

The present invention relates to a mechanism for gripping rolling bins in a bin tilting device for emptying them into a lorry for collecting refuse, in particular household rubbish, corresponding with the preamble to Claim 1 (see, for example DE-A-25 15 929).

For several years a growing development has been found in the mechanised collection of refuse, in particular household rubbish. For this purpose lorries are employed for collection, equipped at their rear with a device enabling one or simultaneously a number of bins filled for collection to be taken over and lifted and tilted with a view to emptying their contents into the loading capacity of the lorry.

The tilting device comprises a gripping mechanism enabling one or more bins to be held on the device during the phases of lifting and tilting and subsequent return to the ground after emptying.

Thus various types of gripping mechanisms are known.

Amongst them a type is used at present which is called a front-grip type and has a frame connected to the tilting device and exhibits at the upper part of it one or more profiled parts especially in the shape of a comb suitable for engaging under a small collar created at the top end of the front wall of the bin tub.

The applicant company manufactures and distributes rolling bins of plastics of various capacities equipped with a small collar like that, these bins having rollers at the bottom of the tub and a hinged lid at the top.

In order to avoid unhooking of the bin during its tilting movement when it reaches and then goes beyond a substantially horizontal position, it is necessary to provide on the tilting device mechanical members such as bearer bars enabling a pinching effect to be ensured on top of the small collar in which the profiled part of the gripping mechanism is engaged.

This mechanical pinching effect causes heavy stresses on the collar, in particular torsion which may cause it to deteriorate rapidly and hence render the bin unsuitable for correct use.

These heavy stresses necessitate equipping the collar with means of making it rigid, especially in the form of ribs, thus complicating the manufacture of the bin.

The present invention proposes to achieve a gripping mechanism which enables the stresses applied to the collar to be considerably reduced, so enabling the length of service of the bins to be increased and manufacture of the bins to be simplified by reducing the importance of the means of making the collar rigid.

The mechanism in accordance with the invention is characterized by the fact that the said member or members are controllable so as to be applied with force against the bin during at least one portion of its path of movement at the time of actuation of the tilting device.

In a particular embodiment the or each bearer member consists of a sucker connected to a circuit for applying reduced pressure.

Preferably the application of reduced pressure to the sucker or suckers is effected during the movement of tilting the bin before it reaches a substantially horizontal position, the reduced pressure being maintained until the bin after completion of the phase of tilting and emptying resumes a nearly horizontal position during its phase of returning to the ground. For this purpose in accordance with the invention contactors are provided which are arranged along the path of movement of the tilting device and the actuation of which controls the operation of solenoid valves connected to a vacuum pump which is preferably actuated from the engine of the collector lorry.

In another embodiment of the invention the bearer member or members consist of electromagnets the actuation of which is likewise controlled by contactors placed along the path of movement of the tilting device.

For collector bins produced from plastics this second embodiment assumes putting a metal plate or sheet in place on or inside the front wall of the bin.

With the aim of letting the invention be better understood, by way of

an in no way restrictive example an embodiment will now be described by referring to the attached drawing in which:

- Figure 1 is a diagrammatic side elevation of the gripping mechanism in accordance with the invention before taking over a rolling bin;
- Figures 2 illustrate the mechanism of Figure 1 after taking to 4/ over a bin, during successive phases of tilting;
- Figure 5 is a diagrammatic rear view of a mechanism in accordance with the invention, employed for the simultaneous gripping of two bins;
- Figure 6 is a view similar to that in Figure 5 showing the use of the mechanism for gripping only one bin of high capacity; and
- Figure 7 illustrates diagrammatically the circuit for putting the suckers of the mechanism of Figures 1 to 6 under reduced pressure.

Reference is made first of all to Figures 1 to 5.

In this drawing an embodiment is illustrated of a gripping mechanism which includes a frame 1 intended for being attached to a tilting device (not shown) at the rear of a lorry for collecting refuse, in particular household rubbish.

The mechanism in accordance with the invention may be mounted on existing tilting devices without involving special modifications to them.

In the embodiment illustrated two profiled parts 2 are mounted on the upper part of the frame, which exhibit a top end in the form of a comb for engaging in the collar 3 on a rolling bin 4, the collar 3 being created at the top end of the front face 5 of the bin.

In accordance with the invention the gripping mechanism comprises, fixed

by arms 6 to the bottom part of the frame (1), two suckers 7 connected to a circuit for applying reduced pressure, which will be described in further detail with reference to Figure 7.

In the drawing an embodiment is illustrated of the type with two suckers. This embodiment is advantageous inasmuch as the gripping mechanism realized in this way enables two bins, as illustrated in Figure 5, of small or average capacity (for example, 120 or 240 litres), to be taken care of simultaneously, or as illustrated in Figure 6, only one bin of high capacity, for example, 600 litres and more, the two profiled parts 2 then engaging under the collar 3a of the bin and the two suckers 7 being capable of being applied, both to the front wall of the bin.

The mechanism in accordance with the invention operates as follows:

Starting from the position in Figure 1 in which the bin or bins have been brought into the vicinity of the mechanism for taking them over, the tilting device is actuated and as illustrated in Figure 2 the or each profiled part 2 engages under the corresponding collar 3 of the bin and simultaneously the sucker 7 comes into contact with the front wall 5 of the bin against the lower half of it. During this phase the sucker or suckers have not been put under reduced pressure and behave as simple thrust feet.

When under the effect of the tilting device, the axis of rotation of which is shown diagrammatically at C, the bin is approaching a nearly horizontal position as illustrated in Figure 3, the said position being detected by a contact (not shown) placed along the path of movement of the tilting device, the sucker or suckers are subjected to reduced pressure and are applied with considerable force against the corresponding wall of the bin, ensuring in cooperating with the profiled part 2 engaged under the collar perfect retention of the bin on the gripping mechanism, especially during the further emptying phase, as illustrated in Figure 4.

Once the emptying of the bin has been effected the tilting device returns the bin to the ground. The suction applied to the suckers is suppressed when the bin has passed back through a nearly horizontal position.

Reference will now be made to Figure 7.

The circuit for controlling the reduced pressure at the suckers 7 includes a vacuum pump 8 driven from the lorry engine 9, the said pump being likewise connected to the lorry air filter 10.

In accordance with the invention a small vacuum tank 11 is provided, connected to the vacuum pump 8 through a non-return valve 12 and connected to two solenoid valves 13 arranged in parallel, each connected to one of the suckers 7.

Each of the solenoid valves 13 is controlled by a contact (not shown) placed along the path of movement of the tilting device.

Although the invention has been described in relation to one particular embodiment it is in no way restricted to it.

In particular, the invention is not restricted to a pneumatic bearing device with two suckers but may be set to work with one or more bearer members which are not merely pneumatic but equally well, for example, electromagnetic.

C L A I M S

1. A mechanism for gripping rolling bins in a bin tilting device for emptying them into a lorry for collecting refuse, in particular household rubbish, comprising a frame connected to the tilting device, the frame (1) exhibiting at the upper part of it one or more profiled pieces (2), in particular in the shape of a comb, suitable for engaging under a collar (3) realized at the top end of the front wall (5) of the bin tub, and at the lower part of it at least one bearer member (7) suitable for coming into contact with the front face (5) of the bin (4), preferably against the lower half of it, characterized by the fact that the said member or members (7) are controllable by contactors arranged along the path of movement of the tilting device so as to be applied with force against the bin during at least one portion of its path of movement at the time of actuation of the tilting device.
2. A gripper mechanism as in Claim 1, characterized by the fact that the or each bearer member consists of a sucker (7) connected to a circuit for applying reduced pressure (8, 11, 12, 13) including solenoid valves (13) which put the sucker or suckers (7) into communication with a vacuum pump (8), preferably actuated from the engine (9) of the collector lorry, the said solenoid valves being controlled by the said contactors.
3. A gripper mechanism as in Claim 2, characterized by the fact that the circuit for applying reduced pressure (8, 11, 12, 13) to the sucker or suckers (7) is actuated during the motion of tilting the bin before the latter reaches a substantially horizontal position, the reduced pressure being maintained until the bin after completion of the phase of tilting and emptying returns to a position nearly horizontal at the time of the phase of returning to the ground.
4. A gripper mechanism as in Claim 1, characterized by the fact that the bearer member or members are electromagnets.
5. A gripper mechanism as in any one of the preceding Claims, characterized by the fact that it includes two bearer members (7) and enables simultaneous gripping of two bins or gripping of only one bin of greater capacity.

