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(54) WASTE COLLECTION DEVICE, UNLOADING DEVICE AND METHOD FOR EMPTYING THE WASTE COLLECTION DEVICE INTO THE UNLOADING DEVICE

(57) The subject matter described comprises a device (1) for collecting waste, a device (110) for unloading such a collection device (1), and a method for emptying the collection device. The collection device comprises two flaps (7, 9) arranged at a lower section so as to be movable for closing off an opening (60) for emptying the collection device.

The flaps are configured for being urged into an inactive position by their own weight, in which position they close off the opening. The flaps are furthermore configured to be movable from the inactive position in opposite directions and at least partly upward into an open position, wherein in the open position of the flaps the opening is at least partly cleared for removing collected waste from the device. In addition, the flaps can be moved independent of each other at least into the open position.

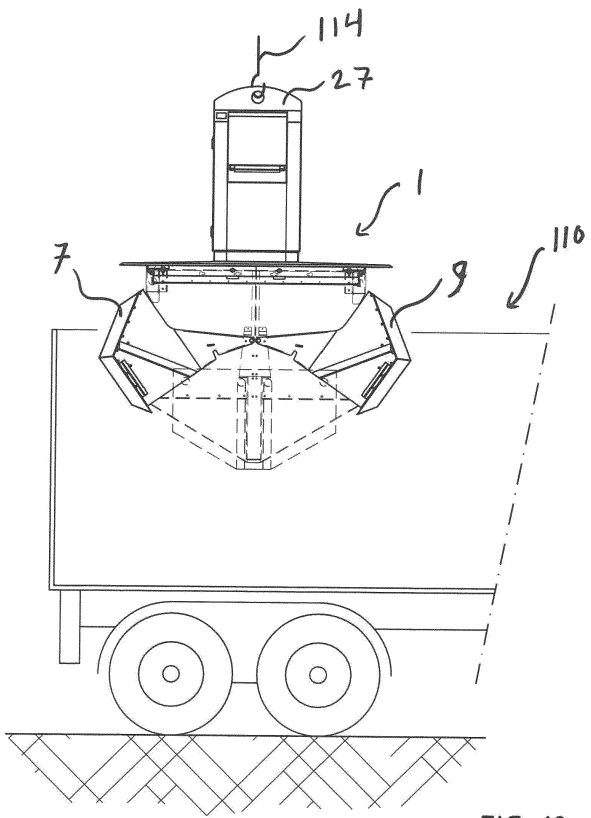

FIG. 12

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Description

BACKGROUND OF THE INVENTION

[0001] The present patent application relates to a device for collecting waste, a device for unloading such a collection device, and a method for emptying a collection device into such an unloading device.

[0002] As a rule, devices for collecting waste, or waste collection devices or waste containers that can be emptied via the bottom side, are used in residential areas. Often, a lower section of such waste containers is placed in an opening in the ground, so that a large part of the waste containers is hidden from view. As a rule, this opening is formed by a concrete silo onto which for safety's sake a safety facility is usually placed. Over the past decades, such containers for the collection of waste have been given an increasingly larger capacity and this continues to be the case. This is mainly achieved by adapting the height of the lower section of the waste container. This is due to the quantity of waste in modern society still increasing and the wish to limit the nuisance to the people living in the neighbourhood by trying to keep the number of emptying events as low as possible.

[0003] Such containers, capable of temporarily storing waste of several (for instance dozens) of households, are periodically emptied, for instance by refuse collection lorries. At their upper sides, such refuse collection lorries have a trough in which the waste container is emptied via its bottom side. The quantity of waste that can be thrown into the trough is limited, in order for an as large as possible volume of a refuse collection lorry remaining available, in which in most cases the waste is compacted. In addition these refuse collection lorries usually have a crane for hoisting up the containers and moving them over the trough.

[0004] To ensure that during hoisting the waste remains in the waste containers and the waste can only exit the waste containers when they are in a correct position over the trough, waste containers have one or more flaps, also called leak trays, at the bottom side. These flaps are kept closed by closing mechanisms and can be operated to open at the right moment.

[0005] A first type of closing mechanism is used in combination with one flap including a bolt. This bolt can be unbolted by an unlocking member located at the trough and pushing against or tapping an unlocking member of the bolt. At that moment, the lid drops open in downward direction.

[0006] A second type of closing mechanism is used in combination with two or more flaps having an operation mechanism that can be operated by complementary operation members of the crane. Such an operation mechanism for instance comprises the "Kinshofer-type" or mushroom mechanism or eyes/hooks at an upper side of the waste container and has bars or cables passing through the container to the flaps situated at the bottom for keeping the flaps closed during hoisting or unlocking a lock keeping the flaps closed when the container is suspended over the trough.

[0007] Waste containers are known that are provided with so-called leak trays, wherein the leak trays remain closed under the influence of gravity. An example of such a waste container is known from FR 2 461 664. The waste container 1 has a top surface provided with one or more loading doors 2. The bottom of the container 1 is provided with a so-called "helmet-type" opening system comprising two jaws 3. Each of the jaws 3 has a circular part. The jaws 3 are connected to each other so as to rotate about axes 4, by means of serrated sectors 5 enabling the jaws 3 to open simultaneously.

[0008] In addition, a waste container is known from FR 2 625 734. The waste container has a caisson 1 with an open base, wherein the caisson 1 is provided with two jaws 6 hinged to side surfaces of the caisson 1. The jaws can be hinged between an open position, in which the base is open, and a closed position, in which the base is closed. In addition, the waste container is provided with a pull bar 10 that is led along a side surface of the caisson. The pull bar 10 is provided with a plate 12 that is active against fingers 16 disposed on the jaws 6 for simultaneously hinging the jaws 6 into the open position. This waste container is also called a waste container with operated flaps.

[0009] DE 43 36 146 also discloses a waste container. The waste container has a number of sorting containers 2 that are disposed around an axis in the form of sectors. Each of the sorting containers 2 is provided with a flap 6 that is disposed so as to hinge. The refuse collection lorry is provided with a stop 7 for simultaneously opening each of the flaps 6 when the waste container is positioned on the refuse collection lorry, so that waste from the sorting containers is received in the refuse collection lorry.

SUMMARY OF THE INVENTION

[0010] The first type of closing mechanism has the drawback that when emptying such containers the centre of gravity quickly changes position, causing the containers to sway, hang askew and as a consequence rendering them more difficult to handle by the crane of the refuse collection lorry. The flap also needs to be closed again by pushing it against a base, such as the pavement or an upper edge of the refuse collection lorry. It may also occur that the flap is opened in an uncontrolled manner and waste ends up where it is not wanted.

[0011] The second type of operating mechanism has the drawback that such operating mechanisms take up considerable room on top of the container and inside in the container, as a result of which there is less room for waste. The waste dropping down can also be impeded by the operating mechanism and waste may get caught on such container operating mechanisms, as a result of which the container is not fully emptied.

[0012] In addition, the waste container as known from FR 2 461 664 has the drawback that the jaws are failure

prone to dirt which, for instance, jams one of the jaws as a result of which the motion of both jaws is jammed. Furthermore, the waste container as known from FR 2 625 734 has the drawback that the mechanism for opening and locking the jaws is located outside of and at the lateral side of the caisson, as a result of which the mechanism is sensitive to dirt that may jam the operation of the mechanism.

[0013] Both waste containers from FR 2 461 664 and FR 2 625 734 are vulnerable to deformation when the waste container is for instance placed in a concrete silo.

[0014] It is an object of the present patent document to provide an improved device for collecting waste.

[0015] According to a first aspect a collection device for collecting waste is provided, or waste collection device, collection device or container, wherein the collection device comprises:

an upper section for receiving the waste;
a lower section, extending from the upper section, for storing the received waste,
wherein at a bottom side opposite the upper section, the lower section comprises at least one opening for removing collected waste from the device; and
two flaps, arranged at the lower section so as to be movable, for closing off the at least one opening, wherein:

the flaps are configured for being urged into an inactive position by their own weight, in which position they close off the at least one opening,
the flaps are movable from the inactive position in opposite directions and at least partly in the direction of the upper section into an open position, wherein in the open position of the flaps the at least one opening is at least partly cleared for removing collected waste from the device, and
the flaps can be moved independent of each other at least into the open position.

[0016] As the flaps are configured for being urged into an inactive position by their own weight, in which position they close off the opening, a mechanism for keeping the flaps closed to keep the waste inside the collection device, for instance when the collection device is being hoisted, is not required. In that way, the collection device also has more volume available for storing waste. It also needs less maintenance.

[0017] Contrary to containers having the above-mentioned second closing mechanism (for instance the mushroom mechanism) the collection device according to the first aspect, when it is located in the field, does not need to support with its flaps on the base or a so-called filling set in the opening in the ground to keep the flaps closed and in that way keep the waste inside the collection device, as the flaps remain closed of their own accord. This makes it possible to suspend the collection device from an upper side of the opening in the ground, as a result of which a tidier sealing between the collection device and ground level can be obtained. The tidier sealing is safer for users.

[0018] As the flaps are movable into an open position, the collection device can be emptied in a refuse collection lorry. As a mechanism for keeping the flaps closed is not required, the collection device can even be emptied into a refuse collection lorry using a chain and a hook.

[0019] The inventors surprisingly found that because the flaps can be moved independent of each other at least into the open position, the failure-proneness of the collection device according to the invention is reduced in comparison to the waste container according to FR 2 461 664 or FR 2 625 734. When for instance movement of one of the flaps into the open position is hampered by a piece of waste, the other one of the flaps will still be able to move into the open position. As a result thereof, the collection device according to the invention can be emptied as yet, despite the fact that only one of the flaps has been moved into the open position. Additionally, blockage of the other one of the flaps can even be ended, as the blocking piece of waste, as a result of opening one of the flaps, will still fall out of the collection device. As a consequence, the failure-proneness of the collection device is reduced considerably as compared to the known waste containers.

[0020] The collection device may comprise means for keeping the flaps in the inactive position, for instance springs, in order to prevent that the flap is pushed open when this is not wanted. In other words, the flaps are urged into an inactive position substantially by their own weight, but can also be partly assisted therein by other means such as push-in springs or draw springs.

[0021] In one embodiment, the flaps can be pivoted between their inactive position and their open position. Alternatively, it is possible that the movable flaps are configured so as to be slidable.

[0022] Preferably each of the flaps comprises a first and a second hinge, wherein the first hinges are arranged at a first lateral side of the lower section and the second hinges are arranged at a second lateral side of the lower section opposite the first lateral side, wherein the first and second hinges are positioned such that the flaps in the inactive position close off the at least one opening by their own weight.

[0023] In this embodiment, the flaps are configured so as to hinge.

[0024] In a preferred embodiment, the first and second hinges are situated closer to the middle of the first and second lateral sides, respectively, than to their respective lateral edges. In such a position of the hinges, flaps can be used that move towards each other up to the inactive position due to gravity and close the opening at the bottom of the collection device, without features such as weighting at specific parts of the flaps or a specific design of the flaps.

[0025] More generally, the hinges of each of the flaps

preferably are situated closer to the middle of the respective first and second lateral sides, than to respective centres of gravity of the flaps. This refers to lateral distances, parallel to a bottom side of the collection device. This positioning of the hinge relative to the centre of gravity ensures that the flap always tends to move towards the inactive position.

[0026] Further, the hinges preferably are spaced apart from the bottom side of the lower section. This distance preferably is larger than a distance from the middle of the first and second lateral sides of their edges.

[0027] Preferably, the flaps each comprise a base part and first and second arm parts, wherein the first and second arm parts extend from the base part along the first and second lateral sides, respectively, wherein the first and second arm parts connect the base part to the first and second hinges, respectively.

[0028] These arm parts can be configured flat as a result of which the volume of constructional parts of the collection device remains limited. Furthermore, the arms are able to ensure an improved closure between the flap and the lower section in order for waste to have a smaller chance of falling out of the collection device when this is not wanted.

[0029] In one embodiment, in the inactive position, the base parts of the flaps are situated next to each other at their respective first base part sides. Preferably, the flaps are arranged at the lower section so as to move to such an extend that in a fully open position the flaps completely clear the opening at the bottom of the collection device. In other words, in the fully open position the base part sides are near or next to respective exterior sides of the lower section. As a result, a narrowing that may obstruct the waste when the collection device is being emptied, is absent. That way the waste is able to fall out of the container efficiently without obstacles.

[0030] Preferably, in the inactive position, the base parts of the flaps are situated next to each other at respective first base part sides, wherein the flaps each comprise an upright part extending from the base part opposite the first base part sides, wherein in the inactive position the upright parts extend at least partly in the direction of the upper section. These upright parts ensure that the waste falling out of the collection device is facilitated when the flaps are moved into the open position and the collection device is emptied. The upright part also ensures a smaller turning circle of the flaps, as a result of which less room is required in a trough of the refuse collection lorry.

[0031] In addition, the base parts of the flaps together form a horizontal surface at the bottom side of the collection device. An advantage of the horizontal surface that is formed by the base parts is that the horizontal surface can advantageously cooperate with the common commercially available safety systems capable of covering the opening of the concrete silo when the collection device has been removed from the concrete silo. In the context of the present patent application it is noted that such a safety system, also called safety floor, is intended to be placed on the upper edge of a concrete silo, in which the collection device or at least its lower section can be housed. The safety systems are intended to prevent that a passer-by falls into the concrete silo when the collection device has been removed from the concrete silo, for instance to be emptied. Such a safety system is for instance provided with a frame that is configured to support on the upper edge of the concrete silo, wherein two floor parts have been provided in the frame. The floor parts are movable between a closed position, in which the concrete silo is closed off, and an open position, in which the collection device is placed inside the concrete silo. In one embodiment of the safety system, each of the floor parts is provided with two operation handles, that means that in total four operation handles have been provided. In order to be able to move the floor parts from the closed position into the open position, all operation handles need to be operated. As the base parts of the flaps form a horizontal surface, the base parts of the flaps are advantageously capable of operating the operation handles during the lowering of the collection device into the concrete silo. Once the operation handles have been operated by the base parts, the floor parts are taken to the open position, wherein the upright parts of the flaps advantageously lead the floor parts into the open position.

[0032] Such an operation of the safety system is not possible with the conventional waste containers known from FR 2 461 664 and FR 2 625 734.

[0033] In one embodiment the flaps comprise upwardly inclined edges at a perimeter of the base part and the upright part, wherein the upwardly inclined edges situated at the first lateral side connect the base parts and upright parts to the first arm part, and the upwardly inclined edges situated at the second lateral side connect the base parts and upright parts to the second arm part. These upwardly inclined edges ensure a reduced number of acute angles in the collection device, as a result of which the waste can easily move out of the collection device when it is being emptied.

[0034] In addition, the upwardly inclined edges can advantageously contribute to centring the collection device relative to a trough of a refuse collection lorry and/or to centring the collection device relative to a concrete silo, optionally provided with a safety system described above, in which the collection device or at least its lower section is housed when in use.

[0035] In yet another embodiment, the flaps each comprise an actuating member for moving the flaps into the open position by means of an unloading device for unloading the device for collecting waste. Such actuating members, that can be configured as protrusions or stops, can be actuated by a means suitable for the purpose, in the trough. In particular, such a suitable means in the trough is able to stop the actuating members, as a result of which, during lowering the collection device over the trough, the flaps are pushed open by means of the weight of the collection device.

[0036] Preferably, the first and second arm parts comprise an actuating member at their exterior sides, wherein each actuating member, at least partly in the direction of the respective hinge of the first and second hinges, extends at an acute angle to the base part or a notional plane defined by it and/or extends from the upright part.

[0037] These actuating members configured so as to be inclined enable sliding along the suitable means in the trough, as a result of which this means in the trough can be configured stationary. The actuating members configured so as to be inclined then define a movement path along which the suitable means will move in the trough. In addition, these actuating members configured so as to be inclined have an arm that is variable relative to the respective hinge of the first and second hinges. At the start of opening the flaps, the arm is largest relative to the respective hinge, as a result of which opening the flaps requires little/slight force.

[0038] Additionally, during opening the flaps the arm reduces relative to the respective hinge, as a result of which the speed of opening the flaps increases advantageously. When the flaps are substantially completely or completely opened, the arm of the actuating members is shortest relative to the respective hinge. This may be advantageous as due to the short arm, the collection device can be introduced less deep in the trough of the refuse collection lorry during emptying, as a result of which more room in the trough below the collection device inserted therein remains available for receiving waste from the collection device. This may result in that despite the increase of volume of the collection device, the collection device can still be emptied in the trough in one go.

[0039] Introducing the collection device less deep into the trough of the refuse collection lorry may in addition have the advantage that the risk of waste getting caught between the flaps during closing the flaps is reduced or ideally eliminated.

[0040] In the context of the present patent application, it is noted that each actuating member may define a rectilinear as well as a curved movement path. This makes it possible to vary both the opening speed of each of the flaps and the arm relative to a respective hinge.

[0041] Although it is conceivable that the flaps can be pushed open at one side thereof using one actuating member, it is preferred to configure an actuating member on both sides of the flaps.

[0042] In the context of the present patent application it is noted that an acute angle must be understood to be an angle between 0 and 90°.

[0043] Preferably, the lower section at the first lateral side and the second lateral side comprises a first and a second guide member, respectively, extending in the direction of the upper section. This guide member can be used in cooperation with a complementary guide element in the trough of the refuse collection lorry for guiding the collection device to a correct position over the trough and in addition also lowering it further in the direction of the trough with increased stability and control. The cooperation between the first and second guide members and the complementary guide element provided in the trough of the refuse collection lorry, prevents that the collection device makes a tilting motion about an axis that is approximately transverse to the downward direction of the collection device to be emptied. In other words, in this way it is prevented that the collection device becomes imbalanced.

[0044] In one embodiment, the collection device comprises a plurality of suspension members at an upper side of the lower section, wherein the suspension members are configured for carrying the collection device when it is placed in an opening made in the ground. In particular in cooperation with the self-closing flaps, it becomes possible to allow the collection device to be suspended. In other subterranean collection devices it is often required to keep the flap(s) closed by placing the collection device supporting on its flap(s) on the ground or a base suitable for that purpose, such as pins with disks extending from the bottom or a so-called filling set placed on the bottom. However, in the case of the collection device described herein this will not be necessary. As also described above, an improved sealing can be achieved between the upper side of the collection device and the ground surrounding the opening therein, which does not only have advantages of an aesthetic nature but also improves user safety.

[0045] In one embodiment, the upper section comprises an engagement member for hoisting up the collection device. The engagement member can be configured like an eye. The engagement member preferably is configured for reducing the free motions of the collection device when it is being hoisted. For that purpose, the crane of the refuse collection lorry may have a complementary gripping device.

[0046] In one embodiment, the lower section is divided into two compartments for collecting the waste separately, wherein the bottom side comprises two openings for removing collected waste from the respective two compartments, wherein the flaps are configured for in the inactive position closing off a respective opening of the two openings. In this case, it is possible to store two different types of waste, for instance glass and domestic waste, in the collection device, separately. As the flaps can be moved independent of each other into their open positions, an unloading device, such as a refuse collection lorry, can be configured for opening one of the two flaps so that only one type of waste is dropped into the trough of the unloading device. In an embodiment in which the lower section has only one compartment, the two flaps in the inactive position together ensure the closing off of the single openings at the bottom side of the collection device.

[0047] In one embodiment, the flaps, at their interior sides, each comprise a curved plate extending from the first base part sides in the direction of the opposite side of the respective flap towards the respective exterior side of the lower section that is at right angles to the first and

second lateral sides. Such a curved plate has the advantage that waste collected thereon easily slides down from it when the flaps are being opened to empty the collection device.

[0048] In one embodiment the flaps are configured such that in the open position a space between the flap and a respective exterior side of the lower section that is at right angles to the first and second lateral sides, is larger than when the flap is in the closed position. The advantage thereof is that by moving the flap into the open position less waste gets stuck and remains stuck between the flap and the walls of the lower section towards which the flap moves.

[0049] According to a second aspect an unloading device is provided for unloading the collection device according to the first aspect. The unloading device comprises:

a trough for receiving waste at an upper side of the device; and
means for urging at least one of the two flaps of the collection device from the inactive position into the open position.

[0050] This unloading device has the advantage that no mechanisms for opening the flaps need to be used in the trough. The weight of the collection device in cooperation with the means for urging the flaps open together ensure that the flaps are opened. When the unloading device also comprises a crane for hoisting the collection device, it is advantageous that the crane does not need to have a mechanism for operating the flap(s) of the collection device, for instance for engaging and tensioning several eyes or operating the mushroom (Kinshofer-type).

[0051] Preferably, the means for urging at least one of the two flaps from the inactive position into the open position are situated at an upper side of the trough and are configured for stopping the at least one of the two flaps of the collection device when the collection device is moved with its bottom side in the direction of the trough.

[0052] Preferably, the means for urging at least one of the two flaps from the inactive position into the open position comprise at least two stops positioned at an upper side of the trough for urging both of the two flaps into the open position, wherein the two stops are configured for stopping the respective flaps of the collection device. The use of stops that are configured for cooperating with actuating members of the collection device offers a simple and stationary manner for opening the flaps when the collection device is lowered at least partly into the trough by the crane.

[0053] In one embodiment the unloading device further comprises guide means for guiding the collection device to an unloading position for unloading the waste into the trough. These guide means preferably are configured for cooperation with the guide strips of the collection device.

[0054] Preferably, the unloading device for unloading the collection device is a refuse collection lorry. Preferably the refuse collection lorry comprises a hoisting device or crane for lifting the collection device and for moving it to above a trough for emptying the collection device into the trough.

[0055] According to a third aspect a method is provided for emptying a collection device for collecting waste according to the first aspect in an unloading device according to the second aspect, wherein the method comprises:

- hoisting the collection device;
- moving the hoisted collection device over the trough of the unloading device for receiving the waste at an upper side of the unloading device,
- lowering the collection device that has been moved over the trough, wherein the means for urging at least one of the two flaps from the inactive position into the open position are configured such that the at least one of the two flaps is moved into the open position by the weight of the collection device, in order for the waste to fall through the at least one opening at the bottom side of the collection device into the trough of the unloading device.

[0056] Preferably the collection device is configured for being placed in an opening made in the ground and the collection device comprises suspension members for suspending the collection device from an upper side of the opening made in the ground, or from an upper side of a safety facility/safety system. Preferably, the method further comprises placing the collection device back into the opening made in the ground in order for by means of the suspension members suspending the collection device from the upper side of the opening made in the ground. The lower section then extends downward into the opening made in the ground, wherein the base parts of the flaps are situated at a distance from a bottom or base of the opening made in the ground.

[0057] The aspects and measures described in this description and the claims of the application and/or shown in the drawings of this application may where possible also be used individually. Said individual aspects and other aspects may be the subject of divisional patent applications relating thereto. This particularly applies to the measures and aspects that are described per se in the sub claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0058] The invention will be elucidated on the basis of an exemplary embodiment shown in the attached drawings, in which:

Figure 1 shows a front view in perspective of a preferred embodiment of a collection device according to the first aspect with flaps in the closed inactive position;
Figure 2 shows a rear view in perspective of the col-

lection device of Figure 1 with flaps in the closed inactive position;
Figure 3 shows a front view in perspective of the collection device of Figure 1 with flaps in the open position;
Figure 4 shows a rear view in perspective of the collection device of Figure 1 with flaps in the open position;
Figure 5 shows a bottom view of the collection device of Figure 1 with flaps in the closed inactive position;
Figure 6 shows a bottom view of the collection device of Figure 1 with flaps in the open position;
Figure 7 shows a schematic side view of the collection device of Figure 1 that is placed in an opening in the ground;
Figure 8 shows a side view of the collection device of Figure 7, wherein the collection device has been hoisted out of the opening in the ground;
Figure 9 shows a schematic side view of the collection device of Figures 7 and 8, wherein the collection device has been hoisted in a position over a trough of a refuse collection lorry;
Figure 10 shows a schematic side view like in Figure 9, wherein the collection device has been hoisted in a position over a trough of the refuse collection lorry;
Figure 11 shows a schematic side view like in Figure 10, wherein the collection device has been partly lowered into the trough of the refuse collection lorry;
Figure 12 shows a schematic side view like in Figure 11, wherein the collection device has been lowered further into the trough of the refuse collection lorry and the flaps have been pushed into the open position;
Figure 13 shows a schematic side view of the collection device and an embodiment of the means for moving the flaps into the open position, with the flaps in the closed inactive position;
Figure 14 shows a schematic side view of the collection device and an embodiment of the means for moving the flaps into the open position, with the flaps pushed open into the open position;
Figure 15 shows a schematic view from inside of the collection device and partly in cross-section of the collection device of Figure 1 with the flaps in the inactive position, with in addition an enlargement of a part of one of the flaps and the collection device;
Figure 16 shows a schematic view like in Figure 15 with the flaps in the open position, with in addition an enlargement of a part of one of the flaps and the collection device; and
Figure 17 shows a safety system in a closed position.

DETAILED DESCRIPTION OF THE DRAWINGS

[0059] Waste container 1, an embodiment of the collection device for collecting waste, comprises an upper section 3 and a lower section 5. While in use, the upper section 3 will be placed above ground and the lower section 5 will be placed below ground, for instance in a concrete silo. The upper section 3 comprises a cover 21 for at least partly closing off an upper side of the lower section. The upper section 3 optionally comprises an insert housing 23 having a rotatable flap 25 and a plate 27 having an eye 28 by means of which the container can be hoisted up. The plate 27 is an embodiment of the engagement member.

[0060] The lower section 5 extends from the upper section. The embodiment shown is a relatively short variety. The lower section 5 may also extend further so that more waste can be collected in the container 1. In this embodiment, the lower section 5 has a square cross-section. The lower section 5 comprises first lateral side 31 (front side), second lateral side 33 (rear side, see Figure 2), third lateral side 32, and fourth lateral side 34.

[0061] The lower section 5 comprises flaps 7 and 9. Via arm part 15, the flap 7 is attached to hinge 11 and via arm part 16 to hinge 12. Via arm part 17, the flap 9 is attached to hinge 13 and via arm part 18 to hinge 14. The arm parts 15-18 are configured as flat plates extending along the front side 31 and rear side 33, respectively.

[0062] The lower section 5 is in this case configured with corner walls 35, 36, 37 and 38, of which respective parts form the sides 31-34. The corner walls 35 and 36 are attached to each other near the middle of side 31. The corner walls 36 and 37, 37 and 38 and 38 and 35 are attached to each other near the middle of side 32, side 33 and side 34, respectively. Alternative embodiments are conceivable, for instance by using plates that are connected to each other near the boundaries between sides 31-34. The advantage of using corner walls 35-38 is that at the attachment locations between corner walls 35 and 36 and 37 and 38 flaps 7 and 9 can also be attached. This ensures reduced use of material and/or a reinforcement of the structure.

[0063] The lower section 5 comprises reinforced corners 51-54 below cover 21 of upper section 3. The reinforced corners 51-54 each protrude at least partly at two respective sides 31-34 for suspending the container 1 from an edge - for instance of a safety facility for preventing persons from falling into the opening in the ground - or recesses formed for that purpose in the edge of the opening in the ground. The reinforced corners are an embodiment of the suspension members.

[0064] At the bottom side of container 1, the lower section 5 has an opening 60 from which the waste can be removed. In the open position of the flaps (Figures 3 and 4) this opening is cleared so that the waste is able to drop out of the collection device.

[0065] The lower section 5 here comprises guide strips 43 and 44, also referred to as guide members, which extend from the bottom side of the container 1 along the middle of the sides 31 and 33, respectively, in the direction of the hinges 11-14, or in the direction of the upper section 3.

[0066] In Figure 3 the flaps 7 and 9 are shown in the open position. Preferably, the flaps 7 and 9 can be moved

independent of each other, which makes it possible for a container with two compartments, having two openings at the bottom of the lower section, to have the compartments emptied individually.

[0067] Furthermore visible in Figure 3 are triangular extensions 41 and 42 partly extending the front side 31 and rear side 33, respectively. Said extensions ensure guiding and shielding the waste from the arm parts 15-18. The extensions 41 furthermore extend the length of the guide strips 43 and 44 towards the bottom side.

[0068] The flap 7 comprises base part 61 and upright part 65 (Figure 5). The flap 9 comprises base part 63 and upright part 67. The base parts 61 and 63 extend substantially parallel to cover 21. The container 1 can be placed on the base parts 61 and 63. Upright parts 63 and 67 extend in the direction of the upper side of the lower section 5.

[0069] The base parts 61 and 63 comprise edges 62 and 64, respectively, which in the inactive position are situated next to each other or abut each other. Those edges 62 and 64 are an embodiment of the first base part sides.

[0070] The flaps 7 and 9 further comprise respective upright edges 69 and 71 along a perimeter of the respective base parts 61 and 63 and upright parts 65 and 67.

[0071] In the bottom view of Figure 6 the interior sides of the cover 21 and the insertion housing 23 can be seen through opening 60.

[0072] The flaps 7 and 9 each comprise a respective push strip 170 and 190 (Figure 13). The push strips 170 and 190 are an example of the above-mentioned actuating members for moving the flaps into the open position by means of an unloading device for unloading the device for collecting waste. The push strip 170 is provided at an exterior side of arm part 15 and extends along the arm part 15. The push strip 190 projects from an exterior side of arm part 17 and extends along the arm part 17. The push strip 170 comprises first end 176 and second end 178. The push strip 190 comprises first end 196 and second end 198. The first ends 176 and 196 are situated along or near upright part 65 and 67, respectively. The push strips 170 and 190 extend from the first ends 176 and 196 to the second ends 178 and 198 upwardly inclined in the drawing, in other words, in the direction of both the upper section and the middle of the respective side (in this case front side 31) and/or in the direction of a respective hinge 11, 13 of hinges 11, 13. As can be seen in Figure 13, each of the push strips 170 and 190 extends between the respective upright parts 65 and 67, and the guide strip 43. As a result, each of the push strips 170, 190 is at an acute angle to the respective base parts 61 and 63 or to a notional plane defined by it.

[0073] The flaps 7 and 9 may further comprise guide strips 172 and 192. These guide strips are an example of the above-mentioned guide members. The arm parts 16 and 18 also comprise such push strips and guide strips, as shown in Figures 2 and 4 (not numbered) .

[0074] The operation of the container 1 in cooperation with a refuse collection lorry 110 and a method for emptying the container are further described on the basis of Figures 7-14. The refuse collection lorry 110 is an example of the device for unloading a collection device as described above.

[0075] Container 1 is in located in an opening 102 in the ground 100. The opening 102, or the hole 102, comprises walls 103 and a bottom 105 which preferably are configured as concrete walls 103 and bottom 105. By means of the eye 28, container 1 is hoisted out of the hole 102 by a crane 112 with hook 114 of the refuse collection lorry 110 (Figure 8).

[0076] By means of the crane 112, the container 1 is subsequently moved over a trough (not shown) of the refuse collection lorry 110 (Figure 9 and enlarged in Figure 10) . At an upper edge of the trough, the refuse collection lorry 110 comprises plates 116 for urging the flaps 7 and 9 of the collection device from the inactive position into the open position. The trough is configured such that the lower section 5 of the container 1 can be lowered into it and the plates 116, located at the front side 31 and rear side 33, respectively, of the container 1, urge the flaps 7 and 9 into the open position. The plates 116 preferably are located along the respective upper edges of the trough.

[0077] When the container 1 is lowered in the direction of the plates 116 and into the trough, the plates 116 and the push strips 170 and 190 cooperate to open the flaps 7 and 9 due to the container 1 being lowered (Figure 11). The weight of the container 1 suffices to effect the opening of the flaps 7 and 9 (Figure 12).

[0078] For that purpose, the plates 116 comprise a first stop 119 and a second stop 121, configured as protrusions. When the container 1 is taken to the correct starting position (Figure 13) relative to the plates, the first stop 119 is located against the first end 176 of the push strip 170. The second stop 121 is located similarly against the first end 196 of the push strip 190.

[0079] When the container 1 is lowered further relative to the refuse collection lorry 110 and the plates 116, the flaps are pushed open by the stops 119 and 121 pushing against the respective push strips 170 and 190. In the fully opened position of the flaps 7 and 9 (Figure 14), the flap 7 has been moved relative to the stop 119 and the stop 119 is located against the second end 178 of the push strip 170. Analogous thereto, the stop 121 is located against the second end 198 of the push strip 190 of flap 9. These positions are among other things achieved because push strips 170 and 190 are configured upwardly inclined (see above).

[0080] In this embodiment, the container 1 comprises the guide strips 43 and 44 which are referred to as guide members. As can be seen in Figures 13 and 14, the guide strip 43 cooperates with the stops 118 and 120 for lowering the container and opening its flaps only when the container is in the correct position. The stops 118 and 120 then move through openings 174 and 194 that are located between the guide strip 43 and the further guide

strips 172 and 192, respectively. In downward direction, the plates 116 also comprise guide strips 122 and 123 which extend along the guide strips 43 and 44 when the container 1 is lowered further. The stops 118 and 120 and strips 122 and 123 are examples of the above-mentioned guide means for guiding the collection device to an unloading position for unloading the waste into the trough.

[0081] Referring to Figures 15 and 16, the container 1 can be seen in side view with the lower section 5 in cross-section along the interface between walls 36 and 37 and walls 31 and 38. The rear side 33 can be seen from an interior side, just like triangular extension 42. Respective curved plates 200 and 202 are mounted in flaps 7 and 9, which plates ensure an improved removal of the waste sitting thereon when the flaps are opened.

[0082] When the flaps 7 and 9 are in the inactive position, there is a space 209 between the curved plates 200 and 202 at the outer edges 205 and 206 of the flaps 7 and 9 and the respective walls at sides 34 and 32, as can specifically be seen in the enlargement 208. The space 209 is located between the corner part 208 and curved plate 202 at the outer edge 206.

[0083] It can be seen in Figure 16 that the space 210 between the corner part 208 and the plate 202 near the edge 64 is an enlarged space, as indicated by the double arrow. This ensures that there is less risk of waste getting stuck between the flaps moving towards the open position and the wall of the lower section 5 of the container. For that purpose, the respective arms and curvature of the plates 200 and 202 are configured to create this enlarged space 210. The distance between the hinges and respective edges 62 and 64 is larger than the distance between the hinges and respective edges 205 and 206. The lower section 5 and the flaps 7 and 9 are adapted to ensure sufficient closure of the bottom side of the container 1 in the inactive position.

[0084] Although the container 1 is an embodiment of which the lower section 5 is being placed in an opening in the ground, the inventive principle of the flaps can also be used for containers that are placed entirely above ground.

[0085] Figure 17 shows a safety system 300, also called safety floor, that is intended to be placed on the edge of the concrete silo that is not shown. The safety system 300 is provided to cover an opening of the concrete silo when the collection device 1 has been removed from the concrete silo, for instance for emptying it. The safety system 300 has a frame 301 with an inner perimeter 302. At the inner perimeter 302 a first floor part 303 and a second floor part 304 are arranged at opposing sides thereof so as to hinge. The first floor part 303 and the second floor part 304 are both provided with two operation handles 305, 306. Each operation handle 305, 306 extends through the respective floor part 303, 304 and is arranged to the respective floor part 303, 304 so as to hinge. Recesses 307, 308 are provided in the upper side of each floor part 303, 304 for accommodating a part of the operation handle 305, 306. The operation handles 305, 306 are functionally coupled to a blocking mechanism 309 that is configured for blocking the floor parts 303 and 304 in the closed position. When the collection device 1 is placed (back) in the concrete silo, the base parts 61 and 63 of the flaps 7 and 9 will be the first to contact the operation handles 305 and 306. Due to the horizontal orientation of the base parts 61 and 63, these base parts 61 and 63 will operate the operation handles 305 and 306, as a result of which the blocking mechanism 309 will be operated to release the floor parts 303 and 304, so that the floor parts 303 and 304 can hinge downwards into an open position. Subsequently the upright parts 65 and 67 of the flaps 7 and 9 get into contact with the floor parts 303 and 304, which upright parts 65 and 67 guide the floor parts 303 and 304 into the open position.

[0086] The present aspects and embodiments are not limited to the preferred embodiments thereof as described above; the requested rights are defined by the following claims within the meaning of which many modifications are conceivable.

Claims

1. Collection device for collecting waste, comprising:

   an upper section for receiving the waste;
   a lower section, extending from the upper section, for storing the received waste,
   wherein at a bottom side opposite the upper section, the lower section comprises at least one opening for removing collected waste from the device; and
   two flaps, arranged at the lower section so as to be movable, for closing off the at least one opening, wherein:

   the flaps are configured for being urged into an inactive position by their own weight, in which position they close off the at least one opening,
   the flaps are movable from the inactive position in opposite directions and at least partly in the direction of the upper section into an open position, wherein in the open position of the flaps the at least one opening is at least partly cleared for removing collected waste from the device, and
   the flaps can be moved independent of each other at least into the open position.

2. Collection device according to claim 1, wherein the flaps are pivotable between their inactive position and their open position, and/or wherein each of the flaps comprises a first and a second hinge, wherein the first hinges are arranged at a first lateral side of

the lower section and the second hinges are arranged at a second lateral side of the lower section opposite the first lateral side, wherein the first and second hinges are positioned such that the flaps in the inactive position close off the at least one opening by their own weight, preferably wherein the first and second hinges are situated closer to the middle of the first and second lateral sides, respectively, than to their respective lateral edges.

3. Collection device according to claim 2, wherein the flaps each comprise a base part and first and second arm parts, wherein the first and second arm parts extend from the base part along the first and second lateral sides, respectively, wherein the first and second arm parts connect the base part to the first and second hinges, respectively.

4. Collection device according to claim 3, wherein in the inactive position the base parts of the flaps are situated next to each other at respective first base part sides, wherein the flaps each comprise an upright part extending from the base part opposite the first base part sides, wherein in the inactive position the upright parts extend at least partly in the direction of the upper section, preferably wherein the flaps comprise upwardly inclined edges at a perimeter of the base part and the upright part, wherein the upwardly inclined edges situated at the first lateral side connect the base parts and upright parts to the first arm part, and the upwardly inclined edges situated at the second lateral side connect the base parts and upright parts to the second arm part.

5. Collection device according to at least one of the preceding claims, wherein the flaps each comprise an actuating member for moving the flaps into the open position by means of an unloading device for unloading the device for collecting waste.

6. Collection device according to claims 4 and 5, wherein the first and second arm parts comprise an actuating member at their exterior sides, wherein each actuating member, at least partly in the direction of the respective hinge of the first and second hinges, extends at an acute angle to the base part or a notional plane defined by it and/or extends from the upright part.

7. Collection device according to at least one of the claims 2 - 5, wherein the lower section at the first lateral side and the second lateral side comprise a first and a second guide member, respectively, extending in the direction of the upper section.

8. Collection device according to at least one of the preceding claims, comprising a plurality of suspension members at an upper side of the lower section, wherein the suspension members are configured for carrying the device when it is placed in an opening made in the ground.

9. Collection device according to at least one of the preceding claims, wherein the upper section comprises an engagement member for hoisting up the device.

10. Collection device according to at least one of the preceding claims, wherein the lower section is divided into two compartments for collecting the waste separately, wherein the bottom side comprises two openings for removing collected waste from the respective two compartments, wherein the flaps are configured for in the inactive position closing off a respective opening of the two openings.

11. Unloading device for unloading a collection device according to at least one of the preceding claims, the device comprising:

a trough for receiving waste at an upper side of the device; and
means for urging at least one of the two flaps of the collection device from the inactive position into the open position.

12. Unloading device according to claim 11, wherein the means for urging at least one of the two flaps from the inactive position into the open position are situated at an upper side of the trough and are configured for stopping the at least one of the two flaps of the collection device when the collection device is moved with its bottom side in the direction of the trough, and/or
wherein the means for urging at least one of the two flaps from the inactive position into the open position comprise at least two stops positioned at an upper side of the trough for urging both of the two flaps into the open position, wherein the two stops are configured for stopping the respective flaps of the collection device.

13. Unloading device according to claim 11 or 12, further comprising guide means for guiding the collection device to an unloading position for unloading the waste into the trough, and/or
wherein the device for unloading the collection device is a refuse collection lorry.

14. Method for emptying a collection device for collecting waste according to any one of the claims 1 - 10 in an unloading device according to any one of the claims 11 - 13, the method comprising:

- hoisting the collection device;
- moving the hoisted collection device over the

trough of the unloading device for receiving the waste at an upper side of the unloading device,
- lowering the collection device that has been moved over the trough, wherein the means for urging at least one of the two flaps from the inactive position into the open position are configured such that the at least one of the two flaps is moved into the open position by the weight of the collection device, in order for the waste to fall through the at least one opening at the bottom side of the collection device into the trough of the unloading device.

15. Method according to claim 14, wherein the collection device is configured for being placed in an opening made in the ground and the collection device comprises suspension members for suspending the collection device from an upper side of the opening made in the ground, the method further comprising placing the collection device back into the opening made in the ground in order for by means of the suspension members suspend the waste collection device from the upper side of the opening made in the ground, wherein the lower section extends downward into the opening made in the ground, wherein the base parts of the flaps are situated at a distance from a bottom or base of the opening made in the ground.

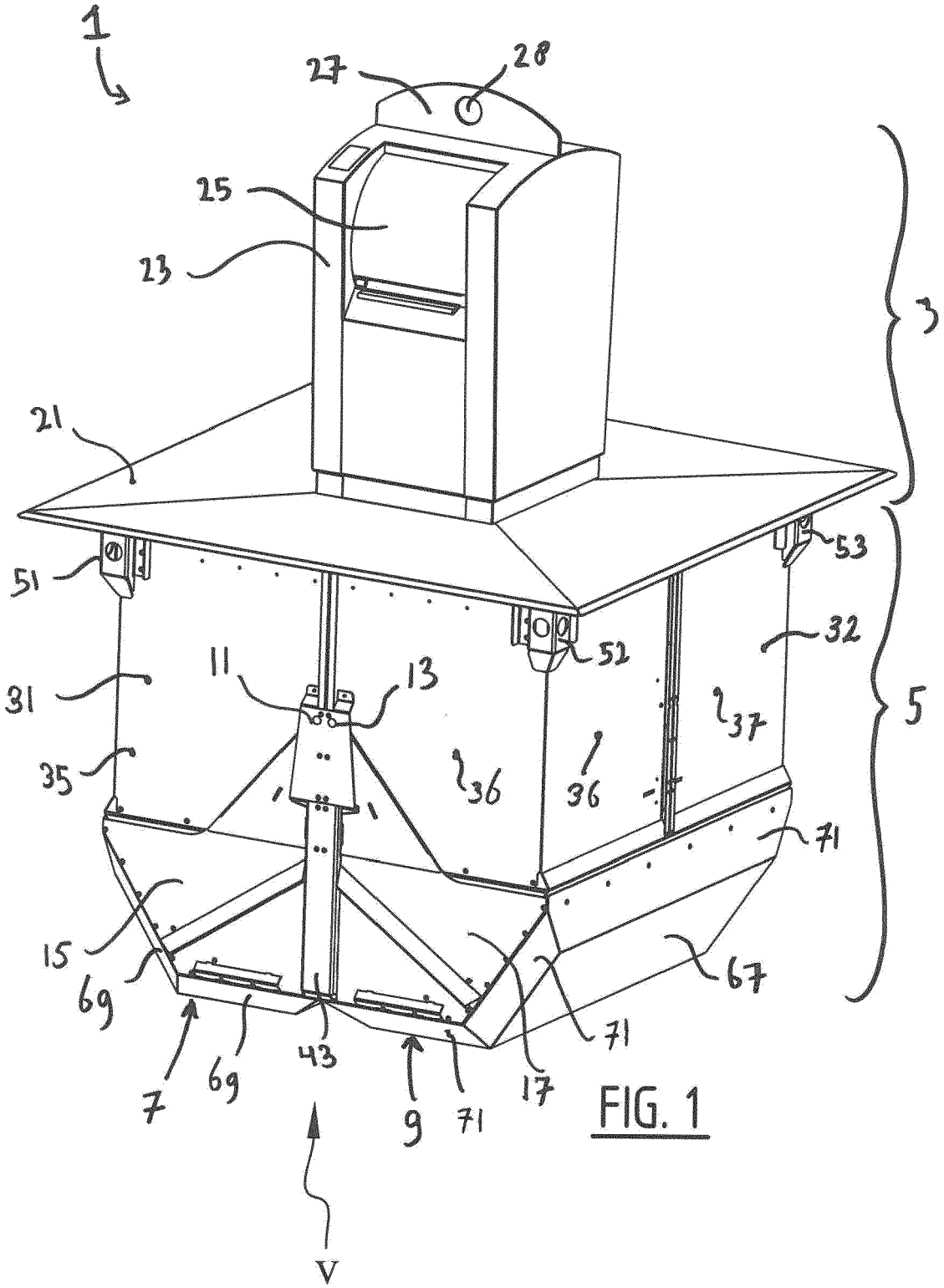
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FIG. 1

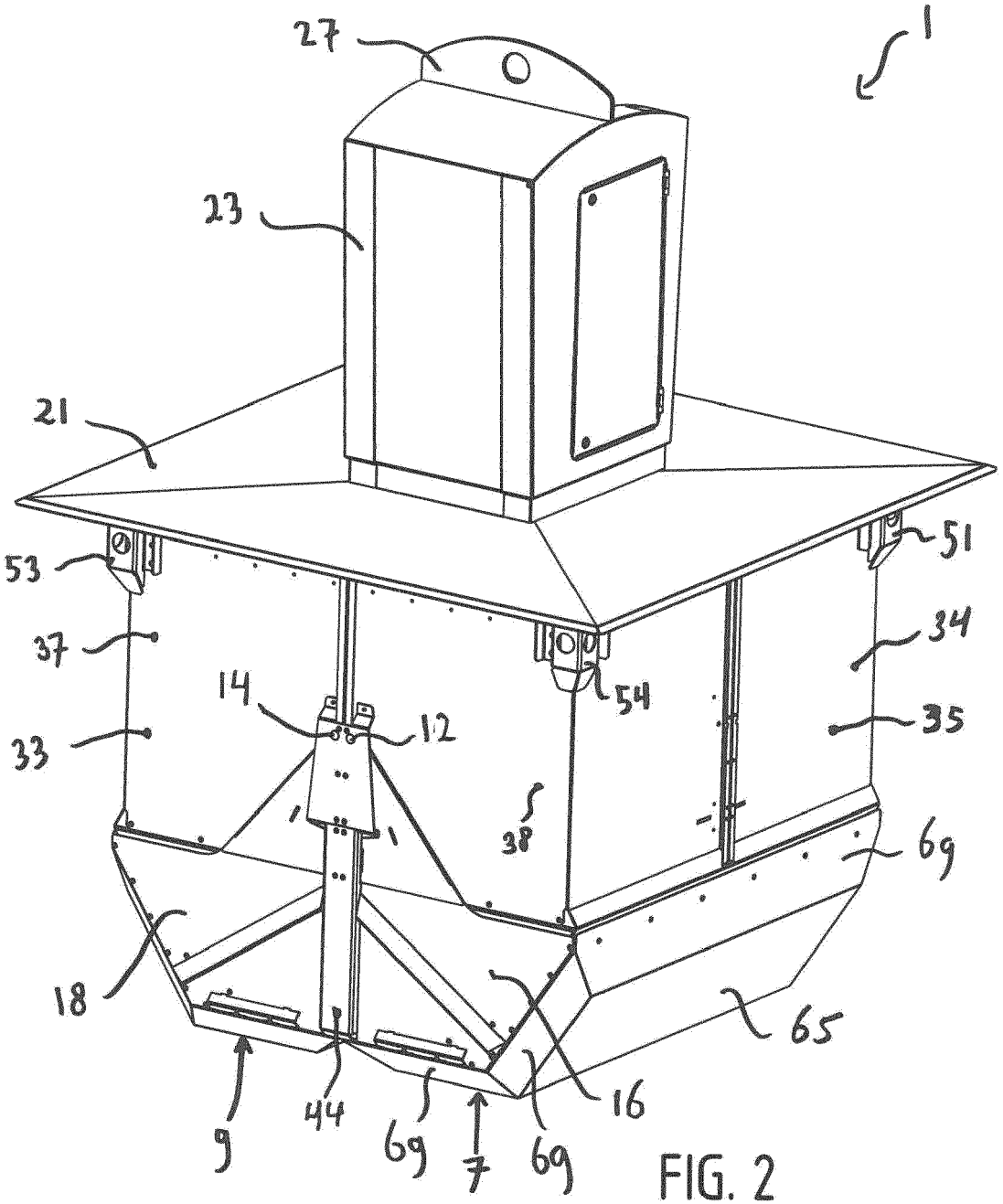

FIG. 2

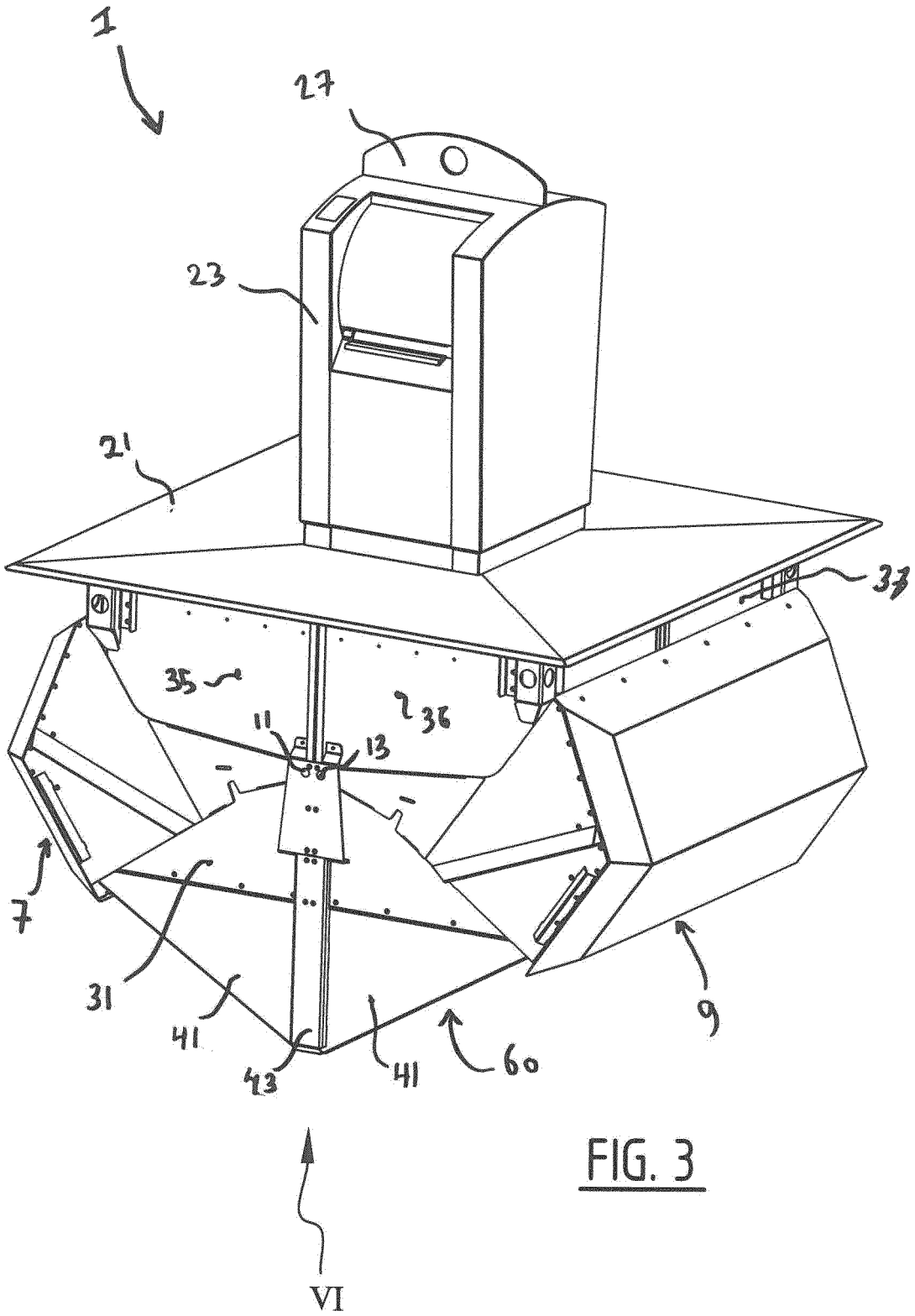

FIG. 3

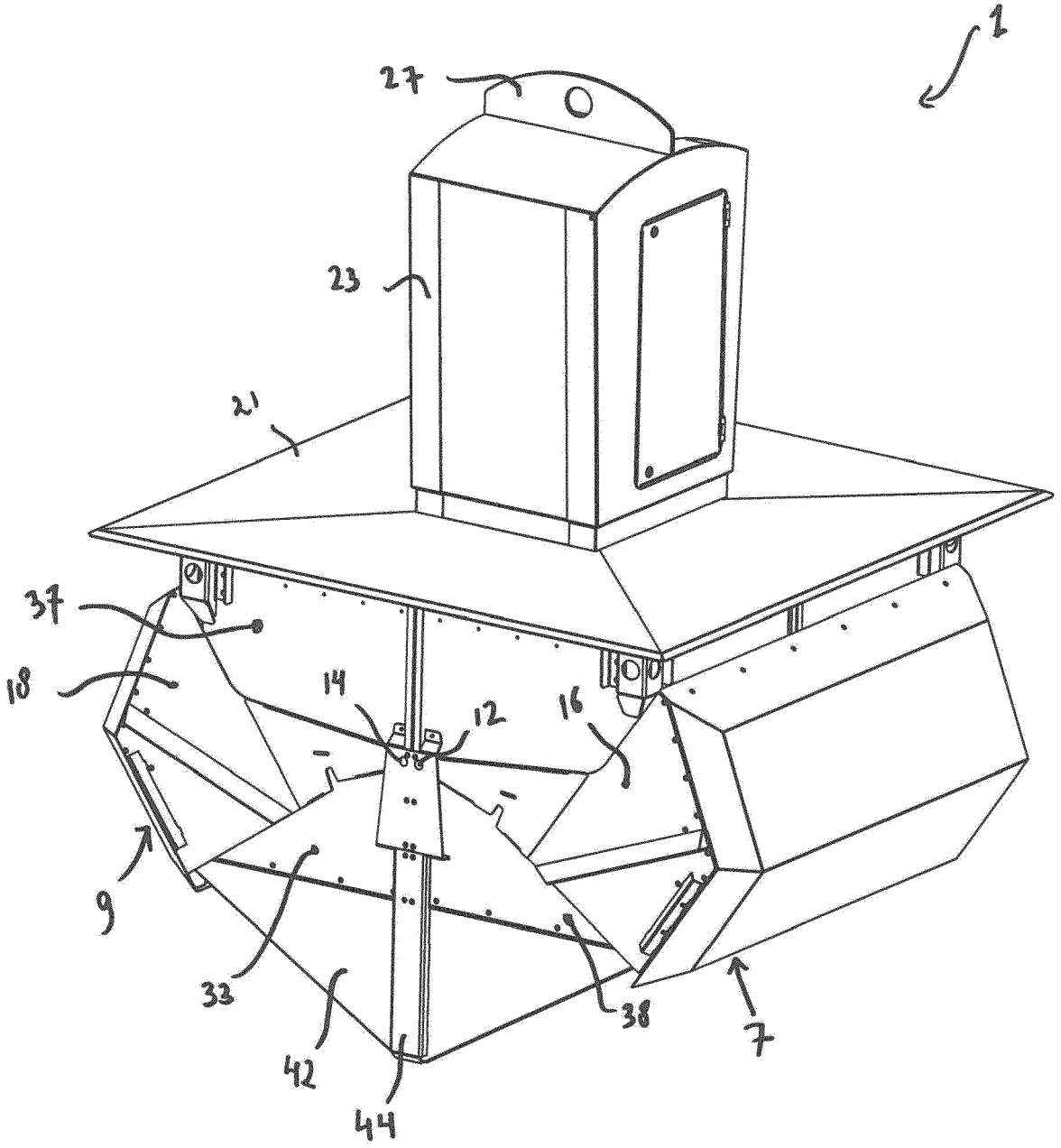

FIG. 4

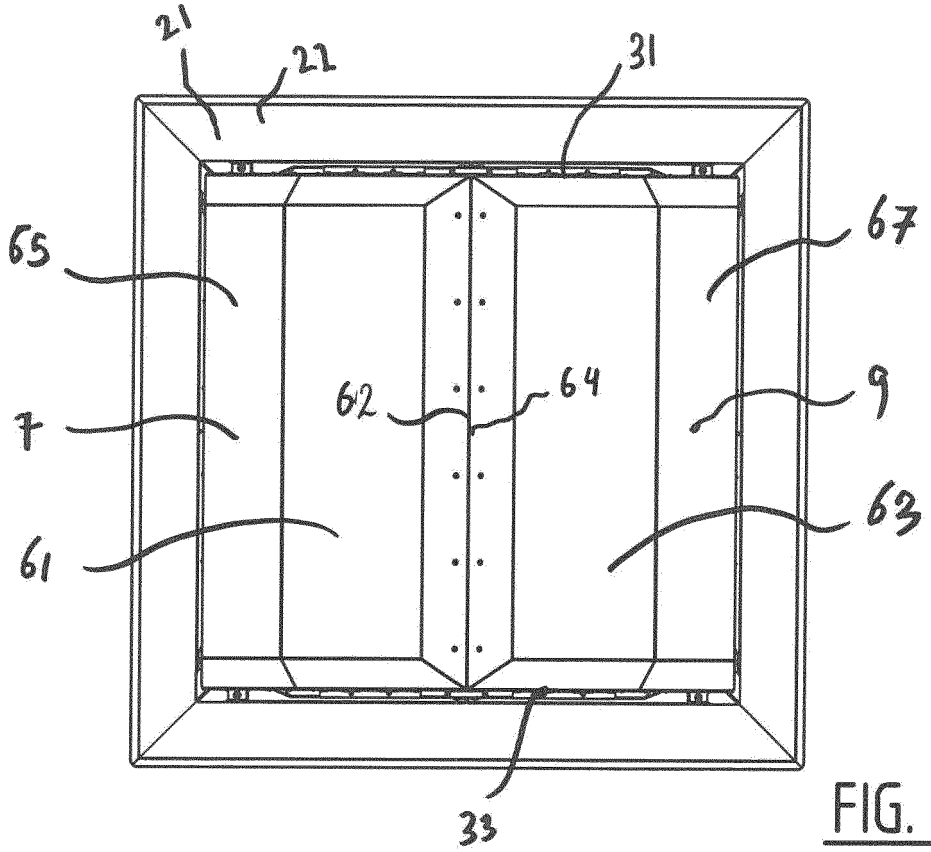

FIG. 5

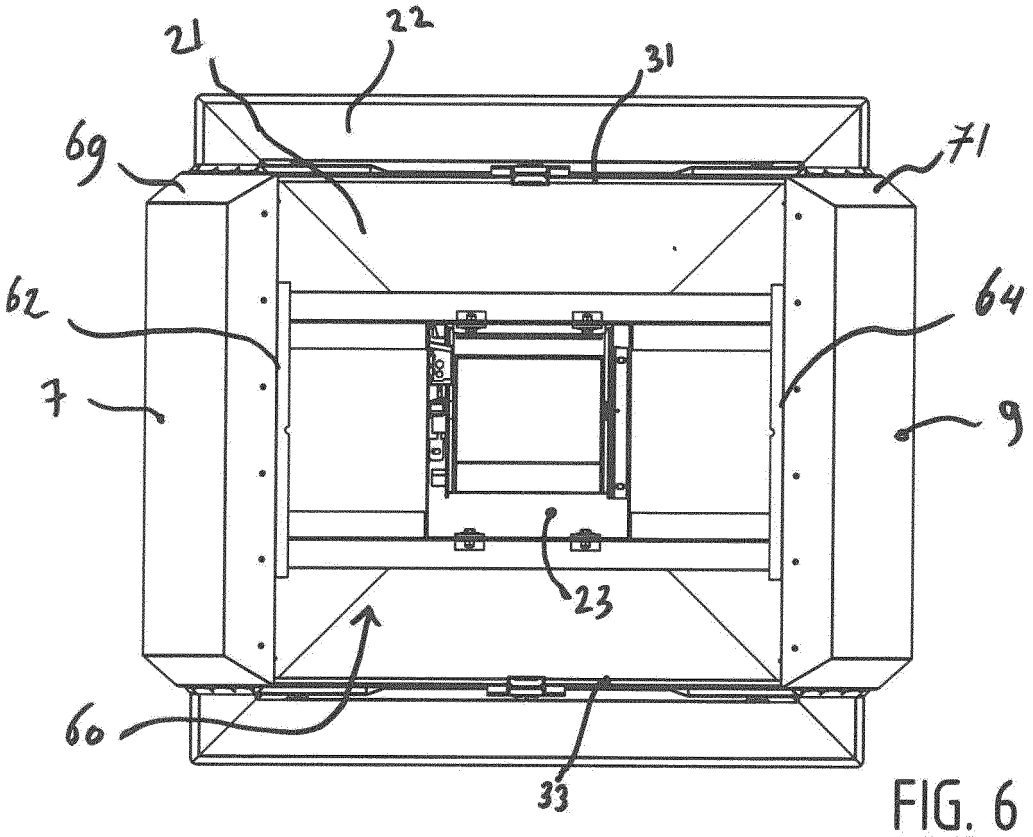

FIG. 6

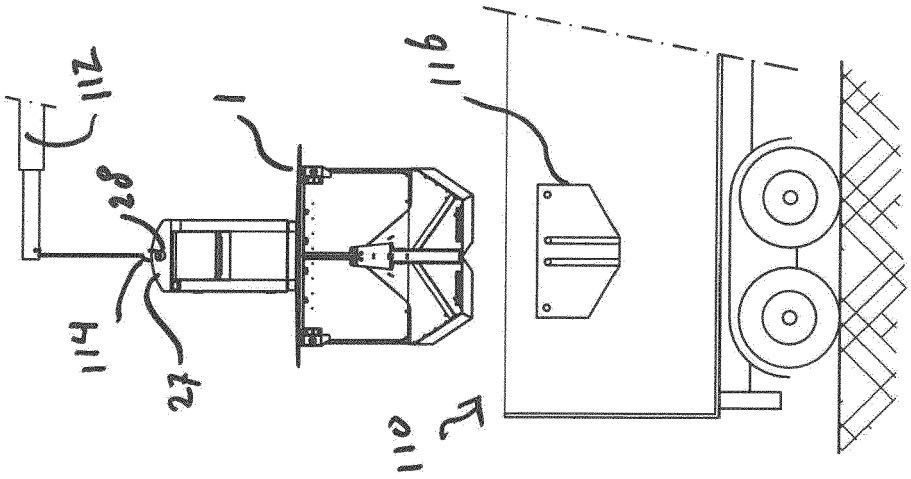

FIG. 9

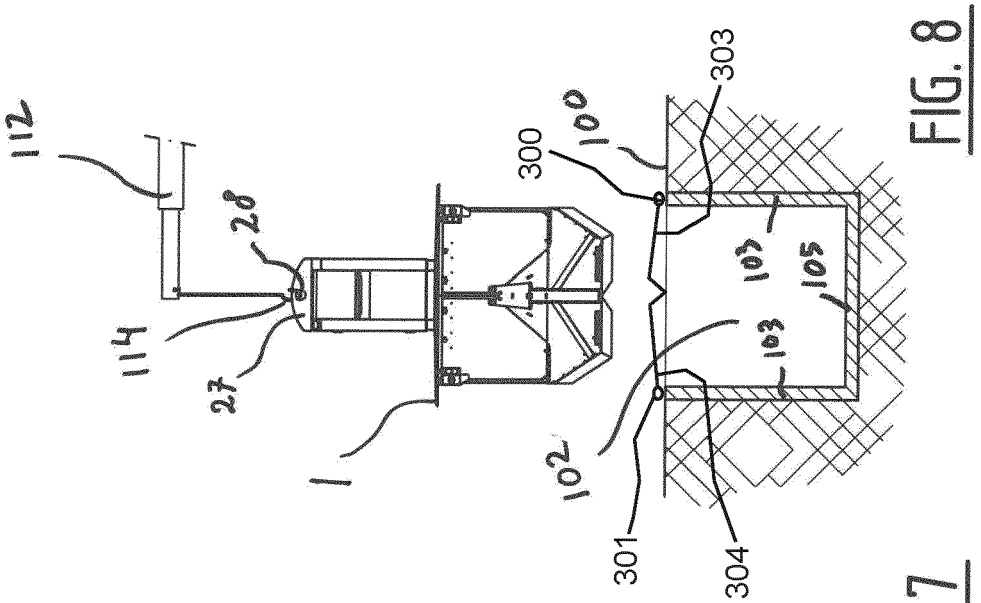

FIG. 8

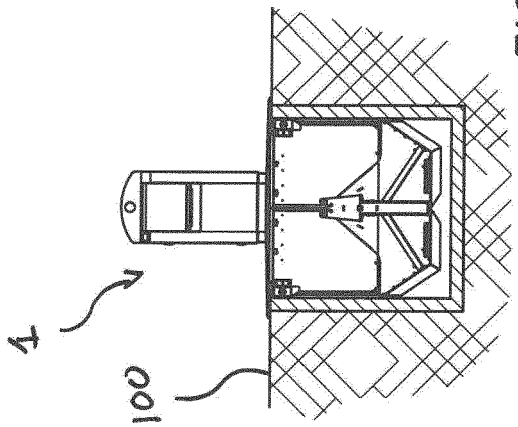

FIG. 7

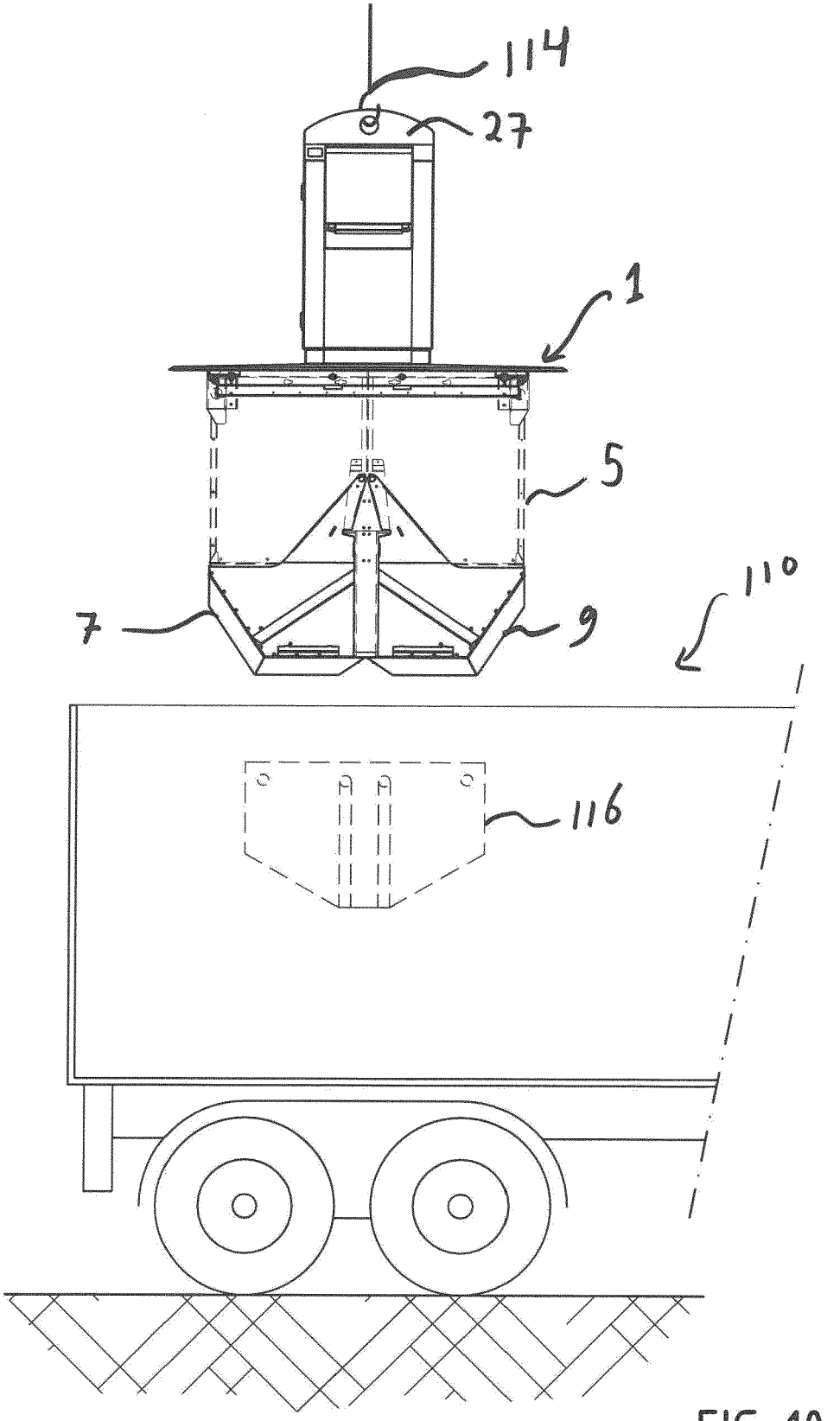

FIG. 10

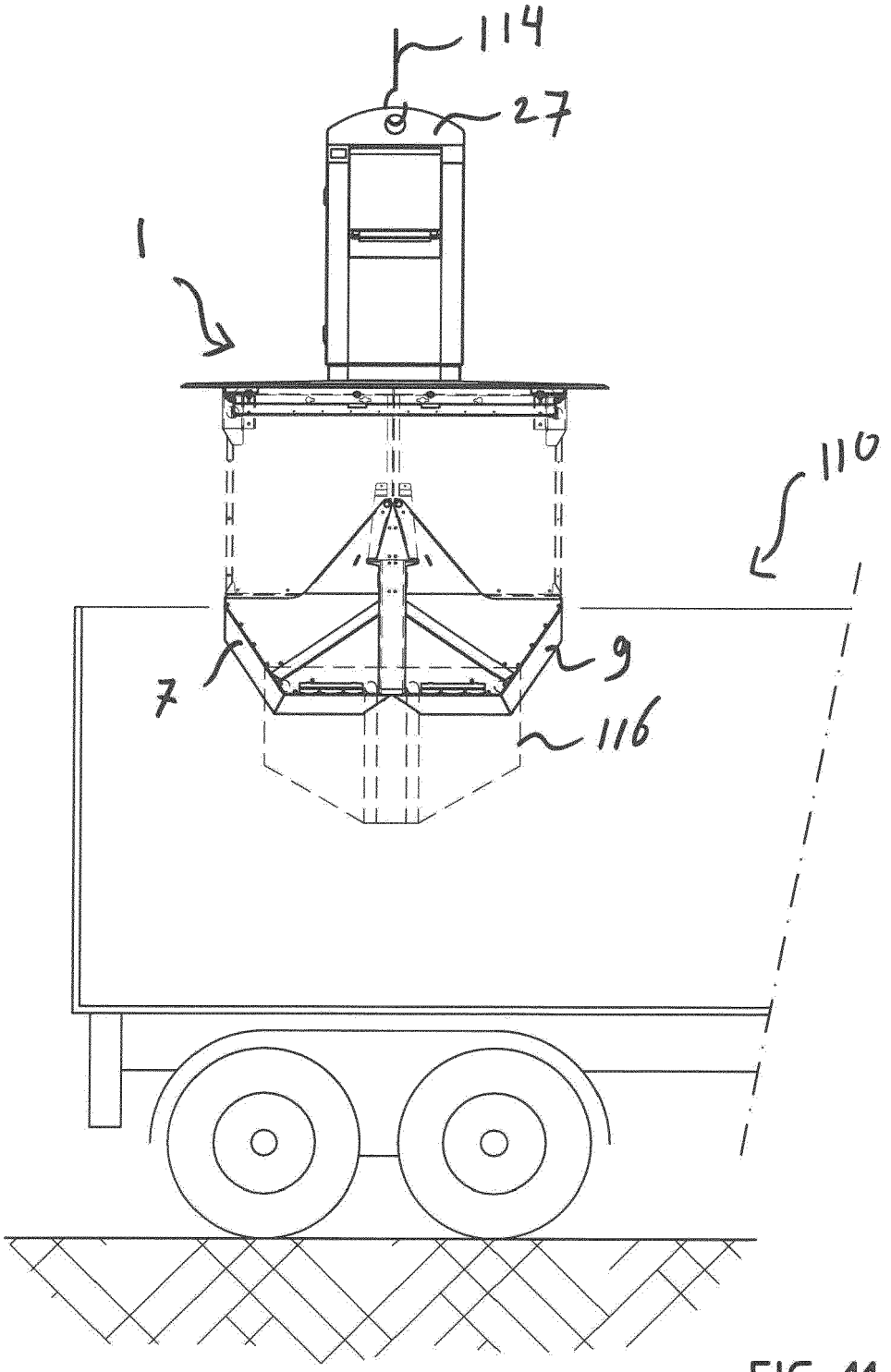

FIG. 11

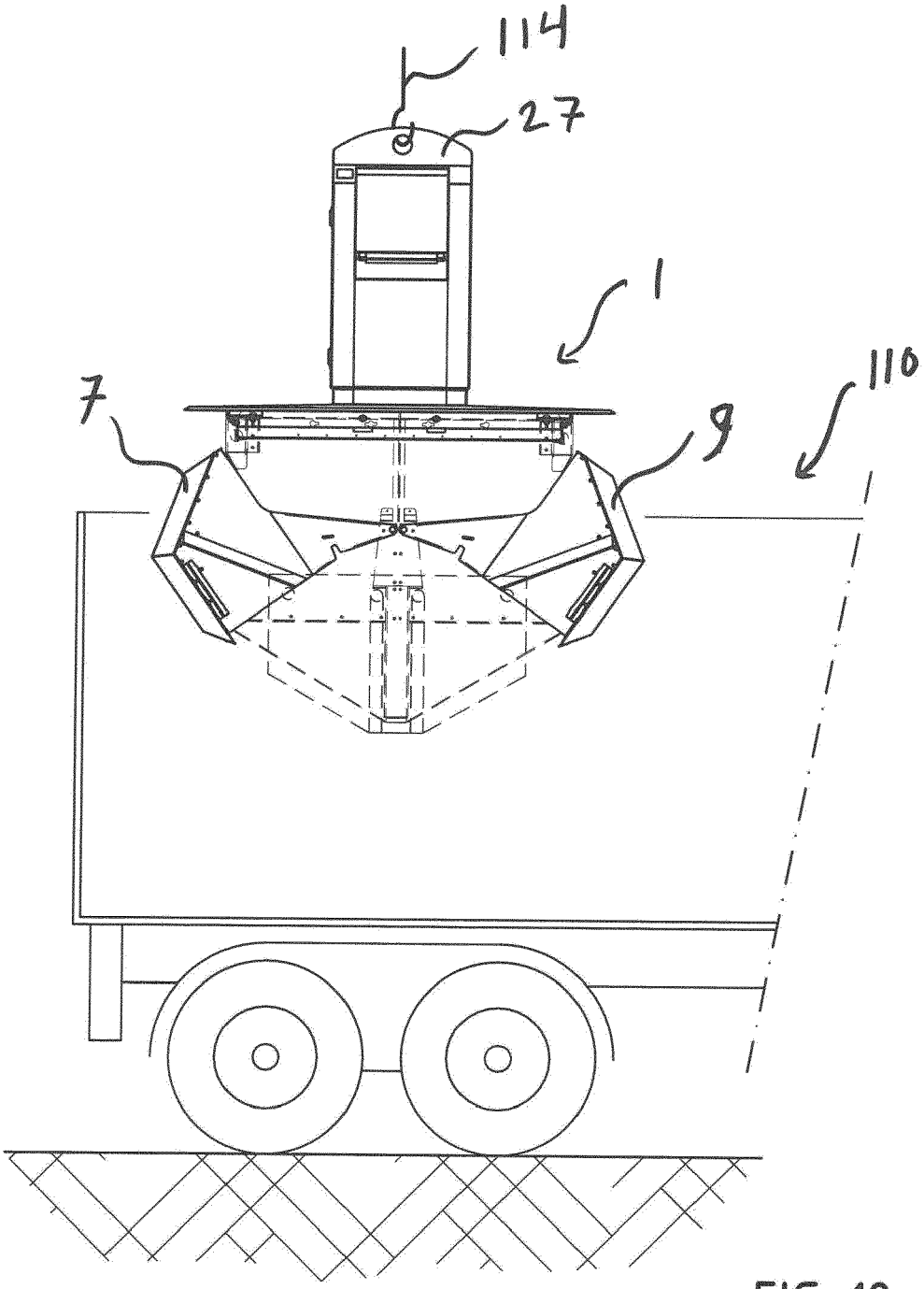

FIG. 12

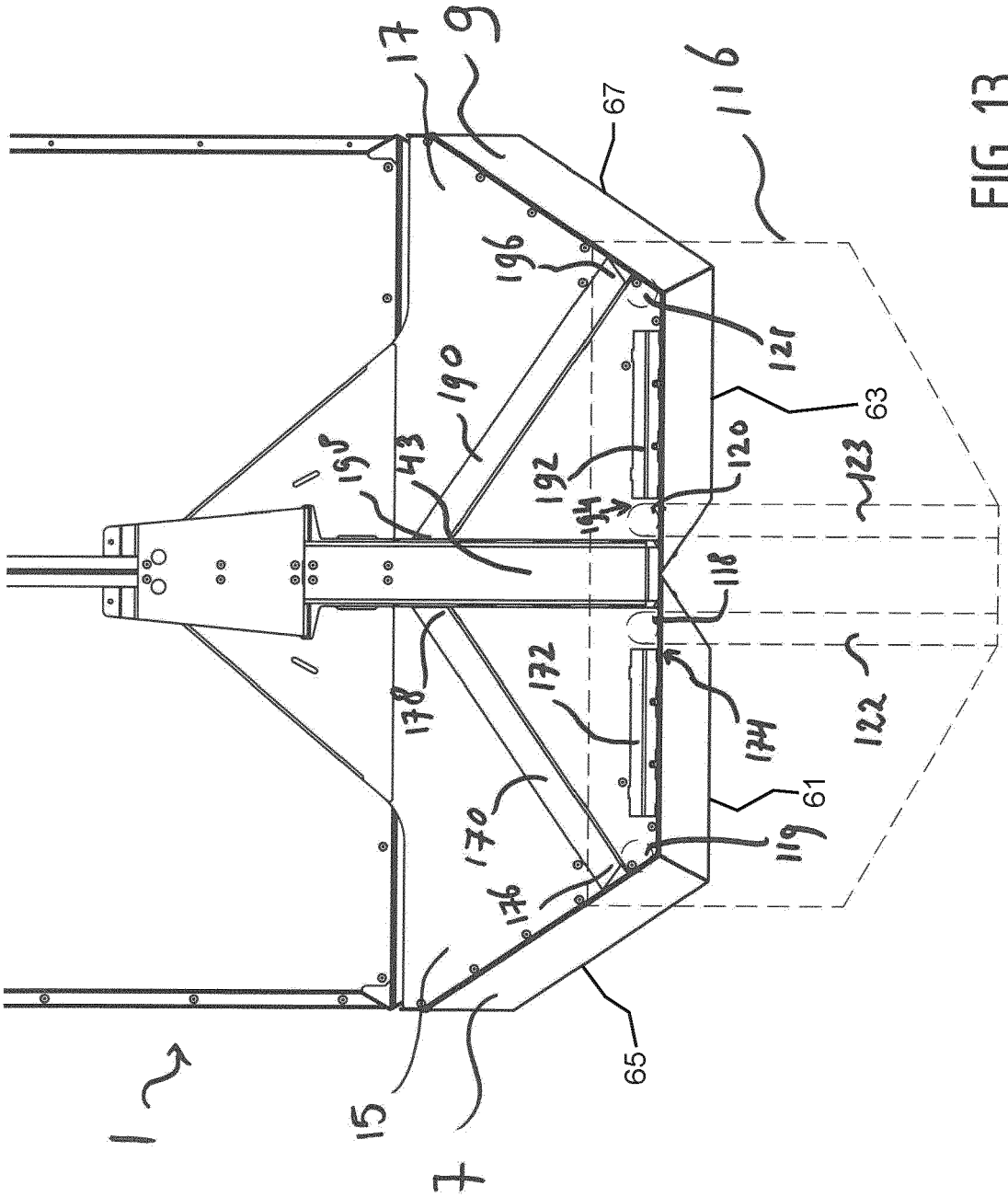
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FIG. 13

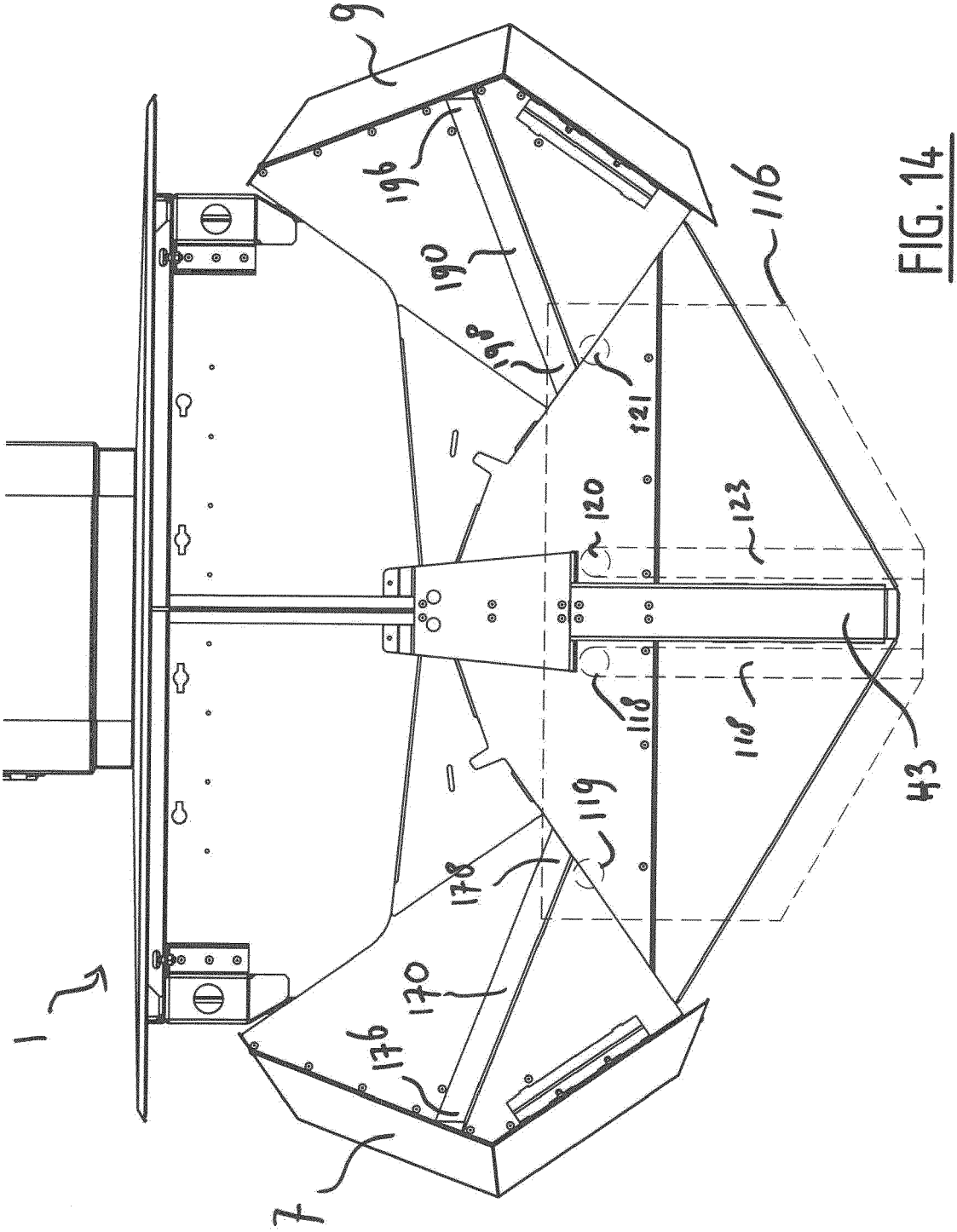

FIG. 14

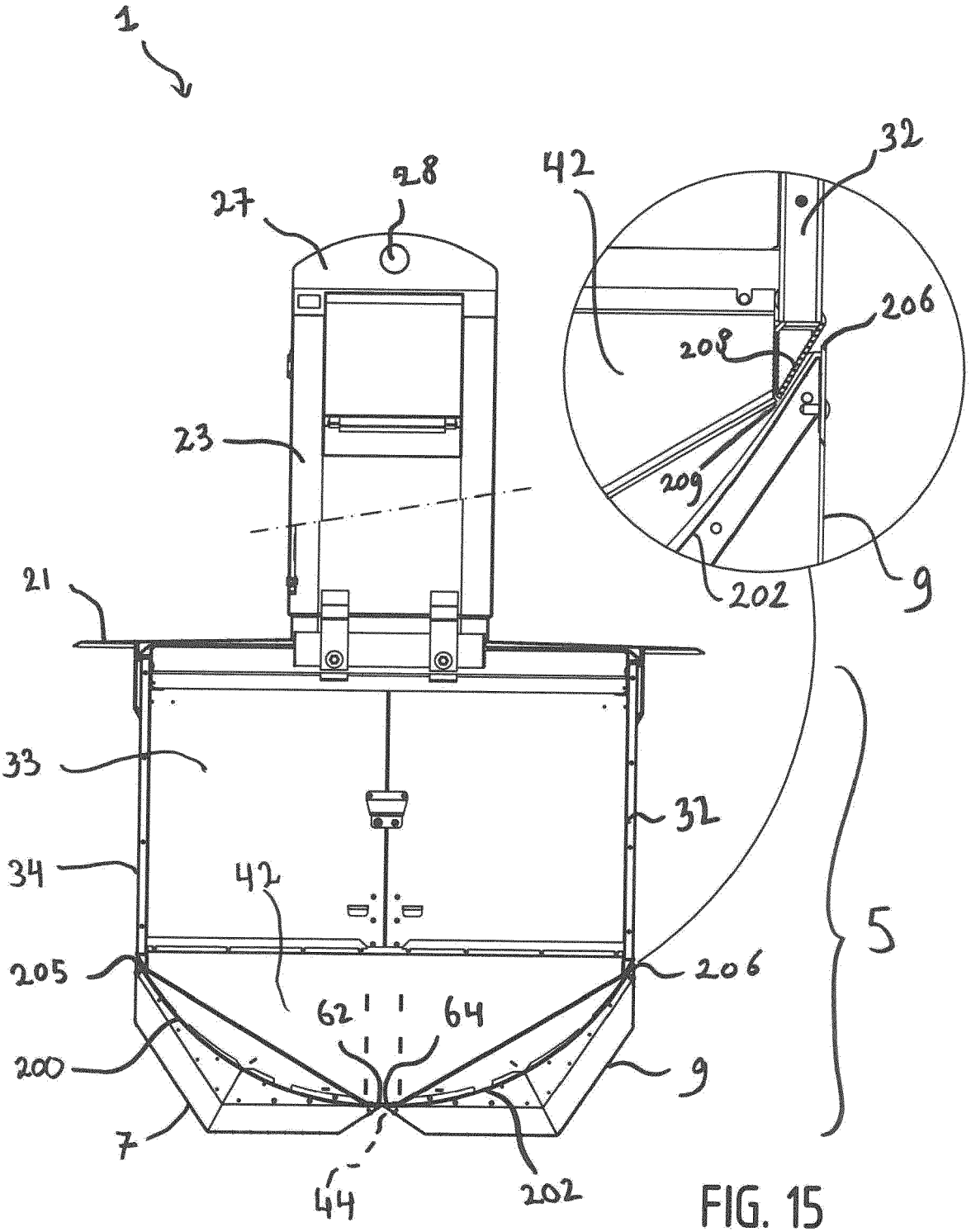
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FIG. 15

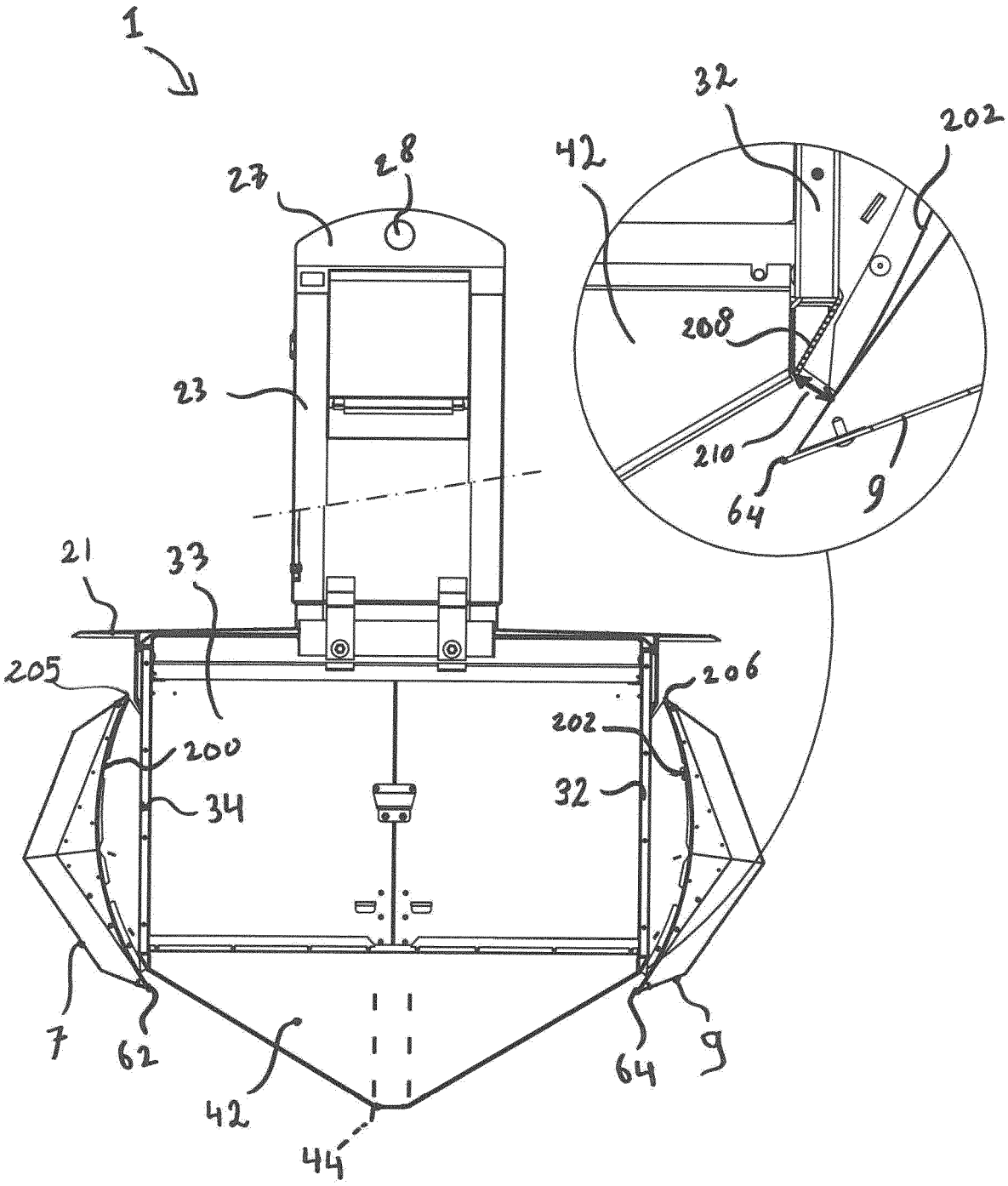
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FIG. 16

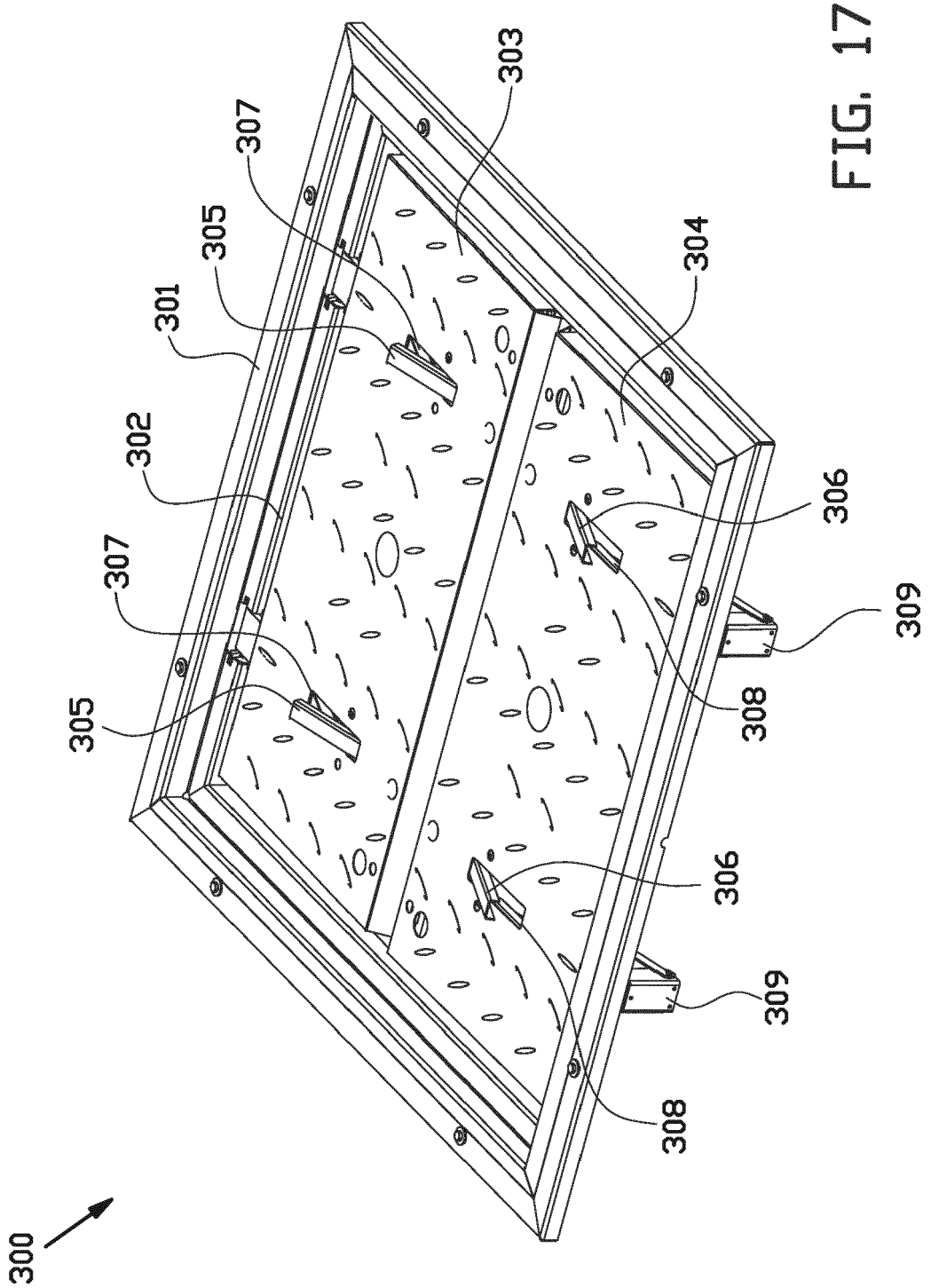

FIG. 17

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EUROPEAN SEARCH REPORT

Application Number
EP 20 17 2370

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 461 664 A1 (OHEIX MICHEL) 6 February 1981 (1981-02-06) * page 2, line 33 - page 3, line 6 * * page 5, line 5 - line 22 * * page 6, line 31 - line 40; figures 1-10 *	1-4,6,7, 9,11-15	INV. B65F1/14 B65F1/12 B65F3/02
X	FR 2 625 734 A1 (SEMAT [FR]) 13 July 1989 (1989-07-13) * page 4, line 33 - page 5, line 9 * * page 5, line 30 - page 6, line 9 * * page 6, line 31 - page 8, line 2; figures 1-4 *	1-7,9, 11-15	
X	DE 43 36 146 C1 (FALTER RITA [DE]; FEHR HARTMUT E [DE]) 27 April 1995 (1995-04-27) * column 1, line 49 - column 3, line 10; figures 1-3 *	1,2,5, 9-14	
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A	* page 3, line 22 - page 4, line 8; figures 1-5 *	1-10,14, 15	B65F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 September 2020	Wartenhorst, Frank

CATEGORY OF CITED DOCUMENTS

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EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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- DE 4336146 **[0009]**