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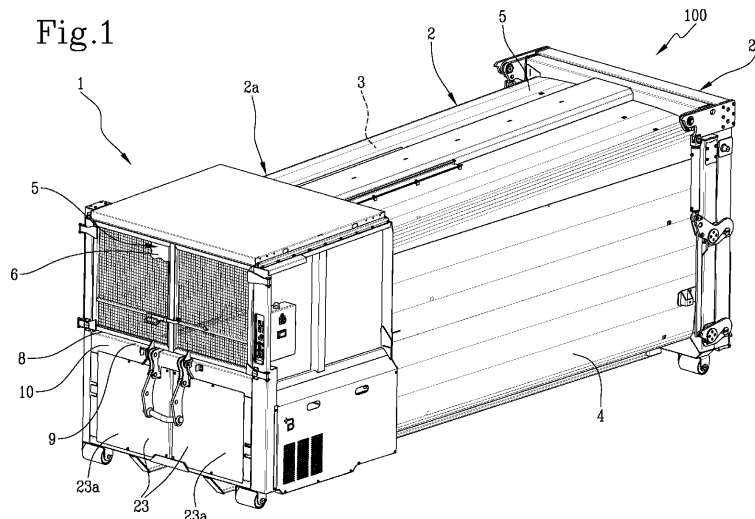
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(54) **COMPACTING UNIT COUPLABLE TO CONTAINERS FOR THE COLLECTION OF MATERIALS, AND COMPACTING CONTAINER EQUIPPED WITH SAID COMPACTING UNIT**

(57) A compacting container (100) is equipped with a compacting unit (1) comprising a transfer chamber (11) placed at the base of a loading hopper (6) and communicating with an accumulation environment (3) through a transfer opening (12). A pusher (14) movable alternately in the transfer chamber (11) transfers material from the loading hopper (6) through the transfer opening (12). A movement mechanism (21) of the pusher (14) is operationally housed in a service chamber (20) having a front

opening (22) closable by at least one door (23) and an evacuation opening (24) at the bottom communicating with the outside, and a sliding shutter (25) movable between a rest position in which it is inserted into the service chamber (20) to close the evacuation opening (24), and an extracted position in which it protrudes through the front opening (22) and frees a passage from the service chamber (20) through the evacuation opening (24).

Fig.1

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Description

[0001] The present invention concerns a compacting unit couplable to containers for collecting materials. The invention also relates to a container for collecting materials, equipped with said compacting unit.

[0002] The subject matter of the present invention is particularly aimed at the waste disposal sector, and in particular the separate collection of waste with the aid of roll-off containers equipped with a compacting system.

[0003] For the purpose of waste collection, the use of roll-off containers is known. These are placed at the recycling areas or other collection sites and are suitable for receiving waste delivered by citizens and/or collection personnel.

[0004] Such containers can be equipped with a compacting unit which, with the help of a pusher, acts on the waste accumulated at the bottom of a loading chamber to push it into a storage compartment where the waste is compacted in order to increase the loading capacity. Containers set up in this way are also commonly referred to as "roll-off compactors".

[0005] The pusher is moved alternately by hydraulic actuators or other movement mechanisms housed within a service chamber at the base of the compacting unit, between a rearward position within the service chamber, and an forward position in the direction of the storage chamber defined within the container. When the pusher is in the rear position, the waste poured into a feed hopper is free to fall into the loading chamber; when the pusher moves to the forward position, the waste accumulated in the loading chamber is transferred into the storage chamber through a transfer opening in a partition wall that delimits the storage chamber from the hopper and the loading chamber.

[0006] One problem typically encountered with the use of compacting units is that, due to the mechanical play inevitably present between the pusher and the surrounding fixed parts, the uncontrolled passage of some materials from the loading chamber to the service chamber occasionally occurs during the pusher's forward and return movements. After a certain period of operation, a considerable amount of material can accumulate in the service compartment, which could impair the smooth operation of the movement mechanism. It is therefore necessary to intervene periodically inside the service compartment to remove undesirable accumulated materials. Since, for safety reasons, the service compartment must be closed off from the outside environment, the only possibility of access is typically a front opening normally closed by at least one door that can only be opened by authorised maintenance personnel, equipped with a special key. By means of a control system supported by microswitches or equivalent sensors operating on the door, the opening of the door automatically disables the operation of the movement mechanism, thus allowing safe access to the service compartment to remove accumulated material.

[0007] However, the applicant found that this single access possibility makes the removal of materials rather difficult, as they often accumulate in cramped spaces behind and below the various parts of the movement mechanism or in other areas of the service compartment that are difficult to reach from the front opening.

[0008] The aim of the present invention is to overcome the limits of the prior art. In particular, the applicant has identified the possibility of significantly facilitating the removal of materials accumulated inside the service compartment, without penalising safety levels in relation to the accessibility of the latter, and without entailing significant increases in production costs, by arranging on the bottom surface of the compartment itself a shutter that can be opened after the opening of the door that closes the front opening.

[0009] More particularly, it is an object of the present invention to provide a compacting unit couplable containers for the collection of materials, according to claim 1.

[0010] In a further aspect, a compacting container, equipped with the aforementioned compacting device, forms the subject matter of the invention.

[0011] In at least one of the above aspects, a convenient embodiment of the invention also comprises one or more of the preferential features listed below:

said sliding pusher operates along a bottom surface of the transfer chamber;

the pusher comprises a thrust bulkhead perimetrically bounded by a lower horizontal edge, an upper horizontal edge and two vertical edges arranged in correspondence with respective internal lateral surfaces of the transfer chamber;

the service chamber is defined behind said thrust bulkhead, underneath a conveyor chute forming part of the loading hopper and converging towards the transfer chamber;

the bottom horizontal edge slides on a bottom surface of the transfer chamber;

a shielding bulkhead extends from the upper horizontal edge away from the transfer opening and slides under the lower edge of the conveyor chute; the internal lateral surfaces of the transfer chamber carry respective sliding guides that guide the movement of the pusher towards and away from the transfer opening;

said at least one door is movable between a closed condition in which it extends transversely to a movement path of the shutter to prevent sliding of the latter towards the extracted position, and an open condition in which it enables access to the service chamber through the front opening and frees the movement of the shutter towards the extracted position; control devices are also provided to disable the operation of the compacting mechanism when said at least one door is not in the closed condition; there are also one or more sliders carried laterally by the shutter and slidingly engaged along respec-

tive guides fixed to the internal walls of the service chamber;
 devices are also provided to stop the sliding shutter in the extracted position;
 these stop devices include mechanical stops arranged between the sliding shutter and at least one fixed part of the service chamber;
 the stop devices comprise mechanical stop elements integral to the shutter and designed to act against stop seats carried by a crossbar extending into the service chamber.

[0012] Further features and advantages will appear more clearly from the detailed description of a preferred, but not exclusive, embodiment of a compacting unit that can be associated with containers for the collection of materials, and a compacting container equipped with said compacting unit, in accordance with the present invention. Such description will be set forth herein below with reference to the accompanying drawings, provided for merely indicative and therefore non-limiting purposes, wherein:

- figure 1 shows a perspective view of a compacting container equipped with a compacting unit according to the present invention;
- figure 2 shows an enlarged detail of figure 1, sectioned along a longitudinal plane, with the pusher in a forward position;
- figure 3 shows the detail of figure 2 from a different perspective angle;
- figure 4 shows the detail of figure 2 in a condition where the door is open and the sliding shutter is pulled out to facilitate the removal of materials from the service compartment, with the pusher in the rear position;
- figure 5 shows the detail in figure 4 from a different perspective angle.

[0013] With reference to the above-mentioned figures, a roll-off container 1 for the collection of materials, equipped with a compacting unit in accordance with the present invention, is collectively referred to as 100.

[0014] The container 100 comprises a substantially parallelepiped-shaped containment box 2, extending longitudinally between one of its front ends and one of its rear ends, and having internally at least one storage compartment 3 laterally bounded between a pair of vertical walls 4, respectively right and left, and a pair of horizontal walls 5, respectively upper and lower, extending parallel to a longitudinal direction.

[0015] The compacting unit 1 is suitable for installation at one of said front end 2a and rear end 2b, more precisely at the front end 2a in the example shown. The compacting unit 1 has a loading hopper 6 into which the material to be treated is conveyed, e.g. waste delivered by citizens and/or collection service personnel, either manually and/or by tipping a container of a service vehicle.

[0016] In the example illustrated, the loading hopper 6, which is accessible through one or more access doors 8, is bounded at the bottom by an access sill 9 arranged at a front wall 10. In addition or as an alternative, the loading hopper 6 can be accessed directly from above.

[0017] At the base of the loading hopper 6 there is a transfer chamber 11 (figures 4 and 5) which, through a transfer opening 12 provided in a partition wall 13, communicates with the storage compartment 3 or other storage environment.

[0018] A pusher 14 sliding in alternating motion along a bottom surface 15 of the transfer chamber 11 operates in the transfer chamber 11 to push and transfer through the transfer opening 12 the material coming from the loading hopper 6.

[0019] The pusher 14 comprises a thrust bulkhead 16 perimetrically bounded by two horizontal edges, lower and upper respectively, extending between two vertical edges arranged at the respective inner side surfaces 11a of the transfer chamber 11. The bottom horizontal edge slides on the bottom surface 15 of the transfer chamber 11. From the upper horizontal edge of the thrust bulkhead 16, parallel to the bottom surface 15 and away from the transfer opening 12, at least one shielding bulkhead 17 extends sliding immediately under a lower edge 18a of a conveyor chute 18 forming part of the loading hopper 6 and converging towards the transfer chamber 11. The internal lateral surfaces 11a of the transfer chamber 11 carry respective sliding guides 19 which guide the movement of the pusher 14 to and from the transfer opening 12.

[0020] Behind the thrust bulkhead 16, i.e. on the opposite side of the transfer opening 12 and below the conveyor chute 18, a service chamber 20 is defined housing a movement mechanism 21 of the pusher 14. In the example illustrated, the movement mechanism 21 comprises two hydraulic actuators (of which only one is visible in the drawings) arranged in a respectively crossed orientation.

[0021] Upon the action of the movement mechanism 21, the pusher 14 is alternately moved between a backward or loading position (figures 4 and 5) and a forward or transfer position (figures 2 and 3). In the loading position, the pusher 14 is moved away from the transfer opening 12, preferably with its upper horizontal edge positioned below the lower edge 18a of the conveyor chute 18, so as to maximise the fall of material from the hopper to the transfer chamber 11. In the transfer position, the pusher 14 is moved towards the loading chamber 3 or other accumulation environment, so that the material previously collected in the transfer chamber 11 is pushed through the transfer opening 12. More specifically, it is preferable that in the transfer position the upper horizontal edge of the pusher 14 is placed at or slightly beyond the transfer opening 12 to maximise material transfer. In the transfer position, the shielding bulkhead 17 retains the material coming from the hopper, preventing it from falling behind the thrust bulkhead 16.

[0022] To permit periodic maintenance and/or repair

work, the service chamber 20 is accessible from the outside through a front opening 22 normally closed by at least one door 23. In the example illustrated, the door 23 comprises two leaves 23a, hinged to the respectively opposite vertical sides of the front opening 22 and each movable with an angular rotation outwards from the service chamber 20, between a closed position in which, as illustrated in figures 1 to 3, it extends parallel to the front wall to close the access to the service chamber 20, and an open position in which it enables access to the service chamber 20 through the front opening 22 as visible in figures 4 and 5.

[0023] During operation, it may happen that some fragments of material, for example sheets of card or other layered or small material, get stuck between the perimeter edges of the thrust bulkhead 16 and the internal lateral surfaces 11a of the transfer chamber 11, and/or between the lower edge 18a of the chute 18 and the pusher 14, and/or below the latter, so as to invade the service chamber 20 and become trapped therein. Since the lowered positioning and the dimensions of the front opening 22 do not allow easy access to all the internal spaces of the service chamber 20, especially when the container 100 is positioned on the ground, in order to facilitate the periodic removal of said fragments, the service chamber 20 is conveniently provided with at least one evacuation opening 24 at the bottom in communication with the external environment. The evacuation opening 24 is normally closed by a sliding shutter 25, which can be positioned between a rest position in which, as shown in figures 2 and 3, it is inserted into the service chamber 20 to close the evacuation opening 24, and an extracted position in which, as shown in figures 4 and 5, it protrudes through the front opening 22. In the rest position, the sliding shutter 25 adequately isolates the service chamber 20 from the outside environment, so as to hinder the entry of animals and/or prevent access by unauthorised persons. In the extracted position, any fragments of material accumulated on the sliding shutter 25 are immediately exposed to the outside and/or near the front opening 22, so that they can be easily collected. At the same time, the passage through the evacuation opening 24 is cleared to facilitate the extraction of foreign material accidentally accumulated inside the service chamber 20. Such material may spontaneously fall to the ground following the movement of the sliding shutter 25 into the extracted position, or be easily reached and picked up at the same time as the container 100 is lifted off the ground, e.g. after or while loading it onto a transport vehicle.

[0024] When the leaves 23a of the door 23 are in the closed condition, the sliding shutter 25 is advantageously concealed within service chamber 20, while the door 23 extends transversely to the movement path of the shutter itself so as to prevent it from sliding in the extracted position. Unauthorised access to the service chamber 20 is thus effectively prevented when the door 23 is in the closed condition. Movement of the sliding shutter 25 in

the extracted position and access to the service chamber 20 can only be enabled after positioning the door 23 in the open condition, which can only be done with the aid of special keys supplied exclusively to authorised service personnel.

[0025] Suitable control devices, comprising, for example, one or more microswitches not illustrated, operatively arranged at the front opening 22 and interacting with the doors 23a, disable the operation of the movement mechanism 21 when the door 23 is not in the closed condition, so as to permit access to the service chamber 20 in safe conditions.

[0026] In the example illustrated, the mobility of the sliding shutter 25 is facilitated by small wheels, sliding rollers or similar sliders 26, carried laterally by the shutter itself and sliding along respective guides 27 fixed to internal lateral walls of the service chamber 20, arranged in continuation of the internal lateral surfaces 11 a of the transfer chamber 11.

[0027] Appropriate mechanical stops or equivalent stopping devices 28 (figure 5) can be provided between the sliding shutter 25 and one or more fixed parts of the service chamber 20, in order to stop the sliding of the shutter into the extracted position. In the example illustrated, these stop devices 28 comprise mechanical stop elements integral with the sliding shutter 25 and arranged to act against stop seats carried by a crossbar 29 extending into the service chamber 20. Intentional accidental removal of the shutter from the service chamber 20 is thus prevented.

Claims

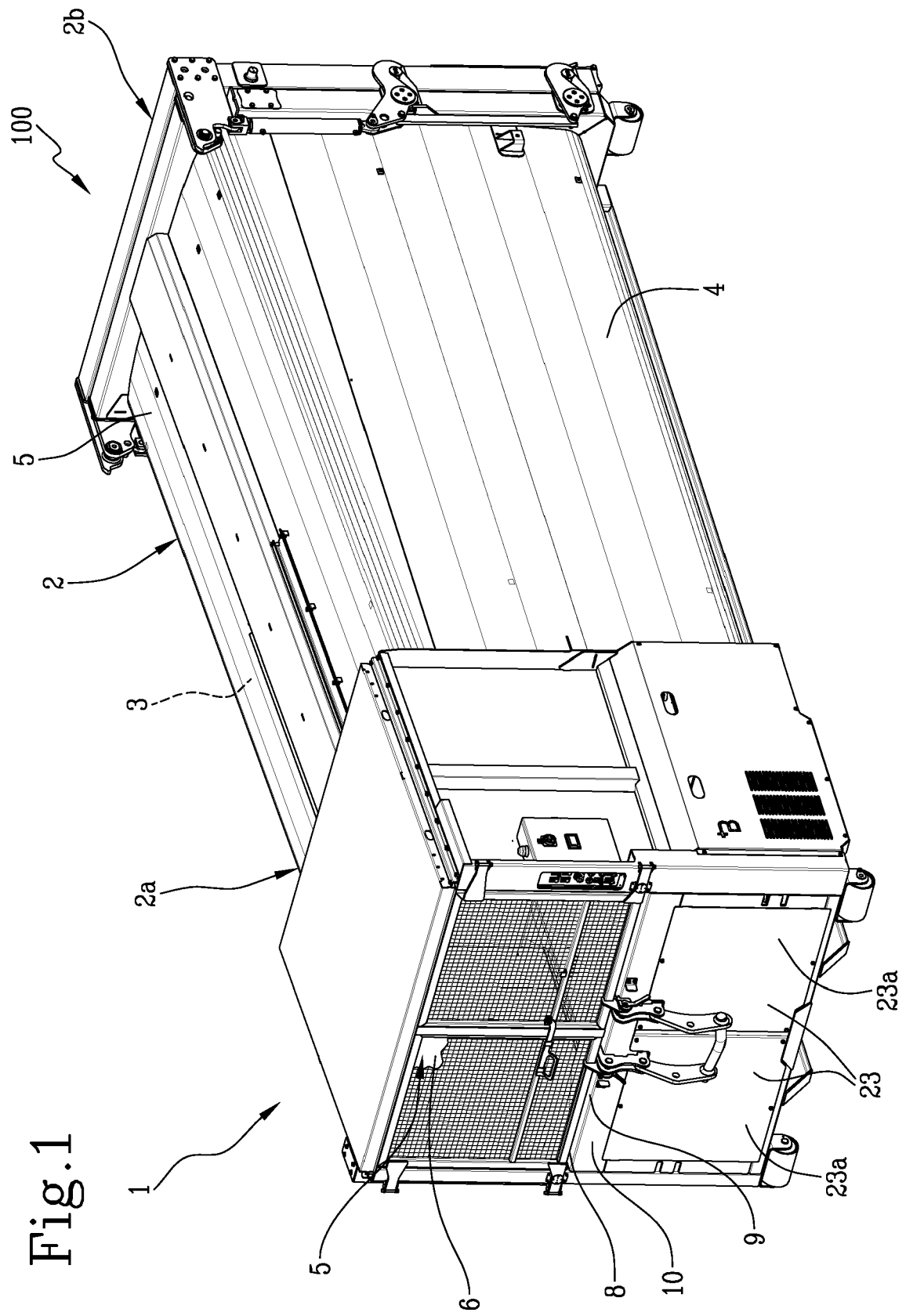
1. Compacting unit couplable to containers for the collection of materials, comprising:

a transfer chamber (11) placed underneath a loading hopper (6) and communicating with an accumulation environment (3) through a transfer opening (12);

a pusher (14) movable alternately in the transfer chamber (11) to transfer material from the loading hopper (6) through the transfer opening (12); a movement mechanism (21) of the pusher (14), operationally housed in a service room (20) having a front opening (22) closable by at least one door (23);

wherein the service room (20) has at least one evacuation opening (24) at the bottom communicating with the outside, and a sliding shutter (25) movable between a rest position in which it is inserted in the service room (20) to close the evacuation opening (24), and an extracted position in which it protrudes through the front opening (22) and frees a passage from the service chamber (20) through the evacuation opening (24).

2. Compacting unit according to claim 1, wherein the pusher (14) comprises a thrust bulkhead (16) perimetrically bounded by a lower horizontal edge, an upper horizontal edge and two vertical edges arranged in correspondence with respective internal lateral surfaces (11a) of the transfer chamber (11). 5
3. Compacting unit according to claim 1, or 2 wherein the service room (20) is defined behind said thrust bulkhead (16), underneath a conveyor chute (18) forming part of the loading hopper (6) and converging towards the transfer chamber (11). 10
4. Compacting unit according to claim 3, wherein from the upper horizontal edge of the thrust bulkhead (16) a shielding partition (17) extends away from the transfer opening (12), which shielding partition (17) slides under the lower edge (18a) of the conveyor chute (18). 15
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5. Compacting unit according to one or more of the preceding claims, wherein said at least one door (23) is movable between a closed condition in which it extends transversely to a movement path of the sliding shutter (25) to prevent sliding of the latter towards the extracted position, and an open condition in which it enables access to the service room (20) through the front opening (22) and frees the movement of the sliding shutter (25) towards the extracted position. 25
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6. Compacting unit according to one or more of the preceding claims, further comprising control devices for disabling operation of the movement mechanism (21) when said at least one door (23) is not in the closed condition. 35
7. Compacting unit according to one or more of the preceding claims, further comprising one or more sliders (26) carried laterally by the sliding shutter (25) and slidingly engaged along respective guides (27) fixed to the internal walls of the service room (20). 40
8. Compacting unit according to one or more of the preceding claims, further comprising stop devices (28) of the sliding shutter (25) in the extracted position. 45
9. Compacting unit according to claim 8, wherein said stop devices (28) comprise mechanical stops arranged between the sliding shutter (25) and at least a fixed part of the service chamber (20). 50
10. Compacting container, comprising a compacting unit (1) according to one or more of the preceding claims. 55



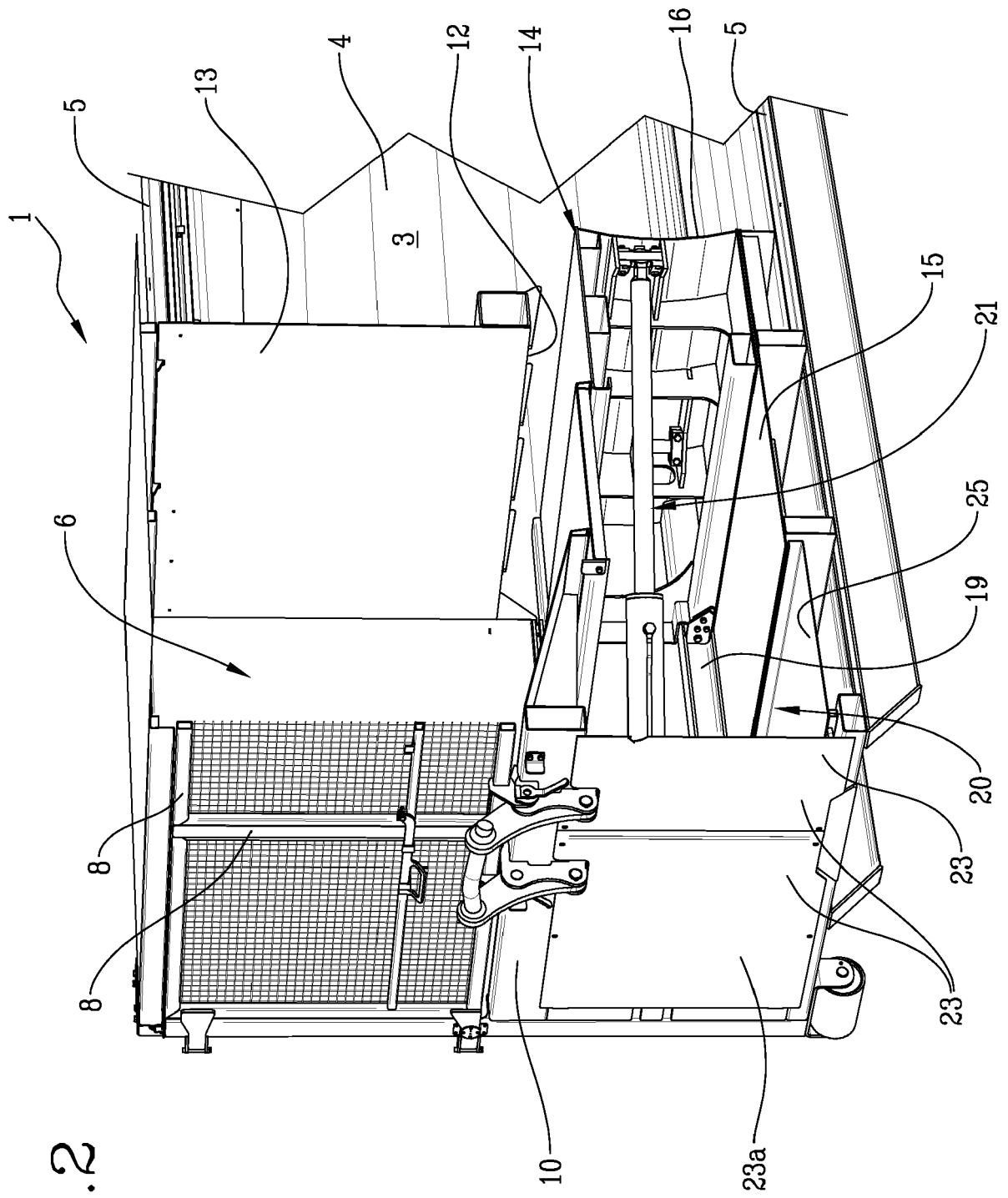
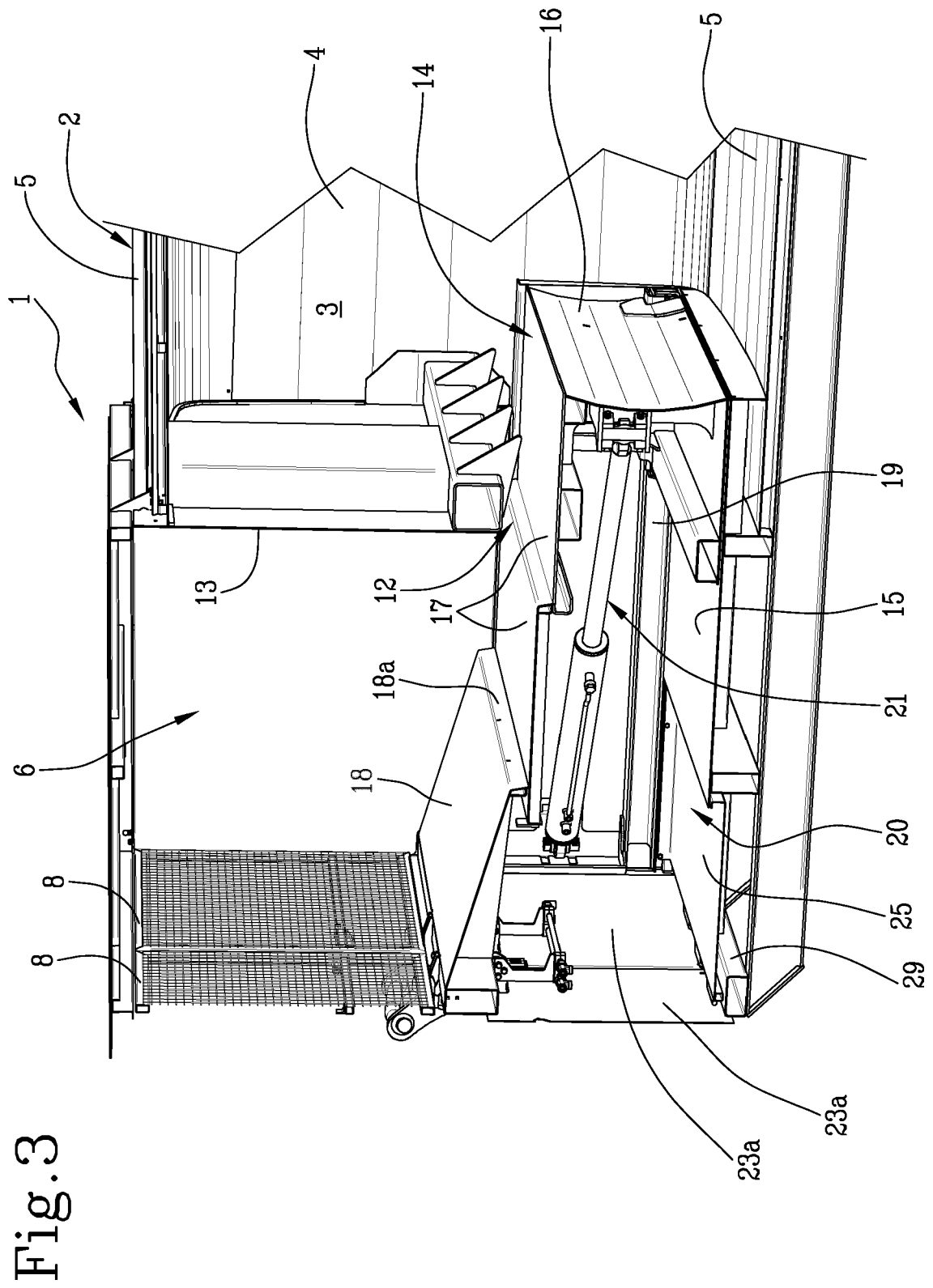
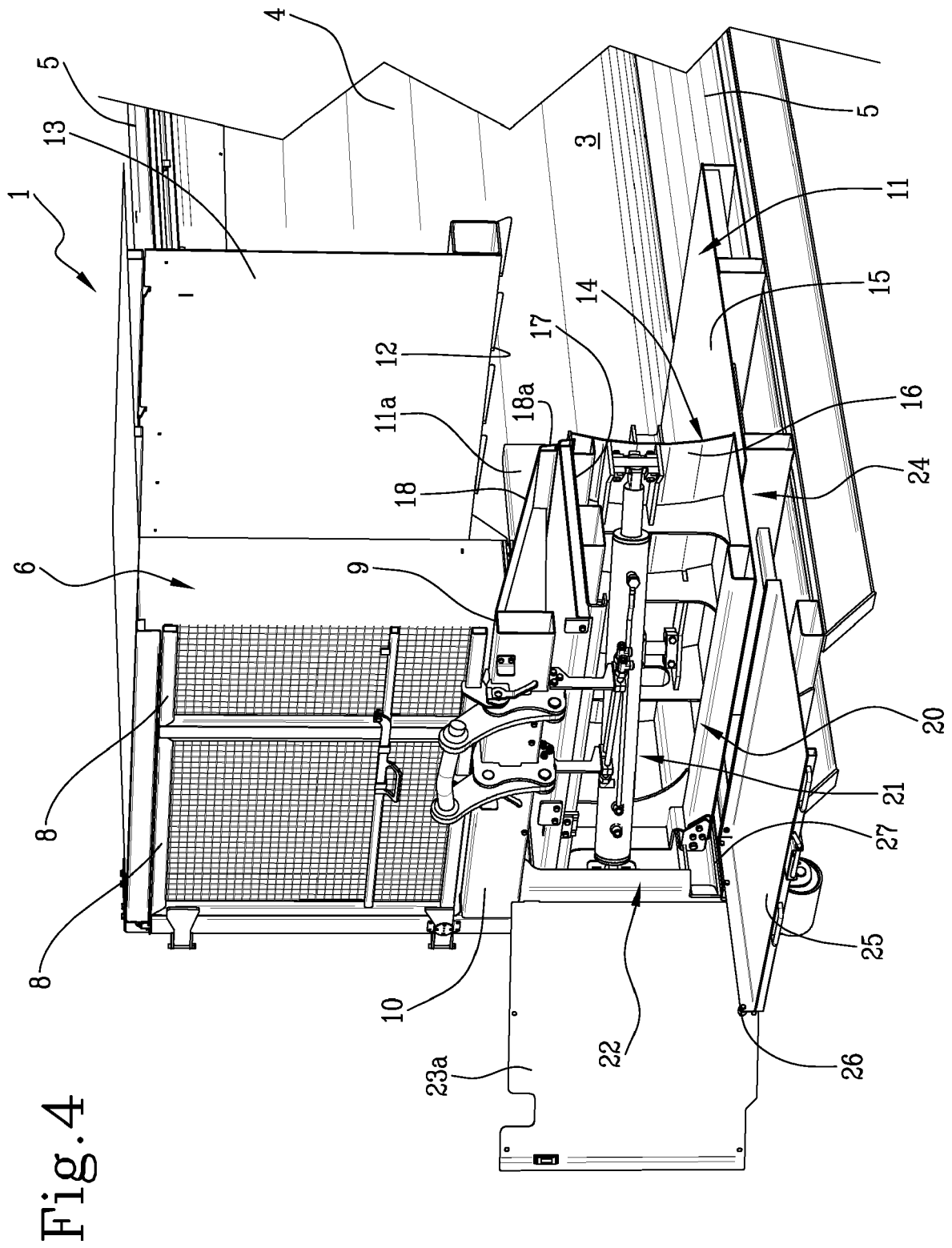


Fig. 2





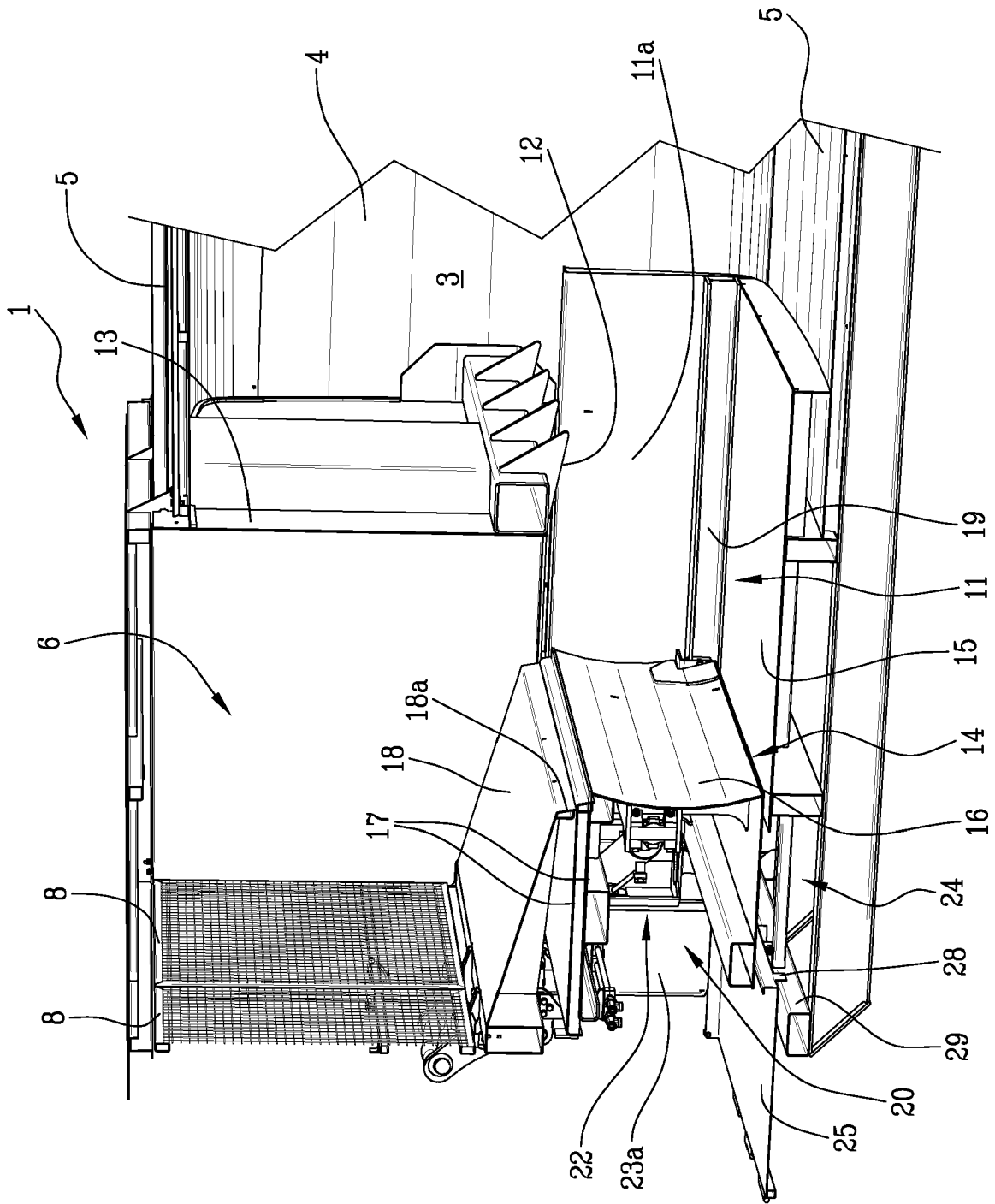


Fig. 5



EUROPEAN SEARCH REPORT

Application Number

EP 23 17 3102

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EPO FORM 1503 03.82 (P04C01)

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			TECHNICAL FIELDS SEARCHED (IPC)
			B30B B65F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 9 October 2023	Examiner de Miscault, Xavier
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09-10-2023

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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