ABSTRACT: A two-piece plastic nozzle which is readily affixed to a flexible or rigid container and a machine for the assembly of such a nozzle having means for deforming one of its pieces for insertion into the other.
1. NOZZLE AND MEANS FOR THE ASSEMBLY THEREOF

This invention relates generally to the liquid packaging arts and more specifically to a dispensing-type squeeze nozzle which automatically assumes its closed position upon the release of a squeezing pressure. One of the concepts leading to the development of the above invention was the insertion of a valve unit within a tubular member under a prestress condition so as to cause a valve stem to be biased against a dispensing outlet.

In recent years, the use of relatively rigid plastic containers has found wide acceptance in the liquid packaging arts. In particular, appreciable savings in the distribution and delivery of milk products in such containers has led to their increasing use. Although there are certain economic advantages in increasing the size of the containers for such products, heretofore container size has been limited by several features. One such limitation, particularly in home use, is the difficulty with which large containers can be tilted for pouring purposes. One of the principal objectives of this invention is to eliminate the necessity for tilting by providing an inexpensive dispensing spout.

A further objective of this invention is to provide a dispensing nozzle wherein a valve stem is prestressed against a dispensing outlet and wherein a transverse pinching or squeezing force exerted on the nozzle will move the valve stem away from its dispensing outlet and upon the release of such pressure, the stem will return to its closing position. As will be seen hereinafter, the squeezing pressure eliminates the need for any push-pull device or turning device which could be transmitted to the container itself.

Another objective of this invention is to provide a squeeze dispenser of the type disclosed which has means by which it can be readily attached to blown plastic containers.

Another of the concepts which led to the nozzle disclosed herein was the concept of deforming, and thereby stress, a relatively rigid stem supporting member to a reduced dimension wherein it could be inserted into a tubular member of lesser dimension. As a result, the tubular member will hold the supporting member in prestressed, deformed condition. The bias or prestress is utilized to urge the valve stem toward a dispensing opening.

A still further objective of this invention is to provide an apparatus by which the valve stem supporting member is deformed and inserted into the nozzle housing in a high speed and efficient manner.

These and other objects of the invention will become more apparent to those skilled in the art by reference to the following detailed description when viewed in the accompany drawings wherein:

FIG. 1 is a side elevation of the nozzle member of this invention;
FIG. 2 is a cross-sectional view along the line 2-2 of FIG. 1;
FIG. 3 is a cross-sectional view similar to FIG. 2 showing the action of the valve when a squeeze pressure has been applied;
FIG. 4 is a perspective view of a valve stem supporting member;
FIG. 5 is a longitudinal cross section in perspective showing the interior of the nozzle housing;
FIG. 6 is a diagrammatic perspective of the valve member insertion machinery;
FIG. 7 is a horizontal, cross-sectional view along the magazine portion of FIG. 6;
FIG. 8 is a side view of the mechanism of FIG. 6 partly in section;
FIG. 9 is a view of the type container in which the nozzle of this invention can be used; and
FIG. 10 shows the nozzle of this invention affixed to the container of FIG. 9 in its tilted, ready-for-use position.

Referring now to the drawings wherein like numerals indicate like parts, the numeral 10 indicates the dispensing nozzle of this invention. The nozzle is comprised of a tubular housing member 12 enclosed at one end 14 and having a threaded opening 16 at the other end thereof. Intermediate its length the tubular member 12 is formed with a dispensing outlet 18. The interior of the body 12 near the dispensing opening is flattened as at 20 whereby opening 18 will present a circular periphery to a valve stem member 22 of an insert 23.

It should also be noted that the walls of opening 18 taper downwardly and outwardly to thus provide a relatively thin sealing lip to said valve member.

The valve member 22 is supported within the tubular member 12 by way of a semicircular element 24 the ends of which are joined by a cross element 26. Together they comprise the insert. As best seen in FIG. 4, the valve member 22 depends downwardly from the cross element 26. At its lower or outer end, the stem is conically formed as at 28. The integral elements 24 and 26 are formed of a plastic relatively rigid with respect to the body 12. The arcuate dimension of the outside surface of element 24 is slightly oversized with respect to the interior surface of tubular body 12.

The insert 23 is deformed and inserted into the tubular member 12. This prestresses the valve stem support member 24 causing the member 26 to bow inwardly as shown in FIG. 2. Thus, the natural tendency of the semicircular element 24 to expand prestresses the closure surface 28 against the perimeter of the dispensing opening 18.

Once the member 23 is inserted within the housing 12 it can be noted by reference to FIG. 3 that a lateral squeezing pressure such as that shown by the arrows will cause a further deformation of the valve stem support member 24 causing the valve stem to move from the dispensing opening 18. Upon release of the squeezing or pinching pressure, the natural tendency of the element 24 to expand will quickly cause the assembly to return to the closed condition as shown in FIG. 2.

Referring now to FIG. 5, the interior configuration of the valve housing can be seen. Note that two interiorly directed flanges 30 and 32 lie on either side of the dispensing opening 18. The flange 30 is formed with a slanted surface 34 at its end nearest the threaded opening 16. The slanted surface 34 aids in inserting the member 23 into the housing 12. The opposing surfaces of each flange, however, are normal to the longitudinal axis of the tubular member and provide an aligning chamber in which the member 24 can nest. Also note that on either side of the chamber are aligning lugs 36 and 38 which align the element 24 radially with respect to the aperture 18. Thus, it can be seen that the valve support insert 23 is both axially and radially affixed with respect to the dispensing opening 18 after assembly.

Referring now to FIG. 6, there is diagrammatically shown a machine for expeditiously and efficiently placing inserts 23 into the tubular members 12. This assembly is comprised generally of a magazine 50 comprised of a chamber 52 which receives a stack of inserts 23 and a cylindrical chamber 54 which slidably receives a discharge piston member 56. The piston 56 is reciprocal within the chamber 54 by means of a hydraulic or pneumatic cylinder 58. The chamber 52 is slotted at 60 through which the stems 22 extend and is bottomed by flanges 59 and 59'. Disposed in the same horizontal plane as the lowermost insert 23 and coaxial with the aligned valve stem thereof is a discharge assistance piston 62 which is operable by a hydraulic or pneumatic cylinder 64. Immediately below the magazine 50 is a conveyor 66 which sequentially moves a series of the tubular members 12 below the chamber 54.

The operation of this machine is best understood by reference to FIG. 7. Initially, the piston 62 moves forward and pushes the lowermost insert 23 into the chamber 54 where it is deformed as shown. The deformed insert 23 is then subjected to a downward movement from piston 56 which ejects it from the open end of the magazine into the member 12 as shown in FIG. 8. Subsequently, a further housing 12 is disposed below the magazine and the sequence is repeated.

As will be understood, the assembled members can be readily fastened to an externally threaded nozzle 70 of a bottle which can be positioned on a bottle shelf 72. After filling the container 72, dispensing nozzle 10 is readily secured thereto and the bottle tilted to the position shown on FIG. 10. There, it can rest on a refrigerator shelf or other support where fluids
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3. said semicircular element being oversize with respect to said member whereby said tubular member maintains said semicircular element under compression such that its tendency to expand will prestress said stem into engagement with the opening.

4. The invention of claim 1 wherein first means in said tubular member longitudinally aligns said support.

5. The invention of claim 1 wherein second means in said tubular member radially aligns said support to a position whereby axial movement of said stem is toward or away from said opening.

6. The invention of claim 4 wherein the open end of said tubular member is interiorly threaded.

7. The invention of claim 6 wherein said first ridge is tapered toward said open end.

can be dispensed therefrom by a mere squeezing. Immediately upon removal of the squeezing force, the valve will be closed as heretofore disclosed.

In a general manner, while there have been disclosed effective and efficient embodiments of the invention, it should be well understood that the invention is not limited to such embodiments, as there might be changes made in the arrangement, disposition, and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims:

1. A dispensing spout comprising:
   a flexible, tubular member having an enclosed end;
   securing means at the other end thereof for affixing said member to a liquid-containing container;
   said tubular member having a dispensing opening intermediate its ends;
   a valve support member within said tubular member comprised of a first semicircular element and a cross element connecting the ends of said semicircular element;
   a valve stem extending between said cross element and said opening; and