

RECEPTACLE FOR STORING AND DISPENSING LIQUIDS

CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit of US Application No. 63/587,322, filed on October 2, 2023 and entitled "Receptacle For Storing and Dispensing Liquids", the disclosure of which is incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a receptacle for storing liquids to be dispensed from the receptacle, for example, for storing and dispensing solvents used in cleaning of fiber optic connectors and the end faces of optical fibers. Any other liquids capable of being dispensed by gas pressure may be stored in and dispensed from the receptacle. The receptacle may comprise a valved canister which may be inserted into any suitable dispensing device, such as a cleaning device for fiber optic connectors and end faces. The receptacle may be readily removed from the device in which it is placed, for example, when the liquid is exhausted or if a different liquid is desired, and replaced with a fresh canister.

[0002] The receptacle is designed as a consumable, for use with any suitable dispensing device. For example, the receptacle may be used to supply a solvent to a fiber optic cleaning device. Such devices emit bursts of a compressed gas to entrain and atomize a solvent and entrain the atomized solvent in a gas flow which is impinged on the fiber optic component to be cleaned. Typically, such cleaning devices follow with a burst of gas flow not containing solvent in order to dry the component being cleaned.

2. Prior Art

[0003] U.S. Patent 6,196,421 issued March 6, 2001 to Williams ("Williams") discloses single use hand-held aerosol containers having dispensing valves at each opposite end. For example, see Figures 4 and 8. In various configurations a different type of valve is provided at each end to produce different types of discharge, for example, a stream, a spray or a foam. See Figures 2, 3, 4 and 7. In other embodiments two different products may be contained in the canister, as shown in Figures 5-8. Figures 6 and 8 show structure to physically separate two different products, by a barrier 69, 70 in Figure 6 and collapsible pouches 181A, 181B in Figure 8.

[0004] UK Patent Application GB 261025 A issued March 29, 2023 to Rushton ("Rushton") discloses a multi use water bottle which contains a mesh structure containing an adsorbent, which may be activated carbon, disposed in the water to purify it. For example, see Figures 3 and 5. The use of activated carbon as the adsorbent is disclosed, for example, at page 10, line 22 *et seq.*, and in claim 13. Page 8, lines 25-31 discloses that the mesh structure may be "similar to a variety of well-known teabags." The application teaches the use of a mesh structure (e.g., a tea bag or a small refillable mesh container) which may be replaced or refilled with adsorbent as needed. The disclosed advantage over a fixed column of adsorbent through which water is flowed into the receptacle is that such columns eventually become saturated and can become a source of contamination, whereas the mesh structure may be replaced or recharged with fresh adsorbent as needed.

[0005] The abstract of Korean 2002-008977 A shows a tea bag filled with an activated charcoal for use in purifying water.

SUMMARY OF THE INVENTION

[0006] In accordance with the present invention there is provided a receptacle for a liquid such as a solvent which receptacle may comprise a receptacle body having a first end and an opposite second end, each of which contains a valve, the first and second ends and their respective valves being identical. The orientation of the receptacle when installed into a given cleaning device is therefore immaterial, as the configuration is identical whichever end (first or second) is facing upwardly or downwardly. An absorbent medium such as activated carbon may be disposed in the liquid contained in the receptacle. The absorbent medium may be dispersed as granules throughout the liquid or the granules may be contained in a liquid-permeable packet.

[0007] Specifically, in accordance with the present invention there is provided a receptacle for storing and dispensing a single body of liquid, the receptacle comprising the following components. A closed receptacle body containing the single body of liquid, the receptacle body having a first end having a first dispensing valve thereon and an opposite second end having a second dispensing valve thereon. The first valve is functionally identical to the second valve, whereby such liquid may be dispensed from the receptacle through the first or second valve by opening the one of the first and second valves which is in contact with such liquid.

[0008] Other aspects of the present invention comprise one or more of the following features in any suitable combination: an adsorbent material may be disposed in the liquid; a

pressurized gas may be disposed within the receptacle to form a gas bubble defining a head-space above the liquid; the adsorbent material may be dispersed as particles in the liquid; the adsorbent material may be contained within a packet comprising a packet material which is permeable to the liquid; the packet material may comprise Melfit BT 60 non-woven fiber or, preferably, a spunbond high density polyethylene fiber, which is more fully described below. The liquid may be an organic solvent suitable for cleaning fiber optic end faces.

[0009] In a specific aspect of the present invention the liquid may comprise a solvent blend comprising:

from about 30 to about 60 weight percent methyl nonafluorobutyl ether,
from about 30 to about 60 weight percent methyl nonafluoroisobutyl ether,
from about 5 to about 10 weight percent (Z)-1-chloro-2,3,3 trifluoropropane, and
the pressurized gas may comprise heptane present in the amount of from about 5 to about 10 weight percent of the weight of the solvent blend and pressurized gas.

[0010] As used herein and in the claims, the following terms have the indicated meaning. The term "functionally identical" means that the paired valves (the valves on opposite ends of the same receptacle) may each be operated by the same mechanism or device. Preferably, to simplify manufacture and inventory of parts, the paired valves are identical valves. The term "single body of liquid" means that there is only one body of liquid in the receptacle as distinguished from situations in which a barrier separates the liquid within the receptacle into two distinct bodies of liquid as shown, for example, in Figures 6 and 8 of the aforesaid US Patent 6,196,421. The terms "receptacle" and "canister" are used interchangeably.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Figure 1A is a cross-sectional view in elevation of a receptacle in an early stage of manufacture before openings at both ends are closed;

[0012] Figure 1B is a cross-sectional view in elevation of the completed receptacle with both ends closed and valved with male stem valves and containing a liquid and a gas bubble;

[0013] Figure 1C is a cross-sectional view similar to that of Figure 1B but valved with female recessed stem valves;

[0014] Figure 1D is a cross-sectional view similar to that of Figure 1B but showing a male stem valve at one end and a female recessed stem valve at the other end;

[0015] Figure 2A is a side view of a fiber packet; and

[0016] Figure 2B is a front view of the packet of Figure 2A; and

[0017] Figure 3 is a schematic view with part broken away of a device in which a receptacle of the present invention may be utilized.

DETAILED DESCRIPTION OF THE INVENTION

[0018] A portable receptacle 1 (Figure 1B) is engineered to store and dispense liquid contents 2 such as specialty cleaning solvents or liquid surface treatments such as polishes, lubricants, specialty adhesives or protective films.

[0019] As shown in Figure 1A, the receptacle body 4, while in an early stage of its production is made with identical openings 3 on its opposite first and second ends 4a, 4b. Each end is then closed with a respective closure lid 5a, 5b as shown in Figure 1B. Both of closure lids 5a, 5b are fitted with respective valves which are identical in size, shape and on/off function. Figure 1B shows identical male stem valves 8 respectively fitted in closure lids 5a and 5b at opposite ends of fluid receptacle 1. Figure 1C shows identical female recessed stem valves 9 fitted in closure lids 5a, 5b at opposite ends of fluid receptacle 1. In Figure 1D, for the purpose of illustrating both types of valves, male and female, which may be used, a male stem valve 8 is shown installed in closure lid 5a at first end 4a of fluid receptacle 1" and a female recessed stem valve 9 is shown installed in closure lid 5b at second end 4b of fluid receptacle 1". It is to be understood, however, that if it is desired that no orientation of the receptacle 1 upon insertion into a device be required, both valves will be identical. That is, both valves will be either male stem valves 8 as shown in Figure 1B or female recessed stem valves 9 as shown in Figure 1C. In either case, one valve is located at the first end 4a of the fluid receptacle and one valve is located at the second end 4b of the fluid receptacle, for a total of two valves per fully assembled fluid receptacle.

[0020] With the same type valve either 8 or 9 on, respectively, the first and second ends of the fluid receptacle 1 or 1', there is no functional top or bottom orientation of the fully assembled fluid receptacles that would require special positioning or orientation of top and bottom when installing a fluid receptacle into equipment or fixtures (not shown) for dispensing the contents of the fluid receptacle. Reference herein to "valves 8, 9" is intended to convey that either two male stem valves 8 or two female recessed stem valves 9 may be used on a given fluid receptacle.

[0021] Valves 8 or 9 are mounted to the closure lids 5a, 5b to close receptacle openings 3 using a mechanical crimp 10 to establish a permanent hermetic seal to prevent the

escape from, or introduction into, a closed fluid receptacle of gas, liquid or vapor during transport or storage. This conventional crimping method of closing receptacle body 4 prevents unintended dispensing or spillage, and prevents intrusion of dust, moisture and oils that could potentially contaminate the liquid contents 2 or otherwise negatively impact the intended function of the liquid contents 2 when the fluid is dispensed.

[0022] Valves 8 and valves 9 are manufactured to industry standard aerosol valve dimensions with desired features selected from available aerosol valve variants and may be purchased ready to use from any number of aerosol valve suppliers. The ideal valve 8, 9 features minimal valve body height to minimize or reduce protrusion of the valve into the receptacle so as to minimize or reduce exposure to a solvent contained in the fluid receptacle of the polymer of which the valve is made. This is in order to minimize leaching of organic nonvolatile residue ("NVR") into the solvent from the valves and to ensure complete emptying of fluid, e.g., liquid, from the fluid receptacle when in use. Valves 8, 9 are configured with no dip tube. Valves 8, 9 may be either sized to fit an aerosol valve industry standard 1 inch (2.54 cm) opening or smaller, such as a 20 mm opening, and the receptacle opening 3 and curl 7 will also be sized appropriately to the size of valves 8 or 9 used.

[0023] Both receptacle openings 3 are configured to feature an industry standard aerosol valve curl 7 geometry that is sized as appropriate to the closure lid 5a, 5b size and type being used. The curl 7 is configured to allow mechanical crimping to form crimp 10 of closure lids 5a, 5b to the receptacle opening 3 located on both ends of the receptacle body 4.

[0024] Valves may be configured either as a male stem valve 8 or a female recessed stem valve 9 for actuation of the valve, but the female recessed stem valve 9 is preferred because a male stem valve 8 is susceptible to breaking during transport and handling, which would render the valve inoperable. Also, a female recessed stem valve 9 is less likely to be unintentionally opened because its stem is recessed in the valve 9, while the male stem valve 8 is exposed and may easily be accidentally pressed to actuate and open the valve 8 causing unintended loss of the liquid contents 2. In normal use, as stated above, only one type of valve, either a male stem valve 8, or a female recessed stem valve 9, is used to close both opposite first and second ends of a fluid receptacle.

[0025] Arrows A in Figures 1B, 1C and 1D denote direction of movement to actuate either of valves 8 or 9 to an open/on position. A valve 8 or 9 must remain depressed to keep the valve in an open/on state. When not in use, the stem on each valve 8 or 9 defaults to a closed/off position (not shown), preventing unintended fluid flow or leakage through the valve 8, 9 from on a filled fluid receptacle 1.

[0026] A full circumferential mechanical crimp 10 dimensioned in accordance with valve manufacturer's specifications is used to secure aerosol valves 8, 9 to receptacle openings 3. A crimp 10 ensures the valve 8 or 9 cannot be user-removed or tampered with without damaging the valve and/or the fluid receptacle 1. This ensures purity of liquid contents 2 in storage, transport and when dispensed for use.

[0027] A liquid 2, such as a solvent used for cleaning fiber optic end faces may be contained in fluid receptacles 1, 1' or 1". For example, liquid 2 may comprise the solvent blend used in the laboratory test described below. When the fluid receptacle is pressurized a gas bubble 11 provides a head space 6, as shown in Figures 1B, 1C and 1D.

[0028] To dispense the liquid contents 2, the fluid receptacle 1 or 1' is oriented in a vertical position with one valve 8 or 9 located at the first end 4a and the second valve 8 or 9 located at the second end 4b of the fluid receptacle 1. As noted above, each opposite end of a given receptacle will have either a valve 8 at both ends or a valve 9 at both ends. Liquid contents 2 dispense only when each valve 8, 9 is engaged with a valve actuator fixture (not shown) that opens each valve 8, 9 simultaneously.

[0029] Liquid flows only through the open/on valve at the second end 4b when second end 4b is positioned as the bottom end. Such flow is established either by gravity or by introducing compressed gas through the open valve on the opposite end of fluid receptacle 1. When compressed gas is employed to dispense liquid 2, the compressed gas forms a pressurized bubble 11 above the liquid contents 2 inside the closed fluid receptacle 1, thus pushing the liquid contents 2 out through the open valve at the opposite end of receptacle 1. The compressed gas bubble 11 is replenished through the open valve adjacent the bubble as liquid volume decreases due to dispensing. The gas bubble 11 pressure may be regulated to control and maintain a constant internal pressure of the closed fluid receptacle 1.

[0030] Flow rate of liquid contents 2 from the fluid receptacle, e.g., fluid receptacle 1 or 1', may be controlled by changing the internal pressure, or flow may also be metered by use of fixtures (not shown) capable of opening and closing the valves 8, 9 respectively, at the first and second ends independently of each other, or simultaneously.

[0031] For high precision dispensing of liquid contents 2, the fluid receptacle 1 may be regulated to a desired set internal pressure using a compressed gas bubble 11, and a metering valve (not shown) used downstream of the valve from which the liquid content 2 is dispensed.

[0032] If desired, the compressed gas bubble 11 pressure may be relieved from the fluid receptacle 1 by closing the valve at the end of the fluid receptacle which is in contact

with liquid 2, that is, at the end of the fluid receptacle which is opposite the end containing the gas bubble 11, and venting the gas bubble through the open valve adjacent the gas bubble. The valve adjacent the gas bubble is then closed to reestablish a hermetically sealed fluid receptacle. This venting relieves internal pressure for easy transport as a not hazardous material and prevents spilling or unintended loss of liquid contents 2 in storage.

[0033] Gravity ensures the liquid contents 2 remain positioned in the bottom of the fluid receptacle 1 regardless of which end of the fluid receptacle 1 is oriented in the top position.

[0034] The contents of the fluid receptacle 1 advantageously need not be pressurized at the time of packaging or when transported or stored before use. Provided the formula for the liquid contents 2 does not meet the defining criteria for the hazard classes and divisions detailed in 49 CFR part 173 as well as 49 USC 5103 or 49 CFR 172.101, a non-pressurized, fully filled or partially-filled container may be transported and stored as non-hazardous material, thereby reducing transport and storage costs.

[0035] Materials of construction of receptacle body 4 may be aluminum, stainless steel, plated carbon steel, brass, or molded plastic such a polypropylene or other materials/polymers that would be compatible with the liquid contents 2 and ensure long term containment and purity of the liquid contents 2 during storage, transport and use.

[0036] Granulated activated carbon particles (not shown) may be immersed in the liquid content 2 of the fluid receptacle 1 to selectively absorb organic nonvolatile residue (NVR) that may leach into the liquid contents 2 from the container and/or valve 8, 9, gaskets and associated plastic components, or when moisture in compressed gas is introduced to establish the gas bubble 11. Granulated activated carbon may be added in its loose particle form and held captive in the fluid receptacle 1, provided that granule particles are of a size and form that ensures they do not plug the valve 8, 9 thereby preventing fluid flow, and that the granule particles are not so small in size that they can flow through the valve and be dispensed with the liquid contents at the time of use.

[0037] Preferably, granulated activated carbon particles can be packaged in a porous nonwoven fiber packet 12 (Figures 2A and 2B) that encloses the particles in the packet. The packet fiber 12 is sufficiently porous to not impede the NVR absorption capacity of the activated carbon. Such a packet is sized to fit in the fluid receptacle 1 and is added and immersed in the liquid contents 2 at the time of fluid packaging. Packet 12 of activated carbon allows for the use of a smaller granulated particle size which increases exposed surface area enhancing selective organic absorption properties. The ideal material for packet 12 is a

porous nonwoven fiber fabric that allows free flow of liquid content through the fabric and prevents small particles of granulated activated carbon from escaping from the packet. The packet fabric must prevent small particles of granulated activated carbon from being released and dispensed with the liquid contents. Packet 12 is discarded when the fluid receptacle is discarded and is thus a one-time use packet.

[0038] The packet 12 is preferably made of a fabric which is permeable enough to permit the solvent to pass through the fabric in order to contact the adsorbent material inside packet 12, but not so permeable as to permit particles of the activated carbon or other adsorbent in the packet to enable carbon (or other dust) to emerge from the packet and contaminate the solvent. A suitable material for the packet used in a solvent such as that used in the laboratory experiment described below is a spunbond high density polyethylene fiber material.

[0039] As noted above, receptacles, i.e., canisters, filled with high-purity solvent may leach plasticizers and organic contamination from polymers contained in gasket valve mechanisms and the like in the interior of the canister and thus exposed to the solvent in the canister. The leached organic contamination can contribute to poor cleaning results in applications that require high-purity solvent, such as cleaning fiber optic end faces.

[0040] Elevated temperatures can accelerate the solubility of organic contamination into solvent. Solvents with low surface tension and high solvency can penetrate into small spaces and leach contamination through direct contact with polymers, or through evaporation and condensation of solvent on the polymer surface. Heat cycling can also increase the evaporation and condensation of solvents onto polymer surfaces which are not in direct contact with the solvent.

[0041] The addition to the canister of a packet containing activated carbon has been found to remove organic contamination that is leached from polymers. Activated carbon is highly effective at removing organic contamination from liquid solvents through adsorption to the carbon surface. A packet containing activated carbon is a convenient way to passively purify solvent. The activated carbon-containing packet can remain permanently in the liquid solvent to leach from the solvent organic contamination that may have dissolved in the solvent.

[0042] The material of which the packet is made should not of course create additional contamination in the solvent. Further, the packet material must allow the solvent to penetrate and access the activated carbon, while also preventing fine carbon dust from escaping from the packet into the solvent.

[0043] A non-woven fiber packet material allows quick penetration into the packet of low surface tension solvents, such as hydrofluoroethers. Penetration of the solvent allows the carbon to adsorb organic contamination efficiently. Especially in canisters stored at or subjected to elevated temperatures, e.g., 40°C, and containing high concentrations of leached organic contamination, non-woven fiber packets are successful at removing non-volatile residues (NVR) quickly.

[0044] While packets made from a spunbond high density polyethylene fiber, such as that sold under the registered trademark TYVEK by Dupont de Nemours, Inc. of Wilmington, Delaware, is less efficient than non-woven fiber materials in allowing penetration of solvents, including HFE solvents, into the packet. Solvent eventually penetrates through the TYVEK® material packet, but it does so more slowly than through the non-woven fiber packets. However, the TYVEK® packet does not allow fine carbon particulate to escape from the packet while the non-woven fiber does allow particulates to pass from the packet into the solvent after an extended period of storage. The particulates from the non-woven fiber packets were found to be less than 0.2 micrometers in diameter, and when they enter the solvent discoloration and contamination of solvent will result.

[0045] Both the non-woven fiber material packets and the TYVEK® brand spunbond high density polyethylene fiber packets containing an activated carbon, when placed in a solvent-containing canister were successful at removing organic contamination from the solvent over time. Evaluation of both types of packets showed that an activated carbon packet prevents NVR from increasing in a canister that has polymer sites from which organic contamination can leach.

[0046] The activated carbon packet 12 is sized so it holds the appropriate amount of granulated activated carbon needed to purify the liquid contents. It also must be sized to fit loosely allowing movement of the packet within the internal confines of the fluid receptacle 1.

[0047] Gravity ensures that the loose fitting granulated activated carbon packet 12 remains positioned on the bottom of the fluid receptacle 1 regardless of which end of the receptacle 1 is oriented in the top position.

[0048] The use of granulated activated carbon (not shown) or granulated activated carbon in a packet 12 eliminates the need for liquid filtration downstream of the fluid receptacle 1. This relieves the user from the responsibility to routinely replace contaminated filters to ensure liquid purity.

[0049] Laboratory tests confirm that the addition of packets containing granulated activated carbon into the liquid contents of a container significantly reduces the presence of organic NVR in the liquid. The absorption capacity of granulated activated carbon is predicated by:

1. the volume of liquid being treated
2. the amount of organic NVR in the liquid needing treatment
3. the purity levels desired in the treated liquid.

[0050] As an example, laboratory tests consistently demonstrate that 1.7 liters of solvent with organic NVR totaling <200ppm requires about 1 gram of granulated activated carbon for effective long-term removal of organic NVR.

[0051] Laboratory test results were obtained using the following materials and procedures:

1. An activated carbon packet contains 1 gram of granulated activated carbon, derived from coconut shell.

Carbon granule particle size: 12 x 30 mesh

Packet material: Melfit BT-60; nonwoven fiber packet - sized 27 mm wide x 48 mm long supplied by Desiccare, Inc. of Las Vegas, Nevada.

Solvent weight/volume: 85 grams/1.5 fluid oz

Solvent formula tested:

30-60% by weight: Methyl Nonafluorobutyl Ether (CAS number: 163702-07-6);

30-60% by weight: Methyl Nonafluoroisobutyl Ether (CAS number: 163702-08-7);

5-10% by weight: (Z)-1-chloro-2,3,3-trifluoropropene (CAS number: 1263679-68-0);

Gas propellant: 5-10% by weight: HEPTANE (CAS number: 142-82-5).

2. Starting point; solvent organic NVR level: 160 ppm

Test Procedure: The activated carbon packet was immersed in the test solvent at room temperature and solvent NVR was tested at 24-hour intervals.

Results:

- A. The starting point organic NVR levels of 160 ppm was reduced to less than 40 ppm within 48 hours of immersion.
 - B. After 90 days immersion, the organic NVR levels remain below 40 ppm
 - C. The granulated activated carbon is selective in its absorption of organic NVR from the solvent.
 - D. No measurable degradation or changes in solvent composition or performance were found after 90 days of packet immersion.
3. The Melfit BT-60 nonwoven packet material showed very satisfactory results with respect to reducing NVR levels. Similar very satisfactory results were attained by packet materials made of spunbond high density polyethylene fiber. The spunbond high density polyethylene fiber material is preferred, however, because it has been found to be superior to the nonwoven packet material in respect of preventing fine particles of activated carbon from escaping from the packet into the solvent. This is of particular importance in cleaning fiber optic end faces where high purity of the solvent is essential for good cleaning results. The escape of fine carbon particles from packets made of the Melfit BT-60 nonwoven packet material is not acceptable for cleaning fiber optic end faces but would be satisfactory for less critical applications.

[0052] It is well known that filtration methods with granulated activated carbon involves the packaging of the activated carbon so it is contained in a closed filter housing. Liquid requiring removal of organic NVR is then run through the filter housing containing activated carbon with contaminated liquid going in, and purified liquid exiting the filter housing and sent to packaging or use. Over time, the filter needs to be changed because as volumes of liquid through the filter increase, the filter's activated carbon granules become progressively saturated with organic contaminants resulting in the filter's activated carbon contents losing its absorption capabilities. It is essential to monitor the filters' performance and change as performance degrades to ensure liquid purity levels are properly maintained.

[0053] From a packaging perspective, it is well known that the purity levels of high purity liquids will degrade over time when the high purity liquid is packaged in a container. This is because impurities are introduced into the liquid by the container and its associated components such as closures and associated closure seals. This is especially true if the closure seals are elastomer/rubber derived. It is important that packaging materials be carefully selected to minimize the introduction of impurities into the liquid. Even with careful

selection of packaging materials the impurities introduced from the packaging will become more concentrated in the liquid over time as impurities continue to be extracted from packaging.

[0054] The activated carbon immersion method described herein is believed to be novel in that the granulated activated carbon is added directly into a container at the time of packaging the liquid contents and remains permanently in the solvent until the receptacle is fully emptied of the solvent. This method provides selective absorption and highly effective long-term control of organic NVR in a closed container. This ensures that the liquid contents are at the desired purity at the time of use and eliminates the need for additional filtration at the point of use. This novel method of NVR absorption eliminates the burden of maintaining and changing downstream filters by the user because filtration is incorporated as a part of the fluid container. A fresh "filter" is supplied each time a new fluid receptacle containing a packet 12 (Figures 2A and 2B) of adsorbent or adsorbent dispersed in the liquid is installed, without the need for any additional action by the user. The packets 12 are single-use packets which are discarded with the discarded, e.g., emptied, fluid receptacle.

[0055] Figure 3 schematically shows a device in which the fluid receptacles of the present invention may be used. The device comprises a carrying case 14 having a handle 14a and a re-closable lid 14b which may be opened to insert a fluid receptacle of the present invention, receptacle 1' being shown, into carrying case 14, and then closed. A valve operating device 16 is operatively associated with the valve 9 (Figure 1C, not shown in Figure 3) located at the lower end (as viewed in Figure 3) of fluid receptacle 1'. Liquid contained in fluid receptacle 1' will under the influence of gravity be at the lower end (as viewed in Figure 3) of fluid receptacle 1' and therefore in contact with the valve at the lower end of fluid receptacle 1'. The gas bubble 11 (Figure 1C, not shown in Figure 3) will move to the upper end of fluid receptacle 1'. Actuation of a valve-operating device 16 will open the valve with which device 16 is associated to flow liquid contents of fluid receptacle 1' through a conduit 18 for exit via nozzle 18a of conduit 18. A hose (not shown) may be connected to nozzle 18 and may have a hose handle (not shown) which operates valve operating device 16..

[0056] The present invention has been described in detail with respect to specific embodiments thereof but these specific embodiments are not intended to be construed as limitations on the scope of the invention.

THE CLAIMS

What is claimed is:

1. A receptacle for storing and dispensing a single body of liquid comprises:
a closed receptacle body containing the single body of liquid, the receptacle body having a first end having a first dispensing valve thereon and an opposite second end having a second dispensing valve thereon;
the first valve being functionally identical to the second valve;
whereby such liquid may be dispensed from the receptacle through the first or second valve by opening the one of the first and second valves which is in contact with such liquid.
2. The receptacle of claim 1 wherein an adsorbent material is disposed in the liquid.
3. The receptacle of claim 1 further comprising a pressurized gas within the receptacle which forms a gas bubble defining a headspace above such liquid.
4. The receptacle of claim 3 wherein an adsorbent material is disposed as particles dispersed in the liquid.
5. The receptacle of claim 3 wherein an adsorbent material is disposed in the liquid, the adsorbent material being contained within a packet comprising a packet material which is permeable to the liquid.
6. The receptacle of claim 5 wherein the packet material comprises a liquid-permeable non-woven fiber material.
7. The receptacle of claim 5 wherein the packet material comprises a liquid-permeable spunbond high density polyethylene fiber material.
8. The receptacle of any one of claims 1, 2, 3, 4 or 5 wherein the liquid is an organic solvent suitable for cleaning fiber optic end faces.
9. The receptacle of any one of claims 3, 4 or 5 wherein the liquid comprises a solvent blend comprising:
from about 30 to about 60 weight percent methyl nonafluorobutyl ether,
from about 30 to about 60 weight percent methyl nonafluoroisobutyl ether,
from about 5 to about 10 weight percent (Z)-1-chloro-2,3,3 trifluoropropane, and
the pressurized gas comprises heptane present in the amount of from about 5 to about 10 weight percent of the weight of the solvent blend and pressurized gas.
10. The receptacle of claim 1 or claim 2 wherein the first and second valves are each female recessed stem valves.
11. The receptacle of claim 1 or claim 2 wherein the first and second valves are each male stem valves.