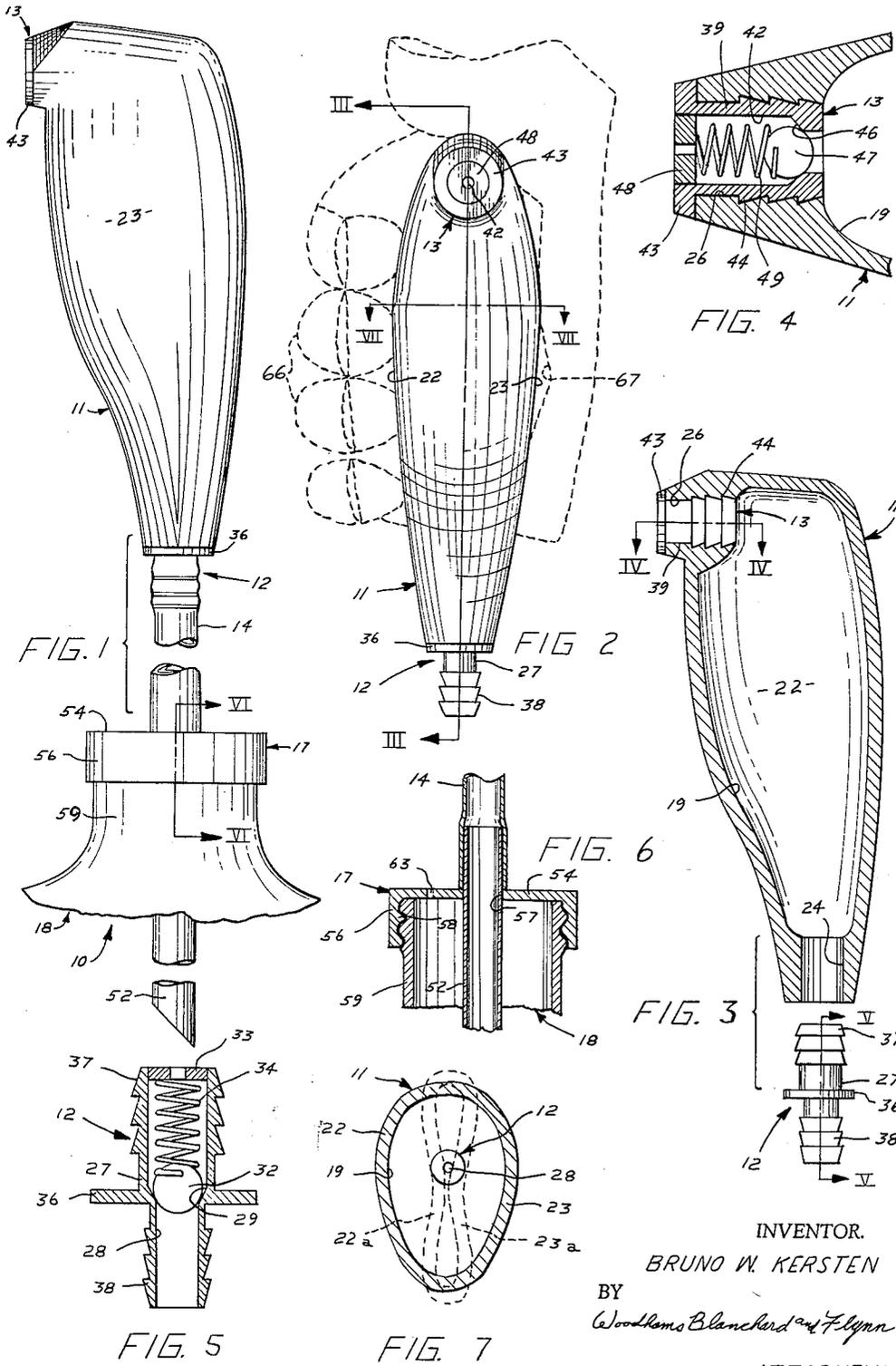


Aug. 6, 1963

B. W. KERSTEN
DISPENSING DEVICE
Filed Oct. 11, 1960

3,100,068



INVENTOR.
BRUNO W. KERSTEN
BY
Woodhams Blanchard and Flynn
ATTORNEYS

1

3,100,068

DISPENSING DEVICE

Bruno W. Kersten, Philadelphia, Pa., assignor to
Marion S. Pump, Kalamazoo, Mich.
Filed Oct. 11, 1960, Ser. No. 61,952
2 Claims. (Cl. 222-287)

This application relates in general to a dispensing device and, more particularly, to an improved bulb construction having valves operatively associated therewith for the purpose of advancing, and controlling flow of, fluid from one point to another.

Many devices have been developed and used for the purpose of dispensing various types of liquids, such as hair dressing liquids, and two such devices are disclosed in Patents No. 2,923,441 and 2,950,030, both of which are assigned to the assignee of this application. Although the dispensing devices disclosed in these two patents are a very definite improvement over the previous devices available for substantially the same purpose, as evidenced by their wide commercial acceptance, they have certain structural limitations which often tend to restrict their performance. More specifically and for example, the bulb in such devices must be fabricated from a material which resiliently, but vigorously, resists compression so that it will be strong enough to resume its normal shape while drawing a viscous liquid through a pipe connected to the inlet of the bulb. Moreover, the bulb must be capable of repeated, substantially complete collapses by manual compression in order to be acceptable for the stated purposes. However, it is believed that such use of existing bulbs, which are designed like those shown in the above-mentioned patents and constructed to meet the above-described needs, tends to fatigue the material adjacent the central portion of the inside surface of the bulb. At least, it has been found in actual use that said existing bulbs are often fractured in this region regardless of what the exact cause may be.

However, persons having many years of experience and a thorough knowledge of the manufacture and operation of bulbs used for dispensing liquids were surprised by the inadequacy of existing bulb constructions for the applicant's particular use. In fact, such persons were of the opinion that the type of bulb disclosed in the above-mentioned patents could not be materially improved upon and, therefore, the solution to the applicant's problem could be achieved only by seeking an entirely different method of dispensing.

It has also been found in practice that existing bulbs do not provide the necessary directional control of the liquid being dispensed, particularly for applicant's purposes.

Thus, in an effort to overcome these problems and in a continuing effort to improve upon the two patented dispensers, as well as other existing structures for the same or similar purposes, the applicant developed an entirely new type of bulb construction especially adapted for comfortable, manual engagement and operation for the purpose of dispensing liquids, such as shampoo, in a very convenient and accurately controllable manner. However, it will be understood that, although reference may be made herein to the use of the invention in connection with the dispensing of hair dressing liquids, such as shampoo, such reference is for convenience of illustration because it was this type of use out of which the problem arose and which gave rise to the invention. Furthermore, it will become apparent that the applicant's improved bulb construction will have utility for many purposes having no relationship with the dispensing of hair dressing liquids.

Accordingly, a primary object of this invention has been the provision of a dispensing device which overcomes the problems previously encountered in dispens-

2

ing devices having the type of bulb structure previously available for applicant's purposes.

A further object of this invention has been the provision of a dispensing device, as aforesaid, including a bulb structure especially designed for comfortable manual engagement and operation by an average, normal adult hand for the purpose of advancing, and controlling the flow of, a liquid between two spaced points in a highly convenient manner, even through the liquids are of much greater viscosity than those normally dispensed with and through bulbs of this general character.

A further object of this invention has been the provision of an improved dispensing device, as aforesaid, including a bulb structure having inlet and outlet valves associated therewith, which is pleasing in appearance, which is easy to clean and keep clean, which requires little or no maintenance, which is virtually unbreakable, which is extremely easy to operate, which requires a minimum of operating parts, and which handles highly viscous and sticky liquids with a minimum of difficulty.

Other objects and purposes of this invention will become apparent to persons familiar with this type of equipment upon reading the following descriptive material and examining the accompanying drawings, in which:

FIGURE 1 is a broken, side elevational view of a dispensing device including the improved dispensing bulb embodying the invention.

FIGURE 2 is a front elevational view of a portion of the dispensing apparatus disclosed in FIGURE 1.

FIGURE 3 is a sectional view taken along the line III—III in FIGURE 2.

FIGURE 4 is a sectional view taken along the line IV—IV of FIGURE 3.

FIGURE 5 is a sectional view taken along the line V—V in FIGURE 3.

FIGURE 6 is a sectional view taken along the line VI—VI in FIGURE 1.

FIGURE 7 is a sectional view taken along the line VII—VII in FIGURE 2.

For convenience in description, the words "upper," "lower" and terms of similar import will have reference to the apparatus of the invention as appearing in FIGURES 1, 2 and 3. The words "front" and "rear" shall have reference to the left and right sides, respectively, of the bulb structure and associated parts as appearing in FIGURES 1 and 3. The words "inlet" and "outlet" will have reference to the lower and upper ends, respectively, of the bulb and parts associated therewith, as appearing in FIGURES 1, 2 and 3. The terms "inner," "outer" and derivatives thereof will have reference to the geometric center of said apparatus and parts thereof.

GENERAL DESCRIPTION

The objects and purposes of the invention, including those set forth above, have been met by providing a dispensing device including an improved bulb structure equipped with inlet and outlet valve assemblies which are arranged at angles to each other. One of the valve assemblies extends through one end of the elongated bulb members so that it communicates with the chamber therein. The other valve assembly extends through the side wall of the bulb structure near the other end thereof and also communicates with the chamber in the bulb. The inlet valve assembly, which is preferably at said one end of said bulb, is also engageable by a tube for the purpose of connecting the bulb structure to a source of liquid. The portion of the bulb structure between the two valve assemblies is comfortably and manually engageable by an average, normal adult hand. By alternately squeezing and releasing the bulb structure, said liquid is caused to move from the tube through the bulb

structure and outwardly through the outlet valve assembly.

Detailed Construction

The dispensing device 10 (FIGURE 1), which has been selected to illustrate a preferred embodiment of the invention, is comprised of a bulb 11, inlet and outlet valve assemblies 12 and 13, respectively, and an elongated flexible tube 14. A cap 17 is mounted upon the tube 14 for the purpose of connecting the tube, hence the inlet valve assembly 12 and the bulb 11, to a receptacle 18 containing the liquid to be dispensed. The bulb 11, which is fabricated from a resiliently flexible material, such as rubber, Koroseal (a product of B. F. Goodrich, Akron, Ohio) or some other suitable plastic material, is substantially elongated and, as indicated by FIGURES 1 and 2, is substantially larger in cross sectional area near its upper end than at its lower end. The bulb 11 has a chamber 19 (FIGURE 3) which is elongated lengthwise (vertically) of the bulb 11 and also frontwardly and rearwardly thereof (FIGURE 7), so that the cross section of said bulb is substantially egg-shaped. Thus, the opposing side walls 22 and 23 of the bulb 11 are relatively flat substantially throughout their lengths.

When the bulb 11 (FIGURE 2) is manually compressed between the fingers 66 and palm 67 of a hand, the walls 22 and 23 (FIGURE 7) will be urged into positions about as indicated in broken lines at 22a and 23a. However, due to the particular shape of the bulb 11, this compression of the bulb does not fatigue the material thereof and, therefore, does not produce the structural failures which have been encountered in the similar use of existing bulbs.

The lower end of the bulb 11 (FIGURE 3) is penetrated by an inlet opening 24 which communicates with the chamber 19 and has a central axis extending lengthwise of the bulb 11. In its normal, unstressed condition, the opening 24 is preferably defined by a substantially cylindrical wall which is axially longer than the average wall thickness of the bulb 11 by a substantial amount. A somewhat similar outlet opening 26 is provided through the wall of the bulb 11 near the upper end thereof so that its central axis is substantially perpendicular to the central axis of the inlet opening 24. Under some circumstances, the upper opening may face sidewardly or rearwardly instead of frontwardly, as shown. Moreover, the lower opening 24 in the bulb 11 may actually be used as an outlet opening and the upper opening, therefore, used as an inlet opening where the needs of the particular use involved may require same. Thus, it will be understood that this terminology is used for illustrative purposes only and is not intended to limit the scope of the invention.

The inlet valve assembly 12 (FIGURES 3 and 5) is comprised of an elongated body member 27 having a substantially circular cross section and a central, preferably cylindrical passageway 28. An upwardly facing valve seat 29 is provided in the passageway 28 so that it is spaced from the upper end thereof. Said valve seat is engageable by a spherical valve element 32, which may be fabricated from glass. The body member 27 is preferably fabricated from a reasonably rigid plastic material, such as nylon or Delrin (products of E. I. du Pont de Nemours Company of Wilmington, Delaware). The glass valve element 32 and plastic body member 27 create a minimum of obstruction to the flow of viscous materials through the passageway 28 in an upward direction. An annular element 33 is rigidly secured within the upper end of said passageway 28 to provide an end wall. A resilient member, such as the spiral spring 34, is disposed within the passageway 28 and preferably held under compression between the annular element 33 and the valve element 32 whereby said valve element is continuously and resiliently urged against the seat 29.

The body member 27 (FIGURES 3 and 5) has an annular, external flange 36, preferably midway between

the opposite axial ends of said body member 27, which positively and accurately controls the extent to which said body member 27 is inserted into the inlet opening 24. A plurality of annular, integral ridges 37 and 38 are provided upon the external surface of the body member 27 above and below, respectively, the flange 36. The radially outer surfaces of the ridges 37 are sloped downwardly and outwardly to provide gripping edges which oppose accidental disconnection of the body member from the bulb 11 when the upper end of the body member 27 is inserted into the opening 24. The outer surfaces of the annular ridges 38 are similarly sloped in the opposite direction to prevent accidental disengagement from within the upper end of the resiliently flexible tube 14, into which the lower end of said body member 27 is inserted.

The outlet valve assembly 13 (FIGURES 3 and 4) includes an elongated body member 39 of circular cross section having a central passageway 42 extending lengthwise therethrough. Said body member 39 has an annular, external flange 43 integral with the front end thereof for limiting the insertion of the body member 39 into the outlet opening 26. A plurality of integral, annular ridges 44 are provided around the body member 39 with frontwardly facing, radial edges which prevent accidental disengagement of the body member 39 from within the outlet opening 26. The passageway 42 (FIGURE 4) has a frontwardly facing valve seat 46 spaced from the front end of the body member 39 for engagement by the spherical valve element 47, which may be fabricated from glass. An annular element 48 is rigidly secured within the front end of the passageway 42 to provide a front end wall. Resilient means, such as a spiral spring 49 is held under compression within passageway 42 between the annular element 48 and the valve element 47, whereby said element 47 in combination with the seat 46 positively opposes inward movement of liquid through the passageway 42 and resiliently resists outward movement of liquid through said passageway 42. The body member 39 may be made from the same material used to fabricate the body member 27.

In this particular embodiment, the lower end of the tube 14 (FIGURE 6) is sleeved upon the upper end of a pipe 52 which is preferably resiliently flexible, but somewhat stiffer than the tube 14. A downwardly opening cap 17 having a circular top wall 54 and a substantially cylindrical side wall 56 is provided with a central opening 57 through said top wall 54 into which the pipe 52 is slidably and snugly received. The interior surface of the side wall 56 is provided with screw thread 58 or the like for snugly and positively engaging the neck 59 of a receptacle 18 of any convenient conventional type for holding the liquid to be dispensed. The top wall 54 of the cap 17 has a vent opening 63.

Operation

With the dispensing device 10 (FIGURE 1) connected to a receptacle 18 containing a supply of liquid, operation of the device 10 is effected by manually grasping the bulb 11 so that the side walls 22 and 23 are engaged, respectively, by and between the fingers 66 and palm 67 of the hand, as shown by broken lines in FIGURE 2. When the device 10 is operated for the first time in connection with a particular receptacle, to which it is connected, it will be necessary first to draw the liquid up through the tube 14 and into the chamber 19 before a dispensing operation can be performed. This is accomplished by compressing and then releasing the bulb 11 in successive operations until the liquid has been drawn through the tube 14 and pipe 52. During each compression of the bulb 11, the valve element 47 of the outlet valve assembly 13 is moved outwardly from the valve seat 46 by the air as it is expelled from the chamber 19. Upon release of the force (usually manual) effecting compression of the bulb 11, the outlet valve element 47 will be tightly held in the closed position by both the spring 49 and the vac-

5

uum thereafter created in the chamber 19 as the bulb 11 returns to its normal shape. At the same time, the inlet valve element 32 will be opened by said vacuum which will cause air to move upwardly through the tube 14, followed by the liquid in the receptacle 18. Eventually, after several of such operations of the bulb 11, liquid will move into the chamber 19 and be expelled through the outlet valve assembly 13 each time the bulb is compressed thereafter, until the supply of liquid in the receptacle 18 is exhausted.

It has been found that the substantially oval cross sectional shape of the bulb 11, as appearing in FIGURE 7, permits repeated distortions of the side walls 22 and 23 by manual compression into their broken line positions 22a and 23a without causing a structural failure in the bulb. Moreover, the volume of the chamber 19 is adequately reduced for a proper dispensing operation by this amount of distortion in said side walls.

Although a particular, preferred embodiment of the invention has been disclosed in detail above for illustrative purposes, it will be understood that variations or modifications of such disclosure, which lie within the scope of the appended claims, are fully contemplated.

What is claimed is:

1. A device for advancing, and controlling the flow of, a liquid from one point to another, comprising:
 - an elongated, resiliently flexible bulb having end walls and side walls defining an elongated chamber therein, the cross-sectional area of said chamber transverse of its lengthwise extent being substantially smaller near one end than near the other end thereof, the cross-sectional shape of the central portion of said bulb and said chamber transverse of their lengthwise extents being substantially oval, and said central portion of said bulb being comfortably engageable by and receivable within an average, normal adult hand;
 - means defining an inlet opening through said one end of said bulb communicating with the adjacent one end of said chamber, the central axis of said inlet opening being lengthwise of said bulb;
 - means defining an outlet opening through a side wall of said bulb adjacent the other end thereof and communicating with said chamber near the other end thereof, the central axis of said outlet opening being substantially parallel with the major axis of said cross-sectional shape and substantially perpendicular to the central axis of said inlet opening;
 - a first valve means including a first elongated body member having a central opening extending therethrough, said first body member being snugly disposed in said inlet opening, a valve element within said body member and resilient means urging said valve element closed, said first valve means being

6

arranged so that it positively obstructs the flow of liquid through said first body member away from said chamber and yieldably resists the flow of liquid through said first body member toward said chamber; and

- a second valve means including a second elongated body member having a central opening extending therethrough, said second body member being snugly disposed in said outlet opening, a valve element disposed within said second body member and resilient means urging said valve element closed, said second valve means being arranged so that it positively obstructs the flow of liquid through said second body member toward said chamber and yieldably resists the flow of liquid through said second body member away from said chamber.

2. The structure of claim 1 wherein the first body member has external flange means between the ends thereof engageable with said one end of said bulb for positioning one end of said first body member within said first opening, wherein the central opening through said first body member has a portion of reduced diameter adjacent said chamber, and said first valve means includes a spiral spring under compression between said portion of reduced diameter and the valve element in said first body member for resiliently urging said element against the seat in said first body member;

wherein the second body member has external flange means at the outer end thereof remote from said chamber, said flange means being engageable with said bulb, wherein the central opening through said second body member has a portion of reduced diameter near said outer end thereof, and said second valve means includes a spiral spring under compression between the reduced portion and the valve element in said second body member for resiliently urging said element against the valve seat in said second body member; and including an elongated resiliently flexible tube sleeved at one end thereof upon the other end of said first body member, and an annular flanged cap slidably and concentrically supported upon said resiliently flexible tube near the other end thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

| | | |
|-----------|------------|----------------|
| 2,385,091 | Lukowitz | Sept. 18, 1945 |
| 2,609,972 | Szekely | Sept. 9, 1952 |
| 2,804,240 | Anderson | Aug. 27, 1957 |
| 2,923,441 | McConnohie | Feb. 2, 1960 |
| 2,950,030 | McConnohie | Aug. 23, 1960 |