Aug. 17, 1965 B. L. LEVINSON ETAL 3,200,994

POSITIVE-PRESSURE CONTROLLED-ATMOSPHERE LIQUID DISPENSER

Filed April 16, 1963 3 Sheets-Sheet 1

FIG. 1

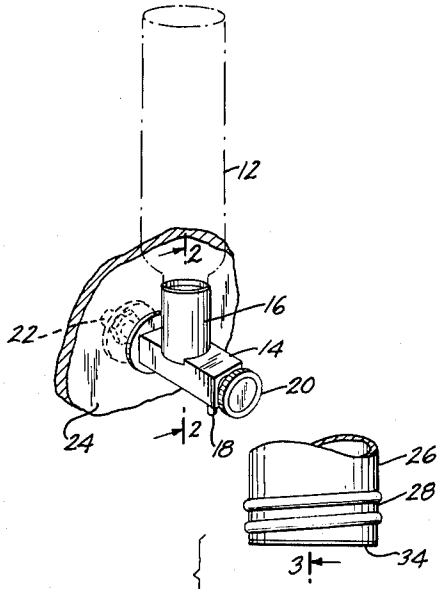


FIG. 3

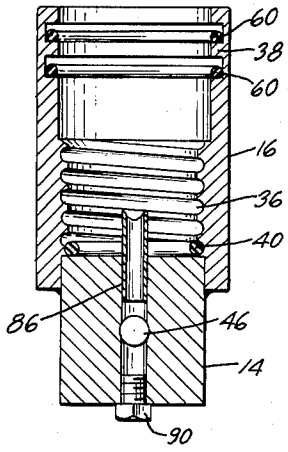
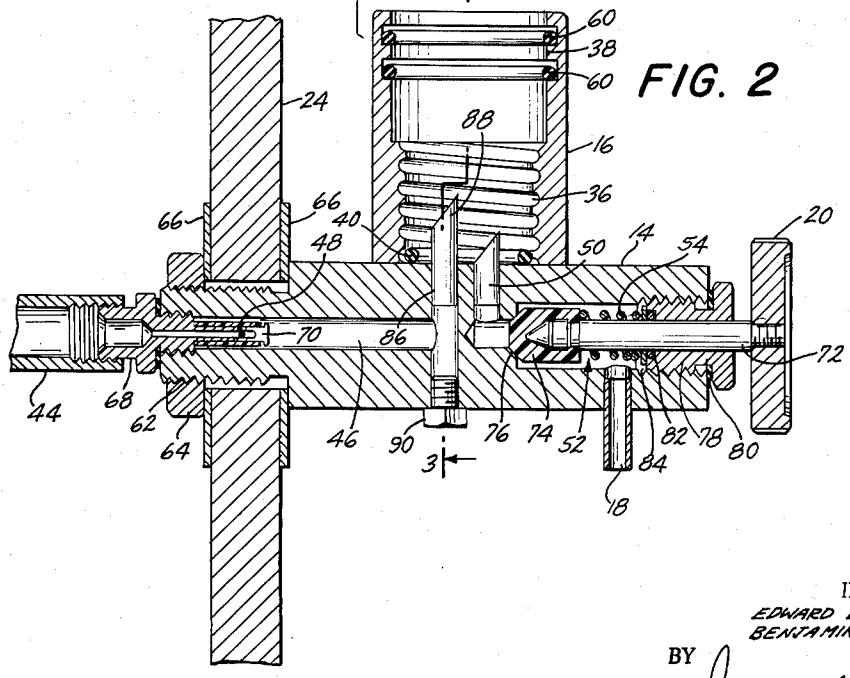


FIG. 2



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Filed April 16, 1963 3 Sheets-Sheet 2

FIG. 4

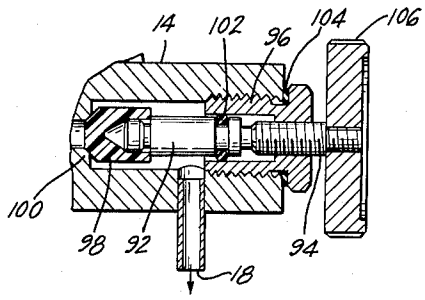


FIG. 5

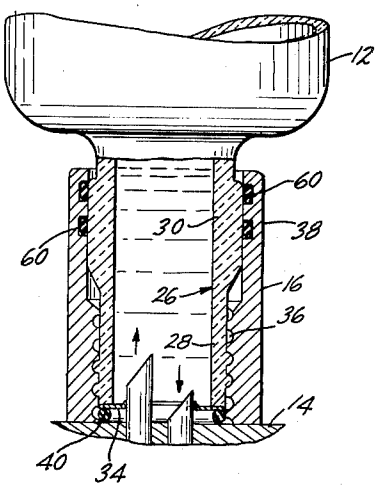


FIG. 6

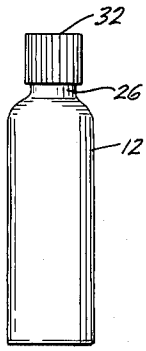


FIG. 7

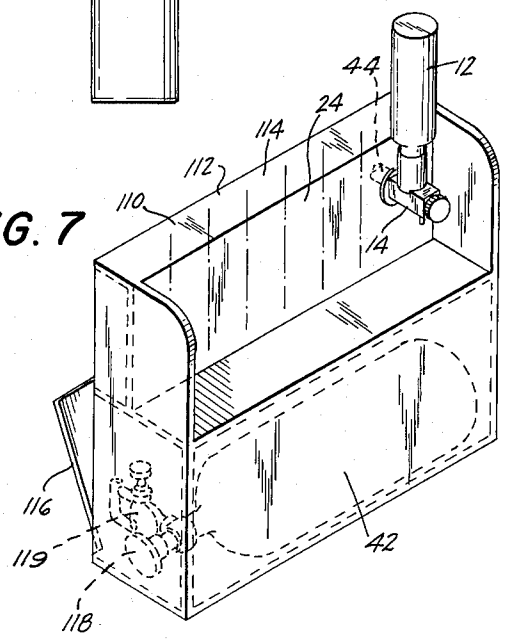
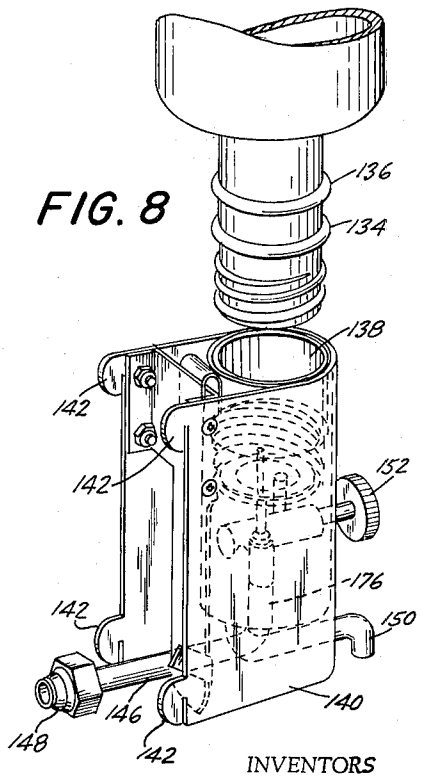


FIG. 8



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Filed April 16, 1963 3 Sheets-Sheet 3

FIG. 9

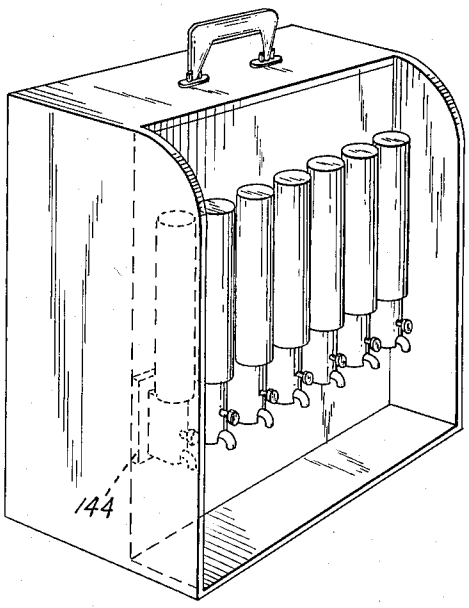


FIG. 10

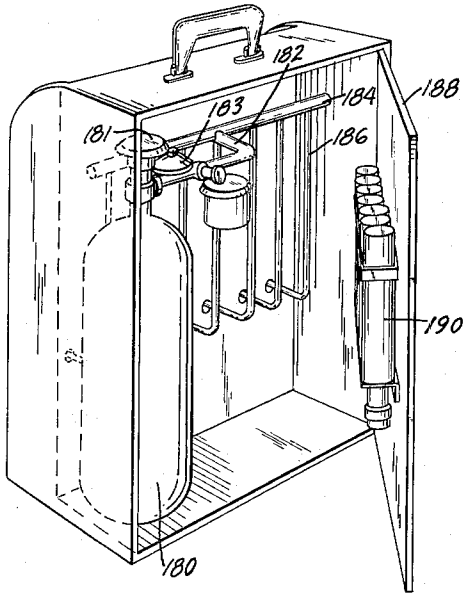


FIG. 13

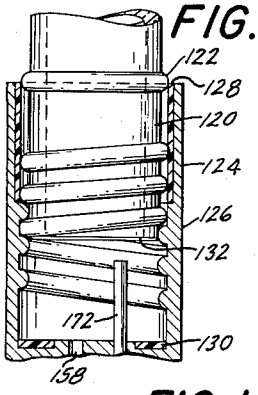


FIG. 11

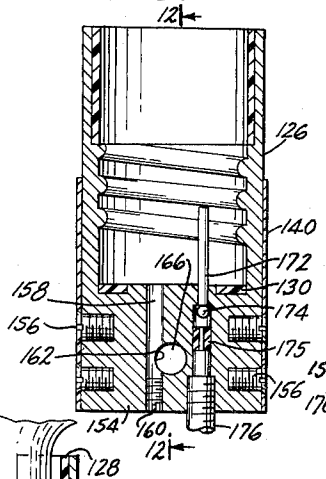


FIG. 12

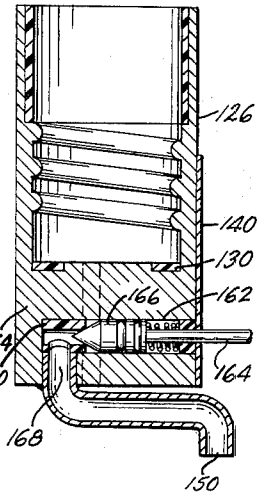
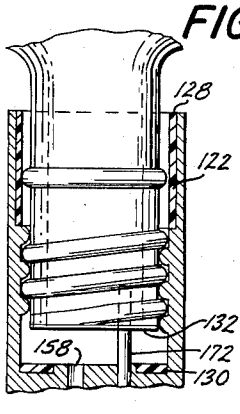


FIG. 14



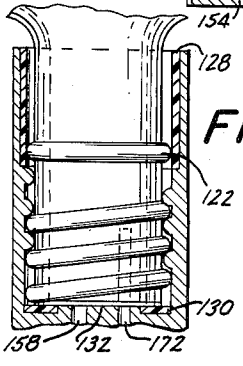


FIG. 15

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3,200,994

POSITIVE-PRESSURE CONTROLLED-ATMOSPHERE LIQUID DISPENSER

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Filed Apr. 16, 1963, Ser. No. 273,495
16 Claims. (Cl. 222—82)

This invention relates to liquid dispensers, and more particularly to such a dispenser for handling a liquid which is sensitive to exposure to air.

The general object of the present invention is to improve bulk liquid dispensers. A more particular object is to provide a dispenser in which the liquid is exposed to a desired or controlled atmosphere, usually an inert gas.

A further object is to provide a dispenser in which the liquid and gas are under positive pressure so that any leakage is outward, thereby further guarding against contamination of the liquid in the dispenser.

The liquid is supplied in a bottle having a threaded neck receiving a threaded cap, and the end of the neck is additionally sealed by means of an easily penetrable membrane. The threaded cap serves primarily for physical protection of the membrane until the bottle is ready for use. In accordance with a feature and object of the invention, the bottle is provided with a long neck, and the bottle and a bottle holder receiving the same are each provided with a slip seal part and a pressure seal part, the slip seal taking effect before penetration of the membrane, and long before the pressure seal would be able to take effect.

The invention is here shown applied to a dispenser for hair dyes for use in beauty parlors, although the invention is also useful in medical, chemical, or other industries dealing with a liquid which must not be exposed to oxygen or air. The usual hair dye is such a liquid, and it is therefore packaged in small one-ounce or two-ounce packages, because once opened the dye deteriorates. This is particularly wasteful when seeking to mix different colors, because only a small part of each package is used, and the rest must be discarded.

One specific object of the present invention is to overcome this difficulty, and to provide a dispenser for hair dyes. The dispenser preferably includes an array or bank of bottles containing dyes of different shades or colors, each bottle having its own dispensing spout and valve, but all of the bottles preferably being supplied with an inert gas from a single tank.

To accomplish the forgoing objects, and other more specific objects which will hereinafter appear, our invention resides in the liquid dispenser elements and their relation one to another, as are hereinfater more particularly described in the following specification. The specification is accompanied by drawings in which:

FIG. 1 is a fragmentary perspective view showing a single dispensing unit;

FIG. 2 is a vertical section drawn to larger scale;

FIG. 3 is a transverse section taken approximately in the plane of the stepped line 3—3 of FIG. 2;

FIG. 4 is a fragmentary section corresponding to the right end of FIG. 2, but showing a different type of control valve;

FIG. 5 is a section corresponding to the middle or socket portion of FIG. 2, and shows the relation of the parts after a bottle has been screwed all the way into the socket;

FIG. 6 shows a capped bottle, drawn to small scale;

FIG. 7 is a perspective view explanatory of how a bank or row of dispensers may be mounted on a panel over a gas tank;

FIG. 8 is a perspective view showing a different form of holder and bottle neck;

FIG. 9 is a perspective view showing a different type of cabinet, equipped with a bank of dispensers of the type shown in FIG. 8;

FIG. 10 is a perspective view looking toward the rear of the cabinet with its back open;

FIG. 11 is a vertical section through a holder generally like that shown in FIG. 8;

FIG. 12 is a section taken approximately in the plane of the line 12—12 of FIG. 11; and

FIGS. 13, 14 and 15 show successive stages in the application of a bottle to the holder of FIGS. 11 and 12.

Referring to the drawing, and more particularly to FIG. 1, the dispenser comprises a bottle 12 having a relatively long neck which is received in a holder 14 having a socket 16. The liquid is dispensed from a spout 18 under the control of a handle or knob 20. There is provision for a gas connection 22 inside a panel 24, through which panel the holder passes and on which it is mounted.

Referring now to FIG. 5, the bottle 12 has a long neck 26, with a threaded portion 28 at the end, and with a slip seal portion 30 which is larger in diameter than the thread and which is located between the threaded portion and the body of the bottle. Referring to FIG. 6, the bottle 12 and neck 26 are initially capped by means of a conventional protective screw cap 32. When this cap is removed the bottle remains sealed because the end of the neck is initially provided with a thin, easily penetrable membrane shown at 34 in FIG. 2, and a remnant of which is shown in FIG. 5.

The socket 16 (FIGS. 2 and 5) has a threaded part 36, and a slip seal part 38. The base of the socket has a gasket 40 which receives the end of the neck with a pressure seal. The parts are so proportioned in axial direction that the slip seal parts 30 and 38 provide a seal as the bottle is being put into the socket, and well before the neck end reaches the gasket 40. The slip seal should and does come into effect before the membrane 34 is penetrated.

Referring now to FIG. 7, there is a tank 42 of a gas which is inert and/or compatible with the liquid being dispensed. In this case the gas is nitrogen. The gas inlet tube is indicated at 44 (FIG. 2) and 46, and provides connection from the gas tank into the base of the socket 16. A check valve 48 is located in the inlet tube 46. There is also a liquid discharge tube 50 leading from the base of the socket 16 to the spout 18. A dispensing valve 52 is disposed between the discharge tube 50 and the spout 18. The valve shown in FIG. 2 is a pull valve, and is operated by pulling the knob 20 against a compression spring 54.

Considering the arrangement in greater detail, the present dispenser is intended for use with hair dyes. The bottle 12 is made of glass, and in the particular case shown is about 2½ inches in diameter and ten inches long and holds sixteen ounces. The membrane 34 is made of metal foil. The holder is made of stainless steel.

The neck of the bottle is made cylindrical at the slip seal portion 30 (FIG. 5), and the socket part 38 is grooved to receive and hold two spaced O rings 60. One slip seal part is cylindrical, and the other has annular rings or beads for slidably engaging the cylindrical part. The beads have the same diameter and in that sense both of the slip seal parts are effectively of uniform diameter to provide a slip seal in axial direction. The bottom gasket 40 also may be an O ring, but in such case it is of smaller diameter than the O rings 60. The O rings are preferably made of a product called Viton, commercially available from E. I. du Pont de Nemours Company. However, the O rings also may be made of Teflon,

but in such case are preferably cored with rubber to make the same more resilient. When Viton is employed it preferably has 70 durometer hardness. Both Viton and Teflon resist attack by the hair dye.

Referring to FIG. 2, the holder in this case comprises a horizontal member **14**, the rear end of which has means for mounting the same on the upright panel **24**. In this case the rear end is necked and externally threaded at **62**, and receives a nut **64**. Metal washers **66** may be employed for appearance and strength. The rear end may be internally threaded to receive a nipple **68** having a slender tubular extension **70**, which is surrounded by an expansible tube **48** which acts as a check valve to prevent flow of liquid back through a nipple **68**. The outer end of the nipple receives a tube or pipe **44** which extends to the gas tank.

The spout **18** depends from the forward portion of the horizontal member **14**, and the socket **16** is mounted on the top center of part **14**, the parts preferably being made of stainless steel, and being welded or brazed together. The valve has a horizontal valve stem **72**, the inner end of which carries a plug **74** which is made of a plastics material which resists attack by the liquid. In the present case the plug is made of Teflon. It has a frusto conical end which bears against a mating valve seat **76**. The valve stem passes through a bushing **78** which is threaded into the forward end of member **14**, and is sealed by a gasket **80**. The valve stem is itself sealed by an O ring or other packing **82**, compressed by the main compressing spring **54**, a suitable washer **84** being interposed between the spring and the packing.

The horizontal gas inlet passage **46** is continued vertically by means of a passage and a pipe **86**, the upper end of which serves to rupture the membrane. For this purpose it may be sloped as shown at **88**. The vertical passage is preferably extended downward for ease in manufacture and for cleaning purposes, and in such case the lower end is closed by a suitable plug **90**.

Pipe **86** is preferably higher than discharge pipe **50**, so that entering gas will rise to the top of the bottle and not enter the pipe **50**. The upper end of pipe **50** need not be sloped because the membrane is previously ruptured by the longer pipe **86**, but it may be sloped if desired.

The check valve tube **48** is made of a yieldable material appropriate for the liquid being handled, and in the present case may be made of Viton. When a new bottle is being loaded into the dispenser, it is started down until the slip seal takes effect but the membrane is not broken. Gas is then supplied. The knob **20** is pulled to permit a nitrogen flow which purges the space in the socket and valve, etc. The knob is released and the bottle then screwed all the way into the socket.

A modified form of valve is shown in FIG. 4 which figure corresponds to the right end of FIG. 2. In FIG. 4 the forward end of the horizontal part **14** again has a spout **18** and a horizontal valve stem **92**, but in this case the valve is a screw valve instead of a pull valve. More specifically, the valve stem **92** is threaded at **94** and is received in a bushing **96** which is internally as well as externally threaded. The inner end of the valve stem again has a valve plug **98**, which is preferably made of Teflon, and which engages a valve seat **100**. The valve stem is sealed within bushing **96** by means of an O ring **102**, and the bushing is itself sealed by a gasket **104**. The knob or handle **106** may be like that previously shown, but it is manipulated by rotation instead of being pulled. The pull valve of FIG. 2 has the advantage that it cannot be left on. The screw valve of FIG. 4 has the advantage of more gradual and precise flow control.

Referring now to FIG. 7, the complete dispenser in this case has seven bottles, one of which is indicated at **12**, and the other six of which are located on the six center lines indicated at **110**, **112**, **114**, etc. The bottles are alike, and are received in like holders, all of which are mounted on a single panel **24**. The gas tank **42** is housed beneath the holders, and access is gained by an openable back **116**. It will be understood that the tank **42** may be a conventional commercially available nitrogen tank provided with the customary valve **118**, which facilitates connection of a new tank to a manifold or distribution pipe which leads to all of the holders **14**. The pressure may be regulated by a conventional pressure regulator **119**.

As so far described, the slip seal portion of the neck is cylindrical and is received in O rings, but this is not essential. Another form of the invention is illustrated in FIGS. 13, 14 and 15 in which the neck **120** of the glass bottle has one or more annular beads **122** which have a rounded exterior configuration. The slip seal portion **124** of the socket **126** is lined with a cylinder **128** of a yieldable non-corrosive material. In the present case the lining **128** is made of Teflon. In FIG. 8 there are two spaced annular beads **134**, **136**. Again there are mating slip seal parts one of which is cylindrical and the other of which has one or more annular beads, but the beads act like a cylinder of uniform diameter for purposes of axial slip. The bottom gasket **130** is also made of Teflon, and in this case is a flat gasket. By comparison of the successive stages illustrated in FIGS. 13, 14 and 15 it will be seen that the thread and slip seal are engaged first, and before the membrane **132** is broken as shown in FIG. 14, and the slip seal is maintained until the pressure seal is established at **130**, at which time a double seal is provided.

There may be more than one annular bead, and FIG. 8 illustrates the use of two annular beads **134** and **136**, received in a cylindrical Teflon lining **138**. In such case the final seal is a triple seal.

The holder illustrated in FIGS. 8–15 differs structurally from that previously described. It includes a U shaped sheet metal housing **140**, the rear edges of which are shaped to provide four slotted anchoring lugs **142**. The holder is mounted on a metal panel shown at **144** in FIG. 9, the latter having slots mating with the lugs **142** (FIG. 8). The holders are detachably locked in position by a suitable lock **146** (FIG. 8). The gas connection is provided at **148**, and liquid is discharged at a spout **150** under control of a valve knob **152**.

Referring now to FIGS. 11 and 12, the socket **126** is the upper part of a cylindrical body **154** which is held within the jacket **140** previously mentioned. It may be secured in place by appropriate screws **156**. It has two vertical passages, one shown at **158** for liquid discharge, this passage being plugged at the bottom by a screw plug **160**. It is somewhat sidewardly displaced from but intersects a horizontal valve passage **162**. The stem **164** (FIG. 12) of pull valve **166** passes through the front, while the spout **150** is connected at the rear as shown at **168**. In this case the valve seat **170** is made of Teflon, while the valve plug **166** is made of stainless steel, it being sealed by O rings made of Teflon or Viton.

There is also an upright gas inlet tube **172** (FIG. 11) and a check valve is provided at **174**, which in this case is a ball check valve resting on a Teflon seat **175**. The gas connection from the rear leads to the vertical passage at **176** (FIG. 11 and also FIG. 8).

FIGS. 9 and 10 show a modified dispenser cabinet for an array of bottles. Referring to FIG. 9, the cabinet is open at the front to expose seven bottles and holders, but it will be understood that a lesser or greater number may be provided. Referring next to FIG. 10, the gas tank **180** is upright and is stored behind the dispensers. A pipe **182** leads to a manifold pipe **184**, from which seven pipes **186** descend and turn forward to the seven dispensers. The tank has a valve **181**, and a pressure regulator **183**, followed by pipe **182**. The pressure employed need not be great, and the pressure regulating valve **183** is adjusted to maintain a suitable low pressure,

say, five pounds per square inch. The back **188** of the cabinet may be used for storage of reserve bottles **190**.

If desired, the slip seal portion of the bottle neck may be ground for greater precision. However, it is preferred not to grind the glass, not only to save the expense of a grinding operation, but also because removal of the original skin of glass greatly weakens the glass structure. The slip seals here shown will operate with a tolerance which is obtainable commercially without grinding. For example, the cylindrical part **30** in FIG. 5 may have a dimension ranging from 1.161 to 1.186 inches.

Here again when loading a new bottle it is started; the air then purged by flowing gas through the socket and valve; and the bottle then screwed home.

It is believed that the construction and method of use of our improved positive-pressure controlled-atmosphere liquid dispenser, as well as the advantages thereof, will be apparent from the foregoing detailed description. It will also be apparent that while we have shown and described the invention in several preferred forms, changes may be made without departing from the scope of the invention, as sought to be defined in the following claims. In the claims the reference to a means to rupture the membrane is not intended to exclude the gas inet tube, the upper end of which, as here illustrated, serves as the rupture means.

We claim:

1. A positive-pressure controlled-atmosphere liquid dispenser comprising a bottle having a relatively long neck with a threaded portion at the end of the neck and an axial slip seal part of equal or larger diameter than the thread and located between the threaded portion and the body of the bottle, the end of the bottle being sealed by a thin, easily penetrable membrane, and a holder for said bottle, said holder including a socket having a threaded part and an axial slip seal part, means to rupture the membrane, the slip seal parts providing a seal as the bottle is being put into the socket, one of said slip seal parts being cylindrical and both being effectively of uniform diameter for purposes of axial slip, a gas inlet tube for connection from a gas tank into the base of the socket, a spout, a liquid discharge tube leading from the base of the socket to the spout, and a dispensing valve between the discharge tube and the spout.

2. A positive-pressure controlled-atmosphere liquid dispenser comprising a bottle having a relatively long neck with a threaded portion at the end of the neck and an axial slip seal part of equal or larger diameter than the thread and located between the threaded portion and the body of the bottle, the end of the bottle being sealed by a thin, easily penetrable membrane, and a holder for said bottle, said holder including a socket having a threaded part and an axial slip seal part, means to rupture the membrane, the base of the socket having a gasket to receive the end of the bottle neck with a pressure seal, the slip seal parts providing a slip seal as the bottle is being slid into the socket before the neck end reaches the gasket, one of said slip seal parts being cylindrical and both being effectively of uniform diameter for purposes of axial slip, a gas inlet tube for connection from a gas tank into the base of the socket, a check valve in the inlet tube, a spout, a liquid discharge tube leading from the base of the socket to the spout, and a dispensing valve in front of said holder between the discharge tube and the spout.

3. A positive-pressure controlled-atmosphere liquid dispenser comprising a glass bottle having a relatively long neck with a threaded portion at the end of the neck and an axial slip seal part of equal or larger diameter than the thread and located between the threaded portion and the body of the bottle, the end of the bottle being sealed by a thin, easily penetrated membrane, and a holder for said bottle, said holder including a socket having a threaded part and an axial slip seal part, means to rupture the membrane, the base of the socket having a gasket to receive the end of the bottle neck with a pressure seal,

one of said slip seal parts being cylindrical and both being effectively of uniform diameter for purposes of axial slip, the slip seal parts providing a slip seal as the bottle is being slid into the socket and before the neck end reaches the gasket, a tank of a gas which is inert and/or compatible with the liquid, a gas inlet tube leading from the tank into the base of the socket, a check valve between the tank and the inlet tube, a spout, a liquid discharge tube leading from the base of the socket to the spout, and a dispensing valve in front of said holder between the discharge tube and the spout, all parts of the dispenser being made of glass and stainless steel, except for the gasket and slip seal element which are made of a yieldable material not attacked by the liquid.

4. A positive-pressure controlled-atmosphere liquid dispenser comprising a glass bottle having a relatively long neck with a threaded portion at the end of the neck and an axial slip seal part of equal or larger diameter than the thread between the threaded portion and the body of the bottle, the end of the neck being sealed by an easily penetrated metal foil, and a holder for said bottle, said holder including a socket having a threaded part and an axial slip seal part, means to rupture the foil, the base of the socket having a gasket to receive the end of the bottle neck with a pressure seal, one of said slip seal parts being cylindrical and both being effectively of uniform diameter for purposes of axial slip, the slip seal parts providing a slip seal as the bottle is being slid into the socket and before the neck end reaches the gasket, a tank of a gas which is inert and/or compatible with the liquid, a gas inlet tube leading from the tank into the base of the socket, a check valve between the tank and the inlet tube, a spout, a liquid discharge tube leading from the base of the socket to the spout, and a dispensing valve in front of said holder between the discharge tube and the spout, all parts of the dispenser being made of glass and stainless steel except for the gasket and slip seal element which are made of a yieldable non-corrosive material such as Teflon or Viton.

5. A liquid dispenser as defined in claim **1**, in which the slip seal portion of the bottle neck is cylindrical, and in which the slip seal portion of the socket has O rings through which the slip seal portion of the bottle neck is slidable.

6. A liquid dispenser as defined in claim **2**, in which the slip seal portion of the bottle neck is cylindrical, and in which the slip seal portion of the socket has O rings through which the slip seal portion of the bottle neck is slidable, and in which the gasket at the base of the socket is an O ring of smaller diameter.

7. A liquid dispenser as defined in claim **3**, in which the slip seal portion of the bottle neck is cylindrical, and in which the slip seal portion of the socket has O rings through which the slip seal portion of the bottle neck is slidable, and in which the O rings are made of Viton, or of Teflon with a rubber core.

8. A liquid dispenser as defined in claim **1**, in which the slip seal portion of the socket is lined with a cylinder of a yieldable non-corrosive material, and in which the slip seal portion of the bottle neck has one or more annular beads with a rounded exterior configuration.

9. A liquid dispenser as defined in claim **2**, in which the slip seal portion of the socket is lined with a cylinder of a yieldable non-corrosive material, and in which the slip seal porton of the bottle neck has one or more annular beads with a rounded exterior configuration, and in which the gasket at the base of the socket is made of a yieldable non-corrosive material.

10. A liquid dispenser as defined in claim **3**, in which the slip seal portion of the socket is lined with a cylinder of Teflon, and in which the slip seal portion of the bottle neck has one or more annular beads with a rounded exterior configuration.

11. A liquid dispenser as defined in claim **1**, in which the holder comprises a horizontal member the rear end of

which is externally threaded for mounting the same through an upright panel, the gas inlet and check valve being located at the rear end, the dispensing valve being located at the forward end, the socket being mounted on top of said member, and the spout depending from the forward portion of said member.

12. A liquid dispenser as defined in claim 3, in which the holder comprises a horizontal member the rear end of which is externally threaded for mounting the same through an upright panel, the gas inlet and check valve being located at the rear end, the dispensing valve being located at the forward end, the socket being mounted on top of said member, and the spout depending from the forward portion of said member.

13. A liquid dispenser as defined in claim 1, in which the holder comprises a horizontal member the rear end of which has means for mounting the same through an upright panel, the gas inlet and check valve being located at the rear end, the dispensing valve being located at the forward end, the socket being mounted on top of said member intermediate the ends, and the spout depending from the forward portion of said member, said valve having a horizontal valve stem the inner end of which carries a valve plug made of a plastics material which is not attacked by the liquid being dispensed.

14. A liquid dispenser for hair dyes comprising a bank of bottles and bottle holders each with a dispensing valve and spout as defined in claim 1, and in which a single gas tank is connected to all of the holders, the said bottles containing hair dye of different shades or colors, and the dispenser facilitating the mixing of the different dyes in small amounts.

15. A liquid dispenser for hair dyes comprising a bank of bottles and bottle holders each with a dispensing valve and spout as defined in claim 2, and in which a single gas tank is connected to all of the holders, the said bottles containing hair dye of different shades or colors, and the dispenser facilitating the mixing of the different dyes in small amounts.

16. In a positive-pressure controlled-atmosphere liquid dispenser comprising a holder including a socket having a threaded part and an axial slip seal part and means to rupture a membrane, a bottle having a relatively long neck with a threaded portion at the end of the neck, and an axial slip seal part of equal or larger diameter than the thread and located between the threaded part and the body of the bottle, the end of the bottle being sealed by a thin easily penetrable membrane, the aforesaid threaded portion receiving a threaded bottle cap which protects the membrane prior to removal of said cap preparatory to insertion of the bottle in the holder, the slip seal parts providing a slip seal as the bottle is being slid into the socket before the membrane reaches the means which ruptures the membrane.

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