

TITLE: WASTE COLLECTION AND MANAGEMENT**TECHNICAL FIELD**

The present invention generally concerns the collection and management of waste deposited in waste inlets and collected in waste containers of the type that are emptied through a container wall section that is opened as the container is in a hoisted position by an appropriate waste truck.

BACKGROUND

Within the general area of waste management, one fairly recent approach has been to collect waste in comparatively small containers that are each accommodated in a designated underground bunker or similar underground space, and that are each directly associated with an isolated waste inlet above ground. In particular, waste is deposited in a waste inlet that is applied directly to the upper part of the container, in immediate communication with the interior of the container. The emptying of deposited waste from such underground containers is carried out by means of special waste collection trucks carrying lifting devices that are connectable to complementary lifting means, such as lifting hooks, lifting eye bolts etc, provided on the upper part of the respective waste inlets. Specifically, when the truck lifting device has been connected to the inlet-container combination, the latter is lifted to a position above an upwardly open waste collection space of the truck, whereupon one or more container bottom lids are swung open to allow the deposited waste to be emptied. Then, the bottom lids are closed again and the inlet-container combination is returned to its position inside the designated underground bunker.

Although the above described, presently available underground container systems are quite attractive in some aspects, such as low investment cost by requiring only minor excavation work; and good transport economy, they also suffer from severe drawbacks. A major disadvantage of the present systems is the restricted options available for the positioning of the inlet-container combinations. In fact, said inlet-container combinations must be positioned in places where they are accessible for the truck and especially its lifting device and where parking of the truck will not be the cause of danger and/or inconvenience to people in the neighborhood. This consequently means that the inlets will also be located at places where they are not within easy and comfortable reach for users, such as residents of a residential area served by the waste management system, desiring to deposit waste therein.

JP408244906 A discloses equipment that will at least partially eliminate some of the drawbacks of the presently used underground container systems. Specifically, this document discloses a system wherein waste from optionally spaced waste inlets is collected in a common associated underground waste container to which waste is transported by a suction air flow generated in waste suction and air exhaust pipes that are connected to an underground bunker wherein the container is received. According to JP408244906 A such waste suction and air exhaust pipes form a tight connection with the underground bunker but are in indirect communication with the actual container through the bunker, the open upper end of which is sealed by the container when the latter is in a lowered waste receiving position. This means that the inside of the entire bunker is subjected to the vacuum, with the resulting added system volume that has to be evacuated in association with each emptying operation and that causes a delay in the process as well as additional energy consumption. The sealing at the upper end of the bunker is also very exposed to damages.

SUMMARY

It is therefore a general object of the present invention to provide an improved waste management solution for underground container type waste collection installations.

It is a particular object of the invention to suggest a method of collecting and managing waste deposited in a system of the underground container type, providing improved cost efficient as well as environmentally favourable operation of the system.

In particular, it is another object of the invention to provide an improved waste collection and management system of the underground container type, offering excellent cost related as well as environmental benefits for the system.

It is yet another object of the invention to suggest an improved underground waste collection container intended for use in the system of the invention.

These and other objects are met by the invention as defined by the accompanying patent claims.

The invention generally relates to the collection and management of waste deposited in waste inlets and collected in optionally spaced underground waste containers that are emptied by opening a container wall section as the container is in a raised position. To achieve the above stated objects the invention, in brief, provides waste management methods and systems permitting detachable tight docking of at least one separate waste inlet to a designated waste container and detachable tight connection of the container to a vacuum source in association with lowering of the container to a waste receiving position and undocking of the tight connections in association with hoisting of the container from the waste receiving position.

In an embodiment that may be specifically preferable for making waste container emptying easier and more cost efficient, the invention suggests that the waste container is automatically docked and undocked to and from the associated piping in connection with the emptying thereof. In another embodiment an air filter is provided inside the container for filtering air sucked from the container, before said air enters the air exhaust piping.

In yet another embodiment of the invention, the entire container, including lifting device connecting means, is provided below ground in a waste receiving position.

In accordance with another aspect of the invention there is provided a waste container adapted for use in the system of the invention and having a closed upper container end and releasable pipe connections that are provided in each of two side wall sections and that communicate with a container interior through respective wall openings.

Advantages offered by the present invention, in addition to those described above, will be readily appreciated upon reading the below detailed description of embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention, together with further objects and advantages thereof, will be best understood by reference to the following description taken together with the accompanying drawings, in which:

Fig. 1 is a schematical illustration of an embodiment of a waste collection and management system according to the invention;

Fig. 2A is a schematical illustration of a waste container of the waste management system of Fig. 1;

Fig. 2B is a partial, sectioned view of the area of the waste suction pipe docking means of the waste container of Fig. 2A;

Fig. 2C is a partial, sectioned view of the area of the air exhaust pipe docking means of the waste container of Fig. 2A;

Fig. 3A is a schematical, partial section through a waste container installation of the waste management system of Fig. 1, in a waste receiving phase;

Fig. 3B is a schematical, partial section through the container installation of Fig. 3A, in a waste emptying phase; and

Fig. 4 is a schematic perspective view illustrating a prior art underground container system.

DETAILED DESCRIPTION

The invention will be explained further below with reference to an exemplifying embodiment thereof that is illustrated in the accompanying drawing figures 1, 2A-C and 3A-B. This exemplifying embodiment of the invention relates to an application of the inventive solution in a particular to a very schematically outlined waste collection and management system containing one or more isolated waste inlets of a type mainly used in an outdoor environment. This exemplifying embodiment shall in no way restrict the invention to the specifically illustrated application or to the specific design or type of the waste inlet structure used or of any other details that are not vital to the basic principles of the invention. Examples of variations and modifications to the illustrated embodiment are given further below.

The prior art underground container systems that were discussed briefly in the introduction are practically only applicable in less densely populated areas and in areas where waste collecting trucks may be driven and parked within reasonable distances from buildings where the collected waste is generated. This is due to the intrinsic properties of the system, as will be briefly explained with reference to a typical example of the prior art waste insert-container combination 100 illustrated in Fig. 4. In said Fig. 4 is schematically illustrated that the known

underground containers 105 during the normal waste receiving phase are accommodated in an upwardly open chamber or bunker 116 that will be located in a small excavation under ground. The containers 105 are for safety reasons normally supported on a safety platform unit 119 that when the container is lifted for emptying, rises up to a position approximately flush with the ground. Therefore, the platform unit 119 is mainly used to avoid injuries to people by closing off the upwardly open chamber when the container is lifted, but also serves a positioning purpose for the container. Fig. 4 furthermore illustrates that in the known systems the waste inlet unit 102 is mounted directly on a closed upper portion of the container 105. Although not specifically illustrated in Fig. 4, it should be realized that the inlet unit 102 is in open or alternatively controlled immediate communication with the interior of the container 105.

With such a conventional solution, where the inlet 102 and the container 105 form one unit, the inlet 102 will have to be positioned at a location where it is possible to drive and park the waste collection truck sufficiently close to the inlet-container combination 100 to allow a truck lifting device to be connected to a lifting device connection means 115 positioned on top of the inlet structure. This restriction, in addition to the intrinsic small waste volume, many times makes such an inlet-container combination less attractive. A major drawback of this prior system is that the inlets may for the described practical reasons very rarely be located close to and easily accessible by the users. Specifically, the available locations for the inlet may be such that the users will have to carry their waste for relatively large distances, which does significantly lessen the comfort of using the system. Since this prior art concept also requires that the inlet is present at the suitable truck parking location, the location will also have to be chosen so that the upright inlet structure will not be a cause of injury to people and/or will not interfere with other activities in an area.

The invention will now be explained with reference to the exemplifying embodiment thereof that is illustrated in the accompanying drawing figures. In Fig. 1 a waste collection and management system 1 of the invention is very schematically disclosed. It comprises one or several inlets or inlet modules 2, 2' and 2'' that for illustrative and non-restricting purposes are disclosed as free standing, so called "litter bin" type inlets and that are separately connected to a waste suction pipe 4. The inlets 2, 2', 2'' may optionally be in open communication with the suction pipe 4 or in controlled communication therewith through an indicated valve V1. Likewise, in the illustrated example, the suction pipe 4 is provided with a separate air inlet valve AV at the remote

- with respect to the later described container - end 4A thereof, for producing the later described suction air flow therethrough. However, it shall be emphasized that the invention is not restricted to such a configuration, and that the inlet of air may be provided through otherwise located air inlet valves and/or, depending upon the type of waste inlet used, through the actual inlet modules
5 or through a waste chute, as is well known within the waste management area.

The opposite end 4B (see Fig. 3B) of the suction pipe 4 is connected to and penetrates a wall of an underground bunker 16 serving to accommodate the later specifically described underground container 5 of the invention. An air exhaust pipe 9 is also provided in the system 1 and is with a
10 remote end 9B thereof connected to a vacuum source 10 for creating a suction air flow in the waste suction 4 and air exhaust pipes 9. The vacuum source 10 may be a designated underground vacuum unit 10 of a general type that is well known within the field of vacuum operated waste collection and that comprises the ordinary fans, silencer and chimney, neither of them being specifically illustrated herein. The opposite end 9A (see Fig. 3B) of the air exhaust pipe 9 is like-
15 wise connected to and penetrates a wall of the underground bunker 16. The flow of waste through the suction pipe 4 and the flow of air through the exhaust pipe 9 may, where required, likewise be controlled by the indicated valves V2 and V3, respectively.

The invention is based on the concept of having an underground container 5 that is detachably or
20 releasably connected to the waste suction as well as air exhaust pipes 4 and 9, respectively. Specifically, the inlet or inlets 2, 2', 2'' are associated with an underground waste container 5 that receives the deposited waste W sucked through the suction pipe 4 by the air flow created in the waste suction as well as air exhaust pipes 4 and 9, respectively, by the vacuum source 10. In the conventional manner the container 5 is in a later described waste receiving position WR (Fig. 3A)
25 supported on a standard type safety platform 19, serving the above described safety purpose.

A filter unit 17 is typically positioned inside the container 5, generally between later described suction pipe 4 and exhaust pipe 9 connections. The purpose of said filter 17 is to clean the air before being exhausted through the vacuum source 10. The container 5 has a conventional bottom
30 wall that in a container emptying position or phase WE (Fig. 3B) may be opened in one or several sections 6; 6A, 6B, as indicated in dash-dot lines in Fig 2A. According to the invention a top lifting device connector 15 for connection to a lifting device 21 of an appropriate waste truck 20 is

fitted directly to the container, and preferably at a top side position so that it will not extend above a container 5 upper part 5A in the waste receiving phase WR, with the container 5 being received inside the bunker 16. In fact, in the waste receiving position WR, the container 5 is completely received in the underground bunker 16 with the closed upper end 5A thereof, typically carrying the lifting device connector 15, being approximately level with the surrounding ground G. Alternatively or additionally, the upper end of the bunker 16 may in the waste receiving position WR of the container 5 be closed by a separate hatch 18 that will be removed or swung open during the waste emptying phase WE. These features of the invention will eliminate any risk of injury or disturbance caused by the container 5 and/or lifting device connector 15 of the system 1.

According to the invention, the releasable or detachable connection between the waste suction 4 and air exhaust pipes 9 and the container 5 will preferably be configured so that the automatic release and reconnection thereof is controlled directly by the lifting up and lowering down, respectively, of the container 5 from and into the bunker 16. An exemplifying embodiment of such a releasable connection according to the invention will now be described with specific reference to Figs. 2A-2C and 3A-3B. The suction pipe 4 is releasably connected to a first side wall section 7 of the waste container 5 and the air exhaust pipe 9 is releasably connected to a second side wall section 8 of the waste container 5 through the respective, mutually complementary docking means 11, 12 and 13, 14 provided at the container side wall sections 7, 8 of the container 5 and at a container facing end 4B and 9A of the respective waste suction and air exhaust pipes 4 and 9, respectively.

The docking means consist of first container docking means 11, 12, each comprising an oppositely inclined docking guide surface 11A and 12A, respectively, at the first and second side wall sections 7 and 8, respectively, of the container 5 and second pipe docking means 13, 14 having oppositely inclined docking surfaces 13A and 14A, respectively, at the container facing end 4B and 9A, respectively of the waste suction and air exhaust pipes 4 and 9, respectively. The respective pairs of docking guide surfaces 11A, 12A and 13A, 14A that cooperate in the receiving position WR of the container 5, between them form an angle (not specifically shown) suitable for automatically forming a tight connection when brought together and for allowing automatic disconnection. In a non-restricting example, the outwardly facing guide surfaces 11A, 12A of the container side docking means 11, 12 may between them form an angle of approximately 330-335°

and the inwardly facing guide surfaces 13A, 14A of the pipe end docking means 13, 14 may between them form an angle of approximately 25-30°.

The first docking means 11, 12 consist of short pipe sections that at their outer ends carry a flange forming the associated docking guide surfaces 11A, 12A, that are attached to the exterior of the respective container wall section 7, 8 and that communicate with the container 5 interior through wall openings 7A, 8A. In a practical embodiment the container 5 has a generally square cross-section and thereby the two releasable container docking means 11, 12 and the respective, associated wall openings 7A and 8A, respectively, are provided in generally opposite side wall sections 7, 8. However, in this connection it shall be emphasized that as used herein, the term side wall sections is not restricted to such a positioning of the docking means in different side walls of a container. In fact, in accordance with the invention, the two specified side wall sections may be optionally positioned, such as side by side in one and the same side wall or in adjacent side walls. In the container 5 waste receiving position WR said first and second docking means 11, 12 and 13, 14, respectively, cooperate to form respective tight docking connections DC1, DC2 connecting the waste suction pipe 4 and the air exhaust pipe 9 to the interior of the container 5.

Referring to Fig. 2A, it will be noted that the two releasable pipe docking or connection means 11, 12 of the container 5 and the respective, associated wall openings 7A and 8A, respectively, are provided at different heights above the opening bottom wall 6; 6A, 6B. This allows the air filter 17 to be positioned inside the container 5, covering the full cross-section thereof, generally at a height between the wall openings 7A, 8A, and specifically above said wall opening 7A through which deposited waste W is sucked in and below or at a level with the other wall opening 8A. This will secure filtering of the exhaust air sucked from the container 5, before said air enters the air exhaust pipe 9, so that the container 5 serves both as a separator and filter unit.

The invention, as described, provides a significant improvement over the existing underground container systems. In fact, the separated inlet and underground container according to the invention allows for a practically free or optional, spaced positioning of one or several inlet modules relative to each other and/or relative to the container. This configuration of the system will create possibilities for providing a very user friendly system. Another essential benefit of

this configuration is that the underground container is at all times, except in the actual emptying phase WE, completely hidden in the ground, thereby constituting no injury risk or other cause of physical disturbance. Other benefits of the invention over the existing underground container systems are: a general enhancement of the flexibility of the system, both with regard to its layout and to the possibilities of combining different types of inlets and inlet modules; an essential safety enhancement on account of the fact that the system may easily be configured so that emptying trucks are not required to drive into and back out from inner yards or alleys; and that the system requires very restricted ground area that may not be used for other purposes.

10 In practicing the present invention, one or several waste inlets 2; 2'; 2'' will be positioned at optional distances from a respective waste container 5 that will be completely received in an underground bunker 16, typically underneath a hatch 18 and positioned with an upper part 5A thereof being approximately level with the ground G. Each of said waste inlets is then detachably connected to a first side wall section 7 of the container 5 through a waste suction pipe 4, whereby
15 several waste inlets 2; 2'; 2'' are typically connected to a container 5 by branching them from the same waste suction pipe 4. Similarly, a vacuum source 10 is detachably connected to a second side wall section 8 of the waste container through an air exhaust pipe 9. During operation of the system 1, in the waste receiving phase WR with the container 5 received in position in the bunker 16, suction air flow is continuously or alternatively intermittently applied to the waste
20 suction 4 and air exhaust 9 pipes by means of the vacuum source 10 that is connected to a second end 9B of the air exhaust pipe. As a result, waste W deposited in the inlets 2, 2', 2'' is continuously or in sequence sucked into the container 5.

The container 5 is emptied at regular intervals or when indicated by a fill sensor (not shown) or
25 similar indicator. Typically, an appropriate waste truck 20 carrying a lifting device 21 is driven to a position close to the container 5, is connected with its container connecting means 22 to the container carried lifting device connector 15, in the relevant case after opening the hatch 18. The container 5 is then lifted up by the lifting device 21, from the waste receiving position WR into an emptying position WE above an infeed opening of the truck, and the container 5 is then emptied
30 through the conventional opening bottom wall section or sections 6; 6A, 6B. During initial lifting of the container, the above described docking means 11, 12, 13, 14 permit automatic undocking or disconnection of the suction 4 and exhaust 9 pipes from the container 5 wall sections 7, 8. After

emptying, the automatic docking of the waste suction and air exhaust pipes 4 and 9, respectively, to the respective first 7 and second 8 container side wall sections is then accomplished in association with a lowering of the container 5 into the waste receiving position WR. Thereby, tight docking connections DC1, DC2 are formed by the generally oppositely inclined docking guide surfaces 11A, 12A at the first and second side wall sections 7, 8, and the generally oppositely inclined docking surfaces 13A, 14A at the container facing end 4B, 9A of the waste suction and air exhaust pipes 4, 9, which together form the complementary first and second docking means 11, 12; 13, 14 that cooperate in the container 5 waste receiving position WR. Although emptying has been described as being carried out from directly above the truck, which is the emptying position by presently available trucks, other future truck configurations may allow or require emptying of the container from positions above one side or corner of the truck or even beside the actual truck.

In alternative, but not specifically illustrated embodiments of the invention, variations of the different illustrated parts of the system may be employed without departing from the scope of the invention. One example thereof is the use of a differently shaped waste container than the illustrated generally box-like shape with two mutually opposite side wall pairs. Thus, with regard to the operation of the system the container may likewise have only one cylindrical, oval or otherwise shaped side wall or even more than four side walls. The container and pipe docking means may be of any other type enabling automatic, tight docking and convenient undocking, but may alternatively be a fully or partly manual means operated by i.e. the truck driver. Likewise, the invention is in no way restricted to the use of a vacuum source in the form of a local, dedicated underground fan installation. Instead, with regard to the operation of the system, it may equally well be supplied with vacuum pressure from a local, dedicated fan installation above ground or even with vacuum pressure diverted from a larger waste terminal or central.

In other advantageous alternative embodiments, the system according to the invention is not restricted to applications having the illustrated type of isolated outdoor waste inlet, but may be applied to any type of presently available, as well as future, indoor as well as outdoor waste insert module, ranging from small, so called litter bins and up to waste inlet chutes inside multi-story buildings. A system of the invention may advantageously also contain combinations of such different types of inlets. The basic principles of the invention may therefore be applied to any kind

of practically appropriate waste system. In particular applications, likewise covered by the invention, the suggested underground waste management method and system may advantageously be used for collecting different fractions of waste, such as recyclable glass, plastic and paper. Such applications may advantageously also be used in combination with i.e. a conventional stationary vacuum waste collection system. Since the recyclable waste fractions are normally deposited in smaller volumes than the combustible bulk waste, the inventive underground containers that have a limited storage capacity, will be very well suited for use in such a combination. In such an application it would in many situations be very convenient to divert the underground container suction from the central collection station or terminal, as was indicated above.

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The invention has been described in connection with what is presently considered to be the most practical and preferred embodiments, but it is to be understood that the invention is not limited to the disclosed embodiments. The invention is therefore intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

PATENT CLAIMS

1. A method for the collection and management of waste (W) deposited in at least one waste inlet (2; 2'; 2'') and collected in underground waste containers (5) that are emptied
5 through a wall section (6; 6A, 6B) of the container by opening said wall section as the container has been lifted from a waste receiving position (WR) into an emptying position (WE), whereby the waste inlet or inlets (2; 2'; 2'') are positioned at an optional distance from a respective waste container (5), through a waste suction pipe (4) the waste inlet or inlets are
10 connected to an underground bunker (16) receiving the respective waste container (5), a vacuum source (10) is connected to the underground bunker (16) through an air exhaust pipe (9) and a suction air flow is created in the waste suction and air exhaust pipes (4 and 9, respectively) by means of the vacuum source (10) that is connected to a second end (9B) of the air exhaust pipe, **characterized in** that in a manner that is known per se the container is
15 lifted from the waste receiving position (WR) to the emptying position by an appropriate waste truck (20), in that the waste suction and air exhaust pipes (4 and 9, respectively) are docked to first and second container side wall sections (7 and 8, respectively) forming tight docking connections (DC1, DC2) with them in association with a lowering to the waste receiving position (WR) and in that the tight docking connections are undocked in association with hoisting of the container (5) from the waste receiving position (WR).

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2. A method according to claim 1, **characterized by** forming first container docking means (11, 12) having generally oppositely inclined docking guide surfaces (11A and 12A, respectively) at the first and second side wall sections (7 and 8, respectively) and forming second complementary pipe docking means (13, 14) having generally oppositely inclined docking surfaces
25 (13A and 14A, respectively) at a container facing end (4B and 9A, respectively) of the waste suction and air exhaust pipes (4 and 9, respectively), said first and second docking means in the container (5) waste receiving position (WR) cooperating to form, controlled by the lowering to the waste receiving position (WR), tight automatically docking and undocking docking connections (DC1, DC2).

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3. A method according to claims 1 or 2, **characterized by** filtering the exhaust air sucked from the container (5), before said air enters the air exhaust pipe (9).

4. A method according to any of claims 1-3, **characterized by** accommodating the entire container (5), including means (15) for connection to a lifting device (21) of the waste truck (20), below ground (G) in the waste receiving position (WR).
5. A method according to any of claims 1-4, **characterized by** connecting several waste inlets (2; 2'; 2'') to a container (5) by branching them from the same waste suction pipe (4).
6. A method according to any of claims 1-5, **characterized by** receiving the complete container (5) in an underground bunker (16), underneath a removable or alternatively opening hatch (18) positioned approximately level with the ground (G).
7. A waste (W) collection and management system (1) including at least one waste inlet (2; 2'; 2'') associated with an underground waste container (5) having an opening wall section (6; 6A, 6B) for emptying, a waste suction pipe (4) being connected to the at least one waste inlet and being connected to and penetrating an underground bunker (16) receiving the waste container (5) and an air exhaust pipe (9) being connected to and penetrating the underground bunker and being connected to a vacuum source (10) for creating a suction air flow in the waste suction and air exhaust pipes, **characterized by** a top lifting device connector (15) that is known per se and that is intended for connection to a lifting device (21) of an appropriate waste truck (20), mutually complementary docking means (11, 12 and 13, 14) provided at respective container side wall sections (7, 8) of the container (5) and at a container facing end (4B and 9A) of the respective waste suction and air exhaust pipes (4 and 9, respectively), said docking means cooperating to form respective tight docking connections (DC1, DC2).
8. A waste (W) collection and management system (1) according to claim 7, characterized in that the docking means (11, 12 and 13, 14) consist of first container docking means (11, 12) having generally oppositely inclined docking guide surfaces (11A and 12A, respectively) at the first and second side wall sections (7 and 8, respectively) of the container (5) and second pipe docking means (13, 14) having generally oppositely inclined docking surfaces (13A and 14A, respectively) at the container facing end (4B and 9A, respectively) of the waste suction and air exhaust pipes (4 and 9, respectively), said first and second docking means cooperating

in a container (5) waste receiving position (WR) to form tight, automatically docking and undocking, respectively, docking connections (DC1, DC2).

9. A waste (W) collection and management system (1) according to claim 7 or 8,
5 **characterized by** a filter unit (17) positioned inside the container (5), between the suction pipe (4) connection and the exhaust pipe (9) connection.

10. A waste (W) collection and management system (1) according to any of claims 7 - 9,
10 **characterized in** that the container (5) in the waste receiving position (WR) is received in the underground bunker (16) with an upper end (5A) of the container being approximately level with the surrounding ground (G).

11. An underground waste (W) collection container (5) for use in the system (1) according to claims 7-10, having at least one side wall (7, 8), an opening bottom emptying wall (6; 6A, 6B)
15 and an upper closed end (5A), **characterized in** that the container upper end (5A) in a manner known per se carries a lifting device connector (15) for connection to a lifting device (21) and that in each of two side wall sections (7, 8) is provided a releasable pipe connection means (11, 12) communicating with a container interior through a respective wall opening (7A, 8A).

20 12. An underground waste (W) collection container (5) according to claim 11, **characterized in** that the two releasable pipe connection means (11, 12) and the respective, associated wall openings (7A and 8A, respectively) are provided at a different height above the opening bottom wall (6) and in that an air filter unit (17) is positioned inside the container (5), covering the full cross-section thereof at a height generally between said wall openings (7A, 8A).

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13. An underground waste (W) collection container (5) according to claims 11 or 12, **characterized in** that the container (5) has a generally square cross-section and in that the two releasable pipe connection means (11, 12) and the respective, associated wall openings (7A and 8A, respectively) are provided in generally opposite side wall sections (7, 8).