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(54) Device for lifting and tipping a curbside waste bin.

(57) Improved device for handling a curbside waste bin comprising: a support (1) for a cross-member (2) that can move axially and is associated with the tailgate (5) of the truck below the waste insertion opening; and means for gripping (14,15) and lifting (12,18) the bin which are rotatably supported at one end of the cross-member (2), characterized in that the means are suitable to produce a first lifting of the bin about a horizontal axis that moves it into a position in which it is not in contact with its normal resting surface and, after a rotation about a vertical axis at the end of the cross-member that transfers the bin to a position where the gripping means (14,15) are parallel to the longitudinal axis of the truck and in which the bin faces the tailgate of the truck, a second lifting action about a horizontal axis that overturns the bin inside the body of the truck.

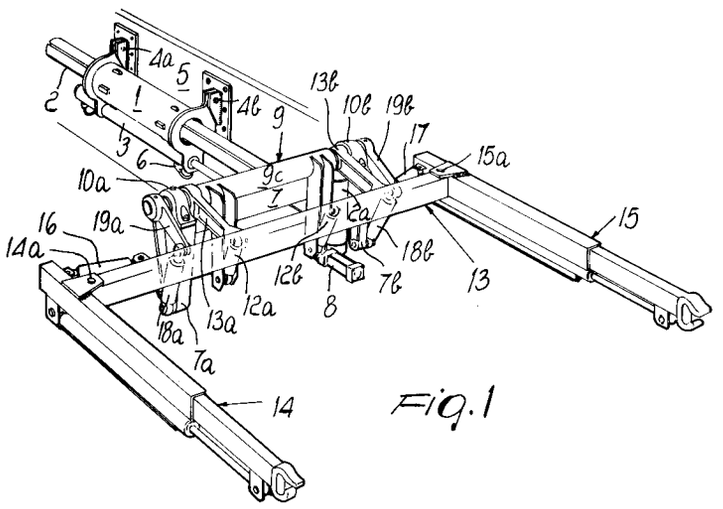

Fig. 1

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The present invention relates to an improved device for handling a curbside waste bin.

It is known that devices are in widespread use which, applied to waste collection trucks, allow the automatic handling of roadside bins to empty them into the body with which said trucks are provided.

The same Applicants disclosed in Italian patent application MN 93 A 000014 a device that has proved to be highly effective, but continuing studies have led to the improvements for which the present patent application seeks protection; said improvements have the principal aim of providing a device that has minimal bulk and can adapt to different operating conditions.

This aim is achieved by an improved device for handling a waste bin, according to the invention, which is suitable to be coupled to a collection truck and comprises a support for a cross-member that can move axially transversely to the truck, said support being associated with the tailgate of said truck below the waste insertion opening, said device furthermore comprising means for gripping and lifting the bin which are rotatably supported at one end of said cross-member, characterized in that said grip and lifting means are suitable to produce a first lifting of the bin that moves it into a position in which it is not in contact with its normal resting surface and, after a rotation about the end of the cross-member that transfers the bin to a position that faces the tailgate of the truck, a second lifting action that overturns said bin inside the body of the truck.

Further characteristics and advantages will become apparent from the following detailed description of a preferred but not exclusive embodiment of the device according to the present invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a perspective view of the device according to the present invention;

figure 2 is a view of a detail of the shaft.

With reference to the above figures, the reference numeral 1 designates the support of the cross-member 2 which can move axially transversely to the truck by virtue of the action of the actuation cylinder 3, which is pivoted at 4a, 4b to the tailgate 5 of a waste collection truck about an axis which is parallel to said cross-member below the waste insertion opening.

The coupling between the support 1 and the tailgate 5 is provided so as to produce minimal protrusion of said support, and there is an actuation cylinder 6 meant to produce small rotations for adjusting the inclination of the plane that contains the bin grip arms which will be described hereinafter; these adjustment rotations are useful if the truck is parked on an upward or downward slope close to a bin to be gripped which is placed on a horizontal surface.

The sleeve 2a is provided at one end of the cross-member 2, and the bracket 7 is pivoted thereto by means of appendices 7a and 7b; said bracket can thus rotate by virtue of the action of the actuation cylinder 8 and supports the bin grip and lifting means which are now described in detail.

Said means thus comprise the shaft, generally designated by the reference numeral 9, which has two end pivots 9a and 9b and a median portion 9c, is inserted in the supports 10a and 10b which are fixed onto the bracket 7, and is provided with the two pairs of lugs designated by the reference numerals 11a and 11b.

Said pairs of lugs support one end of small actuation cylinders 12a and 12b which are connected, at the end of the stem, to the member 13 which is pivoted, by means of the protrusions 13a and 13b rigidly coupled thereto, on said shaft 9 and supports, at its ends, the bin grip arms 14 and 15, which are pivoted at 14a and 15a respectively, so as to be rotatable by virtue of the actuation cylinders 16 and 17, and are provided with telescopic stems as described in Italian patent application MN 93 A 000014.

In other words, the coupling between the shaft 9 and the member 13 which is pivoted thereto is provided by the small actuation cylinders 12a and 12b.

Furthermore, the reference numerals 18a and 18b designate two actuation cylinders which are larger than the cylinders 12a and 12b, are supported, at one end, by the tabs 7a and 7b of the bracket 7, and are connected, at the end of the stem, respectively to the cranks 19a and 19b which are rigidly coupled to the pivots 9a and 9b respectively of the shaft 9.

The operation of the invention is now described starting from the position shown in the figure, in which the cross-member 2 is extracted from the support 1 by the appropriate amount so as to make the arms 14 and 15 surround a bin and so that the arms 14 and 15 are in the fully lowered and spaced position and their stems are fully extended.

The operating cycle occurs according to an automatic sequence and entails the following operations:

-- the arms 14 and 15 close, so that the grip elements at the ends of the stems grip the bin;

-- while the actuation cylinders 18a and 18b are blocked, and thus while the shaft 9 is fixed, the actuation cylinders 12a and 12b are activated, causing a small rotation of the member 13 about the shaft 9 and consequently lifting the arms 14 and 15; the bin thus undergoes a first slight lifting, separating from its normal resting surface;

-- the stems of the arms 14 and 15 retract, the cross-member 2 is moved so as to shift the bin closer to the truck, and the cross-member 7 is rotated, together with all the grip and lifting means which are connected thereto, so as to move the bin into a position in which it faces the tailgate 5 of the truck;

-- while the actuation cylinders 12a and 12b are blocked, and therefore while the member 13 is rigidly coupled to the shaft 9, the actuation cylinders 18a and 18b are actuated, causing a significant rotation of said shaft 9 and accordingly of the arms 14 and 15; the bin thus undergoes a second lifting action that makes it pour its contents into the body of the truck.

Of course, the same steps described above are performed to return the bin to the initial position.

The above description clearly shows the advantages of the invention and in particular that it has been possible to achieve small bulk by making the means supported by the bracket that is hinged to one end of the cross-member perform all the functions for gripping and lifting the bin in two steps from its normal resting level to the level for emptying it into the truck.

In terms of this bulk reduction, the choice to use two pairs of actuation cylinders, each of which has the purpose of performing one of the two bin lifting steps, is particularly important.

It has been observed that during the described automatic operating cycle the support 1 is not moved at all; as mentioned, said support can be rotated, under the control of the operator who is present on board the truck, only to adjust the tilt of the plane in which the arms 14 and 15 lie, in order to optimize the grip on the bin when the inclinations of the truck and of the bin resting surface are different; when it is possible to renounce this possibility of adjustment, the support 1 can be blocked with respect to the tailgate 5 of the truck.

The described invention is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept: thus, for example, a single pair of actuation cylinders provided with an intermediate stroke limiter may perform both bin lifting steps.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. Improved device for handling a waste bin, suitable to be coupled to a collection truck, comprising a support for a cross-member that can move axially transversely to the truck, said support being associated with the tailgate of said truck below the waste insertion opening, said device furthermore comprising means for gripping and lifting the bin which are rotatably supported at one end of said cross-member, characterized in that said grip and lifting means are suitable to produce a first lifting of the bin that moves it into a position in which it is not in contact with its normal resting surface and, after a rotation about the end of the cross-member that transfers the bin to a position that faces the tailgate of the truck, a second lifting action that overturns said bin inside the body of the truck.

2. Device according to claim 1, characterized in that the grip and lifting which are rotatably supported at one end of the cross-member comprise: a shaft which is supported by a bracket pivoted to the end of the cross-member; a member which is provided, at its ends, with arms for gripping the bin, is pivoted to said shaft, and is connected thereto by means of at least one actuation cylinder which is suitable to produce the first lifting of the bin; and at least one actuation cylinder which is connected to said shaft and is suitable to produce a rotation thereof that provides the second lifting of the bin.

3. Device according to claim 1, characterized in that the grip and lifting means which are rotatably supported at one end of the cross-member comprise a shaft which is supported by a bracket which is pivoted to the end of the cross-member and has a member rigidly coupled thereto, said member having, at its ends, arms for gripping the bin, said shaft being connected to at least one actuation cylinder which has an intermediate stroke limiter so as to perform the first and second lifting of the bin.

4. Device according to one or more of the preceding claims, characterized in that the support of the cross-member that can move axially and transversely to the truck is associated with the tailgate of the truck and is pivoted about an axis that is parallel to the axis of the cross-member, so as to protrude as little as possible, and is provided with an actuation cylinder that is suitable to produce small rotations for ad-

justing the inclination of the plane in which the bin grip arms lie.

5. Device according to one or more of the preceding claims, characterized in that the support of the movable cross-member is rigidly coupled to the tailgate of the truck.

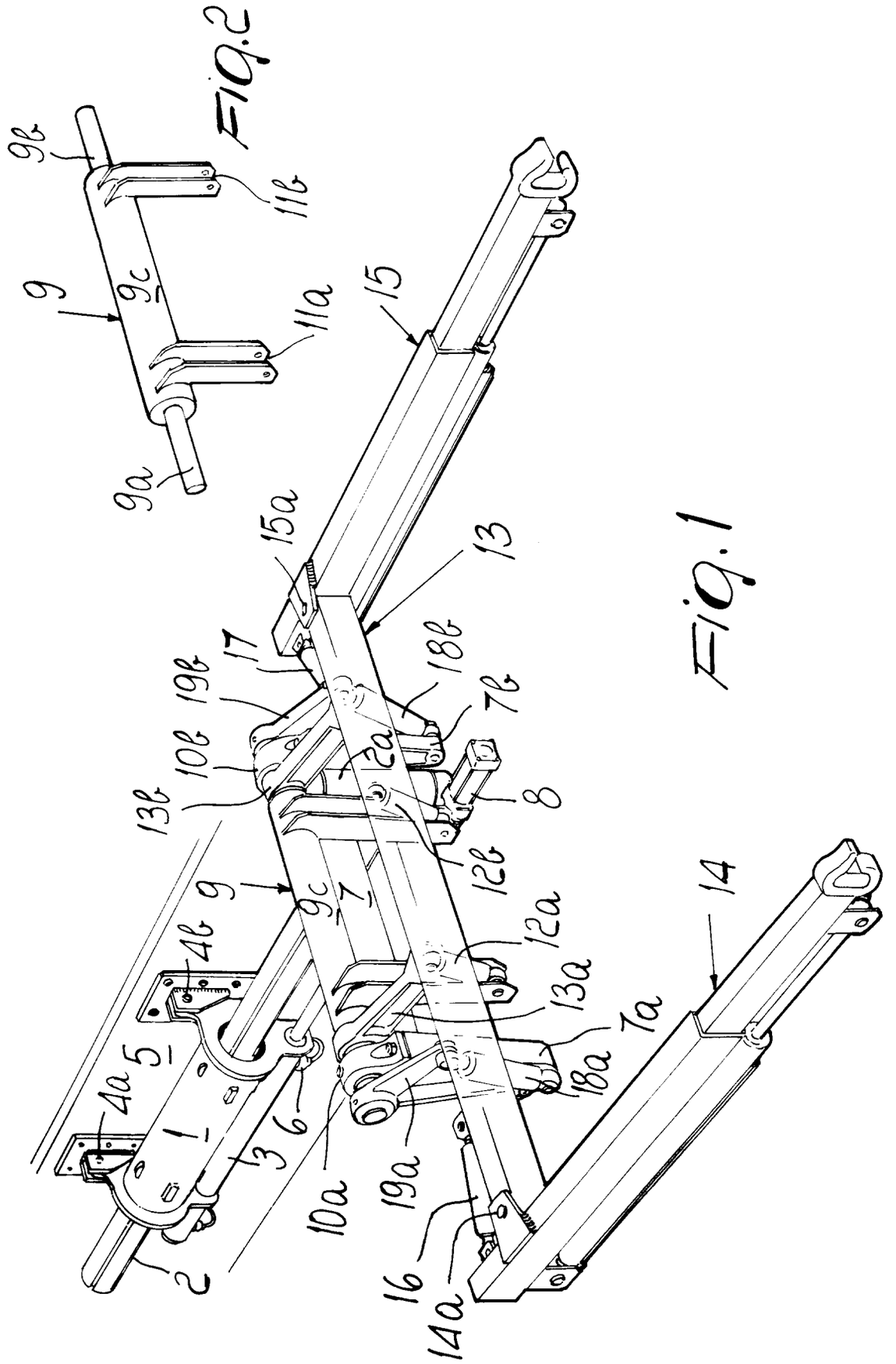
Fig.2
9b
11b
9
9c
11a
9a
Fig.1
15
15a
13
17
19b
18b
7b
10b
12a
13b
8
12b
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9c
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4b
12a
13a
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7a
18a
4a
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6
10a
19a
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14a
2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 10 1606

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.6)
X	EP-A-0 554 528 (EDELHOFF M.S.T.S.) * claims 1,2; figures *	1	B65F3/04
A	EP-A-0 327 948 (EDELHOFF POLYTECHNIK)		
A	EP-A-0 463 386 (ANTONICELLI S.P.A.)		
A	EP-A-0 312 900 (BERGOMI S.P.A.)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 April 1995	J.-P. Deutsch

CATEGORY OF CITED DOCUMENTS

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