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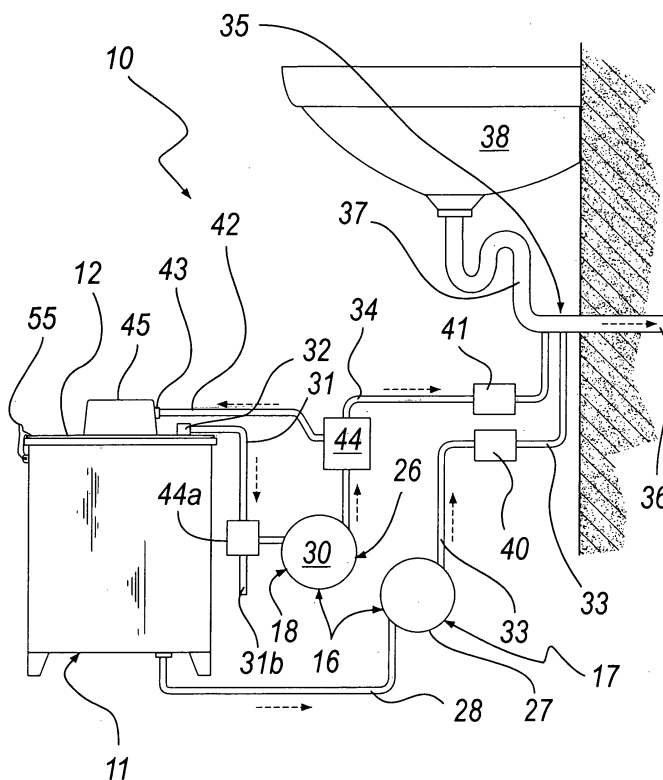
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**(54) Apparatus for collection and disposal of dry waste, wet waste and the like**

(57) An apparatus for collection and disposal of waste, comprising a container (11) with a lid (12) fastened by hermetic closure elements (13), with a piston (14) inside that can slide and forms a hermetic chamber (15); and waste compaction and fluid discharge elements (16), that comprise first air and liquid suction el-

ements (17) connected to a space (19) between a detachable collecting flexible container (20) arranged inside the hermetic chamber (15), and the walls (22) of the hermetic chamber (15), and second air and liquid suction elements (18) connected to the inside of the flexible container (20).



**Fig. 2**

## Description

**[0001]** The present invention relates to an apparatus for collection and disposal of dry waste, wet waste and the like, particularly but not exclusively for the domestic environment.

**[0002]** The present invention is applied also in the management of industrial dirty waste and refuse and in many other fields, such as the medical and sanitary field, the biochemical field, and the like.

**[0003]** As it is known, the sorted collection of the above cited waste is currently mandatory as a consequence of European Economic Community directives regarding the need to manage waste by aiming for its recovery and recycling.

**[0004]** From the hygiene standpoint, the worst waste is the waste generally termed "wet", which includes the discarded parts of food such as meat, vegetables, fruit, fish, et cetera.

**[0005]** Such wet waste, if not disposed rapidly, ferments inside the bag in which it is deposited and becomes the source of bad odors and a strong attraction for insects and small animals of various kinds that are generally unwanted in a domestic environment.

**[0006]** Moreover, some "wet" waste can release liquids which, if the waste containment bag is torn, may spill into the environment when the bag is extracted from the container in which it is accommodated, with great inconvenience both because of the cleaning needed to restore the propriety of the environment and because of the unpleasant odor that said liquids may emit.

**[0007]** Bad odors and greasy and foul-smelling liquids can be present also in so-called "dry" waste, because small portions of food and beverages may remain also in cans, food containers and the like.

**[0008]** Therefore, both due to the difficulty of separating "wet" and "dry" waste but also due to laziness or distraction of a user, "wet" waste often ends up being deposited partly or fully also in the container designed for "dry" waste.

**[0009]** To solve these drawbacks, apparatuses are provided for converting and disposing waste, whose dimensions are such that they can be arranged conveniently even in a domestic environment, for example proximate to a kitchen sink.

**[0010]** A first type of apparatus is known as bioshredder.

**[0011]** The bioshredder is generally installed under the kitchen sink and is suitable to shred any kitchen waste and eliminate it through the water drain of said sink.

**[0012]** Such an apparatus is currently not allowed in Italy, pursuant to legislative decree No. 258 dated 18 August 2000.

**[0013]** Such device, although being capable of reducing the waste to particles small enough to be disposed without problems by a generic domestic sewage system, introduces in the street sewage system a load that

cannot be withstood by said sewage system and in the long term damages it and forces frequent maintenance.

**[0014]** There is also a second type of apparatus that is suitable to pack and heat the waste, so as to reduce its volume and at the same time reduce any liquids present in said waste.

**[0015]** However, this second type of apparatus has a significant bulk and is therefore difficult to install for example in a home kitchen.

**[0016]** Moreover, said apparatus, in addition to being unable to control the release of unwanted odors, has the additional drawback of never completely removing the waste from the user's sight.

**[0017]** Such apparatus, by being provided with a lid to be opened and closed in order to introduce the waste, whether intended for "wet" waste or for "dry" waste, in fact exposes the waste to the user's sight every time it is necessary to load additional waste therein.

**[0018]** The aim of the present invention is to provide an apparatus for collection and disposal of dry waste, wet waste and the like, particularly but not exclusively for the domestic environment, which is capable of obviating the drawbacks noted in conventional waste disposal apparatuses.

**[0019]** Within this aim, an object of the present invention is to provide an apparatus that is capable of eliminating the liquids and odors from the waste collected therein.

**[0020]** Another object of the present invention is to provide an apparatus that is also suitable for compacting "dry" waste, such as paper, polystyrene, plastics and the like.

**[0021]** Another object of the present invention is to provide an apparatus that is capable of completely hiding the waste from the user's sight.

**[0022]** A further object of the present invention is to provide an apparatus whose dimensions are such that it can be installed easily in a domestic environment without particular problems in finding sufficient space.

**[0023]** A still further object of the present invention is to provide an apparatus for waste collection and disposal that can be installed even more conveniently in biochemical laboratories, in surgeries and in industrial buildings and other similar environments dedicated to industrial production.

**[0024]** Another object of the present invention is to provide an apparatus that is structurally simple and can be manufactured at low cost with known systems and technologies.

**[0025]** This aim and these and other objects that will become better apparent hereinafter are achieved by an apparatus for collection and disposal of dry waste, wet waste and the like particularly for the domestic environment, of the type that comprises a container with a lid fastened by hermetic closure means, inside which there is a piston that can slide and forms a hermetic chamber, said apparatus being provided with waste compaction and fluid discharge means, said apparatus being char-

acterized in that said compaction and discharge means comprise first suction means, which are functionally connected to a space comprised between a detachable flexible waste collection container, arranged inside said hermetic chamber, and the walls of said hermetic chamber, and second suction means, which are functionally connected to the inside of said flexible container.

**[0026]** Advantageously, said apparatus comprises return means that are suitable to return said piston to the base of the container.

**[0027]** Further characteristics and advantages of the present invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a sectional side view of an apparatus according to the invention;

Figure 2 is a view of an installation of an apparatus according to the invention;

Figures 3 to 5 are views of the main operating sequences of an apparatus according to the invention.

**[0028]** With reference to the figures, an apparatus for collection and disposal of dry waste, wet waste and the like according to the invention is generally designated by the reference numeral 10.

**[0029]** The apparatus 10 comprises a container 11 provided with a lid 12.

**[0030]** The lid 12 is fastened by hermetic closure means 13.

**[0031]** Inside the container 11 there is a sliding piston 14, which forms a hermetic chamber 15.

**[0032]** The apparatus 10 is provided with means for compacting waste and with means for discharging fluids, generally designated by the reference numeral 16.

**[0033]** The compaction and discharge means 16 use vacuum technology and comprise first suction means 17 and second suction means 18.

**[0034]** The first suction means 17 are functionally connected to a space 19, which is comprised between a flexible removable container 20 for collecting waste 21, which is arranged inside the hermetic chamber 15, and walls 22 of the hermetic chamber 15.

**[0035]** The second suction means 18 are instead functionally connected to the inside of the flexible container 20.

**[0036]** Both the first suction means 17 and the second suction means 18 are suitable to aspirate, from the volumes to which they are connected, both air and any other liquids or particles that are present, generating a vacuum in said volumes.

**[0037]** Advantageously, the flexible container 20 is constituted by a garbage bag 20a of a known type.

**[0038]** There are also return means 23 that are suitable to return the piston 14 to a base 24 of the container 11.

**[0039]** The return means 23 are constituted by a traction spring 25, which is arranged, in the second chamber 15a, between a cross-member 24a arranged at the base 24 of the container 11 and the piston 14.

**[0040]** The apparatus conveniently comprises means 26 for pushing the waste 21 toward the bottom of the bag 20a.

**[0041]** The first suction means 17 are constituted by a first vacuum pump 27.

**[0042]** The first pump 27 is connected to the space 19 between the bag 20a and the internal walls 22 of the chamber 15 by way of a first tube 28, which is connected to a first intake 29 that is opened by means of the piston 14.

**[0043]** Likewise, the second intake means 18 are constituted by a second vacuum pump 30.

**[0044]** The second pump 30 is instead connected to the inside of the bag 20a by means of a second tube 31, which passes through the lid 12 by means of a second intake 32.

**[0045]** The second tube 31 is arranged so as to draw from the bottom of the bag 20a.

**[0046]** Conveniently, the part 31a of the second tube 31 that lies inside the chamber 15 and is inserted in the bag 20a is flexible.

**[0047]** The means 16 for compacting waste and discharging fluids are completed by a first discharge duct 33 and by a second discharge duct 34.

**[0048]** The first duct 33 is arranged between the first pump 27 and a discharge 35.

**[0049]** The second duct 34 is arranged between the second pump 30 and the discharge 35.

**[0050]** The discharge 35 is conveniently a pipe 36 of the domestic sewage system downstream of a siphon 37, such as for example the siphon of a sink 38 shown in Figure 2.

**[0051]** The first duct 33 and the second duct 34 each have a check valve, respectively designated by the reference numerals 40 and 41 in Figure 2.

**[0052]** The check valves 40 and 41 prevent fluids present in the discharge 35 from entering the apparatus 10.

**[0053]** The means 26 for pushing the waste 21 are constituted by the second pump 30.

**[0054]** The second pump 30 is in fact connected by means of a third tube 42 to a blower port 43 arranged on the lid 12.

**[0055]** The third tube 42 is connected to the second discharge duct 34 by means of a first three-way valve 44.

**[0056]** The first three-way valve 44 allows to divert the air stream emitted by the second pump 30 toward the inside of the bag 20a instead of toward the discharge 35.

**[0057]** The second pump 30 draws the air to be injected into the bag 20a from an external intake channel 31b.

**[0058]** The intake channel 31b is connected to the second tube 31 by means of a second three-way valve 44a.

[0059] The lid 12 has an opening 45 for inserting the waste 21.

[0060] The opening 45 is closed by a door 46 that opens toward the inside of the first chamber 15.

[0061] The door 46 is provided with automatic closure means 47.

[0062] The automatic closure means 47 are constituted by a pusher spring 48, which is arranged between the door 46 and a fixing point 49 proximate to a hinge 50 of the door 46.

[0063] The piston 14, which as mentioned constitutes the bottom of the first hermetic chamber 15, is provided with peripheral sealing rings 51, which are adjacent to the internal wall 22 of the container 11.

[0064] The container 11 is substantially cylindrical.

[0065] The hermetic closure means 13 that fasten the lid 12 comprise two pawl-like hooks 55, which are pivoted to the container 11 and are suitable to grip complementarily shaped engagement portions 56 provided on the lid 12.

[0066] To provide a hermetic closure, the closure means 13 are completed by a gasket 57, which is arranged between the upper rim 58 of the container 11 and the lid 12.

[0067] The mouth of the garbage bag 20a is blocked between the lid 12 and the gasket 57.

[0068] The operation of the apparatus 10 described above is as follows, starting with a situation in which the bag 20a is already present inside the container 11 and the lid 12 is closed.

[0069] As shown in Figure 3, waste 21 is then introduced through the opening 45 provided with a door 46.

[0070] The opening movement of the door 46 activates the second pump 30.

[0071] In this manner, the suction work of the second pump 30 prevents the escape of odors or other things from the chamber 15 and from the bag 20a when the door 46 is opened.

[0072] Moreover, the door 46, thanks to the automatic closure produced by the thrust of the spring 48, prevents a user who loads the waste 21 substantially from seeing the garbage that has already accumulated inside the bag 20a.

[0073] At the end of the operation for loading the waste 21, the remaining means 16 for waste compaction and fluid discharge, constituted in this case by the first pump 27, are also activated.

[0074] The first pump 27 aspirates fluids, i.e., air and any liquids that have leaked from the bag 20a, from the space 19 between the bag 20a and the wall 22 of the chamber 15 by means of the first tube 28, while at the same time the second pump 30 continues to aspirate air and liquids present inside the bag 20a through the second tube 31.

[0075] The suction suitable to generate a vacuum produced by the pumps 27 and 30 inside the hermetic chamber 15 causes the piston 14 to rise, compressing the waste 21 against the lid 12.

[0076] The values of the generated vacuum determine the extent of the compaction of the waste 21.

[0077] The first and second pumps 27 and 30 thus achieve the aim of aspirating bad odors, liquids and any other fluids that might facilitate the fermentation of wet waste and therefore the release of further unwanted odors.

[0078] Moreover, the first and second pumps 27 and 30 also achieve, as mentioned, the goal of compressing the waste 21, whether "wet" or "dry" or mixed.

[0079] This suction and compression step is maintained for a preset time, such as to achieve, for the waste 21, a substantially permanent crushing and compaction.

[0080] At the end of the suction and compression step, shown in Figure 4, there is the reset step, in which the second pump 30 injects air into the bag 20a by means of the third tube 42.

[0081] The air reaches the bag 20a after the switching of the first and second three-way valves 44 and 44a.

[0082] By means of the second valve 44a, the second pump 30 in fact draws the air stream that enters from outside by means of the channel 31 b; at the same time, the stream that exits from the second pump 30 is diverted from the second duct 34 to the third tube 42 by way of the first three-way valve 44.

[0083] The halting of the first pump 27 and the action of the traction spring 25 return the piston 14 toward the base 24 of the container 11.

[0084] The injection of air from the second pump 30 propels the compressed waste toward the bottom of the bag 20a, which by being flexible spreads out inside the chamber 15, as shown in Figure 5.

[0085] The compaction of the waste 21 clears new volume inside the bag 20a, said volume being available for filling with an additional load of waste.

[0086] The operation of the second pump 30 is stopped.

[0087] A new loading of waste is performed.

[0088] The three-way valve 44 is switched for the step for compressing the waste and discharging the fluids, connecting the second pump 30 to the discharge 35.

[0089] The bag 20a receives new loads of waste until it is no longer possible to introduce further loads because it is impossible to open the door 46, which is blocked internally by the waste that is already present inside the bag 20a.

[0090] The hooks 55 are released, the lid 12 is opened, and the bag 20a is removed and replaced with a new bag.

[0091] Once the mouth of the bag has been folded around the gasket 57 and the lid 12 has been closed again, the apparatus 10 is ready to resume operating.

[0092] The apparatus 10 can be provided with an electronic management system, not shown, which automates the operating sequences.

[0093] In this manner, for example, when the door 46 opens, a switch activates, as already described, the second pump 30, so that it aspirates the odors that are

present in the bag 20a and in general in the chamber 15, preventing their escape.

[0094] When the door is closed, after a preset interval, intended to allow to introduce several items of waste sequentially without starting the first pump every time, said first pump is activated by means of a further switch, said pump being suitable to start the upward motion of the piston and therefore the compression of the waste.

[0095] After a preset time, required to reach a preset value of the vacuum and therefore of the level of compaction, the first and second three-way valves are switched into the positions that are suitable to connect the second pump to the intake channel at the input and to the inside of the bag at the output, thus providing the configuration for injecting air into the bag in order to push the compacted waste toward the bottom of said bag, while the first pump stops.

[0096] After another preset period of time, the second pump also stops, the three-way valves are again switched into the position for connecting the second pump so that it aspirates from the bottom of the bag toward the discharge, and it is again possible to insert waste through the door.

[0097] In practice it has been found that the invention thus described solves the problems noted in known types of device for collection and disposal of waste particularly but not exclusively for the domestic environment.

[0098] In particular, the present invention provides an apparatus that can be manufactured even so as to have dimensions that allow its easy installation in a domestic environment, such as for example a kitchen, and in tight spaces, such as for example in a piece of kitchen furniture proximate to a sink.

[0099] Accordingly, the present invention provides a waste collection and disposal apparatus that can be installed even more conveniently in biochemical laboratories, surgeries and industrial buildings and other similar environments dedicated to industrial production.

[0100] Moreover, the present invention provides an apparatus that can be used advantageously by fitting it with ordinary garbage bags of a known type; the present invention further provides an apparatus that by compacting waste allows to reduce the frequency with which the garbage bag is replaced.

[0101] Moreover, the present invention provides an apparatus that spares the user from the unpleasant operation of manually compressing the waste inside the bag that contains it.

[0102] The present invention also provides an apparatus that is structurally simple and can be manufactured at low cost with known systems and technologies.

[0103] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0104] In practice, the materials employed, so long as

they are compatible with the specific use, as well as the dimensions, may be any according to requirements and to the state of the art.

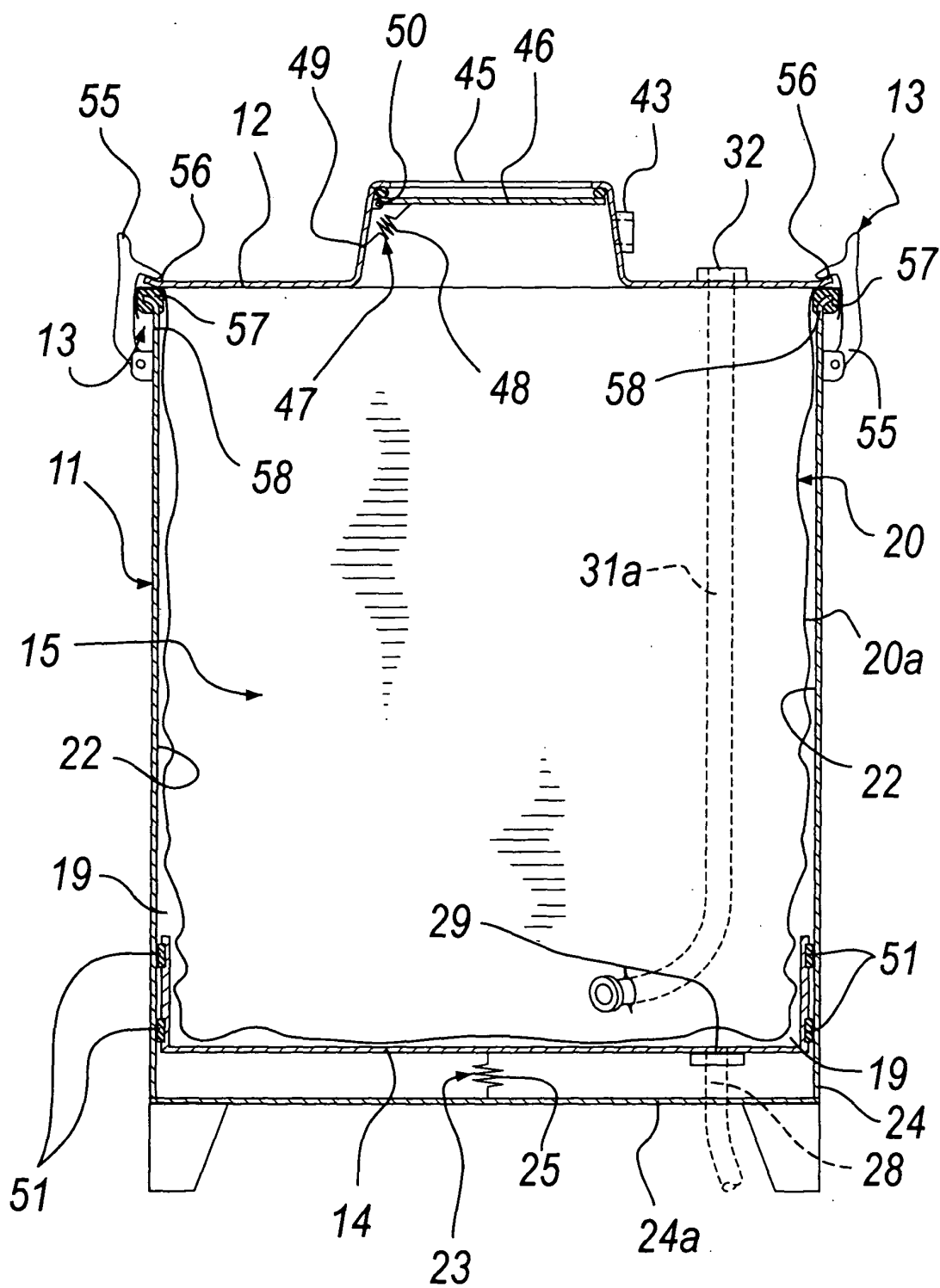
[0105] The disclosures in Italian Patent Application No. PD2003A000164 from which this application claims priority are incorporated herein by reference.

[0106] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

## Claims

1. An apparatus for collection and disposal of dry waste, wet waste and the like, of the type that comprises a container (11) with a lid (12) fastened by hermetic closure means (13), inside which there is a piston (14) that can slide and forms a hermetic chamber (15), said apparatus (10) being provided with waste compaction and fluid discharge means (16), said apparatus (10) being **characterized in that** said compaction and discharge means (16) comprise first suction means (17) for air and liquids, which are functionally connected to a space (19) comprised between a detachable flexible container (20) for collecting the waste (21), which is arranged inside said hermetic chamber (15), and the internal walls (22) of said hermetic chamber (15) and second suction means (18) for air and liquids, which are functionally connected to the inside of said flexible container (20).
2. The apparatus according to claim 1, **characterized in that** it comprises return means (23) that are adapted to return said piston (14) to the vicinity of the base (24) of said container (11).
3. The apparatus according to one or more of the preceding claims, **characterized in that** it comprises means (26) for pushing the waste (21) toward the bottom of said flexible container (20).
4. The apparatus according to one or more of the preceding claims, **characterized in that** said first suction means (17) are constituted by a first vacuum pump (27).
5. The apparatus according to claim 4, **characterized in that** said first pump (27) is connected to said space (19) between the flexible container (20) and the internal walls (22) of said chamber (15) by way of a first tube (28), which passes through said bottom (24) of the container (11) and is connected to a first intake (29) provided on said piston (14).

6. The apparatus according to one or more of the preceding claims, **characterized in that** said second suction means (18) are constituted by a second vacuum pump (30).
7. The apparatus according to claim 6, **characterized in that** said second pump (30) is connected to the inside of said flexible container by means of a second tube (31), which passes through said lid (12) by means of a second intake (32) and is adapted to draw from the bottom of said flexible container (20).
8. The apparatus according to claim 2, **characterized in that** said return means (23) are constituted by a traction spring (25), which is arranged between a cross-member (24a) arranged at said base (24) and said piston (14).
9. The apparatus according to claim 3, **characterized in that** said means (26) for pushing the waste (21) are constituted by said second vacuum pump (30), which is adapted to inject air into said flexible container (20) by means of a third tube (42), which is connected to a blower port (43) that is arranged on said lid (12), said second pump (30) drawing air through an external intake channel (31a).
10. The apparatus according to claim 9, **characterized in that** said external intake channel (31b) is connected to said second tube (31) by means of a three-way valve (44a).
11. The apparatus according to one or more of the preceding claims, **characterized in that** said means (16) for compacting the waste and discharging fluids comprise a first discharge duct (33) and a second discharge duct (34), which are arranged respectively between said first pump (27) and said second pump (30) and a discharge (35).
12. The apparatus according to claim 10, **characterized in that** said discharge (35) is constituted by a tube (36) of the domestic sewage system located downstream of a siphon (37).
13. The apparatus according to one or more of the preceding claims, **characterized in that** said first duct (33) and said second duct (34) each have a check valve (40, 41), which is adapted to prevent fluids present in said discharge (35) from entering said apparatus (10).
14. The apparatus according to one or more of the preceding claims, **characterized in that** said third tube (42) is connected to said second discharge duct (34) by means of a three-way valve (44).
15. The apparatus according to one or more of the preceding claims, **characterized in that** said lid (12) has an opening (45) for introducing waste (21), which is provided with a door (46) with automatic closure means (47).
16. The apparatus according to claim 15, **characterized in that** said automatic closure means (47) are constituted by a pusher spring (48), which is arranged between said door (46) and a point (49) proximate to a hinge (50) of said door (46).
17. The apparatus according to one or more of the preceding claims, **characterized in that** said piston (14) is provided with peripheral sealing rings (51) that are adjacent to the internal wall (22) of said container (11).
18. The apparatus according to one or more of the preceding claims, **characterized in that** said container (11) is substantially cylindrical.
19. The apparatus according to one or more of the preceding claims, **characterized in that** said hermetic closure means (13) comprise at least two pawl-like hooks (55), which are pivoted to said container (11) and are adapted to grip complementarily shaped engagement portions (56) provided on said lid (12).
20. The apparatus according to one or more of the preceding claims, **characterized in that** said hermetic closure means (13) comprise a gasket (57), which is arranged between the upper rim (58) of said container (11) and said lid (12).
21. The apparatus according to one or more of the preceding claims, **characterized in that** the rim of said flexible container (20) is locked between said lid (12) and said gasket (57).
22. The apparatus according to one or more of the preceding claims, **characterized in that** said flexible container (20) is a garbage bag (20a).



*Fig. 1*

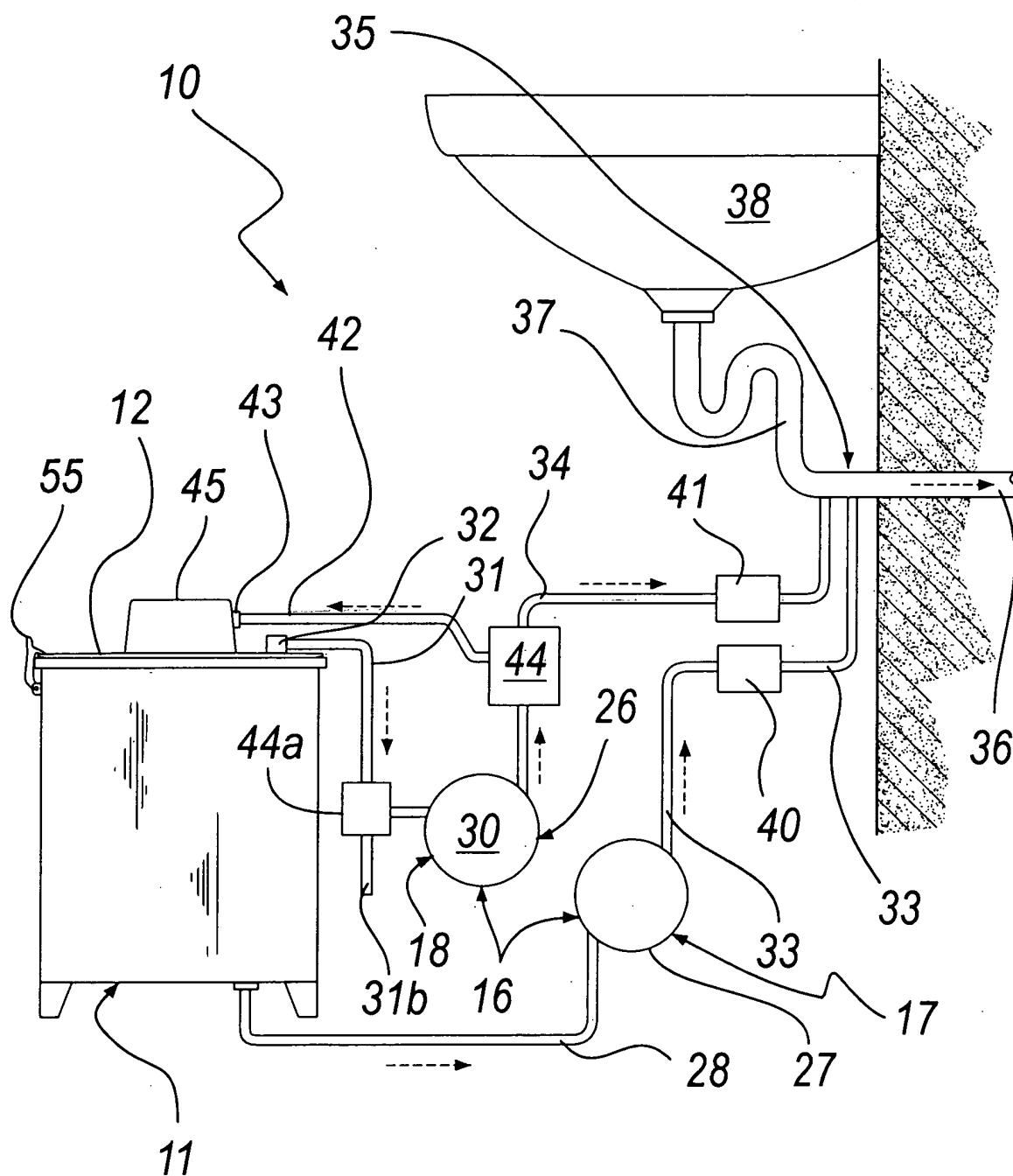


Fig. 2



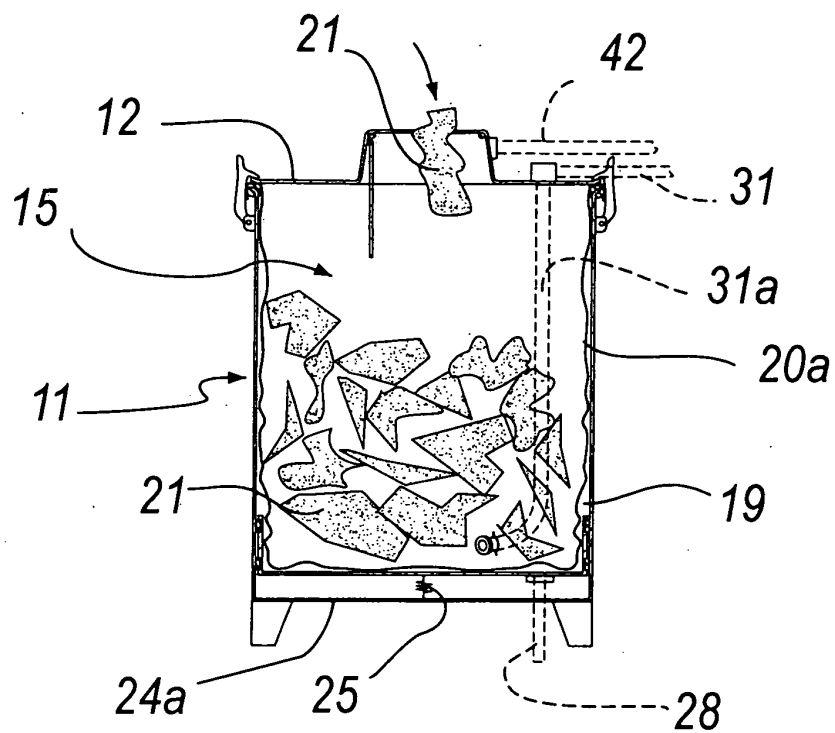


Fig. 3

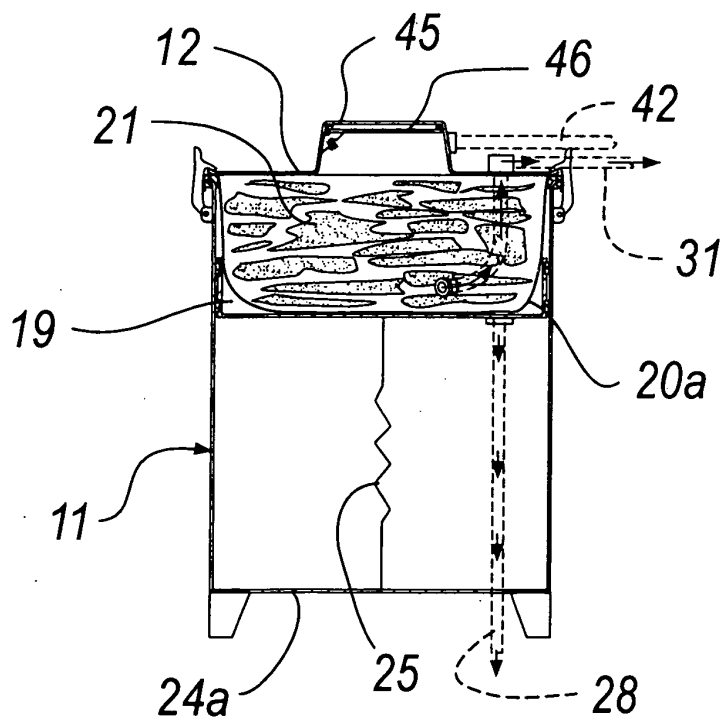
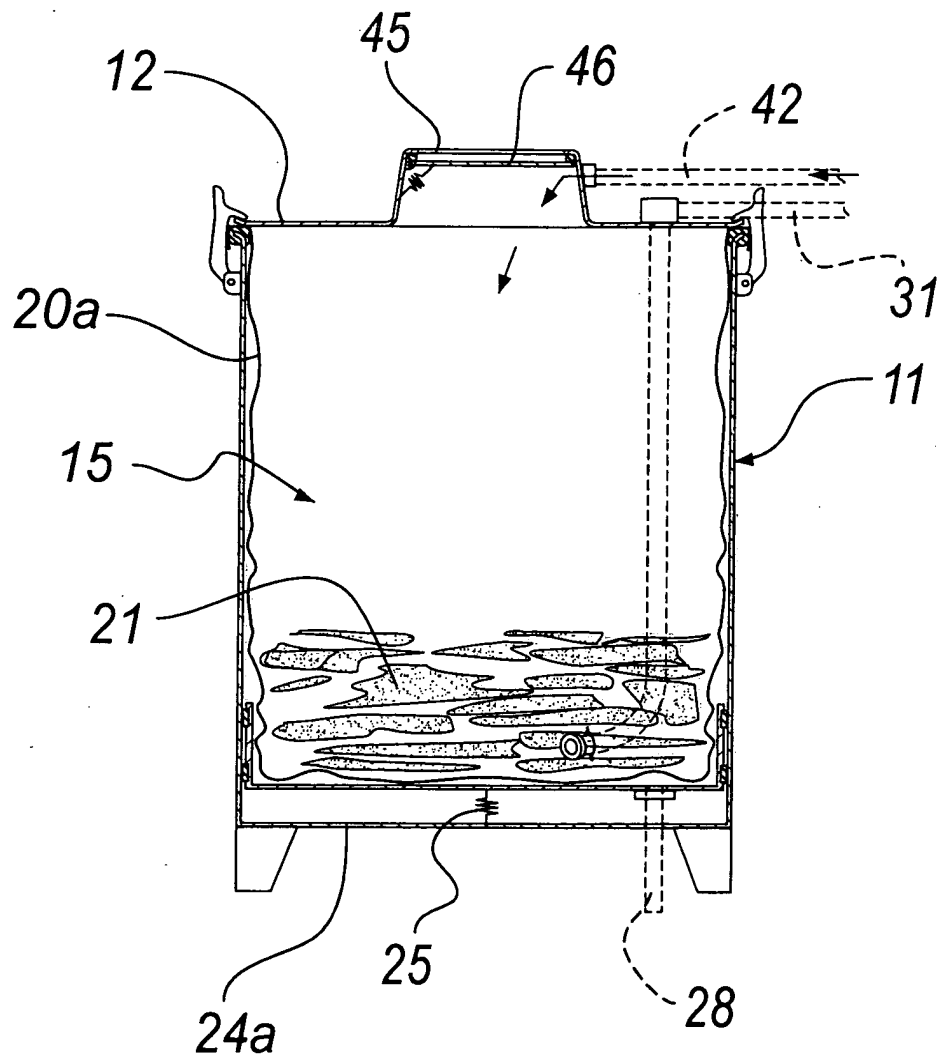


Fig. 4



*Fig. 5*



European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 04 01 5860

DOCUMENTS CONSIDERED TO BE RELEVANT			
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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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		21 September 2004	Martínez Navarro, A.
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 01 5860

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The members are as contained in the European Patent Office EDP file on  
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21-09-2004

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