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3,337,124

VALVE CONSTRUCTION FOR PRESSURIZED FLUID DISPENSERS

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Fig. 1

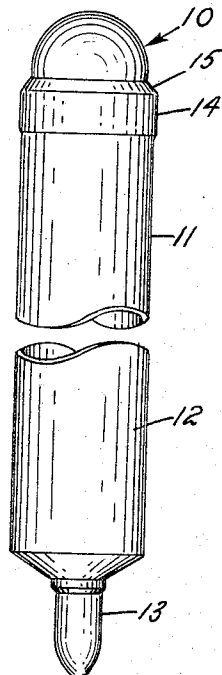


Fig. 2

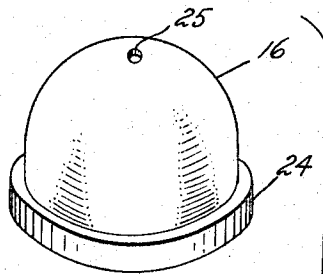


Fig. 3

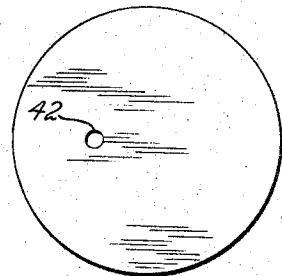


Fig. 5

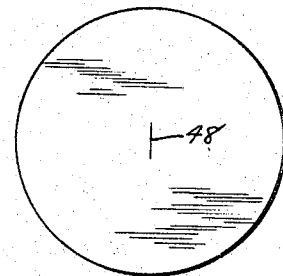
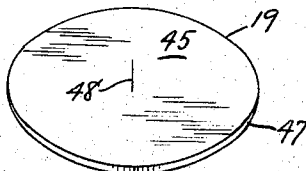
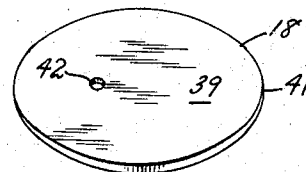
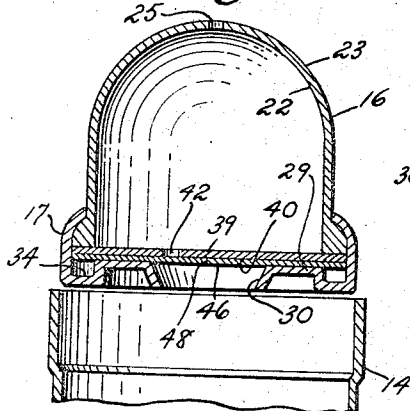


Fig. 4

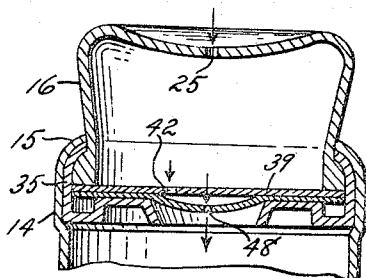
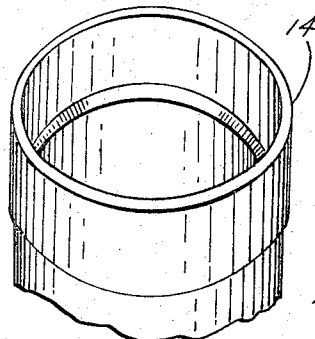


Fig. 6



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VALVE CONSTRUCTION FOR PRESSURIZED FLUID DISPENSERS

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1 Claim. (Cl. 230—169)

ABSTRACT OF THE DISCLOSURE

This invention contemplates the provision of a pressurizing valve which may be pre-assembled to include an orificed casing, first and second valve members having disaligned orifices, one of said valve members being flexible with respect to the other, and a bulb-like member for manually forcing air through said valve members. The casing member forms means for holding the valve construction in assembled condition, and is of circular configuration so as to be insertable into the end of a circular tube, following which the tube may be headed over to retain the valve in hermetically sealed relation therewith. The inventive method includes the steps of enlarging the end of the tube to form a seat for the valve, and a free edge which may be headed over upon the valve casing, whereby filling and assembly of the device with which the valve construction is used may be facilitated.

This invention relates generally to the field of fluid dispensers, as exemplified by ballpoint marking devices, and more particularly to an improved valve construction for creating a pressure differential within the dispenser to assist or replace capillary action in the dispensing of a fluid. Additionally, the invention contemplates the filling and assembling of pressurized fluid dispensers using the within disclosed valve construction. Devices of this general type are known in the art, and the invention lies in the specific constructional details permitting ease of assembly, and reduced cost of manufacture.

In devices of this type, it has been accepted practice to resort to so-called slit valves, in which the valve member is formed of a resilient synthetic resinous material in which an elongated slit has been cut through the plane of the material, the cut edges of the slit forming a valve. To maintain a unidirectional valve action, the valve member is abutted against a similarly shaped relatively inflexible plate having an eccentrically disposed opening which passes air under the action of a compressed bulb of generally hemispherical configuration disposed on the opposite side of said plate, whereby the slit permits the passage of air in a direction away from the plate, but not in a reverse direction. This type of construction, while useful, requires the assembly within the tube forming the upper portion of the fluid dispenser of five individual components, and the subsequent heading over of the end of the tube to maintain the components in proper hermetically sealed position, all of the above assembly procedure being of necessity performed after the tube has been filled with the fluid to be dispensed. In order to avoid spilling of the material, the tube must be jigged, and the individual components assembled by hand.

It is among the principal objects of the present invention to provide an improved valve construction which may be preassembled as a small unit and inserted into the free end of a filled tube as part of an automated assembly procedure utilizing only a single station for assembly.

Another object of the invention lies in the provision of an improved slit valve construction, in which not only

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the components thereof may be readily fabricated without resort to extensive tooling, but in which the components may be assembled in an automated or semi-automated fashion.

Yet another object of the invention lies in the provision of an improved valve construction, possessed of the above advantages, in which the cost of fabrication may be of a very low order, substantially less than the cost of existing equivalent constructions.

A further object of the invention lies in the provision of an improved valving construction which may be substantially impervious to the deleterious effects of organic solvents, moisture, grease, and other ingredients of relatively heavy, grease-base inks.

A feature of the invention lies in the fact that the novel construction herein disclosed may be incorporated into existing types of fluid dispensers, with little if any modification.

Another feature of the invention lies in the complete shielding of the pressurizing means from exposure to the dispensed fluid.

These objects and features, as well as other incidental ends and advantages, will more fully appear in the progress of the following disclosure, and be pointed out in the appended claim.

In the drawing, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

FIGURE 1 is a fragmentary view in elevation of an embodiment of the invention.

FIGURE 2 is an exploded view in perspective of a valve sub-assembly forming an element of the embodiment.

FIGURE 3 is a view in elevation of a first valve member forming a part of the sub-assembly of FIGURE 2.

FIGURE 4 is a view in elevation of a second valve member forming a part of said sub-assembly.

FIGURE 5 is a fragmentary sectional view showing a stage of assembly of the completed embodiment.

FIGURE 6 is a similar view showing a subsequent stage of assembly.

In accordance with the invention, the device, generally indicated by reference character 10, is illustrated in FIGURE 1 in the drawing in installed condition within a conventional marking pen 11, said pen including an elongated barrel 12 of cylindrical configuration, and a dispensing tip 13, the details of which form no part of the present disclosure. The barrel 12 may be formed from extruded metallic tubing, and includes an enlarged end portion 14, terminating in a headed-over upper edge portion 15, beneath which the device 10 is positioned. The device 10 comprises broadly: a flexible bulb member 16, an orificed valve casing member 17, a first or upper valve member 18, and a second or lower valve member 19.

The flexible bulb member 16 may be of generally hemispherical shape, as is well known in the art, and includes an inner surface 22, an outer surface 23, and a generally arcuate edge bead 24. Extending between the inner and outer surfaces 22 and 23 is a generally centrally disposed orifice 25 permitting the passage of air, said orifice being selectively covered by the thumb of the user when the member 16 is compressed to force air through the members 17-19, inclusive.

The valve casing member 17 is preferably formed as a metallic stamping and drawing operation, and includes a generally planar portion 29 having a relatively large centrally disposed orifice 30 extending between upper and lower surfaces 31 and 32, respectively. The edge 33 of the planar portion 29 terminates in a beaded portion 34

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leading to a cylindrical portion 35, the upper free edge 36 of which is headed over to retain the device 10 therein.

The first or upper valve member 18 is also preferably formed as a metallic disc-like stamping, and includes an upper surface 39, a lower surface 40, and a peripheral edge 41. An eccentrically disposed orifice 42 extends between the upper and lower surfaces 39-40, the degree of eccentricity being less than the radius of the orifice 30, so as to lie within the area of the same when the members 17 and 18 are placed in juxtaposed coaxial relation.

The second or lower valve member 19 is preferably formed from a suitable elastomeric membranous material of natural or synthetic resinous type, such as natural rubber, synthetic rubber, nylon or polyethylene, or any other elastomeric material sufficiently inert to the deleterious effects of the solvents and other ingredients employed in the manufacture of the dispensed material. It corresponds in configuration to that of the upper valve member 18, and includes an upper surface 45 and a lower surface 46, as well as a peripheral edge 47. A relatively centrally disposed slit 48 extends between the surfaces 45 and 46, so as to lie within the area of the orifice 30 but in offset relation with respect to the orifice 42.

Assembly of the device 10 includes the positioning of the lower valve member 19 within the cylindrical recess formed by the valve casing member 17, following which the upper valve member 18 is placed in juxtaposed relation, and the bulb member 16 wedged between the edge 36 and the upper surface 39 of the member 18. This assembly may be conducted as an automated operation, using a separate station for the positioning of each of the elements. The result is a complete sub-assembly which may be inserted into the open end of the elongated barrel 12 after the same has been filled with the fluid to be dispensed.

Referring to FIGURE 5 in the drawing, the upper portion 14 of the barrel 12 is enlarged or flared to form a shoulder for supporting the lower peripheral edge of the valve casing member 17. After the filling of the barrel 12, the device 10 is slid or force-fitted into position, following which the portion 15 is headed over as is known in the art. Owing to the fact that the entire device 10 has been pre-assembled as a sub-assembly, the filling and closing of the marking devices may also be performed by resort to automated or semi-automated techniques, thereby materially reducing the amount of manual labor involved.

During operation of the device, the introduction of air into the barrel 12 by means of the bulb 16 follows a path through the orifice 42, the slit 48 and the orifice 30. Air

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pressure in pulse form will cause a distention of the member 19, causing the slit 48 to open to permit the passage of air. When pressure on the bulb is released, the pressure differential built up within the barrel 12 will move the member 19 against the lower surface 40 of the member 18, which will then support the member 19 in planar condition wherein the slit 48 is again closed. This sealing action is assisted by the large area existing between the slit 48 and the orifice 42, the relatively soft member 19 tending to conform to the lower surface 40.

We wish it to be understood that we do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

We claim:

Pressurizing valve construction for use with a fluid dispensing device comprising: an orificed valve casing member including a generally planar first portion having a centrally disposed orifice and an integrally formed cylindrical second portion having a headed-over edge, said first and second portions forming a generally cylindrically shaped recess; a flexible bulb member including a head portion and an arcuate bead portion lying in a plane and having a centrally disposed orifice therein; a first valve member of circular planar configuration and having an eccentrically disposed opening therein, a second valve member of circular planar configuration and having a generally centrally disposed slit opening extending there-through; said second valve member contacting an inner surface of said first portion of said valve casing member wherein said slit may overlie the centrally disposed orifice therein, said first valve member overlying said second valve member wherein said eccentrically disposed opening is in disaligned relation with respect to said slit opening, the head portion of said flexible bulb member overlying the peripheral portion of said first valve member and being retained in compressed relation thereto by contact thereof with said headed-over edge of said second cylindrical portion of said valve casing member.

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50 SAMUEL F. COLEMAN, *Primary Examiner.*