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MIXING CONTAINER

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3 Claims

ABSTRACT OF THE DISCLOSURE

A mixing and dispensing container having a partition wedged within its interior to divide it into two compartments, for the reception of two separate ingredients, and a dispensing nozzle slidably received above the partition in such a manner that the inner orifice of its dispensing channel is held closed by the partition and is thus protected from the danger of being clogged by the contents of the container during storage. Threadably engaged over the open end of the container is a hard-topped screw cap, and when said cap is tightened fully upon the container, it pushes the nozzle downwardly which in turn dislodges the partition to effect mixture of the ingredients in the container. At the same time the inner orifice of the dispensing channel is freed.

The present invention relates to closed containers constructed to store at least two separate substances. Containers of this type are usually employed to store the constituents of solutions that do not remain stable and are therefore best produced immediately before use. Such containers are divided into two or more separate compartments by partitions or diaphragms that provide hermetic seals between the compartments. The partitions must be broken or removed while the integrity of the container is maintained, so that the desired solution may be formed without the danger of contamination from the outside; and once the barrier or barriers between the different compartments has been effectively removed, and the desired solution or mixture has been formed, the containers should provide dependably operative means for dispensing the newly formed product.

It is an object of my invention to provide a mixing container of the type referred to, which permits convenient removal of its partition or diaphragm while maintaining complete integrity of its contents.

It is another object of the invention to provide a container, of the type referred to, which is effectively protected from inadvertent premature removal of its partition or diaphragm.

A further object of the invention is to provide a mixing container of the type referred to, with a dispensing nozzle that is protected from obstruction during storage.

Still another object of the invention is to provide a dispensing container, of the type referred to, that is of simple construction and is composed of a minimum of separate parts.

These and other objects of my invention will be apparent from the following description of the accompanying drawing which illustrates certain preferred embodiments thereof and wherein:

FIGURE 1 is a cross section through a two-compartment dispensing container embodying my invention;

FIGURE 2 is a cross section through a modified embodiment of the invention; and

FIGURE 3 is a section taken along line 3-3 of FIGURE 2 and viewed in the direction of the arrows associated with said line.

In accordance with the invention a dispensing nozzle is made part of the mechanism for dislodging the parti-

tion in mixing containers of the type referred to. For this purpose the nozzle is slidably received in the container and is effectively interposed between a hard-topped, external screw cap that is partially engaged over the top of the container, and a part of the partition which is arranged to close the fine inner orifice of the dispensing channel of the nozzle. By tightening the screw cap fully upon the container, the nozzle is pushed deeper into the container and dislodges the partition which drops away and in so doing frees the inner orifice of the dispensing nozzle for operation.

In FIGURE 1 the reference numeral 10 designates the body of a container which may be cylindrical in shape and may be made of metal, glass or a plastic material, such as polyethylene. At its upper end the container has a radially contracted neck 12 provided with external screw threads as indicated at 14. Threadably engaged over the upper portion of the neck is the cylindrically shaped, internally threaded base portion 16 of a closure cap 18 which is made of a relatively stiff material, such as stiff plastic or metal. Said cap has an outwardly directed frusto-conical center portion 20.

The inner surface of the neck 12 is smoothly cylindrical in shape and forms along its bottom an inwardly projecting smoothly rounded, annular shoulder 22. Seated upon said shoulder is the peripheral rim 24 of a shallow-arched or dome-shaped partition or diaphragm 25 of a resiliently yieldable material, such as polyethylene. At its concave bottom side the partition may be provided with a downwardly projecting annular rib or rim 26 of such external diameter that it forms a snug fit with the described shoulder 22. Moreover, said rib stiffens the diaphragm 25 against distortion. From the convex upper side of the partition 25 at the center point thereof rises a stem 28 whose free top end forms a cup-shaped depression or concavity. Received within the container neck is the cylindrical base portion 32 of a dispensing spout or nozzle 33 which is made of a relatively stiff material, such as linear polyethylene. Said base portion 32 is of such an external diameter that it forms a snug sliding fit with the inner surface of the container neck 12. The nozzle 33 has an upwardly directed frusto-conically-shaped projection or teat 34 that rises to the level of the top wall 35 of closure cap 20 when said cap is partially screwed down upon the container neck 12, as shown in FIGURE 1. Internally said nozzle 33 is provided with a downwardly directed conical projection or teat 36 that bears against the cup-shaped depression 30 of partition stem 28. A gradually expanding dispensing channel 38 commences with a pin point orifice at the apex of the downwardly directed inner projection 36 and passes axially through the nozzle to the apex of the outer teat 34. A limited distance inwardly removed from its periphery the partition or diaphragm 25 may be provided with an upwardly extending annular wall 40 that converts it effectively into a cup. This makes it possible for one of the constituents that are to be stored in the container, for instance a crystalline powder, to be delivered onto the top of the partition 25 at a point remote from the container, i.e. before the partition 25 is placed into position within the neck of the container.

In practical use, the container is first filled with one of the constituents of the products to be stored, say a suitable liquid solvent or suspension medium. The second constituent, for instance a crystalline powder, may be delivered into the cup 40 formed upon the convex surface of the partition 25 at a different location, as pointed out hereinbefore. The filled cup is then introduced into the neck of the container and pushed down until its peripheral rim 24 comes to rest upon the inwardly projecting shoulder 22 around the bottom of the container neck. As the next step the cylindrical base portion 32 of the

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dispensing nozzle 33 is slid into the container neck 12 and pushed downwardly until the apex of its inner teat comes against, and is covered by, the cup-shaped depression at the upper end of the partition stem 28. Now the closure cap 20 is applied over the outwardly directed teat portion 34 of the nozzle, and its internally threaded base 16 is screwed down over the externally threaded neck of the container until the inner surface of its top 35 comes into contact with the top of the dispensing nozzle 34 and pushes the nozzle downwardly causing its inner teat 36 to bear upon the stem 28 of the diaphragm. This flattens the arched diaphragm causing it to expand in a radial direction and press its rim against the inner surface of the container with such force as to establish with said surface a hermetic seal between the compartments of the container above and below the diaphragm. The filled container is now ready for storage, shipment and ultimate use. If the closure cap is made of a sufficient stiff or rigid material and the fit of its internal threads over the external threads of the container neck is sufficiently tight—which is easy to achieve—the container of my invention is protected from the accidental premature congress of the separated constituents stored therein. At the same time, closure of the inlet orifice of the dispensing channel 38 by the upper end of the partition stem 28 prevents parts of the crystalline powder in the cap 40 from obstructing the dispensing channel. In this manner said channel is dependably preserved in condition for immediate effective use.

When the time has come to make use of the contents of the container, it is merely necessary to tighten the closure cap 20 further upon the neck of the container. This causes the diaphragm 25 to assume a downwardly arched shape which reduces its radial dimension and makes it easy, upon further tightening of the screw cap 20, for its rim 24 to negotiate the annular shoulder 24 of the container neck in a downward direction. With the diaphragm thus dislodged from the neck of the container, said diaphragm drops into the pool of liquid underneath causing the contents of its cup 40 to mix with, and/or be dissolved by, the liquid in the container.

To secure the nozzle 33 in its depressed position within the neck of the container, once it has been employed to dislodge the partition or diaphragm 25, its base 32 is provided with an outwardly directed narrow annular flange 46, and the upper end of the container neck is provided along its inner edge with a corresponding annular recess 48 that forms at its upper end a narrow inwardly projecting rim 49. When in the process of dislodging the diaphragm 25, the base of the nozzle 33 is pushed downwardly within the neck of the container by the screw cap 20, the flange 46 of the nozzle base 32 negotiates the inwardly projecting rim 49 of the recess 48 and snaps into position in said recess below said rim. Thus, upon removal of the closure cap 20, the container may be manipulated to dispense its contents through the nozzle 33, without danger of losing the nozzle. The dislodged partition floating in the pool of liquid within the container will act as an agitator that stirs the two ingredients when the bottle is shaken and thus promotes the formation of the desired mixture or solution. As the partition is dislodged in the described manner, the dispensing channel is automatically opened and is dependably in condition for immediate use because during storage and handling its narrow orifice was protected against entrance of the crystalline powder from cup 40 by its firm contact with the upper end of the partition stem 28.

The embodiment of the invention illustrated in FIGURE 2 differs from the embodiment illustrated in FIGURE 1 in that it includes means for holding the dislodged partition 25' in suspended condition above the body of liquid in the container. An arrangement of this sort is desirable in cases where an article floating in the liquid might detract from the eye appeal of the container, or might give rise to the suspicion that the contents of the container may somehow be contaminated by such close

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contact with a foreign body. To hold the diaphragm 25' in suspended position once it has been dislodged, the upper end of its stem is radially expanded to form a head 50 and the downwardly directed internal teat 36' of the dispensing nozzle 33' is provided with a pair of downwardly directed braces or arms 52_a and 52_b which extend at either side of said teat to a level below the head 50 of the partition stem 28' and have inwardly turned terminal flanges 54_a and 54_b, respectively, that engage said stem 28' slidably a predetermined distance below said head 50 (FIGURE 3). When the screw cap 35' is screwed fully down upon the neck 14' of the container, the inner teat 36' of the dispensing nozzle 33' presses against the top surface of the partition stem 28' and pushes the partition downwardly beyond the rounded shoulder 22' at the bottom of the container neck in the same manner as described in connection with the embodiment of the invention illustrated in FIGURE 1, but instead of dropping into the pool of liquid below, the inwardly turned flanges 54_a and 54_b, at the bottom of the braces 52_a and 52_b, respectively, engage the head 50 on stem 28' and keep the partition suspended below the bottom of the container neck at sufficiently large a distance to allow the powder 44' on the upper side of the partition to flow freely into the container and mix the fluid stored therein. To prevent accidental return of the suspended partition into a position wherein it may block the neck of the container, for instance when the contents of the container are dispensed through the nozzle 33' radially extending spacer beads or fillets 55 may be provided upon the upper side of the partition at angularly spaced points of its periphery. These spacer fillets come from below against the shoulder 22' at the bottom of the neck 14' whenever the container is turned over or held in an upside-down position, and keep the communication between container neck and container body dependably open. Thus, there is always an annular space through which the contents of the container may reach the neck 14'; and from there they may always penetrate to and be dispensed through the dispensing nozzle 33' due to the fact that there are open spaces of substantial angular width between the braces 52_a and 52_b which hold the dislodged partition, as best shown in FIGURE 3.

The sterile mixing and dispensing containers of my invention are of simple construction and assembled from a minimum of separate components. Two separate substances can safely be stored therein under sterile conditions until they are ready for mixture and use. When the time has come, it is merely necessary to screw an external protective cap down fully, and the resultant downward movement of the dispensing nozzle dislodges the partition resulting in a mixture of the two ingredients while sterile conditions are maintained. Due to the stiffness of the cap and due to the fact that a definite turning action is necessary to set the partition-release mechanism into effect, there is only very little danger that the ingredients are accidentally mixed prematurely, such as is often the case in containers which have soft caps over their partition-dislodging mechanisms to permit external pressure upon the caps to remove or destroy their partitions. The containers of the invention have the added advantages that they provide a dispensing nozzle which is automatically kept in prime operative condition during storage and which needs no separate closure cap but is sheltered by the same cap that protects and operates the partition-dislodging mechanism.

While I have explained my invention with the aid of certain preferred embodiments thereof, it will be understood by those skilled in the art that the invention is not limited to the specific constructional details and materials shown and described by way of example, which may be departed from without departing from the scope and spirit of the invention.

I claim:

1. A mixing and dispensing container comprising an

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enclosure having an externally threaded open end portion, an internally threaded hard-topped closure cap engaged over said end portion, a partition wedged within said enclosure and having an upwardly extending member, and a dispensing nozzle having upwardly extending and downwardly directed conical projections, both said projections containing a common axially extending dispensing channel, said nozzle being interposed between said cap and said member, with said upwardly extending projection in contact with the top of said cap and said downwardly directed conical projection in contact with said member to close said channel and to provide means for dislodging said partition upon tightening of said closure cap upon said end portion.

2. A container according to claim 1 wherein said member has the form of a stem with a radially expanded head, and wherein said nozzle has braces arranged to engage said stem slidably a distance below said head.

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3. A container according to claim 2 wherein the upper side of said partition carries spacer members at angularly displaced points of its periphery to prevent the dislodged partition from blocking communication between said end portion and the remainder of said enclosure.

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