

(19)



(11)

EP 3 020 544 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
12.07.2017 Bulletin 2017/28

(51) Int Cl.:
B30B 9/30 (2006.01) **B65F 1/06** (2006.01)
B65F 1/14 (2006.01) **B65B 1/24** (2006.01)
B65B 67/12 (2006.01)

(21) Application number: **15191854.7**

(22) Date of filing: **28.10.2015**

(54) METHOD AND DEVICE FOR COMPACTING AND SEALING OF GARBAGE

VERFAHREN UND VORRICHTUNG ZUM VERDICHTEN UND EINSCHLIESSEN VON ABFALL
PROCÉDÉ ET APPAREIL DE COMPACTAGE ET D'ISOLEMENT D'ORDURES

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(30) Priority: **14.11.2014 NL 2013807**

(43) Date of publication of application:
18.05.2016 Bulletin 2016/20

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Description

[0001] The present invention relates to a method which can be used in compacting and, if necessary, sealing of, for example, products, goods or waste.

[0002] The present invention further relates to a device for carrying out said method.

[0003] US-5,083,509 discloses a method and compactor device wherein an airtight bag is placed on the upper surface of a piston which is movable inside a container, which can be closed by a lid provided thereon. A suction pump creates a reduced pressure below the piston and causes the piston to move downwards in the container, whereby when the piston moves out due to a reduced pressure above the piston the bag with its content will be compressed against said closed lid.

[0004] EP-1 498 364 A1 discloses a collection and waste compaction method and device for the domestic environment wherein an airtight bag is placed on the upper surface of a piston which is movable inside a container, which can be closed by a lid provided thereon. Vacuum pumps create a reduced pressure below or above the piston respectively and cause the piston to move downwards in the container, whereby when the piston moves out due to a reduced pressure above the piston the bag with its content will be compressed against said closed lid. Claims 1 and 3 are delimited from its disclosure.

[0005] Such devices are generally known, but they have the drawback that they are heavy and, in addition, that they usually are vacuum packaging machines.

[0006] This has the drawback that the field of application is usually confined to industry.

[0007] It is an object of the present invention to provide a more universally applicable method and device, wherein objects, goods and/or waste can be collected, which method and device do not give off a bad smell and are capable of packaging, compressing and, if necessary, also sealing.

[0008] To achieve this, the method according to the invention is characterized by the features of claim 1.

[0009] The respective device according to the invention is characterized by the features of claim 3.

[0010] An advantage resides in that the reduced pressure created below the piston causes the bottom of the airtight bag, via the air ducts opening at the bottom of said bag, to be held on the upper surface, while at the same time said reduced pressure causes the piston to move downwards in the container to a position where the holding capacity of the bag is readily accessible for objects, goods, products or, for example, waste.

[0011] The piston is provided with passage means operating the air ducts, so that only air is allowed to pass, via the air ducts, which flows from the upper surface through the piston. As a result, by creating an excess pressure below the piston and/or by creating a reduced pressure above the piston, the piston can move back, causing the bag containing objects to be ejected. When

the piston moves back, and if the container is closed by a lid, the bag with content in it will be pressed against said lid or compressed.

[0012] In a further embodiment it is advantageously possible to seal the packaged objects, which are compressed in volume, by means of a sealing unit, so that the bag with content maintains this volume also at a later point in time. In particular, said sealing of the at least partially filled, compressed bag takes place by means of a sealing unit arranged near the input opening in the container space, while there is a reduced pressure in the space above the piston. Advantageously, when the bag is sealed in said condition, the contents of the bag will not be able to spring back to its original form when the lid is opened.

[0013] Further, detailed, possible embodiments explained in the remaining claims are mentioned together with the associated advantages in the description given hereinbelow.

[0014] The method and the device according to the present invention will now be explained in greater detail with reference to the figures mentioned below, in which corresponding elements are indicated by means of the same reference numerals.

In the figures:

Figure 1 is a schematic sectional view of a preferred embodiment of a device for compressing and/or sealing goods, whose piston is in the topmost position;

Figure 2 shows the device of figure 1, wherein the piston is in the bottommost position;

Figure 3 is a perspective view of the device shown in figures 1 and 2; and

Figure 4 shows a control valve whose rotary shaft is connected, in a simple construction, with the hinge pin of the lid by means of which the device can be closed.

[0015] Figures 1, 2 and 3 show a device 1 by means of which objects such as goods, products, but also for example waste contained in a bag 2 can be brought into a densified or compressed state. In said state, the bag 2, which in this case is airtight and made of a synthetic resin material, is sealed by closing it, in particular by sealing the synthetic resin bag. The device 1 shown is in a vertical position, but may just as well be rotated through 90 degrees, so that the objects contained therein can be moved, which may be desirable in industrial applications. In the vertical position of said device, products or, for example, waste can be introduced therein, which may be desirable, for example, for use in household application.

[0016] The device 1 comprises a container 3 which is provided with a piston 4 which is movable therein, said piston being shown, in figure 1, in the topmost position proximate to the input opening 5 of the container. From the top surface 6 of the piston, air ducts 7 extend through

the piston 4, which open into the container space 3-1 below the piston 4. Said device 1 also comprises an air pump 8 which opens into the space 3-1, which can be used, inter alia, to create a reduced pressure in said space. The bottom of the schematically shown bag 2 is placed on the air ducts 7, after which, in an working mode, the bag is held on the air ducts under the influence of the reduced pressure created in said space 3-1, and if said reduced pressure is large enough, the piston 4 starts to move by itself, together with the bag 2 held on the upper surface, in this case in a downward direction in the container 3 up to the bottom of said container 3, if necessary. During this inward motion, the airtight bottom of the bag 2 remains fixed on the upper surface 6, and if the air ducts or perforations 7 also extend along the edge of the upper surface 6 of the piston, the bag will remain proximate to the inside wall 9 of the container 3. The walls of the bag 2 can be draped over the input opening 5 of the container 3. The objects, goods or waste introduced into the container do not contaminate the inside wall 9 of the container 3, which has a favourable effect on the unobstructed motion of the piston 4 in said container.

[0017] If the piston 4 is provided with passage means 10 operating the air ducts 7, so that said air ducts 7 only pass air which flows from the upper surface 6 through the piston 4 in a downward direction, then, by pressing air into the space 3-1 below the piston during this working mode, the piston 4 with the bag filled with objects or waste can move upwards by virtue of the compressed air. It is alternatively possible to move the piston 4 upwards by drawing off air above the piston during said working mode. In the latter case, it is sufficient if an air pump 8, which can be used as a suction pump, and which is to be correctly connected to the spaces 3-1 and 3-2 to be evacuated, is made to move up or down around the piston 4. Advantageously, this does not require heavy means, and during the upward movement the bottom of the bag 2 remains resting on the upper surface 6, and hence, during this movement, the compressed air cannot escape upwards through the channels 7. In principle, the bag 2 can be removed from the container 3 if necessary.

[0018] The container 3 has a lid 11 which closes off the upper space 3-2 and which remains closed during the abovementioned upward movement of the piston 4, and the objects and the bag 2 in which they are contained being pressed together and compressed against said lid. The air drawn from the spaces 3-1 and 3-2 can be led by the pump 8 through an active carbon filter to the outside air, so that no stench is released into the outside air. If necessary, the bag 2 with content can be subsequently removed and sealed.

[0019] In an embodiment which can be used in industry, hospitals, nursing homes, hotel and catering industry, kitchens, restaurants or at home, wherein the container 3 has an input opening 5 from which the bag 2 protrudes and at the location of which the container 3 and/or the lid 11 have a sealing unit 12, the filled, compressed synthetic resin bag 2 can be sealed in an airtight manner. This

takes place by folding over the part of the bag 2 extending in the space 3-2 (see fig. 2) and sealing it by means of the heat generated by the sealing unit 12. After said sealing operation and after opening the lid 11, the sealed packet of minimal volume can be removed from the container 3.

[0020] In a practical embodiment, if the container 3 is provided with lid 11 closing off the space 3-2 above the piston 4, the air pump 8 will be coupled to a sensor provided in said space. Such a sensor is arranged to detect the open or closed state of the lid 11.

[0021] If the device 1, comprises a control valve 13, shown in fig. 4, which is connected to the air pump 8, and which is arranged to influence the air pressure in the spaces 3-1 and/or 3-2 above or below the piston 4, it would be possible to make use of the shaft 14 about which the lid 11 pivots. Said shaft 14 can easily extend directly to the shaft 15, shown in figure 4, which rotates in the valve block, provided with ports A, B and C, of, in this case, the control valve 13. The air pump 8 may be a suction/pressure pump, for example a customary vacuum cleaner pump having a pressure side and a suction side, which can be connected in a controlled manner known to those skilled in the art by means of one or more valves to the spaces 3-1 and/or 3-2, in order to perform the abovementioned working modes and piston movements.

[0022] The control valve 13, schematically shown in figure 4, connects port A, which extends to the suction side of, in this case, a suction pump 8, to either port B or port C in dependence on the position of the shaft 14, 15. The reduced pressure on port B or port C is controlled by means of the control valve 13 which is connected to the space 3-1 below the movable piston 4 or the space 3-2 above said movable piston 4. Advantageously, a suction pump 8 is sufficient.

[0023] Provided the surface of the piston 4 is suitably chosen, a low-power air pump 8 is sufficient in practice. Obviously, electronic, sensor-controlled variants are applicable. In a manner which will not be explained further herein, the device 1 is provided with a control unit by means of which the abovementioned working modes of the device 1 are connected. For this purpose, the device 1 further comprises an electronic processing unit which is connected to one or more of the following, provided it/they are present in the embodiment in question: the pump, the control valve, the control unit, the sensor coupled to the lid, a motion sensor coupled to the piston, a dynamometer coupled to the lid. Likewise, air pressure and/or piston-position sensors may be used. For domestic use, for example, the device 1 may be in the form of a pedal container or pedal bin the lid 11 of which can be operated electronically or by foot.

[0024] The present claims 1 and 7 relate to a method and a device for introducing a bag into a container. The method forms a possible first step in the application of a method in which the bag containing objects can be compressed.

Claims

1. A method wherein an airtight bag (2) is placed on the upper surface (6) of a piston (4) which is movable inside a container (3), which can be closed by a lid (11) provided thereon, after which a reduced pressure is created below the piston (4), causing the piston (4) to move downwards in the container (3), and whereby when the piston (4) moves out due to a reduced pressure above the piston (4) the bag (2) with its content will be compressed against said closed lid (11), **characterised in that** the piston (4) comprises:

- air ducts (7) extending from the upper surface (6) through the piston (4), whereby said reduced pressure below the piston (4) also causes the bag (2) to be held on the piston (4) while it moves downwards, and
- passage means (10) operating the air ducts (7), so that only air is allowed to pass, via the air ducts (7), which flows from the upper surface (6) through the piston (4), and

that the piston (4) moves out under the influence of an excess pressure below the piston (4) and/or said reduced pressure above the piston (4).

2. The method according to claim 1, **characterized in that** the container (3) has an input opening (5), at the location of which a sealing unit (12) is arranged, where the compressed bag (2) with content is sealed.

3. A device (1) comprising:

- a container (3) comprising a piston (4) which is movable therein, which container (3) is provided with a lid (11) closing the space (3-2) above the piston (4), wherein an airtight bag (2) is placed on the upper surface (6) of the piston (4),
- an air pump (8) connected to the container space (3-1) below the piston (4) in order to create a reduced pressure there by means of which the piston (4) caused by said reduced pressure is made to move downwards in the container (3), and
- a control valve (13) which is connected to the air pump (8) and which is arranged to influence the air pressure in the space (3-1) below the piston (4) and/or the space (3-2) above the piston (4),

characterised in that

the device (1) comprises a sensor coupled to the air pump (8) which sensor detects the open or closed state of the lid (11), and

the piston (4) comprises:

- air ducts (7) extending from the upper surface (6) through said piston (4), whereby said reduced pressure below the piston (4) also causes the bag (2) to be held on the piston (4) while it moves downwards, and
- passage means (10) operating the air ducts (7), which passage means (10) are arranged so as to only allow passage of air, via the air ducts (10), which flows from the upper surface (6) through the piston (4),

whereby the piston (4) moves out under the influence of an excess pressure below the piston (4) and/or said reduced pressure above the piston (4), such that the bag (2) with its content will be compressed against said closed lid (11).

4. The device (1) according to claim 3, **characterized in that** said lid (11) being pivotable about a shaft (14; 15) which is connected to the control valve (13), and the rotation of which controls the control valve (13).

5. The device (1) according to claim 3 or 4, **characterized in that** the air pump (8) is a suction pump and/or a suction/pressure pump.

6. The device (1) according to any one of the claims 3 to 5, **characterized in that** the device (1) is provided with a control unit by means of which working modes of the device (1) are controlled.

7. The device (1) according to any one of the claims 3 to 6, **characterized in that** the device (1) comprises an electronic processing unit which is connected to one or more of the following, provided it/they are present: the air pump (8), the control valve (13), the control unit, a sensor coupled to the lid (11), a motion sensor coupled to the piston (4), a dynamometer coupled to the lid (11).

8. Domestic use of the device (1) according to any one of the claims 3 to 7, wherein the device (1) additionally is in the form of a pedal container or pedal bin.

Patentansprüche

1. Verfahren, bei dem ein luftdichter Beutel (2) auf der oberen Fläche (6) eines Kolbens (4) angeordnet wird, der innerhalb eines Behälters (3) beweglich ist, der durch einen auf demselben bereitgestellten Deckel (11) geschlossen werden kann, wonach ein verringerter Druck unterhalb des Kolbens (4) erzeugt wird, was bewirkt, dass sich der Kolben (4) in dem Behälter (3) nach unten bewegt, und wodurch, wenn sich der Kolben (4) auf Grund eines verringerten

Drucks oberhalb des Kolbens (4) herausbewegt, der Beutel (2) mit seinem Inhalt gegen den geschlossenen Deckel (11) zusammengedrückt werden wird, **dadurch gekennzeichnet, dass:**

der Kolben (4) Folgendes umfasst:

- Luftkanäle (7), die sich von der oberen Fläche (6) aus durch den Kolben (4) erstrecken, wodurch der verringerte Druck unterhalb des Kolbens (4) ebenfalls bewirkt, dass der Beutel (2) auf dem Kolben (4) gehalten wird, während er sich nach unten bewegt, und
- Durchgangsmittel (10), welche die Luftkanäle (7) betätigen, so dass ermöglicht wird, dass, über die Luftkanäle (7), nur Luft hindurchgeht, die von der oberen Fläche (6) durch den Kolben (4) strömt, und

dass sich der Kolben (4) unter dem Einfluss eines übermäßigen Drucks unterhalb des Kolbens (4) und/oder des verringerten Drucks oberhalb des Kolbens (4) herausbewegt.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** der Behälter (3) eine Eingabeöffnung (5) hat, an deren Position eine Abdichtungseinheit (12) angeordnet ist, wo der zusammengedrückte Beutel (2) mit Inhalt abgedichtet wird.

3. Vorrichtung (1), die Folgendes umfasst:

- einen Behälter (3), der einen Kolben (4) umfasst, der innerhalb desselben beweglich ist, wobei der Behälter (3) mit einem Deckel (11) versehen ist, der den Raum (3-2) oberhalb des Kolbens (4) schließt, wobei ein luftdichter Beutel (2) auf der oberen Fläche (6) des Kolbens (4) angeordnet ist,
- eine Luftpumpe (8), die mit dem Behälterraum (3-1) unterhalb des Kolbens (4) verbunden ist, um dort einen verringerten Druck zu erzeugen, mit dessen Hilfe der Kolben (4), bewirkt durch den verringerten Druck, dazu veranlasst wird, sich in dem Behälter (3) nach unten zu bewegen, und
- ein Steuerventil (13), das mit der Luftpumpe (8) verbunden ist und das dafür angeordnet ist, den Luftdruck in dem Raum (3-1) unterhalb des Kolbens (4) und/oder dem Raum (3-2) oberhalb des Kolbens (4) zu beeinflussen,

dadurch gekennzeichnet, dass

die Vorrichtung (1) einen Sensor umfasst, der an die Luftpumpe (8) angeschlossen ist, wobei der Sensor den offenen oder geschlossenen Zustand des Deckels (11) erfasst, und

der Kolben (4) Folgendes umfasst:

- Luftkanäle (7), die sich von der oberen Fläche (6) aus durch den Kolben (4) erstrecken, wodurch der verringerte Druck unterhalb des Kolbens (4) ebenfalls bewirkt, dass der Beutel (2) auf dem Kolben (4) gehalten wird, während er sich nach unten bewegt, und
- Durchgangsmittel (10), welche die Luftkanäle (7) betätigen, so dass ermöglicht wird, dass, über die Luftkanäle (7), nur Luft hindurchgeht, die von der oberen Fläche (6) durch den Kolben (4) strömt,

wodurch sich der Kolben (4) unter dem Einfluss eines übermäßigen Drucks unterhalb des Kolbens (4) und/oder des verringerten Drucks oberhalb des Kolbens (4) herausbewegt, so dass der Beutel (2) mit seinem Inhalt gegen den geschlossenen Deckel (11) zusammengedrückt werden wird.

4. Vorrichtung (1) nach Anspruch 3, **dadurch gekennzeichnet, dass** der Deckel (11) um eine Welle (14; 15) schwenkbar ist, die mit dem Steuerventil (13) verbunden ist und deren Drehung das Steuerventil (13) steuert.

5. Vorrichtung (1) nach Anspruch 3 oder 4, **dadurch gekennzeichnet, dass** die Luftpumpe (8) eine Saugpumpe und/oder eine Saug-/Druckpumpe ist.

6. Vorrichtung (1) nach einem der Ansprüche 3 bis 5, **dadurch gekennzeichnet, dass** die Vorrichtung (1) mit einer Steuereinheit versehen ist, mit deren Hilfe Arbeitsmodi der Vorrichtung (1) gesteuert werden.

7. Vorrichtung (1) nach einem der Ansprüche 3 bis 6, **dadurch gekennzeichnet, dass** die Vorrichtung (1) eine elektronische Verarbeitungseinheit umfasst, die, vorausgesetzt, es ist/sie sind vorhanden, mit einem oder mehreren von den Folgenden verbunden ist: der Luftpumpe (8), dem Steuerventil (13), der Steuereinheit, einem an den Deckel (11) angeschlossenen Sensor, einem an den Kolben (4) angeschlossenen Bewegungssensor, einem Deckel (11) angeschlossenen Dynamometer.

8. Haushaltsverwendung der Vorrichtung (1) nach einem der Ansprüche 3 bis 7, wobei die Vorrichtung (1) außerdem die Form eines Pedalbehälters oder Pedaleimers hat.

Revendications

1. Procédé dans lequel un sac étanche (2) est placé sur la surface supérieure (6) d'un piston (4) qui est mobile dans un contenant (3) qui peut être fermé par

un couvercle (11) prévu dessus, après quoi une pression réduite est créée en-dessous du piston (4), ce qui amène le piston (4) à descendre dans le contenant (3), et quand le piston (4) sortant en raison d'une pression réduite au-dessus du piston (4) le sac (2) étant comprimé avec son contenu contre ledit couvercle fermé (11), **caractérisé en ce que** le piston (4) comprend :

- des conduites d'air (7) s'étendant depuis la surface supérieure (6) à travers le piston (4), ladite pression réduite en dessous du piston (4) amenant aussi le sac (2) à être maintenu sur le piston (4) lorsqu'il descend, et
- moyen de passage (10) actionnant les conduites d'air (7), de sorte que peut passer par les conduites d'air (7) seulement de l'air qui s'écoule depuis la surface supérieure (6) à travers le piston (4), et

que le piston (4) sort sous l'influence d'une pression excessive en-dessous du piston (4) et/ou d'une pression réduite au-dessus du piston (4).

2. Procédé selon la revendication 1, **caractérisé en ce que** le contenant (3) comporte un orifice d'entrée (5), à l'emplacement duquel est disposée une unité d'étanchéité (12) où le sac comprimé (2) avec son contenu est scellé.

3. Dispositif (1) comprenant :

- un contenant (3) comprenant un piston (4) qui est mobile dedans, lequel contenant (3) est pourvu d'un couvercle (11) fermant l'espace (3-2) au-dessus du piston (4), un sac étanche (2) étant placé sur la surface supérieure (6) du piston (4),
- une pompe à air (8) connectée à l'espace du contenant (3-1) en dessous du piston (4) afin de créer là une pression réduite au moyen de laquelle le piston (4), en raison de ladite pression réduite, est amené à descendre dans le contenant (3), et
- une vanne de commande (13) qui est connectée à la pompe à air (8) et qui est conçue pour influencer la pression d'air dans l'espace (3-1) en dessous du piston (4) et/ou l'espace (3-2) au-dessus du piston (4),

caractérisé en ce que

le dispositif (1) comprend un capteur couplé à la pompe à air (8), lequel capteur détecte l'état ouvert ou fermé du couvercle (11), et

que le piston (4) comprend :

- des conduites d'air (7) s'étendant depuis la surface supérieure (6) à travers le piston (4), ladite

pression réduite en-dessous du piston (4) amenant aussi le sac (2) à être maintenu sur le piston (4) lorsqu'il descend, et

- moyen de passage (10) actionnant les conduites d'air (7), lequel moyen de passage (10) sont disposé de manière à ce que puisse passer par les conduites d'air (7) seulement de l'air qui s'écoule depuis la surface supérieure (6) à travers le piston (4), et

le piston (4) sortant sous l'influence d'une pression excessive en-dessous du piston (4) et/ou d'une pression réduite au-dessus du piston (4) de manière à ce que le sac (2) avec son contenu soit comprimé commande contre ledit couvercle fermé (11).

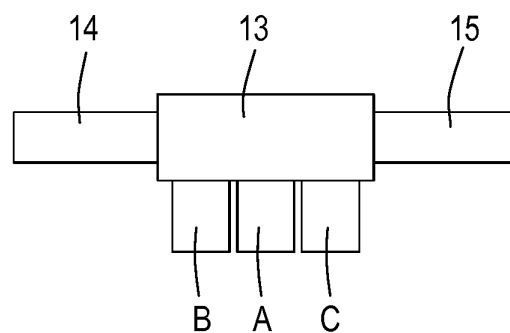
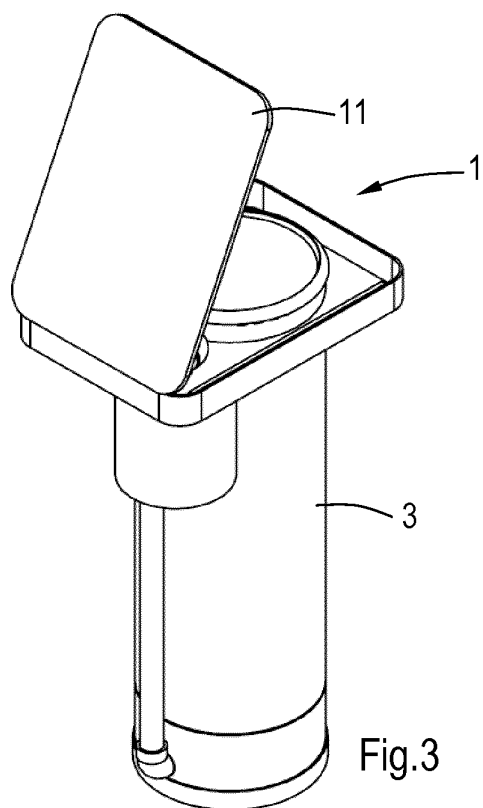
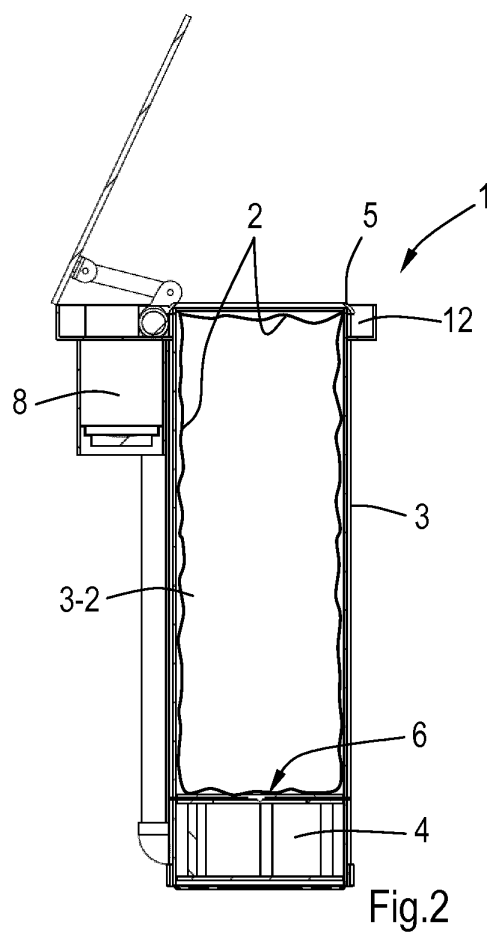
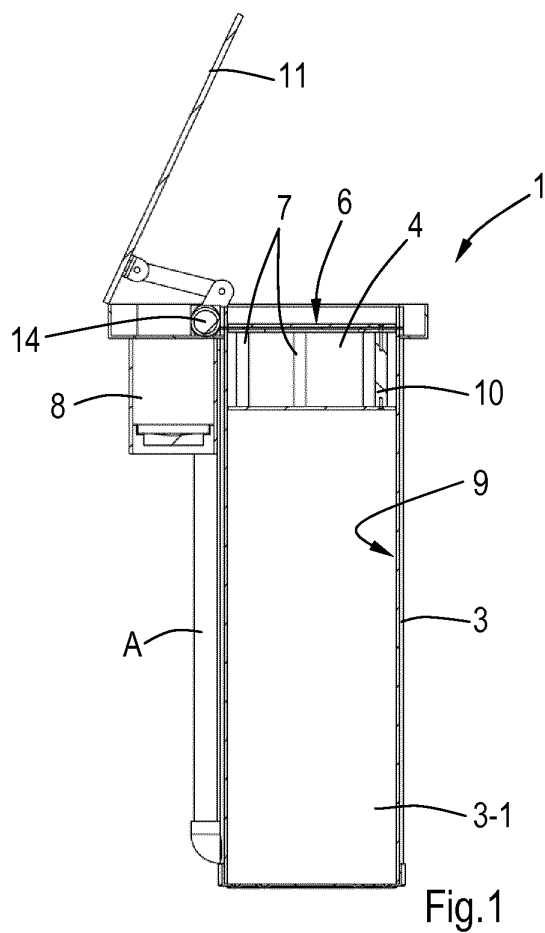
4. Dispositif (1) selon la revendication 3, **caractérisé en ce que** ledit couvercle (11) est pivotable autour d'un arbre (14 ; 15) qui est connecté à la vanne de commande (13) et dont la rotation commande la vanne de commande (13).

5. Dispositif (1) selon la revendication 3 ou 4, **caractérisé en ce que** la pompe à air (8) est une pompe à succion ou une pompe à pression et succion.

6. Dispositif (1) selon l'une quelconque des revendications 3 à 5, **caractérisé en ce que** ce dispositif (1) est pourvu d'une unité de commande au moyen de laquelle les modes de travail du dispositif (1) sont contrôlés.

7. Dispositif (1) selon l'une quelconque des revendications 3 à 6, **caractérisé en ce que** ce dispositif (1) comprend une unité de traitement électronique qui est connectée à un ou plusieurs des éléments suivants à condition qu'ils soient présents : la pompe à air (8), la vanne de commande (13), l'unité de commande, un capteur couplé au couvercle (11), un détecteur de mouvement couplé au piston (4), un dynamomètre couplé au couvercle (11).

8. Utilisation domestique du dispositif (1) selon l'une quelconque des revendications 3 à 7, le dispositif (1) se présentant de plus sous la forme d'un contenant à pédale ou d'une poubelle à pédale.



REFERENCES CITED IN THE DESCRIPTION

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