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(71) Applicant: **RJE Engineering Limited**
Beaconsfield, Buckinghamshire HP9 1QL (GB)

(72) Inventor: **Storey, Colin, c/o RJE Engineering Ltd**
Gloucester GL2 5DA (GB)

(74) Representative: **Moffat, John Andrew et al**
Lewis & Taylor,
5 The Quadrant
Coventry CV1 2EL (GB)

(54) Waste collection vehicle

(57) Waste collection vehicles, of the kind typically used in the collection of municipal waste, may comprise at least one compartment in which waste material is to be transported. It is a problem that in transporting certain kinds of waste material, such as plastics containers or garden or green waste, from a collection point to a recycling point that the ratio of mass transported to volume occupied by the waste material is not particularly high. Embodiments of a municipal waste vehicle are disclosed in which waste material passes through an opening (14;44) in an upper region of a vehicle compartment (8;38) and subsequently through a waste processing unit (4;34), the waste processing unit (4;34) being adapted to reduce the volume of the waste material as the waste material enters the compartment (8;38).

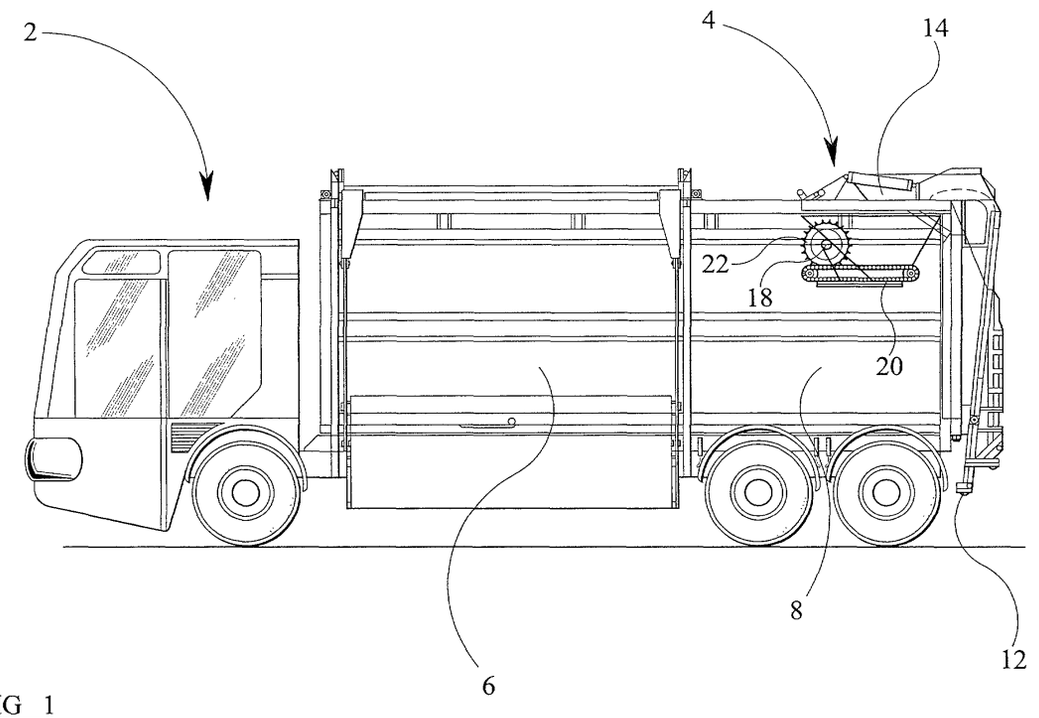

FIG 1

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Description

[0001] The present invention relates to improvements in and relating to a waste collection vehicle. In particular, the invention relates to waste collection vehicles having at least one compartment in which waste material is to be transported. Such vehicles are typically used in the collection of municipal waste.

[0002] Municipal authorities are required by regulation to recycle a certain amount of waste material. Some waste material is more economic to recycle than others. In particular, the waste material is collected from domestic or commercial properties and transported to a remote waste collection site where the collected waste material is sorted for recycling. In some cases the recycling may occur at this remote collection site.

[0003] It is a problem that in transporting certain kinds of waste material that the ratio of mass transported to volume occupied by the waste material is not particularly high. For example, when transporting plastics containers, most of the volume transported is air, whether within the containers or between them.

[0004] A similar problem arises in the transportation of garden or green waste where the ratio of mass transported to volume occupied by the waste material is not particularly high.

[0005] It is an advantage of the present invention that it eliminates or at least substantially reduces such problems.

[0006] According to a first aspect of the present invention a municipal waste vehicle has at least one compartment in which a waste material is to be transported, the or each compartment having an opening in an upper region through which a volume of the waste material enters the compartment, in which the vehicle is characterised in that the waste material passes through a waste processing unit disposed in the opening of the compartment to the waste processing unit, the waste processing unit being adapted to reduce the volume of the waste material as the waste material enters the compartment.

[0007] Preferably the waste processing unit is a crusher. This is particularly advantageous where the waste material comprises containers.

[0008] More preferably, the crusher comprises a driven roller and an endless belt. Preferably, the roller is provided with raised portions extending along a longitudinal axis of the roller about a peripheral region thereof, the raised portions being adapted to correspond with corresponding gaps in the endless belt. This has the advantage that containers collapsed by the crusher, retain their collapsed shape until the municipal waste vehicle has returned to the remote collection site.

[0009] Preferably the opening is defined by a plurality of walls, including a first wall. Preferably, the first wall is displaceable under the action of a ram.

[0010] Alternatively the waste processing unit is a thresher. This is particularly advantageous where the waste material comprises garden or other green waste.

[0011] Preferably, the thresher comprises a roller having a plurality of radially extending members disposed about a periphery thereof.

[0012] Preferably the opening is defined by a plurality of walls, including a first wall. Preferably the first wall is preferably provided with openings through which the radially extending members may pass. Preferably, the first wall is displaceable. More preferably, the first wall is displaceable under the action of a ram.

[0013] Preferably, the waste processing unit is provided with means whereby when the waste material cannot be processed the waste material may nevertheless enter the compartment. In a preferred embodiment, the opening is defined at least in part by a displaceable panel, the panel being displaced to enlarge the opening when the waste material cannot be processed.

[0014] The invention has as an advantage that it allows larger masses of waste material to be collected than hitherto. In particular it allows a relatively large mass of plastics containers or green waste to enter a recycling stream, thereby making collection of such waste material more economic.

[0015] The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 shows a schematic side view of a first municipal waste vehicle in accordance with the present invention in which the waste processing unit is adapted to process plastics containers;
Figure 2 shows a schematic end view of the municipal waste vehicle of Figure 1;
Figure 3 shows a schematic end view of a second municipal waste vehicle incorporating the waste processing unit shown in Figures 1 and 2;
Figure 4 shows a schematic side view of a first municipal waste vehicle in accordance with the present invention in which the waste processing unit is adapted to process green waste;
Figure 5 shows a schematic end view of the municipal waste vehicle of Figure 4; and
Figure 6 shows a schematic end view of a second municipal waste vehicle incorporating the waste processing unit of Figures 4 and 5.

[0016] Referring first to Figures 1 and 2 there can be seen a first embodiment of a municipal waste vehicle incorporating a waste processing unit 4 adapted to process containers in accordance with the present invention. The municipal waste vehicle has two compartments in which waste may be collected and subsequently conveyed to a remote waste collection site; a first compartment 6 disposed towards a front end of the vehicle 2 and a second compartment 8 disposed at a rear end of the vehicle 2.

[0017] The first compartment 6 is provided with a known lifting device 10 whereby waste material is supplied to the first compartment. The lifting device 10 is

shown in ghost in Figure 2 in a number of operating positions.

[0018] The second compartment 8 is provided with a rear lifter 12 to raise a waste containing receptacle to an opening 14 provided in the second compartment 8. In the illustrated embodiment, the opening 14 is located in an upper region of the second compartment 8. In use the waste containing receptacle is lifted to a height and inclination such that the waste material contained therein is directed through the opening 14.

[0019] The waste processing unit 4 adapted to process containers is located in the opening 14. The waste processing unit comprises a hopper 16 and a waste processing mechanism. In the illustrated embodiment, the waste processing mechanism comprises a driven roller 18 and an endless belt 20. The roller 18 is provided with raised portions 22 about a peripheral region thereof. The raised portions 22 extend along a longitudinal axis of the roller. The raised portions 22 are adapted to correspond with gaps or recesses in the endless belt 20. The endless belt 20 may conveniently comprise a number of spaced linkages.

[0020] In use when waste material comprising containers is deposited in the hopper 16 the roller 18 is driven for rotation. The waste material is caught between the roller 18 and the endless belt 20 and dragged therethrough. This has the effect of collapsing the waste material thereby reducing the volume of the waste material. In the case of a plastics container, the interaction of the raised portions 22 of the roller 18 and the corresponding gaps in the endless belt 20 imparts a ripple or wave to the collapsed containers. In the case of plastics containers this prevents the container from adopting a shape of greater volume until after the waste material has been delivered to the remote collections site.

[0021] It will be understood that such a waste processing unit is particularly suitable for processing plastics containers, tins, and/or cans.

[0022] Figure 3 shows a schematic end view of a second municipal waste vehicle incorporating a waste processing unit 4 as shown in Figures 1 and 2. In this embodiment, the second compartment 8 is provided with a rear trough 24 whereby the waste containing receptacle is raised to the opening provided in the upper region of the second compartment 8.

[0023] Turning now to Figures 4 and 5, there can be seen a further embodiment of a municipal waste vehicle 32 incorporating a waste processing unit 34 in accordance with the present invention. The municipal waste vehicle 32 has two compartments in which waste may be collected and subsequently conveyed to the remote collection site; a first compartment 36 disposed towards a front end of the vehicle and a second compartment 38 disposed at a rear end of the vehicle.

[0024] The first compartment 36 is provided with a known lifting device 40 whereby waste material is supplied to the first compartment. The lifting device 40 is shown in ghost in Figure 5 in a number of operating positions.

[0025] The second compartment 38 is provided with a rear lifter 42 to raise a waste containing receptacle to an opening 44 provided in the second compartment. In the illustrated embodiment, the opening is located in an upper region of the second compartment 48. In use the waste containing receptacle is lifted to a height and inclination such that the waste material contained therein is directed through the opening 44.

[0026] The waste processing unit 34 is located in the opening 44. The waste processing unit comprises a hopper 46 and a waste processing mechanism. In the illustrated embodiment, the waste processing mechanism comprises a roller 48 having a plurality of radially extending members 50 disposed about a periphery thereof. The roller 48 is adapted to be driven for rotation.

[0027] The hopper 46 comprises a number of walls defining a throat in which the roller 48 is located. One of the walls further includes a guard portion 56 extending partially over the roller 48.

[0028] In use, the waste material is directed down the throat towards the roller 48.

[0029] The radially extruding members 50 of the roller are spaced along a longitudinal axis of the roller 48. The radially extending members 50 need not extend fully about a circumference or periphery of the roller 48. Where the radially extending members 50 extend fully about the periphery of the roller at least a portion of the or each member extends radially further than a remainder of the or each member.

[0030] A first wall 52 of the hopper is preferably provided with openings through which the radially extending members 50 of the roller can pass. The first wall 52 is disposed a small distance from the periphery of the roller 48 to define a space therebetween.

[0031] In use when waste material is deposited in the hopper 46 the roller 48 is driven for rotation. The radially extruding members 50 of the roller 48 act as a flail to break up the waste material. The broken up waste material then passes through the space between the periphery of the roller 48 and the first wall 52 of the hopper and into the second compartment 38.

[0032] Each of the radially extending members 50 will be understood to have a leading edge as the roller is rotated. The leading edge may take the form of a blade to provide a chopping action in addition to the flailing action.

[0033] On occasion an item of waste material will enter the hopper which cannot be broken up by the action of the radially extending members 50, for example because it is too large. In such a case, the item of waste will become wedged between the roller 48 and the first wall 52 of the hopper 46, thereby causing the roller 48 to cease rotation. The waste processing unit is provided with a detector or sensor to recognise this condition. When such a condition is recognised a ram 58 connected to the first wall 52 of the hopper 46 is actuated to move the first wall 52 further away from the roller 48

thereby enlarging the space therebetween. The item of waste material should then pass through into the second container 38. The first wall 52 is then returned by the ram 58 to its previous position. The ram 58 may be operated hydraulically, pneumatically or by any other convenient means.

[0034] A second wall 60 of the hopper 16 may be provided with openings through which the radially extending members 50 of the roller 48 may pass. The openings may be so shaped or disposed so as to strip any waste material caught on or between the radially extending members 50 from the roller 48.

[0035] Figure 6 shows a schematic end view of a second municipal waste vehicle 32 incorporating a waste processing unit as shown in Figures 4 and 5. In this embodiment, the second compartment 38 is provided with a rear trough 54 whereby the waste containing receptacle is raised to the opening provided in the second compartment 38.

Claims

1. A municipal waste vehicle having at least one compartment (6,8;36,38) in which a waste material is to be transported, the or each compartment (8;38) having an opening (14;44) in an upper region through which a volume of the waste material enters the compartment (8;38), in which the vehicle is **characterised in that** the waste material passes through a waste processing unit (4;34) disposed in the opening (14;44) of the compartment (8;38) to the waste processing unit (4;34), the waste processing unit (4;34) being adapted to reduce the volume of the waste material as the waste material enters the compartment (8;3 8).

2. A waste vehicle according to claim 1, **characterised in that** the waste processing unit (4) comprises a driven roller (18) and an endless belt (20).

3. A waste vehicle according to claim 2, **characterised in that** the driven roller(18) is provided with raised portions (22) extending along a longitudinal axis of the driven roller (18) about a peripheral region thereof, the raised portions (22) being adapted to correspond with corresponding gaps in the endless belt (20).

4. A waste vehicle according to any previous claim, **characterised in that** the opening is defined by a plurality of walls, including a first wall.

5. A waste vehicle according to claim 1, **characterised in that** the waste processing unit (34) comprises a roller (48) having a plurality of radially extending members (50) disposed about a periphery thereof.

6. A waste vehicle according to claim 5, **characterised in that** the opening is defined by a plurality of walls, including a first wall (52), in which the first wall (52) is provided with openings through which the radially extending members (50) may pass.

7. A waste vehicle according to either claim 4 or claim 6, **characterised in that** the first wall (52) is displaceable.

8. A waste vehicle according to claim 7, **characterised in that** first wall (52) is displaceable under the action of a ram (58).

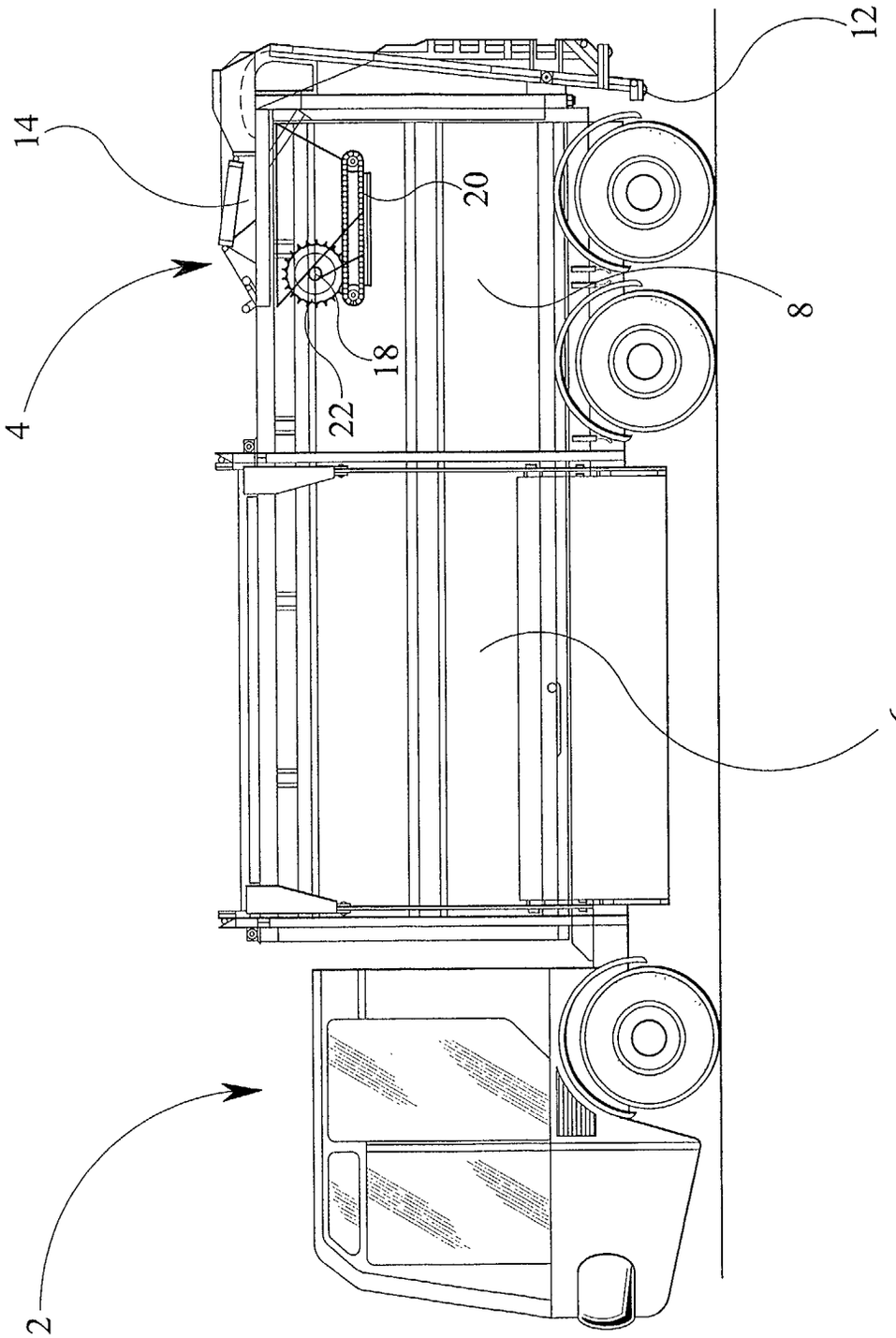


FIG 1

FIG 3

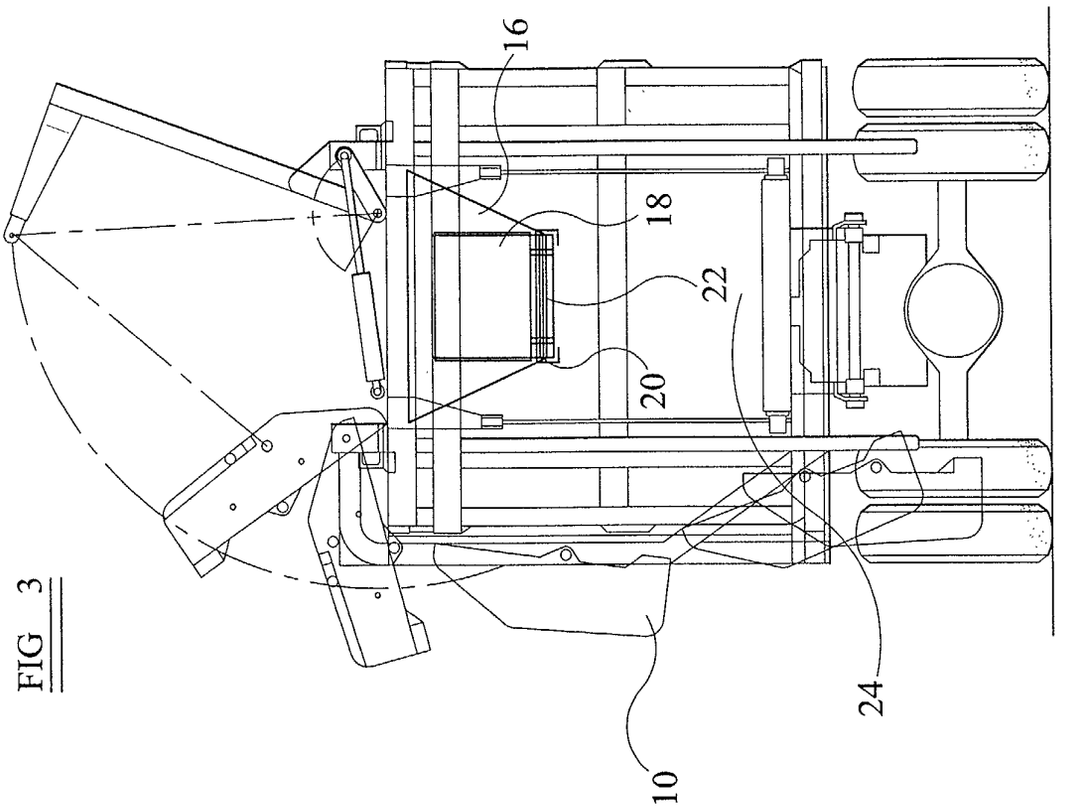
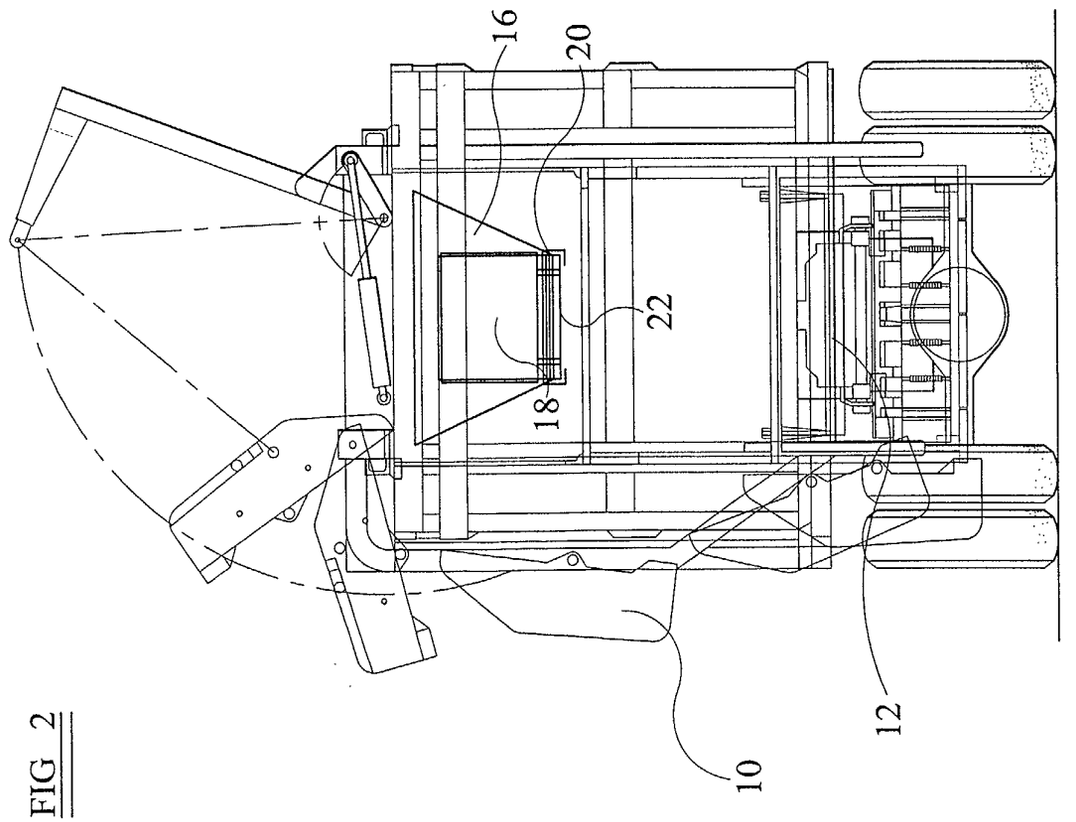


FIG 2



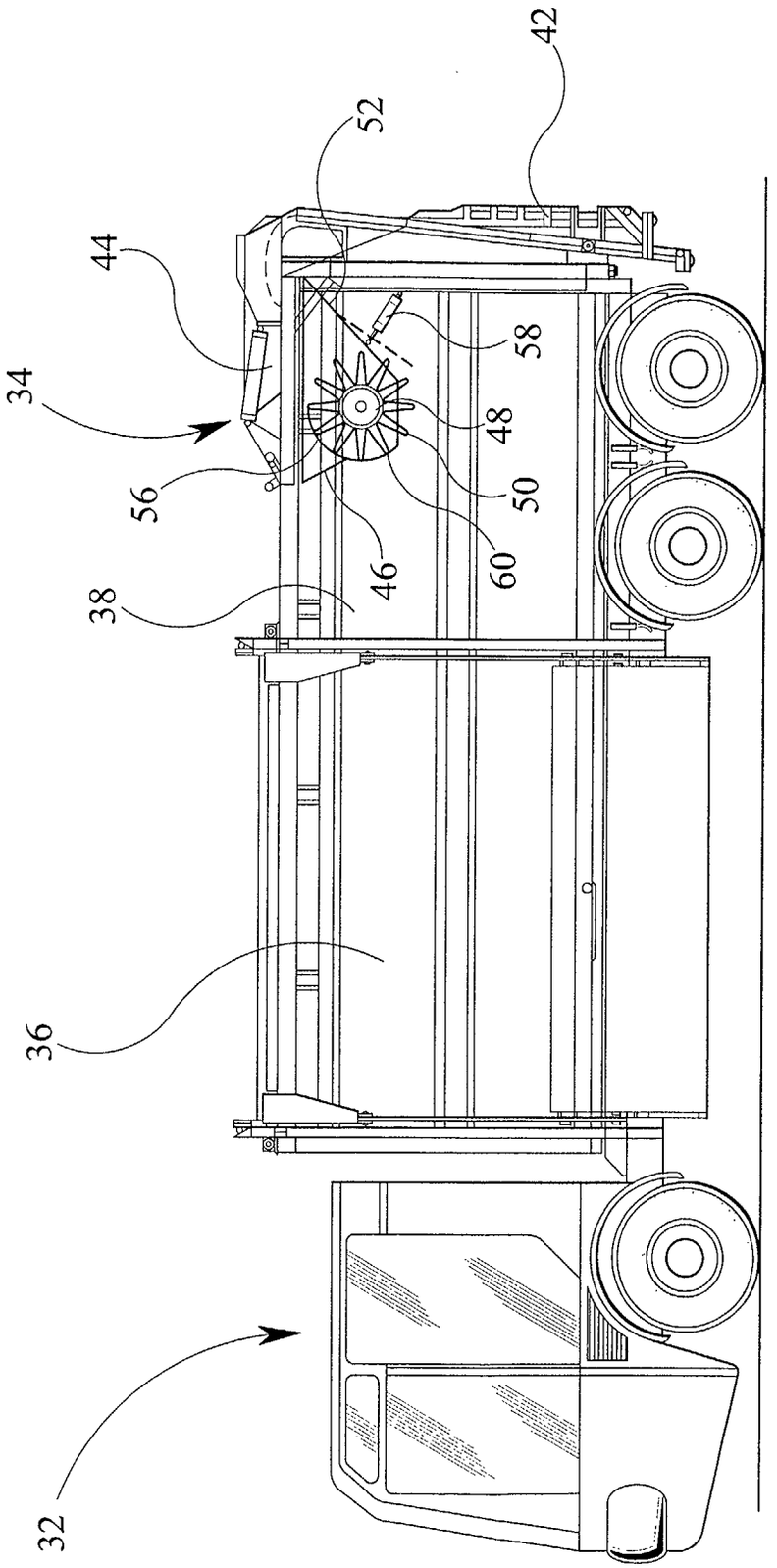


FIG 4

FIG 6

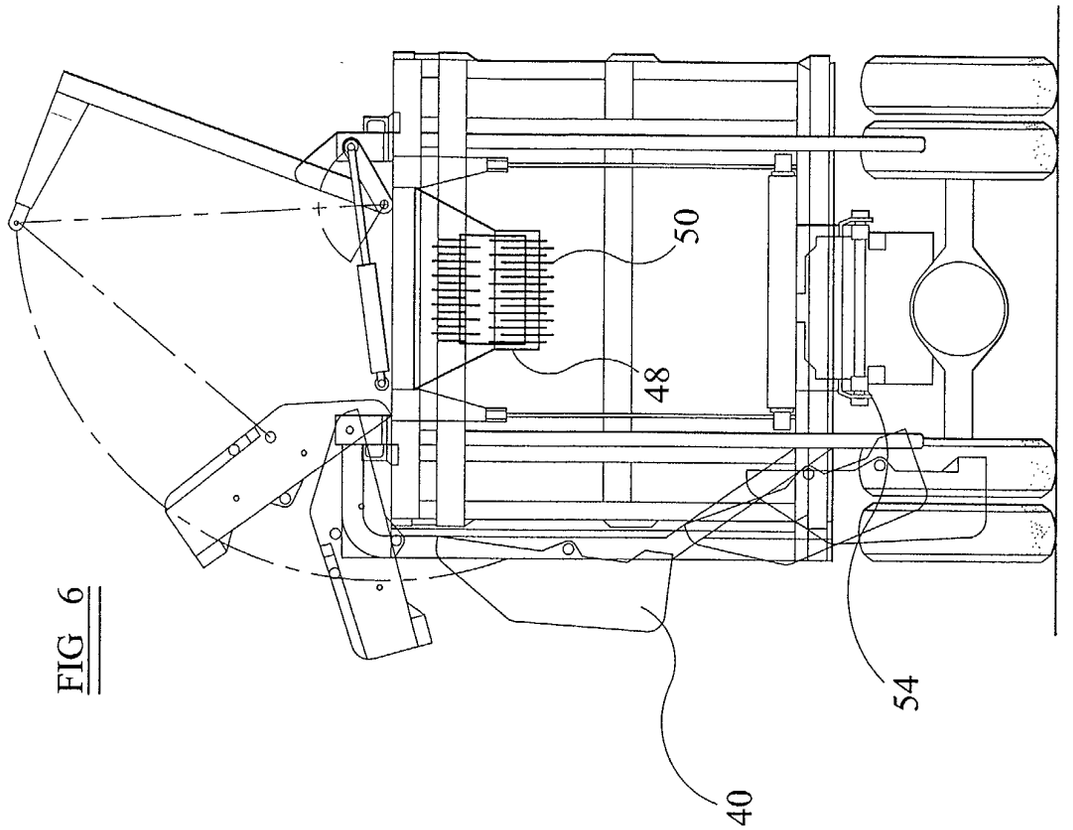
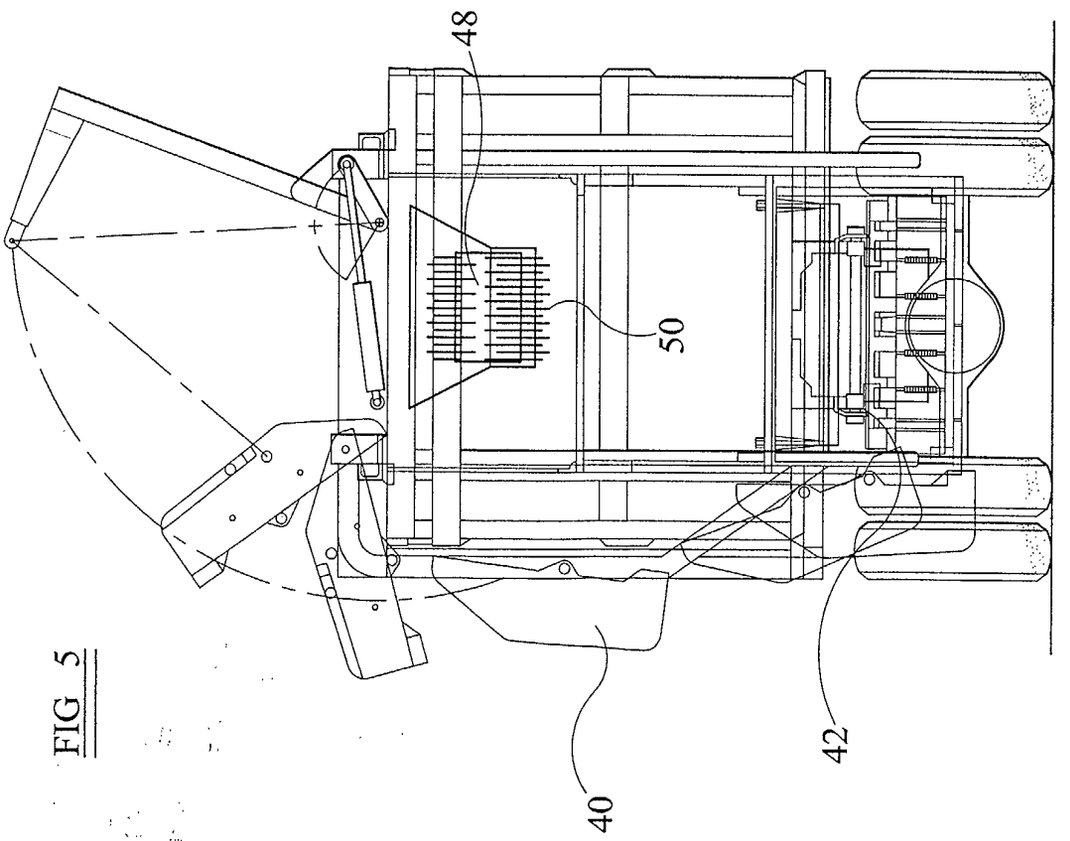


FIG 5



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EUROPEAN SEARCH REPORT

Application Number
EP 02 25 1459

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 May 2002	Smolders, R

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