



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
16.01.2019 Bulletin 2019/03

(51) Int Cl.:
B65F 3/20 (2006.01)

(21) Application number: **18181972.3**

(22) Date of filing: **05.07.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(71) Applicant: **Ab Närpes Trä & Metall - Oy Närpiön Puu ja Metalli**
64200 Närpes (FI)

(72) Inventor: **LÄRKA, Miika**
64200 Närpes (FI)

(74) Representative: **Kolster Oy Ab**
(Salmisaarenaukio 1)
P.O. Box 204
00181 Helsinki (FI)

(30) Priority: **10.07.2017 FI 20175675**

(54) **APPARATUS AND METHOD FOR FEEDING WASTE**

(57) The present invention is related to a feeding arrangement (14) especially to be used in a compactor (5) arranged next to a collection container (4) for waste. Said feeding arrangement is arranged in the compacting compartment (6) and is essentially opposite the track for the waste emptied into said compartment. The feeding arrangement has a swing arm (15) that can swing back and forth around a shaft (17) that, in use, is essentially horizontal and is arranged perpendicularly to the working direction of the compactor's pendulum device (11). The swing arm has a tip (16) that is displaceable relative to said shaft, it being possible for the tip of the swing arm to adopt a rotational movement in a vertical plane so that said tip, in its movement back towards the shaft, essentially follows the waste track.

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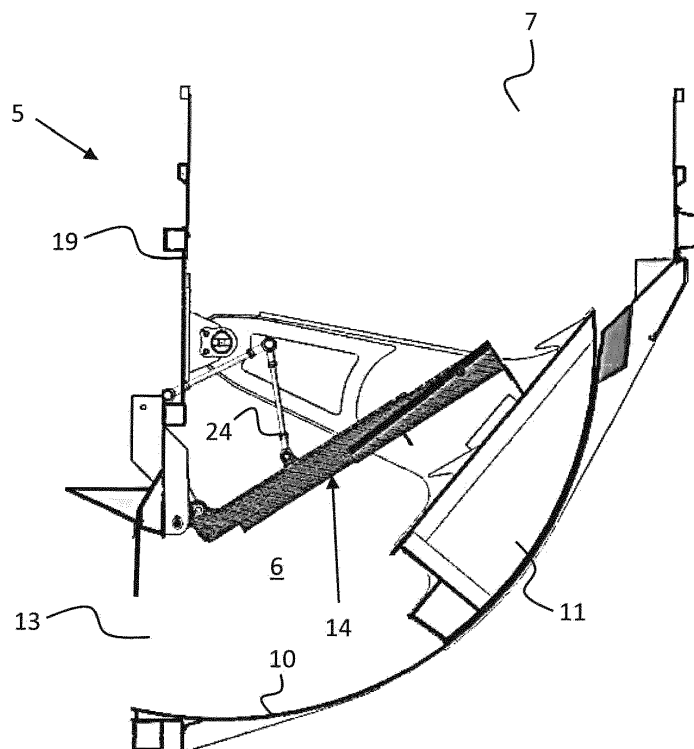


FIG. 5

Description

Technical field

[0001] The present invention relates to a feeding arrangement according to the preamble of patent claim 1.

[0002] The present invention also relates to a waste-feeding method using said arrangement according to the preamble of patent claim 9.

Prior art

[0003] The use of top-fed collection containers when emptying waste containers or bins is already known. However, in recent times, problems have arisen when compacting the waste from these containers. Problems particularly arise when the waste contains large cardboard packaging that easily gets jammed in the compacting compartment.

[0004] Solutions such as that in patent publication US 5,015,144 are already known. Said publication describes a waste collection container where a compactor is arranged to move waste from a compacting compartment to a container. The problem with the solution is as described above. Sticky waste collects on the compactor's pendulum device and eventually results in the compactor becoming blocked. Similar solutions are also shown in patent publications CN 104890279, EP 2 524 879, US 2007/0122258 and NL 7805936.

Presentation of the problem

[0005] Using the present invention, the problems afflicting known solutions may essentially be avoided. Thus the invention is to provide an easy-to-handle and operationally reliable feeding arrangement.

[0006] This role is fulfilled in the invention by a feeding arrangement according to the invention being given the characteristics stated in patent claim 1. Furthermore, this feeding arrangement is used in accordance with a method that, according to the invention, is given the characteristics stated in patent claim 9. The subsequent, dependent patent claims set out appropriate, further developments and variants of the invention that further improve its functionality.

[0007] With the arrangement and method described in the present invention, a plurality of significant advantages are achieved over the prior art. For example, rapid and safe handling of all forms of waste can be ensured. This makes waste collection more predictable and thus contributes to a streamlining of collection logistics.

[0008] Further advantages and details of the invention are set out more closely in the description below.

Summary of drawing figures

[0009] In the following, the invention is described more closely with reference to the drawings, in which:

Figure 1 shows, from the side, a refuse collection vehicle with a compactor arranged next to a collection container for waste.

Figure 2 schematically shows the function of a compactor that uses prior art technology.

Figure 3 schematically shows the function of a compactor furnished with a feeding arrangement according to the present invention, the feeding arrangement being in its rest position.

Figure 4 shows a compactor, according to figure 3, with the feeding arrangement in the extended position.

Figure 5 shows a compactor, according to figure 3, with the feeding arrangement at the start of an interaction.

Figure 6 shows a compactor, according to figure 3, with the feeding arrangement at the end of an interaction.

Figure 7 shows a compactor, according to figure 3, with the feeding arrangement on the way to its rest position.

Figure 8 shows, in a front view, the feeding arrangement in its rest position.

Figure 9 shows, in a rear view, the feeding arrangement in its extended position.

Figure 10 shows, from the side, an alternative refuse collection vehicle with a compactor arranged in front of a collection container for waste.

Figure 11 shows, from the side, a second alternative refuse collection vehicle with a compactor arranged in front of a collection container for waste.

Figure 12 shows, from the rear, a refuse collection vehicle as per figure 11.

Preferred embodiment

[0010] The above-mentioned figures are not a to-scale depiction of the feeding arrangement. Their sole purpose is to illustrate the preferred embodiments' construction solutions and the embodiments' function. In this connection, the individual design elements that are each shown and labelled with a reference number in the figures correspond to the design solutions presented in the description given below (in which said elements are also cited with a reference number).

[0011] In the following, the present feeding arrangement and its function are described in use with a top-fed refuse collection vehicle. However, this does not limit use of the feeding arrangement to only this embodiment. The feeding arrangement can be used in various waste handling solutions, mobile and stationary alike.

[0012] Thus, figure 1 is a schematic depiction of a refuse collection vehicle 1 comprising a chassis 2 and a driver's cab 3. The figure also shows a collection container 4 for carrying waste from a collection point to a processing plant. To feed the waste into the collection container, the refuse collection vehicle is furnished with a compactor 5 - see figure 2. This compactor has a com-

pacting compartment (6), into which the waste is fed via a feeding aperture 7.

[0013] To feed waste into the collection container 4, the refuse collection vehicle 1 has a crane 8 with which a waste container 9 can be lifted above, and emptied via, the feeding aperture. The waste that drops from said container into the compacting compartment then moves along a track to a bottom part 10 of the compacting compartment.

[0014] The compactor 5 also has a pendulum device 11 that, with the help of one or more operating devices 12, executes a pendulum movement to move the waste from the compacting compartment 6 to the collection container 4. Figure 2 illustrates the pendulum device's movement more closely. Solid lines show the pendulum device swung, with an anticlockwise movement, to its upper position, this simultaneously freeing the compacting compartment's bottom. In a subsequent swinging movement, the pendulum device is moved clockwise to its lower compacting and rest position. At the same time, it moves the dropped waste, via a compacting aperture 13, from the compacting compartment into the collection container (where the waste is stored). This pendulum movement continues until the waste in the compacting compartment has essentially been moved into the container.

[0015] Both the collection container and the compactor are of a conventional design and are thus not described more closely in this context.

[0016] As problems sometimes arise with the waste not dropping as fully and quickly as desired to the bottom 10 of the compacting compartment 6, the present compactor 5 has been furnished with a special feeding arrangement 14. This is shown more closely in figures 8 and 9. Such a feeding arrangement is advantageously arranged in the compacting compartment so that it is essentially opposite the waste track. The feeding arrangement's design includes a swing arm 15 that is telescopically extendable. This swing arm is arranged so that, in use, it can move back and forth in what is, in use, an essentially vertical plane. In this way, the tip 16 of the swing arm can also adopt a rotational movement in the same vertical plane. To effect this, the swing arm is turned around at least one shaft 17 that, in use, is essentially horizontal and is arranged perpendicularly to the working direction of the pendulum device 11 of the compactor 5. See figures 3 - 7.

[0017] By allowing the tip 16 of the swing arm 15 to be displaceable relative to said shaft 17, the tip can be manoeuvred towards the waste track. Here, the tip can be further manoeuvred in a movement back towards the shaft 17 while, at the same time, the tip essentially follows the track. Through this movement, the tip will interact with at least a part of the waste that is still on the track and move it towards the bottom 10 of the compacting compartment 6. This movement along the track is advantageously executed while the pendulum device 11 is in its upper position. To further improve the interaction between the waste and the tip, the latter can be furnished

with one or more scraper or shovel devices 18 that can be brought into contact with the waste track - cf. figures 8 and 9.

[0018] Figures 8 and 9 show an advantageous embodiment of the feeding arrangement 14. Its swing arm is (e.g. as per figure 3) arranged, via a body 20, on a partition 19 that separates the collection container 4 and the compactor 5 from each other. A primary arm 21 is arranged to the body so that, via the shaft 17, it can be turned in relation to this body. A secondary arm 22 is mounted telescopically displaceable to the primary arm, the secondary arm's movement being regulated by an operating device built into the swing arm. In figure 8, the swing arm's scraper or shovel devices 18 can be seen on the front of the secondary arm. Here, the tip 16 of the swing arm is furnished with a scraping device that is wider than said tip. The turning of the primary arm is regulated by a control device 23, e.g. a hydraulic or pneumatic cylinder mounted between the body and the primary arm (well-protected at the primary arm's base). To stabilise the swing arm's movements and prevent waste jamming or collecting between the partition and the swing arm, the swing arm is advantageously furnished with an angle stay 24 mounted between the body and the primary arm.

[0019] The present compactor 5, with a feeding arrangement 14 mounted therein, works in the following way (cf. figures 3 - 7). The feeding arrangement is arranged on a partition 19 that separates the collection container 4 and the compactor 5. Said arrangement is thus in the compacting compartment 6, essentially opposite the track for the waste that drops into the compacting compartment. The feeding arrangement's swing arm can move back and forth in a plane that, in use, is essentially vertical. Thereby, the tip 16 of the swing arm can also adopt a rotational movement in the same vertical plane, said rotation being executed around an essentially horizontal axis arranged perpendicularly to the working direction of the pendulum device.

[0020] When waste is emptied from a container 9 into the compacting compartment 6, it drops towards the bottom 10 - see figure 3. To free the compacting aperture 13, the pendulum device 11 is manoeuvred anticlockwise to its upper position. From its upper position, the pendulum device is swung clockwise towards the compacting aperture so as to compact the waste and move it into the collection container 4 - see figures 4 to 7.

[0021] While the pendulum device 11 is moved to its upper position, the feeding arrangement's secondary arm is displaced to its outermost position and the swing arm takes up its furthest position with its tip 16 maximally extended away from the shaft 17 - see figure 4. Simultaneously with the pendulum device being moved to its uppermost position, the swing arm is manoeuvred rotationally around the shaft 17 to take up, while the pendulum device is reaching its uppermost position, a position next to the track - see figure 5. While the pendulum device is in this uppermost position, the secondary arm 22 drags. This results in the tip 16 of the swing arm, and any scraper

or shovel devices 18, being displaced along the track to here interact with at least a part of the waste that is still on the track and move it towards the bottom 10 of the compacting compartment 6 - see figure 6. When the secondary arm reaches its bottom position, the swing arm is turned free from the track (see figure 7) to return to its rest position (as per figure 3). The pendulum device can now execute its next compaction cycle. The interaction between the feeding arrangement and the pendulum device continues until the waste has essentially been moved into the collection container.

[0022] The description above and the figures cited therein are solely intended to give an overview of the present solution for the design of a feeding arrangement. Thus, the solution is not limited solely to the embodiment described above or in the attached patent claims. Indeed, within the idea described in the attached patent claims, several variations or alternative embodiments are possible.

[0023] Thus, the refuse collection vehicle 1 could, for example, be furnished with a compactor 5 located between the driver's cab 3 and the collection container (as per figure 10). Like the embodiment that is described above and in figures 3 - 7, this compactor has a compacting compartment 6 into which the waste is fed via a feeding aperture 7.

[0024] To feed waste into the collection container 4, this alternative refuse collection vehicle 1 has a lifting fork 25 with which a waste container 9 can be lifted above, and emptied via, the feeding aperture 7. The waste that drops from said container into the compacting compartment then moves along a track to a bottom part 10 of the compacting compartment.

[0025] In a second alternative embodiment the refuse collection vehicle 1 is furnished with a compactor 5 between the driver's cab 3 and the collection container (as per figure 11). Like the embodiments that are described above and in figures 3 - 7, this compactor has a compacting compartment 6 into which, via a feeding aperture 7, the waste is fed (as per figure 12).

[0026] To feed waste into the collection container 4, this alternative refuse collection vehicle 1 has a lifting arm 26 with which a waste container 9 can be lifted above, and emptied via, the feeding aperture. The waste that drops from said container into the compacting compartment then moves along a track to a bottom part 10 of the compacting compartment.

[0027] Like the preferred embodiment described above, the compactor 5 in these alternative solutions also has a pendulum device 11 that, with the help of one or more operating devices 12, executes a pendulum movement to move the waste from the compacting compartment 6 to the collection container 4. These solutions are also furnished with the special feeding arrangement 14. This latter is shown more closely in figures 8 and 9 and its function is described with references to figures 3 - 7.

Claims

1. Feeding arrangement (14) especially to be used in a compactor (5) arranged next to a collection container (4) for waste, said compactor (5) having a compacting compartment (6) with a feeding aperture (7) via which it is arranged for the waste from a container (9) to be emptied, whereby the waste is moving along a track towards a bottom (10) of the compacting compartment (6), and a pendulum device (11) is arranged to move the waste on from the compacting compartment (6), via a compacting aperture (13), to the collection container (4) for storing the waste, **characterised in that** the feeding arrangement (14) is arranged essentially opposite to the track in the compacting compartment (6), whereby the feeding arrangement is provided with a swing arm (15) turnable back and forth around a shaft (17) that, in use, is essentially horizontal and is arranged perpendicularly to the working direction of the pendulum device (11), and the swing arm (15) is provided with a tip (16) displaceable relative to said shaft (17), whereby the tip (16) is arranged to adopt a rotational movement in a vertical plane such, that said tip, in its movement back towards the shaft (17), will essentially follow the waste track.
2. Feeding arrangement (14) according to patent claim 1, **characterised in that** the swing arm (15) is arranged on a partition (19) separating the collection container (4) and the compactor (5) from each other.
3. Feeding arrangement (14) according to patent claim 1 or 2, **characterised in that** the swing arm (15) is telescopically extendable.
4. Feeding arrangement (14) according to patent claim 3, **characterised in that** the swing arm (15) comprises a primary arm (21) turnably arranged on a body (20) via the shaft (17), and, a secondary arm (22) telescopically displaceable relative to the primary arm.
5. Feeding arrangement (14) according to patent claim 4, **characterised in that** the movements of the secondary arm (22) are arranged to be regulated by a control device built into the swing arm (15).
6. Feeding arrangement (14) according to patent claim 4 or 5, **characterised in that** the turning of the primary arm (21) is arranged to be regulated by a control device (23) mounted between the body (20) and the primary arm (21).

7. Feeding arrangement (14) according to patent claim 4, 5 or 6, **characterised in that** the swing arm (15) has an angle stay (24) mounted between the body (20) and the primary arm (21). 5
8. Feeding arrangement (14) according to any of the foregoing patent claims, **characterised in that** the swing arm (15) has scraping devices (18) that to be brought into contact with the waste track. 10
9. Feeding method using a feeding arrangement (14) to feed waste into a compactor (5) arranged next to a collection container (4) for waste, whereby the waste from a waste container (9) is emptied, via a feeding aperture (7), into a compacting compartment (6) of the compactor, whereafter 15
said waste is moved along a track towards a bottom (10) of the compacting compartment (6), and a pendulum device (11) moves the waste on from the compacting compartment (6), via a compacting 20
aperture (13), to the collection container (4) to be stored,
characterised in that
the feeding arrangement (14) is arranged essentially opposite to the track in the compacting compartment 25
(6), whereby
said feeding arrangement is provided with a swing arm (15) and a swing arm tip (16) thereof is arranged during use to be turnable around an essentially horizontal shaft (17) arranged perpendicularly to the 30
working direction of the pendulum device (11), said swing arm tip (16) such, that
the swing arm tip (16) is arranged to be displaceable relative said shaft, whereby
the tip (16) is made to rotate in a vertical plane so 35
that said tip, in its movement back towards the shaft (17), essentially follows the waste track.
10. Method according to patent claim 9, **characterised in that** the swing arm (15), during its rotation, is adjusted telescopically. 40

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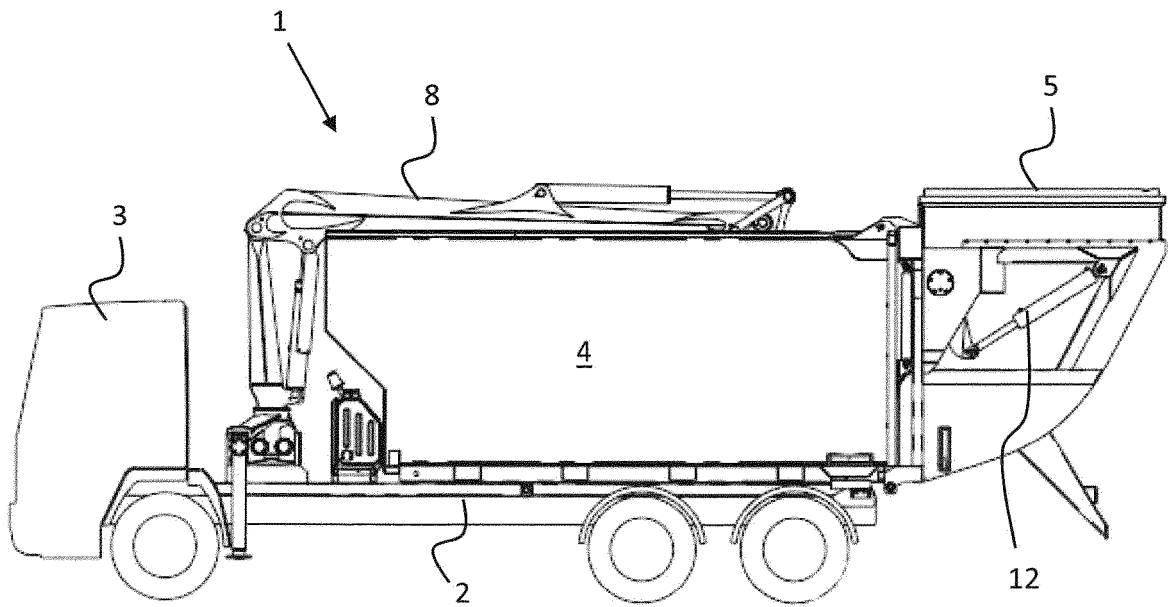


FIG. 1

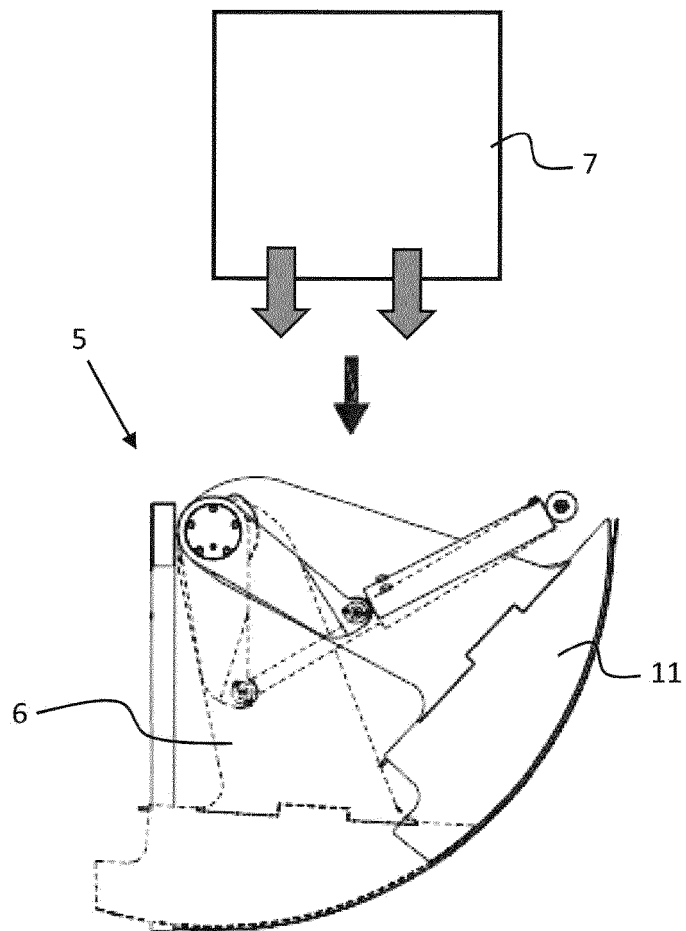
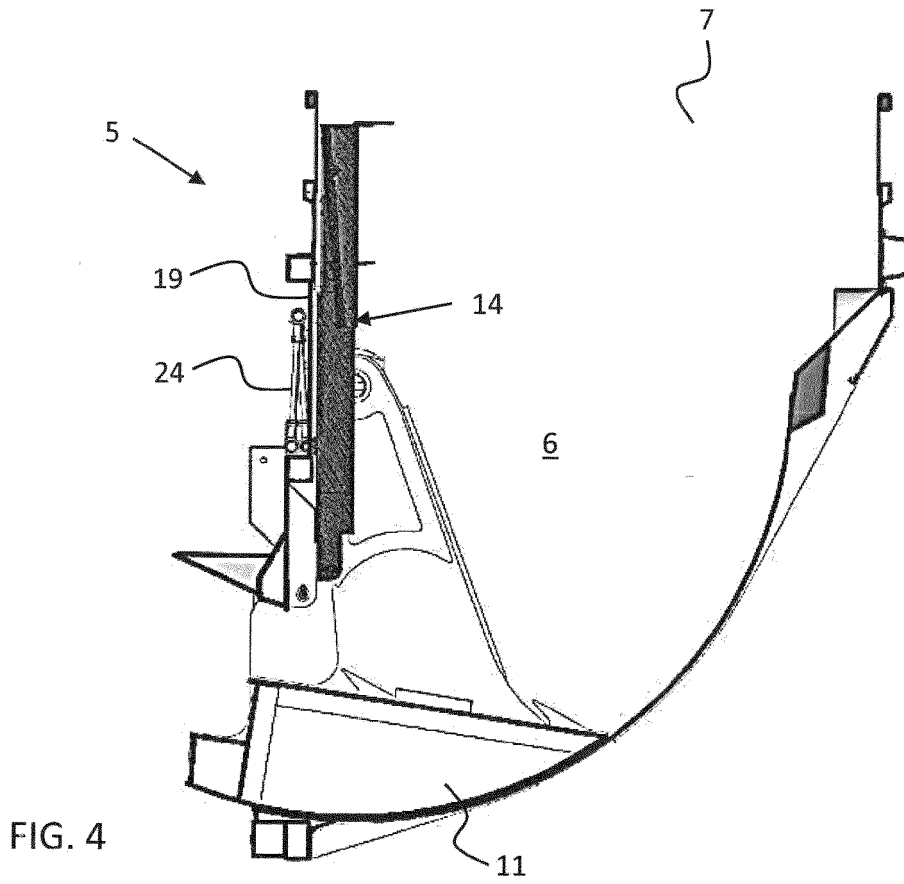
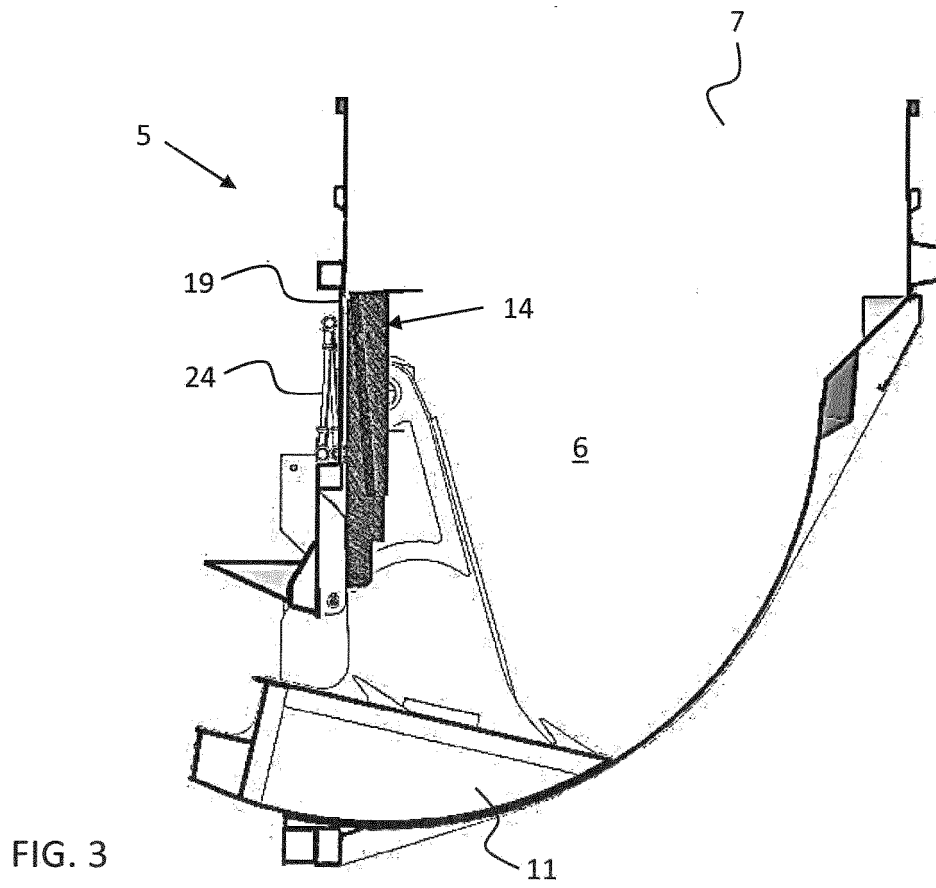


FIG. 2



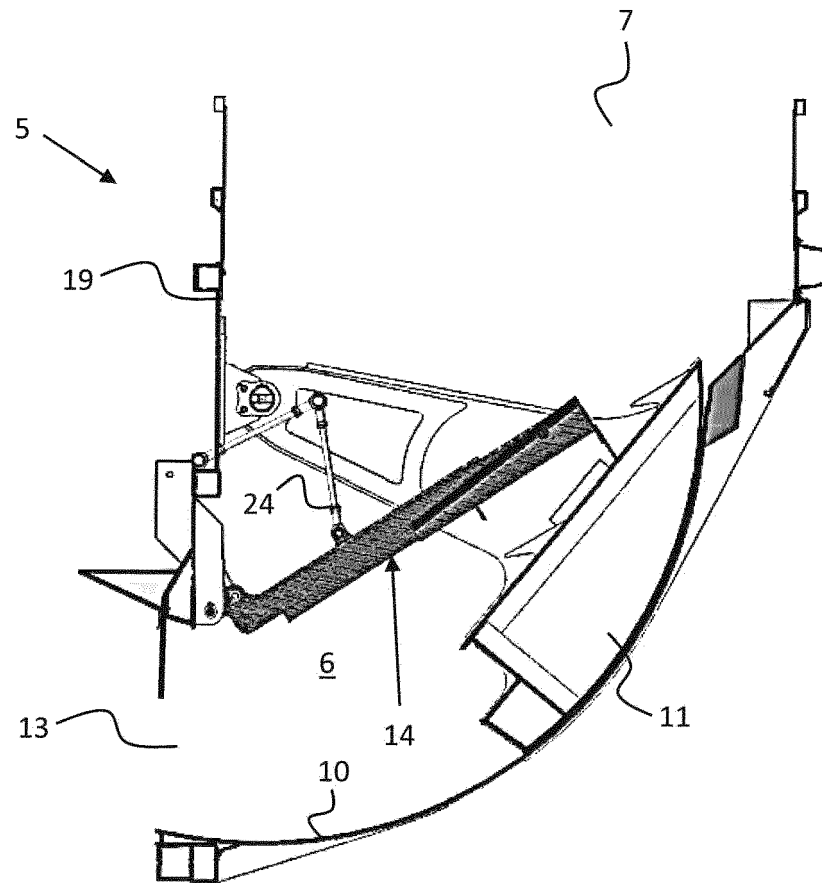


FIG. 5

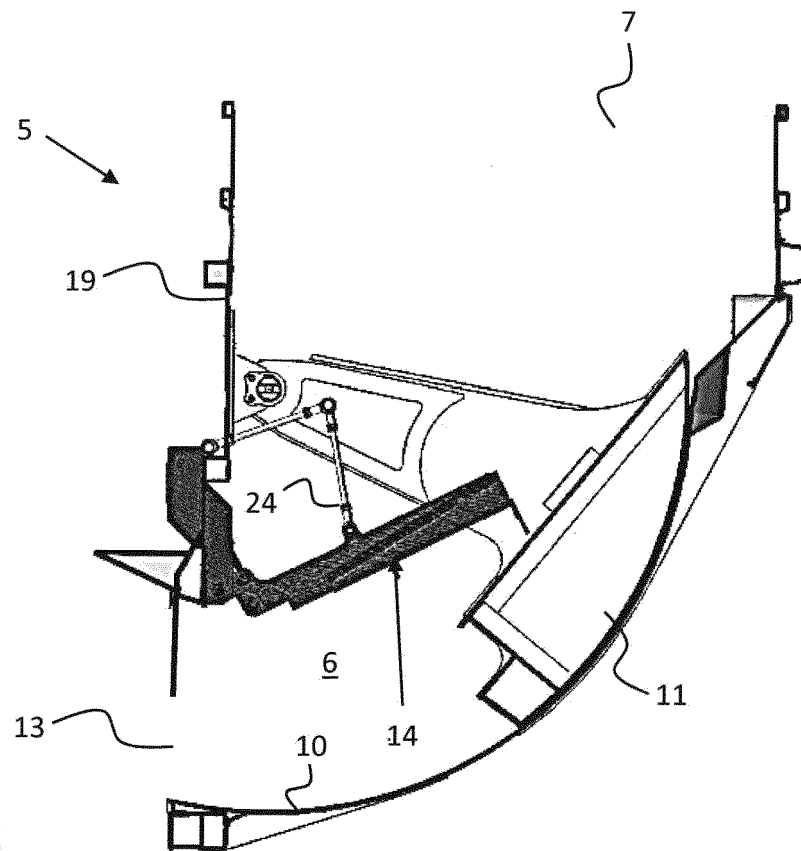
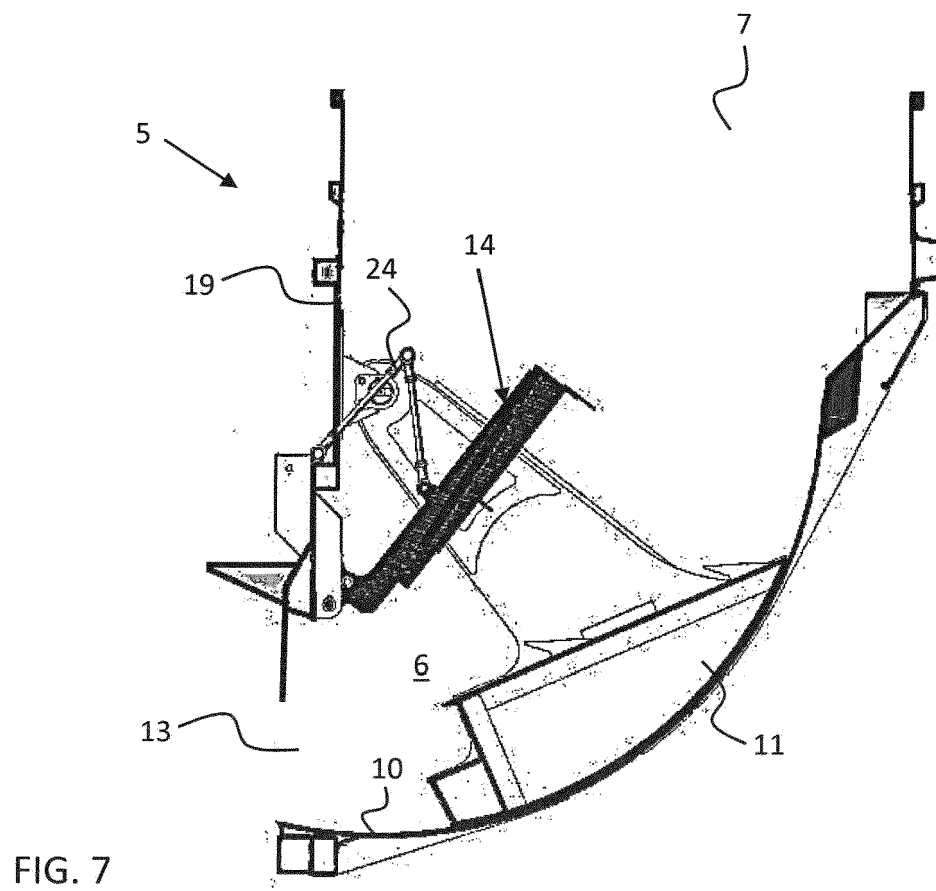
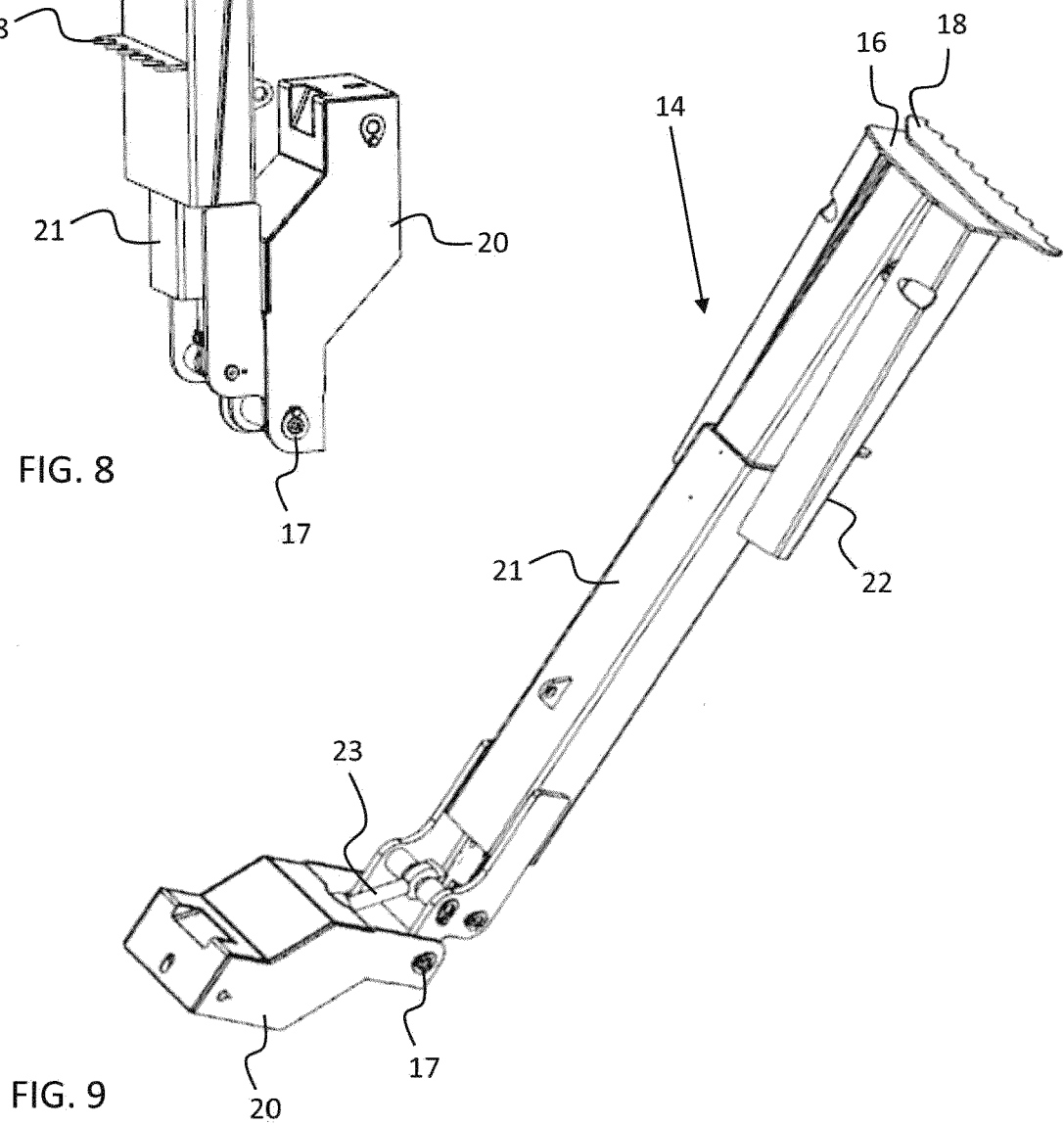
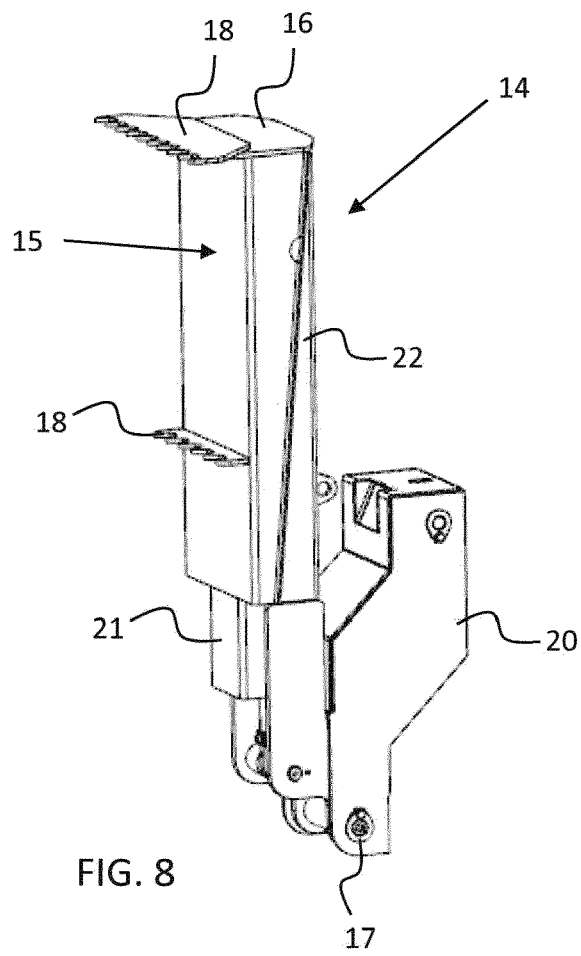


FIG. 6





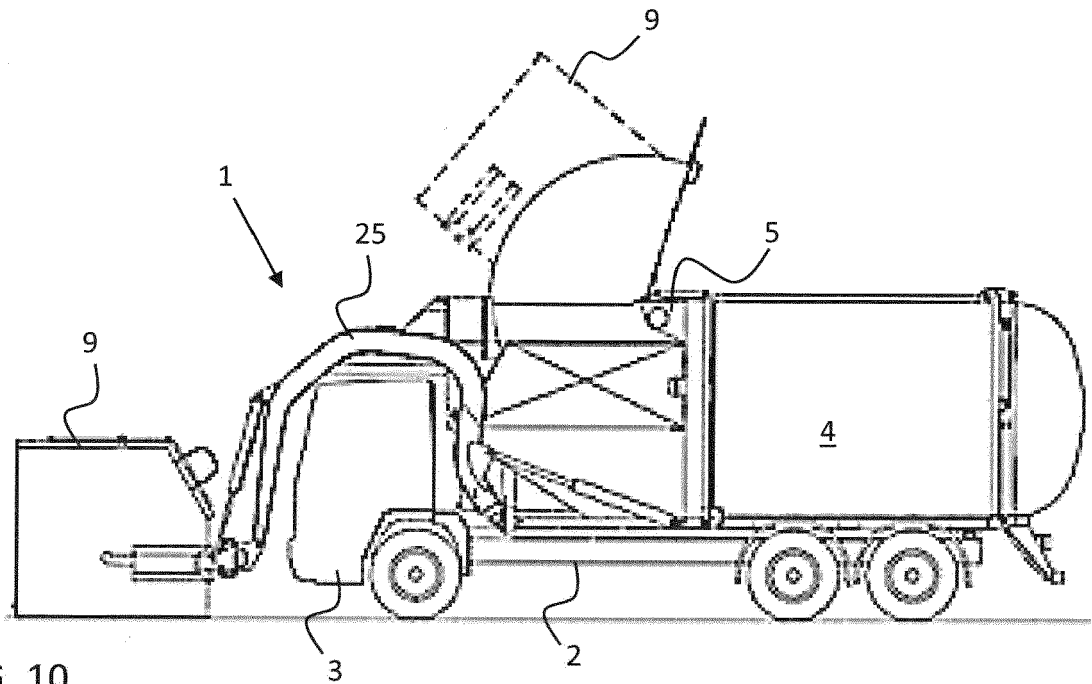


FIG. 10

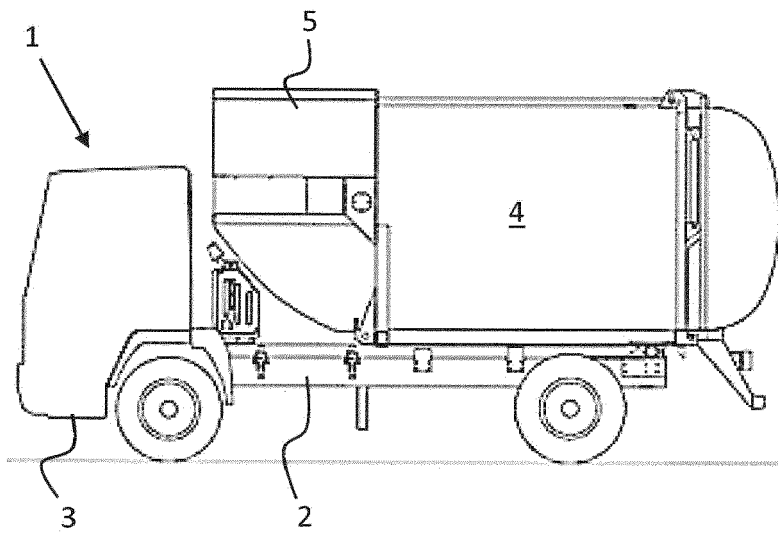


FIG. 11

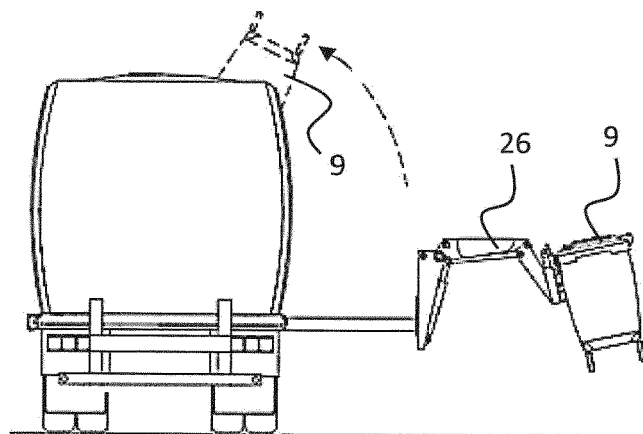


FIG. 12



EUROPEAN SEARCH REPORT

Application Number
EP 18 18 1972

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2003/202870 A1 (HUANG SIMON [CA]) 30 October 2003 (2003-10-30) * abstract; figures * * paragraph [0027] * -----	1-10	INV. B65F3/20
A	NL 7 805 936 A (BERNARD AVERMANN MASCHINENFABR) 4 December 1979 (1979-12-04) * figures 1-3 * -----	1-10	
A	US 5 015 144 A (SMITH FRED T [US] ET AL) 14 May 1991 (1991-05-14) * column 4, line 45 - column 7, line 4; figures 5-7 * -----	1-10	
X	EP 0 514 355 A1 (FARID SPA [IT]) 19 November 1992 (1992-11-19) * column 3, line 8 - column 4, line 31; figures * -----	1-8	
A		9,10	
X	EP 0 659 659 A1 (C E B COSTRUZIONI ECOLOGICHE B [IT]) 28 June 1995 (1995-06-28) * column 2, line 42 - column 3, line 25; figure 1 * -----	1-8	TECHNICAL FIELDS SEARCHED (IPC)
A		9,10	B65F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 November 2018	Examiner Serrano Galarraga, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document 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			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 18 1972

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003202870 A1	30-10-2003	CA 2386021 A1 US 2003202870 A1	30-10-2003 30-10-2003
NL 7805936 A	04-12-1979	NONE	
US 5015144 A	14-05-1991	NONE	
EP 0514355 A1	19-11-1992	AT 115502 T CZ 9201436 A3 DE 69200896 D1 EP 0514355 A1 IE 921522 A1 IT 1245546 B NO 921865 A PL 294527 A1	15-12-1994 13-04-1994 26-01-1995 19-11-1992 18-11-1992 29-09-1994 16-11-1992 08-02-1993
EP 0659659 A1	28-06-1995	EP 0659659 A1 IT 1265431 B1	28-06-1995 22-11-1996

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 5015144 A [0004]
- CN 104890279 [0004]
- EP 2524879 A [0004]
- US 20070122258 A [0004]
- NL 7805936 [0004]