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(54) **Refuse collection system with coupling means**

(57) A refuse collection system comprises a chamber (1) permanently located below ground (2) which opens at ground level at the top, a cover (3) for opening and closing off the chamber (1), a container (14), open at the top, that can be accommodated in the chamber for collecting refuse via a deposit opening (5) in the cover (3), as well as a vehicle (18) that is provided with lifting gear

(20) for lifting said container (14) out of the chamber, which container and lifting gear (20) are provided with coupling means (17,23) for coupling the lifting gear to the container when the cover is open. The coupling means (17,23) comprise at least one bayonet coupling (17,26).

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Description

[0001] The invention relates to a refuse collection system comprising a chamber permanently located below ground which opens at ground level at the top, a cover for opening and closing off the chamber, a container, open at the top, that can be accommodated in the chamber for collecting refuse via a deposit opening in the cover, as well as a vehicle that is provided with lifting gear for lifting said container out of the chamber, which container and lifting gear are provided with coupling means for coupling the lifting gear to the container when the cover is open, which coupling means comprise at least a bayonet coupling provided with a rotary member that can be rotated about an axis of rotation and has a shape that is not revolutionally symmetrical with respect to said axis of rotation, as well as a pick-up member in which the rotary member can be inserted in a first rotational position and with respect to which the rotary member is locked in a second rotational position.

[0002] A refuse collection system of this type is disclosed in NL-A 1002778. With this known system the chamber in which the container is located is formed by a concrete bunker or tube that has been buried in the soil, such that only a deposit shaft and the like with deposit opening protrudes above ground level. Lifting gear can be coupled to the coupling means after the cover has been opened, after which the container can be lifted out of the bunker and can be emptied into the load space of the vehicle by tilting.

[0003] However, coupling of the lifting gear to the container can give rise to problems, especially if this has to be carried out in an automated manner. It is then extremely important that the coupling means have a self-seeking nature to a certain extent, so that the driver of the vehicle does not have to leave his position. Tilting the container in a stable manner in connection with the emptying thereof imposes particular requirements on the coupling means.

[0004] The aim of the invention is to provide a refuse collection system of the type described above that has coupling means that are better equipped for these tasks. Said aim is achieved in that the pick-up member comprises an undercut, curved slot. As soon as the lifting gear has been correctly positioned with respect to the container, turning the rotary members of the bayonet couplings is sufficient to achieve coupling. In addition, positioning of the rotary members with respect to the container is relatively simple since these can be guided by the curved insertion openings in which the rotary members have to be introduced. By virtue of this curvature, coupling can still take place even if the rotary members are still positioned at somewhat of an angle with respect to the slots concerned. After all, the curvature thereof provides the rotary members with initial coupling within a broad range of play, which provides a guide for further completion of the coupling.

[0005] As already mentioned, the bayonet couplings

can comprise a rotary member that can be rotated about an axis of rotation and has a shape that is not revolutionally symmetrical with respect to said axis of rotation, as well as a pick-up member into which the rotary member can be inserted in a first rotational position and with respect to which the rotary member is locked in a second rotational position. Preferably, the rotary member has two projections protruding diametrically with respect to the axis of rotation and the pick-up member comprises an undercut slot (twistlock). As already mentioned, these slots are curved somewhat in the plane of the top of the container, in order to promote guiding of the rotary members into the correct position thereof with respect to said slots.

[0006] The container can have at least two flanged edges at the top, each of which is provided with a pick-up member. In this case the lifting means have two correspondingly positioned rotary members. Furthermore, the lifting means can have a head with respect to which the rotary members protrude. Stable coupling between the lifting gear and the container can be achieved with the aid of this head. This can be achieved in particular if the head has at least one stop surface with respect to which the rotary members protrude, which stop surface (s) can be brought into contact with the flanged edges. In the coupled position the flanges bear on the stop surface of the head in a stable manner, such that the container and the lifting gear form a rigid whole that can be controlled well when lifting and tilting the container.

[0007] In this connection, the lifting gear can, in a known manner, comprise an articulated arm as well as control means for manipulating the arm such that the container can be moved along an essentially straight, vertical path with respect to the chamber.

[0008] The vehicle can also have safety barriers that can be moved between a rest position on the vehicle and a safety position in which they extend with respect to the vehicle in order to screen off the chamber when the cover is open.

[0009] Finally, the invention relates to a container for a system as described above, which container is provided at the top with at least two flanged edges in each of which there is a curved slot for twistlock couplings of a lifting gear.

[0010] The invention will be explained in more detail below with reference to an illustrative embodiment shown in the figures.

Figure 1 shows a perspective view of the top of the refuse collection installation according to the invention.

Figure 2 shows the refuse collection installation in the open position, without container.

Figure 3 shows the refuse collection installation with partially lifted container.

Figure 4 shows a perspective view of the refuse collection system where the container has been lifted out of the chamber by a vehicle.

Figure 5 shows a bottom view of the heads of the lifting gear of the vehicle.

Figure 6 shows a side view of a head.

[0011] The refuse collection installation shown in Figures 1 - 3 comprises a bunker 1 permanently installed below ground 2, which opens at the top at ground level. The cover 3 is mounted on the bunker 1 such that it can hinge. Said cover has a deposit shaft 4 with a deposit opening 5 that is closed off by a spring-loaded lid 6. In the illustrative embodiment in Figure 1 three such deposit shafts 4 are shown for different types of refuse.

[0012] At the top of the bunker 1 there is a frame 6 consisting of four frame sections 8, 9, 10 and 11. These frame sections each have a flange 12 at the top, against which the cover 3 can close. Below the flanges 12 there is, inter alia, the spring pretensioning device that is used when opening the cover. It is also possible to use an electromechanical actuator, for example a screw spindle driven by an electric motor. Power can be supplied to this by a rechargeable battery, connected to solar cells that are mounted on the filler lid. It is also possible to supply the actuator with power from the refuse lorry.

[0013] As shown in Figure 3, the container indicated in its entirety by 14 can be placed in the bunker 1. This container 14 has a container body 15 that is delimited at the top by a collar 16. This collar 16, which points outwards, is provided in a known manner with openings 17 in which the lifting gear of a refuse lorry 18 can engage.

[0014] This refuse lorry 18 is shown in Figure 4. It has a refuse collection chamber 19 as well as lifting means 20 by means of which the container 14 can be lifted out of the bunker 1 as shown in Figure 4. In addition, the container 14 can be tilted in a known manner by means of the lifting means 20 until it is above the load space 19, such that the container 14 can be emptied.

[0015] The lifting means 20 have a set of arms 21 that can be controlled by means of hydraulic piston/cylinder assembly 22 in such a way that the container 14 can initially be lifted essentially vertically upwards out of the bunker 1. Furthermore, the set of arms 21 is suitable for the tilting and emptying of the container mentioned above. At the end, the set of arms 21 bears, by means of joints 29, the heads indicated in their entirety by 23, the bottom of which is shown in Figure 5 and the side view of which is shown in Figure 6. This bottom has two hydraulic rams 24, 25. The rotary members 26 protrude with respect to these rams 24, 25. These rotary members 26 are constructed as so-called "twistlocks" and comprise a rotary pin 27 at the end of which an elongated locking piece 28 is fitted.

[0016] During coupling the elongated locking pieces 28 are introduced into the openings 17 in the collar 16 of the container 14. The locking pieces 28 are then turned through approximately 90°, such that they hook underneath the collar 16.

[0017] In this position the rams 24, 25 are actuated, which as a result are each pressed into contact with the

relevant edge of the collar 16. Rigid, stable coupling between the lifting means 20 and the container 14 is produced by this means.

[0018] The rotary members 16 can each be driven by means of their own hydraulic motor. Although a sunken bunker is shown in the figures, the invention can also be used with a bunker installed above ground.

[0019] As a safety feature for the open bunker 1, arms 32 are fitted on the refuse lorry 18 which can be folded out on either side of the bunker. These arms 32 are provided with acoustic and/or visual warning elements 31.

Claims

1. Refuse collection system comprising a chamber (1) permanently located below ground (2) which opens at ground level at the top, a cover (3) for opening and closing off the chamber (1), a container (14), open at the top, that can be accommodated in the chamber (1) for collecting refuse via a deposit opening (5) in the cover (3), as well as a vehicle (18) that is provided with lifting gear (20) for lifting said container (14) out of the chamber (1), which container (14) and lifting gear (20) are provided with coupling means (17, 23) for coupling the lifting gear to the container (14) when the cover (3) is open, which coupling means (17, 23) comprise at least a bayonet coupling (17, 26) provided with a rotary member (26) that can be rotated about an axis of rotation and has a shape that is not revolutionally symmetrical with respect to said axis of rotation, as well as a pick-up member (16, 17) in which the rotary member can be inserted in a first rotational position and with respect to which the rotary member is locked in a second rotational position, **characterised in that** the pick-up member comprises an undercut, curved slot (17).
2. System according to Claim 1, wherein the rotary member (26) has two projections (28) protruding diametrically with respect to the axis of rotation.
3. System according to one of Claims 1 - 2, wherein the container (14) has at least two flanged edges (16) at the top, each of which is provided with a pick-up member (17) and the lifting gear (20) has two correspondingly positioned rotary members (26).
4. System according to Claim 3, wherein the lifting gear (20) has heads (23) with respect to which the rotary members (26) protrude.
5. System according to Claim 4, wherein each head (23) has at least one ram (24, 25) with respect to which the rotary members (27) protrude, which rams (24, 25) can be brought into contact with the flanged edges (17).

6. System according to one of the preceding claims, wherein the lifting gear (20) comprises an articulated arm (21) as well as control means for manipulating the arm such that the container (14) can be moved along an essentially straight, vertical path with respect to the chamber (1). 5
7. System according to one of the preceding claims, wherein the chamber comprises a concrete bunker (1). 10
8. System according to Claim 7, wherein the bunker (1) has a supporting rim (8 - 11) all round the top on which the container can be supported. 15
9. System according to Claim 7 or 8, wherein the top of the bunker (1) is defined by a frame (7) with four frame sections (8 - 11), on the top of two (9, 11) of which frame sections the container can be supported. 20
10. System according to Claim 9, wherein the cover (3) is mounted on one (11) of the frame sections in a hinged manner. 25
11. System according to one of the preceding claims, wherein the vehicle (18) can also have safety barriers (33) that can be moved between a rest position on the vehicle (18) and a safety position in which they extend with respect to the vehicle (18) in order to screen off the chamber (1) when the cover (3) is open. 30
12. Container for a system according to one of the preceding claims, provided at the top with at least two flanged edges (16) in each of which there is a curved slot (17) for twistlock couplings (26) of a lifting gear. 35

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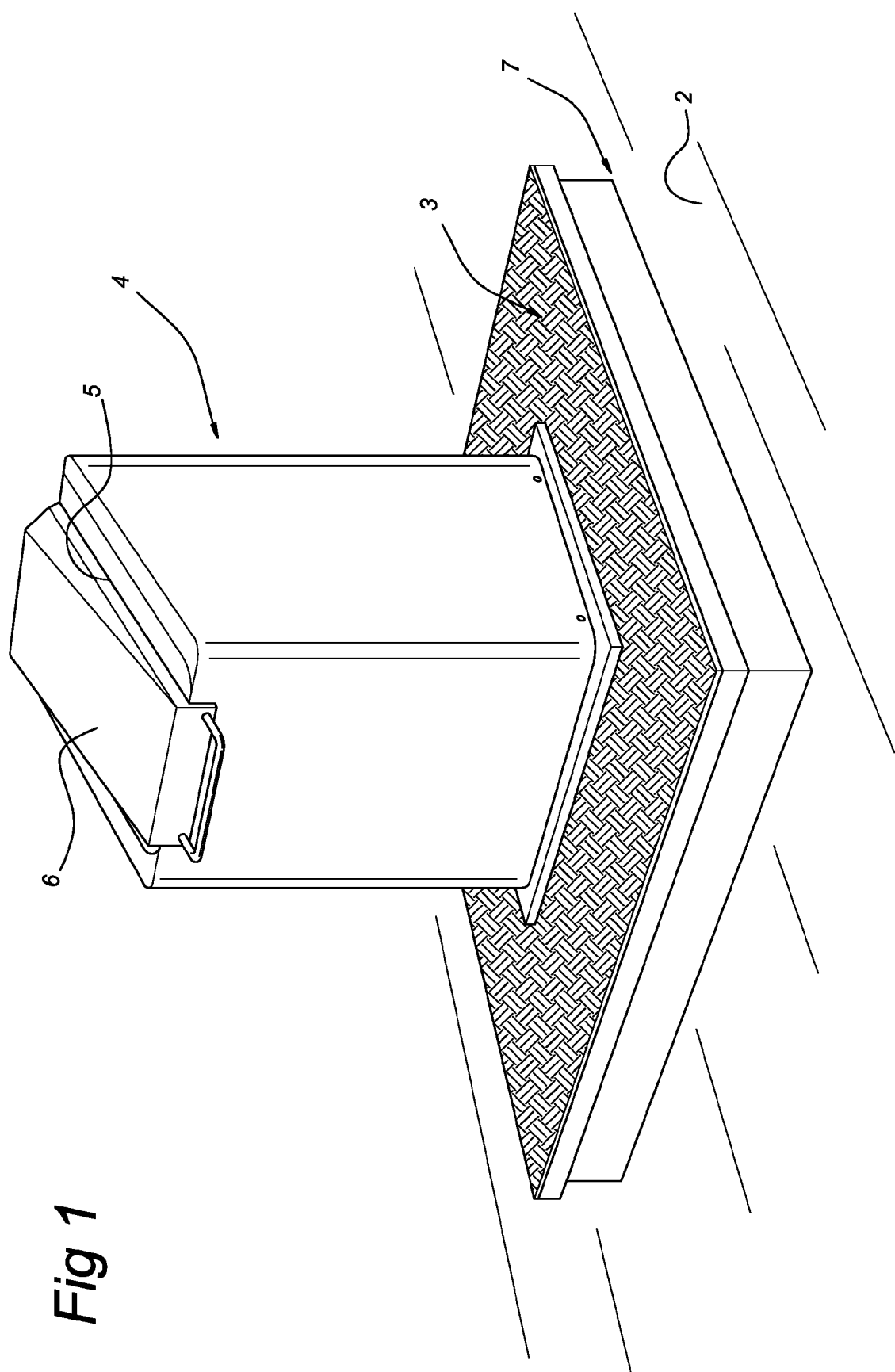


Fig 1

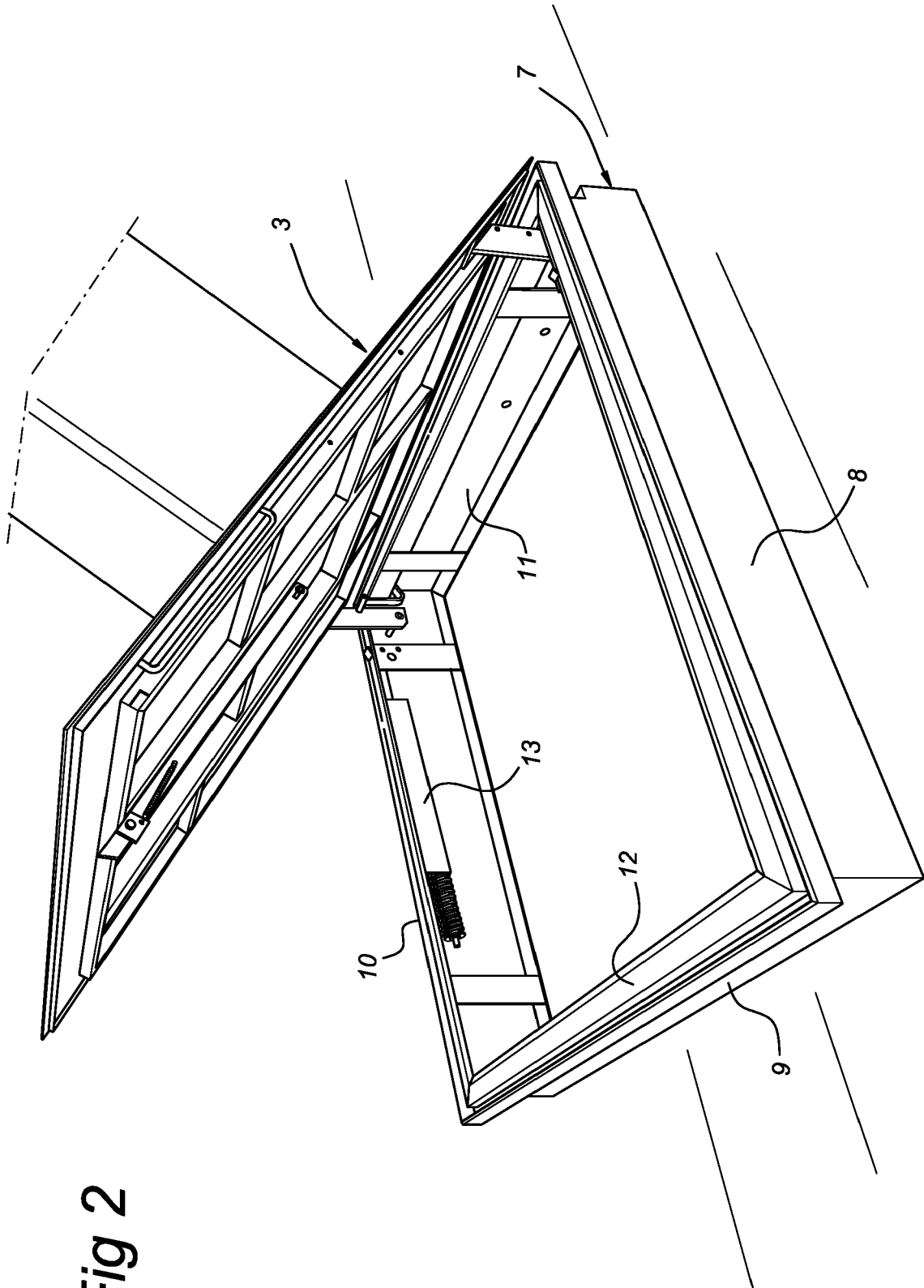


Fig 2

Fig 3

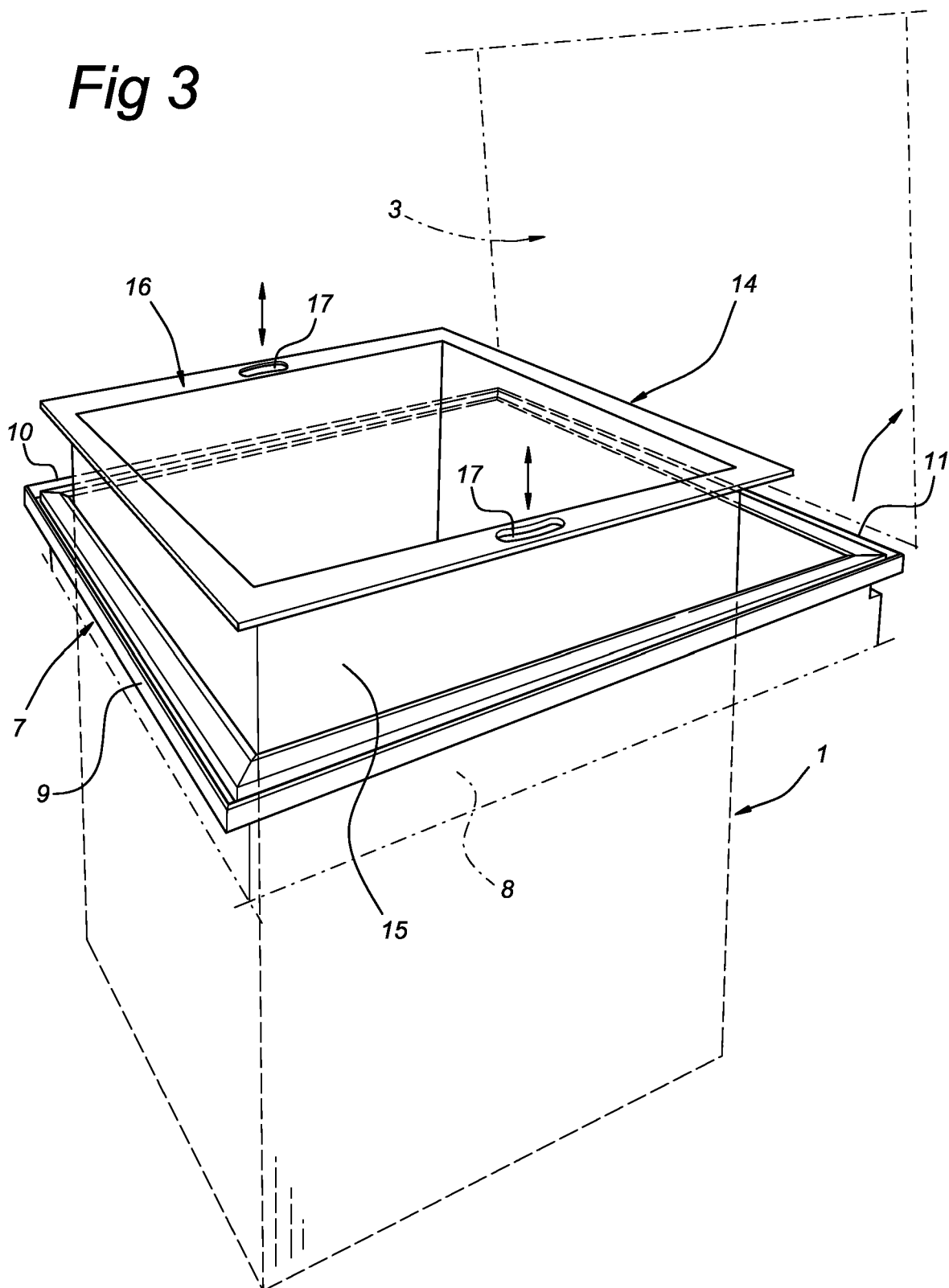


Fig 4

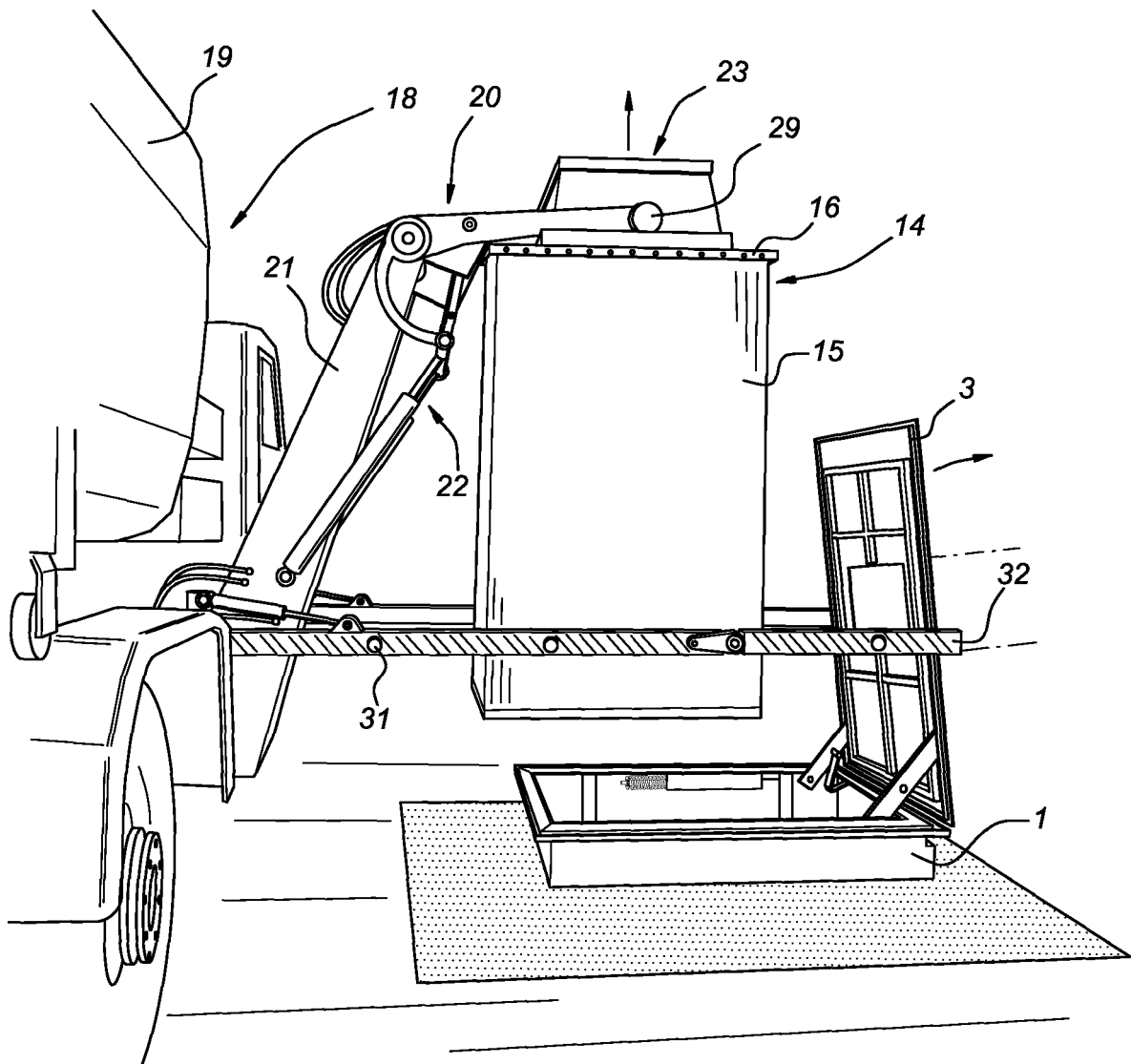


Fig 5

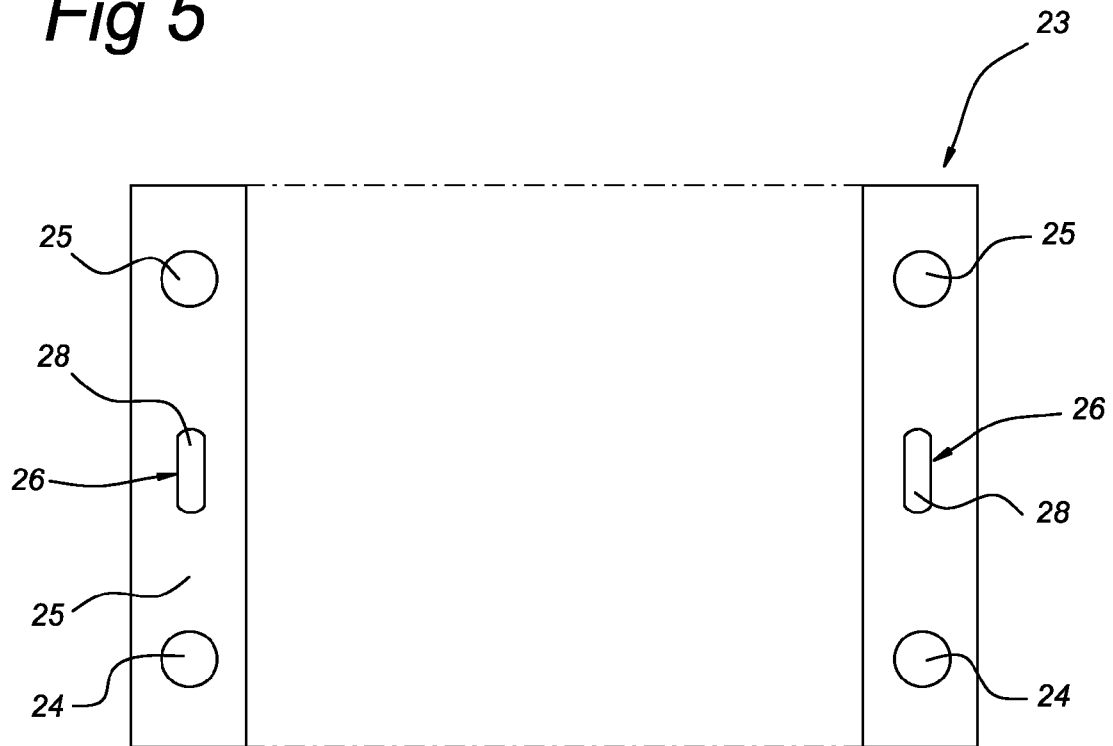
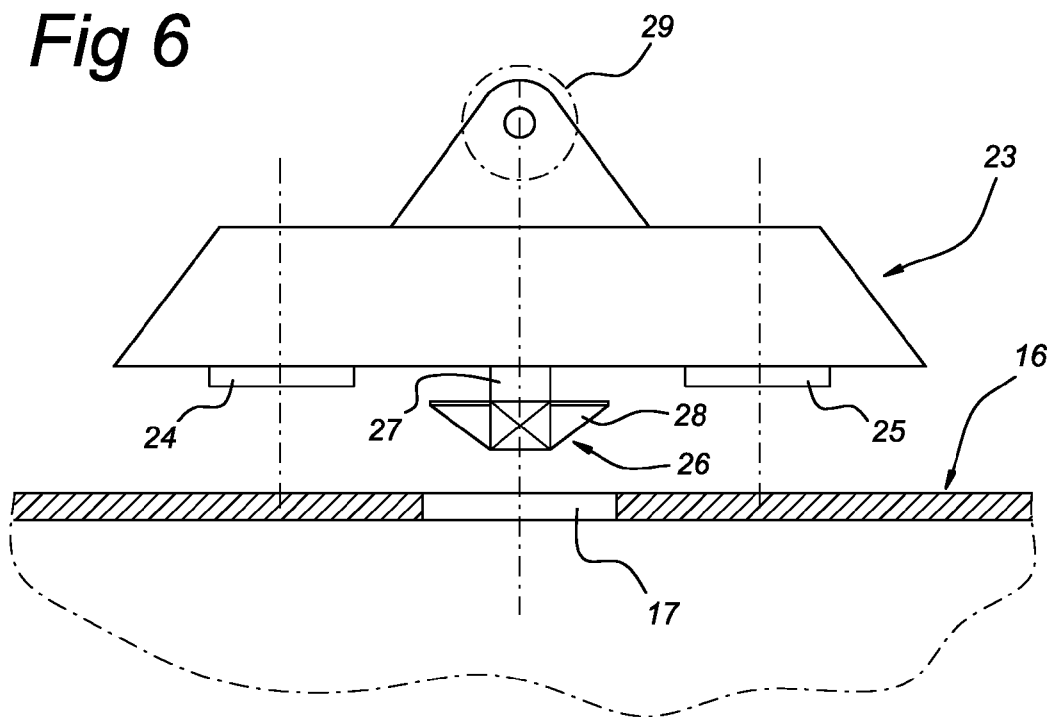


Fig 6





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EUROPEAN SEARCH REPORT

Application Number
EP 05 10 7503

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	DE 297 05 938 U1 (KLIKO MILIEUTECHNIEK B.V., VEENENDAAL, NL) 3 July 1997 (1997-07-03) * page 3, line 13 - line 31; figures 1-3 * -----	1	B65F1/14 B65F3/04
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B65F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 27 September 2005	Examiner Wartenhorst, F
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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

EP 05 10 7503

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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27-09-2005

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