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(72) Inventor: **Benson, Glynn**
Huyton, Liverpool L36 8JJ (GB)

(74) Representative: **Hutchinson, Thomas Owen**
W.P. Thompson & Co.
Cooper Building
Church Street
Liverpool, Merseyside L1 3AB (GB)

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(71) Applicant: **Muni-Serv Limited**
Widnes Cheshire WA8 8YX (GB)

(54) **Waste Collection Apparatus**

(57) A waste collection apparatus (50; 74) comprising: a storage compartment (16); an inlet aperture (20) communicating with the interior of the storage compartment (16); receiving means (56; 58) for receiving items (22); and conveyor means (56, 58, 60) arranged, in use, to convey items (22) from the receiving means (56; 58)

to the inlet aperture (20), characterised by: the inlet aperture (20) being spaced-apart from the receiving means (56; 58). The conveyor means (56, 58, 60) may comprise a conveyor belt. A compactor (64) and/or an ejector (76) may be provided for compacting, and/or ejecting, items (22) within the storage compartment (16). The waste collection apparatus may be mounted on a vehicle (50; 74).

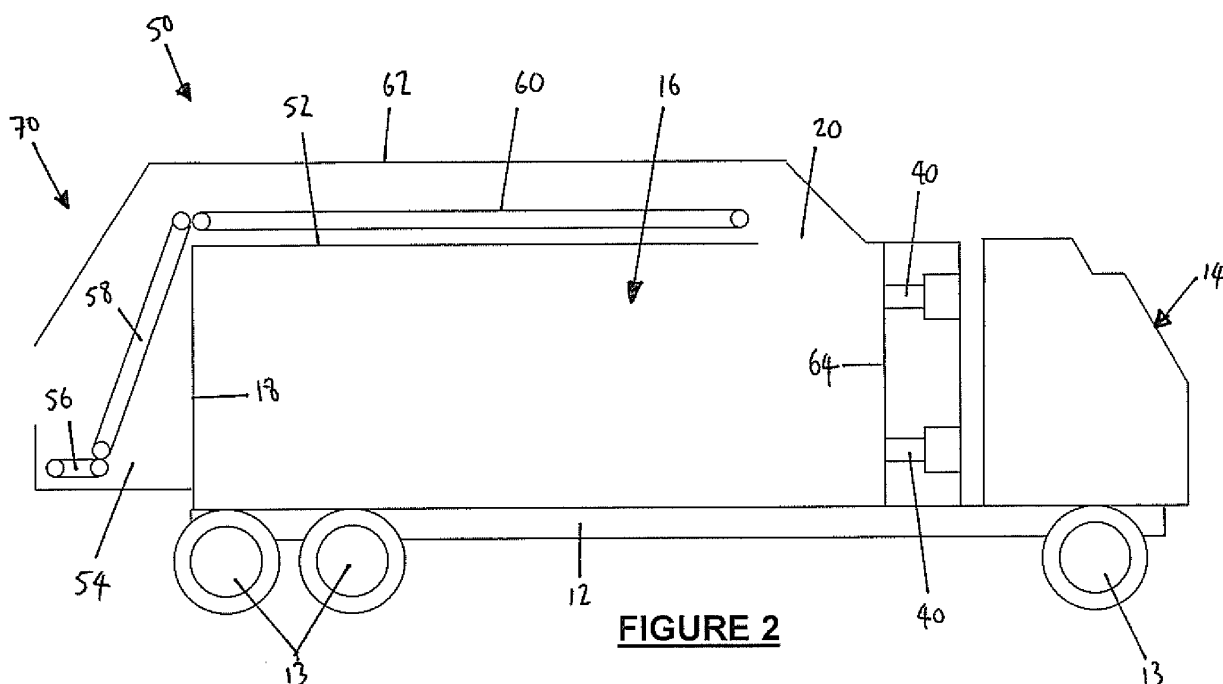


FIGURE 2

Description

[0001] This invention relates to a waste collection apparatus, and in particular, but without limitation to a waste collection apparatus for use on waste collection vehicles.

[0002] Household and office waste is commonly left in bins outside premises for periodic collection by waste collection companies who transport the waste to disposal or recycling facilities for processing. In many situations, it is most efficient and/or economic for the waste collection companies to use a dedicated waste collection vehicle for this purpose.

[0003] Known waste collection vehicles are most often of the rear-loading type, and comprise a rear hopper into which waste is placed either by hand, or using specially designed bin handling machinery. A compactor is normally provided in, or adjacent, the hopper to reduce the volume of the waste, thereby increasing the payload of the vehicle. Various types of compactor can be used, for example: a moving plate compactor, which presses the waste against the base or an end wall of the hopper, or a screw compactor, which comprises an Archimedean screw of decreasing pitch and/or radius such that the waste is compacted as it moves along the screw. In most cases, the compactor also serves to move the compacted waste into a storage compartment of the vehicle. Thus, waste can be continually added to the hopper and compacted into the storage compartment. Once the storage compartment is full, the vehicle can be driven to a waste processing facility and the rear hopper removed (e.g. lifted up or swung outwards) to enable the contents of the storage compartment to be ejected.

[0004] Known waste collection vehicles suffer from a number of disadvantages, namely:

- Due to their robust construction and complex moving parts, rear-loading compaction systems can be heavy (up to 2000 kg), which means that a disproportionate amount of the vehicle's weight is transmitted to the road via the rear axle. This problem is exacerbated by the fact that the storage compartment of known rear-loading waste collection vehicles fills from the rear towards front. Thus, until the storage compartment is relatively full, the weight distribution of the vehicle can be heavily biased towards the rear of the vehicle. These problems can lead to overloading of the rear axle, which can cause excessive road wear, and/or under-loading of the steering axle, which can reduce steering efficiency.
- The compaction system is exposed within the hopper and therefore presents a potential crush injury hazard to both the operators of the vehicle, and passers-by.
- Because the waste is compacted in an open hopper, operators and passers-by can be subjected to splashing and/or spatter (e.g. as partially filled bottles or pressurised containers are crushed), which poses both a physical injury hazard, in addition to a

health and safety hazard.

- Known waste collection vehicles can be excessively noisy due to the mechanical parts thereof (i.e. the compactor) being exposed, and also because the waste is crushed / compacted in an open hopper.

[0005] It is an object of this invention to address one or more of the above problems and/or to provide an improved waste collection vehicle and/or method.

[0006] According to a first aspect of the invention there is provided a waste collection apparatus comprising: a storage compartment; an inlet aperture communicating with the interior of the storage compartment; receiving means for receiving items; and conveyor means arranged, in use, to convey items from the receiving means to the inlet aperture, characterised by the inlet aperture being spaced-apart from the receiving means.

[0007] Advantageously, since the items received by the receiving means are introduced into the storage compartment at a location spaced-apart therefrom, the weight of the items within the storage compartment helps to balance/offset the weight of the receiving means. This can give rise to a more even weight distribution.

[0008] Preferably, the inlet aperture is located at, or towards, the opposite end of, the storage compartment to the receiving means.

[0009] The inlet aperture may be located at, or towards, an upper part of the storage compartment. Thus, items received by the receiving means can be conveyed up, and/or over, the storage compartment and deposited/dropped therein via the inlet aperture.

[0010] A cover means may be provided to cover the conveyor means and/or the inlet aperture. The cover means, where provided, may help to prevent items from being blown off the conveyor means by wind, and/or help to contain noise/smells within the apparatus.

[0011] The storage compartment may comprise a base, a front wall, a rear wall, sidewalls and a roof, and the inlet aperture may be located in the roof.

[0012] The conveyor means may comprise one or more conveyor belts. The conveyor belt or belts may comprise an endless web arranged to pass over and/or be guided by one or more rollers. The or each conveyor belt may comprise a series of lateral ribs or projections that help to prevent waste items from slipping relative to the conveyor belt. Where relatively deep ribs or projections are provided, they may, in conjunction with the web of the conveyor belt, define a plurality of mini-hoppers. Such a configuration may remove the need for a hopper, as such.

[0013] A part of the storage compartment and/or a part of the hopper is preferably manufactured of a lightweight material, such as a polymeric material and/or an aluminium alloy. Advantageously, this helps to reduce the weight of the apparatus (a major consideration where the apparatus is to be vehicle-borne), and/or by reducing the weight of the receiving means relative to that of the storage compartment, the weight of the apparatus can be

more evenly distributed.

[0014] The storage compartment may further comprise a closable outlet aperture, which may be provided in, or adjacent, a rear wall of the storage compartment. The rear wall of the storage compartment may be removable and/or openable to form the closable outlet aperture. The rear wall of the storage compartment may be hingedly connected to the base, top or side walls of the storage compartment.

[0015] The receiving means may comprise a loading area into which items can be placed to be conveyed to the inlet aperture. The receiving means may comprise a hopper, which may comprise a generally open-topped receptacle having a base, sidewalls front and rear walls. The front wall of the hopper may be integrally formed with the rear wall of the storage compartment.

[0016] Additionally or alternatively, the receiving means may comprise a conveyor belt onto which items can be placed. The conveyor belt, where provided may be located within a hopper.

[0017] A compaction means may be provided, which compaction means may be located within the storage compartment, and may be arranged to compact items located within the storage compartment. The compaction means (compactor) may comprise a plate, located within the storage compartment, movable between a first position and a second position. The first position may be located towards the front of the storage compartment and the second position may be located towards the rear of the storage compartment. The first and second positions may be located on opposite sides of the inlet aperture.

[0018] The plate may be connected to one or more actuators (e.g. motor-driven worm screws, and/or one or more rams) arranged, in use, to cause the plate to move forwards and/or backwards within the storage compartment.

[0019] Additionally or alternatively, the compactor may comprise an Archimedean screw.

[0020] The compactor may be slidably mounted so as to be slidable within and/or relative to the storage compartment. The compactor may be slidable between first and second positions, e.g. forwards and backwards, within the storage compartment to effect/facilitate ejection of contents thereof, as will be described in detail below.

[0021] According to a second aspect of the invention, there is provided a vehicle comprising a waste collection apparatus as previously described. The vehicle may be a waste collection vehicle. According to a third aspect of the invention, there is provided a waste collection vehicle comprising: a waste storage compartment; an inlet aperture communicating with the interior of, the waste storage compartment; and a hopper for receiving waste items,

characterised by the inlet aperture being located at, or toward, the front of, the storage compartment, the hopper being located at, or toward, the rear of the vehicle, and a conveyor belt arranged, in use, to convey waste items from the hopper into the waste storage compartment via

the inlet aperture.

[0022] The vehicle may comprise two or more waste collection apparatuses. Vehicles having two or more waste collection apparatuses can be useful where waste is sorted at source, e.g. into "recyclable" and "non-recyclable" bins, so that different categories of waste items do not need to be mixed up. Such an arrangement allows single vehicle to collect different types of waste simultaneously, rather than having to make multiple trips to a single location.

[0023] The waste collection apparatus or apparatuses may be located at any position on the vehicle, although preferably at, or towards the rear of the vehicle, or between the driver's cab and the storage compartment.

[0024] Preferred embodiments of the invention are described below, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a schematic cut-away side view of a known waste collection vehicle;

Figure 2 is a schematic cut-away side view of a first embodiment of a waste collection vehicle comprising a waste collection apparatus according to the invention;

Figures 3 to 7 are a sequence showing how the waste collection vehicle of Figure 2 is loaded and unloaded; Figure 8 is a schematic cut-away side view of a second embodiment of a waste collection vehicle comprising a waste collection apparatus according to the invention;

Figure 9 is a schematic cut-away side view of third embodiment of a waste collection vehicle comprising a waste collection apparatus according to the invention; and

Figures 10 to 14 are a sequence of schematic cut-away side views of a fourth embodiment of a waste collection vehicle comprising a waste collection apparatus according to the invention showing how the vehicle is loaded and unloaded.

[0025] In Figure 1, a known refuse collection vehicle 10 comprises a chassis 12, wheels 13 and a drive-train (not shown) of conventional construction. Mounted to the chassis 12 are; a driver's cab 14 at the front of the vehicle 10; and a generally cuboid refuse storage compartment 16 at the rear of the vehicle 10.

[0026] The rear end wall 18 of the refuse storage compartment 16 comprises an inlet aperture 20 through which refuse items 22 can pass into the interior of the refuse storage compartment 16.

[0027] A hydraulically actuated compactor 24 is mounted to the rear of the refuse collection compartment 16 and overhangs the rear of the vehicle 10. The compactor 24 comprises a curved base plate 26 manufactured of high strength steel and an articulated scraper 28, which is driven by hydraulic rams (not shown). The curved base plate 26 forms part of a hopper, into which refuse items 22 can be placed. When the hopper is full,

the articulated scraper 28 moves from a retracted position, down into the hopper, and scrapes a lower edge thereof across the curved base plate and pushes the refuse items 22 through the inlet aperture 20 into the storage compartment 16. The action of the scraper 28 (as indicated by arrow 30) serves two functions simultaneously, namely to crush the refuse items 22 within the hopper, and to transfer them into the storage compartment 16.

[0028] The weight distribution of the known vehicle is heavily biased towards the rear. Arrows 32, 34 and 36 represent the reaction force of each wheel from the road: their relative sizes indicating the relative magnitudes of the reaction forces. Since the hopper, base plate 26 and scraper 28 are built from heavy materials; the hopper, base plate 26 and scraper 28 overhang the rear of the vehicle 10; and since refuse items 22 fill the compartment from rear towards the front, the weight distribution of the vehicle is strongly biased towards the rear driving wheels 13', with little weight being transmitted to the front, steering wheels 13".

[0029] A moveable refuse ejection plate 38 is provided within, and towards the front of, the refuse storage compartment 16. The ejection plate 38 is moveably mounted on hydraulic rams 40, which can be extended to force the ejection plate 38 rearwards, and hence to push any refuse items 22 within the refuse storage compartment 16 out through either the inlet aperture 20, or a separate outlet aperture (not shown).

[0030] Figure 2 shows, schematically, a first embodiment of a refuse collection vehicle 50 according to the invention, which is similar to the known refuse collection vehicle shown in Figure 1. Figure 2 shows a refuse collection vehicle 50, comprising a chassis 12, wheels 13 and a drive-train (not shown) of conventional construction. Mounted to the chassis 12 are: a driver's cab 14 at the front of the vehicle 50 and a generally cuboid refuse storage compartment 16 at the rear of the vehicle 50.

[0031] Unlike the known refuse collection vehicle 10, an inlet aperture 20 is provided in the roof 52, rather than the rear end wall, of the refuse storage compartment 16.

[0032] A hopper 54, which is of relatively lightweight construction, overhangs the rear of the vehicle 50. Located within the hopper are horizontal 56 and inclined 58 conveyor belts. A third, horizontal conveyor belt 60 passes over the roof of the storage compartment 16 and terminates above the inlet aperture 20.

[0033] Since, in use, refuse items are placed on conveyor belts 56 and 58, it is not necessary for the hopper 54 itself to be manufactured particularly robustly. In the illustrated embodiment, the hopper 54 is manufactured of moulded Glass Reinforced Plastic (GRP) since it merely serves as a cowling for the conveyor belts 56, 58, and has no real load-bearing function.

[0034] A cover 62 is also provided over the third conveyor belt 60 to prevent refuse items from being blown off the conveyor belt 60 in high winds and to prevent foreign objects from inadvertently/accidentally falling into

the refuse storage compartment 16 via the inlet aperture 20. The cover 62 is manufactured of a laminated GRP - polymer foam - GRP material which is lightweight, relatively stiff and exhibits good sound insulation properties. By surrounding the inlet aperture 20 with a sound-insulated cover 62, the noise emissions of the vehicle 50 can be reduced significantly.

[0035] A moveable refuse compaction and ejection plate 64 is provided within, and towards the front of, the refuse storage compartment 16. The compaction and ejection plate 64 is moveably mounted on hydraulic rams 40, which can be extended to force the compaction and ejection plate 64 rearwards, and hence to push and compress any refuse items 22 within the refuse storage compartment 16. The rear-end wall 18 of the refuse storage compartment 16 is integral with the front wall of the hopper 54

[0036] The series of schematic illustrations forming Figures 3 to 7 show the refuse collection vehicle 50 of Figure 2 in use. In Figure 3, an operator (not shown) places refuse items 22 onto the horizontal conveyor belt 56 within the hopper 54. The refuse items 22 are transferred by the conveyor belts 56, 56, 60 up and over the roof 52 of the storage compartment 16. When the refuse items 22 reach the end of the horizontal conveyor belt 60, they drop into the refuse storage compartment 16 via the inlet aperture 20. As can be seen in Figure 3, since the weight of the hopper 54 is relatively low, and since the refuse items are loaded into vehicle between the front 13" and rear 13' wheels, the weight of the vehicle, as indicated by reaction force arrows 32, 34 and 36 is relatively evenly distributed.

[0037] As can be seen in Figure 4, once a certain quantity of waste items 22 have been loaded into the storage compartment 16, the conveyor belts 56, 58, 60 are switched off and the compaction and ejection plate 64 moves rearwards to push and compress the refuse items 22 against the rear end wall 18 of the refuse storage compartment 16.

[0038] In Figure 5, the compaction and ejection plate 64 moves forwards again and the conveyor belts 56, 58, 60 are switched back on enabling further waste items to be added to the hopper 54. This procedure continues until the storage compartment 16 is full, as shown in Figure 6, whereupon the vehicle 50 drives to a waste processing facility to unload.

[0039] As can be seen from Figure 7, the hopper 54, horizontal 56 and inclined conveyor belts 58, and rear wall of the storage compartment 18 form a loading unit 70 that is hingedly connected to the vehicle 50. Thus, the loading unit 70 can be hinged upwards to expose the waste items 22 within the storage compartment 16, whereupon the compaction and ejection plate 64 can move rearwards to push the refuse items 22 out through the open end of the refuse storage compartment 16. Once the vehicle 50 has been emptied, the loading unit 70 is lowered and the compaction and ejection plate 64

moved forwards to enable the vehicle 50 to be re-loaded.

[0040] Figure 8 shows a second embodiment of waste collection vehicle according to the invention comprising two waste collection apparatuses mounted side-by-side on the vehicle. In Figure 8, the waste collection apparatuses are of equal sizes giving rise to a 50:50 split, although one waste collection apparatus may be wider than the other to give a different split, e.g. a 60:40 or a 70:30 split.

[0041] Also shown in Figure 8 are a series of lateral ribs 72 on the conveyor belt 58 that help to prevent waste items from slipping down the conveyor belt 58. Since the ribs 72 are quite deep, they, in conjunction with the web of the conveyor belt 58, define mini-hoppers thereby removing the need for a horizontal conveyor belt (56) as shown in Figures 2 to 7.

[0042] Additionally, in Figure 8, the loading unit 70 does not significantly overhang the rear wheels 13' of the vehicle 50.

[0043] Figure 9 shows a third embodiment of a waste collection vehicle according to the invention in which the loading unit 70 is placed between the driver's cab and the storage compartment. Such a configuration places the weight of the loading unit 70 between the front 13" and rear wheels 13' of the vehicle to more evenly distribute the vehicle's weight. Such a configuration also enables an operator (not shown) to walk alongside the vehicle 50, e.g. on the pavement (sidewalk) to load it, rather than having to walk in the road behind the vehicle 50.

[0044] In each of Figures 10 to 14, the refuse collection vehicle 74, which is similar to the refuse collection vehicle shown in Figure 2, comprises a chassis 12, wheels 13 and a drive-train (not shown) of conventional construction. Mounted to the chassis 12 are a driver's cab 14 at the front of the vehicle 74 and a generally cuboid, refuse storage compartment 16 at the rear of the vehicle 74. An inlet aperture 20 is provided in the roof 52 of the refuse storage compartment 16.

[0045] A hopper 54, which is of relatively lightweight construction, overhangs the rear of the vehicle 74. Located within the hopper 54 is an inclined conveyor belt 58. A horizontal conveyor belt 60 passes over the roof of the storage compartment 16 and terminates above the inlet aperture 20.

[0046] Since, in use, refuse items are placed on the inclined conveyor belt 58, it is not necessary for the hopper 54 itself to be manufactured particularly robustly. In the illustrated embodiment, the hopper 54 is manufactured of moulded Glass Reinforced Plastic (GRP) since it merely serves as a cowling for the inclined conveyor belt 58, and has no real load-bearing function.

[0047] A cover 62 is also provided above the horizontal conveyor belt 60 to prevent refuse items 22 from being blown off the conveyor belt 60 in high winds and to prevent foreign objects from inadvertently/accidentally falling into the refuse storage compartment 16 via the inlet aperture 20.

[0048] A moveable refuse compactor 76 is provided

within, and towards the front of, the refuse storage compartment 16. The compactor comprises a relatively forward, inclined guide plate 75 and a relatively rearward curved, inclined guide plate 77 that, together with the sidewalls of the refuse storage compartment 16 define a box into which refuse items 22 from the inlet aperture 20 are received. Located at the bottom of the box is a compactor 40, which comprises a ram or Archimedean screw that compacts and forces refuse items 22 rearwards into the main body of the refuse storage compartment 16.

[0049] The compactor 76 advantageously enables refuse items to be continuously added thereto whilst compaction is taking place. In the same way as described with reference to Figures 3 to 7, the refuse items 22 are loaded into the relatively forward end of the storage compartment 16, and the compactor 76 is located between the front 13" and rear wheels 13' of the vehicle 74 thereby more evenly distributing the weight of the vehicle 74.

[0050] In use, refuse items 22 are loaded onto the inclined conveyor belt 58 and are conveyed up and over the storage compartment by the conveyor belts 58 & 60, whereupon they drop into the compactor 76 via the inlet aperture 20.

[0051] Unlike the previously described embodiments, the compactor 76 is not used to eject the contents 22 of the storage compartment 16: ejection being effected instead by a separate ejector mechanism 78.

[0052] The ejector mechanism 78 comprises a system of tracks 80 mounted on the base wall of the storage compartment 16 upon which the compactor 76 is able to slide on rollers (not shown).

[0053] An ejector ram 88 is cooperates with the front wall 15 of the storage compartment 16 and a relatively forward part (i.e. the front wall 15, 75) of the compactor 76. By extending and retracting the ejector ram 88, the compactor 76 can be slid forwards and backwards, in its entirety, within the storage compartment 16.

[0054] The series of schematic illustrations forming Figures 10 to 14 show the fourth embodiment of the refuse collection vehicle in use.

[0055] In Figure 10, an operator (not shown) places refuse items 22 onto the inclined conveyor belt 58 within the hopper 54. The refuse items 22 are transferred by the conveyor belts 58, 60 up and over the roof 52 of the storage compartment 16 and when the refuse items 22 reach the end of the horizontal conveyor belt 60, they drop into the compactor 76 via the inlet aperture 20. Compaction of the refuse items 22 is effected using the ram 40 of the compactor 76 in a manner analogous to that described with reference to Figures 3 to 7 above.

[0056] As can be seen in Figure 11, the storage compartment 16 of the vehicle 74 is full and the hopper 54 and inclined conveyor belt 58 have been raised to expose the rear wall 18 of the storage compartment.

[0057] In Figure 12 it can be seen that the rear wall 18 of the storage compartment 16 comprises a hinged door that can be opened to permit the contents 22 of the storage compartment 16 to be ejected.

[0058] In Figures 13 and 14, it can be seen that the ejector ram 88 is extended to force the compactor 76 rearwards and hence push the contents 22 of the storage compartment 16 out through the outlet aperture 92, i.e. the opening formed by pivoting the rear wall 18 of the storage compartment 16 upwards.

[0059] Once the vehicle 76 has been emptied, the rear wall 18 and the inclined conveyor belt 58 are lowered, and the ejector ram 88 retracted to pull the compactor 76 towards the front of the storage compartment 16 to enable the vehicle 50 to be re-loaded.

[0060] The invention is not limited to the details of the foregoing embodiments. For example, the shape and configuration of the vehicle may be adapted for different purposes, the position of the inlet aperture need not be towards the front of the storage compartment and the compactor need not be of the sliding plate type.

Claims

1. A waste collection apparatus (50; 74) comprising:

a storage compartment (16);
an inlet aperture (20) communicating with the interior of the storage compartment (16);
receiving means (56; 58) for receiving items (22); and
conveyor means (56, 58, 60) arranged, in use, to convey items (22) from the receiving means (56; 58) to the inlet aperture (20), **characterised by:**

the inlet aperture (20) being spaced-apart from the receiving means (56; 58).

2. A waste collection apparatus (50; 74) as claimed in claim 1, wherein the storage compartment (16) comprises a base, a front wall (15), a rear wall (18), side walls and a roof (52), and the inlet aperture (20) is located in the roof (54) and located at, or towards, the opposite end of the storage compartment (16) to the receiving means (56; 58).

3. A waste collection apparatus (50; 74) as claimed in any of claims 1 or 2, wherein the receiving means (56; 58) and/or the conveyor means (56, 58, 60) comprises one or more conveyor belts.

4. A waste collection apparatus (50; 74) as claimed in any of claims 1 to 3, wherein a part of the storage compartment (16) and/or a part of the receiving means (56; 58) is manufactured of a lightweight material.

5. A waste collection apparatus (50; 74) as claimed in any preceding claim, wherein the storage compartment (16) further comprises a closable outlet aper-

ture (92).

6. A waste collection apparatus (50; 74) as claimed in any preceding claim, wherein a wall of the storage compartment (16) is removable and/or openable to form the closable outlet aperture (92).

7. A waste collection apparatus (50; 74) as claimed in any preceding claim, further comprising compaction means (76) arranged to compact items (2) located within the storage compartment (16).

8. A waste collection apparatus (50; 74) as claimed in claim 15, wherein the compaction means (76) comprises a compaction plate (64), located within the storage compartment (16), movable between a first position and a second position.

9. A waste collection apparatus (50; 74) as claimed in claim 8 wherein the first position is located towards the front of the storage compartment (16) and the second position is located towards the rear of the storage compartment (16).

10. A waste collection apparatus (50; 74) as claimed in claim 8 or claim 9, wherein the compaction means (76) is slidably mounted so as to be slidable within and/or relative to the storage compartment (16).

11. A waste collection apparatus (50; 74) as claimed in claims 8, 9 or 10, further comprising one or more actuators (40) for moving the plate (64) and/or the compaction means (76) within and/or relative to, the storage compartment (16).

12. A waste collection apparatus (50; 74) as claimed in 12, wherein the or each actuator (40) comprises one or more motor-driven worm screws, and/or one or more rams.

13. A vehicle (50; 74) comprising at least one waste collection apparatus as claimed in any preceding claim.

14. A vehicle (50; 74) comprising two or more waste collection apparatuses as claimed in any of claims 1 to 12.

15. A waste collection vehicle (50; 74) comprising:

a waste storage compartment (16);
an inlet aperture (20) communicating with the interior of the waste storage compartment (16); and
means (56; 58) for receiving waste items (22), **characterised by:**

the inlet aperture (20) being located at, or toward, the front of, the waste storage com-

partment (16);
means (56; 58) for receiving waste items
(22) being located at, or toward, the rear of
the vehicle; and
a conveyor belt (56, 58, 60) arranged, in
use, to convey waste items (22) from the
means for receiving (56; 58) into the waste
storage compartment (16) via the inlet ap-
erture (20).

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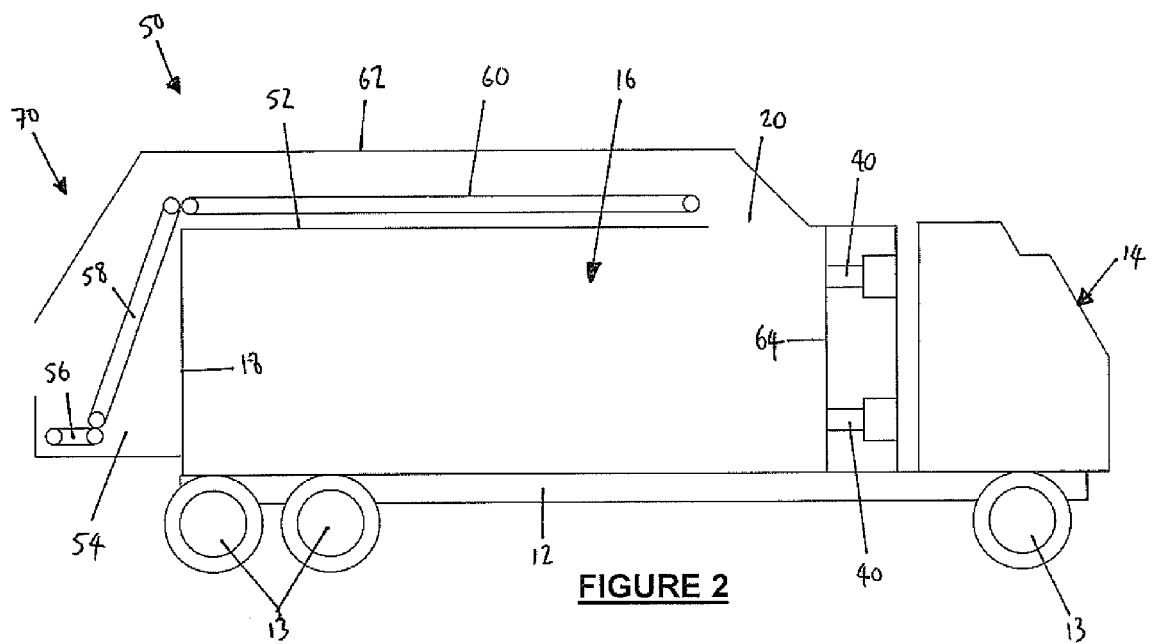
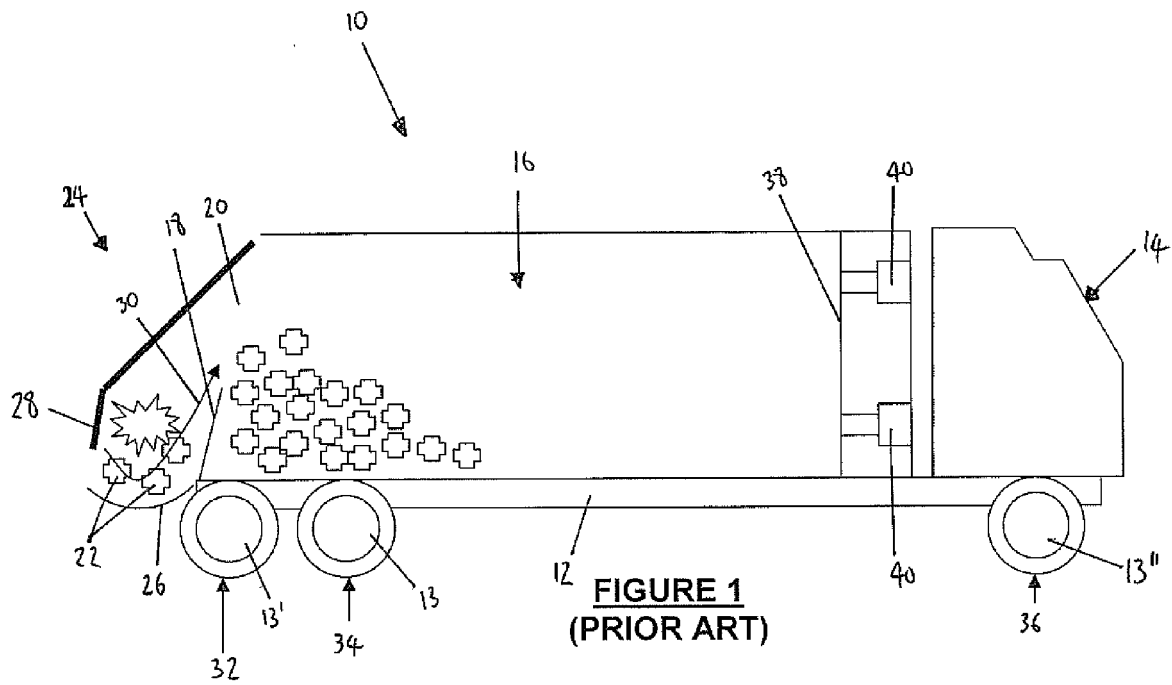
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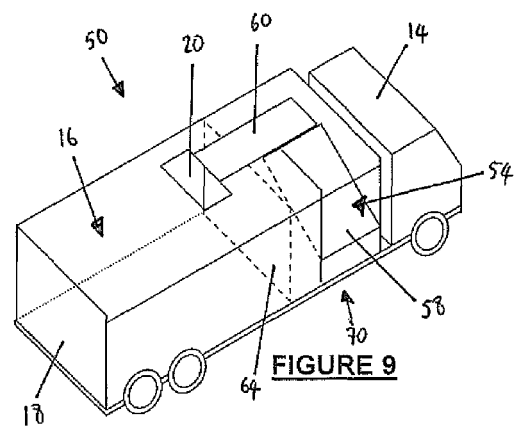
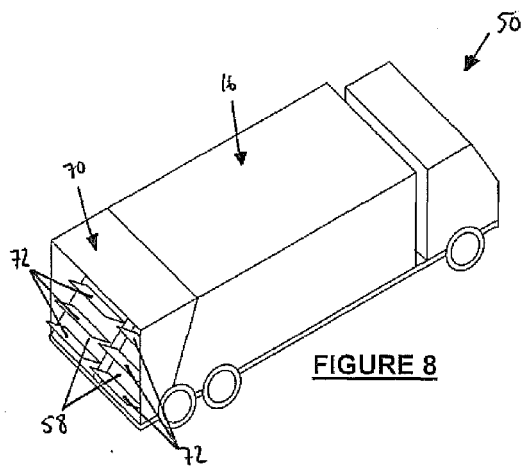
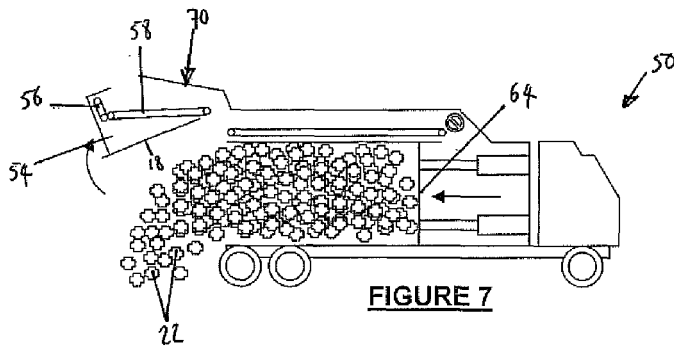
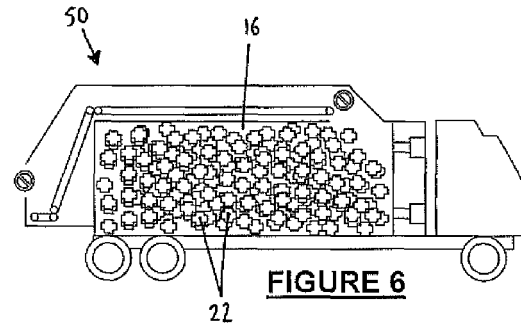
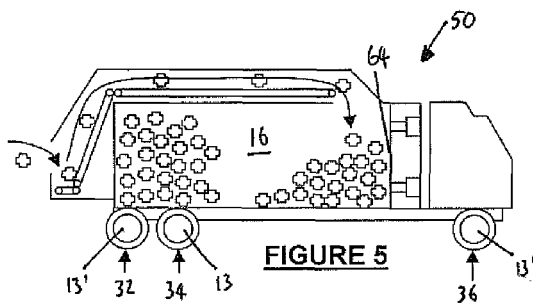
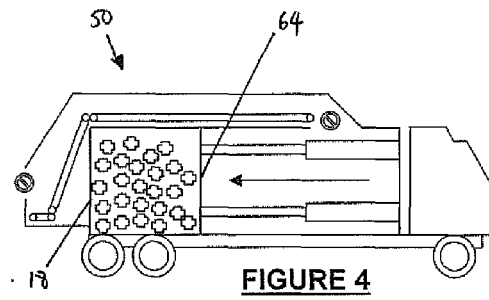
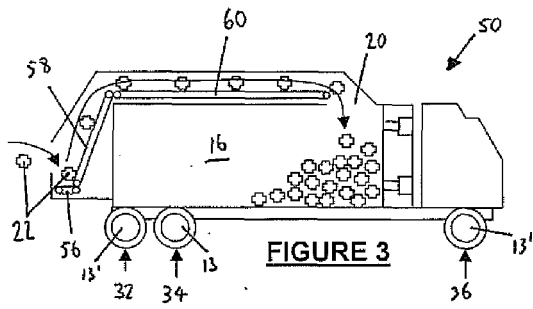
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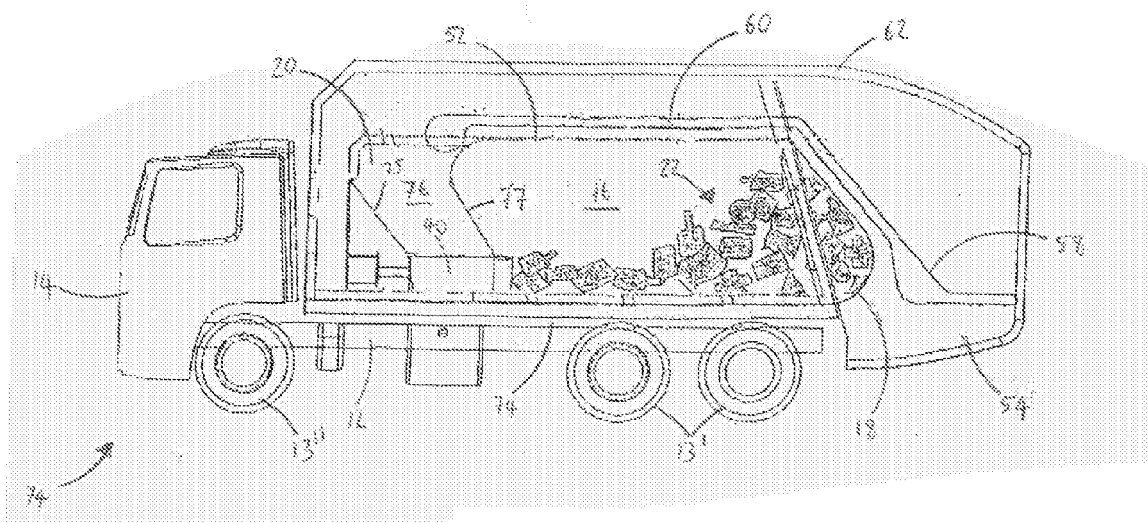


FIGURE 10

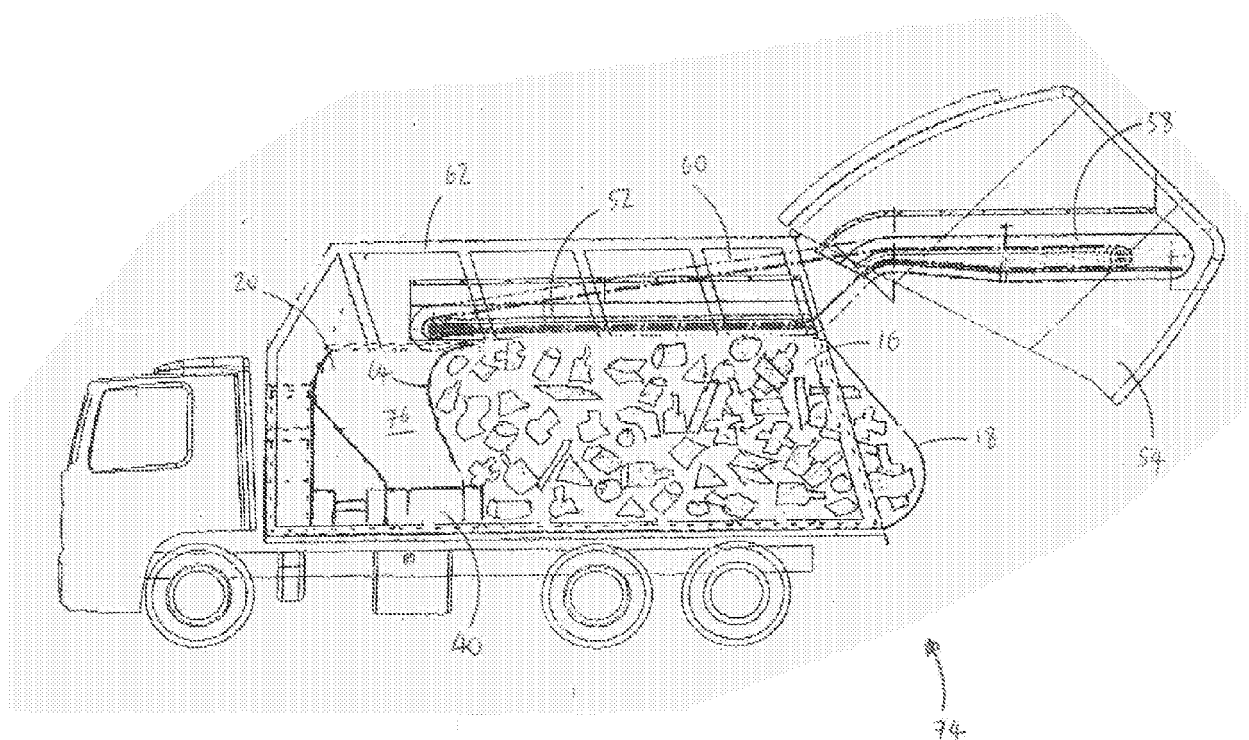


FIGURE 11

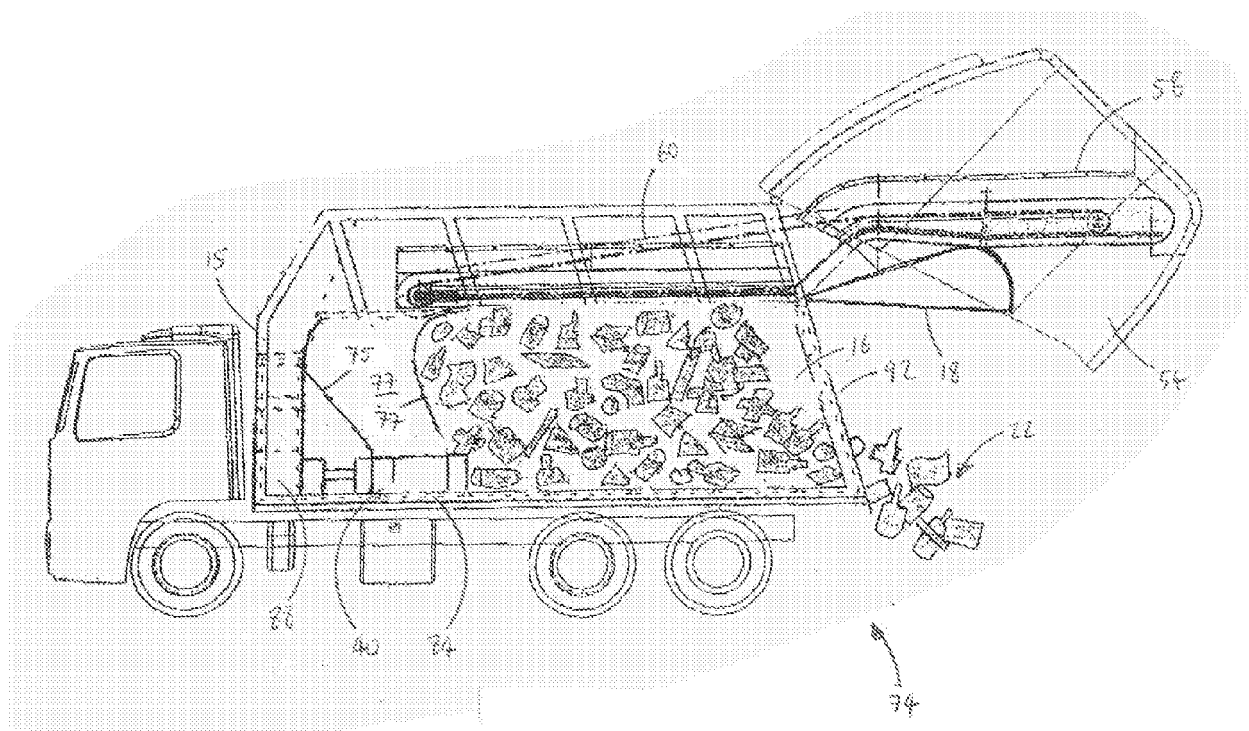


FIGURE 12

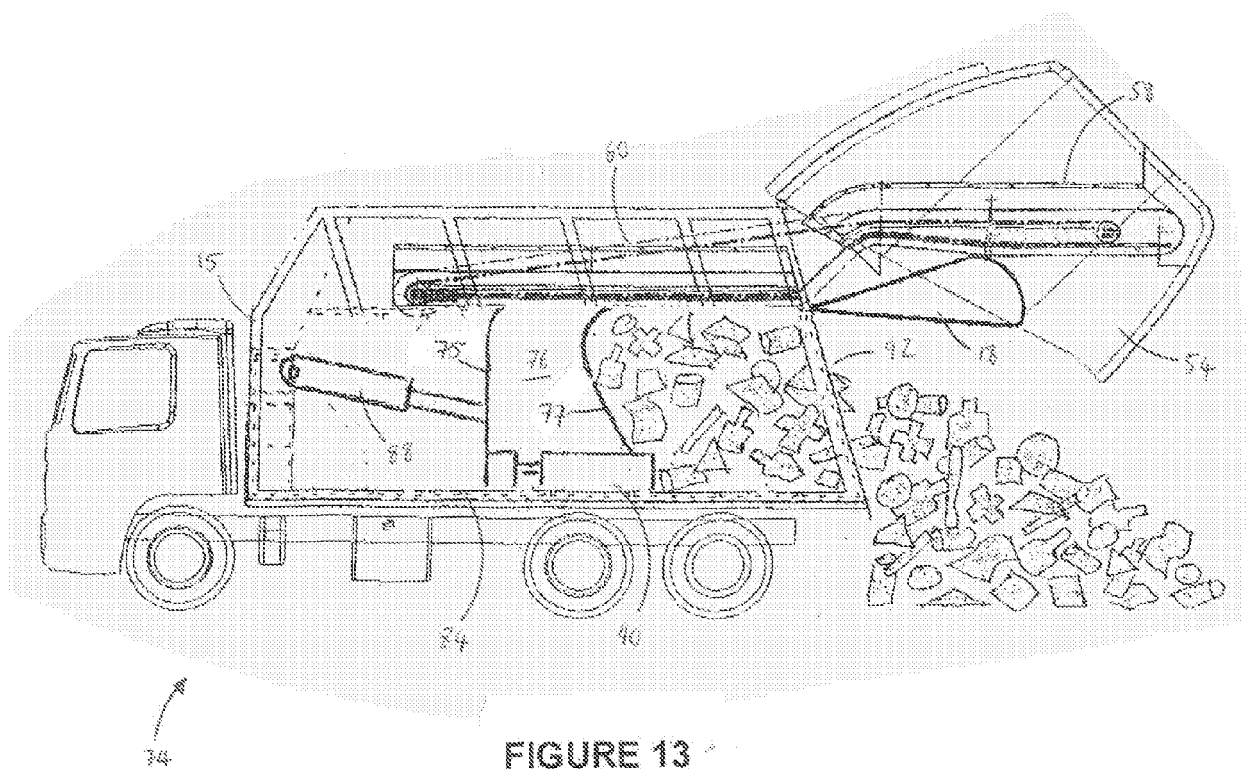


FIGURE 13

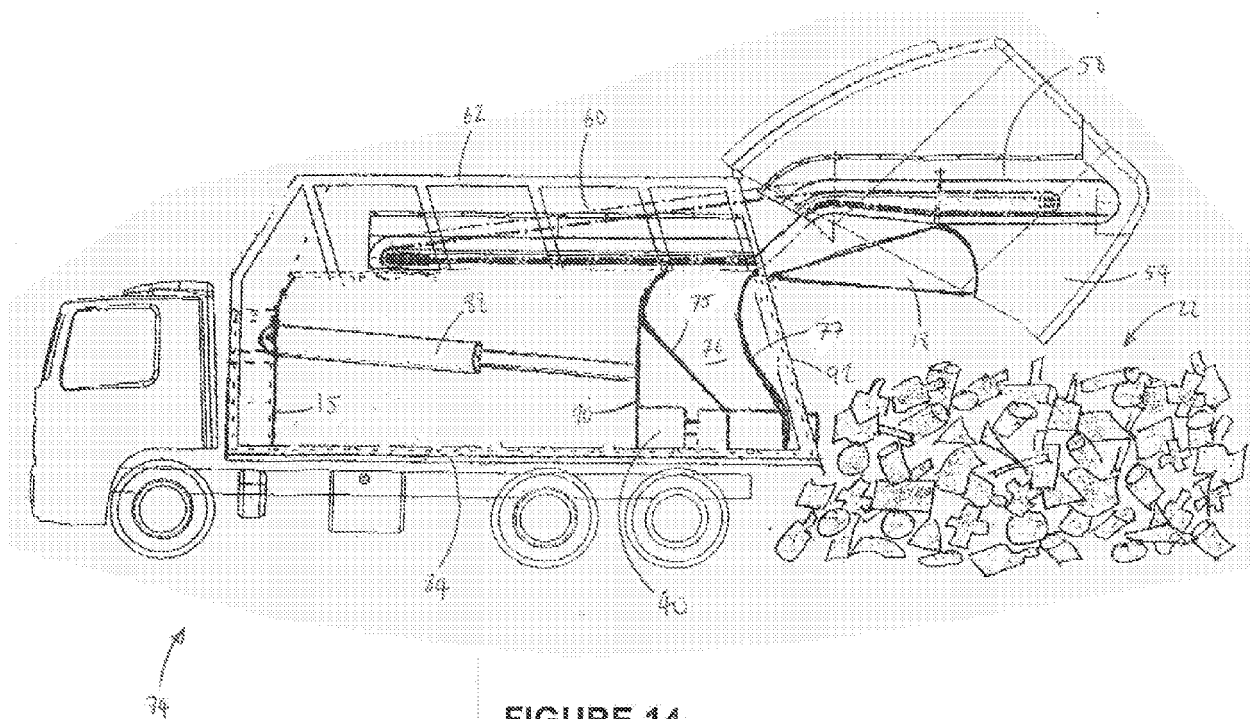


FIGURE 14

Application Number
EP 08 16 8667

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 91/03411 A (QUALITY INSTALLATIONS PTY. LTD.) 21 March 1991 (1991-03-21)	1-3, 5-13,15	INV. B65F3/18
A	* page 5, line 12 - page 7, line 21 * * page 10, line 18 - page 11, line 4 * * page 12, line 18 - page 13, line 19 * * figures 1-3 *	4,14	ADD. B65F3/28
A	FR 1 292 412 A (A. DUFOUR) 4 May 1962 (1962-05-04) * the whole document *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65F
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
The Hague	5 January 2009	Smolders, Rob	
CATEGORY OF CITED DOCUMENTS		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
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82