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## (54) Refuse collection vehicle

(57) The present invention relates to a refuse collection vehicle of the kind in which refuse is loaded to the rear of a storage compartment of a vehicle and compacted by a compaction blade to form a slug of compacted waste material within the storage compartment of the vehicle. A refuse collection vehicle is disclosed having at least first and second axles (4,6;8,10) and a storage compartment (12) disposed over said at least first and second axles, load measurement means (14,16) to determine a loading of each of said first and second axles (4,6;8,10), a compaction blade (20) to drive refuse into the storage compartment at a first pressure, an ejector blade (24) exerting a second pressure against which refuse is driven, in which each of the first and second pressures are determined and varied in response to the loading determined by the load measurement means (14,16). Such a refuse collection vehicle enables optimum compaction of a slug of refuse thereby achieving optimum load carrying capacity without overloading of the axles of the refuse collection vehicle or over dense compaction of the slug of refuse.

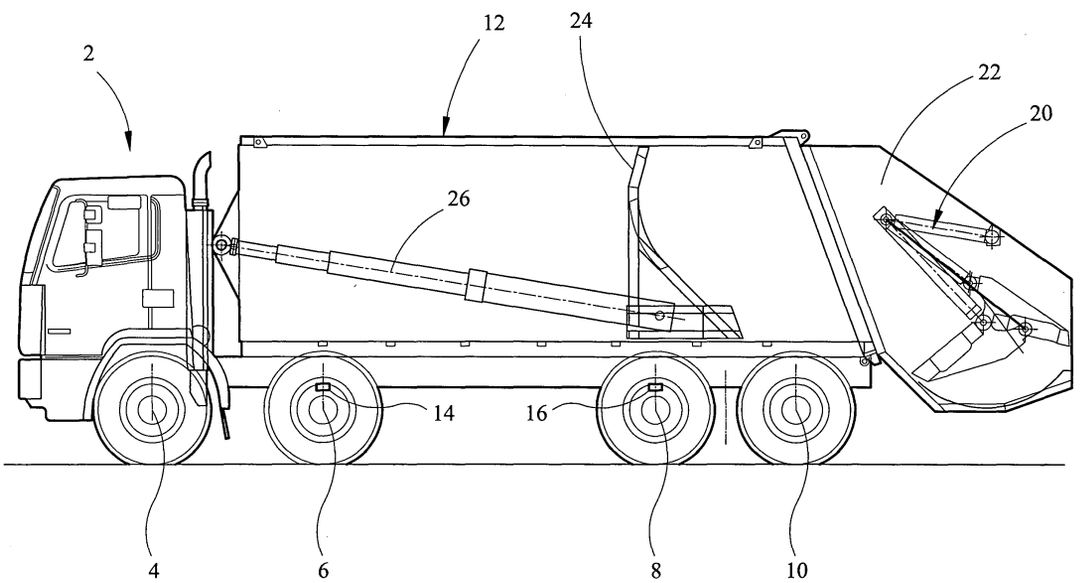


FIG 1

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## Description

**[0001]** The present invention relates to an improved refuse collection vehicle of the kind in which refuse is loaded to the rear of a storage compartment of a vehicle and compacted to form a slug of compacted waste material within the storage compartment of the vehicle.

**[0002]** In this description where not otherwise clear, the terms front and rear are used to indicate a direction towards the front or rear of the vehicle in question.

**[0003]** In refuse collection vehicles the refuse is compacted by a compaction blade located to the rear of the storage compartment to drive the refuse towards a front of the storage compartment. Such refuse collection vehicles have a moveable front wall or ejector blade against which the compacted refuse is compacted.

**[0004]** In known devices the front wall or ejector blade is biased towards the rear of the refuse collection vehicle such that a slug of compacted refuse must overcome this bias to be moved toward the front of the refuse collection vehicle. For example the front wall or ejector blade may be biased by a hydraulic ram. For example, the ram may be set to offer a constant bias. However, as the slug of refuse grows the pressure needed to compact the refuse and move the slug of refuse against the bias increases (at least in part because of frictional forces between the slug of refuse and the sides of the compartment). This results in the density of the slug of refuse at the rear of the refuse collection vehicle being much greater than the density of the slug of refuse in the region of the front wall or ejector plate. This, in turn may cause undue loads to accrue over a rear axis of the refuse collection vehicle and in some case overloading of the rear axle removing the refuse collection vehicle from active service while repairs are made.

**[0005]** It is known to provide load sensors over a rear axle to detect incipient overloading. On detecting such overloading the pressure of the hydraulic ram at the front wall or ejector blade may be reduced to a lower fixed level to enable the slug to be moved toward a front of the compartment rather than be further compacted.

**[0006]** The front wall or ejector blade may also be backed off from the enlarging slug of refuse to allow the slug of refuse more easily to move towards a front of the refuse collection vehicle.

**[0007]** It is also known to provide load sensors at the front axis of the refuse collection vehicle to detect when a predetermined load or overload condition is reached. It is known in such circumstances either to stop loading the refuse collection vehicle (even if the capacity of the refuse collection vehicle has not been reached) or to drive the front wall or ejector blade back into the slug of refuse at a fixed pressure to move the refuse away from the front axis thereby reducing the load. However, this also has the effect of further compacting the slug of refuse. In certain circumstances this may cause the pressure of the slug of refuse against the sides of the storage compartment to reach a level preventing ready removal of the slug of refuse, causing the vehicle to be taken out of service while this is remedied.

**[0008]** Thus it can be seen that there is a need for a refuse collection vehicle enabling optimum compaction of a slug of refuse thereby achieving optimum load carrying capacity without overloading of the axles of the refuse collection vehicle or over dense compaction of the slug of refuse.

**[0009]** According to a first aspect of the present invention there is provided a refuse collection vehicle having at least first and second axles and a storage compartment disposed over at least said first and second axles, load measurement means to determine a loading of each of said first and second axles, a compaction blade to drive refuse into the storage compartment at a first pressure, an ejector blade exerting a second pressure against which refuse is driven, in which each of the first and second pressures are determined and varied in response to the loading determined by the load measurement means.

**[0010]** This has the advantage that more efficient compaction of a slug of refuse is to be obtained thereby achieving optimum load carrying capacity of the refuse collection vehicle.

**[0011]** Advantageously, the first and second pressures are controlled by means of an electronic control unit. In this way, each of the first and second pressures may have predetermined upper and lower limits, said upper and lower limits being related to the load detected by the load measurement means. In this way, over dense compaction of the slug of refuse is to be avoided.

**[0012]** This has the advantage that efficient loading of a refuse collection vehicle may occur while avoiding potential over loading of the vehicle axles.

**[0013]** The upper and lower limits of each of the first and second pressures may also be related to the position of the ejector blade in addition to the load detected by the load measurement means.

**[0014]** Preferably, the load measurement means comprises a first load measurement means associated with a front axle of the refuse collection vehicle and a second load measurement means associated with a rear axle of the refuse collection vehicle.

**[0015]** The invention will now be described, by way of example only, with reference to the accompany Figure which shows in side section a refuse collection vehicle in accordance with the present invention.

**[0016]** A refuse collection vehicle 2 is shown having a first and second front axles 4,6 and first and second rear axles 8,10. A storage compartment 12 is disposed over the second front axle 6 and the first and second rear axles 8,10. First and second load measurement means 14,16 are in the illustrated embodiment associated with said second front axle 6 and the first rear axle 8. Any suitable load measurement means may be used for this purpose. In alternative embodiments, the load measuring means may instead be associated with the first front axle and the second rear axle, alternatively

with each of the axles of the vehicle or still further the load measuring means may be located between the storage compartment and a chassis of the refuse collection vehicle with the load on the axles being interpolated from the detected load. In short any suitable means for detecting or otherwise determining the load on the axles of the refuse collection vehicle may be used.

**[0017]** A compaction blade 20 to drive refuse into the storage compartment is provided within a hopper 22 to the rear of the refuse collection vehicle 2. A moveable wall or ejector blade 24 against which refuse is driven is shown towards the rear of the storage compartment 12. In use, the ejector blade 24 is driven toward the front of the storage compartment 12 by a hydraulic ram 26.

**[0018]** Operation of the present invention will briefly be described. Refuse is deposited in the hopper 22 and directed into the storage compartment 12 by the compaction blade 20. The refuse is compacted in the storage compartment 12 between the ejector blade 24 and the compaction blade 20 to form a slug of refuse (not shown). Refuse continues to be added to the storage compartment 12 and the slug of refuse becomes progressively more dense increasing the load over the rear axles 8,10 of the vehicle. Once a predetermined level of loading of the first rear axle 8 has been detected, the pressure exerted by hydraulic ram 26 is reduced such that the next compaction of refuse by the compaction blade 20 will drive the slug of refuse and the ejector blade 24 against which the slug of refuse rests forwardly within the storage compartment 12 thereby reducing the load on the rear axles 8,10.

**[0019]** Continued loading of refuse will cause the slug of refuse to expand and drive the ejector blade 24 toward the front of the storage compartment 12 thereby increasing the load on the front axles 4,6. Should a predetermined level of loading of the second front axle 6 be detected, the pressure exerted by hydraulic ram 26 is increased to drive the ejector blade 24 back into the slug of refuse to further compact the slug of refuse and reduce the loading on the front axles 4,6.

**[0020]** By monitoring of the load levels detected, it is possible to manage the density of the slug of refuse to ensure a more even density distribution in the slug of refuse. For example the predetermined level of loading of the first rear axle 10 needed to be detected to reduce the pressure of the hydraulic ram 26 and/or the predetermined level of loading of the second front axle 6 necessary to be detected to increase the pressure of the hydraulic ram 26 may vary over time.

**[0021]** Also while the compaction blade 20 typically works at a constant pressure, this may be varied in the present invention to ensure the desired density distribution in the slug of refuse is obtained for optimum loading of the storage compartment 12.

**[0022]** By factoring in the position of the ejector blade 24 additional calculations may be made to ensure that varying of the pressure exerted by either the ejector blade 24 or the compaction blade 20 does not lead to unacceptable levels of loading on the axles 4,6,8,10 of the refuse collection vehicle 2.

## Claims

1. A refuse collection vehicle (2) having at least first and second axles (4,6;8,10) and a storage compartment (12) disposed over at least said first and second axles (4,6;8,10), load measurement means (14,16) to determine a loading of each of said first and second axles (4,6;8,10), a compaction blade (20) to drive refuse into the storage compartment (12) at a first pressure, an ejector blade (24) exerting a second pressure against which refuse is driven, **characterised in that** each of the first and second pressures are determined and varied in response to the loading determined by the load measurement means (14,16).

2. A refuse collection vehicle according to claim 1, **characterised in that** the first and second pressures are controlled by means of an electronic control unit.

3. A refuse collection vehicle according to claim 1 or claim 2, **characterised in that** each of the first and second pressures may have predetermined upper and lower limits, said upper and lower limits being related to the load detected by the load measurement means (14,16).

4. A refuse collection vehicle according to claim 3, **characterised in that** the upper and lower limits of each of the first and second pressures are also related to the position of the ejector blade (24) in addition to the load detected by the load measurement means (14,16).

5. A refuse collection vehicle according to any previous claim, **characterised in that** the load measurement means (14,16) comprises a first load measurement means (14) associated with a front axle (6) of the refuse collection vehicle (2) and a second load measurement means (16) associated with a rear axle (8) of the refuse collection vehicle (2).

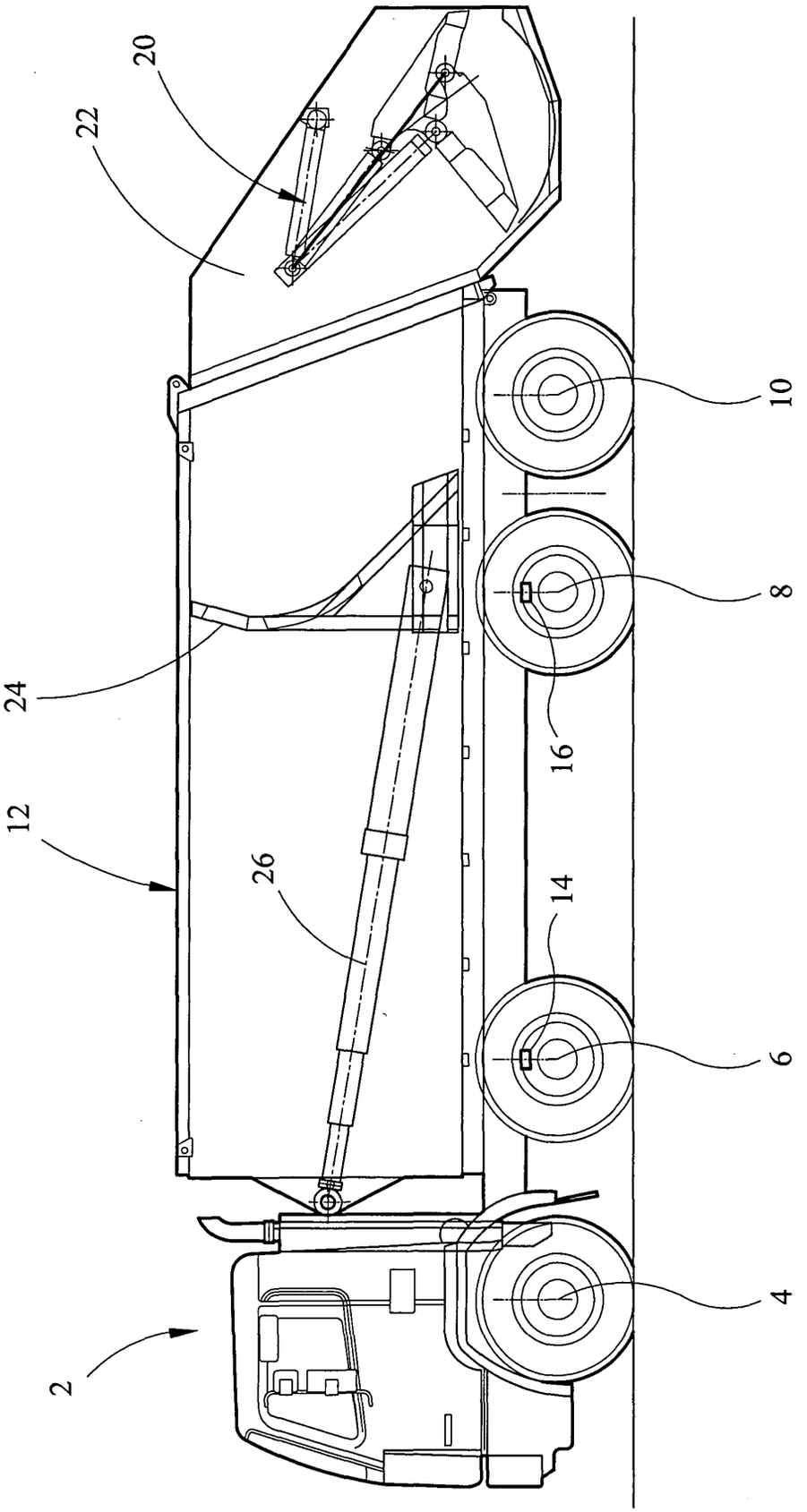


FIG 1

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# EUROPEAN SEARCH REPORT

Application Number
EP 05 25 0371

## 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) |
|---|---|---|---|
| X | GB 2 355 972 A (SPECIALIST VEHICLES LTD) 9 May 2001 (2001-05-09) * the whole document * | 1-5 | B65F3/20 B65F3/28 |
| A | GB 2 288 782 A (DAVID MACKRILL ENGINEERING LTD) 1 November 1995 (1995-11-01) * the whole document * | 1-4 | |
| A | GB 2 152 898 A (DAVID MACKRILL ENGINEERING LTD) 14 August 1985 (1985-08-14) * the whole document * | 1-4 | |

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65F

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 24 March 2005 | Smolders, R |

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 25 0371

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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24-03-2005

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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| GB 2355972 A | 09-05-2001 | NONE | |
| GB 2288782 A | 01-11-1995 | NONE | |
| GB 2152898 A | 14-08-1985 | NONE | |

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82