United States Patent

Marraffino

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[54] **PRESSURIZED DISPENSER FOR PLURAL FLUIDS**

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[51] **Int. Cl.** **B65d 35/28,** B65d 83/14

[58] **Field of Search**.....222/94, 95, 136, 402.1, 402.18, 222/402.24, 193

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Assistant Examiner—Frederick R. Handren
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[57] **ABSTRACT**

A pressurized container has separate compartments for primary and secondary fluids which should not comingle prior to dispensing. Separate flow paths for the two fluids lead to a common exit and mixing passage. A single distortable washer valve element operates to control the flow of both fluids from their respective compartments to said common exit and mixing passage.

8 Claims, 6 Drawing Figures

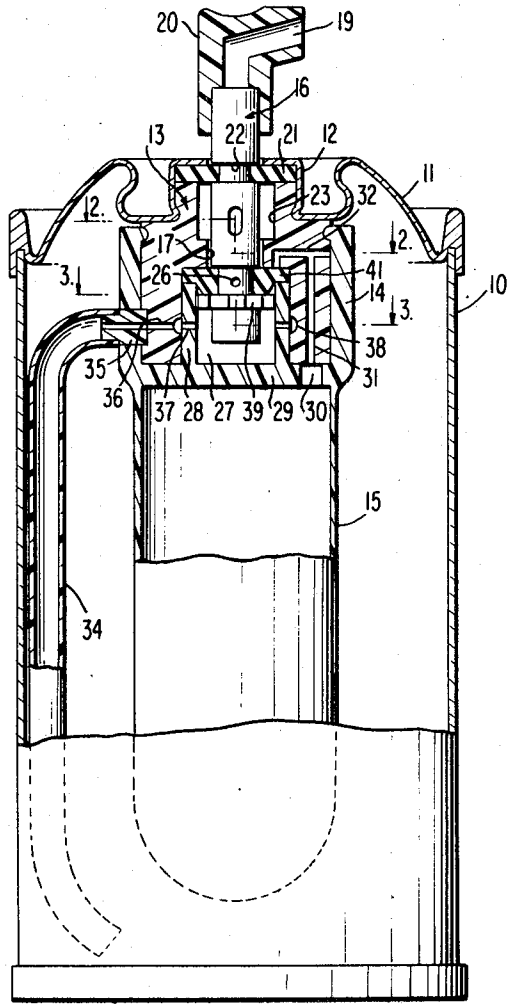


FIG 1

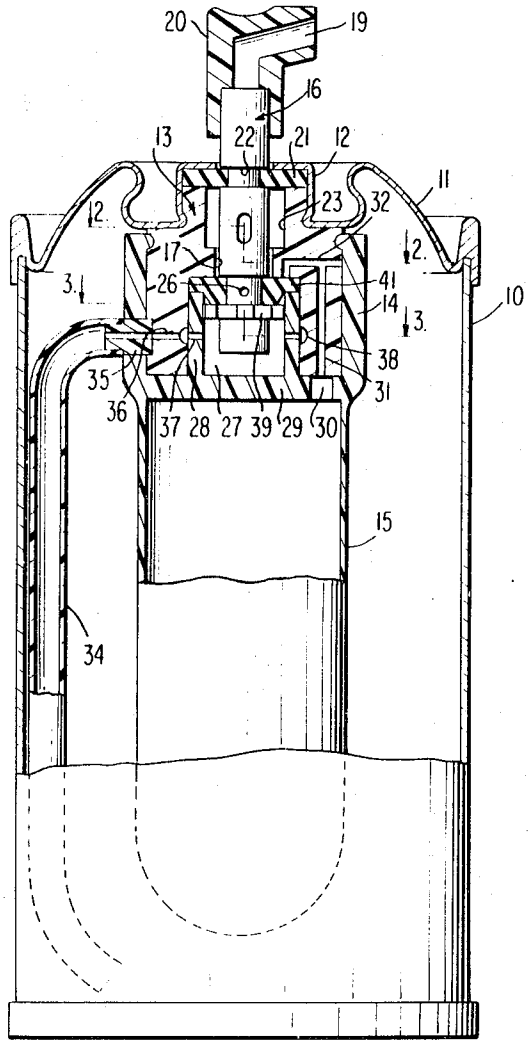
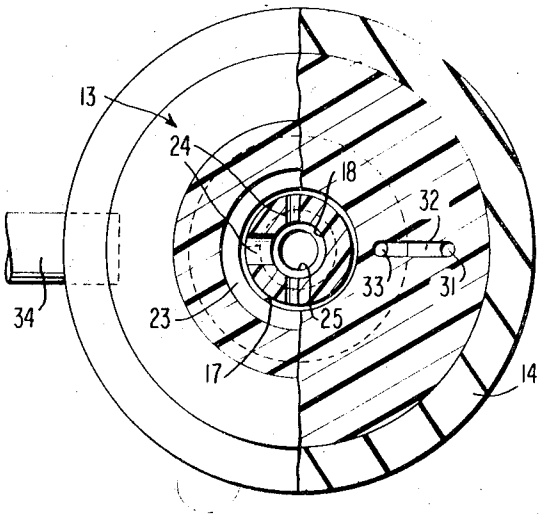


FIG 2



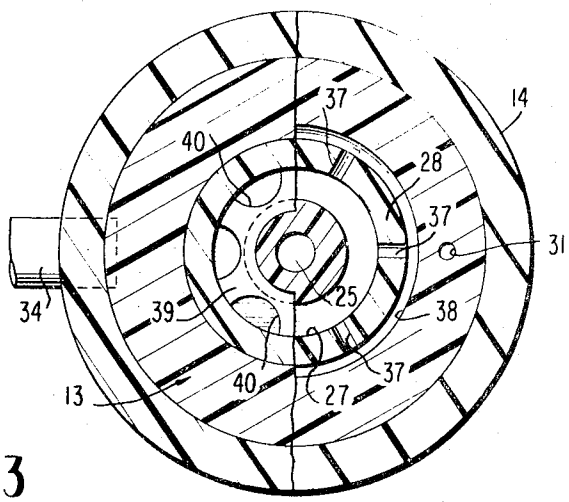


FIG 3

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FIG. 4

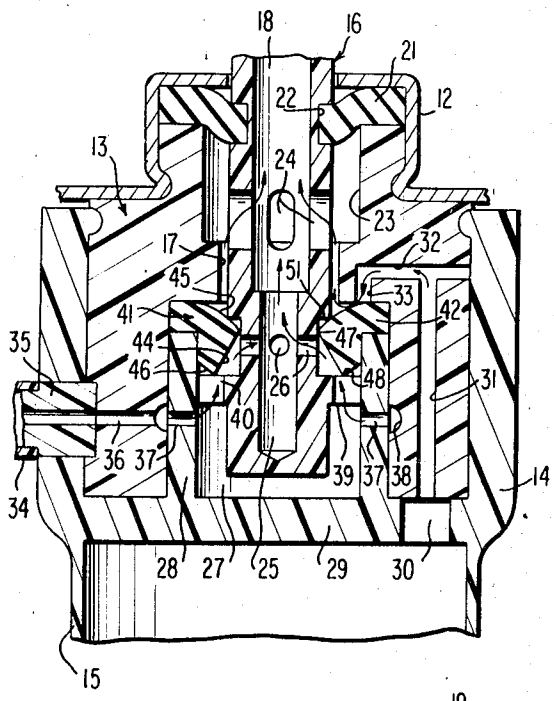
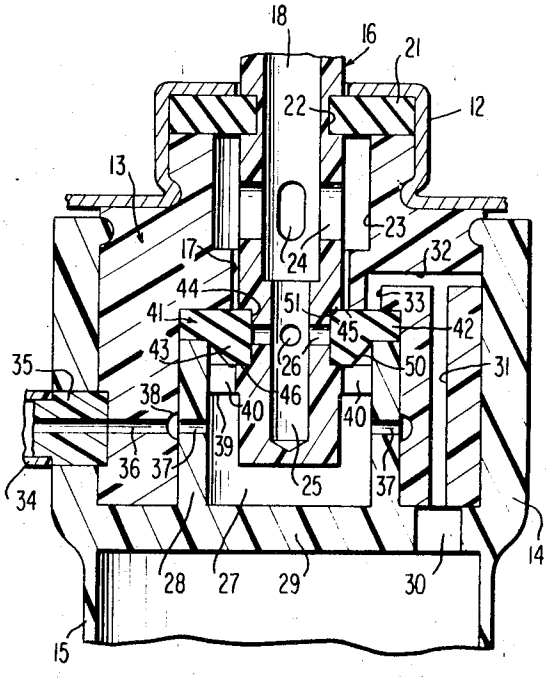


FIG. 4a



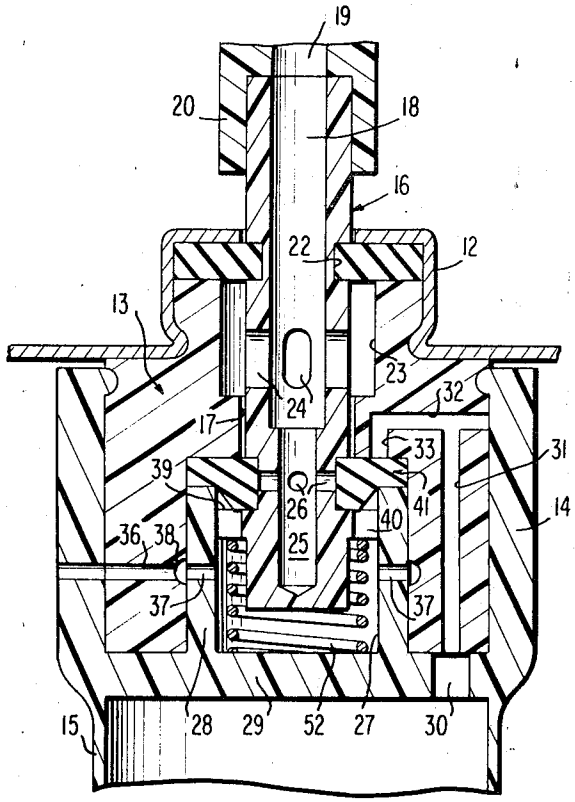


FIG. 5

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PRESSURIZED DISPENSER FOR PLURAL FLUIDS

It is well known that certain compositions cannot be marketed in premixed form. Such compositions include hair dyes, certain lacquers, paints and the like, wherein chemical changes occur upon mixing of the components. Compositions of the above type require special packaging in order to maintain the ingredients separated during shipment and storage prior to sale or use, and yet allow the ingredients to be brought together and combined at the time of dispensing or shortly before. Additionally, certain fluid components have a corrosive effect on metal or may be deteriorated by contact with metal, as for example, the hydrogen peroxide component of hair dye. In such cases, the dispensing device must have a compartment formed of plastic or other like material which will resist corrosion and prevent deterioration of the sensitive component. The present invention satisfies these requirements in a complete and efficient manner.

Additionally, dispensers for plural fluids have generally required complex and costly valve structures to regulate the admission of the fluid components in proper quantities into the final mixing and exit chamber. The present invention provides a single simplified valve element which controls the metering of two pressurized fluid components in a highly efficient manner, so that the components are maintained completely separated in a safe manner prior to dispensing or use. The single valve element may be constructed and arranged to cause simultaneous flow of two fluid components from port means with which the valve element coacts, or one fluid component may be released prior to the release of the second component. Consequently, accurate metering is obtainable. Additionally, the valve means is positive and reliable for sealing and separating the components while in a nonuse position. Various additional features and advantages of the invention will be apparent during the course of the following description.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a central vertical cross section, partly in elevation, through a dispenser and valve means for plural fluids embodying the invention.

FIG. 2 is a horizontal section taken on line 2—2 of FIG. 1.

FIG. 3 is a similar section taken on line 3—3 of FIG. 1.

FIG. 4 is a greatly enlarged central vertical section through a distortable valve element and associated parts.

FIG. 4*a* is a sectional view similar to FIG. 4 showing the valve element in an undistorted condition.

FIG. 5 is a central vertical sectional view similar to FIG. 1 showing a modification.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIGS. 1 through 4 wherein like numerals designate like parts, the numeral 10 designates an outer or primary container preferably formed of sheet metal and being of the general type employed for the storage and dispensing of pressurized aerosols and fluids of various types. In this connection, the invention is not restricted to the handling of any particular fluids although it is ideally suited for handling hair dyes, as mentioned. However, with only minor variations in construction, the invention is capable of handling fluids having a wide variation in physical properties including weight, viscosity, surface tension and the like. Additionally, the fluid in the primary container 10 may be part gas and part liquid in some instances, or may be entirely gas in other instances.

The primary container 10 includes a permanent cover 11 formed centrally to provide an anchoring sleeve portion 12 for a fixed valve body or head 13 having port and chamber means, to be described. Firmly secured to the valve body 13 in surrounding relation thereto is a relatively thick and rigid sleeve portion 14 of a depending collapsible container 15 for a secondary fluid component which must be stored separately prior to use from the primary fluid in the container 10. The interior container 15 is formed of plastic or some rubberlike material to allow collapsing under pressure and the material of the container 15 is also suitable for resisting the corrosive action of certain fluid components, and the material will also protect certain fluids which are subject to deterioration in contact with metals. The size of the interior container 15 may be varied in accordance with metering requirements. The gaseous propellant for the entire dispenser is contained within the chamber of the outer container 10 along with the primary fluid component and externally of the container 15, whereby the pressure of the propellant will expel the primary and secondary fluids when the dispensing valve means is operated.

A discharge nozzle and valve stem 16 is disposed centrally of the valve head 13 and reciprocates axially through the main bore 17 thereof which serves as a bearing for the nozzle or stem. Sufficient clearance is provided between the nozzle 16 and bore 17 for the passage of secondary fluid from the inner container 15, as will be further described. The nozzle 16 has a main bore 18 opening through its outer end and serving as a mixing or comingling chamber for the primary and secondary fluids immediately prior to discharge through the exit opening 19 of valve actuating pushbutton 20. The nozzle or stem 16 is biased to the closed position shown in FIG. 1 by a resilient washer 21 held between the top of the head 13 and the top wall of sleeve portion 12 and engaged within an external groove 22 of the stem 16.

Immediately below the washer 21 and covered thereby is an annular entry chamber 23 for secondary fluid passing upwardly through the bearing bore 17. Adjacent to this chamber 23, the stem 16 is provided preferably with plural slots 24 opening into the nozzle bore 18. Below the slots 24 and bore 18, stem 16 has a reduced bore 25 closed at its lower end and having plural circumferentially spaced radial ports 26 extending outwardly therefrom through which primary fluid flows when the valve means is open.

Another annular chamber 27 for primary fluid surrounds the lower end of stem 16 and is defined by an internal annular wall 28 rising from a transverse wall 29 of inner container 15, the wall 29 closing the bottom of chamber 27. A port 30 in the transverse wall 29 radially outwardly of chamber 27 leads to a longitudinal port 31 in valve head 13 which in turn leads to a transverse port 32 above the chamber 27 extending inwardly and communicating with a short reverse longitudinal port 33. The several ports 30, 31, 32 and 33 receive secondary fluid from the collapsible container 15 during the dispensing operation.

A dip tube 34 in the primary fluid container 10 connects at its top with a port fitting 35 or nipple anchored within the sleeve portion 14 and communicating with further transverse ports 36 and 37 in the head 13 and annular wall 28, respectively. The plural radial ports 37 of wall 28 communicate at their outer ends with an annular groove 38 in the head 13, as shown. Primary fluid from the container 10 enters the chamber 27 through the elements 34, 35, 36 and 37, as described.

Within the top portion of chamber 27, the stem 16 carries an external annular flange 39, FIG. 3, having circumferentially spaced notches 40 in its periphery and such periphery being in close relation to the wall of chamber 27. The notches 40 form further flow paths for primary fluid.

The single valve element or means for controlling the flow of both primary and secondary fluid to the nozzle main bore 18 comprises a resilient distortable washer 41 having a marginal annular flange 42 clamped securely between the wall 28 and an internal shoulder of the valve head 13. The valve element 41 has a central depending annular portion 43 of reduced external diameter and a central cylindrical through bore 44 which snugly engages and covers the outer ends of radial ports 26 when the valve element 41 is in a relaxed port closing position, as shown in FIG. 1. The element 41 has a flat top face 45 perpendicular to the through bore 44 and this face overlies and closes the port 33 for secondary fluid when the valve is in closed position, FIG. 1. The bottom end face 46 of distortable element 41 is flat and normally parallel to the top face 45 as when the valve is in a closed condition. In such condition, the end face 46 firmly contacts the top face of annular

flange 39 inwardly of notches 40. At this time, it may be seen that the single valve element 41 securely covers or closes the ports 33 and 26, thereby effectively stopping the flow of secondary and primary fluid components into the mixing and outlet bore 18 of valve stem 16.

When the button 20 is depressed to move the stem 16 axially inwardly, the resilient washer 21 will yield to allow this and the distortable washer valve element 41 will yield and distort and assume a port opening condition similar to the showing in FIG. 4 so long as the button 20 remains depressed. At such time, the normally flat top face 45 becomes curved and moves away from the longitudinal port 33 to uncover the same and simultaneously the through bore 44 assumes a conical configuration and moves away from the radial ports 26, as shown in FIG. 4. In this condition of the valve means, primary fluid under pressure from the container 10 may flow from the chamber 27, through the notches 40, and through the distorted bore 44 of valve element 41 to the ports 26 and, finally, from these ports into the valve stem or nozzle bore 18. At this time, the upper face 45 of valve element 41 will form a fluid seal with an annular shoulder 51 on stem 16, as shown in FIG. 4, thus preventing mixing of the primary and secondary fluids. Simultaneously, the lower circular edge 48 of the element 41 will form an interrupted line seal with the upper surface of annular flange 39 across the tops of the notches 40. Likewise, while the valve element is distorted, FIG. 4, secondary fluid will flow from the inner container 15 through ports 31, 32 and 33 into the space now formed above the distorted valve element 41 and from this space through the annular clearance space between stem 16 and bearing bore 17. The secondary fluid enters the bore 18 through the previously described slots 24 of the valve stem.

The external periphery of annular portion 43 is tapered as at 50 to allow the valve element 41 to assume the fully distorted condition indicated in FIG. 4 without being compressed against the annular wall 28. The valve element 41 is moved to the open or distorted position by the shoulder 51 on the stem 16 immediately above the radial ports 26, and this shoulder also forms a seal with the top of the washer valve element, as explained. In effect, the central portion of the distortable valve element is confined between the flange 39 and this shoulder 51 so that reciprocation of the stem 16 will be certain to move the valve element from open to closed condition and vice versa.

When the button 20 is released, the resiliency of washer 21 and element 41 acting in concert will be sufficient to return the valve to the fully closed position where the ports 26 and 33 are securely covered and no primary or secondary fluid can flow to the bore 18. It should be understood that the element 41 is tensioned or biased to return to the port covering position of FIG. 1 when relaxed and free of the force imparted to it when the valve stem 16 is depressed.

It will be further understood that very accurate metering of the primary and secondary fluids may be obtained by slightly varying the contour of the distortable washer valve element. That is to say, the position of the interrupted line seal 48 relative to the notches 40 will control the metering of primary fluid and the valve structure may be formed to allow greater or less flow of primary fluid in relation to secondary fluid, and vice versa. Also valve operation is possible to allow either primary or secondary fluid to be released first which may be desirable in some instances. In any event, when both flow paths are open, as in FIG. 4, the two fluid components will comingle and mix in the bore 18 prior to exiting through the final discharge opening 19.

As indicated in the slightly modified embodiment depicted in FIG. 5, the dip tube 34 may be omitted where the consistency of the primary fluid is such that the tube is unnecessary or undesirable. Additionally, the resiliency of washer elements 21 and 41 may, in some instances, be augmented by a valve closing spring 52 disposed within the chamber 27 and bearing upwardly against flange 39 of stem 16. Such a spring will render the closing of the ports somewhat more quick and positive. In all other respects, the construction and operation of the modified form is identical to the construction and operation of the form of the invention in FIGS. 1 through 4.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

I claim:

1. A pressurized dispenser for primary and secondary fluids comprising a first container for a primary fluid and a second container for a secondary fluid, a valve head common to said first and second containers and having a first port in communication with the second container and a second port in communication with said first container, a reciprocatory valve stem engaging said valve head and having a primary and secondary fluid mixing and discharge bore, secondary fluid passage means communicating with said mixing and discharge bore and communicating with said first port, primary fluid passage means communicating with said mixing and discharge bore and also communicating with said second port, and a single distortable resilient valve element anchored to said valve head and having a part secured to the reciprocatory valve stem, whereby movement of the valve stem in one axial direction distorts said valve element and uncovers said first port in communication with said secondary fluid passage means and also uncovers said primary fluid passage means, said resilient valve element returning automatically to an undistorted condition in covering relationship with said first port and said primary fluid passage means, and wherein said first container is an outer substantially rigid container for pressurized fluid and the second container is disposed within the first container and is formed at least in part of material which is collapsible under the influence of pressure in the first container, said valve head connected with the first and second containers, and wherein said distortable valve element is a resilient annular body mounted on and surrounding the reciprocatory valve stem and having a bore normally covering a part of said primary fluid passage means and having an end surface normally covering said first port in communication with said secondary fluid passage means when the valve element is in a relaxed and undistorted condition.

2. A pressurized dispenser for primary and secondary fluids as defined by claim 1, and wherein said primary fluid passage means includes at least one radial port in said valve stem substantially at right angles to said first port, said bore and end surface of the resilient annular body coacting respectively with said one radial port and first port to open and close the same upon reciprocation of said valve stem and thereby regulating the flow of the primary and secondary fluids into said mixing and discharge bore.

3. A pressurized dispenser for primary and secondary fluids as defined by claim 2, and wherein said resilient annular body includes an external relatively thin flange fixedly secured to said valve head and an internal relatively thick sealing body portion having a bore snugly surrounding the valve stem adjacent said at least one radial port and said thick body portion engaging between a pair of spaced annular shoulders on the valve stem, whereby axial movement of the valve stem in one direction will move said thick body portion axially and distort said annular body to cause uncovering of said one radial port and said first port.

4. A pressurized dispenser for primary and secondary fluids as defined by claim 3, and wherein the external periphery of the relatively thick body portion is tapered to provide clearance for said distortion.

5. A pressurized dispenser for primary and secondary fluids as defined by claim 3, and wherein one end of the bore of said thick body portion maintains a seal with the top shoulder of the valve stem during distortion of the annular body to uncover said one radial port and first port and thereby preventing comingling of the primary and secondary fluids prior to

their entry into said mixing and discharge bore of the valve stem.

6. A pressurized dispenser for primary and secondary fluids as defined by claim 5, and wherein the bottom shoulder of the valve stem having an interrupted line seal engagement with one end of the bore of said thick body portion has at least one peripheral recess constituting a part of said primary fluid passage means, whereby metering of primary fluid through the primary fluid passage means is regulated by said line seal engagement.

7. A pressurized dispenser for primary and secondary fluids as defined by claim 2, wherein said valve head has a bearing bore receiving and guiding the reciprocatory valve stem and the annular clearance between said bearing bore and stem is a part of the secondary fluid passage means, said end surface of the resilient annular body covering said part of the secondary fluid passage means while undistorted.

8. A pressurized dispenser for primary and secondary fluids as defined by claim 1, and an auxiliary resilient means connected with said valve stem and urging the valve stem to a position wherein the distortable valve element is undistorted.

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