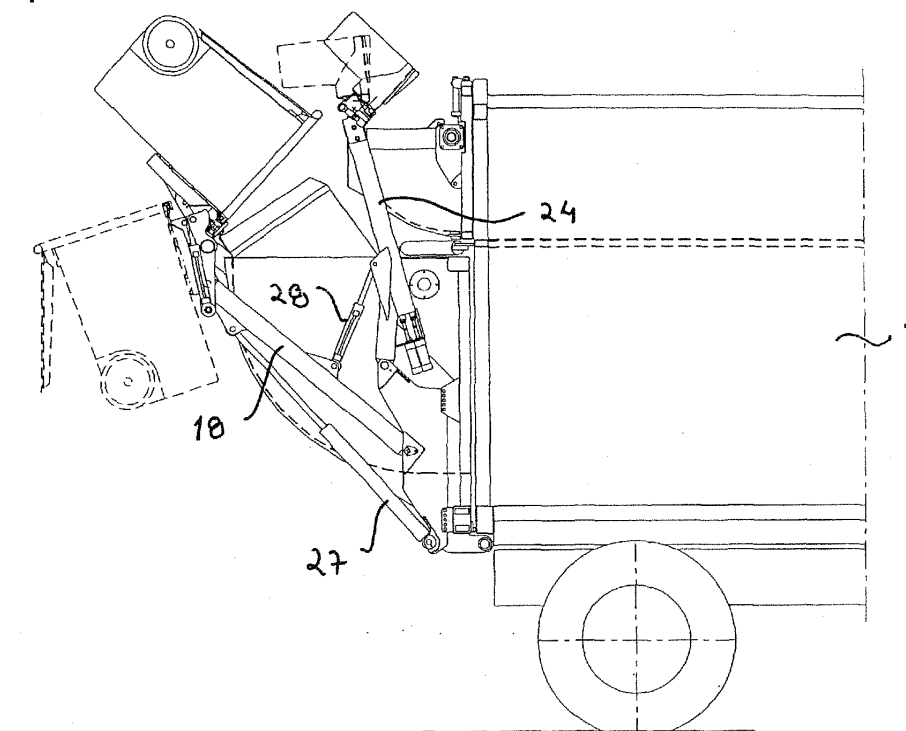
(71) Applicant: **Ab Närpes Trä & Metall**
64200 Närpes (FI)

(54) **Lifting device**

(57) The present invention relates to a lifting device (14) in a refuse collection vehicle (1). Said device is utilized in turning over and emptying refuse containers (15, 22) or the like in an at least two-piece collection bin (2). The lifting device comprises a substantially U-shaped primary lifting yoke (16) arranged hinged in the refuse collection vehicle, the yoke being arranged to lift a refuse container above at least one emptying through

(10 to 13) provided in the refuse collection vehicle and to tip it over. The present lifting device (14) also comprises at least one secondary lifting yoke (23) for engaging lifting fittings (26) provided in a refuse cassette (22) arranged in the refuse container, and for lifting and tipping the refuse cassette over at least one second emptying trough (12, 13) comprised by the refuse collection vehicle.

Fig. 4



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Description

TECHNICAL FIELD

[0001] The present invention relates to a lifting device of the kind indicated in the preamble of independent claim 1.

[0002] Such a lifting device is employed when emptying refuse containers into a refuse collection vehicle. The lifting device is particularly intended for use in emptying refuse containers having receptacles for more than one refuse fraction.

PRIOR ART

[0003] It is previously known to employ lifting devices in refuse collection vehicles, the devices being constructed as an elevator arrangement adjacent a collection bin provided in the vehicle. On the other hand, it is also known for instance from patent publication EP 0 359 083 or FR 2 029 848 to employ lifting devices provided with a lifting yoke arranged hinged in the refuse collection vehicle. Such a lifting yoke is connected to a refuse container, and the container is then lifted above an emptying pocket provided in the collection bin along a substantially circular path. In the course of its path or well above the emptying pocket, the refuse container is turned for emptying the refuse into one or several emptying pockets.

[0004] However, the prior art suffers from drawbacks and shortcomings in respect of emptying modern refuse containers provided with a plurality of receptacles intended for refuse in different fractions and arranged detachably to each other. Present lifting devices require either that the refuse containers are emptied several times with the same lifting device or that different refuse receptacles are emptied with different lifting devices in different positions around the collection bin. Besides being expensive, solutions having several lifting devices are also laborious since the refuse containers have to be emptied a plurality of times.

PRESENTATION OF THE PROBLEM

[0005] The present invention allows the problems in known solutions to be substantially avoided. The object of the invention is thus to provide a lifting device that is as easy to handle as possible and yet provides good reliability of operation. This object is achieved in accordance with the invention by the lifting device according to the invention having the characteristics described in claim 1. The subsequent dependent claims specify suitable further enhancements and variants of the invention that further improve its performance.

[0006] In the following description, the terms 'up', 'down', 'above', 'under' and so on, refer to directions relative to the lifting device or its constructional details as they are shown in the attached figures.

[0007] The lifting device described in the present invention provides a plurality of significant advantages over the prior art. Accordingly, the invention enables considerable simplification of the emptying of containers comprising a plurality of adjacent receptacles; a construction that is becoming increasingly common as refuse sorting increases in society. Simplification of the tasks naturally brings about economic savings in the emptying of each individual refuse container, but it also brings about savings due to the capability of handling the emptying of a larger number of refuse containers with the same refuse collection vehicle.

[0008] The construction of the invention also allows all receptacles of the refuse container to be emptied on the same side of the collection bin. Besides simplifying the emptying of the refuse container, this also simplifies the construction and emptying of the collection bin.

[0009] Further advantages and details of the invention are disclosed in detail in the description below.

SUMMARY OF THE DRAWING FIGURES

[0010] In the following, a preferred embodiment of the lifting device according to the invention is described in detail with reference to the attached drawing, in which

Figure 1 is a top view of a lifting device with the refuse collection vehicle outlined,

Figure 2 is a side view of a lifting device according to Figure 1 in its lowest position,

Figure 3 shows a lifting device in a position where the gripping means have engaged the refuse container and the refuse cassette and are ready to start the lifting step, and

Figure 4 shows a lifting device seen from the side in its uppermost position with the refuse container and the refuse cassette tipped, and their position before/after the tipping outlined.

PREFERRED EMBODIMENT

[0011] In the following, a preferred embodiment of the lifting device is described with reference to the above figures. In this connection, the solution comprises the constructional parts shown in the figures, each being designated by a corresponding reference numeral. These reference numerals correspond to the reference numerals indicated in the description below.

[0012] The figures show the back part of a refuse collection vehicle 1, which also comprises a chassis, which is not shown, and a driver's cab. The figures show a part of a collection bin 2, in which the refuse is transported from the collecting site to a waste treatment centre. In this case, the collection bin is divided into four adjacent chambers 3 to 6 on top of each other by means of a perpendicular partition 7 and a horizontal separating plane 8 that extend in the longitudinal direction of the refuse collection vehicle. Both the height and width of

the chambers can vary depending on the type of refuse intended to be transported with the vehicle. The rear end of the collection bin is open for achieving at least one feeding and discharge opening.

[0013] For feeding the refuse into the collection bin 2, the refuse collection vehicle 1 is provided, behind the bin, with at least one back part 9, often called a compressor, which pivots around an axis of rotation at the edge of the feeding and discharge opening. The back part is provided with a discharge trough 10 to 13 according to Figure 1 for each chamber 3 to 6 provided in the collection bin for receiving collected refuse. The back part also comprises a pivot plate movable along the bottom of the discharge trough by means of a hydraulic device for transporting the refuse to the feeding and discharge opening of the collection bin. However, these are not indicated in detail in the attached figures. Both the collection bin and the back part have a conventional structure and they are therefore not described in more detail in this connection.

[0014] For feeding the refuse into the collection bin 2, the refuse collection vehicle 1 comprises at least one lifting device 14 with which the refuse container can be tipped over the discharge troughs 10 to 13 of the back part 9. The present embodiment of such a lifting device is utilized particularly in emptying refuse containers 15 or corresponding containers into an at least two-piece collection bin provided in the refuse collection vehicle. For this purpose, the lifting device comprises a substantially U-shaped primary lifting yoke 16 preferably arranged hinged in the collection bin or back part of the refuse collection vehicle. The lifting yoke comprises at least two substantially parallel lever arms 17 and 18 that extend from the collection bin in a direction behind the refuse collection vehicle. A crossbar 19 provided with primary gripping means 20 is arranged in the lever arms. The lifting yoke is arranged to use these means to grasp lifting fittings 21 provided in a refuse container brought alongside the refuse collection vehicle for the purpose of then being able to lift or turn the refuse container relative to the collection bin in a substantially vertical direction and then empty the container into the corresponding discharge trough in accordance with what is shown in Figures 2 to 4.

[0015] As refuse collection has developed and the requirements set on refuse containers 15 have increased, they have been provided with more receptacles for receiving different refuse fractions. In a present embodiment of the refuse container, the container is two-piece and provided with a partition. The container also comprises an insert or mounting in the form of a refuse cassette 22, which also preferably can be two-piece. For emptying this refuse cassette, the present lifting device 14 comprises at least one secondary lifting yoke 23. It comprises at least a lever arm 24, which like the lever arms 17 and 18 in the primary lifting yoke 16, extends from the collection bin 2 in a direction behind the refuse collection vehicle 1 and is pivoted relative to the collec-

tion bin. The lever arm comprises, in turn, at least one therein arranged secondary gripping means 25, which is arranged to grasp the refuse cassette and manoeuvre it to emptying.

[0016] For easy conveyance of the secondary gripping means 25 to the lifting fittings 26 provided in the refuse cassette 22, the secondary lifting yoke 23 is preferably pivotally fastened above the primary lifting yoke 16. Accordingly, as shown in Figure 2, the travel path of the lifting yoke extends from its outer end taking a first end position at the primary gripping means for engaging the lifting fittings provided in a refuse cassette arranged in the refuse container to a second end position above the collection bin according to Figure 4 for tipping the refuse cassette over an upper discharge trough 12 or 13 provided in the collection bin. In conformity with the primary lifting yoke, the secondary lifting yoke 23 is brought in movement with a jack device 27 known per se. This device preferably comprises at least a regulating unit arranged to manoeuvre the lever arm of the lifting yoke.

[0017] In this connection, the movements of the lifting device 14 can be divided into three main parts according to Figures 2, 3 and 4. In the initial step corresponding to Figure 2, the primary lifting yoke 16 and particularly the gripping means 20 provided therein take a position alongside the refuse container 15 in the immediate vicinity of the primary lifting yoke. Once the primary lifting yoke has engaged the lifting fittings 21 provided in the refuse container, its lever arms 17 and 18 are arranged to take a position according to Figure 3, whereby the refuse container is slightly lifted from its base. When the refuse container is arranged according to Figures 3 and 5, the gripping means 25 of the secondary lifting yoke 23 is able to grasp the lifting fittings 26 in the refuse cassette 22 of the refuse container, after which the refuse cassette is arranged to be released from the refuse container such that the lever arm is brought in a position substantially parallel above the lever arm 18 of the primary lifting yoke. At this stage, the lifting device is ready to initiate the actual lifting and emptying step.

[0018] When the gripping means 20 and 25 are arranged in the refuse container 15 or the refuse cassette 22, respectively, the lifting step is initiated once the containers are brought against the corresponding emptying trough for emptying in accordance with Figure 4. In this connection, the lever arms are preferably manoeuvred with the above indicated dedicated jack device 27, which attends to the shifting of the corresponding lever arm from the initial stage of movement until the refuse container and cassette are emptied. On the other hand, by combining the lever arms of both lifting yokes with a bar or by means of a regulating unit 28, the lever arms are arranged to maintain a substantially symmetrical movement while the refuse container and the refuse cassette are lifted to their upper positions. By thus mechanically combining the lever arms 18 and 24, the movements of the secondary lifting yoke 23 can be at-

tended to by the primary lifting yoke 16 on the underside, whereby the construction only requires a jack device. This considerably simplifies the construction and manoeuvring procedure of the lifting device.

[0019] When the refuse container 15 and the refuse cassette 22 reach their upper positions at the emptying troughs 10 to 13, the emptying step is initiated. The refuse container and the refuse cassette are rotated above the corresponding emptying through for reaching an end position where the contents of the containers are tipped into the emptying trough of the back part according to Figure 4. The emptied containers then resume their substantially vertical position, after which the lifting yokes 16 and 23 are lowered and the refuse container and the refuse cassette resume their relative places and are restored to the ground.

[0020] According to the above description, the bar or regulating unit 28 that attends to the manoeuvring of the secondary lifting yoke 23 is preferably arranged at its one end in the lever arm 18 of the primary lifting yoke 16, and at its opposite end in the lever arm 24 of the secondary lifting yoke. In this connection, a regulating unit preferably comprises a pneumatic or hydraulic cylinder. Well-thought-out placing of the bar or the regulating unit allows the lifting yokes to be manoeuvred from their initial position to their emptying position in a single continuous movement.

[0021] The description and the therein-presented figures are only intended to illustrate the present solution for the structure of a lifting device. Consequently, the solution is not restricted only to the above or the embodiment described in the attached claims, but a plurality of variations and alternative embodiments are possible within the idea described in the attached claims.

Claims

1. A lifting device (14) in a refuse collection vehicle (1), the device being utilized in turning over and emptying refuse containers (15, 22) or the like in an at least two-piece collection bin (2) provided in the refuse collection vehicle, the lifting device comprising a substantially U-shaped primary lifting yoke (16) arranged hinged in the refuse collection vehicle, the yoke comprising at least two substantially parallel lever arms (17, 18) arranged to be rotating relative to the collection bin, and a crossbar (19) arranged in the lever arms and provided with gripping means (20) for engaging lifting fittings (21) provided in a refuse container (15) brought alongside the refuse collection vehicle, the lifting device being provided with at least a secondary lifting yoke (23) that comprises at least one lever arm (24) and at least one secondary gripping means (25) arranged therein, the refuse container being arranged to be lifted with the lifting yoke above at least one emptying through (10 to 13) provided in the refuse collec-

tion vehicle and to be tipped over it, **characterized in that**

the secondary lifting yoke (23) being rotating relative to the collection bin (2) above the primary lifting yoke (16) such that

the secondary gripping means (25) is arranged to take a first end position at the primary gripping means (20) for engaging lifting fittings (26) provided in a refuse cassette (22) arranged in the refuse container (15), and a second end position above the collection container (2) or an end part (9) provided therein for tipping the refuse cassette over an upper emptying trough (12, 13).

2. A lifting device (14) as claimed in claim 1, **characterized in that** the lifting device (14) comprises a bar or a regulating unit (27) arranged to manoeuvre the lever arm (24) of the secondary lifting yoke (23) in a position substantially parallel to the lever arm (18) of the primary lifting yoke (16) when the primary gripping means (20) has engaged the lifting fittings (21) of the refuse container.
3. A lifting device (14) as claimed in claim 2, **characterized in that** the shifting means (27) is arranged to maintain a substantially symmetrical movement between the lever arms (18, 24) in the primary and secondary lifting yoke (16, 23) for manoeuvring the gripping means (25) provided in the secondary lifting yoke in the upper position of the lever arm (24) of the primary lifting yoke to a position above an upper emptying trough (12, 13).
4. A lifting device (14) as claimed in claim 2 or 3, **characterized in that** the shifting means (27) comprises a pneumatic cylinder.
5. A lifting device (14) as claimed in claim 2 or 3, **characterized in that** the shifting means (27) comprises a hydraulic cylinder.
6. A lifting device (14) as claimed in any one of claims 2 to 5, **characterized in that** the shifting means (27) is arranged at its one end in the lever arm (18) of the primary lifting yoke (16) and in its opposite end in the lever arm (24) of the secondary lifting yoke (23).

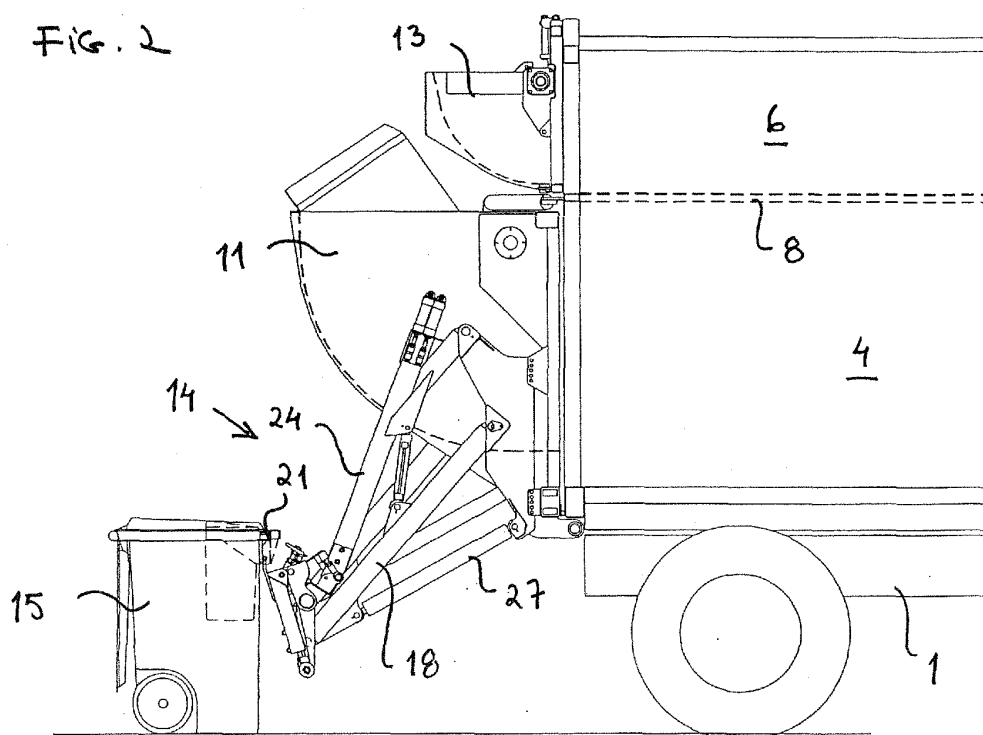
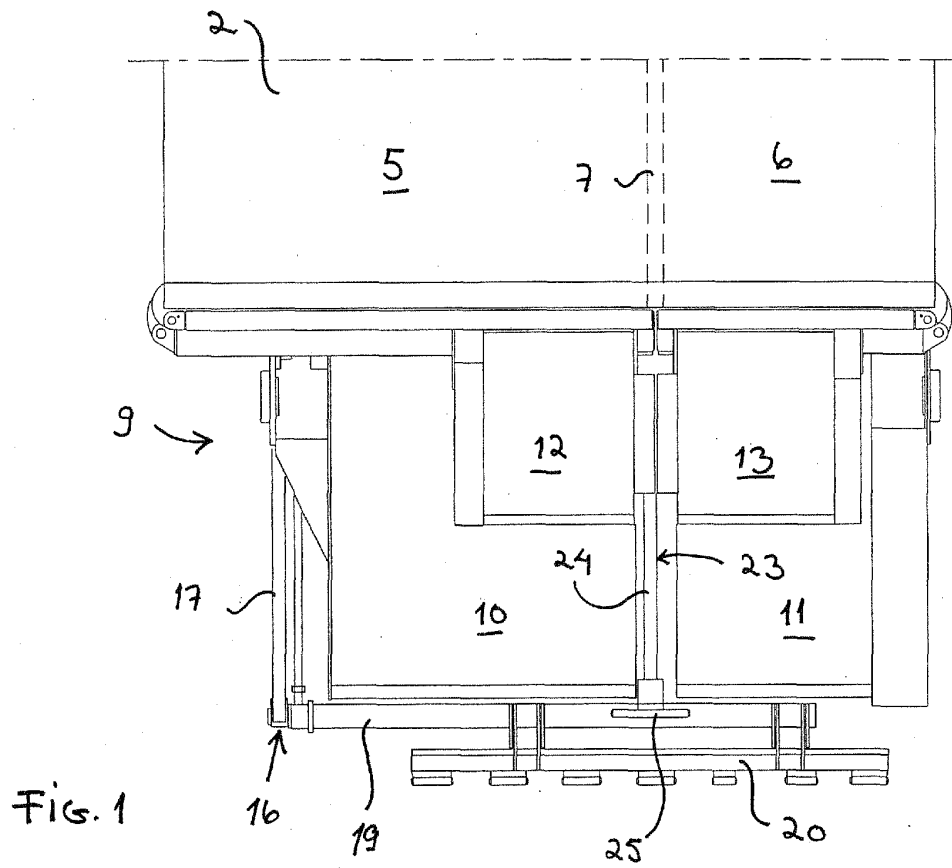


Fig. 3

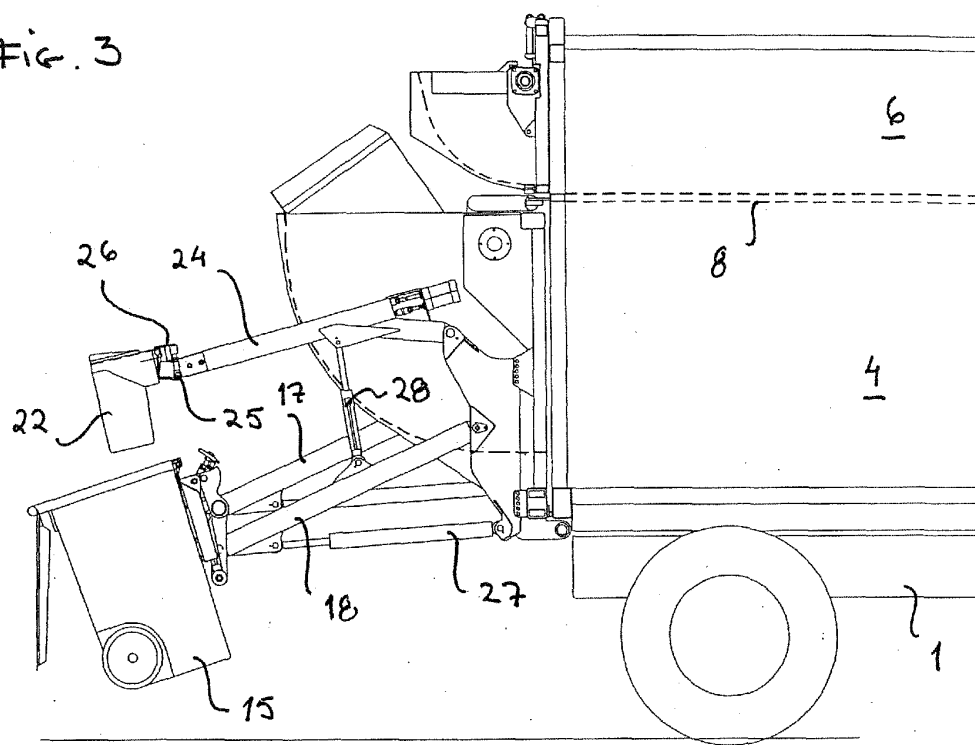
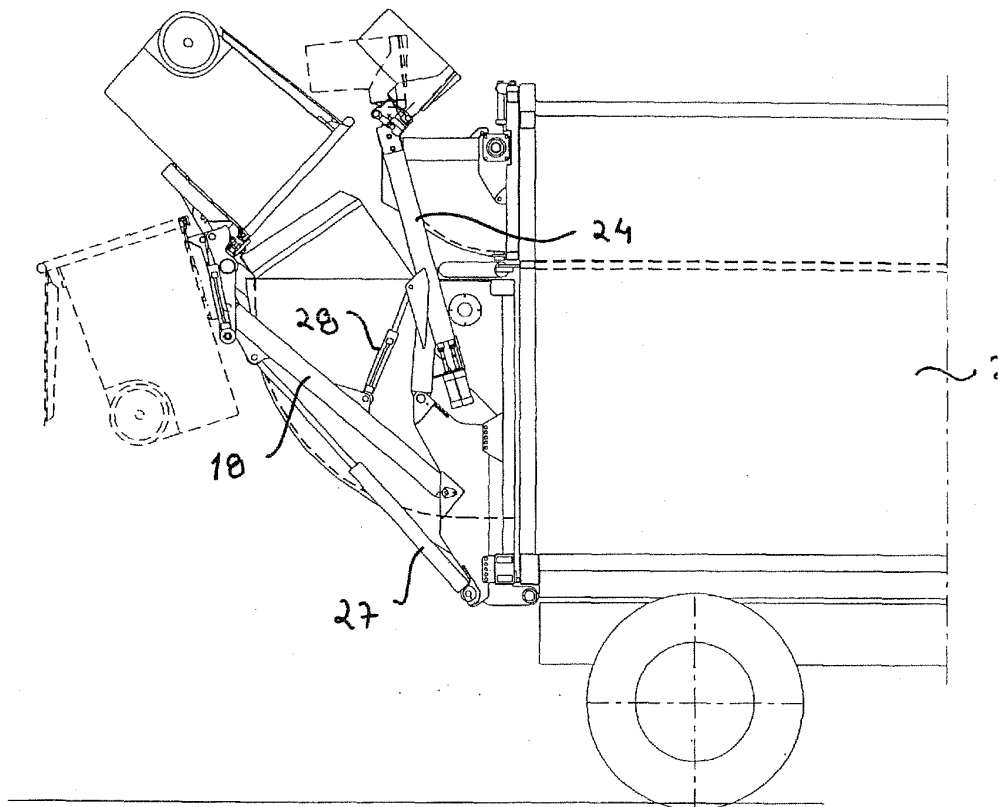


Fig. 4





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EUROPEAN SEARCH REPORT

Application Number
EP 04 10 2818

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)
A	BE 1 013 261 A (NUYTS LUDO ; TRANS BALANS N V (BE)) 6 November 2001 (2001-11-06) * page 7, line 11 - line 15; figure 1 *	1	B65F3/04 B65F3/00
A	US 5 466 110 A (REDDING JOHN W) 14 November 1995 (1995-11-14) * column 2, line 62 - column 3, line 2 * * column 4, line 26 - line 59; figures 1-3 *	1	
A	US 5 074 737 A (PELLEGRINI LOUIS A ET AL) 24 December 1991 (1991-12-24) * column 5, line 33 - line 39 * * column 5, line 67 - column 6, line 25; figures 1-5 *	1	
A	US 6 120 079 A (SCHILLER ROLF) 19 September 2000 (2000-09-19)		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7) B65F
Place of search The Hague		Date of completion of the search 14 September 2004	Examiner Wartenhorst, F
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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

EP 04 10 2818

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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14-09-2004

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
BE 1013261	A	06-11-2001	BE 1013261 A6	06-11-2001
US 5466110	A	14-11-1995	NONE	
US 5074737	A	24-12-1991	US 5443355 A	22-08-1995
US 6120079	A	19-09-2000	AT 160552 T	15-12-1997
			AU 690268 B2	23-04-1998
			AU 2444595 A	18-12-1995
			CA 2190759 A1	30-11-1995
			WO 9532135 A1	30-11-1995
			DE 19518434 A1	07-12-1995
			DE 59501047 D1	08-01-1998
			DK 759880 T3	10-08-1998
			EP 0759880 A1	05-03-1997
			JP 10500382 T	13-01-1998