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(54) Device for underground waste collection

(57) Device (1) for underground waste collection, comprising a container (2) which is closed in peripheral direction and can be sunk into the ground and which is provided with at least one bottom part (3) which is movable to provide a discharge opening and with a cover part with an inlet opening in the centre of the container, which device comprises a frame (4) which is fixedly connected to the container and which is formed by two tubes (5) standing perpendicularly from the cover on either side of the inlet opening and extending through the cover on their underside, which tubes are connected at their top by a transverse element (6), wherein an operating element (7) for the at least one movable bottom part (3) extends through at least one of said tubes (5), and the cover part bears a column (15) for providing an inlet channel above the level of the ground surface which debouches above the inlet opening.

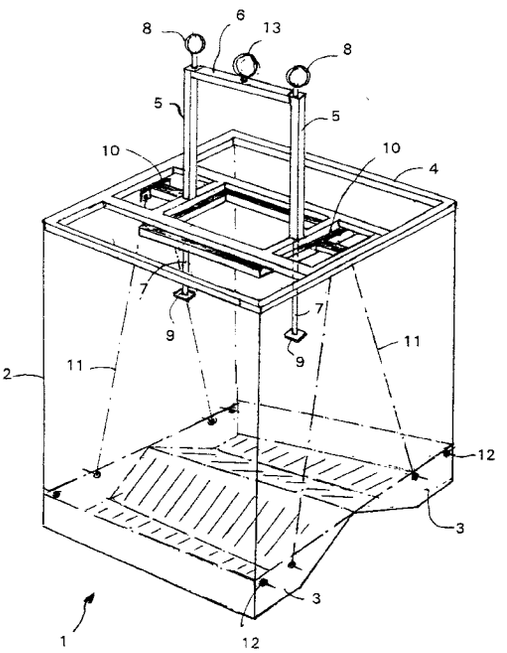

FIG. 1

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Description

The invention relates to a device for underground waste collection, comprising a container which is closed in peripheral direction and can be sunk into the ground and which is provided with at least one bottom part which is movable to provide a discharge opening and with a cover part with an inlet opening.

Such a device is generally known for collecting domestic refuse tendered in plastic sacks, but also for collecting for instance glass or used clothing.

The container of the known device is usually placed in a concrete holder which is buried in the ground. The device is provided with a lifting eye which is arranged under the cover in the centre thereof and which is accessible via a hatch in the cover, and with operating means for an openable bottom assembled from two parts, which operating means are likewise accessible via said hatch. In the known waste collection device, waste is thrown into the container via an opening in a column standing on the cover above the inlet opening, an inlet channel through the column and the inlet opening in the cover. The container is emptied in due time using a hoisting device intended for this purpose which is coupled to the lifting eye under the hatch and to the operating means for the bottom, wherein the container is successively lifted out of the concrete holder and placed above the loading platform of a truck and the bottom is opened by activating the operating means.

The drawback associated with the known waste collection device is that the position of the lifting eye and the operating means for the openable bottom above the centre of the container renders impossible the provision of an inlet opening in the cover above the centre of the container. In the known device the column with the inlet channel debouching above the inlet opening stands on the edge of the cover, as a result of which waste deposited in the container accumulates outside the centre of the container, which can cause the container to hang askew when it is hoisted out of the concrete holder and which in any case results in a relatively low degree of filling of the container. Because in the known device waste is deposited into the container from an inlet opening on the edge of the container, the top of the heap of deposited waste reaches the inlet opening relatively quickly, while the deposited waste along an opposite side still lies relatively far beneath the level of this opening. Once the top of the heap of deposited waste has reached the inlet opening, further depositing of waste into the container is no longer possible and a large part of the volume of the container remains unutilized, as a consequence of which the container must be emptied more often than may be anticipated on the basis of the total volume thereof.

Another drawback of the known device is the chance of water penetrating along the edges of the hatch in the cover.

The object of the invention is to provide a waste collection device which can be sunk, wherein the volume of the container can be optimally utilized, so that the container requires less frequent emptying than a container with a corresponding volume of the known device.

Another object is to provide a waste collection device which does not hang askew when it is lifted up.

A further object is to provide a waste collection device wherein no water collects in the sunken container.

These objectives are realized, and other advantages achieved, with a waste collection device of the type stated in the preamble which according to the invention comprises a frame which is fixedly connected to the container and which is formed by two tubes standing perpendicularly from the cover on either side of the centre of the container and extending through the cover on their underside, which tubes are connected at their top by a transverse element, wherein an operating element for the at least one movable bottom part extends through at least one of said tubes.

Such a waste collection device offers the advantage that the operating element for the at least one movable bottom part does not occupy any space above the centre of the container, so that an inlet opening can be provided in the cover above this centre and the container can be filled from the centre, and thus evenly. Using a hoisting device the filled container can be lifted out of a ground holder, for instance on the transverse element or on a lifting eye fixed thereto, without the container coming to hang askew in the hoisting device. Because it is not necessary to open the cover of the container or a hatch therein in order to hoist the container, it is exceptionally simple to provide the container with a watertight cover so that no water can leak into the container. Although in principle one operating element suffices to operate the at least one movable bottom part, for structural reasons it is often advantageous in practical embodiments if an operating element is provided in both standing tubes of the fixed frame.

The inlet opening in the device according to the invention is preferably formed substantially in the centre of the cover between the standing tubes, more preferably the cover part in such a device bears a column for providing an inlet channel above the level of the ground surface which debouches above the inlet opening.

In an embodiment of this device the container comprises a movable frame guided in a direction perpendicularly of the plane of the cover and the operating element comprises a pull rod guided through this frame and provided with a carrier element for this frame, which movable frame is coupled to the pull rod and the at least one movable bottom part in a manner such that a highest position of the movable frame corresponds with a closed situation of the movable bottom part, irrespective of the position of the carrier element relative to the movable frame, and a lowest position of the movable frame corresponds with an opened situation of the movable bottom part, wherein the movable frame is supported by the carrier element.

In an advantageous embodiment of the device according to the invention the container comprises a movable frame guided in a direction perpendicularly of the plane of the cover and the operating element comprises a telescopic element, which movable frame is coupled to the telescopic element and the at least one movable bottom part in a manner such that a highest position of the movable frame corresponds with a closed situation of the movable bottom part, irrespective of the situation of the telescopic element, and a lowest position of the movable frame corresponds with an opened situation of the movable bottom part and an extended situation of the telescopic element, wherein the movable frame is supported by the telescopic element.

The coupling between the movable frame and the movable bottom part in these embodiments is realized for instance with chains, preferably with cables, more preferably with rods which in preference are positioned along side walls of the container.

In a very advantageous embodiment of a waste collection device with an inlet channel in a column on the cover, the inlet channel comprises a closing flap on the column and a tiltable drum open on one side which is coupled to the closing flap in a manner such that when the flap is opened the open side of the drum is directed toward the opening left clear by the flap and when the flap is closed the open side is directed toward the inlet opening in the cover of the container.

In the device according to the invention the container is for instance a rectangle or a square in horizontal cross-section and the inlet opening is formed above the intersection of the diagonals of this rectangle respectively this square.

The invention will be elucidated in the following on the basis of embodiments and with reference to the annexed drawings, in which corresponding components are designated with the same reference numerals.

In the drawings

Fig. 1 shows in perspective view a part of a first embodiment of an underground waste collection device,

Fig. 2 shows a front view of a second embodiment of an underground waste collection device,

Fig. 3a-d show in front view a detail of the device of fig. 2 at different stages during emptying of the container,

Fig. 4 shows a front view of a third embodiment of an underground waste collection device, and

Fig. 5 shows the device of fig. 4 in side view.

Fig. 1 shows a device 1 for underground waste collection with a square container 2 which can be sunk and which is provided with bottom parts 3 which can be folded open. The top part of container 2 is connected to a fixed frame 4 on which rests a cover (not shown) through which extend two standing tubes 5 of fixed frame 4 which are connected at their top by a transverse connection 6 with a lifting eye 13. Through each of tubes 5 is guided a pull rod 7 which is provided at its top with a lifting eye 8 and at is bottom with a carrier element 9 and which extends through a movable frame 10 which is connected by rods 11 to the bottom parts 3 pivotable on axes 12. Not shown are a column on the cover of the container over tubes 5, transverse element 6 and lifting eyes 8, 13, through which column is formed an inlet channel debouching above the centre of container 2. In the shown position the device 1 rests on a horizontal ground surface so that bottom parts 3 are in a closed situation, as a result of which the movable frame 10 is pressed against fixed frame 4 by rods 11, and pull rods 7 hang in their lowest position. During emptying of a filled container 2, the pull rods 7 are first pulled upward on lifting eyes 8 so that movable frame 10 is pressed by carrier elements 9 against fixed frame 4 and bottom parts 3 remain suspended in a closed position on rods 11, so that the whole device 1 can be raised on lifting eye 13 and manoeuvred above a loading platform. Above the loading platform the pull rods 7 are moved downward again, as a result of which the movable frame 10 resting on carrier elements 9 and the rods 11 coupled to frame 10 are moved downward so that bottom parts 3 fold open on pivot axes 12 and the contents of container 2 drop into said loading platform. After emptying of container 2 the lifting eyes 8 are pulled upward once again so that bottom parts 3 fold shut and the device can be re-placed on the original position, wherein pull rods 7 can again drop downward and movable frame 10 is again pressed against fixed frame 4 by rods 11.

Fig. 2 shows a front view of a second embodiment of a waste collection device 20, which differs from the device 1 of fig. 1 in that the movable frame 10 is suspended from telescopic systems 14 in tubes 5. The figure further shows a column 15 with a loading flap 16, a cover 17 of which the edges extend over the edges of a concrete holder 18 in which container 2 is placed, and a safety platform 19 which, using a linkage system 21 driven by a gas spring (not shown), is pressed upward when container 2 is hoisted out of concrete holder 18.

Fig. 3a shows in front view a detail of the device 20 of fig. 2 in a rest position, in which the container 2 is supported by linkage system 21 in concrete holder 18. The movable frame 10 is coupled by means of a telescopic rod 23 and a telescopic tube 22 to the lifting eye 8. In the shown situation the telescopic system 22, 23 is wholly accommodated in tube 5 and movable frame 10 is pressed against fixed frame 4. The bottom flaps 3 are closed.

Fig. 3b shows the situation at the start of emptying of container 2, wherein telescopic system 22, 23 is pulled out of tube 5 on lifting eye 8 using a lifting device 25, so that movable frame 10 is pressed against fixed frame 4 and the bottom parts 3 are held closed during the coming hoisting movement.

Fig. 3c shows the situation during opening of bottom parts 3, wherein the entire device 20 hangs from the lift-

ing eye 13 (not shown) and in extended situation the telescopic system 22, 23 assumes its lowest position relative to fixed frame 4, as a consequence of which the movable frame 10 likewise assumes its lowest position and bottom parts 3 are opened.

Fig. 3d shows the situation wherein prior to replacing of container 2 in concrete holder 18 the bottom parts 3 are closed once again by hoisting upward the movable frame 10 using telescopic system 22, 23. Fig. 3a-d further show a guide 14 which is not shown in fig. 2 and which consists of a tube 24 extending from movable frame 10 through fixed frame 4.

Fig. 4 and 5 show in respectively front view and side view a third embodiment of an underground waste collection device 30, wherein movable frame 10 is again suspended from telescopic system 22, 23 in standing tubes 5 of the fixed frame, wherein telescopic tubes 22 are mutually connected on either side of the inlet by a horizontal hoisting arm 31 which is movable in vertical direction and which is in turn connected to one pull rod 7 which is provided on its outer ends with a lifting eye 8 and is guided through a guide tube 32, on the top part of which a fixed lifting eye or ring 13 is arranged.

Fig. 5 further shows the drum 33 in rest position, i. e. with the open side directed downward, which drum can be tilted on pivot point 35 using flap 16 and rod 34 to the situation shown in dashed lines, wherein the open side of drum 33 is directed toward the opening in the column left clear by flap 16 in order to throw in waste.

It is noted that the above described embodiments serve to illustrate and not to limit the inventive concept.

The container can be manufactured for instance from a suitable plastic such as polyethylene or from a suitable plate material, for instance galvanized steel. The fixed and movable frames are preferably manufactured from hot-galvanized square pipe but may also be manufactured from round pipe. No limitations are in principle imposed on the dimensions of the device but an embodiment in which the volume of the container amounts to roughly $4m^3$ and the total height to about 4 m provides practical advantages in respect of road transport.

With a waste collection device according to the invention it is possible in simple manner to fill the container for about 90%, this in contrast to the container of the existing device wherein the degree of filling is significantly lower.

Claims

1. Device for underground waste collection, comprising a container which is closed in peripheral direction and can be sunk into the ground and which is provided with at least one bottom part which is movable to provide a discharge opening and with a cover part with an inlet opening, **characterized in that** it comprises a frame which is fixedly connected to the container and which is formed by two tubes standing perpendicularly from the cover on either side of the centre of the container and extending through the cover on their underside, which tubes are connected at their top by a transverse element, wherein an operating element for the at least one movable bottom part extends through at least one of said tubes.

2. Device as claimed in claim 1, **characterized in that** the inlet opening is formed substantially in the centre of the cover between the standing tubes.

3. Device as claimed in claim 2, **characterized in that** the cover part bears a column for providing an inlet channel above the level of the ground surface which debouches above the inlet opening.

4. Device as claimed in any of the claims 1-3, **characterized in that** the container comprises a movable frame guided in a direction perpendicularly of the plane of the cover and the operating element comprises a pull rod guided through this frame and provided with a carrier element for this frame, which movable frame is coupled to the pull rod and the at least one movable bottom part in a manner such that a highest position of the movable frame corresponds with a closed situation of the movable bottom part, irrespective of the position of the carrier element relative to the movable frame, and a lowest position of the movable frame corresponds with an opened situation of the movable bottom part, wherein the movable frame is supported by the carrier element.

5. Device as claimed in any of the claims 1-3, **characterized in that** the container comprises a movable frame guided in a direction perpendicularly of the plane of the cover and the operating element comprises a telescopic element coupled to this frame, which movable frame is coupled to the telescopic element and the at least one movable bottom part in a manner such that a highest position of the movable frame corresponds with a closed situation of the movable bottom part, irrespective of the situation of the telescopic element, and a lowest position of the movable frame corresponds with an opened situation of the movable bottom part and an extended situation of the telescopic element, wherein the movable frame is supported by the telescopic element.

6. Device as claimed in any of the claims 3-5, **characterized in that** the inlet channel comprises a closing flap on the column and a tiltable drum open on one side which is coupled to the closing flap in a manner such that when the flap is opened the open side of the drum is directed toward the opening left clear

by the flap, and when the flap is closed the open side is directed toward the inlet opening in the cover of the container.

7. Device as claimed in any of the foregoing claims, **characterized in that** the container is a rectangle in horizontal cross-section and the inlet opening is formed above the intersection of the diagonals of this rectangle.

8. Device as claimed in claim 7, **characterized in that** the container is a square in horizontal cross-section.

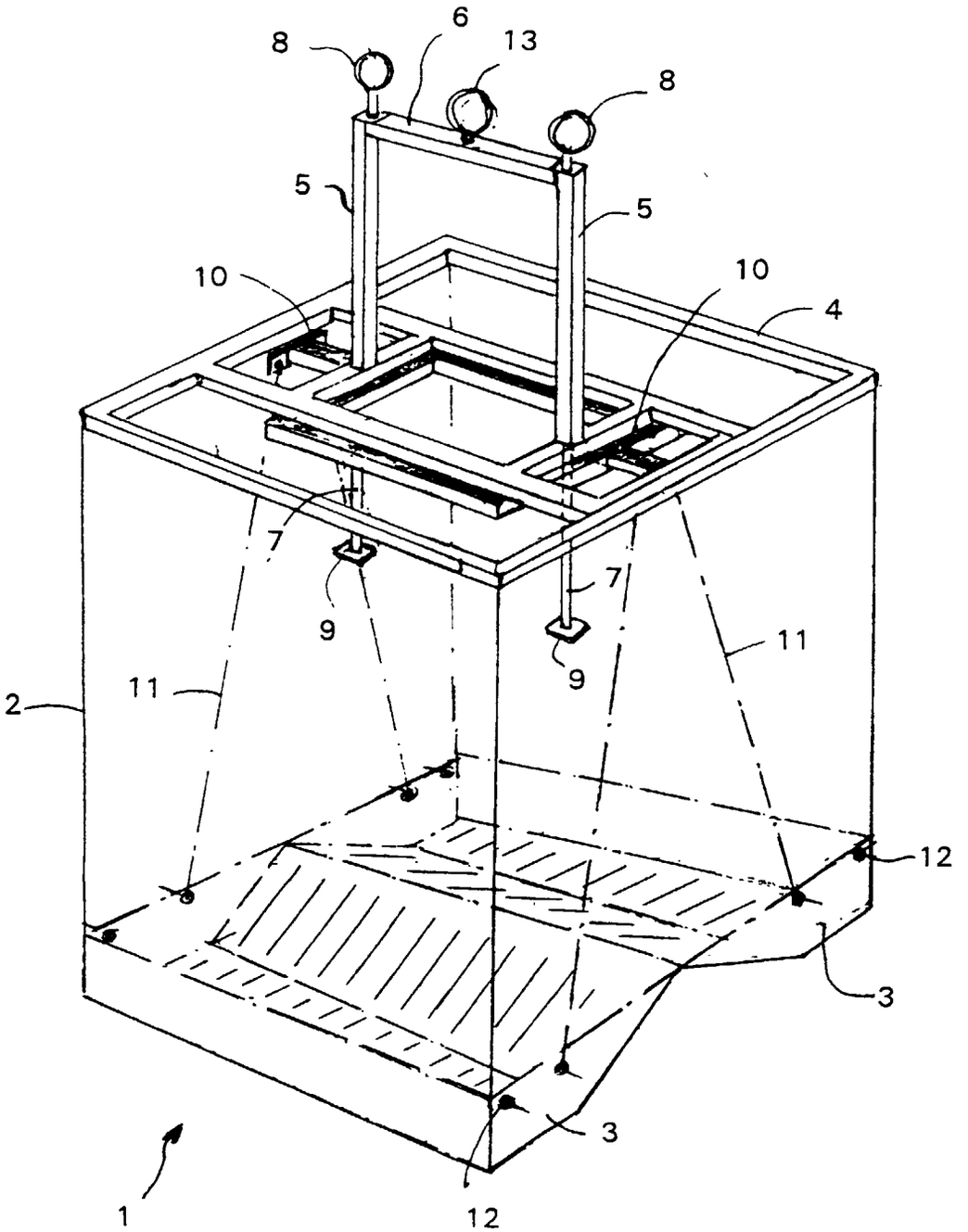

FIG. 1

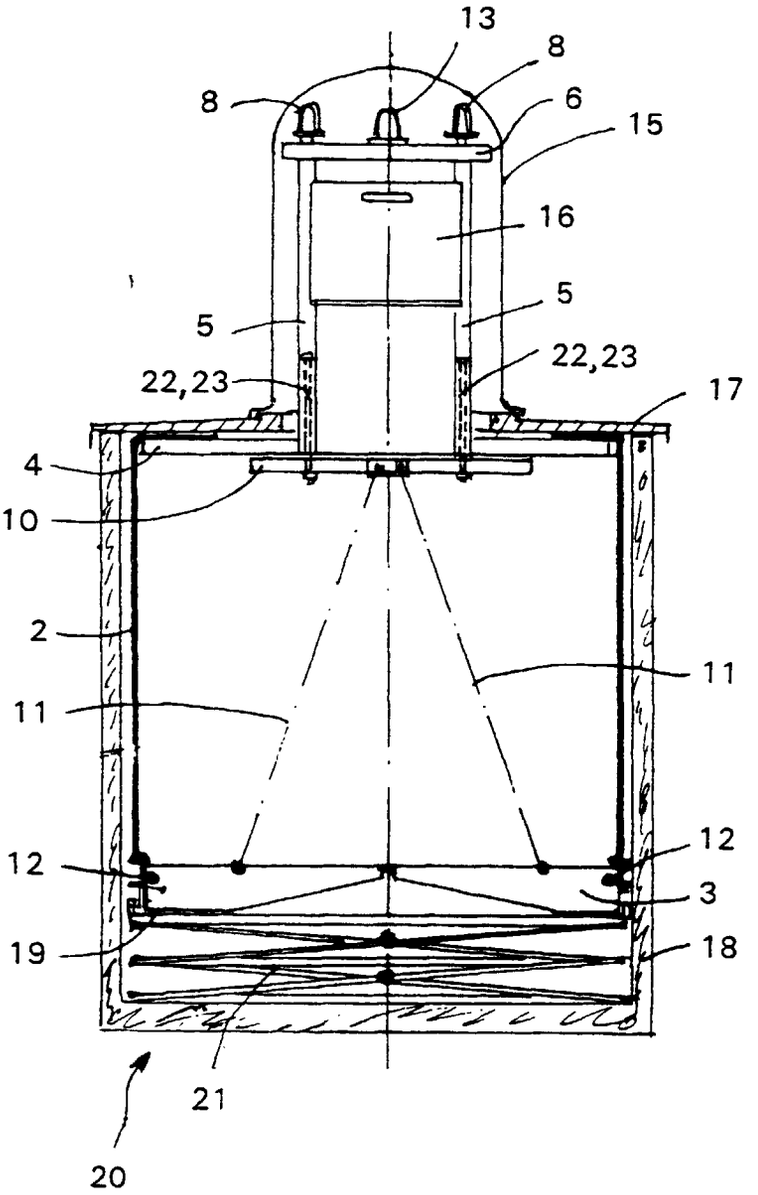

FIG. 2

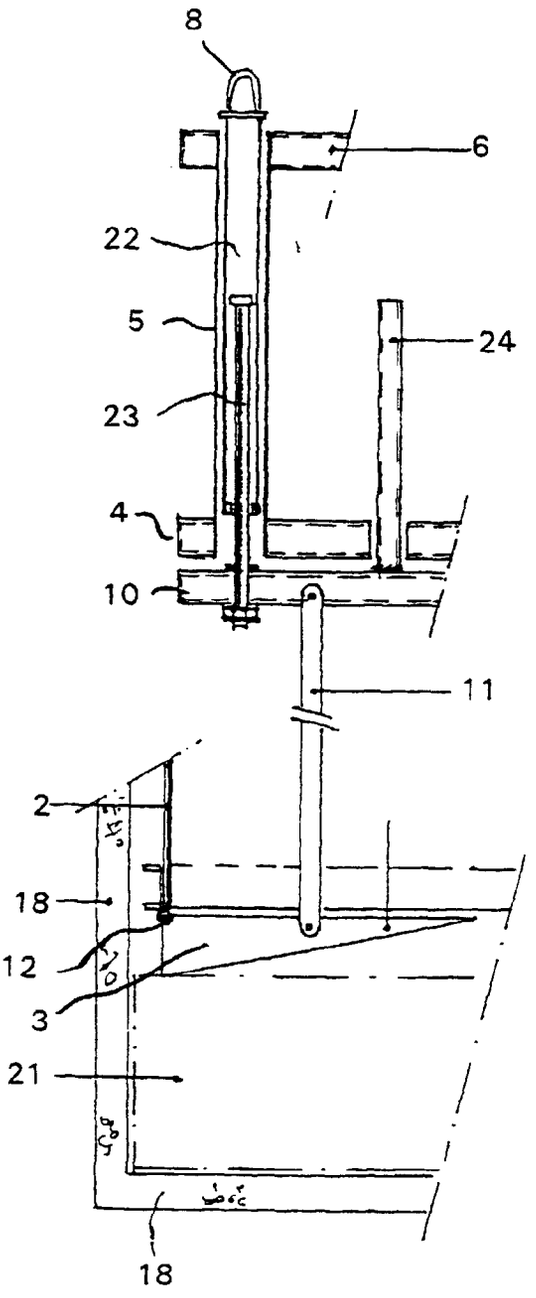

FIG. 3a

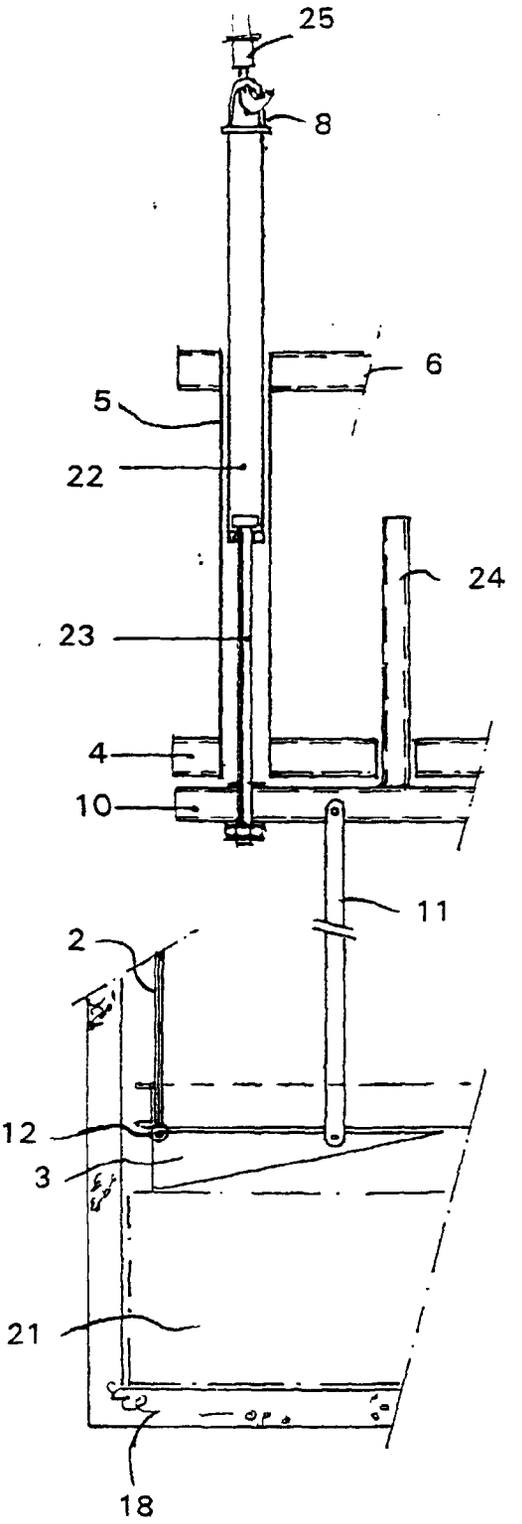

FIG. 3b

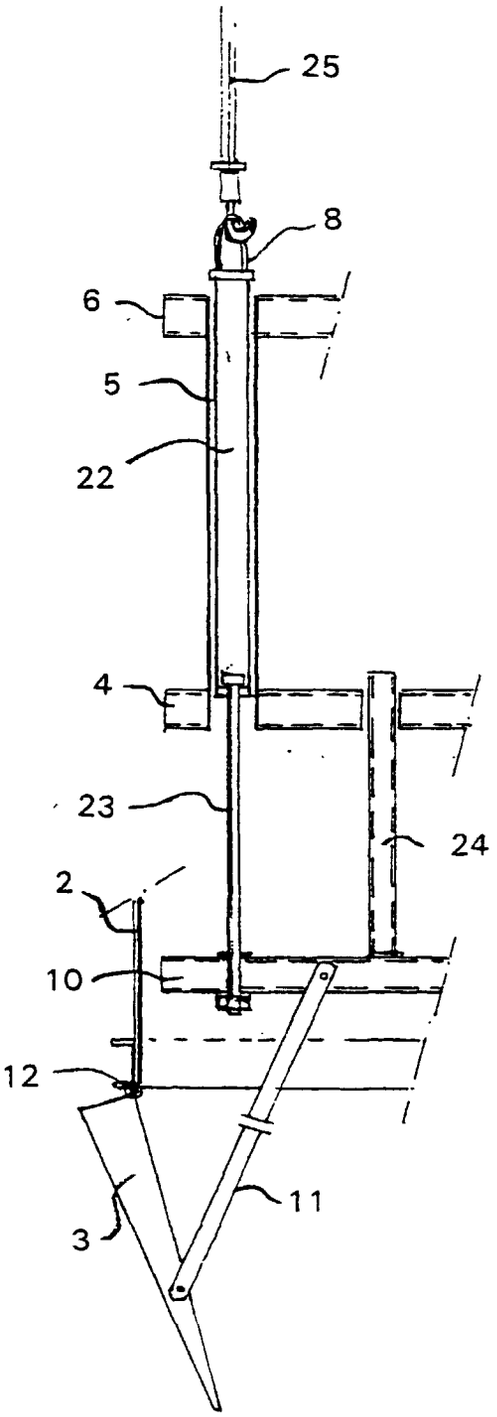

FIG. 3c

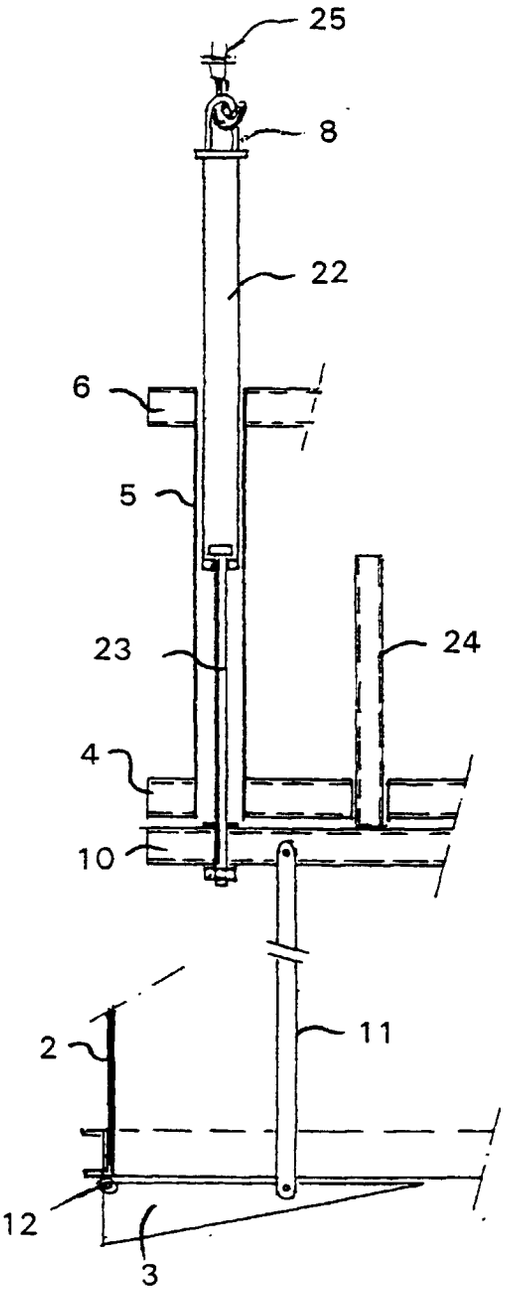

FIG. 3d

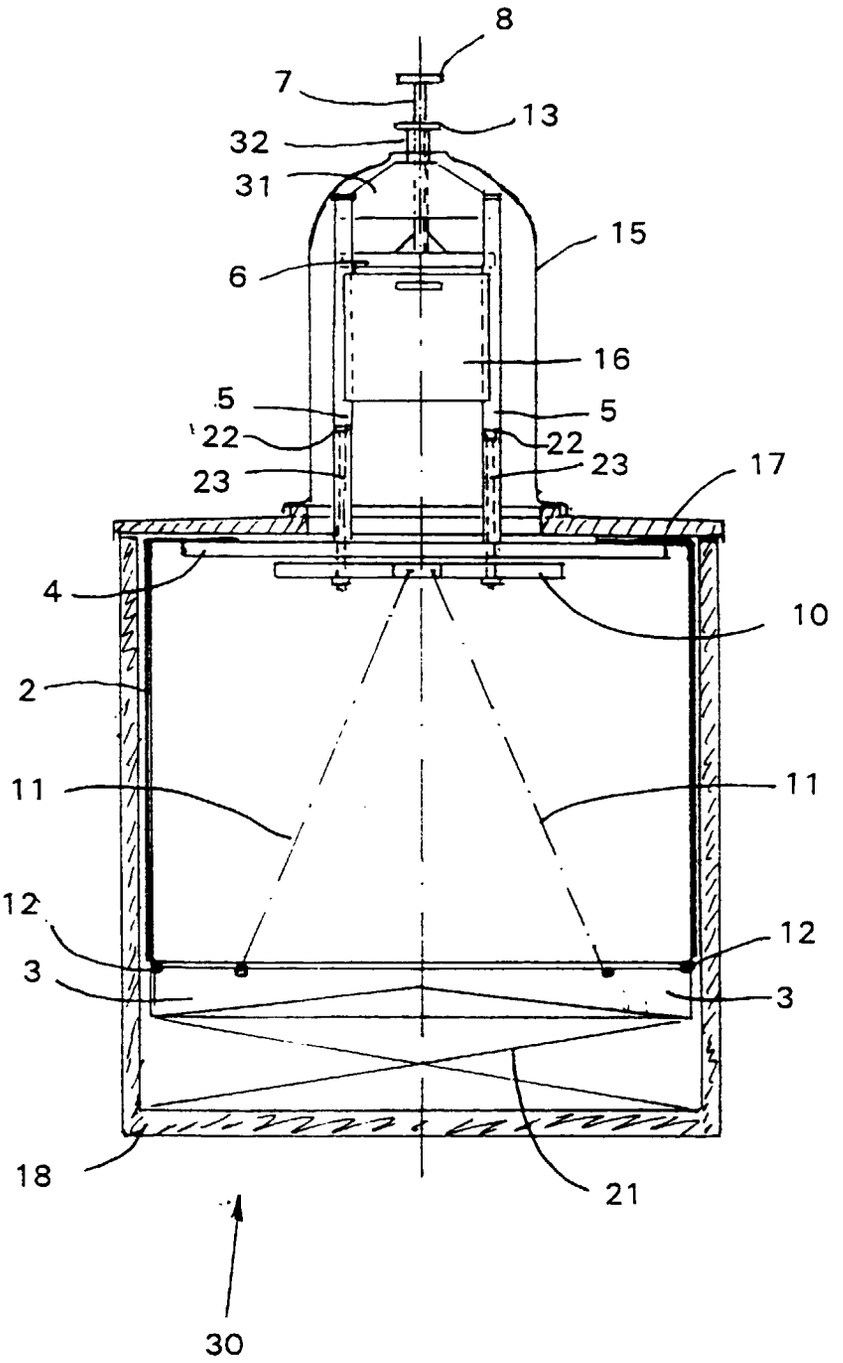

FIG. 4

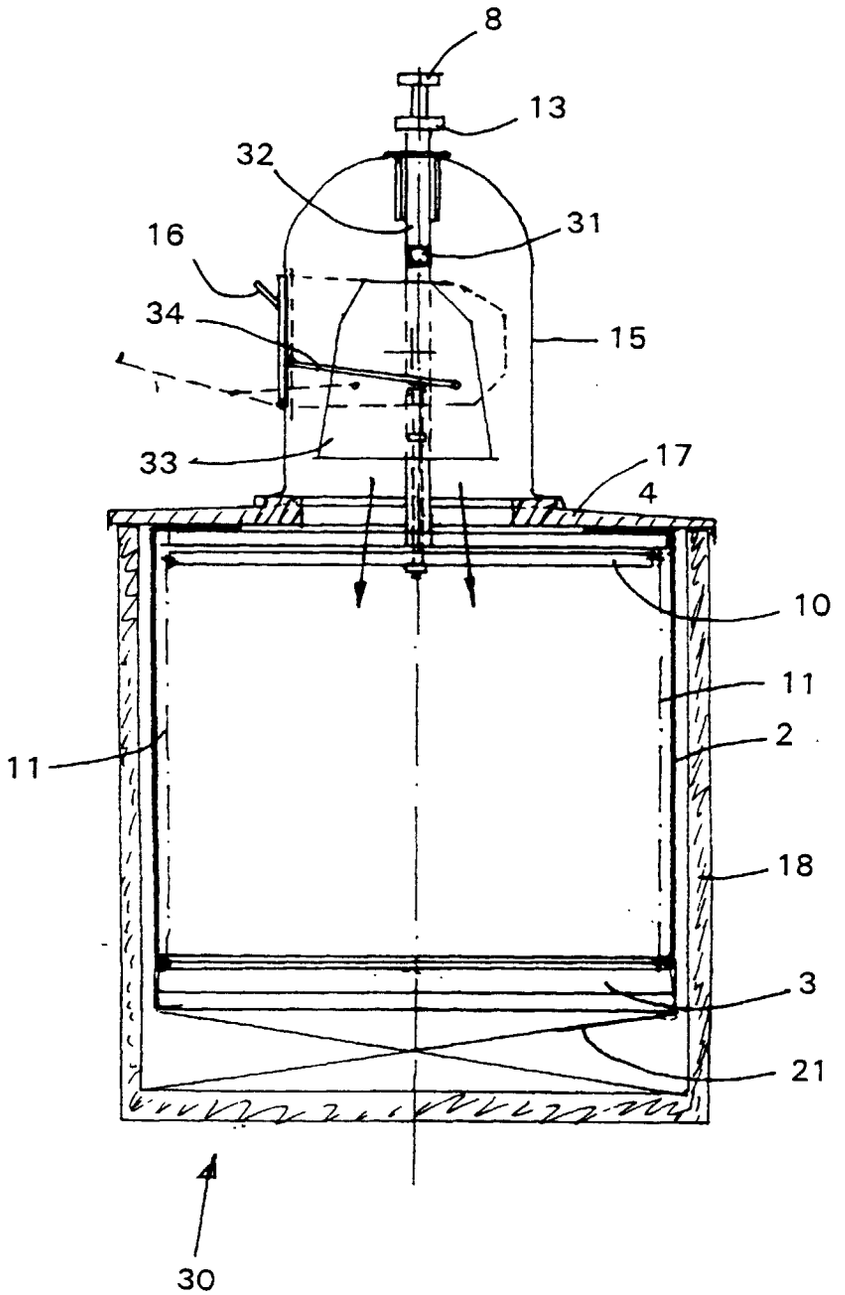

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 98 20 1144

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.6)
A	DE 91 05 976 U (OLBERTS) 1 August 1991 * the whole document *	1,4,7,8	B65F1/12 B65F1/14
A	FR 2 713 610 A (BELLOIR) 16 June 1995 * the whole document *	1,5	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	5 August 1998	Martens, L

CATEGORY OF CITED DOCUMENTS

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