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(54) **APPARATUS FOR WASTE COLLECTION**

(57) The present invention relates to an apparatus (2) for collecting waste, comprising a support (21) for a collection bag (5) and a sealing device (25) for the bag (5). The support (21) is adapted to receive a top edge (50) of the bag (5) and keep the bag (5) hanging in such a way that it extends downwards and has a closed bottom (55). The sealing device (25) is configured to seal the bag (5) in a sealing region (56) which is located between the top edge (50) and the closed bottom (55), so as to obtain a closed bag (59) which constitutes a wrapping for an amount of waste (90). The present disclosure relates also to a method for managing waste collection.

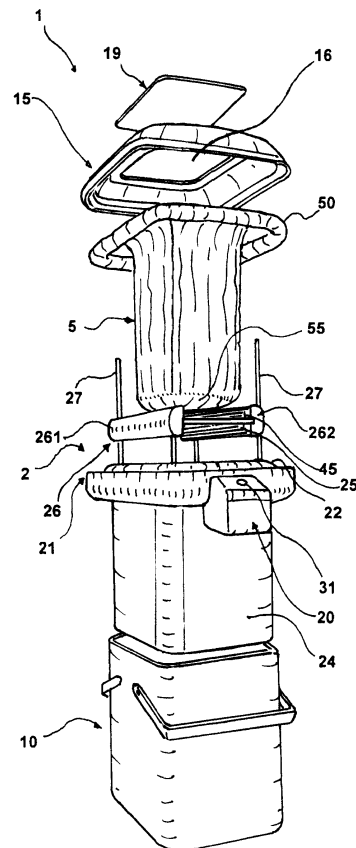


FIG.2

Description

[0001] The present disclosure relates in general to the sector of waste collection. More specifically it relates to an apparatus for collecting waste, in particular for collecting the wet fraction of the waste in a domestic or commercial environment by a user. Considering a domestic environment, commercial environment (such as bars and restaurants) or street environment (such as waste bins along the roadside), the collection of waste usually envisages the use of a container, which may be provided with a collection bag inside which the waste will be placed and subsequently transferred to a bin and/or removed by the municipal refuse collection service and suitably disposed of.

[0002] As regards in particular the wet or organic fraction of the waste, it is common knowledge that the waste collected inside the container give off a bad smell, in particular if it remains for a few days inside the containers and starts to decompose as a result of microorganisms.

[0003] In a domestic environment, for users it is often inconvenient to take every day a bag of organic waste to a roadside bin, even more so if the amount of waste is small. Even in the case of a door-to-door collection service, this service generally is not daily, but is normally carried out every few days and therefore the problem of the bad odours which arise pending disposal remains.

[0004] Moreover it often happens that the user must throw away a bag of waste which is so full that it cannot be closed or, on the contrary, throw away a bag which is practically empty and has a large amount of unused volume.

[0005] Therefore the current waste collection systems have drawbacks as regards management by the users as well as the bad odours which are produced.

[0006] Moreover, they also pose drawbacks for the workers of the municipal refuse collection service who, when emptying and cleaning the bins or containers, are exposed to bad odours and must perform a laborious (and not always entirely effective) cleaning operation owing to the loss of wet refuse from bags which have been not properly closed or left open.

[0007] Some waste collection apparatus are known from the patent applications CN200992397Y, CN102514862A; FR2841229A1; WO0228717A1 and JP2001139103A.

[0008] The present disclosure is therefore based in the technical problem of providing a method for managing waste collection which is able to overcome the drawbacks mentioned above with reference to the prior art and/or achieve further advantages. This is obtained by providing an apparatus for collecting waste according to the independent claim 1. The technical problem is also solved by a method for managing waste collection according to claim 11.

[0009] Particular embodiments forming the subject of the present disclosure are defined in the corresponding dependent claims.

[0010] According to one aspect of the present disclosure, an apparatus for collecting waste comprises a sealing device for a collection bag, i.e. for a bag intended to receive waste: the sealing device is configured to seal the bag in a sealing region which is located between the top edge and the closed bottom of the bag.

[0011] This is useful for obtaining a closed bag which constitutes a wrapping for an amount of waste which has been previously thrown into the bag. Since this wrapping is closed on all sides, the waste is not dispersed when it is transferred to a waste bin or to the refuse collection service, with an advantage from the point of view of hygiene and ease of management. Moreover, the bad smell produced by the decomposition of the waste due to microorganisms remains substantially confined within the closed bag and therefore is not noticed at all (or only minimally) by persons.

[0012] The sealing device is moreover movable and displaceable along the collection bag. This is useful for performing sealing slightly above or at a height corresponding to the filled level of the bag, thus obtaining a closed bag which is full and optimizing the use of collection bags. For example, a user may seal a small amount of waste without this necessarily resulting in the need to throw away the entire bag. It is even possible, ideally, for a seal to be created every time that waste is thrown into the bag, resulting in a plurality of small closed bags. This would be particularly effective for eliminating entirely the bad odours since the waste would be sealed inside the closed wrapping before it starts to decompose.

[0013] Furthermore the apparatus comprises a sensor which detects the filling level of the bag; owing to a suitable control system, the apparatus performs sealing depending on the filling level detected.

[0014] This is useful for automating the operations and reducing to a minimum the action needed by the user.

[0015] In one embodiment the apparatus comprises a cutting device which is adapted to cut the collection bag above the sealing region. This is useful for separating the closed bag from the rest of the bag which has not yet been used, allowing the closed bag to be thrown away without removing the rest of the bag from the apparatus and facilitating the subsequent use of the rest of the bag for collecting further waste. In particular, in this embodiment, a sealing device also seals the bottom of the rest of the bag, so as to obtain a closed bottom which allows the collection of waste in the rest of the bag.

[0016] In one embodiment, the apparatus also comprises a second sealing device (separate from the sealing device which seals the waste inside the closed bag) which has precisely the object of sealing the bottom of the rest of the bag.

[0017] In one embodiment, the apparatus comprises a suction device which is configured to suck air from the collection bag before operation of the sealing device. This is useful for obtaining a closed bag which occupies a smaller amount of space, determined almost only by the volume of the waste contained inside it. Moreover, the

fermentation of the waste inside the bag is slowed down owing to the smaller amount of air which is available for the microorganisms inside the closed bag.

[0018] In one possible embodiment, the suction device is configured to create a proper vacuum effect inside the closed bag containing the waste.

[0019] Further characteristic features and modes of use forming the subject of the present disclosure will become clear from the following detailed description of embodiments thereof, provided by way of a non-limiting example.

[0020] It is evident, however, that each embodiment forming the subject of the present disclosure may have one or more of the advantages listed above; in any case it is not required that each embodiment should have simultaneously all the advantages listed.

[0021] Reference will be made to the figures of the accompanying drawings in which:

- Figure 1 shows a perspective view of an embodiment of a container for collecting waste including an apparatus according to the present disclosure;
- Figure 2 shows an exploded view of the container according to Figure 1;
- Figure 3 shows a perspective view of the container according to Figure 1, from which some components have been removed so as to show a collection bag mounted on the container;
- Figure 4 shows a perspective view of part of an apparatus according to the present disclosure in which an internal volume for housing a collection bag is also shown;
- Figure 5 shows a first cross-sectional view of the container according to Figure 1, comprising also a collection bag;
- Figure 6 shows a second cross-sectional view of the container according to Figure 1, without collection bag;
- Figures 7A to 9B show cross-sectional views illustrating operation of an apparatus according to the present disclosure, during successive operating steps;
- Figures 10 and 11 show cross-sectional views of details of two variations of embodiment of an apparatus according to the present disclosure;
- Figures 12A to 12C show cross-sectional views illustrating a number of successive operating steps of another variant of an apparatus according to the present disclosure.

[0022] With reference initially to Figures 1 to 6, an embodiment of a container for collecting waste according to the present disclosure is denoted by the reference number 1. The container 1 comprises bucket or bin-shaped receptacle 10, an apparatus 2 for supporting and sealing a collection bag 5, a top frame 15 and a lid 19.

[0023] The apparatus 2 for collecting waste is removably positioned inside the bucket-like receptacle 10. A

collection bag 5 is mounted on the apparatus 2, inside a suitable perimetral seat 23, and extends inside an internal volume 200 of the apparatus 2 towards the bottom of the bucket-like receptacle 10. The collection bag 5 terminates in a closed bottom 55 so as to be able to contain the waste thrown inside it. In practice the collection bag 5 is a bag intended to receive waste.

[0024] The top frame 15 is positioned on top of the apparatus 2 and the collection bag 5; in practice, the top frame 15 is a finishing element of the container 1. The top frame 15 has an opening 16 around which the said frame extends; waste 90 may be thrown into the collection bag 5 through the opening 16. The lid 19 is positioned on the top frame 15 so as to close the opening 16; the lid 19 is removable so as to allow the waste 90 to be thrown into the collection bag 5. The lid 19 is provided with a handle 190.

[0025] The apparatus 2 forms specifically the subject of the present disclosure: it comprises a support 21 for the collection bag 5 and a sealing device 25 for the collection bag 5: the support 21 supports the collection bag 5, keeping it open and extending heightwise to receive the waste; the sealing device 25 is operated so as to close the bag 5 with a seal or weld when the bag 5 containing the waste must be transferred to a bin or collected by a door-to-door collection service.

[0026] Essentially, the support 21 is designed to receive a top edge 50 of the collection bag 5. For example, the support 21 is formed by a perimetral frame 22 with a curved profile and by the perimetral seat 23 for receiving the rolled-up top edge 50. The collection bag 5 is arranged straddling the perimetral frame 22 and remains hanging from the support 21 owing to the friction between bag 5 and perimetral frame 22 and/or is fixed to the support 21 by other methods.

[0027] The support 21 may be formed in a different manner from that described and shown, while retaining the function of keeping the collection bag 5 hung inside the internal volume 200.

[0028] The apparatus 2 also comprises side walls 24 which are fixed to the support 21; the support 21 is situated at the top of the side walls 24 and the latter extend downwards. The side walls 24 define the internal volume 200 inside which the collection bag 5 extends downwards, i.e. towards the bottom of the bucket-like receptacle 10.

[0029] The side walls 24 may also have a bearing and supporting function, i.e. they may rest on the bottom of the bucket-like receptacle 10 (or directly on the ground, if the bucket-like receptacle 10 is not present) and keep the support 21 raised, so as to provide sufficient height for the vertical extension of the collection bag 5.

[0030] Optionally, simple bars or legs may be provided instead of the side walls 24 or even the side walls 24 could not be present: in this case the support 21 is supported by the top edge of the bucket-like receptacle 10 on which it rests.

[0031] The sealing device 25 is configured to seal the

collection bag 5 in a sealing region 56 which is located in an intermediate position between the top edge 50 and the closed bottom 55. In practice, the seal creates a closed top in a portion of the bag 5 situated between the said seal and the closed bottom 55. By means of the seal, the bag 5 is closed and constitutes a wrapping 59 which is also closed and contains an amount of waste which had previously been thrown into the said bag 5.

[0032] The seal is of the permanent type (obviously unless forced or broken) and therefore the waste is enclosed stably and permanently inside the closed wrapping or bag 59, at least so long as the latter is not broken.

[0033] In particular, the sealing device 25 is mounted on two operating members 261, 262 which are arranged opposite and movable towards and away from each other. For example, both the operating members 261, 262 are mounted on horizontally sliding guides 263 which guide their movement towards and away from each other. This movement is motor-driven and controlled by a control unit 36 which manages operation of the apparatus 2.

[0034] By way of an example of embodiment (see in particular Figure 5), one of the horizontal guides 263 is a threaded bar or worm, having two sections with an opposite threading (one right-hand and the other left-hand); each section is engaged by a threaded bush which is fixed to a respective operating member 261, 262. A motor 264 causes rotation of said threaded bar and, depending on the direction of rotation, causes the movement towards or away from each other of the two operating members 261, 262 owing to their opposite "screwing" or "unscrewing" movement on the threaded bar. The two operating members 261, 262 are mounted slidably on the other horizontal guide 263 which is, for example, inserted inside seats formed in the said operating members 261, 262.

[0035] More specifically, the two operating members 261, 262 are substantially horizontal and parallel. They have an elongated form with a length greater than the diameter or the width of the bag 5.

[0036] When the two operating members 261, 262 are in the separated condition, they are located on opposite sides of the apparatus 2 and between them there is a wide space inside which the bag 5 may hang without interfering with the two said operating members 261, 262. Therefore, the separated condition is a rest position in which the sealing device 25 is not operational.

[0037] When the sealing device 25 is operated, the two operating members 261, 262 move towards each other until they nearly touch and grip a region of the bag 5 to be sealed: this region to be sealed remains enclosed and compressed between the two operating members 261, 262 and is sealed permanently by means of a suitable sealing system, the actuating elements 251, 252 of which are mounted on the said operating members 261, 262.

[0038] For example, the sealing device 25 is configured to seal the collection bag 5 by means of a method such as heat sealing, ultrasonic welding or laser welding. These methods are particularly suitable for a collection

bag 5 made of plastic material, such as biodegradable polyethylene or plastic.

[0039] In the embodiment shown, the apparatus 2 is positioned inside the bucket-like receptacle 10 in a removable manner and therefore may be extracted from the bucket 10, for example when the latter must be washed or in order to remove a closed bag 59 which has fallen onto the bottom of the bucket-like receptacle 10.

[0040] In alternative embodiments, a bucket-like receptacle may form an integral part of the apparatus 2 or even may not even be provided. The top frame 15 and/or lid 19 may also be made differently, or not be provided.

[0041] The sealing device 25 is movable along the collection bag 5 and can be positioned in a region to be sealed which may be different in each case. In the specific case, the sealing device 25 is mounted on a movable carriage 26 which is adapted to slide along the collection bag 5, between the top edge and the closed bottom, such as to position the sealing device 25 in the zone of the bag 5 where sealing must be performed. In practice, the carriage 26 is movable in a vertical direction.

[0042] In the embodiment shown (see in particular Figures 5 and 6), the movable carriage 26 comprises the operating members 261, 262, the horizontal sliding guides 263 and the motor 264.

[0043] The movable carriage 26 slides on vertical guides 27 which consist for example of four metal bars. In particular, the vertical guides 27 are fixed on an internal projection 240 which is situated at the bottom of the vertical walls 24 of the apparatus 2.

[0044] The apparatus 2 furthermore comprises a motor 30 for moving the vertical carriage 26, i.e. for causing it to slide on the vertical guides 27. The motor 30 is connected to the carriage 26 by means of a suitable movement transmission system, for example comprising a chain or cable 32, a driving pulley 33 connected to the motor 30 and designed to wind/unwind the chain or cable 32, and an idle transmission pulley 34 for the chain or cable 32. Other transmission and/or movement systems are obviously possible.

[0045] For example, the motor 30 is arranged inside a seat 20 which forms an appendage of the support 21. One or more operating and control pushbuttons 31 are positioned on one side of the seat 20.

[0046] The apparatus 2 further comprises a sensor for detecting a filling level of waste inside the collection bag 5; in practice this sensor detects the height at which the waste is situated. The level sensor is connected to the control unit 36 which operates the motor 30 so as to position the carriage 26 (and therefore the sealing device 25) depending on the filling level. Essentially, the sealing region is defined slightly above the level of the waste, so as to obtain a closed bag 59 which is completely or nearly full.

[0047] More specifically, the level sensor is mounted on the movable carriage 26 so as to detect this level during a travel movement of the movable carriage 26 towards the bottom 55 of the bag 5. In the embodiment

shown (see in particular Figures 5 and 6), the level sensor comprises two opposing elements 41, 42 which are adapted to receive the collection bag 5 between them. The level sensor also comprises a detector which detects a separating force which acts on the two opposing elements 41, 42.

[0048] For example, the operating principle of this level sensor during detection is as follows: In the region of the bag 5 which does not contain waste, the two opposing elements 41, 42 nearly make contact with each other, being separated only by the thickness of the bag walls, and therefore a separating force is not detected. In the proximity of the region of the bag 5 which contains waste 90, the bag 5 is deformed and widened by the presence of the said waste: its walls diverge and therefore exert a separating force on the two opposing elements 41, 42, generating a signal for the control unit 36 as to when the filling level is reached.

[0049] More specifically, the two opposing elements 41, 42 have a roller-like form and are each mounted on a respective operating member 261, 262. Each roller 41, 42 has a degree of freedom for transverse displacement with respect to the respective operating member 261, 262, which degree of freedom is opposed by a spring cooperating with the force detector. In practice, when the two operating members 261, 262 are in a condition close together, the elements 261, 262 of the level sensor are pushed towards each other by the respective springs. When the level of the waste is approached, a force against the springs acts on the opposing elements / rollers 41, 42 owing to the increased thickness.

[0050] In other embodiments, the level sensor may be differently designed.

[0051] The apparatus 2 may also comprise a cutting device 44, which is configured to cut the collection bag 5 in a cutting region 54 which is situated in between the sealing region 56 and the top edge 50. In practice, the cutting device 44 performs a cut in the bag 5 slightly above the seal 56 and therefore allows separation of the closed wrapping 59 containing the waste from the remaining collection bag 5 which remains hanging from the support 21. More specifically, the cutting device 44 is mounted on the movable carriage 26 and comprises at least one cutting element. The cutting element, for example, is an electric resistance wire which, when it is heated by the passage of electric current, locally melts the bag 5, thus cutting it along a cutting line corresponding to the wire itself. In other words, the cutting element is a thermal blade. In particular, the cutting device 44 comprises two cutting elements 441, 442 which are mounted opposite each other, each on a respective operating member 261, 262. Alternatively the cutting elements are blades.

[0052] The apparatus 2 may also comprise a second sealing device 45 which is configured to seal the collection bag 5 in a second sealing region 57 which is situated between the first sealing region 56 and the top edge 50. In practice, the second sealing device 45 creates a sec-

ond sealing region 57 which is a closed bottom of the empty portion 58 of the collection bag 5 which remains hanging from the support 21. Essentially, the second sealing device 45 is similar to the first sealing device 25. In particular, it is also mounted on the movable carriage 26 and comprises respective actuating elements 451, 452 which are mounted on the operating members 261, 262.

[0053] If the cutting device 44 is also present, it is situated in a position located between the first sealing device 25 and the second sealing device 45. The second sealing device 45 operates between the cutting region 54 and the top edge 50 of the bag.

[0054] A specific field of application of the apparatus 2 and in particular of the receptacle 1 is waste collection in a domestic environment or in an activity such as a restaurant, a bar or a canteen. The use of the apparatus 2 is particularly advantageous for collecting organic waste, i.e. for collecting the wet fraction of the waste; in fact, sealing of the collection bag 5 prevents (or at least limits greatly) the bad odours produced by organic decomposition from being emitted into the surrounding environment.

[0055] The apparatus 2 could be also be applied to a roadside bin or container into which persons can throw their bags of refuse so that they may be collected by the municipal refuse collection service. This would be useful for limiting as far as possible the bad odours which are produced between two successive bin or container emptying operations.

[0056] Below, with reference to Figures 7A to 9B, a mode of operation of the apparatus 2 and the container 1 is described; in practice, this mode allows implementation of a method for managing waste collection, in particular in a domestic environment.

[0057] A collection bag 54, in particular made of plastic material such as biodegradable polyethylene or plastic, is mounted on the support 21 of the apparatus 2.

[0058] The top edge 50 of the bag 5 is arranged, in the rolled-up condition, inside the perimetral seat 23 and the body of the bag 5 hangs downwards in the region 200 defined by the vertical walls 24. The top frame 15 and the lid 19 are positioned on the support 21 so as to close off access to the bag 5.

[0059] In the condition of normal use of the waste container 1, the carriage 26 is located in the top region, at the top end of the vertical guides 27 and in the vicinity of the support 21. The two operating members 261, 262 are in a separated condition, such as not to obstruct in any way the entrance mouth of the bag 5, leaving it completely open. In particular, the operating members 261, 262 are positioned underneath the perimetral frame 22 and are therefore outside of the zone of interference with the bag 5.

[0060] Waste 90 is thrown into the bag 5 through the opening 16, obviously after removal of the lid 19, and accumulates on the bottom of the bag 5 (Figure 7A).

[0061] When it is required to perform sealing of the bag

5, the user operates the sealing device 25 by means of a pushbutton 31.

[0062] The control unit 31 manages the operations, moving first of all the two operating members 261, 262 towards each other so as to grip the bag 5 between them (Figure 7B). If the bag 5 is not completely full, the rollers 41, 42 of the filling sensor are practically arranged against each other.

[0063] The carriage 26 is slid downwards, i.e. towards the region where the waste 90 has accumulated. During the downward movement, the walls of the bag 5 are pushed against each other by the two operating members 261, 262 and therefore the air inside the bag 5 is gradually expelled from the top of the bag.

[0064] In order to allow or favour the expulsion of air from the bag 5 during the downward movement of the carriage 26, the rollers 41, 42 of the filling sensor are grooved or have sections with a smaller diameter, so as to leave regions in which the walls of the bag 5 are not pressed against each other and leave an exit channel for the air. Alternatively, the rollers 41, 42 could extend only over a section (for example a central section) of the length of the operating members 261, 262.

[0065] In the vicinity of the waste 90, the walls of the bag 5 are separated from each other owing to the presence of the waste 90 which makes the bag bulge. The rollers 41, 42, which follow the walls of the bag 5, are correspondingly moved away from each other and therefore the filling sensor measures a force which is interpreted as reaching the filling level (Figures 7C and 8A).

[0066] The control unit 36 stops the movement of the carriage 26 towards the bottom and performs the sealing operations.

[0067] In the embodiment shown, first a top seal 57 is created by means of the second sealing device 45, the actuating elements 451, 452 of which are moved towards each other and weld the bag 5 (Figure 8A). For example, the actuating elements 451, 452 comprise electric resistances which, when they are powered after the movement of the actuating elements 451, 452 towards each other, locally melt the bag 5 and, owing also to the pressure exerted, create a heat weld.

[0068] Then the two cutting elements (or thermal blades) 441, 442 of the cutting device 44 are moved towards each other and cut the bag 5 along a cutting line 54 underneath the top seal 57 (Figure 8B). Gripping elements, for example rubber pads 445, 446, are fixed to the cutting elements 441, 442 and, when they are moved towards each other during cutting, they grip between them the walls of the bag underneath the cutting line 54 in order to prevent the bag portion 5 full of waste 90 from falling onto the bottom of the receptacle 10.

[0069] Finally, the portion of the bag 5 full of waste 80 is sealed by the first sealing device 25, which creates the seal 56; the actuating elements 251, 252 are moved towards each other and weld the bag 5 (Figure 8C). A closed bag 59 which constitutes a wrapping for an amount of waste 90 is thus obtained.

[0070] The gripping elements 445, 446 are moved away from each other (Figure 8D) and the opposing members 261, 262 are brought into the separated condition, freeing the closed bag 59 which thus falls onto the bottom of the container 10 (Figure 9A). Finally, the carriage 26 is brought back into the top position (Figure 9B) and the container 1 is ready to receive new waste 90 inside the bag 5 where it remains hanging from the support 21 and has a new bottom formed by the seal 57.

[0071] It should be noted that, irrespective of the order in which the operations are performed:

- the closed bag 59 is sealed by a seal 56 which was created in a first sealing region located between the top edge 50 and the closed bottom 55;
- the remaining portion 58 of the bag 5, i.e. the top part, has a bottom which is closed by a seal 57 formed in a second sealing region located between the top edge 50 and the first sealing region 56, in particular between the top edge 50 and the cutting region 54; a closed bottom 57 is therefore obtained in the portion 58 of the collection bag 5 which remains hanging from the support 21 and which is ready to be filled with waste 90;
- the cut 54 is formed in a region between the first sealing region 56 and the top edge 50, in particular between the first sealing region 56 and the second sealing region 57. A closed bag 59 which encloses the waste 90 and which may be transferred to a waste collection bin is thus obtained.

[0072] Optionally, if the bag 5 has a top edge 50 rolled up on the support 21, the portion 58 which remains hanging from the support 21 may be unrolled a little in order to lower the closed bottom 57 and have a greater volume available for the subsequent waste 90. This unrolling operation may be performed also as a result of the weight which will be subsequently thrown in.

[0073] The sealing/cutting/second sealing operations may be repeated whenever it is required to do so.

[0074] The closed bag 59 may be taken out by removing the apparatus 2 from the container 10.

[0075] The operations described above may be carried out in a different order: for example, the cut may be performed after performing the first seal and the second seal; the seal 56 of the closed bag 59 may be performed before the seal 57 for creating the closed bottom of the remaining bag.

[0076] In a variation of embodiment, the carriage 26 comprises a single sealing device 25; the first seal 56 and the second seal 57 are performed by the sealing device 25 by positioning the carriage 26 at two different heights.

[0077] In a variation of embodiment a movable carriage is not envisaged and the sealing device (and optionally the cutting device) is mounted fixed slightly below the support 21. In this variant, the apparatus 2 is useful in particular for sealing the bag 5 before throwing it away,

irrespective of the filling level of the bag 5 itself.

[0078] In another variation of embodiment, the apparatus 2 comprises a suction device 49 which sucks air from the bag 5 before the latter is sealed, i.e. before operation of the sealing device 25. This allows the volume of the closed bag 59 to be reduced: since as much air as possible is evacuated, the volume of the closed bag 59 corresponds substantially to only the volume of the waste 90 contained inside it. Operation of the suction device 49 is controlled by the control unit 36.

[0079] For example, as shown in Figure 10, the suction device 49 is mounted on the lid 19 and faces the entrance mouth of the bag 5. The suction device 49 is operated before the operating members 261, 262 of the carriage 26 move towards each other, gripping the bag 5 between them.

[0080] Alternatively, as shown in Figure 11, the suction device 490 is mounted on the carriage 26 and comprises a suction pipe 490 which is inserted into the portion of the bag 5 containing the waste 90. For example, the suction pipe 490 is pointed and perforates the wall of the bag 5. Since the main aim is to reduce the volume of the closed bag 59, not necessarily creating a vacuum-sealed bag 59, any small hole left by the suction pipe 490 does not constitute a problem for the purposes of maintaining a small volume.

[0081] In another variation of embodiment, shown in Figures 12A to 12C, a suction device 49 is mounted on the carriage 26 and is configured to be inserted into the bag through the top opening created by the cutting device 44.

[0082] Figure 12A corresponds essentially to the step of providing the top seal 57 shown in Figure 8A; Figures 12B and 12C show the cutting step (Figure 12B) and the suction step (Figure 12C) which precede formation of the seal 56 for the closed bag 59. The suction device 49 comprises a first suction element 49, which is mounted on a respective operating member 261, 262 and is movable vertically with respect thereto. The suction device 49 also comprises a second suction element 492 which is also mounted on a respective operating member 261, 262, underneath the first movable suction element 491; the second suction element 492 is mounted fixed on the respective operating member 261, 262. The second suction element 492 has an inclined surface which comprises a plurality of small suction holes 493 through which the air is removed. When the second suction element 492 is operated, it creates a vacuum which pulls towards the inclined surface a respective cut portion 500 of the bag 5, causing it to open (Figure 12B).

[0083] The first suction element 491 is then displaced towards the second suction element 492, being inserted into the bag 5 kept open by the second suction element 492 and drawing air from the portion of the bag 5 containing the waste 90.

[0084] Once suction has been completed, the suction device 49 is reset to the rest condition and the seal 56 is performed, as already described above.

[0085] For example, the suction device 49 is mounted on a block on which a cutting element 441, 442 and a pad 445, 446 are also mounted. In order not to disturb suction, the gripping elements or pads 445, 446 extend only over a section of the length of the operating members 261, 262; for example the pads 445, 446 are positioned along end sections of the operating members 261, 262 and leave a central section free, along which the first suction element 491 is inserted.

[0086] In particular two suction devices 49 are provided (each comprising a first movable suction element 491 and a second fixed suction element 492) which are mounted facing each other on the operating members 261, 262.

[0087] If necessary, the suction device 49 is configured to create a proper vacuum inside the closed bag 59.

[0088] The subject-matter of the present disclosure has been described hitherto with reference to preferred embodiments thereof. It is understood that other embodiments relating to the same inventive idea may exist, all of these falling within the scope of protection of the claims which are illustrated hereinbelow.

Claims

1. An apparatus (2) for collecting waste, comprising a support (21) for a bag (5) intended to receive waste (90), and a sealing device (25) for the bag (5), wherein the support (21) is adapted to receive a top edge (50) of the bag (5) and to keep the bag (5) hanging, in such a way that the bag (5) extends downwards and has a closed bottom (55), wherein the sealing device (25) is configured to seal the bag (5) in a sealing region (56) that is located between the top edge (50) and the closed bottom (55), so as to obtain a closed bag (59) which constitutes a wrapping for an amount of waste (90), wherein the sealing device (25) is mounted on a movable carriage (26), the movable carriage (26) being adapted to slide along the bag (5) for positioning the sealing device (25) in a region to be sealed (56), the apparatus comprises a control unit (36) and a level sensor adapted to detect a filling level or height of waste (90) inside the bag (5), the control unit (36) being configured to position the sealing device (25) depending on said filling level or waste height, and wherein the level sensor is mounted on said movable carriage (26), the level sensor comprising two opposing elements (41, 42) adapted to receive the bag (5) between them, the level sensor comprising a detector of a force moving away the two opposing elements (41, 42).
2. The apparatus (2) for collecting waste according to claim 1, comprising a motor (30) for moving the mov-

able carriage (26) along the bag (5).

3. The apparatus (2) for collecting waste according to claim 1 or 2, comprising a cutting device (44) which is configured to cut the bag (5) in a cutting region (54) which is located between the sealing region (56) and the top edge (50). 5
4. The apparatus (2) for collecting waste according to claim 3, wherein the cutting device (44) is mounted on the movable carriage (26). 10
5. The apparatus (2) for collecting waste according to any one of claims 1 to 4, comprising a second sealing device (45) which is configured to seal the bag (5) in a second sealing region (57) which is located between the top edge (50) and said sealing region (56), so as to obtain a closed bottom in the second sealing region (57). 15
6. The apparatus (2) for collecting waste according to claim 5, wherein the second sealing device (45) is mounted on the movable carriage (26). 20
7. The apparatus (2) for collecting waste according to claim 3 or 4 and according to claim 5 or 6, wherein the cutting device (44) is in an intermediate position between the sealing device (25) and the second sealing device (45). 25
8. The apparatus (2) for collecting waste according to any one of claims 1 to 7, comprising a suction device (49) configured to suck air from the bag (5) before operation of the sealing device (25). 30
9. The apparatus (2) for collecting waste according to any one of claims 1 to 18, wherein the sealing device (25) is configured to seal the bag (5) by means of a sealing method belonging to a group composed of: heat sealing, ultrasonic welding, laser welding. 35
10. A container (1) for collecting waste, comprising a bucket-like receptacle (10) and an apparatus (2) for collecting waste according to any one of claims 1 to 9, wherein the apparatus (2) is removably positioned in the bucket-like receptacle (10). 40
11. A method for managing a waste collection, comprising the steps of: 45
 - providing a bag (5) intended to receive waste (90), the bag (5) being mounted hanging on a support (21) and extending downwards, the bag (5) having a closed bottom (55); 50
 - throwing waste (90) into the bag (5); 55
 - sealing the bag (5) in a sealing region (56), which is located between a top edge (50) and the closed bottom (55), by means of a sealing

device (25), thus obtaining a closed bag (59) which constitutes a wrapping for an amount of waste (90), wherein the sealing device (25) is mounted on a movable carriage (26) which slides along the bag (5) for positioning the sealing device (25) in the region to be sealed (56),

- detecting a filling level or height of waste (90) inside the bag (5) and positioning the sealing device (25) depending on said filling level or waste height,
- wherein the filling level is detected by means of a level sensor mounted on said movable carriage (26), the level sensor comprising two opposing elements (41, 42) adapted to receive the bag (5) between them, the level sensor comprising a detector of a force moving away the two opposing elements (41, 42).

12. The method for managing a waste collection according to claim 11, comprising the steps of:

- cutting the bag (5) in a cutting region (54), which is located between the sealing region (56) and the top edge (50), thus obtaining a closed bag (59) which is detached from the support (21) and a portion (58) of the bag (5) which remains hanging from the support (21);
- sealing the bag (5) in a second sealing region (57), which is located between the top edge (50) and the cutting region (54), by means of a sealing device (45), thus obtaining a closed bottom in the portion (58) of the bag (5) which remains hanging from the support (21).

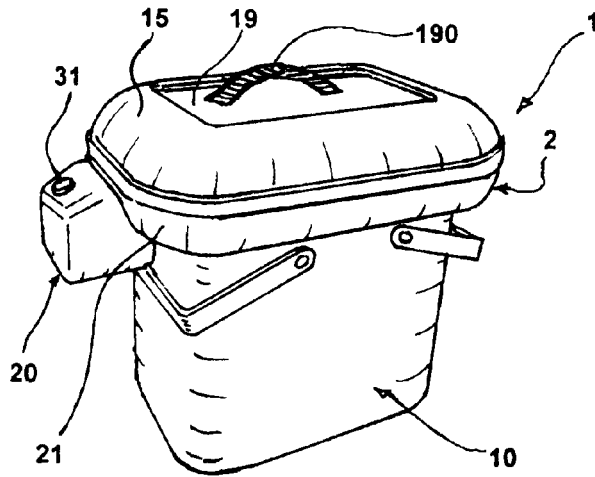


FIG. 1

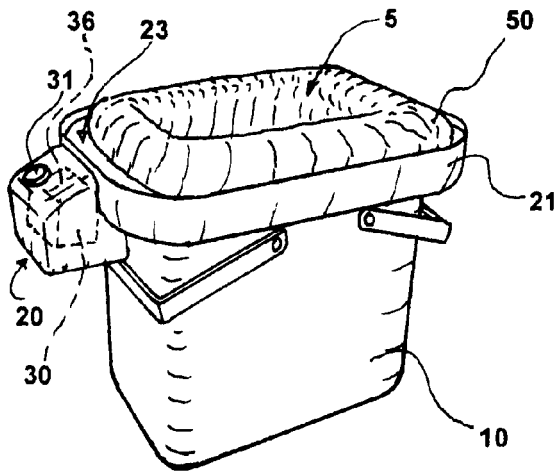


FIG. 3

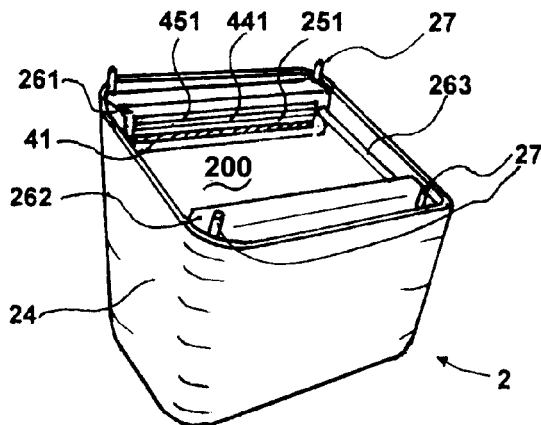


FIG. 4

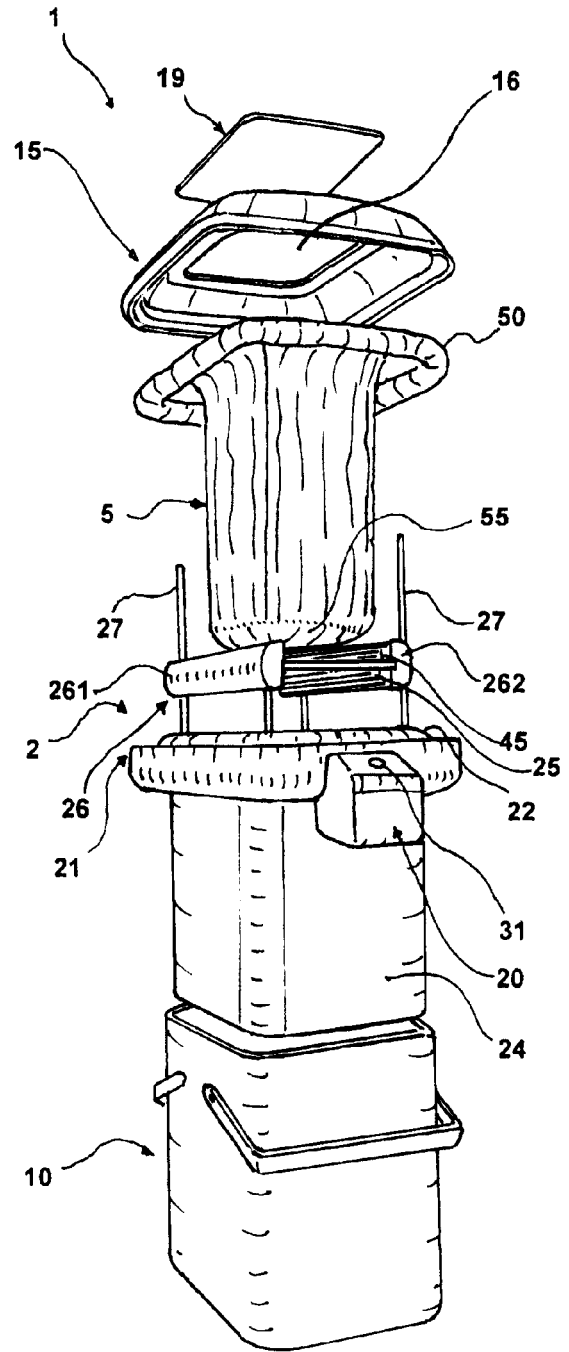


FIG. 2

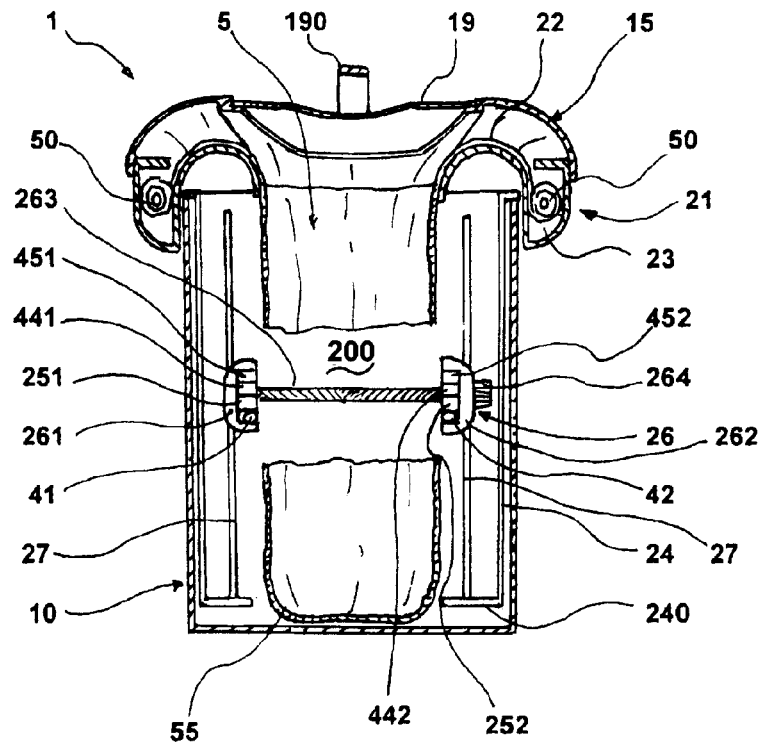


FIG. 5

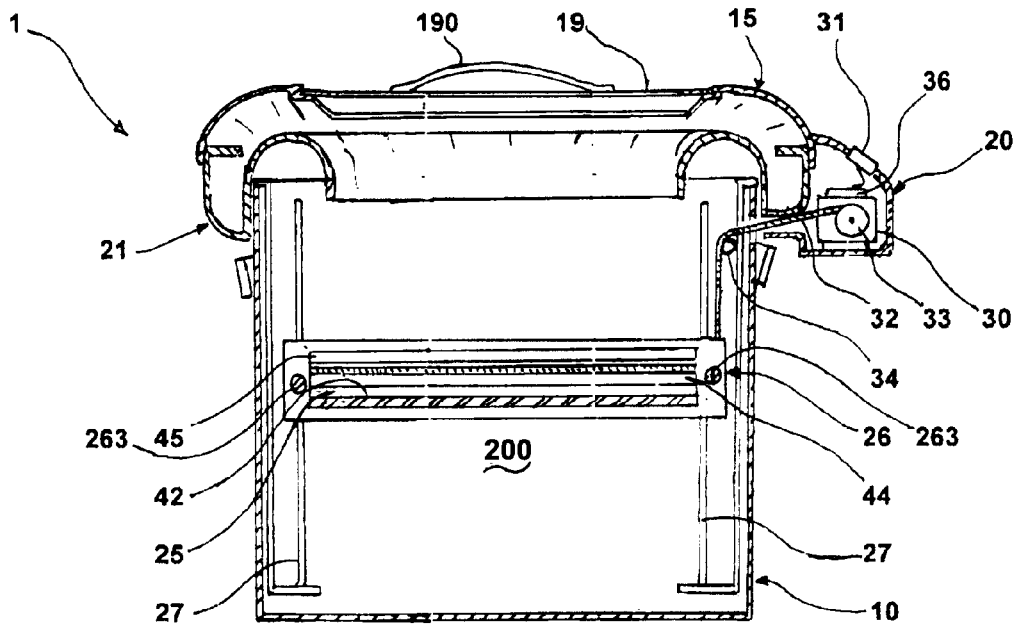


FIG. 6

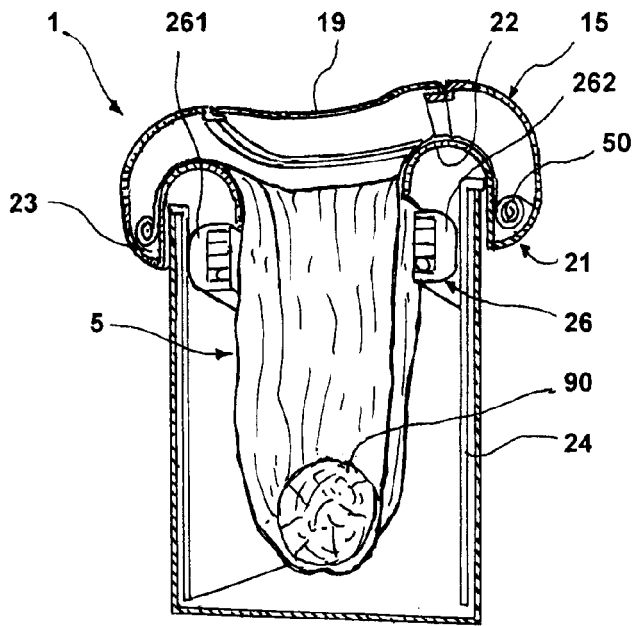


FIG. 7A

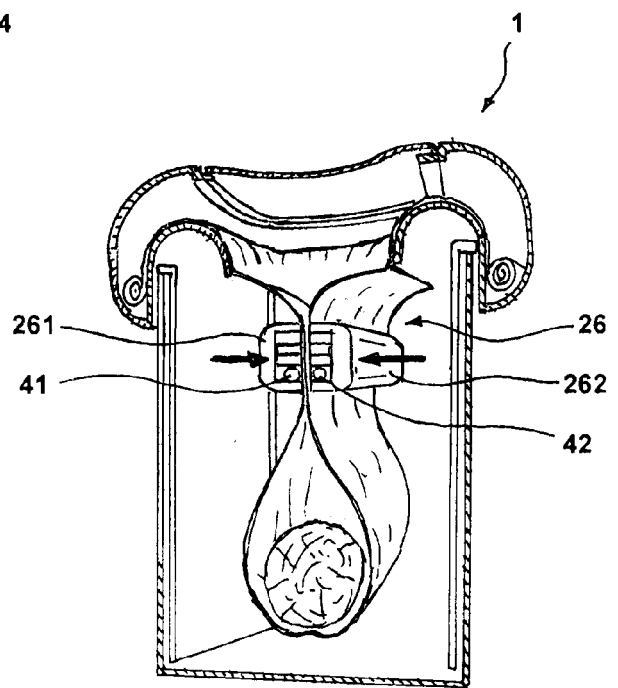


FIG. 7B

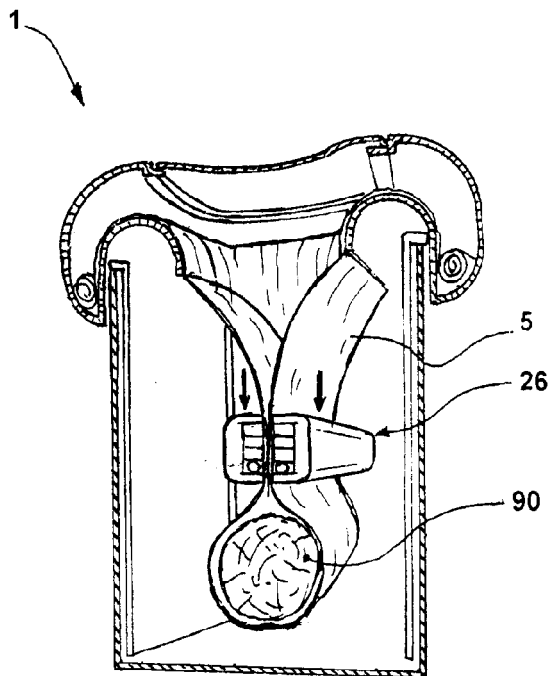


FIG. 7C

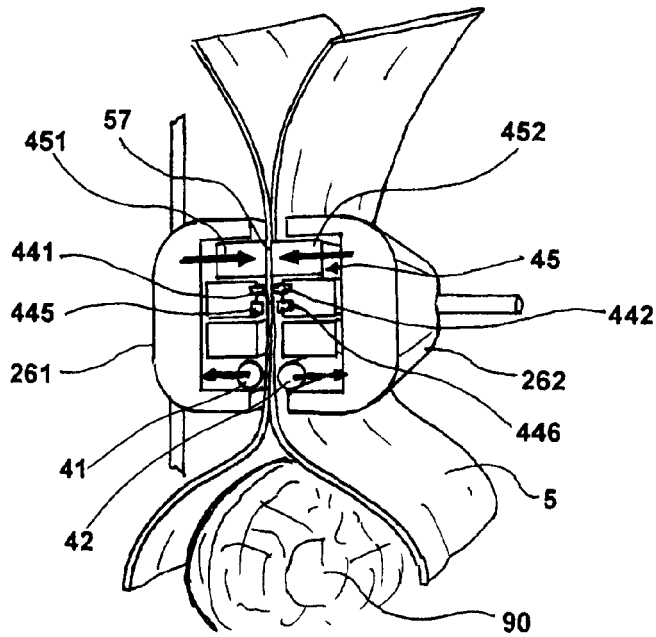


FIG. 8A

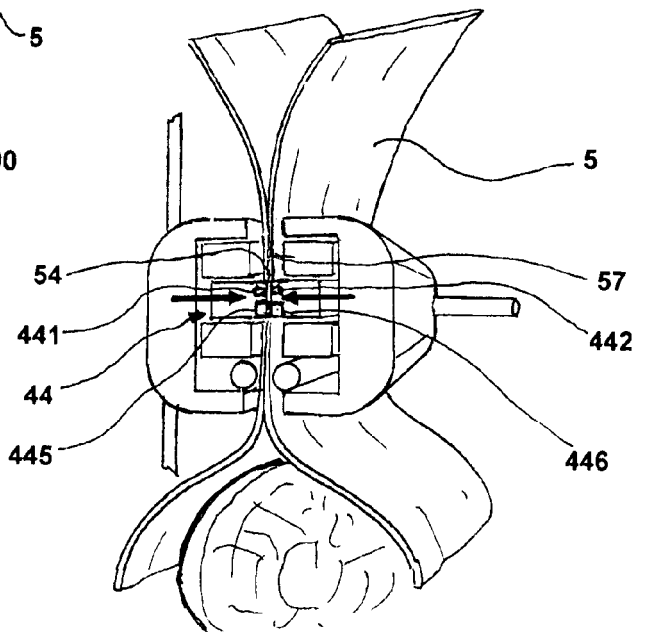


FIG. 8B

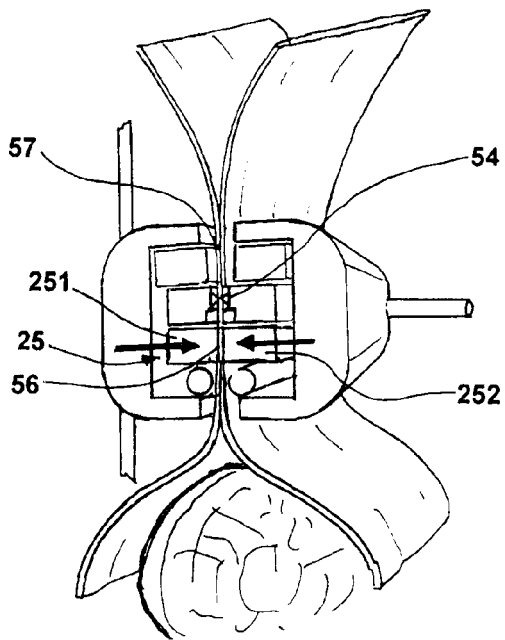


FIG. 8C

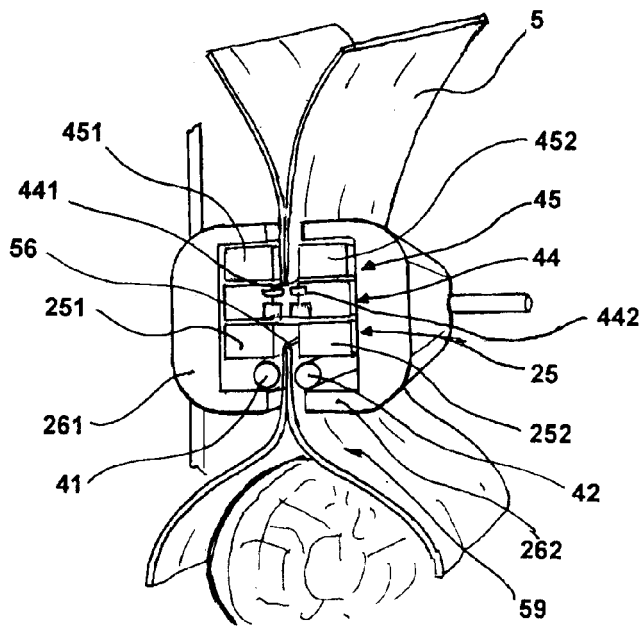


FIG. 8D

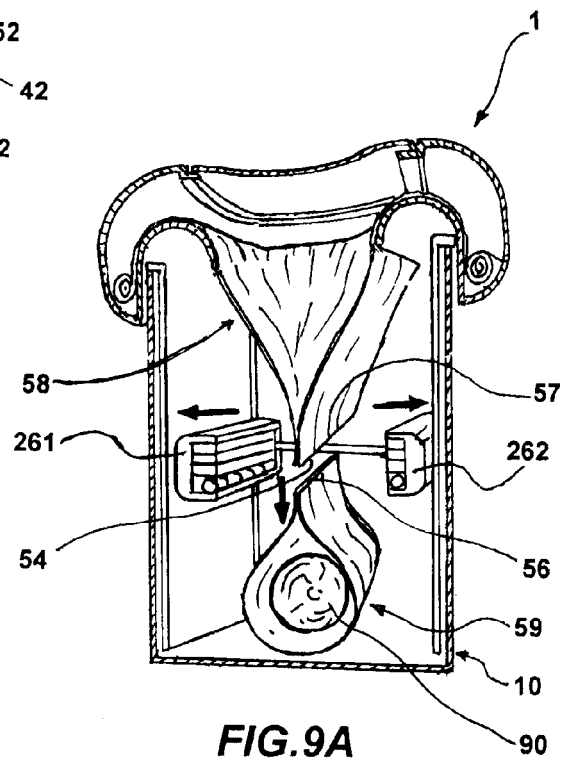


FIG. 9A

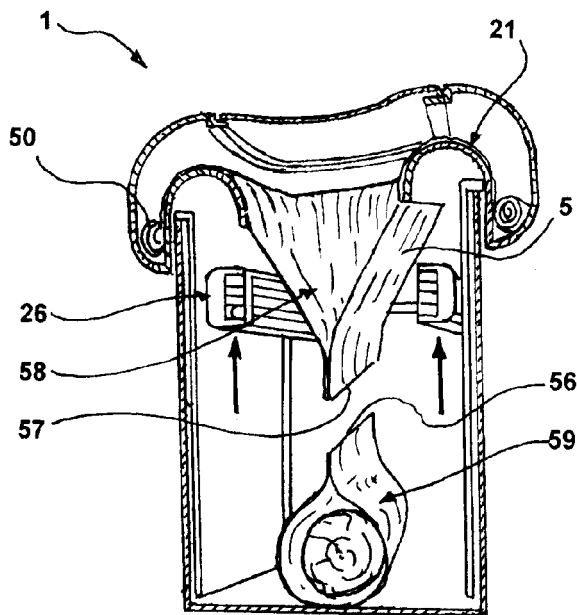


FIG. 9B

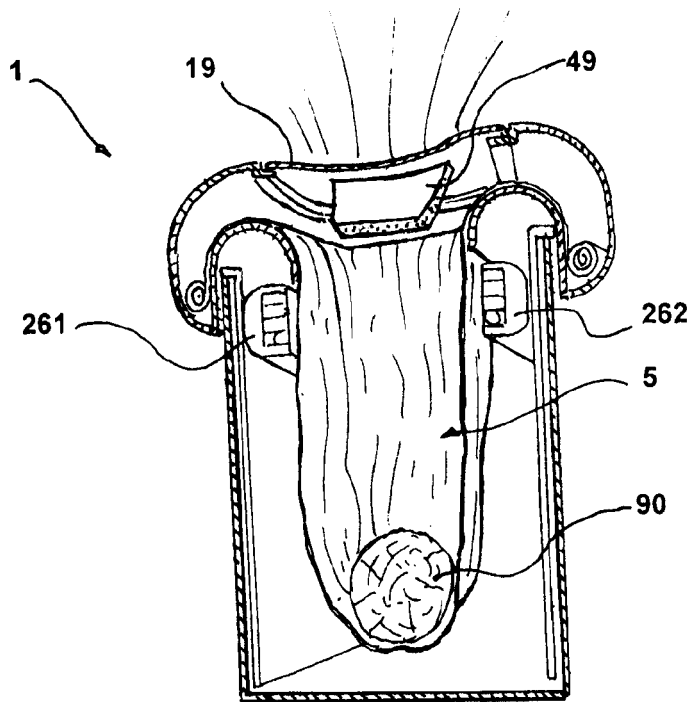


FIG. 10

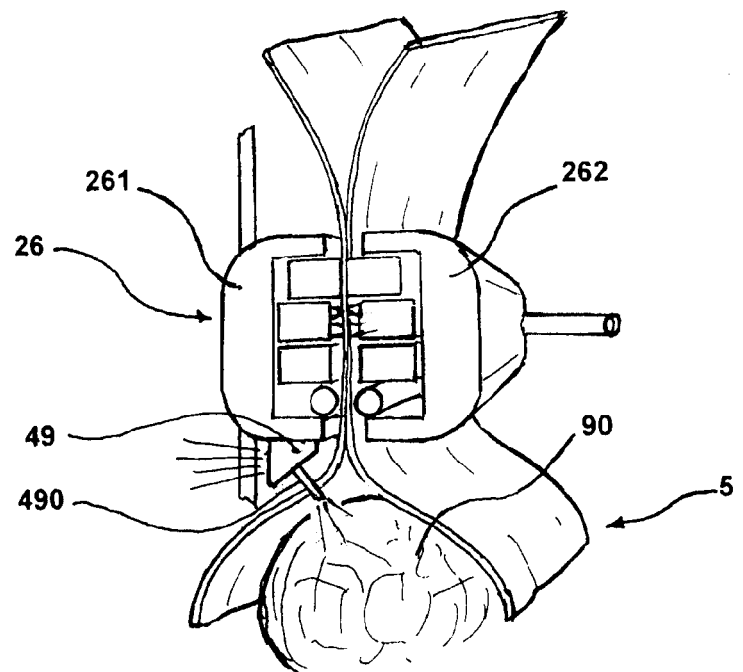


FIG. 11

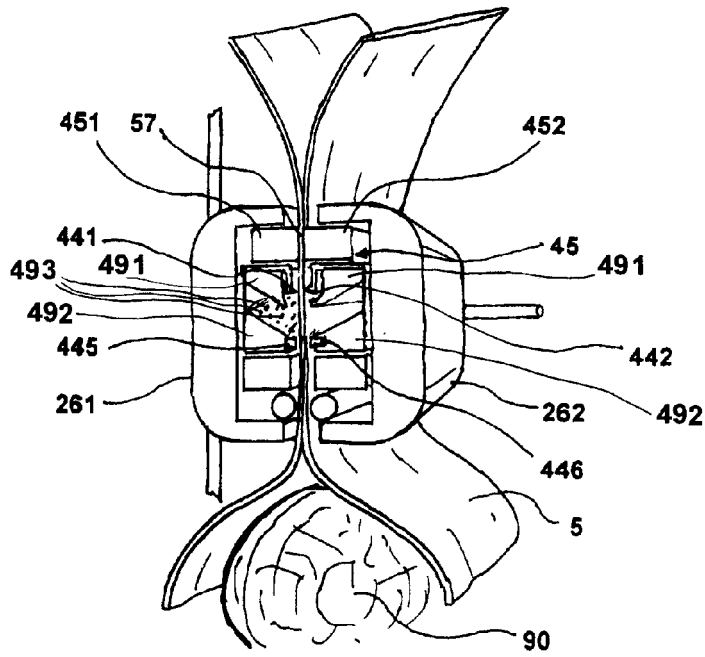


FIG. 12A

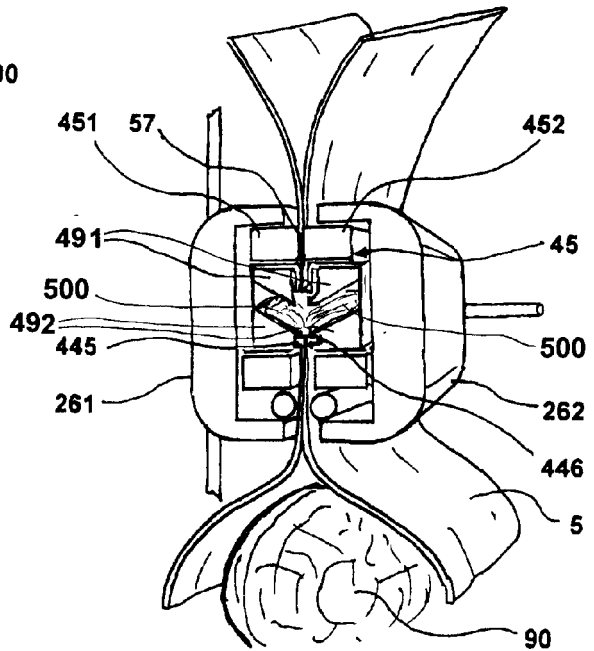


FIG. 12B

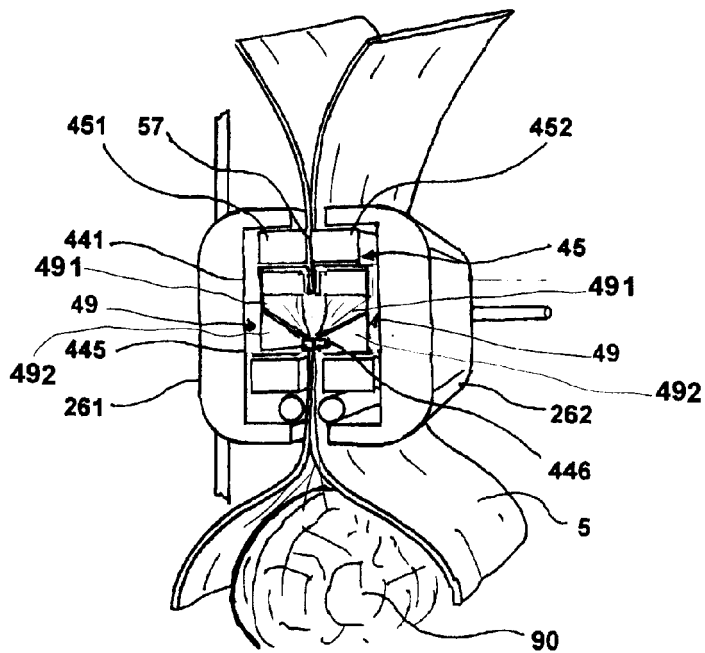


FIG. 12C



EUROPEAN SEARCH REPORT

Application Number
EP 15 17 3585

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	CN 200 992 397 Y (FUZHOU RUISHANG SCIENCE TECHNO [CN]) 19 December 2007 (2007-12-19) * figures 1-12 * * abstract; claim 1 * -----	1-12	INV. B65F1/06 B65B67/12
A,D	CN 102 514 862 A (UNIV ZHEJIANG) 27 June 2012 (2012-06-27) * figures 1-10 * * abstract * * paragraph [0018] *	1-12	
A,D	FR 2 841 229 A1 (AA MAN [FR]) 26 December 2003 (2003-12-26) * figures 1-8 * * page 11, line 21 - page 13, line 24 * -----	1-12	
A,D	WO 02/28717 A1 (JENSEN TIM ALLAN NYGAARD [US]; JENSEN VICTORIA MARIE WORDEN [US]) 11 April 2002 (2002-04-11) * figures 2A-7 * * page 14, line 8 - page 16, line 13 * -----	1-12	TECHNICAL FIELDS SEARCHED (IPC)
A,D	JP 2001 139103 A (TAKAZONO SANGYO KK) 22 May 2001 (2001-05-22) * figures 1-3 * * paragraphs [0019] - [0022] * -----	1-12	B65F B65B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 15 October 2015	Examiner Pardo Torre, Ignacio
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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EPO FORM 1503 03.82 (P04C01)

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ON EUROPEAN PATENT APPLICATION NO.**

EP 15 17 3585

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The members are as contained in the European Patent Office EDP file on
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15-10-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 200992397 Y	19-12-2007	CN 200992397 Y	19-12-2007
		WO 2008086677 A1	24-07-2008

CN 102514862 A	27-06-2012	NONE	

FR 2841229 A1	26-12-2003	AT 316050 T	15-02-2006
		AU 2003260584 A1	06-01-2004
		CN 1668517 A	14-09-2005
		EP 1513745 A1	16-03-2005
		FR 2841229 A1	26-12-2003
		JP 2005534586 A	17-11-2005
		US 2006010837 A1	19-01-2006
		WO 2004000694 A1	31-12-2003

WO 0228717 A1	11-04-2002	AU 9320101 A	15-04-2002
		GB 2383790 A	09-07-2003
		US 2002038535 A1	04-04-2002
		US 2002092273 A1	18-07-2002
		WO 0228717 A1	11-04-2002

JP 2001139103 A	22-05-2001	NONE	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 200992397 Y [0007]
- CN 102514862 A [0007]
- FR 2841229 A1 [0007]
- WO 0228717 A1 [0007]
- JP 2001139103 A [0007]