April 22, 1958 T. F. SCHLICKSUPP 2,831,620

SELF-SEALING CLOSURE MECHANISM FOR LIQUIDS

Filed July 19, 1954 2 Sheets-Sheet 1

FIG. 1

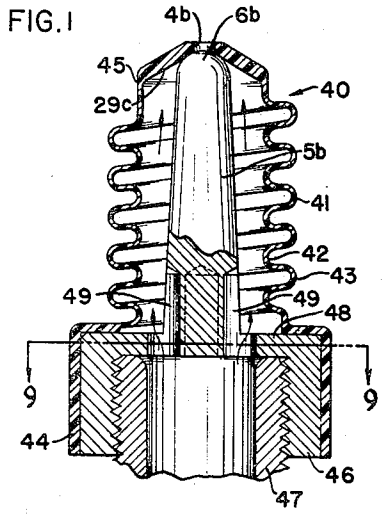


FIG. 2

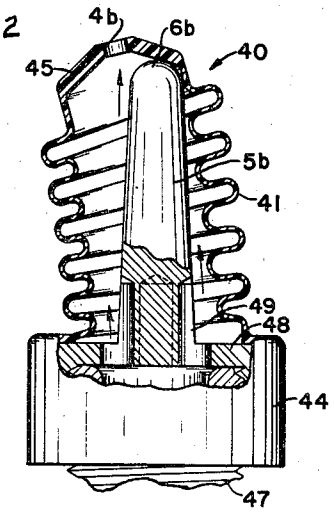


FIG. 4

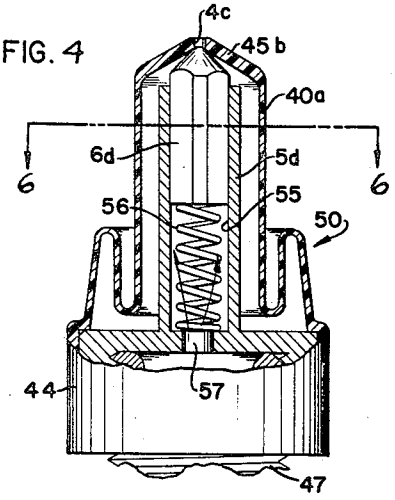


FIG. 3

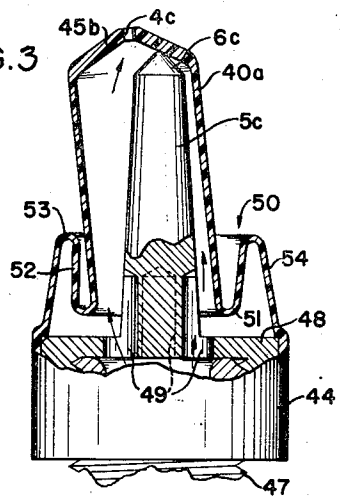


FIG. 5

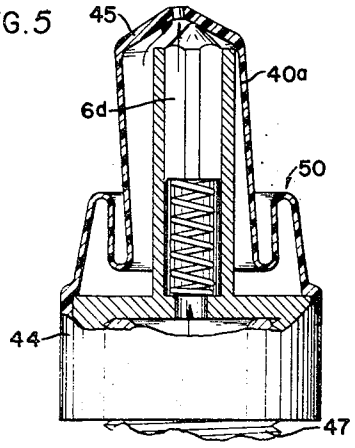
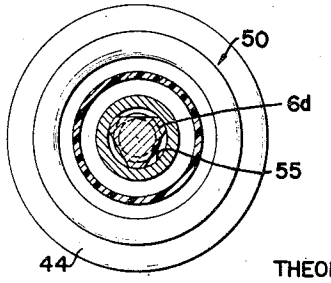


FIG. 6



INVENTOR.
THEODORE F. SCHLICKSUPP

BY
Pennie, Edmonds, Morton, Barrows and Taylor

HIS ATTORNEYS

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SELF-SEALING CLOSURE MECHANISM FOR LIQUIDS

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FIG. 7

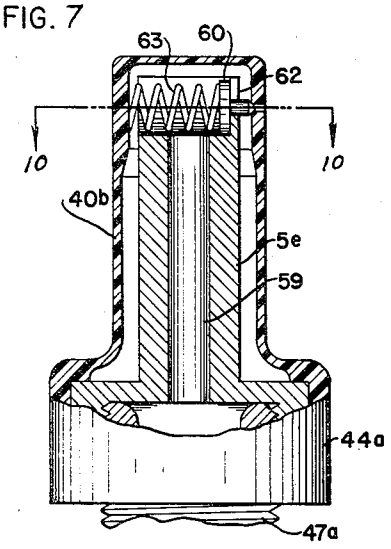


FIG. 8

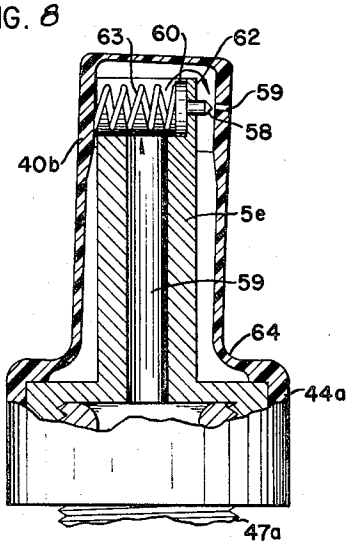


FIG. 9

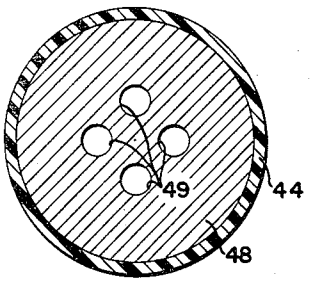
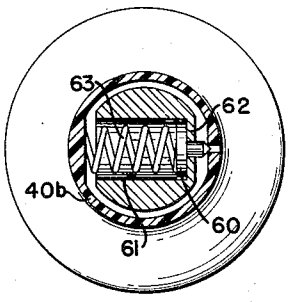


FIG. 10



INVENTOR.
THEODORE F. SCHLICKSUPP

BY
Pennie, Edmonds, Morton, Barrows & Taylor

HIS ATTORNEYS

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SELF-SEALING CLOSURE MECHANISM FOR LIQUIDS

Theodore F. Schlicksupp, Long Island City, N. Y.

Application July 19, 1954, Serial No. 444,115

4 Claims. (Cl. 222—517)

This invention relates to devices for closing containers of various kinds from which liquids are to be dispensed, and, more particularly, it relates to a discharge mechanism which is self-sealing or self-closing so that the container can not be unintentionally left open after use.

The discharge mechanism of the invention is intended to be used in connection with containers for liquids, creams, toilet water, skin lotions, perfume, and the like, where conservation of the liquid is essential, and also with containers charged with a volatile propellant under suitable pressure.

The primary object of the invention is to provide a discharge mechanism which provides a tight closure so as to reduce evaporization to a minimum, and which at the same time can be easily manipulated to control the discharge of the contents of the container.

Another object of the invention is to provide a device of this kind which can be readily applied to the bottle of toilet water, lotion, etc. in place on the cap or other closure with which the bottle is provided at the time of purchase.

A further object of the invention is to provide a device of this kind wherein the construction is sufficiently simple and economical to produce to enable it to be supplied with the container in place of the ordinary cap or other closure, or, if desired, built into the container as a permanent part thereof.

The construction of the improved discharge mechanism of the invention will be understood from a consideration of the accompanying drawings and the following detailed description of the several embodiments illustrated therein.

In these drawings:

Figs. 1 and 2 are views the device in closed and open positions, respectively;

Fig. 3 is a view similar to Fig. 2 showing a very slightly changed form of the device in open position;

Figs. 4 and 5 are similar views of another modification, in closed and open positions, respectively;

Fig. 6 is a sectional view taken on line 6—6 of Fig. 4;

Figs. 7 and 8 are views similar to Figs. 1 and 2 showing a still further modification;

Fig. 9 is a sectional view taken on line 9—9 of Fig. 1; and

Fig. 10 is a sectional view taken on line 10—10 of Fig. 7.

Referring now to these drawings, the device comprises a generally cylindrical body member, or fixed part 44, a spout or nozzle member indicated generally by reference numeral 40, having at its outer or upper end a discharge aperture 4*b*, and an associated valve seat surrounding the inner periphery of this aperture, together with a central post 5*b* supporting at its outer end a valve member 6*b*, the end of the fixed post itself being rounded to constitute this valve member. At least the outer end portion 45 of nozzle member 40 is a substantially rigid cylindrical member, as illustrated in Figs. 1 and 2, although in Fig. 3

this rigid portion 45*b* is much longer and extends approximately the entire length of the nozzle.

Such rigid nozzle portion 45 (Figs. 1 and 2) is connected with the body member 44 by means of a longitudinally extending bellows sections 41, having bellows-like formations therein with alternate inwardly and outwardly projecting folds 42 and 43. This bellows section renders the nozzle end portion 45 movable both longitudinally and laterally. The inner surface of such nozzle end portion is conical forming a cam surface 29*c*, and the bellows-like portion 41 of the nozzle being both flexible and resilient, tends to urge the end portion of the nozzle and the fixed post 5*b* in opposite directions so as to cause the valve 4*b*, 6*b* to be biased to closed position as shown in Fig. 1.

The bellows construction referred to renders the nozzle both axially and laterally displaceable, and inasmuch as it is made of resilient material the spout member is also resilient in both of these directions. The spout members shown in each of Figs. 1–10 are made of any suitable flexible and resilient material, and advantageously are made of nylon plastic although they may also be made of other plastic, such as polyethylene or of thin resilient metal.

The body portion 44 of the device is formed by enlarging the lower portion of spout member 40, that is, these parts are integral with one another. This body portion is fitted closely, with a force or push fit, onto the outer cylindrical surface of a collar member 46 by which the discharge mechanism may be removably connected to the neck 47 of the container by means of the screw threads shown, or otherwise.

The post member 5*b* is advantageously made integral with a base flange or base portion 48, formed integrally with the upper end of collar 46.

The flow of the material from the container to the discharge aperture 4*b* is upwardly through a set of four passageways 49 which extend through the base flange 48 adjacent the base of post 5*b* so that the material may flow upwardly in the annular space between this post and the nozzle member 40 as indicated by the arrows.

Referring to Fig. 2 which shows the device in open position, the opening action is obtained by pressing with the fingers on the side of the spout or nozzle member 40 in any direction. This opening movement causes the inner conical or cam surface 29*c* of the end portion of the nozzle to slide on the rounded outer end 6*b* of the post and open the discharge aperture 4*b*, inasmuch as cam surface 29*c* is in contact with the rounded outer end 6*b* of the post when the spout and post are in coaxial position, i. e. even when the post closes the discharge aperture 4*b* (Fig. 1). The resilient construction of the nozzle member 40 resulting from the cylindrical bellows formation permits not only the tilting of the nozzle, but also the necessary axially outward movement of the outer end portion 45. It will be understood that upon release of the pressure at the side of the nozzle it will automatically return to closed position by the natural resilient nature of the material of which the nozzle is made and the cam action of the coacting surfaces of 29*c* and 6*b*.

It will be understood that the annular space intermediate the post and spout member serves in the various forms of the discharge mechanism to permit the tilting movement required to open the nozzle mechanism, and in addition also to serve as the flow space for the material between the neck of the container and the discharge opening of the nozzle.

With certain exceptions, the construction shown in Fig. 3, is similar to that just described. Thus, the outer end of the post member 5*c* is formed with a conical valve portion 6*c* having a pointed tip and constructed to co-

operate with a smaller discharge opening 4*c*. Also, the spout or nozzle member 40*a* is formed as a smooth cylinder without the cylindrical bellows-like formation of Figs. 1 and 2. Also, the interconnection of the base of the nozzle with the body portion 44*a* is by means of what may be described as a radial type of bellows, indicated generally by numeral 50.

Such a radial bellows construction includes a downwardly or inwardly projecting fold 51 from the lower end of the cylindrical spout member 40*a* and continuing into an upwardly extending cylindrical portion 52 which may be approximately one-quarter the height of the spout member. At the upper end of cylindrical portion 52 there is a second upwardly extending fold 53 which joins it with a downwardly flared conical skirt portion 54. This lower end of this skirt joins integrally with the body section 44*a*.

With the spout or nozzle member 40*a* and its integral parts molded for nylon, the two folds 51 and 53 will provide sufficient axial flexibility as well as lateral flexibility to permit the axial and lateral displacements of the upper end portion 44*b* which are required in shifting such upper end from the central or closed position to the open position as shown in Fig. 3.

In the modified form of the device shown in Figs. 4 and 5 the construction of the spout or nozzle member 40*a* is identical with that just described including the construction of its lower end with the formation 50 which has been referred to as a radial form of bellows. The only difference between these two modifications is in the construction of the post and valve members.

Instead of a solid post, the form shown in Figs. 4 and 5 is provided with a hollow post 5*d*. This post has a cylindrical bore 55 extending from bottom to top within the upper end of which a plug type valve 6*d* slides. This valve is urged upwardly by means of a coil spring 56 which is seated at the bottom of bore 55 on a ledge surrounding a central opening 57. This opening is necessary for the admission of the contents of the container to the interior of bore 55, and in order to allow the material to flow past the plug valve 6*d* it is made of generally triangular shape in cross section, as shown in Fig. 6, with the apexes of the triangular formation rounded to fit the surface of bore 55, and with the flat sides spaced from the walls of the bore to form flow passages. Valve 6*d* and spring 56 are preferably of metal. The upper end of the valve member is a pointed cone so as to close a small aperture 4*c* the same as in the device of Fig. 3, although a larger discharge aperture, and a corresponding change in the valve form can be made, if desired.

The opening of this mechanism is by a tilting movement of the spout member 40*a* as in the other forms, but it is not necessary for the outer end 45 of the nozzle member to move axially inasmuch as the required relative motion is provided by the sliding valve member 6*d*.

Referring now to Figs. 7, 8 and 10, the discharge mechanism construction here shown is intended for use where some degree of pressure exists within the container upon which the mechanism is mounted. Such pressure might be due to the incorporation in the container of a volatile propellant for the purpose of discharging the contents in the form of a spray, foam, lather, etc.

In this form of the mechanism the post 5*e* carries at its upper end a small valve member 58 which is placed horizontally instead of vertically and cooperates with a small lateral discharge aperture 59 provided in the side wall of the spout or nozzle member 40*b* adjacent the end thereof. The discharge is therefore lateral instead of axial.

The opening of the valve is caused by tilting the nozzle 40*b* as in the other constructions, although it is necessary to place an indicator on the end of the nozzle to show in which direction the nozzle should be tilted. The post 5*e* is rigid and may be supported as described in connection with Figs. 1 and 2. As shown, it has a bore 59

extending from end to end for the flow of the container contents to the discharge aperture, although perforations may be made around the base of the post and the flow permitted through the space between the post and interior wall of the nozzle, as shown in Figs. 1, 2 and 3, and also in the earlier figures.

The valve 58 is preferably provided with an integral supporting disc 60 and, to mount the valve, a cross bore 61 is provided at the top of post 5*e* slightly larger in diameter than the disc 60. This bore 61 is open at its left-hand end, but is not cut entirely through at the right end, leaving a thin vertical wall 62. The shank of the valve 58 is inserted through a small aperture made in this wall, and the valve is held in place by means of a coil spring 63. Spring 63 not only holds the valve in place, but projects from the left-hand open end of cross bore 61 and engages the interior wall of the nozzle or spout member 40*b*. This spring therefore tends to return the spout member to vertical position in axial alignment with the post 5*e* to close the valve after the nozzle member has been tilted to the right in open position, as shown in Fig. 8.

The extent of tilting movement required for the opening of the valve in this form of the invention, is small, and is provided for by the flexibility of a small radial flange portion 64 which is formed on the lower end of spout or nozzle member 40*b* and joins in the base of this nozzle to the body portion 44*a*.

It will be understood that changes may be made in the construction and arrangement of the parts of the closure mechanism of the invention, which changes are intended to be included as part of the invention if they are within the terms of the appended claims.

It will also be understood that the form of the invention shown in Figs. 7 and 8, instead of being removably attached to the container in the manner shown in the drawings, or otherwise, may be built into the container structure itself thereby eliminating the necessity for a screw thread or similar attachment, and it will be understood further that in the forms of construction which include a movable valve, namely, Figs. 4 and 5, the flow of the contents to the discharge aperture may be, at least in part, through hollow post 5*d*.

I claim:

1. A discharge mechanism for containers comprising a fixed part, a post member fixed at its inner end to said part and projecting outwardly therefrom, a valve member adjacent the outer end of said post, a spout member surrounding and in spaced relation to said post and forming an annular passage therewith, said spout member having a discharge aperture adjacent its outer end and a seat for said valve member associated with said aperture, said spout member being displaceable to a tilting position with respect to said post, said spout member having a flexible resilient bellows section intermediate its outer end and said fixed part urging the said post and spout member in opposite axial directions and towards coaxial position with respect to said post to close the said discharge aperture, and an interior cam surface at the outer end of said spout member in engagement with said valve member when said post and spout members are in coaxial position so that when a lateral force is applied to tilt the spout member the interaction of said cam surface with said valve member causes a combined lateral and longitudinal movement of the outer end of said spout member thereby opening said discharge aperture.

2. A discharge mechanism as set forth in claim 1 wherein the outer end of the spout member has an interior conical surface forming a cam surface which is in operative engagement with the outer end of said post when the post and spout members are in coaxial position.

3. A discharge mechanism as claimed in claim 1 in which the spout member is of substantially rigid tubular form and the flexible resilient bellows section thereof is a radial formation connecting the inner end of said

spout member and the fixed part and rendering the spout member flexible and resilient both laterally and longitudinally for coaction with the fixed post.

4. A discharge mechanism for containers comprising a fixed part, a post member fixed at its inner end to said part and projecting outwardly therefrom, a valve member adjacent the outer end of said post, a spout member surrounding said post and forming an annular passage therewith, said spout member having a discharge aperture adjacent its outer end and a seat for said valve member associated with said aperture, said spout member being displaceable to a tilting position with respect to said post, said spout member having an enlarged base portion joining it to said fixed part, the inner end of the spout member and said enlarged base portion being interconnected by a flexible resilient section urging said post and spout member in opposite axial directions and towards coaxial position with respect to said post to close the said discharge aperture, and an interior cam surface at the

outer end of said spout member in engagement with said valve member when said post and spout members are in coaxial position so that when a lateral force is applied to tilt the spout member the interaction of said cam surface with said valve member causes a combined lateral and longitudinal movement of the outer end of said spout member thereby opening said discharge aperture.

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U. S. DEPARTMENT OF COMMERCE

PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,831,620 Theodore F. Schlicksupp April 22, 1958

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 34, for "on the" read -- of the --; column 3, line 19, for "for nylon" read -- from Nylon --.

Signed and sealed this 27th day of May 1958.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON

Commissioner of Patents