Feb. 25, 1969 J. D. UNDERWOOD 3,429,642

HAIR TREATMENT APPLICATOR

Filed Sept. 5, 1967

FIG. 1.

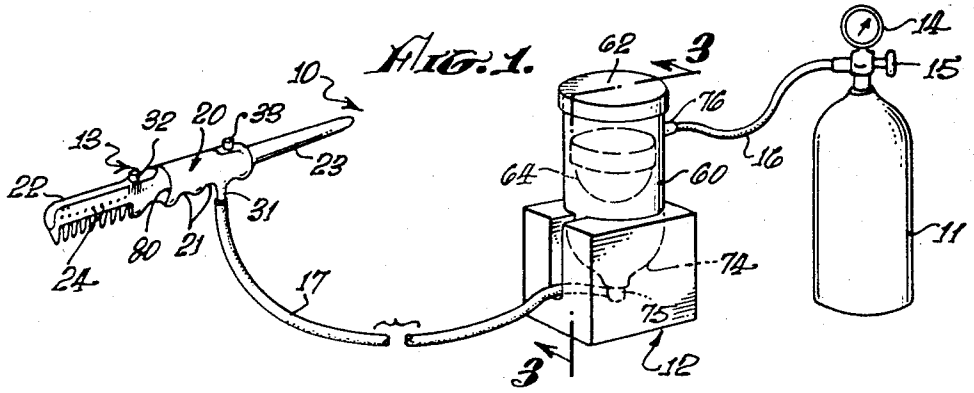


FIG. 2.

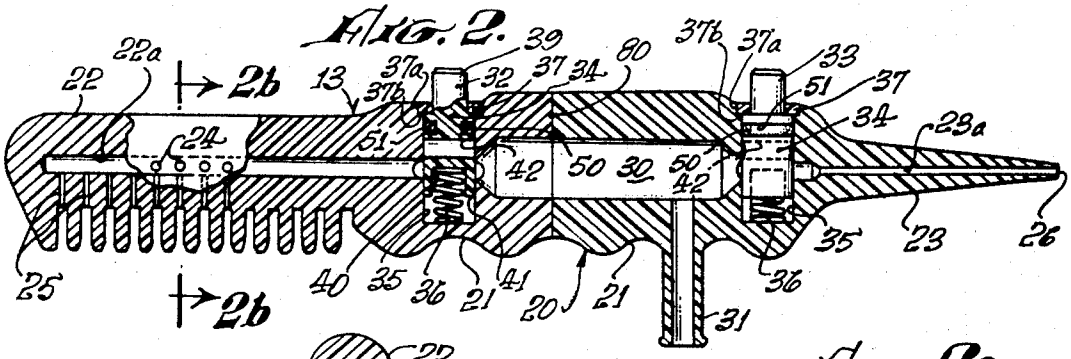


FIG. 2b.

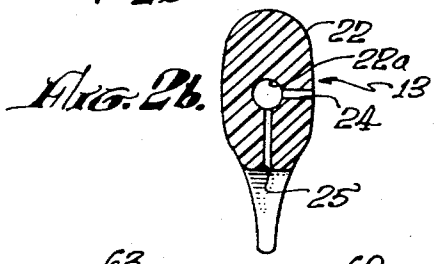


FIG. 2a.

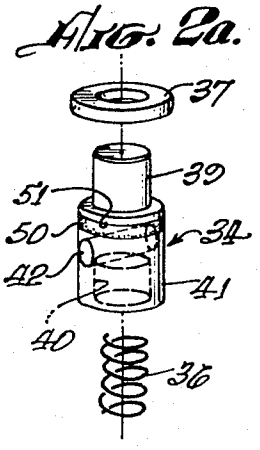
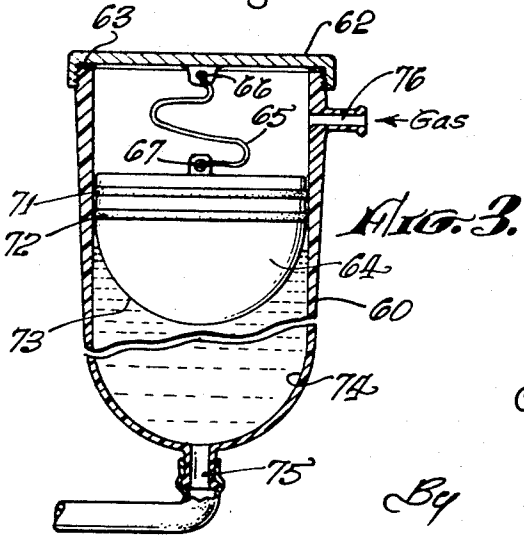


FIG. 3.



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HAIR TREATMENT APPLICATOR

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Int. Cl. A46b *11/02, 11/06;* A45d *24/22*

ABSTRACT OF THE DISCLOSURE

A hair treatment applicator for precisely controlled application of bleach liquids and the like, the applicator being comprised of a hand-held reservoir tube, applicator nozzles of different shape at each end of said tube, separate valves in said tube for finger control of release of treatment liquid from a selected one of said nozzles, and a stationary reservoir supplying said hand-held reservoir tube with treatment liquid under controlled pressure through a flexible supply hose.

This invention relates to hair treatment applicators for use by professional beauticians, and more particularly to such an applicator in which the treatment liquid can be precisely controlled by supplying the liquid under a uniform and adjustable pressure from a stationary supply reservoir to the internal reservoir of a hand-held applicator, from which the flow of treatment liquid is further controlled by valves and a choice of nozzles.

Most of the important hair treatment liquids used by professional beauticians are subject to rapid chemical deterioration. It is desirable that they be so, since this chemical deterioration provides a limiting control on their chemical effects on the hair and scalp. For example, many bleaches and tinting mixtures used on hair by professional beauticians must be prepared in a special batch for the treatment of each client, so as to provide fresh treatment liquid designed to meet the particular requirements of that client's hair.

Another important characteristic of hair treatment liquids used by professional beauticians is that they act rapidly on the hair, but more rapidly immediately after preparation than later, and often without immediately revealing some lack of uniformity in a degree to which each hair area has been affected.

Heretofore, great skill and care has been demanded of the professional beautician, and even then, it has often happened that spots of overbleaching or overtinting, or underbleaching or undertinting have been discovered in spots a few minutes or more after the beautician had completed a perfect job of hair treatment.

Various applicators for applying hair treatment liquids have been proposed, but none have provided sufficient precision in flow of hair treatment liquid to enable the beautician to treat the entire head of hair in a minimum amount of time, but with assured confidence that treatment liquid would flow with reliable uniformity from the applicator. For example, squeeze bottle applicators are notoriously variable in the rate at which liquid is discharged by hand-squeezing pressure. Pressurized applicators have been proposed for the application of chemically stable liquids but have not been successful with hair treatment liquids of great chemical instability, which liquids are the most important ones in hair treatment.

It is the primary object of the present invention to provide a hair treatment applicator especially suited for use by professional beauticians and providing the precise control required for dealing with the rapid acting but chemically unstable bleach liquids, or tint liquids, which are the most important treatment liquids in the salons of beauticians and cosmetologists.

The invention makes use of an applicator system in which a batch of treatment liquid may be freshly prepared in a stationary reservoir, and then fed by controlled pressure means through a flexible hose to a hand-held applicator, which is provided with a small secondary reservoir, and manually controlled valve and nozzle means.

An important advantage of the applicator system of the invention is that it can be inexpensively constructed of molded plastics. Associated with this advantage in economy, is the advantage in quality that the corrosive hair treatment liquids are in contact only with plastic and rubber materials upon which they do not have any adverse effect.

The many advantages in construction, efficiency in preparation for use, and precision in application of the invention will best be understood from the following description of one preferred specific embodiment, which description should be read in connection with the accompanying drawings, in which:

FIGURE 1 is a peripheral perspective representation of the entire applicator system of the invention;

FIGURE 2 is a sectional view, much enlarged in comparison with FIGURE 1, of the hand-held applicator, the section being taken at a vertical plane through the longitudinal axis of the applicator;

FIGURE 2*a* is a perspective detail view of the internal components of one of the valves in the applicator of FIGURE 2;

FIGURE 2*b* is a sectional view taken at the transverse vertical plane indicated in FIGURE 2 by numerals 2*b*; and

FIGURE 3 is a vertical sectional view through the stationary reservoir of the applicator system, taken at a vertical plane through the vertical axis of the reservoir as indicated in FIGURE 1 by the numerals 3.

In FIGURE 1 the arrow **10** is used to designate the applicator system as a whole, which system is seen to be comprised of three separable units connected to each other by a pair of flexible hoses. A tank of inert gas (such as nitrogen) is indicated by the numeral **11**. The stationary reservoir is indicated by the numeral **12**, and the applicator itself by the numeral **13**.

Gas from tank **11** is used solely for applying a controlled pressure in stationary reservoir **12**, and plays no chemical role in the hair treatment process. The operator can precisely control the pressure applied to the hair treatment liquid in stationary reservoir **12** by observing a pressure gage **14** and manipulating a discharge valve **15**, both of which are mounted on the upper end of tank **11**. The gas under pressure passes through gas supply hose **16** to produce a controlled flow of hair treatment liquid from stationary reservoir **12** to applicator **13** through treatment liquid hose **17**, as will be described in detail hereinafter.

The detailed construction of applicator **13** may be explained in connection with FIGURES 1, 2 and 2*b*. The middle part of the applicator **13** is a tubular handle **20**, which may be conveniently molded from plastic with fingergrooves **21** on one side, so that the handle **20** can be accommodated within the hand of the beautician, and firmly held by his fingers.

Extending from each end of handle **20**, and, preferably, on approximately the same longitudinal axis, are two differently shaped applicator nozzles **22** and **23**. Applicator nozzle **22** is a comb nozzle provided with a large number of small lateral orifices **24** and **25**.

Nozzle **23** is a straight nozzle tapering almost to a point and provided with a single orifice **26** at its extreme end.

As may be best seen in the longitudinal sectional view of FIGURE 2, treatment liquid under pressure from the

stationary reservoir **12** passes through the hose **17** and enters a handle reservoir **30**, inside of the tubular handle **21**, through a laterally projecting tube **31**, which serves as a connection means for hose **17**.

Discharge of treatment liquid from handle reservoir **30** through either nozzle **22** or **23** is selectively controlled by the operator as he positions handle **20** in his hand with his thumb over either valve button **32** or **33**, respectively.

The rate at which treatment liquid is discharged from the nozzle selected will be determined first by the pressure adjustment of pressure tank valve **15**, and secondly by the degree to which either valve **32** or **33** is opened. In most cases, the operator will prefer to open valve **32** or **33** all the way, and control flow primarily by the period of time he opens the valve, and the pressure adjustment at pressure tank valve **15**.

Valves **32** and **33** are identical in construction, and a description of valve **32** in connection with FIGURES 2 and 2*a* will suffice for both. Valve **32** is seen to be of the plunger type, with a valve piston **34** reciprocable in a cylindrical cavity **35**, on an axis along the axis of reservoir **30**.

The piston **34** is urged resiliently upward by a helical spring **36**, which is preferably made of stainless steel, bronze or other material resistant to corrosion. A retainer ring **37** is cemented into the upper opening of cylindrical cavity **35**, and meets with shoulders **37***a* and **37***b* in the cavity walls and piston end respectively. The valve push-button **39** projects from the retainer ring **37**.

It will be noted that the spring **36** is protected to a very substantial degree from any contact with treatment liquid, and is firmly held in place, since the upper end of spring **36** is received into the interior cavity **40** enclosed by a depending lower skirt **41** on piston **34**.

A transverse valve passage **42**, preferably coaxial with reservoir **30**, is provided to permit the passage of treatment liquid from reservoir **30** through passage **42** into a longitudinal nozzle passage or conduit **22***a*. The interior walls of nozzle **23** design a similar but smaller nozzle conduit **23***a*.

A sealing O-ring **50** is seated in an external annular recess **51** in the walls of piston **34**, at a location below retaining ring **37** but above passage **42**. The ring **50** makes close sealing contact with the adjacent wall surfaces of the cylindrical cavity **35**.

The stationary reservoir **12** may be described in detail in connection with FIGURES 1 and 3. A convenient construction for the reservoir **12**, which makes for complete use of treatment liquids, and easy cleaning, employs, as illustrated, a vertical cylinder reservoir **60** supported in a base stand. Access to the interior of cylinder **60** may be had by removing a top cover **62**, which, as seen in FIGURE 3, is readily received on the upper end of cylinder **60**, and is provided with a gas sealing gasket as indicated at **63**.

As revealed in the cross-sectional view of FIGURE 3, and by dashed outline in FIGURE 1, a piston **64** is vertically reciprocable in the interior of cylinder **60**. The underside of cover **62** is connected to the upper face of piston **64** by a connection cord **65** between connection points **66** and **67** respectively. Thus, cover **62** can be unthreaded from cylinder **60** and withdrawn, simultaneously removing piston **64** from cylinder **60**, and permitting the cylinder to be cleaned and then used as a mixing chamber for a new batch of hair teratment chemicals.

A preferred construction for the piston **64** is as illustrated in FIGURE 3. For the upper part of its length, piston **64** is cylindrical, and provided with a pair of sealing rings **71** and **72**, received in annular recesses in the outer cylindrical surface of piston **64**; but the lower end of piston **64** is shaped with a convex spherical wall **73** which closely mates with and seats upon the concave spherical outer wall **74** of the interior of cylinder **60**.

At the lowest point of spherical bottom **74** a central and preferably vertical discharge tube **75** is provided and the upstream end of treatment liquid hose **17** is seen connected thereto.

The inner pressure gas from gas tank **11** is admitted to the upper part of cylinder **60** through a tubular gas inlet **76**, projecting laterally just below cover **62** as illustrated in FIGURES 1 and 3.

A preferred construction for the principal components of both stationary reservoir **12** and applicator **13** is by plastic moldings and assembly thereof. Thus, the applicator **13** may be molded in two halves which may then be cemented together at a plane transverse through their longitudinal axis indicated in FIGURE 2 by the line **80**. The parts of valve **32** and **33**, other than the spring **36** may be plastic molded, and assembled into the valve cylinder cavities **35**, as shown in FIGURE 2, and then retained in place by cementing into position the retainer rings **37**. The stationary reservoir **60** and the cover **62** may be plastic moldings. A good construction for reservoir **60** is illustrated by the cross-sectional view of FIGURE 3, showing relatively thick upper walls (the region of most pressure), and somewhat thinner walls in the lower part of cylinder **60**, which enclose the treatment liquid cavity.

It will be noted that cylinder **60** is easily removable from hose **17** and support **61** for rinsing between batches.

The utility of the applicator of the invention is not restricted to any particular treatment liquids. Also, its novelty does not relate in any way to the composition of any particular treatment liquid. It is contemplated that the applicator may be employed for the precise application of any of the many hair treatment bleaches, tints, dyes, oils, or other hair treatment liquids or liquid suspensions presently known to the hair dressers' art, or hereafter introduced into that art. By way of example, but not by way of limitation, the applicator is extremely useful for the application of bleaches which must be freshly mixed in reservoir **60** just prior to use. Some such bleaches have chemical reactions which generate by-products, sometimes gaseous by-products, which produce a slightly foamy liquid. Precise control over such foamy and compressible liquid-gas mixtures has been practically impossible with applicators heretofore known, but in the applicator of the invention, precise adjustments may be made with dial **15** and valves **32** and **33** to achieve uniform and fast distribution by means of comb nozzle **22**, which may then be followed by touch-up application of very small quantities through the nozzle **23**.

It is believed that the many advantages of the applicator, and the many alternative methods of operation with different liquids, will be quickly comprehended by those skilled in the art of hair treating, and further discussion of such operation at this point is not deemed necessary.

While I have shown and described a preferred embodiment of the invention, it will be apparent that it is capable of variation and modification from the particular form selected for illustration, so that its scope should be limited only by the scope of the claims appended hereto.

I claim:

1. A hair treatment applicator which includes:

a tubular handle sized for accommodation within the hand of an operator, said handle including an elongated internal reservoir chamber and a supply hose connection means communicating with said handle reservoir;

a pair of dispenser nozzles, one extending from each end of said handle in longitudinal alignment therewith, each of said nozzles including internal walls defining a conduit for receiving liquid from one end of said handle reservoir, and each of said nozzles having at least one applicator orifice;

a pair of piston valves in said handle, one at each end of said handle reservoir, for controlling the flow of liquid from said handle reservoir to one of said dispenser nozzles, each of said piston valves including a valve piston slidably received in a cylindrical cavity

having an axis at right angles to the longitudinal disposition of said handle and nozzles, each of said valves including a resilient spring means urging said piston to a valve closure position, and including a pushbutton control extending from said piston to the exterior of said handle for finger-tip control of said valve;

a stationary reservoir, large relative to said handle reservoir, for hair treatment liquids, said stationary reservoir including an elongated cylindrical container, a piston reciprocable in said container, said piston dividing said container into an actuating gas chamber on an upstream side of said piston, and a treatment-liquid chamber on a downstream side of said piston;

a source of compressed gas communicating with said actuating gas chamber for applying controllable pressure to the upstream side of said piston; and a treatment-liquid supply hose between the downstream end of said treatment-liquid chamber and said handle reservoir.

2. A hair treatment applicator as described in claim **1** in which one of said dispensing nozzles has at its outer end a single restricted orifice in alignment with said handle, and the other of said dispenser nozzles is in the form of a comb having an internal conduit system comprised of one longitudinal main supply conduit and lateral branch conduits to distribute treatment liquid from orifices distributed along the teeth of said comb.

3. A hair treatment applicator as described in claim **1** in which the piston, in each of said piston valves, is provided with a transverse passage to permit the flow of liquid from said handle reservoir into one of said dispenser conduits when said piston is manually depressed to overcome said resilient spring means, and said resilient spring means is a metallic helical spring enclosed within said valve cylinder and shielded from said treatment liquid by means of a cylindrical skirt downwardly depending from said piston and enclosing one end of said spring.

4. A hair treatment applicator as described in claim **1** in which said stationary reservoir is a substantially vertical cylinder with a central bottom discharge opening for connection to said supply hose, and the bottom of said stationary reservoir is internally concave, symmetrical about the vertical axis of said reservoir, and the downstream wall of said piston therein is convex in shape to meet with said concave reservoir bottom; and the upper end of said reservoir is covered by a removable cover for providing access to the interior of said reservoir.

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LAWRENCE CHARLES, *Primary Examiner.*

U.S. Cl. X.R.

401—36, 151, 176, 188; 132—116, 148