STATEMENT OF INVENTION

Aspects and embodiments of the invention are set out in the accompanying claims.

In general terms, one embodiment of a first aspect of the invention can provide a container handling vehicle, comprising: a container bed; and a container handling means, the container handling means configured to: contact a container; lever the container around a pivot point on the vehicle to raise from a floor a first floor contact point of the container; and subsequently propel the raised container along the container bed.

This allows the container to be lifted, before any part of a floor-standing container has left the floor, by a lever action rather than a direct lift action. This makes the handling or lifting action less demanding on the mechanism employed, and therefore the lifting action can be more efficient.

The first floor contact point of the container may be the first point of contact of the container to leave the floor when raised. For example, a container may comprise a base having a plurality of contact points on the floor. On levering the container about the pivot point, the container is tilted and a first of the plurality of contact points is raised from the floor. Other contact points may still be in contact with the floor. The levering action may continue to raise second and other points of contact of the container from the floor. For example, a container with wheels may have a floor contact point at the base of each wheel.

Preferably, the container handling means is configured to, following levering of the container around the pivot point, slide the raised container along a surface of

In an embodiment, the container bed comprises an inlet to accommodate the pivot member projecting from the container, and propelling of the pivot member along the container bed with the container.

One embodiment of a second aspect of the invention can provide a container handling means for a vehicle according to any embodiment described above.

One embodiment of a third aspect of the invention can provide a container handling system comprising a vehicle according to any of the above described embodiments, and a container leverable around the pivot point by the container handling means.

One embodiment of a fourth aspect of the invention can provide a container for a container handling system according to the above embodiment.

One embodiment of a fifth aspect of the invention can provide a method of handling a container with a container handling vehicle, the vehicle comprising a container bed, the method comprising: contacting the container; levering the container around a pivot point on the vehicle to raise from a floor a first floor contact point of the container; and subsequently propelling the raised container along the container bed.

Preferably, the method further comprises: propelling the raised container back along the container bed; and pivoting the container around the pivot point to lower the container to a floor contact point. More preferably, the step of pivoting the container comprises, during propelling of the container back along the container bed, engaging at the pivot point a pivot member coupled to and projecting outwardly from the container.

The above aspects and embodiments may be combined to provide further aspects and embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described by way of example with reference to the accompanying drawings, in which:

Figures 1 to 4 are diagrams illustrating a container handling vehicle and a container according to an embodiment of the invention, in a series of in-use positions according to embodiments of the invention..

DETAILED DESCRIPTION OF EMBODIMENTS

Embodiments of the invention provide mechanisms that can lift, tilt and slide a container onto a vehicle. These actions can be undertaken sequentially, and achieved using a single component or system acting in a single degree of freedom. Embodiments of the invention can begin a lifting action for a container, before any part of the floor-standing container has left the floor, by a lever action rather than a direct lift action, making the handling or lifting action less demanding and more efficient.

In embodiments, a vehicle, such as a garbage collection vehicle, has a bed of the vehicle on which a container can be placed. This bed can be attached to the base of the vehicle, or suspended above it. The vehicle also has a container handling mechanism or device. In use, this mechanism is brought into contact with a floor-standing container, engages the container and levers the container around a pivot point on the vehicle, for example at an end of the container bed nearest the container, raising the container off the ground. The mechanism then moves the raised and tilted container along the container bed.

The contents of the container can then be removed, to be placed in the vehicle's garbage hold area. This removal can be achieved by any of various previously considered techniques, for example by a screw removal device inserted into an aperture in the top of the container, which moves the refuse from inside the container along the screw and drops it into the hold.

Once emptied, the container is moved back along the container bed by the mechanism, or allowed to slide under the force of gravity along the bed. The container is then pivoted around the pivot point to return it to the ground.

Embodiments of the invention may be of particular use in a system in which a vehicle is able to collect garbage from bin chutes located at the basement level of each of a number of residential blocks, and after collection from several bin chutes (for example, collecting one or more black bin bags from each bin chute), for example when the container on the vehicle is full, the vehicle can proceed to a garbage disposal hub/centre and unload the container from the vehicle. The container can then be emptied into a larger garbage bin or container, by any previously considered means, for example by lifting the container using a pair of lifting arms and tipping the contents of the container into the larger bin. The container may be separable from the rest of the vehicle to facilitate this.

In such an embodiment, the hold area of the vehicle may be the container itself, so that its contents are not removed on the vehicle, but at a central garbage centre. In this manner, the container can be levered off the vehicle for a collection, then levered back onto the vehicle for transit to another collection location, where the process may be repeated.

One embodiment of the invention is illustrated in Figures 1 to 4. Figure 1 is a side view of a vehicle (102) having a container handling mechanism, in this case a pair of actuating arms 112 attached to the vehicle base. A container 103 is shown on the ground behind the vehicle.

direct lifting mechanism may lift the container above the ground with no contact between the container and the container bed (or any pivot point or edge of the container bed), for example by a hoist attached to the top of the container. The combination of tilting and lifting (and sliding) actions in embodiments of the invention requires less power than a direct lifting mechanism, due to the lever (rather than lift only) action. The pivot point on the container bed effectively takes some of the weight of the container, so that it is not all borne by whatever mechanism is being used to lift the container.

It is also more secure, as the container is in contact with the vehicle at all times. The lever action is also provided wholly on the pivot point of the vehicle, rather than in some previously considered systems in which a container is tilted before being lifted into contact with the vehicle. This again provides a more efficient tilting/lifting action.

The positioning of the hinging of the pivoting arms (112) low down on the vehicle towards the ground, allows for a longer arm between the hinge and the trunnion of the container, thereby making the lever action more efficient and requiring less torque to lift and load the container. This position also allows the pivot point at the end of the contained bed to be lower down.

The low position of the pivot point means that the container's centre of gravity can traverse the pivot point sooner and therefore the force of gravity on the container can aid the pivoting/levering action. In another embodiment, the pivot point can be made even lower, so that for example by the point shown in Figure 3, the centre of gravity of the container will have already passed the pivot point, and be contributing to the rotation of the container, reducing the torque needed on the pivoting arms.

The extension of the container bed, and therefore the end of the container bed with the pivot roller 106, past the end of the vehicle and therefore past the hinge

It will be appreciated by those skilled in the art that the invention has been described by way of example only, and that a variety of alternative approaches may be adopted without departing from the scope of the invention, as defined by the appended claims.

It will be understood that the invention disclosed and defined in this specification extends to all alternative combinations of two or more of the individual features mentioned or evident from the text or drawings; all of these different combinations constitute various alternative aspects of the invention.

22. A container handling system comprising a vehicle according to any of the Claims 1 to 20, and a container leverable around the pivot point by the container handling means.

23. A container for a container handling system according to Claim 22.

24. A method of handling a container with a container handling vehicle, the vehicle comprising a container bed, the method comprising:

contacting the container;

levering the container around a pivot point on the vehicle to raise from a floor a first floor contact point of the container; and

subsequently propelling the raised container along the container bed.

25. A method according to Claim 24, further comprising:

propelling the raised container back along the container bed; and

pivoting the container around the pivot point to lower the container to a floor contact point.

26. A method according to Claim 25, wherein the step of pivoting the container comprises, during propelling of the container back along the container bed, engaging at the pivot point a pivot member coupled to and projecting outwardly from the container.

STATEMENT OF INVENTION

The invention is defined in the independent claims. Some optional features of the invention are defined in the dependent claims.

Aspects and embodiments are set out in the accompanying claims.

In general terms, in one arrangement it is possible to provide a container handling vehicle, comprising: a container bed; and a container handling means, the container handling means configured to: contact a container; lever the container around a pivot point on the vehicle to raise from a floor a first floor contact point of the container; and subsequently propel the raised container along the container bed.

This allows the container to be lifted, before any part of a floor-standing container has left the floor, by a lever action rather than a direct lift action. This makes the handling or lifting action less demanding on the mechanism employed, and therefore the lifting action can be more efficient.

The first floor contact point of the container may be the first point of contact of the container to leave the floor when raised. For example, a container may comprise a base having a plurality of contact points on the floor. On levering the container about the pivot point, the container is tilted and a first of the plurality of contact points is raised from the floor. Other contact points may still be in contact with the floor. The levering action may continue to raise second and other points of contact of the container from the floor. For example, a container with wheels may have a floor contact point at the base of each wheel.

Preferably, the container handling means is configured to, following levering of the container around the pivot point, slide the raised container along a surface of

In an embodiment, the container bed comprises an inlet to accommodate the pivot member projecting from the container, and propelling of the pivot member along the container bed with the container.

One arrangement can provide a container handling means for a vehicle according to any embodiment described above.

One arrangement can provide a container handling system comprising a vehicle according to any of the above described embodiments, and a container leverable around the pivot point by the container handling means.

One arrangement can provide a container for a container handling system according to the above embodiment.

One arrangement can provide a method of handling a container with a container handling vehicle, the vehicle comprising a container bed, the method comprising: contacting the container; levering the container around a pivot point on the vehicle to raise from a floor a first floor contact point of the container; and subsequently propelling the raised container along the container bed.

Preferably, the method further comprises: propelling the raised container back along the container bed; and pivoting the container around the pivot point to lower the container to a floor contact point. More preferably, the step of pivoting the container comprises, during propelling of the container back along the container bed, engaging at the pivot point a pivot member coupled to and projecting outwardly from the container.

The above arrangements may be combined to provide further arrangements .

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described by way of example with reference to the accompanying drawings, in which:

Figures 1 to 4 are diagrams illustrating a container handling vehicle and a container according to an exemplary arrangement, in a series of in-use positions.

DETAILED DESCRIPTION OF EMBODIMENTS

As disclosed herein, it is possible to provide mechanisms that can lift, tilt and slide a container onto a vehicle. These actions can be undertaken sequentially, and achieved using a single component or system acting in a single degree of freedom. Exemplary apparatus can begin a lifting action for a container, before any part of the floor-standing container has left the floor, by a lever action rather than a direct lift action, making the handling or lifting action less demanding and more efficient.

In embodiments, a vehicle, such as a garbage collection vehicle, has a bed of the vehicle on which a container can be placed. This bed can be attached to the base of the vehicle, or suspended above it. The vehicle also has a container handling mechanism or device. In use, this mechanism is brought into contact with a floor-standing container, engages the container and levers the container around a pivot point on the vehicle, for example at an end of the container bed nearest the container, raising the container off the ground. The mechanism then moves the raised and tilted container along the container bed.

The contents of the container can then be removed, to be placed in the vehicle's garbage hold area. This removal can be achieved by any of various previously considered techniques, for example by a screw removal device inserted into an aperture in the top of the container, which moves the refuse from inside the container along the screw and drops it into the hold.

Once emptied, the container is moved back along the container bed by the mechanism, or allowed to slide under the force of gravity along the bed. The container is then pivoted around the pivot point to return it to the ground.

Embodiments may be of particular use in a system in which a vehicle is able to collect garbage from bin chutes located at the basement level of each of a number of residential blocks, and after collection from several bin chutes (for example, collecting one or more black bin bags from each bin chute), for example when the container on the vehicle is full, the vehicle can proceed to a garbage disposal hub/centre and unload the container from the vehicle. The container can then be emptied into a larger garbage bin or container, by any previously considered means, for example by lifting the container using a pair of lifting arms and tipping the contents of the container into the larger bin. The container may be separable from the rest of the vehicle to facilitate this.

In such an embodiment, the hold area of the vehicle may be the container itself, so that its contents are not removed on the vehicle, but at a central garbage centre. In this manner, the container can be levered off the vehicle for a collection, then levered back onto the vehicle for transit to another collection location, where the process may be repeated.

One exemplary arrangement is illustrated in Figures 1 to 4. Figure 1 is a side view of a vehicle (102) having a container handling mechanism, in this case a pair of actuating arms 112 attached to the vehicle base. A container 103 is shown on the ground behind the vehicle.

direct lifting mechanism may lift the container above the ground with no contact between the container and the container bed (or any pivot point or edge of the container bed), for example by a hoist attached to the top of the container. The combination of tilting and lifting (and sliding) actions as described herein may require less power than a direct lifting mechanism, due to the lever (rather than lift only) action. The pivot point on the container bed effectively takes some of the weight of the container, so that it is not all borne by whatever mechanism is being used to lift the container.

It is also more secure, as the container is in contact with the vehicle at all times. The lever action is also provided wholly on the pivot point of the vehicle, rather than in some previously considered systems in which a container is tilted before being lifted into contact with the vehicle. This again provides a more efficient tilting/lifting action.

The positioning of the hinging of the pivoting arms (112) low down on the vehicle towards the ground, allows for a longer arm between the hinge and the trunnion of the container, thereby making the lever action more efficient and requiring less torque to lift and load the container. This position also allows the pivot point at the end of the contained bed to be lower down.

The low position of the pivot point means that the container's centre of gravity can traverse the pivot point sooner and therefore the force of gravity on the container can aid the pivoting/levering action. In another embodiment, the pivot point can be made even lower, so that for example by the point shown in Figure 3, the centre of gravity of the container will have already passed the pivot point, and be contributing to the rotation of the container, reducing the torque needed on the pivoting arms.

The extension of the container bed, and therefore the end of the container bed with the pivot roller 106, past the end of the vehicle and therefore past the hinge

It will be appreciated by those skilled in the art that the invention has been described by way of example only, and that a variety of alternative approaches may be adopted without departing from the scope of the invention, as defined by the appended claims.

It will be understood that the techniques disclosed and defined in this specification extend to all alternative combinations of two or more of the individual features mentioned or evident from the text or drawings; all of these different combinations may constitute various alternative aspects of the invention.

22. A container handling system comprising a vehicle according to any of the Claims 1 to 20, and a container leverable around the pivot point by the container handling means.

23. A method of handling a container with a container handling vehicle, the vehicle comprising a container bed, the method comprising:

contacting the container;

levering the container around a pivot point on the vehicle to raise from a floor a first floor contact point of the container; and

subsequently propelling the raised container along the container bed.

24. A method according to Claim 23, further comprising:

propelling the raised container back along the container bed; and

pivoting the container around the pivot point to lower the container to a floor contact point.

25. A method according to Claim 24, wherein the step of pivoting the container comprises, during propelling of the container back along the container bed, engaging at the pivot point a pivot member coupled to and projecting outwardly from the container.