MULTI-DIRECTIONAL APPLICATOR WITH SHAPE RETENTION PROPERTIES

Background of the Invention

The present invention relates generally to applicators for and methods for application of fluids and fluid-like materials, and more particularly to an improved applicator for such fluids that is flexible enough to be formed into various desirable dispensing configurations without detrimentally affecting the flow of the fluid therethrough and retains its particular dispensing configuration.

Although the present invention possesses great utility in the dispensing of pressurized liquids and aerosol foams, particularly those formed from liquid polyurethane prepolymers or liquid latexes, it also has utility in the dispensing of other fluids and fluid-like materials, regardless of their chemistries and physical properties, such as adhesives, caulking compounds, cleaning compounds, lubricants, insecticides, solvents and the like. The present invention may also be utilized in the dispensing of food materials, such as pastry fillings, whipped creams and decorative icings.

For example, the aforementioned dispensing of liquid polyurethane prepolymers and latexes from pressurized containers is accomplished by way of a gas propellant or a blowing agent, that forces the liquid out of the container under pressure when a dispensing valve is actuated. Sometimes, the pressurized container includes a central dip tube that extends within and toward the bottom of the container, so that the propellant will push the liquid down to the bottom of the container, into the

dip tube and out of the dispensing valve. In such a container structure, the propellant pushes the liquid out of the container by way of the dip tube. Thus, care must be taken to ensure that the orientation of the container is such that the dip tube always is beneath the level of the liquid. If not, the propellant will escape from the container through the dip tube and frustrate the user. The use of such products is therefore restricted to a certain orientation of the container, typically a substantially vertical or upright orientation, and thus increases the difficultly in depositing such liquids in hard to reach places.

The aforementioned containers may utilize a rigid or semi-rigid straw attached to the dispensing valve through which the liquid is dispensed. The rigid dispensing straw facilitates the utilization of such containers by increasing the "reach" of the user. However, this rigid straw is not flexible and can only maintain a single, straight configuration. The user is still restricted in his application of these liquids by the need to maintain the dispensing container in its substantially upright orientation and is therefore limited in his ability to apply these liquids.

A semi-rigid dispensing straw is known and is used with the aforementioned dispensable liquids. This dispensing straw is somewhat movable by the user, but it does not hold its shape when moved and the user must use two hands in dispensing the liquid: he must use one hand to hold the container and the other hand to hold the dispensing straw while dispensing the liquid. Although somewhat bendable, the dispensing container must still be maintained in its upright orientation and one-handed

application of the liquid is impossible because the user must use his other hand to hold the dispensing straw to direct the liquid. Thus, one-handed application of such a liquid is not possible with this semi-rigid straw, and often two-handed application compromises the safety of the user, especially when the user is standing on a ladder.

Another pressurized container for the dispensing of pressurized liquids may be provided with what is known as a Clayton or a tiltable valve. This type of valve extends a short distance from the top of the container above the container and protrudes a short distance into the interior of the container. It opens when deflected and permits the passage of liquid therethrough. However, in order to discharge pressurized liquids from such a container effectively, the propellant must be maintained above the level of the liquid and the valve. Therefore, the container must always be used in a substantially upright and inverted fashion so that the propellant remains above the valve to force the liquid through the valve opening.

Even with the use of the rigid or semi-rigid dispensing straw referred to above, this type container must be kept in its upright, inverted orientation, and the user must use his two hands for certain applications of fluids. If the user moves the container while dispensing the liquid in order to reposition the dispensing straw, he may allow part or most of the propellant to escape, which will deprive the operator of the ability to dispense all of the liquid. Accordingly, although rigid and semi-rigid applicator straws may increase some of the range of dispensing of liquids on such a pressurized container, they do not overcome all of the limitations and disadvantages inherent

with the structure of their supply containers.

In yet another liquid dispensing application, the structure of the fluid supply container has been modified to correct the dispensing orientation problems described above. For example, a pressurized liquid container may be provided with an internal bag, or pouch, that is positioned within the container and which contains the dispensable liquid and which further communicates with the dispensing valve on the container. Propellant is provided in the container in the area around the pouch and the propellant acts on the bag to force the liquid out of the container through the dispensing valve. Although the internal bag effectively eliminates the loss of propellant problems referred to above, it still possess certain problems. One such problem is that such a container uses only the rigid and semi-rigid dispensing straws mentioned above, and accordingly, two-handed application is required to direct the application of the liquid. Therefore, such a container prohibits its user from one-handed application, even in hard to reach application instances. A second problem is that the internal bag structure is complex and requires increased labor to assemble, thus increasing the overall cost of the container and its dispensing assembly. Still further, when used in the dispensing of certain fluids, such as liquid polyurethane prepolymers, the solvents and/or blowing agents used with such prepolymers are chemically aggressive and are prone to attack the integrity of the bag over time. Therefore, material compatibility with such containers must be taken into account and such containers have a greatly reduced shelf life.

In still another application, and as described in U.S.

Patent No. 5,441,181, issued August 15, 1995, a pressurized liquid container is provided with an internal piston that effectively separates the container into two different compartments, one containing the liquid, and the other containing the propellant. Although effective in dispensing, this type of structure is also costly and care must be taken in the manufacture and assembly of the piston to ensure an effective seal between the piston and the container wall to prevent blow-by of the propellant into the liquid. This piston-type container is also expensive to manufacture as compared to the aforementioned dip-tube and Clayton or tiltable valve containers.

Still other attempts to provide a positionable application nozzle for a liquid container are described in the art. U. S. Patent No. 1,593,016, issued July 20, 1926 describes a segmented metal tube with a outer reinforcing wire wrapped around it. This type of construction is costly to assemble and package, and is somewhat difficult for an ordinary consumer to use.

U.S. Patent No. 5,004,128, issued April 2, 1991 describes a flexible nozzle for use on a sealant container in which a structure of the nozzle body is modified, by corrugating a portion of it so as to enable that portion of the nozzle to be manipulated. However, the interior corrugations of this type nozzle may affect the flow of the liquid through the nozzle by increasing the resistance to liquid flow, and such a nozzle will not hold its flexed shape under the pressure of the liquid being dispensed therethrough.

U.S. Patent No. 5,529,226, issued June 25, 1996 describes a flexible applicator compound of many pieces that relies upon an

external attachment ring to support it on the fluid container. This multi-piece applicator is expensive to make and assemble because of its many pieces. The pieces may come apart during attachment and frustrate the user.

The present invention is therefore directed to a flexible applicator, in the form of a hollow, flexible tube for use in the dispensing of pressurized fluids in which the applicator is capable of being manipulated into a variety of configurations and which holds its configuration so as to enable one-handed application of liquids with such an applicator, thereby facilitating the application of liquids into hard to reach places by the user and in such a manner not to affect the flow of the fluid through the applicator.

Summary of the Invention

It is a general object of the present invention to provide an improved applicator for dispensing of liquids and fluid-like materials under pressure, in which the applicator is easily formed into a dispensing position by the user and is repeatedly repositionable by the user.

It is another object of the present invention to provide an flexible applicator for dispensing fluids and fluid-like materials from a container wherein the applicator includes a flexible hollow tube having a fluid passage extending the length of the applicator and a shape-retaining member integrated with the applicator.

It is still another object of the present invention to provide a hollow, shapeable applicator for use with a dispensable fluid, the fluid being contained in a fluid supply

container having a dispensing assembly associated therewith, the applicator matable with the dispensing assembly and the applicator having a shaping element integrated therewith that permits it to be easily shaped by hand to any number of dispensing configurations, the applicator retaining its configuration when shaped and permitting the flow of fluid therethrough under pressure without altering the configuration of the fluid, thereby permitting one-handed operation by a user such that the fluid may be dispensed in hard to reach areas.

It is yet a further object of the present invention to provide an improved dispenser assembly for dispensing liquid compounds such as polyurethane prepolymers, latexes, adhesives, lubricants, sealants and the like from pressurized containers, wherein the dispenser assembly includes a dispensing body that mates with the liquid container and the dispensing assembly further having a dispensing nozzle and an actuator operatively connected to the nozzle for manipulating a valve to release a stream of fluid from the container through the nozzle, and an elongated, flexible and shapeable applicator that is engageable with the nozzle for directing the stream of liquid compound in a predesired direction, the applicator having a hollow fluid passage extending therethrough and a shape-retaining member integrated with the applicator in the form of a wire or strip or the like, the shape-retaining member extending alongside of the fluid passage therein, the shape-retaining member being flexible enough to be easily bent into a shape by a user, yet strong enough to retain the shape of the applicator under the pressure of the fluid passing through the fluid passage.

It is a still further object of the present invention to

provide a method for applying a fluid to a surface from a pressurized fluid container utilizing one hand, the method including the steps of: providing a supply of a dispensable fluid in a pressurized container; providing a dispensing assembly with a dispensing nozzle for the container for dispensing fluid from the container through the dispensing nozzle; providing a hollow applicator with a shape-retaining member integrated therein, the applicator being mateable with the dispensing assembly nozzle, the applicator having a body portion with at least one fluid passage extending lengthwise therethrough and at least one shaping element extending through the body portion generally parallel to the fluid passage thereof, the shaping element being easily deformable by bending; shaping the applicator into a predesired configuration by bending the applicator and its shaping element into the predesired configuration; placing a dispensing end of the applicator in opposition to a surface intended to receive a bead of fluid thereon from the pressurized fluid container; and, actuating the dispensing assembly to discharge the fluid from the pressurized container through the configured dispensing assembly and out of the dispensing end of the applicator.

It is yet another object of the present invention to provide shapeable applicator for dispensing fluids in which the applicator is formed from a flexible material such as plastic, and which includes a plurality of fluid passages extending therethrough, the applicator having one or more shaping elements formed as part of the applicator, the shaping elements being embedded in the applicator and extending for the length of the applicator proximate to the fluid passages thereof.

These and other objects, features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, wherein like reference numerals refer to like parts.

Brief Description of the Drawings

In the course of this detailed description, reference will be made to the accompanying drawings in which:

FIG. 1A is a schematic, sectional view of a known pressurized fluid container having a dispenser with a hollow application straw extending therefrom;

FIG. 1B is the same view as FIG. 1A, but with the container and dispenser oriented horizontally, and illustrating the level of the fluid within the dispenser;

FIG. 1C is the same view as FIG. 1A, but with the container and dispenser oriented at a downward angle and illustrating the level of the fluid within the dispenser;

FIG. 1D is a diagrammatic view of a hard to reach area presenting obstructions to the placement of liquid using the container of FIG. 1A and using two hands;

FIG. 2A is a schematic, sectional view of a second known pressurized fluid container with a dispenser that discharges its fluid in an inverted orientation;

FIG. 2B is the same view as FIG. 2A, but with the container and dispenser oriented horizontally and illustrating the level of fluid therein;

FIG. 3 is a perspective view, partially in section illustrating a third known pressurized fluid container with a dispenser;

FIG. 4 is a perspective view of a shapeable applicator constructed in accordance with the principles of the present invention, with the applicator being shaped in a particular configuration;

FIG. 5A is an elevational view of the shapeable applicator of FIG. 5 shaped into another dispensing configuration;

FIG. 5B is an elevational view of the shapeable applicator of FIG. 5 shaped into yet another dispensing configuration;

FIG 5C is an elevational view of the shapeable application of FIG. 5 shaped into a complex curve dispensing configuration;

FIG. 6 is a sectional view of the applicator of FIG. 4 taken along lines 6-6 thereof;

FIG. 6A is a sectional view of an alternate embodiment of the applicator illustrating an alternate shaping element used in association therewith;

FIG. 7 is a partial longitudinal sectional view of the applicator of FIG. 4 taken along lines 7-7 thereof;

FIG. 8 is a partially exploded view of a dispensing assembly utilizing the applicator of FIG. 4;

FIG. 8A is an exploded view of the dispensing-applicator assembly of FIG. 8;

FIG. 8B is an enlarged detail view of an alternate dispenser nozzle construction;

FIG. 9 is an elevational view of an applicator of the present invention used with another type of fluid dispenser;

FIG. 9A is an enlarged detail view of the dispensing nozzle of the fluid dispenser of FIG. 9;

FIG. 10 is a view illustrating one-handed dispensing of a liquid utilizing the shapeable applicator of FIG. 4 in

combination with a pressurized liquid supply container having a Clayton, or tiltable valve, to apply a liquid in a gap between two hard to reach surfaces close to the ground;

FIG. 11 is a view illustrating one-handed dispensing of a liquid utilizing the shapeable applicator of FIG. 4 in combination with a dip tube-type pressurized liquid supply container to apply liquid in an elevated, hard to reach area;

FIG. 12 is a perspective view of another embodiment of a shapable applicator constructed in accordance with the principles of the present invention and using two shaping elements;

FIG. 12A is a view of another embodiment of a shapeable applicator of the present invention having multiple fluid passages extending therethrough;

FIG. 12B is another view of an alternate embodiment of a shapeable applicator of the present invention having both multiple fluid passages and multiple shaping elements extending therethrough;

FIG. 13 is a view illustrating one-handed use of the applicator of the present invention with a dispenser to apply a fluid in a tight area;

FIG. 14 is a view illustrating one-handed use of the applicator of the present invention with a dispenser to applying fluid into a blind area; and,

FIG. 15 is a cross-sectional view of a combined dispensing applicator tube assembly constructed in accordance with the principles of the present invention.

Detailed Description of the Preferred Embodiments

FIGS. 1A-1C illustrates a known pressurized liquid container 20 having a supply of liquid 22 contained therein, that is typically used in the art in order to dispense a foamable latex liquid compound for sealing, insulating and other purposes. The container also includes a propellant, or blowing agent 24, and may dispense its liquid as either a liquid or a foam, typically in the form of a bead by the user.

The container 20 includes a dispenser assembly 26 mated to one end thereof which includes a dispensing nozzle 27 and an actuator 28 that opens and closes the dispensing nozzle 27. The dispensing assembly 26 of this container 20 includes an elongated tube 30, known as a "dip tube" in the art that extends from the dispensing assembly 26 to near the opposite end 31 of the container 20. The dip tube 30 has an opening 30a that is immersed beneath the level of the liquid 22 so that when the actuator 28 is moved, a valve in the dispensing assembly 26 opens and the propellant 24 will force the liquid 22 to enter the dip tube opening 30a.

In order to facilitate the use of such a container 20, a rigid applicator straw 32 may be provided to extend the reach of the dispensing nozzle. In some instances, the applicator straw used is a semi-rigid applicator straw 33 that may be bent by the operator to direct the dispensing of the liquid. Such semi-rigid applicator straws 33 do not retain their shape and must be held in one hand by the user in order to maintain their orientation, while the other hand of the user must hold the container 20 in place. The phantom lines in FIGS. 1A-1C illustrate the range of movement of the semi-rigid applicator

straw 33 and illustrate the placement of the users hands to manipulate and hold the applicator straw 33 in place.

One problem that occurs with the use of either a rigid or semi-rigid applicator straw 32, 33 involves the loss of propellant 24 from the container 20 due to the inherent orientation limitations associated with the container 20 by the user in an effort to dispense the liquid 22. It will be appreciated that loss of propellant 24 will not permit the user to dispense all of the liquid 22 from the container 20. FIG. 1B illustrates the container 20 in a horizontal orientation wherein the opening 30a of the internal dip tube 30 is raised above the level of the propellant due to the orientation of the container 20. FIG. 1C illustrates another, but angled, orientation of the container 20 wherein the dip tube opening 30a is raised above the level of the propellant 24.

From a study of these two orientations, it will be appreciated that the user is limited in the range of motion in which the container may be oriented due to the rigid or semi-rigid straw 32, 33 and the structure of the container 20. Movement of the semi-rigid straw 33 is effected in that it requires the user to use both hands in order to dispense and place the liquid. This use of both hands will, in some instances as illustrated in FIG. 1D, prevent a user from reaching the location where the liquid must be deposited. As will be appreciated from a consideration of FIG. 1D, an obstruction, shown as a pipe 38 will either prevent a user from one-handed operation of the container 20 or render two-handed operation difficult, if not impossible and dangerous, especially where the user is positioned on a ladder 39. In FIG. 1D, the

user is attempting to lay down a bead of foam sealant at the gap 80 that occurs between a sill plate 81 and the top of the foundation wall 82.

In this hard to reach area, the user is likely to move the container 20 into a more comfortable dispensing orientation such as a horizontal orientation as in FIG. 1B. If he does this and activates the dispensing assembly 26, the propellant 24 will escape rather than the liquid 22 exiting the container 20.

These limitations restrict the user's ability to dispense the liquid and also affect other container structures. Turning now to FIG. 2A, another known container is illustrated generally at 40 and contains a liquid 42 and a propellant 43 that pressurizes the liquid 42. This type of container 40 has what is known in the art as a "Clayton" or a tiltable dispensing valve 44 that projects through one end 46 of the container 40. This dispensing valve 44 includes a short dispensing nozzle 47 and a pair of actuator arms 48 extending outwardly therefrom that may be manipulated by the user's fingers. Movement of the actuator arms 48 causes the dispensing valve 44 to tilt and open. Opening of the valve 44 permits the liquid 42 to enter the valve opening 44a under the pressure of the propellant 43.

This type of container 40 has no dip tube, and hence it must be used in a substantially vertical dispensing orientation as illustrated in FIG. 2A so that the propellant 43 is always positioned above the liquid 42. A rigid applicator straw 49 or a semi-rigid applicator straw 50 that may be flexed and held in place by the user may be provided to extend the reach of the dispensing nozzle 47. When the container 40 is oriented by the user out of its preferred vertical orientation into an

orientation such as that represented in FIG. 2B, it can be seen that when the level L of the liquid 42 lies beneath the opening 44a of the dispensing valve 44, actuation of the dispensing valve 44 will result in escape of the propellant 43 from the container 40, rather than dispensing of the liquid 42. By requiring a substantial vertical dispensing orientation of the container 40, the ability to deposit a bead of liquid is greatly restricted.

FIG. 3 illustrates a third known pressurized fluid container 60 as described in U.S. Patent 5,441,181, issued August 15, 1995. This container 60 has a supply of dispensable liquid 61 contained therein and a propellant supply 62. The liquid 61 and propellant 62 are separated from each other by a piston 64 which may include an annular skirt 65 that extends around the edge 66 of the piston 64 into contact with the interior surface 68 of the container wall 69. A dispensing valve 70 shown in the form of a conventional spray head 72 is positioned at one end of the container 60 and communicates with the interior of the container 60. The container 60 may also be provided with a rigid applicator straw 73 or a semi-rigid applicator straw 74.

As noted in the aforementioned '181 patent, with such a piston type container structure, care must be taken in the design and assembly of the container to ensure that the piston 64 maintains a secure and reliable seal with the container wall 69. Problems with this seal will result in propellant 62 blowing by the piston 64, through the liquid 61 and out the dispensing valve. Notwithstanding the blow-by problem, such a container 60 is also expensive to manufacture and requires

additional labor in assembly, than the previously-discussed containers and thereby increases the overall cost thereof.

The present invention provides a dispensing applicator that overcomes the aforementioned disadvantages and limitations and increases the range of motion of liquid application significantly and at a greatly reduced cost. Turning now to FIG. 4, a flexible and shapeable (or resiliently deformable) applicator constructed in accordance with the principles of the present invention is shown generally at 100. The applicator 100 is elongated and hollow, having a central fluid passage 101 that extends for the length of the applicator 100 and which is surrounded by a continuous sidewall 102. A shaping element 103, illustrated in the preferred embodiment as an elongated metal wire 104 is embedded in a portion of the applicator sidewall 102 and extends for the length of the applicator 100 in a generally parallel fashion to the internal fluid passage 101 of the applicator 100.

In an important aspect of the present invention, the applicator 100 may be extruded from a flexible material such as plastic, and preferably from a flexible plastic such as polyvinylychloride (flexible PVC) that is easily extruded around the wire 104 to avoid the increased costs associated with molding of the applicator 100. The presence of the wire as part of the applicator 100 permits the applicator 100 to be readily positioned by its user in whatever shape or configuration desired to apply a pressurized fluid and repositioned, if necessary, for a different, but subsequent application of fluid. Moreover, the location of the shaping wire 104 within the sidewall 102 of the applicator 100 permits the fluid passage 101

to have a substantially uniform cross-section that promotes the flow of a fluid therethrough rather than inhibits the flow therethrough were the shaping wire to be located within the central passage 101 of the applicator 100.

The shaping element 103 permits the applicator to be formed and re-formed into any desired configuration by the user to thereby increase the range of motion of the dispensing assembly of the pressurized container with which it is used. The shaping wire 104 also beneficially holds the positioned shape of the applicator 100 which permits the user to now operate the pressurized container with one hand and move the container along an intended dispensing surface in the preferred container orientation, such as the vertical orientation of the Clayton, or tiltable valve, container illustrated in FIG. 10, and the vertical orientation of the dip tube style container illustrated in FIG. 11. Thus, with the use of applicators 100 of the present invention, the detrimental escape of propellant is avoided and the user is able to reach, using only one hand, cracks, gaps, crevices and substrates, in hard to reach places and subsequently dispense the liquid from the pressurized container in its preferred dispensing orientation.

By extruding the applicator sidewall 102 around the shaping element 103 (and also by extruding the shaping element 103 itself simultaneously with the sidewall 102), the shaping wire 103 is integrated within the applicator 100 and the resultant applicator is of one-piece construction. Preferred results have been obtained using a shaping wire 103 having a diameter of about 0.040 inches and an applicator 100 having a diameter of about 0.250 inches and with an internal passage diameter of

about 0.170 inches. It will be understood that these dimensions are merely exemplary and that the flexibility of the applicator 100 may be controlled by utilizing a shaping wire 103 having a greater diameter or by utilizing a second shaping wire 103a as illustrated in FIG. 12. Additionally, the shaping element 103 used need not be a round wire 104. As illustrated in FIG. 6A, a wide strip-like shaping element 105, made from flat wire or the like may also be used. The shaping element may also utilize a high density, but pliable plastic material that has shape memory and retention characteristics.

This single-piece applicator has an increased range of motion over the prior art rigid and semi-rigid dispensing straws discussed above and illustrated in FIGS. 1-3 and has the same, if not better, range of motion thereof. FIG. 5A illustrates another configuration into which the applicator 100 may be formed having two bends formed therein. FIG. 5B illustrates a more complex configuration utilizing three major bends and a minor bend toward the applicator exit at the right of the Figure. FIG. 5C illustrates an applicator 100 formed into a complex curve having multiple, curved bends formed therein.

The ability to shape the applicator 100 permits the one-handed operation of the liquid containers as illustrated in FIG. 13 and, as illustrated in FIG. 14, where the applicator tip 109 is bent, the liquid may be distributed to areas through penetrations, such as in the open space 150 behind an electrical junction box 151 as illustrated. The user merely needs to shape the tip 109 into a desired configuration, insert it through a hole 152 and turn the container while dispensing to fill the open area 150 behind the junction box 151.

The use of a single piece structure also affords a significant cost savings compared to the aforementioned two-to three-piece structures especially where the dispenser is intended for the ordinary consumer market. Additionally, because of its one-piece nature, it neither requires prior assembly to the nozzle of the dispensing assembly, nor manual insertion into the container packaging. The insertion of the applicator 100 during assembly of container packages may be automated, thereby resulting in a savings as to the overall cost of the container and its dispensing assembly.

As best illustrated in FIG. 8, the shapeable applicator 100 is applied directly to the end 110 of the dispensing nozzle 112 of a dispensing assembly 113 that is applied to the pressurized container 115. In this regard, the dispenser nozzle 112 may have a reduced diameter section that is equal to or slightly larger than the inner diameter D of the applicator 100 shown in FIG. 6, or as shown in FIG. 8, the outer diameter of the nozzle 112 may be slightly large than the inner diameter of the applicator 100 in order to provide a slight interference fit between the two components. The dispensing assembly 113 may include a hollow recess 117 that surrounds the dispensing nozzle 112 and which is formed within the head portion 118 of the dispensing assembly 113. This recess 117 receives one end 120 of the applicator 100 and the sides of the applicator 100 in this area fit against the walls of the dispensing assembly head portion 118.

As illustrated in FIG. 8A, the dispensing assembly 113 includes a housing or head portion 118, that is adapted to fit on the top of a fluid container 115. The housing 118 contains a

dispensing nozzle 112 that has a hollow horizontal portion 122 that communicates with a hollow vertical portion 123, the end 124 of which communicates directly with the valve on the fluid container 115. The nozzle 112 is supported within an actuator member 125 that has end clip portions 126 formed therewith which are engageable with an internal recess 127 of the dispenser housing 118. The engagement between the end clip portions 126 and the housing 118 permits the actuator member 125 to move, or rock up and down, around the end clip portions 126. A trigger 128 is formed on the actuator member 125 in position to be engaged by a user's fingers. Depressing the trigger 128 will move the actuator member 125 down which in turn will move the vertical tube portion 123 of the nozzle 112 into actuating contact with the container valve, thereby permitting the flow of fluid through the valve, the dispensing nozzle 112 and the applicator tube 100.

FIG. 8B illustrates and alternate dispensing nozzle construction. In this structure, the dispensing head 118' has a recess, or bore 117' formed therein and at the seat of the bore 117' is located the opening 116' of the dispensing nozzle 112'. The end 120' of the applicator 100' is fit into the bore 117' and engages it with an interference-type fit.

Similarly, as illustrated in FIG. 10, the applicator 100 may be directly attached to the end of a dispensing nozzle 120 utilizing a Clayton-type valve arrangement. The inherent flexibility of the plastic sidewall 102 of the applicator 100 will permit it to be expanded slightly to fit onto the dispensing nozzle 112 with an interference fit. Still further, applicators 100 of the present invention may be used with other

fluid dispensing devices, such as the hand-held dispensing wand 140 illustrated in FIG. 9. Such a dispensing wand 140 includes an elongated, hollow body portion 142, with an actuating lever 144, and a dispensing nozzle 146 attached to the end of the dispensing body 142. As shown in FIG. 9A, the dispensing nozzle 146 may be of machined construction, and include a plurality of circular ribs 148 formed thereon which provide a series of interference surfaces that engage the inner surface of the applicator sidewall 101.

The shapeability of the applicator 100 of the present invention permits a user to rely upon one-handed dispensing of fluids in almost any hard to reach areas. For example, as illustrated in FIG. 13, the applicator 100 is bent into a somewhat Z-shaped configuration and applied to a supply container 130 that contains a liquid, such as a latex sealing compound. Although a pipe 131 presents an obstruction to clear access to a gap 132 formed between a sill plate 133, a ceiling joist 134 and a foundation wall 135, the shapeable applicator 100 permits a user merely to hold the supply container in one hand and inject the liquid sealant into the gap 132 because the applicator may be bent into a shape where it passes around the obstruction 131 and the discharge end 138 reaches into the gap 132 for sealing. The applicator 100 holds its shape and therefore two-handed application is eliminated.

Still further, although the present invention has been largely described in terms of a single passage applicator, other styles of applicators, such as those displayed in FIGS. 12A and 12B, may be used. The applicator 160 of FIG. 12A has two fluid passages, or lumens 161 that extend for the length of its body

portion 162. One shaping element 163 is provided in the body portion between the two fluid passages 161. FIG. 12B illustrates an applicator 150 that demonstrates the use of multiple fluid passages 151 and multiple shaping elements 152 associated therewith. Such constructions would be suitable in application of two component materials where mixing of the components occurs at the end tips of the fluid passages or in instances where the fluid like material must be applied with two different colors, such as decorative cake icing. Additionally, the use of a multi-passage applicator tube 160, such as that illustrated in FIG. 12A permits the application of two beads of liquid onto a substrate or into a gap, which may be the preferred manner of application when using an expandable material such as either a formable latex or a formable polyurethane prepolymer. The two passages 161 will deposit two leads that may grow into each other using less foaming pressure.

FIG. 15 illustrates yet another embodiment of an applicator assembly 165 constructed in accordance with the principles of the present invention. In this embodiment, the applicator assembly 165 is a one-piece molded assembly with a hollow body portion 166 and applicator tube portion 172 integrated together. Such an applicator assembly may be particularly useful with fluid supply containers having a Clayton, or tiltable valve, such as that illustrated in FIG. 2A, but is also useful on other style of fluid containers. The hollow body portion includes a threaded interior portion 167 that mates with and is engageable with the stem portion 168 of a Clayton, or tiltable valve 169, of a fluid supply container 170.

An elongated, flexible applicator tube portion 172 is

integrally formed with the applicator assembly body portion 166. The applicator tube 172 has an internal fluid passage 173 that communicates with the interior portion 167 so that a continuous fluid passage is defined from the entry end 175 to the exit end 177. A manipulation pad, or member 179, may be positioned in proximity to the point where the applicator tube 172 transitions to be hollow body portion 166. A user may rest his finger or fingers on the manipulation pod 179 and exert pressure thereon to move the valve stem 168 by tipping it or bending it. The applicator tube portion 172 has, similar to the other embodiments, a shaping element 180 formed therein. The applicator tube portion 172 may be shaped and re-shaped into a variety of different dispensing configurations. Such a structure may be molded together as a one-piece, integral assembly that may be dropped into a packaging carton that holds the fluid supply container 170. Such a one-piece structure may also be used or other type of fluid supply containers.

Although the prior description has been set forth largely in terms of use with a pressurized container, it will be appreciated that the applicators of the present invention may also be used with "squeeze-type" fluid supply containers wherein the user squeezes the containers in order to dispense the fluid from the container under pressure. In such applications, the applicator tube may be shaped and reshaped by the user and then used to dispense the fluid in a one-handed manner where the one hand exerts the required pressure on the fluid supply container and the applicator retains its dispensing configuration under the dispensing pressure.

While the preferred embodiment of the invention have been

shown and described, it will be apparent to those skilled in the art that changes and modifications may be made therein without departing from the spirit of the invention, the scope of which is defined by the appended claims. For example, although the present invention has been described in terms of pressurized containers for particular fluids such as the liquid polyurethane prepolymers and latexes mentioned above, the present invention is believed to have equal utility in the application of other fluids, such as lubricants, sealants and the like.

CLAIMS:

1. A method for dispensing a fluid under pressure from a supply container, comprising the steps of:

providing a supply container that can be held in one hand, the supply container containing a supply of a dispensable fluid and a propellant therein, said supply container having a valve for releasing said fluid under pressure from said propellant from said supply container, said supply container further including a dispensing assembly that actuates the valve to release fluid under pressure from said supply container through said valve and through said dispensing assembly;

providing an elongated applicator that is shapeable into many different configurations, the applicator including an elongated hollow, tubular member having opposing first and second ends, said applicator further having a fluid passage extending therethrough between said first and second ends, said applicator having a first shaping element integrally formed therewith, said first shaping element being flexible enough so as to be bent into and out of said different configurations and strong enough to retain said configurations once bent;

engaging said applicator first end with said dispensing assembly so as to provide a continuous fluid path from said valve through said dispensing assembly and to said applicator second end;

shaping said applicator into a desired configuration in order to dispense said fluid onto a surface by bending said applicator into a desired dispensing configuration

while keeping said supply container in a dispensing orientation and actuating said valve to dispense said fluid through said applicator.

2. The method of claim 1, wherein said applicator further includes a second shaping element integrally formed therewith that extends between said applicator first and second ends.

3. The method of claim 1, wherein said fluid is a one-component liquid polyurethane prepolymer.

4. The method of claim 1, wherein said fluid is a latex polymer.

5. The method of claim 2, wherein said applicator includes a continuous sidewall surrounding said fluid passage and said first and second shaping elements are embedded in said sidewall.

6. The method of claim 1, wherein said applicator includes at least one additional fluid passage extending between said applicator first and second ends.

7. The method of claim 5, wherein said applicator includes a second shaping element formed therewith and extending between said applicator first and second ends.

8. The method of claim 1, wherein said valve is a tiltable

valve and supply container must be maintained in a substantially inverted configuration in order to dispense said fluid therefrom without loss of said propellant from said supply container and said applicator may be bent into a configuration that permits one-handed dispensing of said fluid in hard to reach dispensing areas while maintaining said supply container in said substantially inverted configuration.

9. The method of claim 1, wherein said supply container includes an internal dip tube immersed beneath the level of said fluid in said supply container and said supply container must be maintained in a substantially vertical configuration in order to dispense said fluid therefrom without loss of said propellant from said supply container and said applicator may be bent into a configuration that permits one-handed dispensing of said fluid in hard to reach dispensing areas while maintaining said supply container in said substantially vertical configuration.

10. The method of claim 1, wherein said first shaping element includes an elongated wire.

11. The method of claim 1, wherein said first shaping element includes an elongated metal strip.

12. The method of claim 1, wherein said dispensing assembly includes a hollow dispensing nozzle and said applicator engages an exterior surface of said dispensing nozzle.

13. The method of claim 1, wherein said dispensing assembly includes a dispensing nozzle and said applicator engages said dispensing assembly such that said applicator fluid passage is aligned with said dispensing nozzle.

14. A method of applying a dispensable fluid from a pressurized supply, comprising the steps of:

providing a pressurized supply of said fluid in a fluid container, the fluid container having a valve assembly connected thereto;

applying a dispensing assembly to the fluid container and to the dispensing assembly;

providing a shapeable applicator tube for engaging said dispensing assembly, the applicator tube having an internal fluid passage extending lengthwise therethrough, said applicator further having a shaping element embedded within a portion of said applicator tube and extending lengthwise through said applicator tube, said shaping element being bendable into a first shape to form a first dispensing configuration for said applicator tube and retaining said first dispensing configuration, said shaping element being further rebendable into a variety of shapes to form other dispensing configurations;

engaging said applicator tube to said dispensing assembly such that said applicator internal fluid passage is mated to said dispensing assembly to provide a path for said fluid to exit from said fluid container through said dispensing assembly and through said applicator internal fluid passage;

bending said applicator into said first dispensing configuration, said first dispensing configuration permitting one-handed dispensing of fluid from said fluid container, while maintaining said fluid container in a predetermined dispensing configuration.

15. The method of claim 14, wherein said applicator tube includes a second internal fluid passage extending therethrough.

16. The method of claim 14, wherein said applicator tube includes a second shaping element extending therethrough, said second shaping element also being bendable and rebendable into a variety of shapes.

17. A dispensing assembly for mating to a fluid supply container, the fluid supply container having a dispensing valve operatively connected to said fluid supply container, the dispensing valve opening when moved and providing a dispensing path by which said fluid may exit from said fluid supply container under pressure, the dispensing assembly comprising, in combination:

a dispensing nozzle for connection to said dispensing valve, the nozzle having two opposing ends and an interior fluid passage extending therethrough between the two opposing ends one of said ends being adapted to mate with said dispensing valve and the other of said two ends being adapted to discharge said fluid upon movement of said dispensing valve; and,

an elongated, shapeable applicator tube having a first internal fluid passage extending therethrough between two opposing ends, one of said ends being large enough to engage said dispensing nozzle other end in a manner so as to provide a fluid tight connection between said dispensing nozzle and said applicator tube, said applicator tube including a shaping element formed therein and extending the length of said applicator tube between said two ends thereof, said shaping element being deformable under exterior pressure applied thereto by a user, said applicator tube being flexible so as to adopt the deformed shape of said shaping element to thereby form a predetermined dispensing configuration, said shaping element being deformable into a plurality of different configurations.

18. The dispensing assembly of claim 17, further including a housing adapted to engage an end of said fluid supply container in opposition to said dispensing valve, said dispensing nozzle being held within said housing so that said dispensing nozzle other end protrudes out of said housing, said dispensing assembly further including a trigger member mounted to said housing and operatively associated with said dispensing nozzle, whereby manipulation of said trigger member moves said dispensing valve and thereby opens said fluid container so that fluid therein may exit therefrom via said dispensing nozzle and out of said applicator tube.

19. The dispensing assembly of claim 17, wherein said applicator tube includes, at one end thereof, means for engaging said dispensing nozzle.

20. The dispensing assembly of claim 19, wherein said applicator tube dispensing nozzle engagement means includes an annular skirt integrally formed with said applicator tube, the annular skirt engaging the exterior surface of said dispensing nozzle.

21. The dispensing assembly of claim 17, wherein said applicator tube includes a second shaping element formed therein, said first and second shaping elements being spaced apart from each other, said second shaping element also being deformable into different configurations.

22. The dispensing assembly of claim 17, wherein said applicator tube includes a second, internal fluid passage extending therethrough.

23. The dispensing assembly of claim 17, wherein said dispensing nozzle includes a plurality of projections extending up from its exterior surface and said applicator tube being flexible enough to extend over said projections when said applicator tube is pushed onto said dispensing nozzle, said projections serving to frictionally engage an interior surface of said applicator tube fluid passage and retain said applicator tube on said dispensing nozzle.

24. A low-cost, applicator assembly for applying a fluid from a container having a pressurized supply of fluid therein, said fluid being pressurized by a propellant contained within said fluid container and said fluid container having a valve that dispenses fluid from said container when actuated when said fluid container is in a preferred orientation and said valve dispensing propellant rather than said fluid when actuated when said fluid container is in an unpreferred orientation, the applicator assembly including:

an actuator assembly for mounting on said fluid container and mating with said fluid container valve, the actuator assembly having an actuator for opening and closing said valve when force is applied to the actuator by a user of said applicator assembly, said actuator assembly having a nozzle operatively connected to said actuator, the nozzle having a fluid passage that communicates with said valve to provide a fluid passage from said fluid container through said nozzle, said applicator assembly further including an elongated flexible and shapeable applicator tube having first and second opposite ends, said applicator tube including an internal fluid passage extending therethrough between said first and second ends thereof, said applicator tube first end being engageable with said nozzle such that said applicator tube fluid passage is joined to said nozzle fluid passage, said applicator tube further having a shaping element integrally formed therewith and aligned with said nozzle, said shaping element being repeatedly shapable into a variety of

configurations, said applicator tube adopting said configuration without obstructing said applicator tube fluid passage, whereby a user may operate said applicator assembly with one hand to dispense said fluid from said fluid container into hard to reach areas while permitting said user to maintain said fluid container in said preferred orientation.

25. A shapeable dispenser for attaching to a fluid supply container and for dispensing fluid from the fluid supply container, said fluid supply container having a dispensing end and passage through which said fluid may be dispensed comprising:

a base portion for engaging said fluid supply container dispensing end and an elongated application portion formed integrally with the base portion, the application portion and base portion having a continuous and common fluid passage extending axially therethrough, said application portion further including a shaping element formed therewith and extending for substantially the entire length of said application tube portion and having a configuration that approximates that of said shaping element, said shaping element being shapeable and re-shapeable into a variety of configurations by a user and said application tube portion adopting said variety of configurations without obstructing said fluid passage, said shaping element retaining said application tube portion in its configuration, even under pressure of flow of fluid from said fluid supply container through said fluid

passage.

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26. The dispenser of claim 25, wherein said fluid supply container is a pressurized fluid supply container.

27. The dispenser of claim 25, wherein said base portion has a hollow interior portion that is threaded and said fluid supply container dispensing end having an exterior threaded portion, said base portion interior portion and said dispensing end threaded portion being engageable with each other.

28. The dispenser of claim 25, further including a manipulating member formed thereon that accommodates the finger of a user.

29. The dispenser of claim 25, wherein said application portion has a continuous sidewall that encircles said fluid passage and said shaping element is embedded within said side wall.