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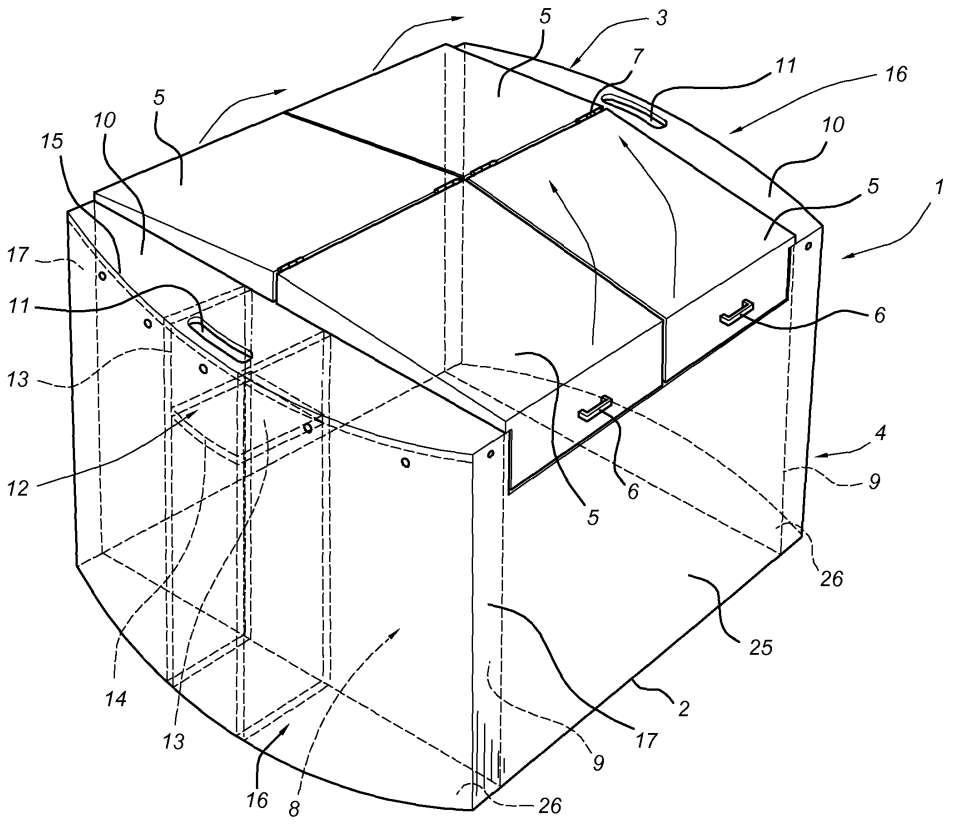
(54) **Refuse collection system and container therefore**

(57) The invention is related to a refuse collection system, comprising a refuse collection container (1), a lifting device (19) and a ground surface (23), said refuse collection container (1) comprising a supporting base (2) supported on the ground surface (23), a top (3), a circumferential wall (4) extending between the base (2) and the top (3), which base (2), top (5) and circumferential wall (4) define a refuse collection chamber (8), and a closeable opening for deposing refuse in the chamber (8), said refuse collection container (1) and lifting device (19) comprising coupling means (10,11,21,22) which are activatable for coupling the refuse collection container (1) and the lifting device (19) to each other for emptying the refuse collection container (1). The coupling means are of a bayonet type (11,21).

Fig 1



EP 2 107 015 A1

Description

[0001] The invention is related to a refuse collection system, comprising a refuse collection container, a lifting device and a ground surface, said refuse collection container comprising a supporting base supported on the ground surface, a top which extends above the ground level while the base is supported on the ground surface, a circumferential wall extending between the base and the top, which base, top and circumferential wall define a refuse collection chamber, and a closeable opening for deposing refuse in the chamber, said refuse collection container and lifting device comprising coupling means which are activatable for coupling the refuse collection container and the lifting device to each other for emptying the refuse collection container.

[0002] Such refuse collection systems are widely known. The prior art refuse collection systems are usually applied for handling relatively large amounts of refusal, for instance in public areas. Also applications in industrial environments are known. The refuse collection containers are positioned on a surface, in such a way that the refuse collection opening is accessible to the public. The covering of the refuse collection opening should thus be readily accessible, which is the case when said covering is at a level of for instance about 1 to 1,5 meter above the surface. A refuse collection system of this type is disclosed in DE-U-29705938.

[0003] Further refuse collection systems are known according to which the refuse collection container is fully contained in a bunker below ground level. Via a column on the lid which closes the bunker on the top side, refuse can be collected in the refuse collection container which is open at the top side and which therefore does not comprise a cover itself. Such type of refuse collection system is outside the scope of the present invention. An example of such refuse collection system is disclosed in EP-A-1679271.

[0004] For the purpose of emptying the refuse collection container, several systems are known. Usually these entail a refuse collection vehicle which carries a lifting device which is able to grip the refuse collection container, to lift it and to turn it upside down above the hold of the refuse collection vehicle so as to transfer the collected refuse from the refuse collection container to said hold.

[0005] Although these prior art systems are widely applied, nevertheless some disadvantages are connected thereto. These disadvantages are related to the way in which the refuse collection containers are connected to the lifting device. This coupling generally allows quite some play, which makes the lifting and turning over of the refuse collection containers, for the purpose of emptying, not quite convenient. Moreover, this process is accompanied by noise generation, which makes the prior art refuse collection system less fit for the specific applications, such in crowded areas.

[0006] The object of the invention is therefore to provide a refuse collection system by means of which a better coupling can be obtained between the refuse collection container and the lifting device. Said object is achieved by the step of applying bayonet type coupling means. The application of bayonet type coupling means has several advantages. First of all, such a coupling means can be carried out in a way which provides a sturdy, stiff connection between the refuse collection container and the lifting device. Thereby, the process of lifting and turning over the refuse collection container can be carried out in a reliable way, having regard to the absence of any play between the refuse collection container and the lifting device. Moreover, noise generation is suppressed largely by such stiff connection.

[0007] Furthermore, the bayonet type coupling means provides the possibility to approach the refuse collection container from several directions by means of the lifting device. This makes the proper positioning of the lifting device with respect to the refuse collection container more easy, which is favourable for a quick coupling process. Thus, the work of the operator which controls the coupling process is greatly simplified and moreover the cycle time of handling a refuse collection container for emptying thereof is shortened. Alternatively, the bayonet type coupling means makes it more attractive to apply an automatic coupling process, that is without control by an operator.

[0008] In particular, the refuse collection container may comprise coupling supports having longitudinal slots, and the lifting device may comprise rotatable locking members having a longitudinal shape, said locking members being insertable through a corresponding coupling support slot each and being rotatable so as to hook behind the coupling supports. With the aim of further simplifying the process of coupling the lifting device onto the refuse collection container, the slots may have a curved shape, the radius of the curvature being an order of magnitude larger than the length of said slots.

[0009] By virtue of this curvature, coupling between the refuse collection container and the lifting device can take place even in case the rotatable locking members are positioned somewhat at an angle with respect to the slots concerned. This is obtained by the fact that the curvature may provide the rotatable members with an initial coupling within a certain range of play, in such a way that the rotatable members are guided further into the slots for a complete coupling.

[0010] Preferably, the coupling supports are positioned on opposite sides of the refuse collection chamber, a skirt being provided on each of these sides and the coupling supports each extending between a side and a respective skirt. These skirts have the function of shielding the coupling supports, which protrude with respect to the refuse collection chamber, in such a way that the users of the refuse collection container are not harmed by said protruding parts, or soiled thereby. After all, the refuse collection container is placed on the surface of a specific area where the users have access so as to dispose of their garbage.

[0011] Furthermore, the skirts may comprise end strips which are oriented perpendicular with respect to, and which are connected to, a respective side of the refuse collection chamber. Furthermore, the coupling supports may comprise a support plate each which is connected to a respective side of the refuse collection chamber at approximately right angles with respect to said side, the slots being provided in said support plates.

[0012] The lifting device may comprise counter supports which are positioned against the support plates for providing a stiff connection between the lifting device and the refuse collection container when the coupling means are in the activated condition. As mentioned before, said the lifting device approaches the support plates from above during the process of coupling. Finally, the coupling means abut or even collide against the support plates, and subsequently the coupling means are pressed firmly onto said support plates so as to enable the twist lock couplings to become activated. The downward forces exerted by the coupling means can therefore be considerable. Moreover, as the weight of the refuse collection container, together with collected refuse, may be considerable, the coupling members should be of a sturdy character. With the aim of providing sufficient resistance against such coupling forces and loadings, several types of reinforcements can be applied to the refuse collection container.

[0013] As mentioned before, the coupling means may approach the container from several directions. In a first embodiment, the direction of approach is vertical from above. To that end, the coupling supports comprise a support plate each, connected to a respective side of the refuse collection chamber at approximately right angles with respect to said side and parallel to the base, the slots being provided in said support plates.

[0014] According to a second possibility, the coupling means may approach the container in horizontal direction towards a side thereof. In this connection, the coupling supports comprise an end strip each connected to a respective side of the refuse collection chamber at approximately right angles with respect to said side and the base of the refuse collection chamber, the slots being provided in said end strips.

[0015] Fixed reinforcements may be provided which are each connected to the underside of a respective support plate of skirt and to the respective side. Furthermore, each reinforcement may comprise vertical respective horizontal stiffening plates extending between the underside of a respective support plate and the support base respective between the sides. These reinforcements provide a load path by means of which the coupling forces exerted on the coupling plates can be transferred, e.g. to the support base and thereby to the ground surface. Moreover, stiffening plates provide the refuse collection container with a sturdy character so as to cope with the loadings of the refuse collected therein.

[0016] According to a further possibility, displaceable reinforcements are provided, said displaceable reinforcements each extending in vertical direction in line with a respective longitudinal slot and comprising an upper control part and a lower foot part, said displaceable reinforcements having a rest position in which the lower foot part is at a distance above the ground surface and the upper control part protrudes in upward direction through the corresponding longitudinal slot, and an activated position in which the lower foot part rests upon the ground surface and the upper control part is at a distance beneath the corresponding longitudinal slot.

[0017] Such displaceable reinforcements can be activated by means of the lifting device. In this connection, the upper control part comprises an upper control surface against which a corresponding locking member is resting, a distance of the upper control surface of the upper control part beneath the corresponding longitudinal slot being generally equal to the thickness of the corresponding locking member.

[0018] Thus, after the twist lock type coupling means have been applied, at the same time the displaceable reinforcements are activated so as to transfer the coupling forces to the ground surface. These coupling forces are directed downwardly, and possibly would expose the refuse collection container to undesirable loadings. Such kind of reinforcements are in particular useful in case the refuse collection container comprises wheels which are positioned beneath the supporting base. As the coupling forces a are transferred by means of the activated reinforcements, the vulnerable wheels are protected against overloadings.

[0019] The top may be provided with all kinds of closeable openings, depending on the use of the refuse collection chamber and the ease of handling desired. In particular the top may be provided with at least one refuse collection opening and at least one lid for opening respectively closing said refuse collection opening. Such lid can have a handle which may be gripped by a user at a convenient eight, for instance 1 to 1,5 metres above the surface supporting the refuse collection container. Furthermore, for ease of handling and accessibility the lid may extend up to a transverse side of the refuse collection chamber, a hand grip being provided at said lid bordering said side. According to a variant, two opposite lids may be are provided, said lids being hingeably supported in the middle of the refuse collection chamber between two opposite sides of the refuse collection chamber. Thus, the refuse collection container is accessible from two sides. Usually, the lifting device is mounted on a refuse collection vehicle provided with a refuse collection hold.

[0020] The invention is furthermore related to a refuse collection container for the refuse collection system described before, which refuse collection container comprises a supporting base, a top, a circumferential wall extending between the base and the top, which base, top and circumferential wall define a refuse collection chamber, and a closeable opening for deposing refuse in the chamber, said refuse collection container compris-

ing coupling means which are activatable to attach the refuse collection container to a lifting device for emptying the refuse collection container. According to the invention, the coupling means comprise elongate slots for use in a bayonet type coupling means.

[0021] The invention will allow further be described with reference to the refuse collection system as shown in the drawings.

Figure 1 shows the refuse collection container according to the invention.
Figure 2 shows the top view of the refuse collection container according to figure 1.
Figure 3 shows a side view of the refuse collection container according to figure 1.
Figures 4a-d show several phases of the refuse collection system according to the invention, during emptying of the refuse collection container according to figures 1-3.
Figure 5 shows a second embodiment of the refuse collection container.
Figures 6-8 show a third embodiment of the refuse collection container.
Figure 9 shows an alternative embodiment of the container according to figure 1.
Figure 10 shows an alternative embodiment of the container according to figure 6
Figure 11 shows an example of handling the container according to figures 9 and 10.

[0022] The refuse collection container 1 as shown in figures 1-3 comprises a supporting base 2 and a top which has been indicated with the reference 3 in general. Furthermore, the circumferentially extending wall 4 extends between the base 2 and the top 3. The top comprises a number of four lids 5, each provided with a handle 6 to be gripped by a user for opening the respective lid 5 around the hinge 7.

[0023] The base 2, the top 3 and the circumferential wall 4 define the refuse collection chamber 8. In particular, said refuse collection chamber 8 is delimited by two sides 9 and two transverse sides 25. Welded to the top of the sides 9 are the respective support plates 10, which each comprise a curved slot 11. At the location of these curved slots 11, each support plate 10 is reinforced by means of a box 12, comprising vertical stiffening plates 13 and a distance plate 14. The stiffening plates 13 are welded to the underside of the respective support plate 10, at opposite ends of the curved slot 11, as well as to a respective side 9 of the refuse collection chamber 8. The lower end of the stiffening plates 13 is welded to the projecting parts 26 of the supporting base 2. The distance plate 14 is positioned at the distance from the slot 11, and is welded to the lower edges of the stiffening plates 13.

[0024] As is clear from figure 1, the support plates each have a curved outer edge 15 onto which a similarly curved skirt 16 has been welded. Said curved skirt 16 has end strips 17, which on the one hand are welded to the curved skirt 17 and on the other hand to the refuse collection chamber 8.

[0025] Now turning to the phases as shown in figures 4a-b, the refuse collection container 1 is shown, as well as a refuse collection vehicle 18 which is provided with a lifting device 19. Both the refuse collection device 1 and the vehicle 18 are positioned on a ground surface 23. Said lifting device has an articulated arm 20, the free end of which is provided with elongate rotatable locking members 21 as well as counter supports 22. In full, two of such rotatable locking members 21 and counter supports 22 are provided next to each other on the lifting device 19.

[0026] In the phase shown in figure 4a, the lifting device 19 has been manipulated in such a way that the rotatable locking members 21 each have been inserted into a respective curved slot 11 of the refuse collection container 1, and have subsequently been rotated over 90° so as to grip behind the support plate 10 according to a generally known bayonet fitting. By lifting the arm 19 to the position shown in figure 4a, the refuse collection container 1 is slightly tilted towards the hold 24 of the refuse collection vehicle 18. Upon further moving the arm and 19 to the position as shown in figure 4c, the refuse collection container 1 is overturned above the hold 24. Under the influence of gravity, the lids 5 (or 32, see figure 5) pivot to the open position, after which the refuse collected in the refuse container 1 is dropped into the hold 24.

[0027] By reversing the movements of the lifting device 19, the refuse collection container is swung back and repositioned on the ground surface 23. During all these movements, the bayonet type coupling means in combination with the support plates 10 and the counter supports 22 provide a firm grip of the lifting device 19 so as to ensure a stable and play free movement of the refuse collection container 1.

[0028] As shown in figure 4d, the refuse collection container 1 can also be accommodated in a recessed area 40, the container base being down below the ground surface 23. However, the top is still at their sufficient level above the ground surface 23, so as to enable users to dispose of their garbage in a convenient way.

[0029] The refuse collection container 1 as shown in figure 5 comprises two lids 5, which each can be equipped with an electronic access device. Furthermore, solar cells may be present as well as a battery for powering such electronic access device. By presenting a badge near the electronic access device, a customer may obtained access by either opening the lid by hand, or by means of an automatically actuated lid. A filling segment may be present beneath the lid for the purposes of the limiting the amount of refuse which can be deposed each time.

[0030] Furthermore, said refuse collection container is equipped with an emptying lid 32, provided with a tumbling lock 33. Said tumbling lock is permanently locked in the nominal position of the refuse collection container.

After turning over the refuse collection container by means of the lifting device of the refuse collection vehicle, said tumbling lock automatically disengages and releases the emptying the lid so as to depose the refuse collected in the container into the hold of the refuse collection device.

[0031] The container as shown in figures 6-8 comprises wheels 31. Although said wheels 31 are strong enough for handling the container in normal use, they are vulnerable with respect to the coupling forces which are exerted by the lifting device on top of the supporting plates 10. For the purpose of transferring these forces to the ground surface other than by the wheels 31, the displaceable reinforcements 27 are provided. These displaceable reinforcements 27 are guided in vertical direction by means of the guides 35. Through the springs 36 the reinforcements 27 are biased in upward direction. Thus, in the rest position the upper control part 28 projects above the slot 11. Moreover, the foot part 29 is at a distance above the ground surface 23.

[0032] Upon approaching the refuse collection container by means of the lifting device, the locking members 21 of the counter supports 22 come into contact with the upper surface 30 half the upper control part 28. Next, upon further lowering the lifting device, the reinforcement is 27 are pushed in downward direction, against the bias of the springs 36. Finally, the footpath 29 ends up on the ground surface 23, and the upper control parts 28 at a distance beneath the slot 11. The locking members 21 are then rotated. The forces which are generated by the lifting device at this face on the top side of the refuse collection container, are however transferred to the ground surface 23 through the reinforcements 27, in such a way that the wheels 31 are not exposed to these relatively high forces.

[0033] In the embodiments of figures 9-11, the curved slots 11 are provided in the end strips 17. As shown in figure 11, the lifting device 19 may thus approach the container 1 or 1' from the side.

[0034] Furthermore, the refuse collection containers described before may be provided with a monitoring system for monitoring the degree of filling. Such monitoring system may for instance make use of GPRS. These kind of components may be accommodated in the space behind one of the skirts.

Claims

1. Refuse collection system, comprising a refuse collection container (1), a lifting device (19) and a ground surface (23), said refuse collection container (1) comprising a supporting base (2) supported on the ground surface (23), a top (5) which extends above the ground level while the base (2) is supported on the ground surface (23), a circumferential wall (4) extending between the base (2) and the top (5), which base (2), top (5) and circumferential wall (4) define a refuse collection chamber (8), and a closeable opening for deposing refuse in the chamber (8), said refuse collection container (1) and lifting device (19) comprising coupling means (10, 11, 21, 22) which are activatable to attach the refuse collection container (1) and the lifting device (19) to each other for emptying the refuse collection container (1), **characterised in that** the coupling means comprise bayonet type coupling means (11,21).

2. System according to claim 1, wherein the refuse collection container (1) comprises coupling supports (10, 17) having longitudinal slots (11), and the lifting device (19) comprises rotatable locking members (21) having an elongated shape, said locking members (21) being insertable through a corresponding coupling support slot (11) each and being rotatable so as to hook behind the coupling supports (10, 17).

3. System according to claim 2, wherein slots (11) have a curved shape, the radius of the curvature being an order of magnitude larger than the length of said slots (11).

4. System according to claims 2 or 3, wherein the coupling supports (10, 17) are positioned on opposite sides (9) of the refuse collection chamber (8), a skirt (16) being provided over each of these sides (9) and the coupling supports (10, 17) each extending between a side (9) and a respective skirt (16).

5. System according to claim 4, wherein the skirts (16) have a convex outside surface.

6. System according to claim 4 or 5, wherein the coupling supports comprise an end strip (17) each, connected to a respective side (9) of the refuse collection chamber (8) at approximately right angles with respect to said side (9) and the base (2) of the refuse collection chamber, the slots (11) being provided in said end strips (17).

7. System according to any of claims 4-6, wherein the coupling supports comprise a support plate (10) each, connected to a respective side (9) of the refuse collection chamber (8) at approximately right angles with respect to said side (9) and parallel to the base (2), the slots (11) being provided in said support plates (10).

8. System according to any of claims 2-8, wherein the lifting device (19) comprises counter supports (22) which are positioned against the coupling supports (10) for providing a stiff connection between the lifting device (19) and the refuse collection container (1) when the coupling means (10, 11, 21, 22) are in the activated condition.

9. System according to any of claims 4-8, wherein fixed reinforcements (12) are provided which are each connected to the underside of a respective support plate (10) or skirt (16) and to a respective side (39).

10. System according to claim 9, wherein each reinforcement (12) comprises stiffening plates (13) one edge of which is connected to the underside of a respective support plate (10) and which extend in downwardly from said respective support plate (10).

11. System according to claim 10, wherein the stiffening plates (13) are connected to the respective side (9) of the refuse collection chamber (8).

12. System according to claim 10 or 11, wherein the supporting base (2) projects with respect to the sides (9) of the chamber (8), the bottom part of the stiffening plates (13) being connected to the projecting parts (26) of the supporting base (2).

13. System according to any of claims 10-12, wherein a distance plate (14) is connected between the stiffening plates (13).

14. System according to any of claims 10-13 when dependant on claim 2 or 3, wherein the stiffening plates (13) enclose the longitudinal slots (12).

15. System according to any of claims 4-8 when dependant on the claims 2 or 3, wherein displaceable reinforcements (27) are provided, said displaceable reinforcements each extending in vertical direction in line with a respective longitudinal slot (12) and comprising an upper control part (28) and a lower foot part (29), said displaceable reinforcements (27) having a rest position in which the lower foot part (29) is at a distance above the ground surface (23) and the upper control part (28) protrudes in upward direction through the corresponding longitudinal slot (12), and then activated position in which the lower foot part (29) rests upon the ground surface (23) and the upper control part (28) is at a distance beneath the corresponding longitudinal slot (11).

16. System according to claim 15, wherein the upper control part (28) comprises an upper control surface (30) against which a corresponding locking member (21) is resting, a distance of the upper control surface (30) of the upper control part (28) beneath the corresponding longitudinal slot (11) being generally equal to the thickness of the corresponding locking member (21).

17. System according to claim 15 or 16, wherein the refuse collection container (1) comprises wheels (31) which are positioned beneath the supporting base (2).

18. System according to any of the preceding claims, wherein the top (3) is provided with at least one refuse collection opening and at least one lid (5) for opening respectively closing said refuse collection opening.

19. System according to claim 18, wherein the lid (5) extends up to a transverse side (25) of the refuse collection chamber (8), a hand grip (6) being provided at the lid near said bordering said transverse side.

20. System according to claims 18 or 19, wherein two opposite lids (5) are provided, said lids being hingeably supported in the middle of the refuse collection chamber (8) between two opposite transverse sides (25) of the refuse collection chamber (8).

21. System according to claim is 18 or 19, wherein an emptying lid (32) is provided, said lid being helping closed position by means of a tumbling lock (33), said tumbling lock (33) being locked in the nominal position of the refuse collection container (1) and being released in the turned over position thereof for emptying the contents of the refuse collection container (61).

22. System according to any of the preceding claims, wherein the lifting device (19) is mounted on a refuse collection vehicle (18) provided with a refuse collection hold (24).

23. System according to any of the preceding claims, wherein the ground surface (23) is level with respect to ground level.

24. System according to any of claims 1-22, wherein the ground surface is countersunk (40) with respect to ground level (23) over a distance which is at most equal to half the height of the refuse collection container (1).

25. System according to claims 6 and 8, wherein fixed reinforcements are provided which extend between opposite end strips (17).

26. Refuse collection container (1) for a refuse collection system according to any of the preceding claims, comprising a supporting base (2), a top (3), a circumferential wall (4) extending between the base (2) and the top (3), which base, top and circumferential wall define a refuse collection chamber (8), and a closeable opening for deposing refuse in the chamber (8), said refuse collection container (1) comprising coupling means (10, 11, 21, 22) which are activatable to attach the refuse collection container (1) to a lifting device (19) for emptying the refuse collection container (1),
characterised in that the coupling means comprise

elongate slots for use in a bayonet type coupling means (11, 21).

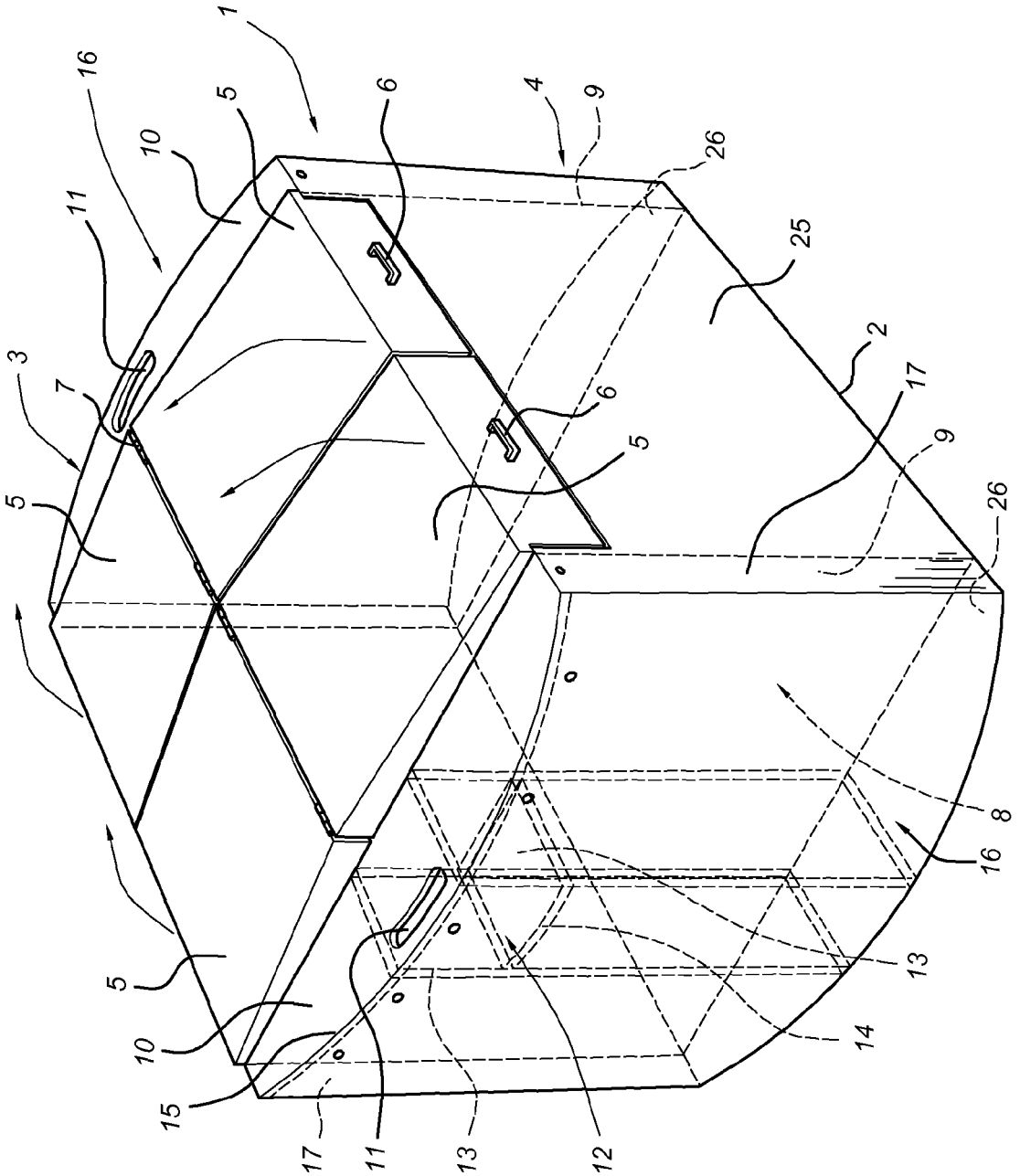


Fig 1

Fig 2

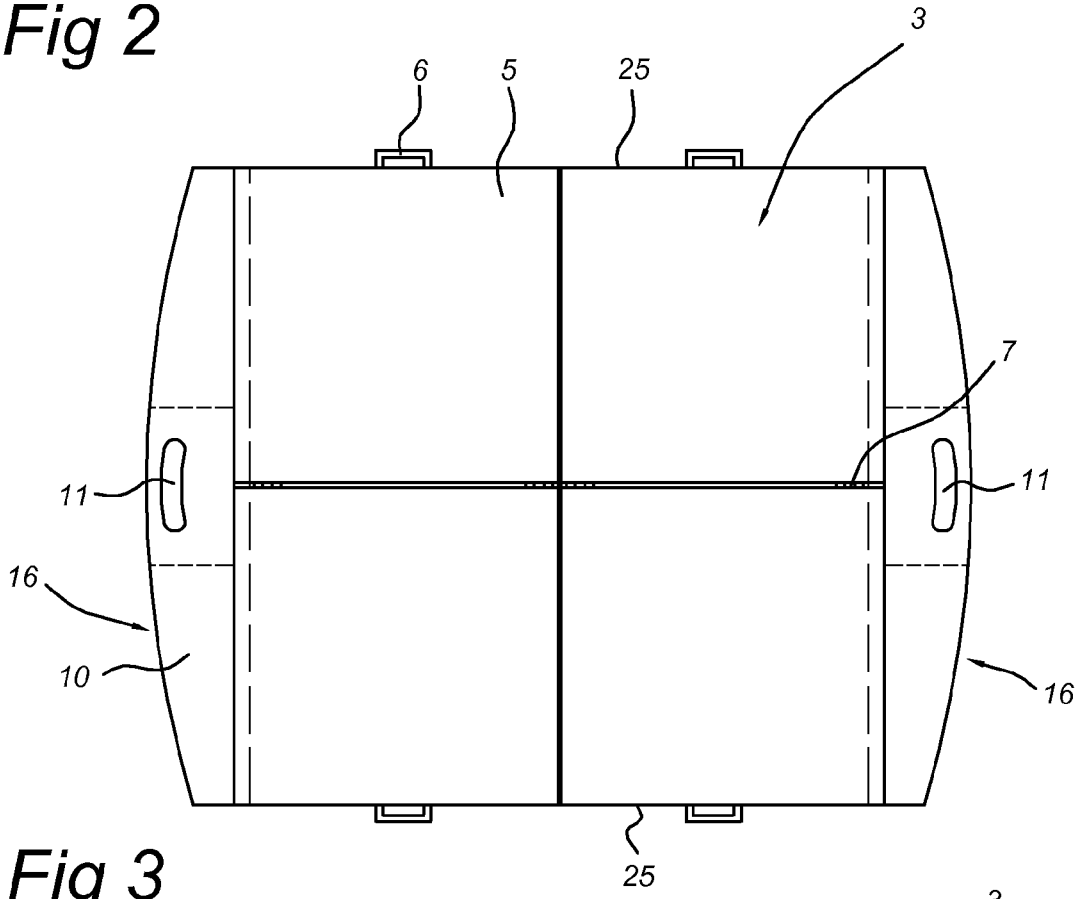


Fig 3

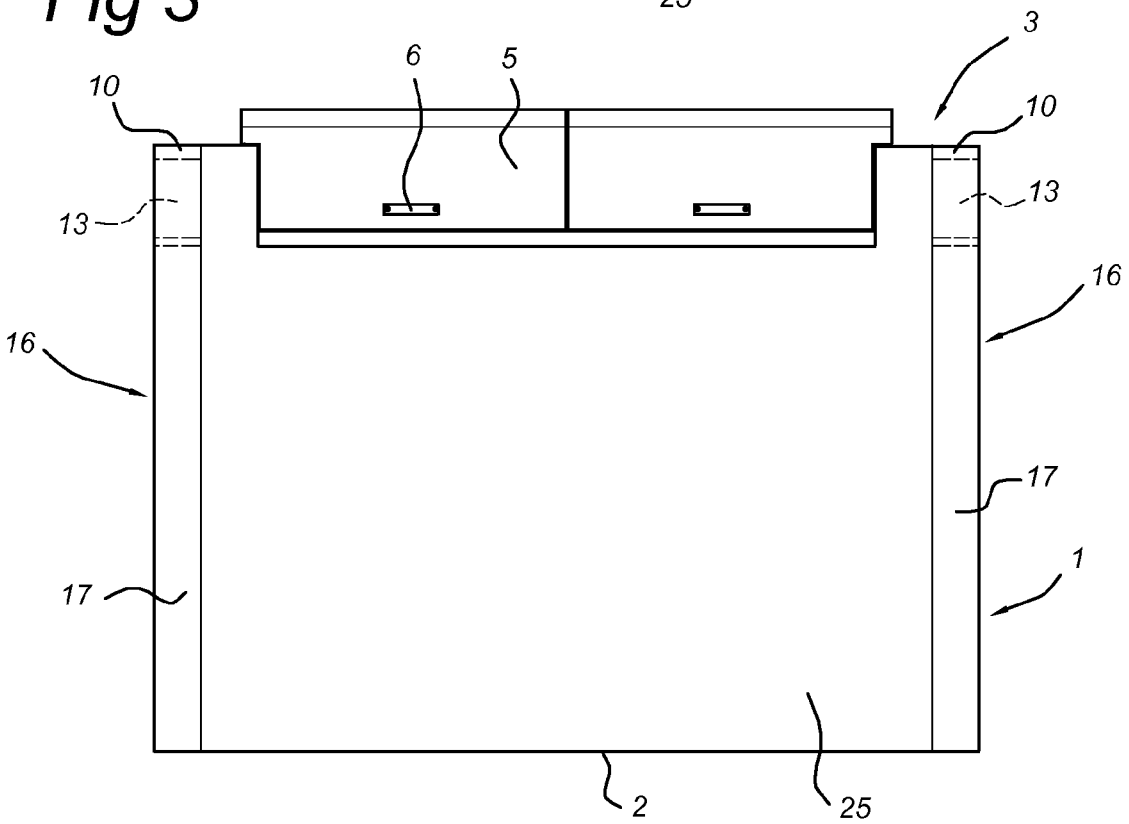


Fig 4a

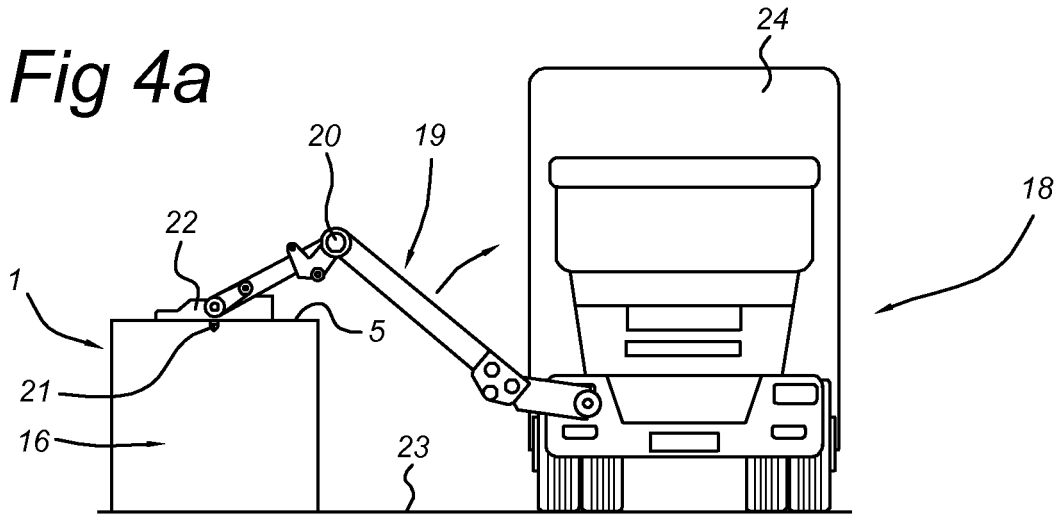


Fig 4b

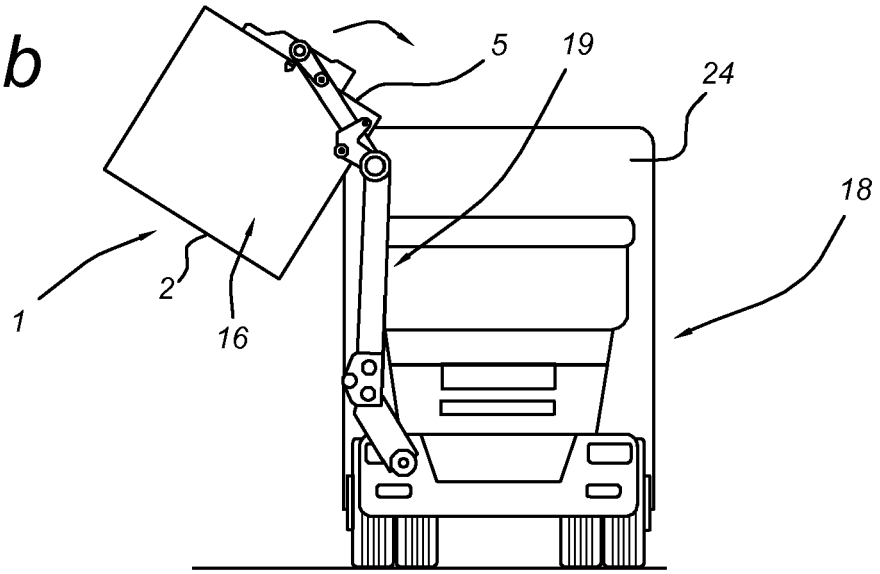


Fig 4c

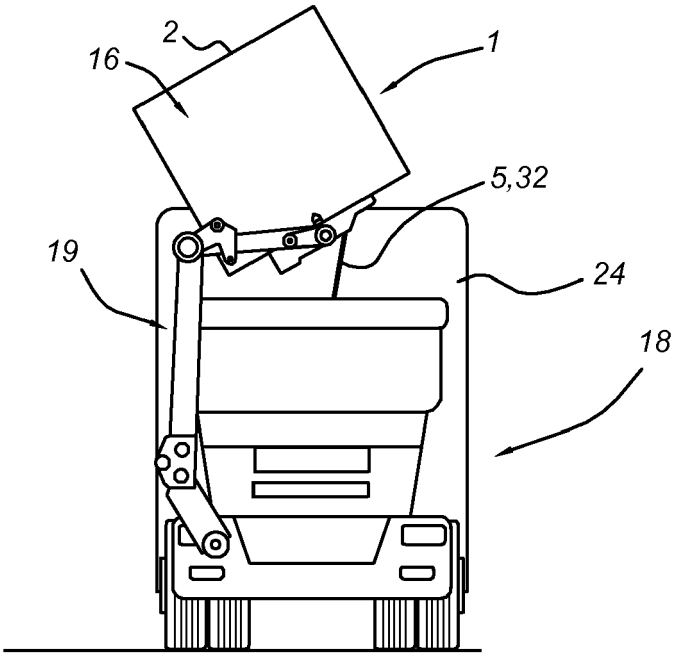
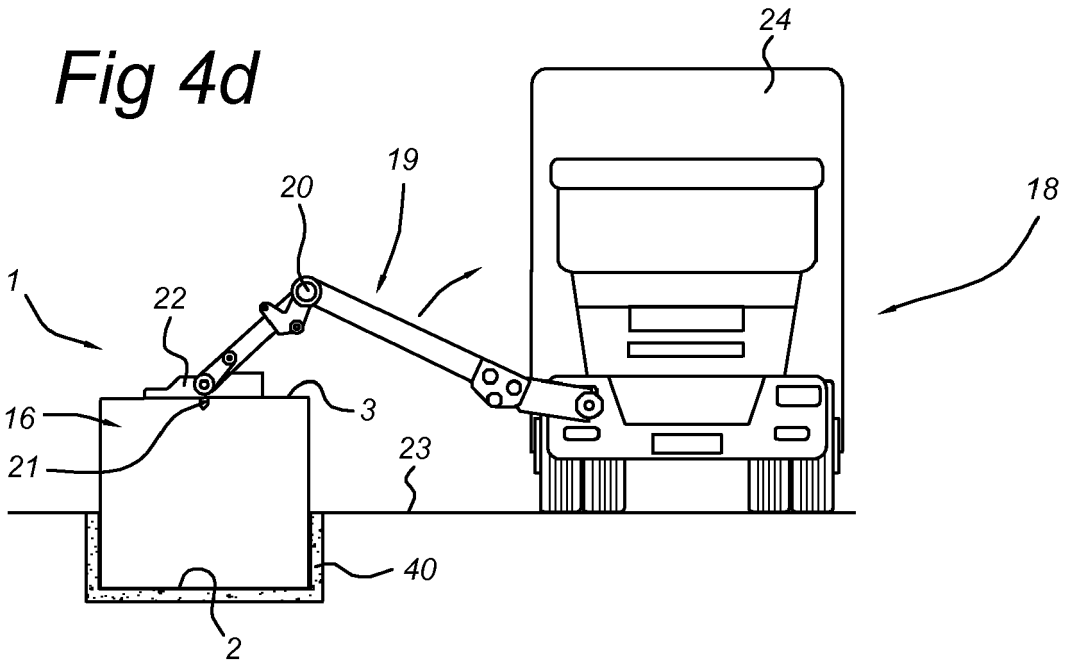


Fig 4d



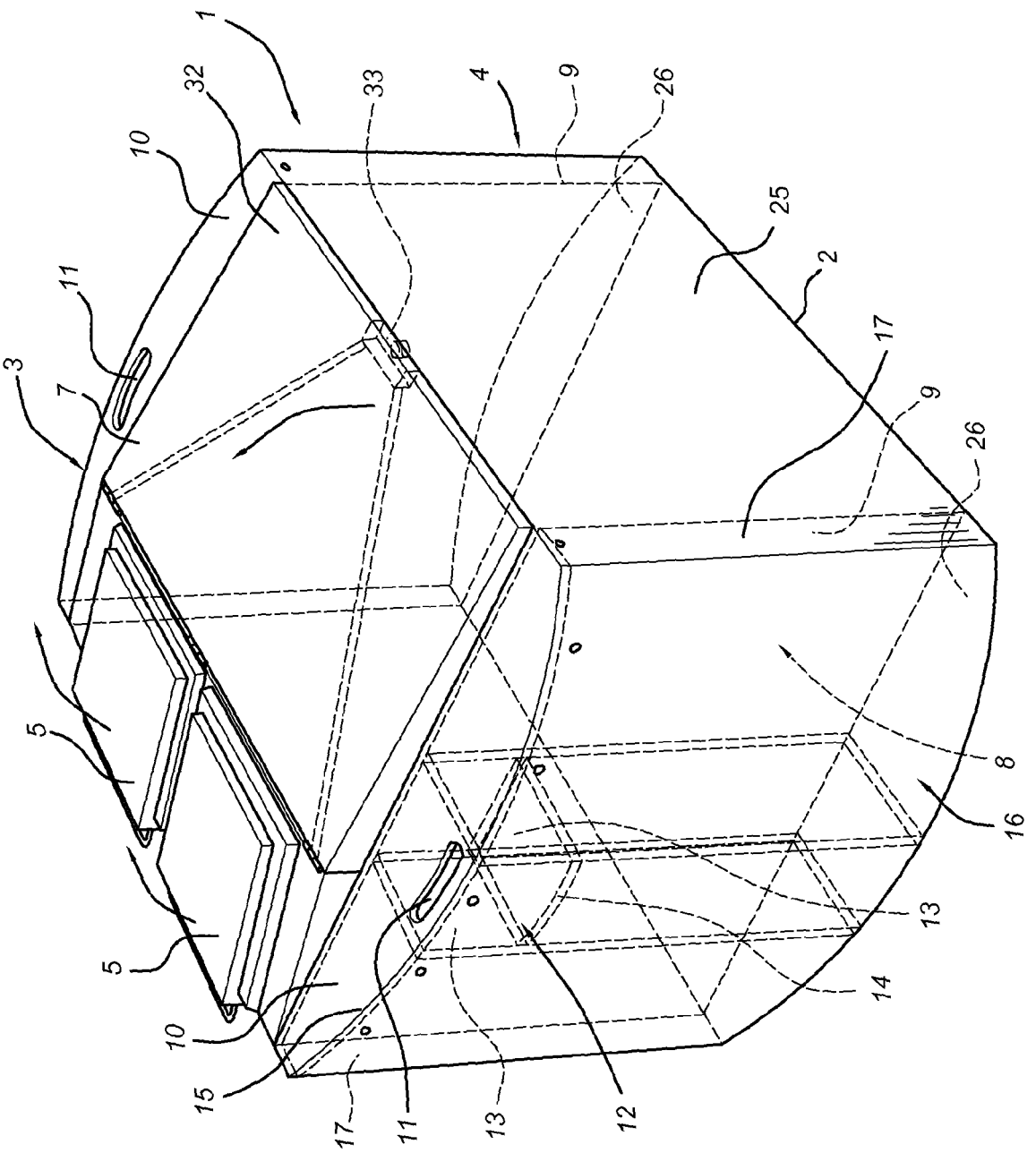


Fig 5

Fig 6

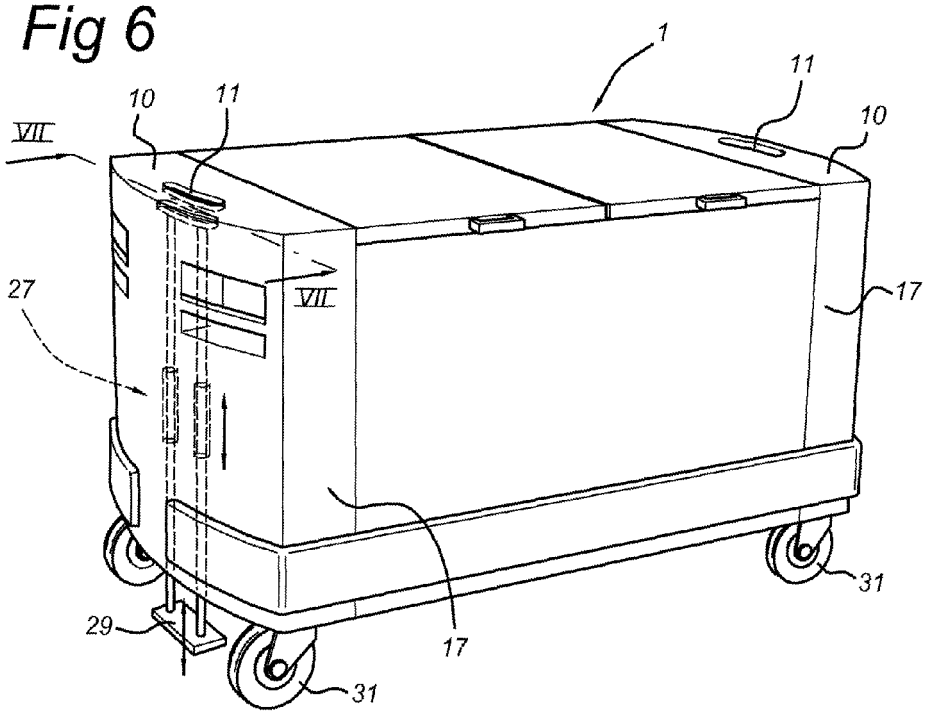


Fig 7

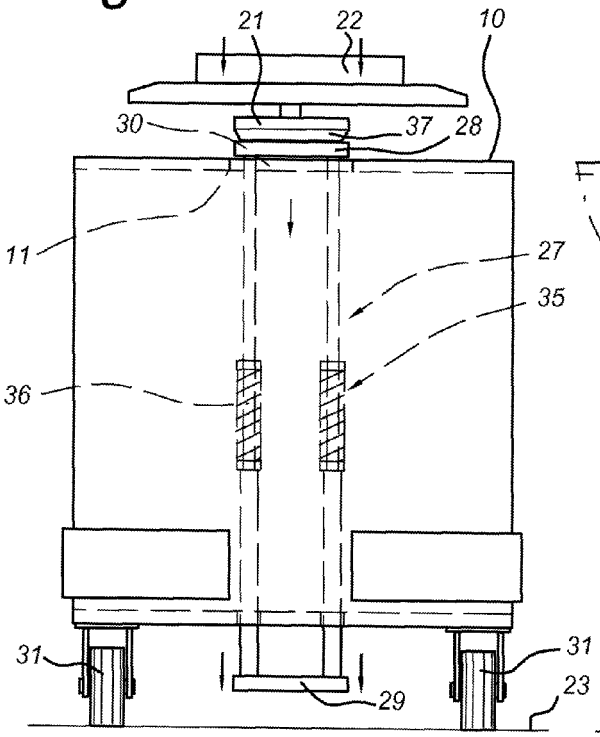
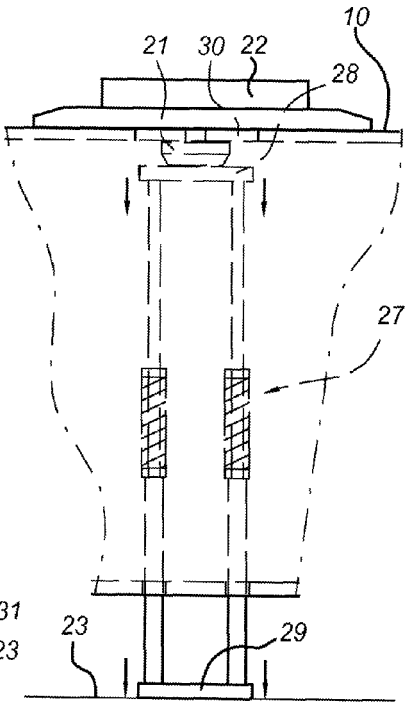


Fig 8



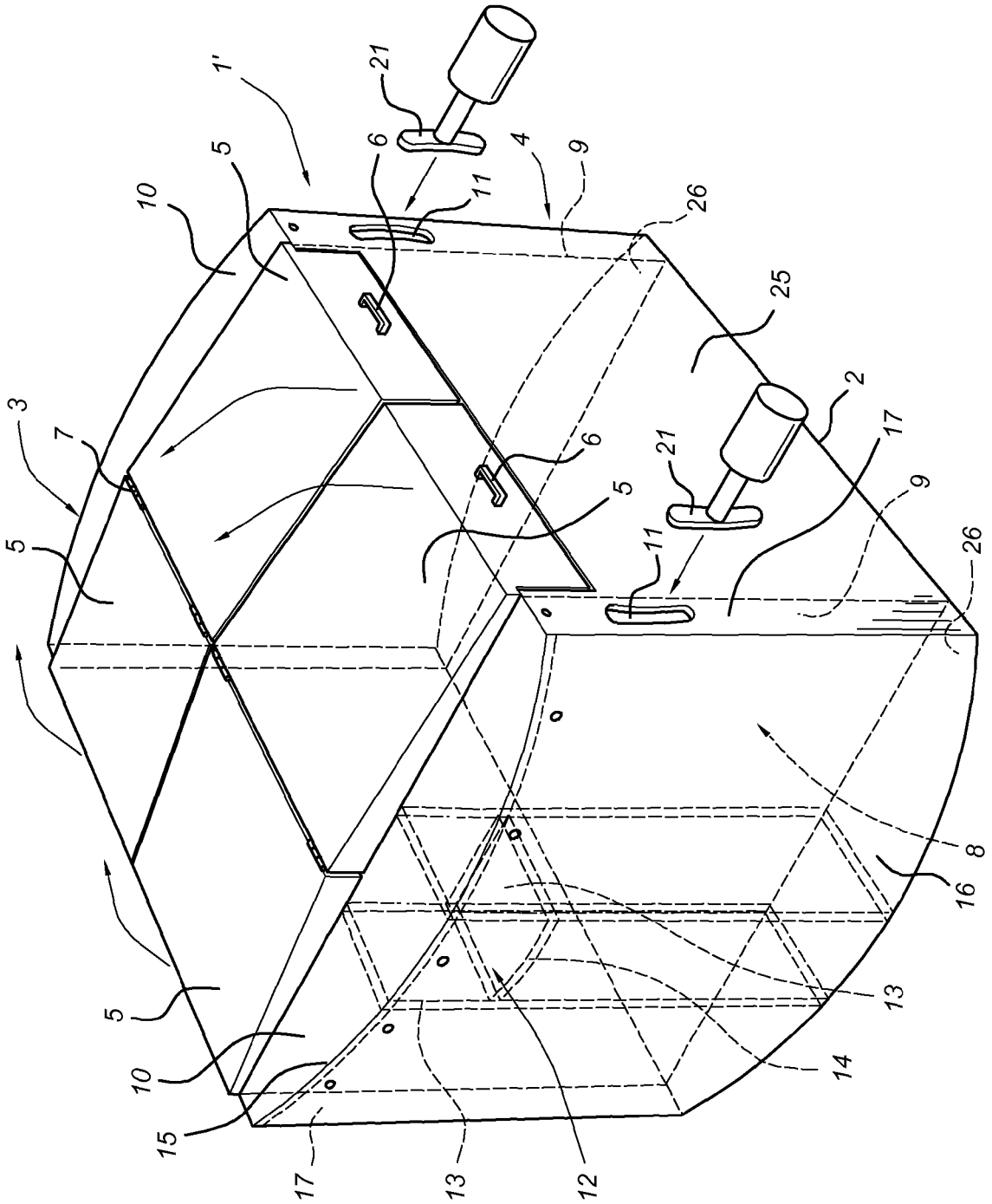


Fig 9

Fig 10

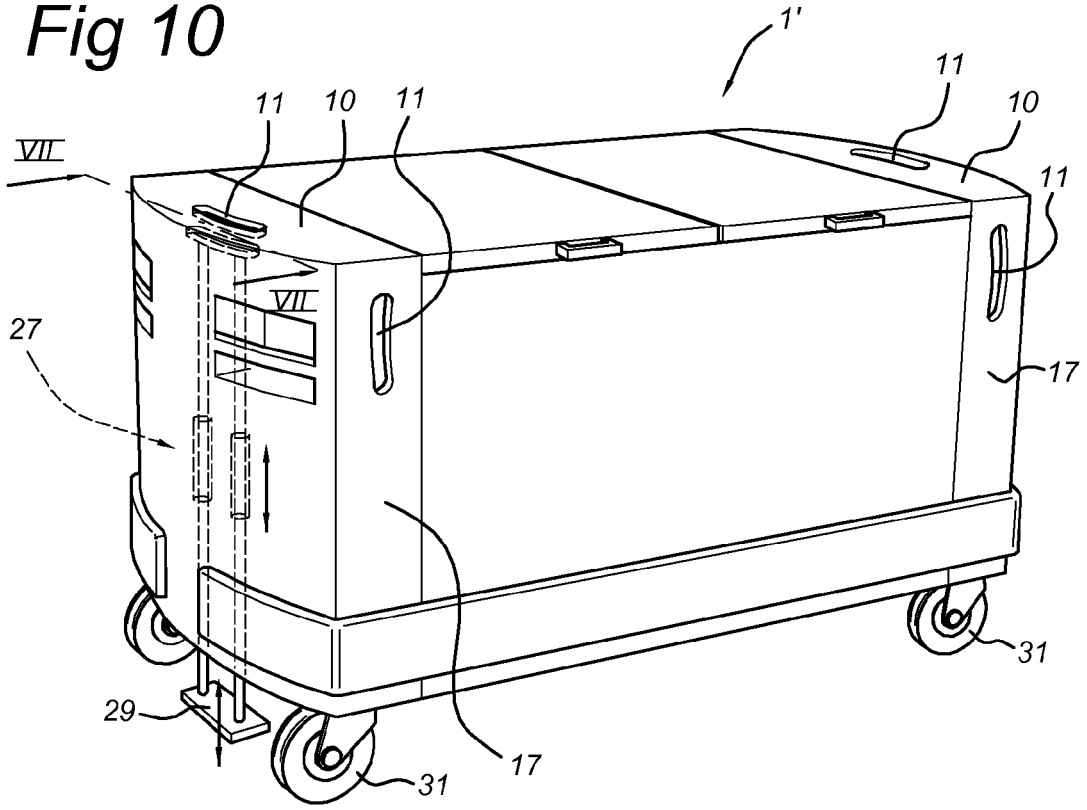
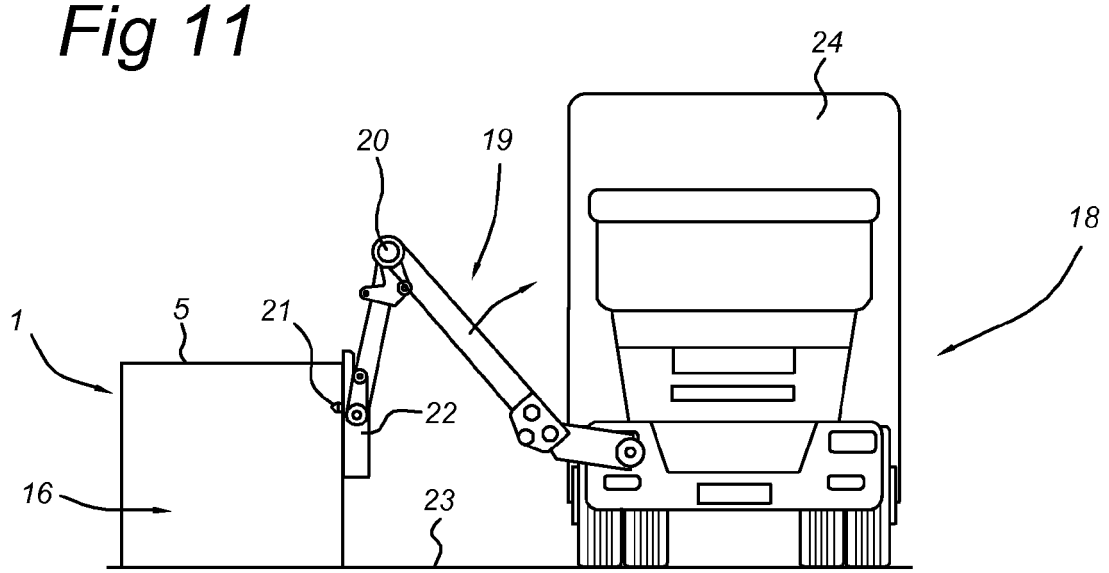


Fig 11



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EUROPEAN SEARCH REPORT

Application Number
EP 08 15 3751

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	4 September 2008	Smolders, Rob

CATEGORY OF CITED DOCUMENTS

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