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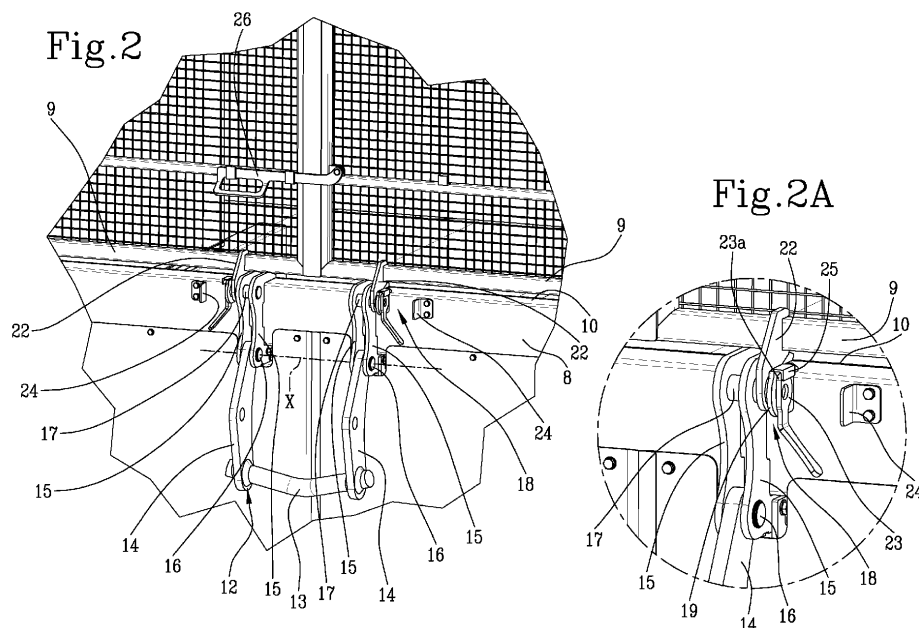
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(54) **ROLL-OFF CONTAINER FOR THE COLLECTION OF MATERIALS**

(57) The container (1) has a loading chamber (6) having an inlet opening (7) downwardly bounded by an access threshold (10). Access doors (9) to the loading chamber (6) are each movable between an open position and a closed position. A loading/unloading hook (12) is rotatably engaged near the access threshold (10). At least one locking pin (17) is slidably insertable through a restrain bracket (15) and the hook (12) to hold it in working

position. Locking devices (18) of the door comprise at least one guide plate (19) of the locking pin (17) and an auxiliary bracket (22) projecting from the lower part of the door and insertable in an admittance space (21) defined between the guide plate (19) and the restrain bracket (15), to be engaged by the locking pin (17) in the insertion position.



Description

[0001] The present invention relates to a roll-off container for the collection of materials. The object of the present invention is particularly addressed to the field of waste disposal, and in particular to the separate collection thereof with the aid of roll-off containers, preferably equipped with a compaction system.

[0002] For the purpose of waste collection, the use of roll-off containers is known which, positioned in the recycling islands or at other collection sites, are suitable to receive the waste delivered by the citizens and/or by the personnel in charge of the collection service. These containers can be equipped with a compaction system which, with the aid of pushers normally moved by hydraulic actuators, are suitable to act on the waste accumulated on the bottom of a loading chamber placed at one of the longitudinal ends of the container itself, to push it into a storage chamber in which the waste is compacted so as to increase the loading capacity. Containers thus equipped are also commonly referred to as "roll-off compactors".

[0003] After filling, the container is suitable to be hoisted onto the flatbed of a motor vehicle for the purpose of transporting the waste to other treatment sites. To this end, a loading/unloading hook is arranged at one front side of the container, structured and positioned so as to be suitable for the engagement by a mechanical arm or other loading device installed on the motor vehicle used for the transport.

[0004] In many applications, it is required that the loading/unloading hook can be folded down to free the space in front of the front wall of the container, so as to facilitate access to the loading chamber after a possible opening of access doors arranged on the front wall itself and hinged near the opposite sides of the container, respectively. To this end, the loading/unloading hook is rotatably hinged with respect to the front wall of the roll-off container, below the access threshold of the loading chamber, so that it can be moved, with a rotation around its own horizontal fulcrum axis, between a rest position in which it is lowered, and a working position in which it is raised. In the rest position, the loading/unloading hook extends vertically below the access threshold of the loading chamber, freeing the space in front of the inlet opening to the chamber itself, so as not to be an obstacle to the access thereto and/or to the introduction of waste. When the container is to be loaded onto a motor vehicle, the loading/unloading hook is manually brought and locked into the working position, where it protrudes from the front wall above the access threshold. A pair of locking pins, each slidably engaged through a respective restrain bracket projecting from the front wall near the access threshold, are suitable to be manually moved between an insertion position in which they are engaged through respective seats arranged in the arms of the loading/unloading hook, to lock the positioning thereof in the working position and/or in the rest position, and an extraction po-

sition in which they are axially extracted from the respective seats to free the movement of the loading/unloading hook.

[0005] When the loading/unloading hook is in the rest position, the access doors are suitable to be opened towards the outside of the container, in order to allow access to the loading chamber. The fixing of the doors in the closed position is ensured by means of bolts installed on each of the same doors and arranged to be inserted in respective locking seats carried by the front wall near the access threshold.

[0006] The Applicant has observed that the manual intervention on these bolts for the purpose of opening and closing the doors is often quite difficult, especially when a prolonged exposure to atmospheric agents causes the formation of oxides and fouling between the moving parts. The use of suitable materials and surface treatments in the construction of the bolts and of the parts cooperating with them also entails a significant increase in the production costs.

[0007] The presence of numerous movable parts necessary to ensure the fixing of the doors in the closed position and the fixing of the loading/unloading hook in the working position leads to further drawbacks related to structural complications, increased costs, and manoeuvring complications. The presence of several movable parts subject to wear and exposed to the atmospheric agents further results in a reduction in the durability of the system and its operating reliability over time.

[0008] Aim of the present invention is to overcome the limitations of the prior art, by proposing a simplified system that allows the opening and closing state of the doors and the operating and rest state of the loading/unloading hook to be managed with a reduced number of movable components.

[0009] In this regard, the Applicant has observed that the need to open the doors occurs only when the container is positioned on the ground with the loading/unloading hook in the rest position. It is therefore considered useful and convenient to ensure the locking of the doors in the closed position in conjunction with the locking of the loading/unloading hook in the raised position, in order to avoid the risk of abnormal openings of the doors during the container loading/unloading manoeuvres. In the state of the art, in fact, a failure to fix the bolts, due to forgetfulness, negligence or due to a malfunction, could lead to unwanted openings of the doors during the loading/unloading operations and/or during the transport of the container.

[0010] In accordance with the present invention, a roll-off container for the collection of materials is proposed], comprising: a substantially parallelepiped containment box, extending longitudinally between an its front end and an its rear end; a loading chamber defined at one of said front and rear ends, having an inlet opening made in a front wall of the containment box and downwardly bounded by an access threshold; at least one access door arranged in correspondence with the loading cham-

ber and movable between an open position in which it enables access to the loading chamber through the inlet opening, and a closed position in which it extends parallel to the front wall to close access to the loading chamber; a loading/unloading hook rotatably engaged with respect to the front wall near the access threshold, and movable around a horizontal hinging axis between a rest position in which it is lowered and a working position in which it is raised; at least one locking pin slidably insertable through at least one restrain bracket integral with the front wall near the access threshold, to hold the loading/unloading hook in the work position; locking devices of the door in the closed position. Preferably, locking devices comprise: at least one guide plate integral with the front wall and slidably engaging the locking pin, to guide it between an insertion position in which the locking pin extends through the guide plate and the restrain bracket, and an extraction position in which the locking pin is disengaged from the constrain bracket; and an auxiliary bracket projecting from the lower part of the door and insertable in an admittance space defined between the guide plate and the restrain bracket, to be engaged by the locking pin in the insertion position.

[0011] The fixing of the doors in the closed position is therefore achieved by means of the same locking pins used to fix the loading/unloading hook in the working position, eliminating the need for additional bolts to achieve the fixing of the doors.

[0012] One or more convenient embodiments of the invention may further comprise one or more of the following preferred features:

the auxiliary bracket extends substantially in a plane parallel to the guide plate and to the restrain bracket; the auxiliary bracket has a through seat for the engagement of the locking pin; in the extraction position, the locking pin remains engaged through the guide plate and disengages the admittance space to enable insertion and extraction of the auxiliary bracket in and from the admittance space; said at least one locking pin has a control head movable between the guide plate and a stop shoulder carried by the front wall; in the extraction position, one end of the locking pin, in particular the one opposite the control head, is spaced from the restrain bracket by a measure greater than the thickness of the auxiliary bracket.

[0013] In the insertion position the locking pin is further engaged through the loading/unloading hook;

two locking pins are provided, placed in respectively opposite positions with respect to the loading/unloading hook and operating on respective access doors; a compaction mechanism operating near to the loading chamber to transfer the waste or other materials

into a compaction compartment defined inside the containment box is provided.

[0014] Further characteristics and advantages will become more apparent from the detailed description of a preferred, yet not limiting, embodiment of a roll-container for the collection of materials, according to the present invention. Such a description will be set out hereinafter with reference to the accompanying drawings given only for illustrative and, therefore, nonlimiting purpose, in which:

- figure 1 shows in perspective view a container according to the present invention;
- figure 2 shows an enlarged detail of figure 1, highlighting the doors in the closed position and the loading/unloading hook in the rest position;
- figure 2a shows an enlarged detail of figure 2;
- figure 3 shows the detail of figure 2, with the pins extracted to enable the opening of the doors;
- figure 3a shows an enlarged detail of figure 3;
- figure 4 shows the detail of figure 2, with the doors in the closed position and the loading-unloading hook in the working position.

[0015] With reference to the mentioned figures, the number 1 globally indicates a roll-off container for the collection of materials, in accordance with the present invention.

[0016] The container 1 comprises a substantially parallelepiped containment box 2, extending longitudinally between an its front end and an its rear end, 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 direction of longitudinal development.

[0017] At one of said front 2a and rear 2b ends, more precisely the front end 2a in the illustrated example, a loading chamber 6 is defined in which the waste delivered by the citizens and/or by the personnel in charge of the collection service is conveyed, manually and/or by overturning a dumper of a service vehicle.

[0018] In the illustrated example, the loading chamber 6 is accessible through an inlet opening 7 arranged in a front wall 8 and preferably provided with one or more access doors 9. The inlet opening 7 is downwardly bounded by an access threshold 10. In possible embodiments, the loading chamber 6 can also be directly accessible from above.

[0019] In the loading chamber 6, a compaction system 11 can operate, not described in detail as it can be realized in various known ways, essentially comprising at least one electrically and/or hydraulically actuatable pusher with alternating motion, to transfer the waste delivered in the loading chamber 6 into the storage compartment 3 which occupies a predominant part of the internal volume of the container 2.

[0020] In the preferential example illustrated, two access doors 9 are provided, each hinged at one of the vertical walls 4 and movable, with an angular rotation towards the outside of the loading chamber 6, between a closed position in which, as illustrated for example in figure 1, it extends parallel to the front wall 8 to close access to the loading chamber 6, and an open position in which it enables access to the loading chamber 6 through the inlet opening 7.

[0021] At least one loading/unloading hook 12 is also installed on the front wall 8 of the container 1, rotatably engaged near the access threshold 10. In the illustrated example, the loading/unloading hook 12 has a gripping crosspiece 13 extending between a pair of arms 14 respectively parallel, rotatably bounded to respective restrain brackets 15 integral with the front wall 8. Each of the restrain brackets 15 may comprise a pair of mutually parallel plates, approached to the opposite sides of the respective arm 14 constrained to them by a hinging pin 16 concentric to a horizontal hinging axis (X).

[0022] The loading/unloading hook 12 is movable around the hinging axis (X), between a rest position in which it is lowered as per figures 1 to 3, and a working position in which it is raised as per figure 4. In the rest position, the loading/unloading hook 12 hangs by gravity from the respective hinging pins 16, below the access threshold 10. In the working position, the loading/unloading hook 12 rises with respect to the hinging axis (X), so that the gripping crosspiece 13 is elevated with respect to the access threshold 10 and positioned at a predetermined height from the ground, suitable for the engagement of the loading/unloading hook 12 by a mechanical arm or other loading device (not illustrated) installed on a motor vehicle equipped for picking up and transporting the container 1. One or more locking pins 17 are slidably insertable through the restrain brackets 15 and through the arms 14 to hold the hook in the work position, as per figure 4. In the illustrated example, two locking pins 17 are provided, placed respectively in opposite positions with respect to the loading/unloading hook 12 to interact each through one of the arms 14.

[0023] Locking devices 18 of the access doors 9 are also conveniently provided in the closed position. In accordance with the present invention, the locking devices 18 provide that each locking pin 17 is slidably engaged and axially guided through a respective guide plate 19 integral with the front wall 8, projecting perpendicularly from the latter below the access threshold 10. Each guide plate 19 is suitably spaced from the respective restrain bracket 15 adjacent thereto. Consequently, an admittance space 21 is bounded between each of the guide plates 19 and the respective restrain bracket 15, which is suitable to accommodate a respective auxiliary bracket 22 projecting from the lower part of the access door 9 in the closed position. Each of the auxiliary brackets 22 extends substantially according to a plane parallel to the guide plate 19 and to the restrain bracket 15, and has a through seat 22a for the engagement of the locking pin

17.

[0024] Each locking pin 17 preferably has a cylindrical shape, with a control head 23 carrying a handle or other manual gripping seat. The control head 23 is manually movable between the guide plate 19 and a stop shoulder 24 projecting from the front wall 8, to cause the axial movement of the locking pin 17, guided by the guide plate 19, between an insertion position and an extraction position.

[0025] In the insertion position, the locking pin 17 is axially inserted through the guide plate 19, the auxiliary bracket 22, the restrain brackets 15 and, when the loading/unloading hook 12 is in the working position, through the arms 14.

[0026] As can be seen better in figures 3 and 3a, in the extraction position the locking pin 17 is disengaged from the restrain brackets 15 and from the arm 14 but, with one end thereof placed on the opposite side to the control head 23, it preferably remains engaged through the guide plate 19, without projecting inside the admittance space 21 by a measure that is sufficient to prevent the insertion and the extraction of the auxiliary bracket 22. To this end, it is preferably provided that, in the extraction position, the end of the locking pin 17 opposite the control head 23 is spaced from the restrain bracket 15 by a measure greater than the thickness of the auxiliary bracket 22.

[0027] In the control head 23 of each locking pin 17, a diameter projection 23a (figure 2a) can be conveniently made which is suitable to interact with a retaining flap 25 carried by the guide plate 19 to hold the locking pin 17 in the insertion position. An angular rotation of the locking pin 17, for example according to an excursion of about 90°, causes the disengagement of the diametrical projection 23a from the retaining flap 25, so as to free the axial mobility of the pin itself towards the extraction position.

[0028] In a condition of normal use of the container 1, as illustrated in figures 1 and 2, the loading/unloading hook 12 is in the rest position and the access doors 9 are held in the closed position by means of the respective locking pins 17. In fact, the latter, in the insertion condition, hold the restrain brackets 15 in order to prevent the opening of the access doors 9. An auxiliary deadbolt 26 can possibly be arranged to operate between the access doors 9 for greater safety of their fixing in the closed position, as an obstacle to attempts to break in.

[0029] The opening of the access doors 9 can be easily performed after unlocking the possible auxiliary deadbolt 26 and moving the locking pins 17 to the extraction position. The contact of the control heads 23 against the respective stop shoulders 24 prevents the locking pins 17 from disengaging from the respective guide plates 19, avoiding possible falls and losses of the pins themselves. With the locking pins 17 in the extraction position, each of the auxiliary brackets 22 is free to disengage from the respective admittance space 21 following the opening of the access door 9, as well as it is free to be inserted again into the admittance space itself when the access door 9

is closed.

[0030] Furthermore, when the locking pins 17 are in the extraction position, each of the arms 14 is free to be inserted between the respective restrain brackets 15, enabling the loading/unloading hook 12 to be raised in the working position. A new movement of the locking pins 17 in the insertion position causes the locking of the access doors 9 in the closed position and of the loading/unloading hook 12 in the working position.

Claims

1. Roll-off container for the collection of materials, comprising:

a substantially parallelepiped containment box (2), extending longitudinally between an its own front end (2a) and an its own rear end (2b);

a loading chamber (6) defined at one of said front (2a) and rear ends, having an inlet opening (7) made in a front wall (8) of the containment box (2) and downwardly bounded by a access threshold (10);

at least one access door (9) arranged in correspondence with the loading chamber (6) and movable between an open position in which it enables access to the loading chamber (6) through the inlet opening (7), and a closed position in which it extends parallel to the front wall (8) to close access to the loading chamber (6);

a loading/unloading hook (12) rotatably engaged with respect to the front wall (8) near the access threshold (10), and movable around a horizontal hinging axis (X) between a rest position in which it is lowered and a working position in which it is raised;

at least one locking pin (17) slidably inserted through at least one restrain bracket (15) integral with the front wall (8) near the access threshold (10), to hold the loading/unloading hook (12) in the work position;

locking devices (18) of the door in the closed position, wherein said locking devices (18) comprises:

at least one guide plate (19) integral with the front wall (8) and slidably engaging the locking pin (17), to guide it between an insertion position in which the locking pin (17) extends through the guide plate (19) and the restrain bracket (15), and an extraction position in which the locking pin (17) is disengaged from the restrain bracket (15);

an auxiliary bracket (22) projecting from the lower part of the access door (9) and insertable in an admittance space (21) defined between the guide plate (19) and the re-

strain bracket (15), to be engaged by the locking pin (17) in the insertion position.

2. Container according to claim 1, wherein the auxiliary bracket (22) substantially extends along a plane parallel to the guide plate (19) and to the restrain bracket (15).
3. Container according to claim 1 or 2, wherein the auxiliary bracket (22) has a through seat for the engagement of the locking pin (17).
4. Container according to one or more of the preceding claims, wherein in the extraction position the locking pin (17) remains engaged through the guide plate (19) and disengages the admittance space (21) to enable insertion the extraction of the auxiliary bracket (22) in and from the admittance space (21).
5. Container according to one or more of the preceding claims, wherein said at least one locking pin (17) has a control head (23) movable between the guide plate (19) and a stop shoulder (24) carried by the front wall (8).
6. Container according to one or more of the preceding claims, wherein in the extraction position one end of the locking pin (17) is spaced from the restrain bracket (15) by a measure greater than the thickness of the auxiliary bracket (22).
7. Container according to one or more of the preceding claims, wherein in the insertion position the locking pin (17) is further engaged through the loading/unloading hook (12).
8. Container according to one or more of the preceding claims, wherein two locking pins (17) are provided, positioned respectively in opposite positions with respect to the loading/unloading hook (12) and operating on respective access doors (9).
9. Container according to one or more of the preceding claims, further comprising a compaction mechanism operating near to the loading chamber (6) to transfer the materials into a storage compartment (3) defined inside the containment box (2).

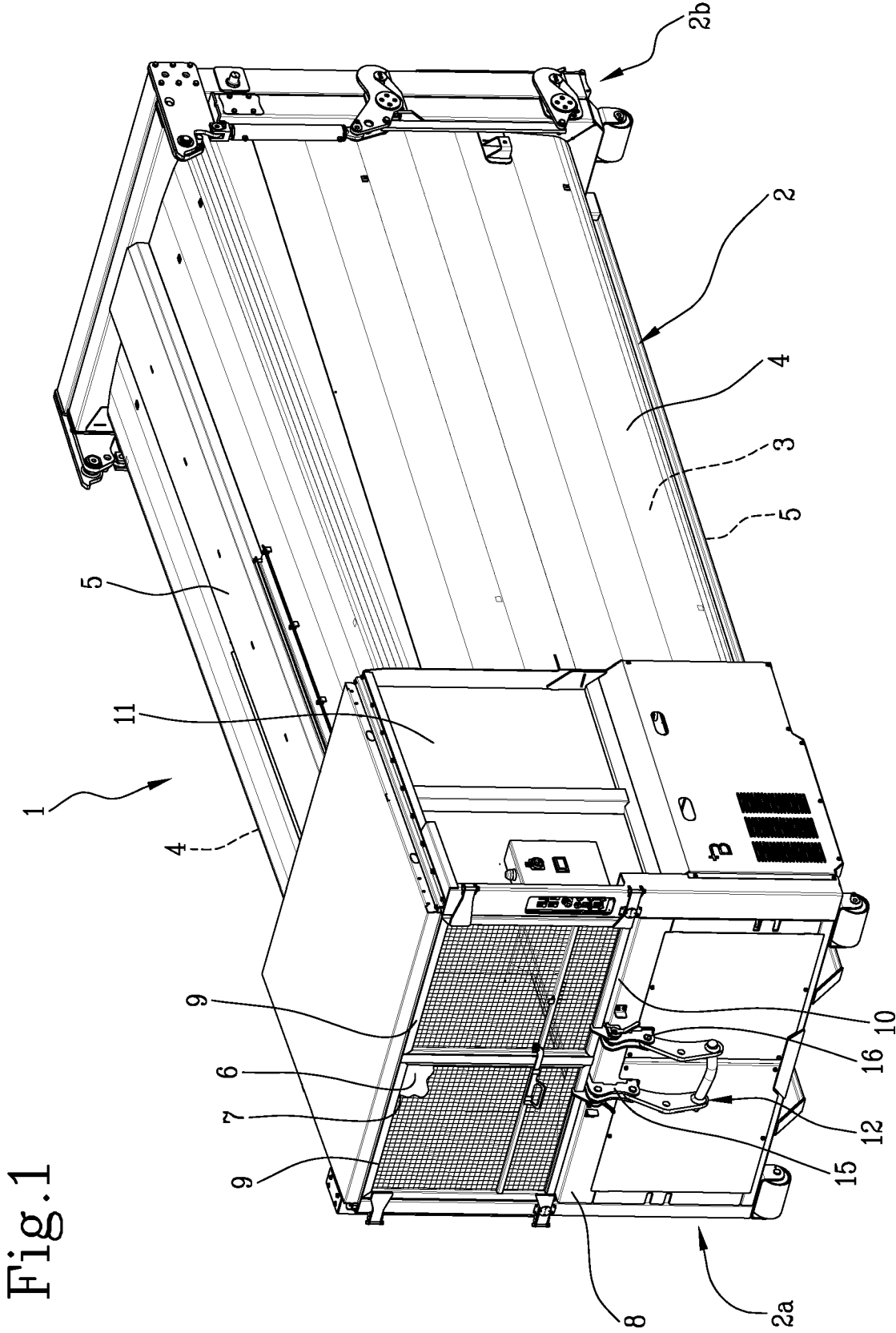


Fig. 2

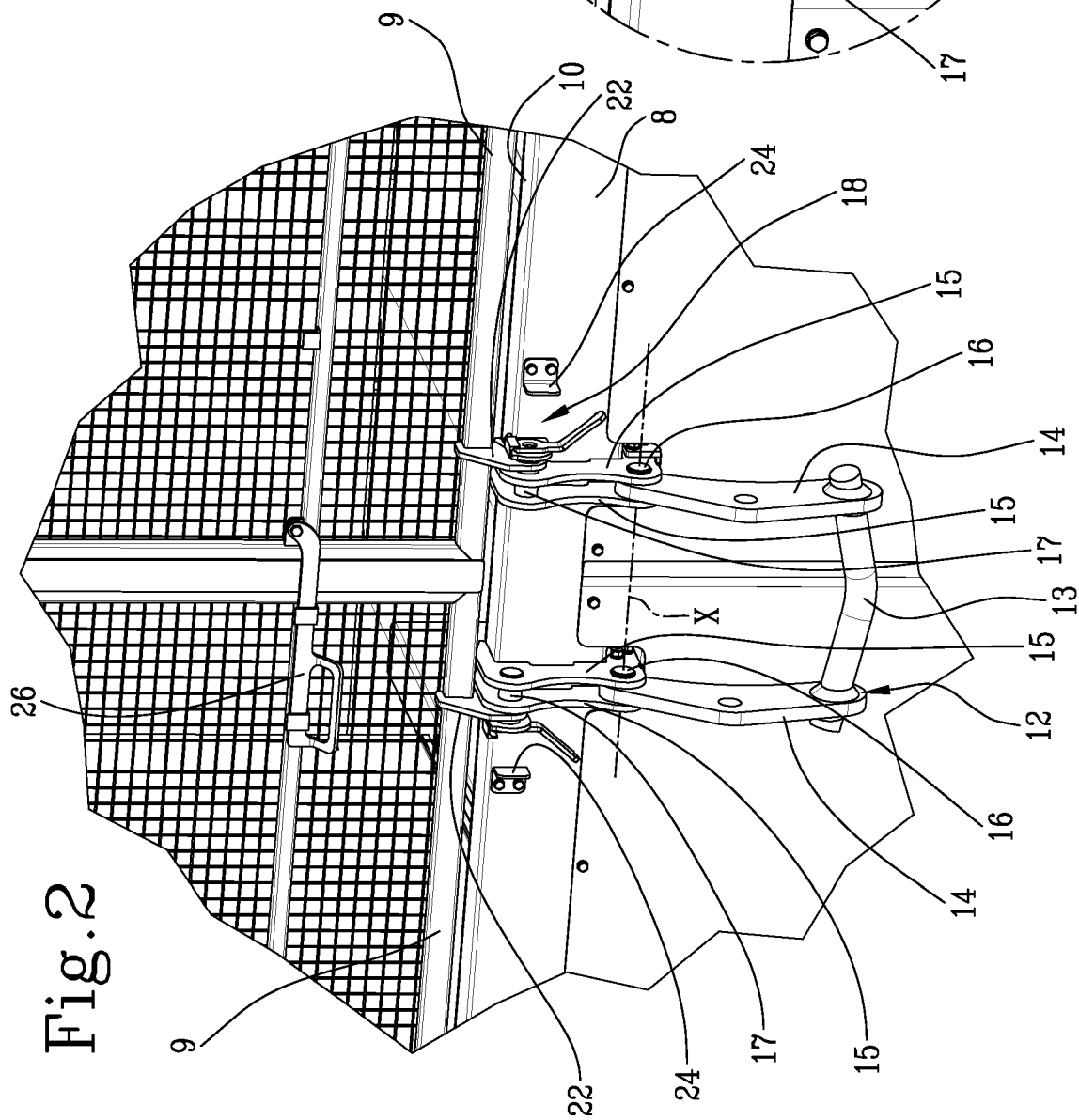
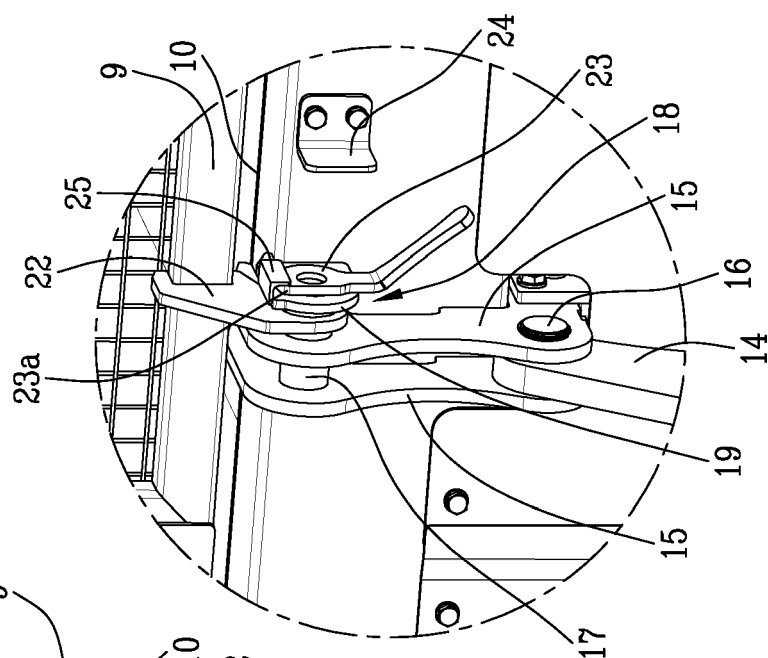


Fig. 2A



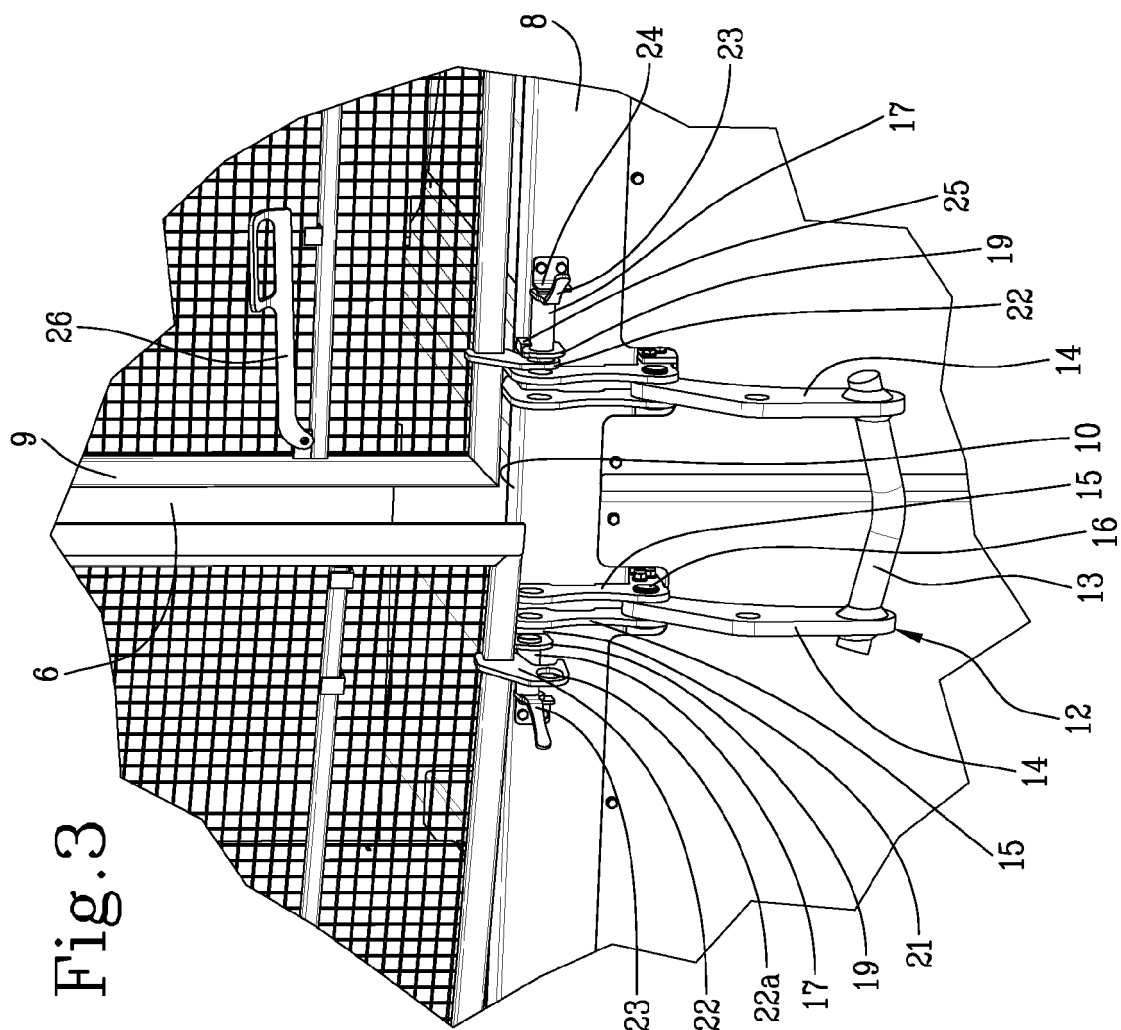
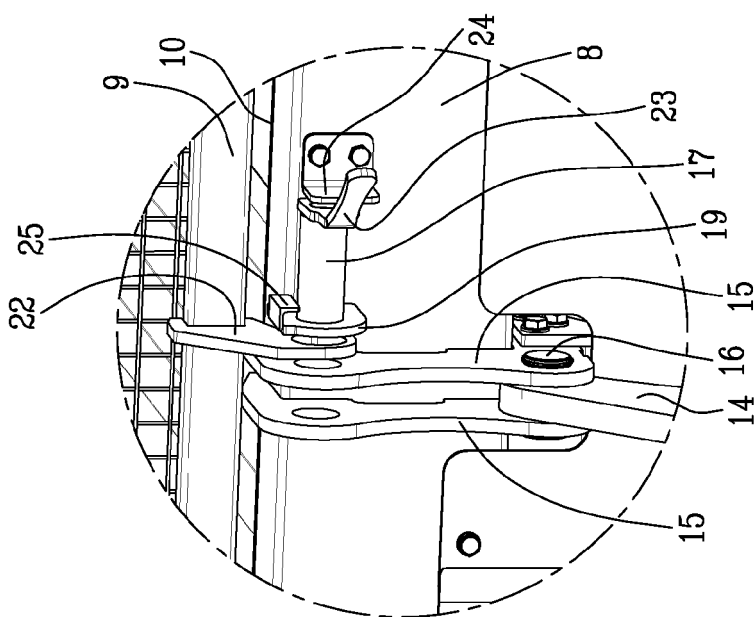


Fig. 3A



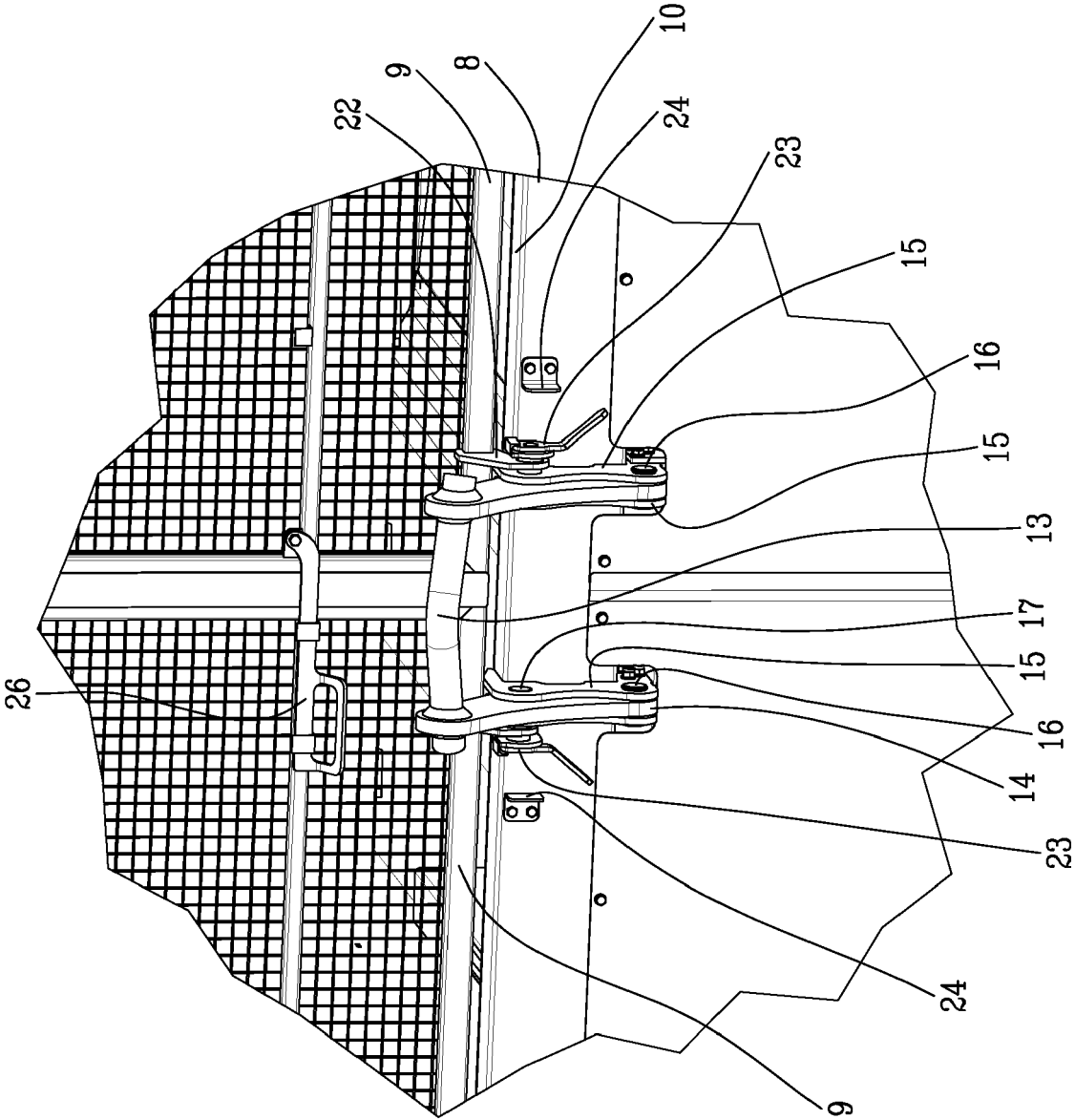


Fig.4



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Application Number

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 December 2022	Examiner Mendão, João
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	

**ANNEX TO THE EUROPEAN SEARCH REPORT
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