An assembly having a trash receptacle with a lid. The receptacle includes a trash bag or liner attached thereto. The assembly includes a pumping device designed to expand the liner within the inner cavity of the receptacle by either pressuring the area within the liner or by evacuating the air trapped between the liner and the receptacle.
TRASH RECEPTACLE LID HAVING A PUMPING APPARATUS

BACKGROUND OF THE INVENTION

[0001] 1. Field

The present invention generally relates to receptacles having lids used to hold various items which utilize an inner liner. More specifically, the present invention relates to trash receptacles having a trash bag fitted therein and a mechanism adapted to evacuate air from the area between the liner and the receptacle.

[0002] 2. Background

Receptacles are well known in the art and are used to hold and store a variety of items. One such receptacle common in the art is a trash receptacle. In household applications, it has been found desirable to fit a trash bag within the receptacle to facilitate easy removal and disposal of the contents accumulated therein while also preventing leakage within the trash receptacle. Once filled, removal of the trash bag is often resisted by a vacuum created between the bag and the trash receptacle. As the user attempts to remove the trash bag, this vacuum impedes removal of the trash bag.

[0003] To overcome this problem, several references have suggested a variety of solutions. U.S. Pat. No. 5,388,717 to LeVasseur suggests incorporating openings in the lower portion of the trash receptacle to break the seal thus allowing the trash bag to be easily removed rather than suctioned to the container. Although this design may operate effectively for its intended purpose, it does so by compromising the integrity of the trash receptacle. In the event that the trash bag is perforated, trash or debris may leak from the can. In addition, bugs and external contaminate may freely enter the receptacle through the hole.

[0004] Other references suggest devices which both break the seal between the trash bag and the receptacle while deflecting fluid away from the openings formed in the receptacle. For instance, U.S. Pat. No. 5,265,755 to McArthur Jr. et al. describes a trash receptacle having a central stalk with a dome shaped roof overhang. In addition to breaking the seal between the trash bag and the receptacle upon removal of the trash bag as in the '717 patent, the dome shaped roof deflects fluid and debris away from the vent holes. Although adequately deflecting fluid, the stack and domed roof reduces the overall volume of the receptacle. Moreover, the stick and roof present a complicated geometry which itself may snag or perforate the liner.

[0005] Other references broadly disclose a trash receptacle which vents the inner cavity about the upper periphery of the receptacle such as U.S. Pat. No. 6,000,571 to Brooks et al. and U.S. Pat. No. 5,375,732 to Bowers et al. The '571 patent describes a trash receptacle with dual side walls which define an air passage therebetween. The base of the inner wall has apertures which are in communication with the air passage permitting air trapped within the receptacle to escape. The device suggested in the '732 patent has an air conduit extending from the base to the upper periphery of the receptacle. The conduit has a plurality of openings formed along its length. Both of these devices may assist in breaking a vacuum within the receptacle; however, they are difficult to manufacture and reduce the overall volume of the receptacle.

[0006] Still other devices have been suggested using one-way valves to allow entry of air into the receptacle upon removal of the trash bag while sealing the receptacle in the event that air is forced in the opposite direction. For instance, U.S. Pat. No. 4,890,760 to Nicoll, Sr. et al. discloses a trash receptacle having a flexible flapper valve which covers air holes in the base of the trash can. Similarly, U.S. Pat. Nos. 5,269,434 and 5,390,818 to LaBuda disclose a trash receptacle having a one-way duckbill valve.

[0007] Although the above described devices suggest various solutions to breaking the vacuum of a trash receptacle upon removal, none of these devices even recognize the problem associated with inserting the trash bag. When inserting a trash bag, the area between the trash receptacle and trash bag traps air and frustrates insertion. Although openings in the trash receptacle may provide some assistance, they do not positively assist in evacuating air trapped between the bag and receptacle. The user would still need to physically force the bag into the receptacle and expel the air trapped within the receptacle which often requires substantial labor and bending over at the waist which may be difficult for older users.

SUMMARY OF THE INVENTION

[0010] The present invention attempts to overcome the deficiencies present in the prior art.

[0011] An object of an embodiment of this invention is to provide a receptacle in which air may be positively evacuated;

[0012] Still another object of an embodiment of this invention is to provide an assembly which minimizes the alterations needed to employ the unique aspects of this invention with a prior art receptacle; and

[0013] Still yet another object of an embodiment of this invention is to provide a vented lid adapted to expand the liner within the receptacle.

[0014] In accordance with one exemplary embodiment constructed in accordance with one teaching of the present disclosure, an assembly is provided having a receptacle and a lid. The receptacle has a bottom wall with upstanding side walls which terminate at an upper edge. The lid has a pumping device which is attached to the lid. A liner is disposed within the receptacle in a substantially sealing relationship with the receptacle. The pumping device pressurizes the inner cavity of the receptacle to forcibly expand the liner within the receptacle.

[0015] In a first alternative embodiment, the receptacle has a hole with a tube interconnecting the pumping device and the hole. In this embodiment, the pumping device depressurizes or suction air trapped from between the trash liner and the receptacle to expand the liner within the receptacle.

[0016] In a second alternative embodiment, the pumping device is an electronic pump configured to pressurize the inner cavity of the receptacle to expand the liner within the receptacle. In a third alternative embodiment, the pumping device is an electronic pump configured to depressurize or suction air trapped from between the liner and the receptacle to expand the liner within the receptacle.

[0017] These together with other objects of the invention, along with the various features of novelty which character-
ize the invention, are pointed out with particularity in the claims. For a better understanding of the invention, its operating advantages and the specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] While the specification concludes with claims which particularly point out and distinctly claim the invention, it is believed that the present invention will be better understood from the following description of embodiments taken in conjunction with the accompanying drawings, in which like reference numerals identify identical elements and wherein:

[0019] FIG. 1 is a perspective view of the assembly of the present invention;

[0020] FIG. 2a is an exploded perspective view of a lid of the present invention;

[0021] FIG. 2b is a partial cross section of the lid along line 2b-2b of FIG. 3.

[0022] FIG. 3 is a top plan view of the lid of FIG. 2a;

[0023] FIG. 4 is a front cross-sectional view of the lid of FIG. 3 along line 2b-2b of FIG. 3;

[0024] FIG. 5 is a partial cross-section through the second valve of the lid along line 2a-2b of FIG. 3;

[0025] FIG. 6 is a partial cross-section through the first valve of the lid along line 2b-2b;

[0026] FIG. 7a is a perspective view of the present invention having a hinged lid with holes formed in the bottom wall;

[0027] FIG. 7b is a perspective view of an alternative embodiment of the present invention having holes formed in the handles of the receptacle;

[0028] FIG. 8 is a partial cross section of the lid of FIG. 7b with an alternate valve along line 8-8 of FIG. 9;

[0029] FIG. 9 is a top plan view of a lid of an alternative embodiment of the present invention;

[0030] FIG. 10 is a front cross-section of the embodiment along line 10-10 of FIG. 9 of the present invention;

[0031] FIG. 11 is a partial cross sectional view of the receptacle of FIG. 10 through the depressurization device;

[0032] FIG. 12 is a perspective view of a second alternative embodiment of the present invention; and

[0033] FIG. 13 is a perspective view of a third alternative embodiment of the present invention.

DESCRIPTION OF EMBODIMENTS

[0034] As best appreciated with reference to FIG. 1, the assembly 10 has a receptacle 12 with a lid 14 having a pumping device 16. As is well known in the art, a trash liner (not shown) may be sealingly attached to the receptacle 12. The receptacle has a bottom wall 18 with upstanding walls 20 which terminate at an upper edge 22 thereby defining an inner cavity 23. Preferably, the upstanding walls 22 are flared outwardly and terminate at an upper lip 24 which assists in scaling the liner to the receptacle 12 (as shown in FIGS. 7a and 7b). Flaring the upstanding walls 22 outwardly helps to simplify the manufacturing process while also making it easier to remove the liner from the receptacle 12.

[0035] The receptacle 12 also includes a pair of scalloped portions 25 terminating at a ledge 26 thereby defining a handle 28. Preferably, the receptacle 12 has a pair of handles 28 oppositely disposed 180 degrees apart. The receptacle shown in FIG. 1 has a circular cross-sectional geometry; however, one skilled in the art can best appreciate that a variety of other cross-sectional geometries may be employed with the unique aspects of this invention such as rectangular, oval and the like.

[0036] As shown in FIG. 2a, the lid 14 includes a pumping device 16. The pumping device 16 has bellows 30 supported by a base 32 and may include a flexible seal or o-ring 33, as shown in FIG. 2b, to assist in forming a air tight seal between the receptacle 12 and the lid 14. The base 32 includes an annular sealing region 34 about the periphery of the base 32 and a hole 36. The bellows 30 is formed from a flexible material and has a hole 38. The bellows 30 is configured to receive a spring 40 therein to urge the bellows 30 to return to its fully expanded position after being compressed by the user. The pumping device 16 includes a pair of valves 42, 44. The first valve 42 is oriented to permit unidirectional airflow out from the bellows 30. The second valve 44 is oriented to permit unidirectional airflow into the bellows 30 from the external environment. In combination, the first valve 42 and the second valve operate to force air into the inner cavity of the receptacle 12 and thus expand the liner within the receptacle 12. The first valve 42 is attached to receptacle via a grommet 48 which is fitted into a hole 60 formed through a plug 50. The plug 50 operates to interconnect the bellows 30 with the base 32. In addition, the base 32 has an undercut 52 and the bellows 30 has an annular bead 54. The annular bead 54 is fitted into the undercut 52 on the base 32 to secure the base 32 and bellows 30 together.

[0037] As shown in FIGS. 3 and 4, the pumping device 16 also includes a cap 56. The cap 56 has a hole 58 (shown in FIG. 5) which is sized to receive the second valve 44. A grommet 46 is placed in the hole 58 to secure the second valve 44 to the cap 56. The cap 56 also includes a handle 60 which allows for the user to easily remove the lid 14.

[0038] Each valve 42, 44 has a first housing 62 and a second housing 64 fit together. Together the first housing 62 and the second housing 64 define an inner channel 66. A flapper valve 68 is placed within the inner channel 66 and oriented to permit substantially unidirectional airflow there-through. Turning now to FIG. 6, the first valve 42 is shown secured to the base 32 via the plug 50 and grommet 60. The plug 50 is flared outwardly and sized so that it forms a substantially air tight seal with the base 32 and bellows 30.

[0039] To vent air from the receptacle 12 without permitting fluid from escaping, the receptacle 12 has a domed portion 70 with a plurality of openings 72. As the pumping device 16 pumps air into the receptacle 12, the trash liner fills with air and expands within the receptacle 12. The air trapped between the receptacle 12 and liner is expelled from the receptacle 12 through the openings 72. The openings are formed on the domed portion 70 to raise the openings 72 above the bottom wall 18 thus minimizing the opportunity
for fluid to leak out of the receptacle 12. Formed about the bottom wall 18 is a plurality of channels 74. These channels 74 help to insure that there is an unimpeded path for air flow out of the openings 72. Alternatively, the openings may be formed in a variety of other locations. For instance, as shown in FIG. 7b, the openings 74 may be formed into the handles 28 rather than in the bottom wall 18 to further insure that fluid or debris in the receptacle 12 does not clog the openings 72.

[0040] As best appreciated by one of ordinary skill in the art, various valves may be utilized to permit unidirectional airflow such as duck bill valves, flapper valves and the like without departing from the unique aspects of this invention. One such alternative valve contemplated by the inventors of the present invention is depicted in FIG. 8. As shown in FIG. 8, the valve 76 has a planar portion 78 with a stem 80 terminating with a bulb 82. The stem is fitted through a hole 84. As shown in FIG. 8, the valve 76 is attached to the cap 34. One skilled in the art can appreciate that valve 76 may be used to replace any of the valves used in this assembly. Valve 76 operates to overlay apertures 78. When pressure is exerted through the holes 84 against the flapper valve 78, the flapper valve opens to permit the air to enter the bellows. When the pressure is exerted from the other side towards valve 76, valve 76 seals against the holes 84 to prevent the air from escaping.

[0041] One unique aspect of the present invention is that it may be utilized with existing receptacles 12. Accordingly, in order to practice the present invention, one would only need to manufacture the lid 14 as shown in FIGS. 1-6. Alternatively, the inventors contemplate that the unique aspects of the present invention may be incorporated into a lid 14 which is hingedly coupled to the receptacle 12. As best appreciated with reference to FIG. 7a, the lid 14 has a hinge arm 104 coupled to a hinge arm 106 formed on the receptacle 12 via a hinge pin 108.

[0042] An alternative embodiment of the present invention is shown in FIGS. 9-11. As best appreciated with reference to FIG. 9, in this first alternative embodiment, the lid 14 has an opening 85 which receives a tube or hose 86. The receptacle 12 has a hole 88 to which the hose 86 is connected so that the pumping device 16 is in communication with the portion of the inner cavity 23 of the receptacle 12 below the liner rather than above the liner as in the previous embodiment. In order to expand the liner within the inner cavity 23, the pumping device 16 is configured to evacuate air trapped between the liner and the receptacle 12. In order to evacuate air from within the receptacle, the valves 42 and 44 are reversed in orientation such that as the bellows 30 is pumped air is evacuated from the receptacle 12. However, in this embodiment, the domed portion 70 includes a depressurization device 89.

[0043] With reference to FIG. 11, the depressurization device 89 is preferably a valve 90 having a similar construction to valve 76. Valve 90 has a planar portion 92 with a stem 94 terminating at a bulb portion 96. The planar portion 92 overlays holes 98 formed in the domed portion. Since air is positively evacuated from the receptacle 12 by the pumping device 16, valve 90 is necessary to seal holes 98 and prevent air from being drawn from the external environment rather than from the inner cavity.

[0044] In a second alternative embodiment, the assembly 10 is similar in construction to the first embodiment. However, in this second alternative embodiment, the pumping device 16 is an electric pump 100 rather than a manual bellows. As shown in FIG. 12, the electric pump 100 may be operated to pump air into the receptacle 12 to expand the liner within the inner cavity 23 of the receptacle 12. Preferably, the electric pump 100 may be operated via standard A/C current via an electrical connection 104. In addition, the electric pump 100 may be affixed to the lid 14, as shown in FIG. 12, or may be a separate unit in fluid communication with the inner cavity 23 of the receptacle 12. In either event, the electric pump 100 may be connected via a tube or pipe 102 as shown. However, the inventors of the present invention anticipate that a variety of other attachment methods may be employed without departing from the unique aspects of this invention.

[0045] In a third alternative embodiment, the assembly 10 is similar in construction to the first alternative embodiment. However, in this embodiment, the pumping device 16 is an electric pump 100 which is connected via a tube 102 to the inner cavity 23 of the receptacle 12 below the liner. The electric pump 100 is configured to remove air from between the inner cavity 23 and the receptacle 12. The electric pump 100 may be affixed to the lid 14 or may be a separate unit connected via the tube 102.

[0046] In the second alternative embodiment and the third alternative embodiment, the electronic pump 100 may have an electronic control, not shown, which has a manual on/off switch. Alternatively, the electronic control may be designed to have an automatic cycle which operates for a fixed time, fixed volume of air, or fixed pressure. The electronic pump 100 may also be battery operated via DC current.

[0047] Although particular embodiments of the present invention have been illustrated and described, modifications may be made without departing from the teachings of the present invention. For instance, the present invention has described the particular configuration of the valves. The principle operation of these devices is to permit airflow in one direction and resist airflow in the opposite direction. One of ordinary skill in the art can best appreciate that there are a variety of devices which can achieve this function such as duck bill valves, one-way flapper valves, pumps and the like. As readily apparent to one of ordinary skill in the art. The pumping device may be any of a multitude of pumps capable of moving air from one region to another. The pump may be also be manual or automatic. The present invention anticipates the substitution of these various other devices may be made without departing from the teachings of the present invention. Accordingly, the scope of the invention shall be limited only by the following claims.

What is claimed is:
1. A lid for use with a receptacle comprising:
   - a base, said base having a seal; and
   - a pumping apparatus for pressurizing the inner cavity of a receptacle.
2. The lid as recited in claim 1, wherein said pumping apparatus is a bellows.
3. The lid as recited in claim 1, wherein said pumping apparatus is an electronic pump.
4. An assembly comprising:
   a receptacle having a bottom wall and a side wall extending from said bottom wall defining an inner cavity and terminating at an upper edge;
   a lid fitting about the upper edge of the receptacle;
   a pumping apparatus for pressurizing the inner cavity of the receptacle.
5. The assembly as recited in claim 4, wherein said pumping apparatus comprises:
   a bellows; and
   at least two valves oriented to pressurize the inner cavity.
6. The assembly as recited in claim 5, wherein each of said valves comprises:
   a first housing;
   a second housing attached to the first housing defining an inner cavity;
   a flapper valve located within the inner cavity to permit unidirectional airflow.
7. The assembly as recited in claim 5, wherein at least one of said valves is a flapper valve.
8. The assembly as recited in claim 5, wherein at least one of said valves is a duckbill valve.
9. The assembly as recited in claim 4, wherein said lid further includes a seal.
10. The assembly as recited in claim 4, wherein said receptacle further comprises:
    a domed portion having at least one hole therethrough;
    at least one channel in communication with said domed portion.
11. The assembly as recited in claim 4, wherein said receptacle further comprises:
    a handle having a scalloped portion terminating at a ledge.
12. The assembly as recited in claim 11, wherein said handle further comprises a hole.
13. An assembly comprising:
    a receptacle having a bottom wall and a side wall extending from said bottom wall defining an inner cavity and terminating at an upper edge, said receptacle having an opening;
    a lid fitting about the upper edge of the receptacle;
    a pumping apparatus; and
    a hose interconnecting the pumping apparatus to the opening in the receptacle for evacuating the inner cavity.
14. The assembly as recited in claim 13, wherein said pumping apparatus comprises:
    a bellows; and
    at least two valves oriented to pressurize the inner cavity.
15. The assembly as recited in claim 14, wherein each of said valves comprises:
    a first housing;
    a second housing attached to the first housing defining an inner cavity;
    a flapper valve located within the inner cavity to permit unidirectional airflow.
16. The assembly as recited in claim 14, wherein at least one of the valves is a flapper valve.
17. The assembly as recited in claim 14, wherein at least one of the valves is a duckbill valve.
18. The assembly as recited in claim 13, wherein said lid further includes a seal.
19. The assembly as recited in claim 13, wherein said receptacle further comprises:
    a domed portion having at least one hole therethrough;
    at least one channel in communication with said domed portion.
20. The assembly as recited in claim 19, wherein said assembly further includes a valve associated with said hole for permitting unidirectional airflow through said hole in the dome portion.
21. An assembly comprising:
    a receptacle having a bottom wall and a side wall extending from said bottom wall defining an inner cavity and terminating at an upper edge, said receptacle having an opening; and
    a lid fitting about the upper edge of the receptacle; and
    an electronic pumping apparatus for pressurizing the inner cavity.
22. An assembly comprising:
    a receptacle having a bottom wall and a side wall extending from said bottom wall defining an inner cavity and terminating at an upper edge, said receptacle having an opening;
    a lid fitting about the upper edge of the receptacle;
    an electronic pumping apparatus; and
    a hose interconnecting the electronic pumping apparatus to the opening in the receptacle for evacuating the inner cavity.
23. An assembly comprising:
    a receptacle having a bottom wall and a side wall extending from said bottom wall defining an inner cavity and terminating at an upper edge;
    a liner sealing attached to said receptacle and fitted within the inner cavity;
    a lid fitting about the upper edge of the receptacle; and
    a pumping apparatus in communication with the inner cavity of the receptacle and configured to expand the liner within the receptacle.