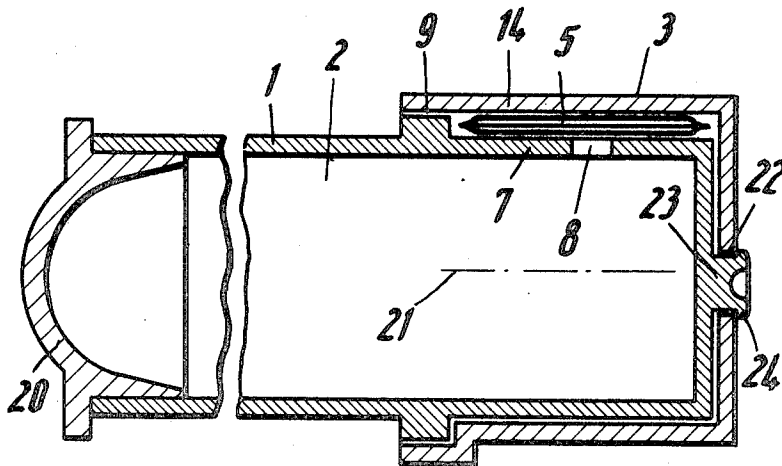


[72] Inventor Ernst A. Muhlbauer
Hamburg, Germany
[21] Appl. No. 874,540
[22] Filed Nov. 6, 1969
[45] Patented Dec. 7, 1971
[73] Assignee Zahn-Porzellan KG E. Muhlbauer & Co.
Hamburg, Germany
[32] Priorities Mar. 4, 1969
[33] Germany
[31] P 19 10 885.1;
July 9, 1969, Germany, No. P 19 34 729.6

[56] **References Cited**
UNITED STATES PATENTS
3,415,360 12/1968 Baumann et al. 206/47 A
3,425,598 2/1969 Kobernick 206/47 A
Primary Examiner—William T. Dixon, Jr.
Attorney—John Lezdey

[54] **DUPLEX CAPSULE FOR DENTAL FILLING INGREDIENTS**
9 Claims, 7 Drawing Figs.
[52] U.S. Cl. 206/47 A,
128/272, 206/63.5
[51] Int. Cl. B65d 81/32
[50] Field of Search 206/47 A,
56 AA, 56 R, 63.5; 128/272

ABSTRACT: A container for storing two ingredients or components which are to be later mixed together to produce a dental filling substance or the like which comprises a container body having a first chamber adapted to hold a first component, said chamber having a sidewall with at least one perforation; a rotatable closure member partially encompassing and eccentric to said container body, said closure member cooperating with said perforated wall to define a second chamber for holding a bag of frangible material containing a liquid second component, said second chamber having a wall section of diminishing radius whereby upon rotation of said closure member and the volume of the second chamber is reduced and the bag is pressed against the perforated wall so as to burst and deliver the liquid into the first chamber.



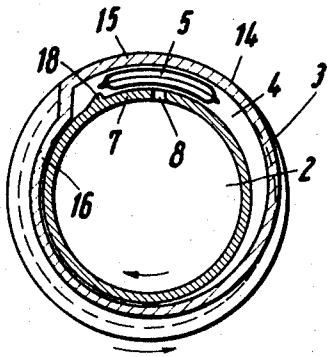


Fig. 1

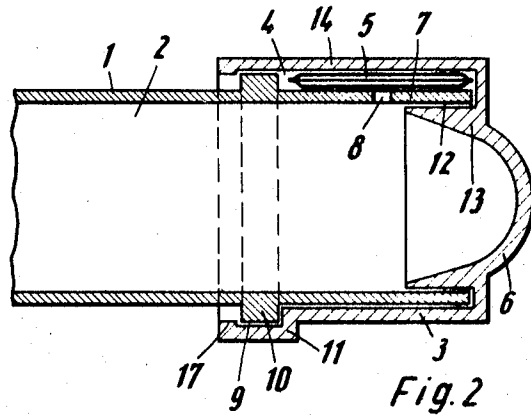


Fig. 2

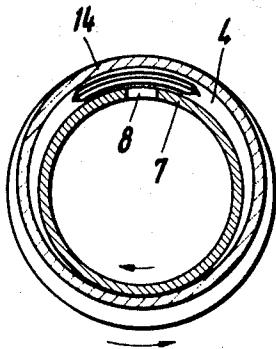


Fig. 3

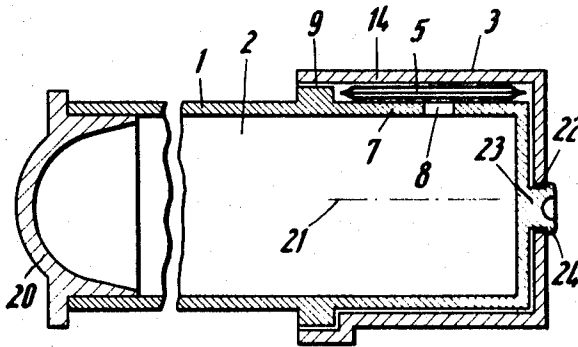


Fig. 4

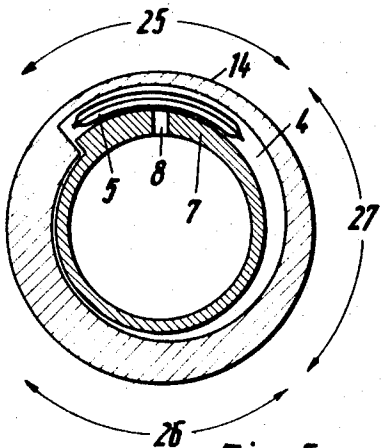


Fig. 5

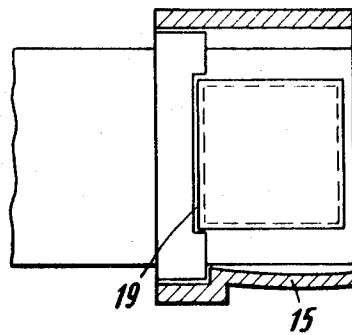


Fig. 6

ERNST A. MÜHLBAUER Inventor:

John Lezdey Attorney

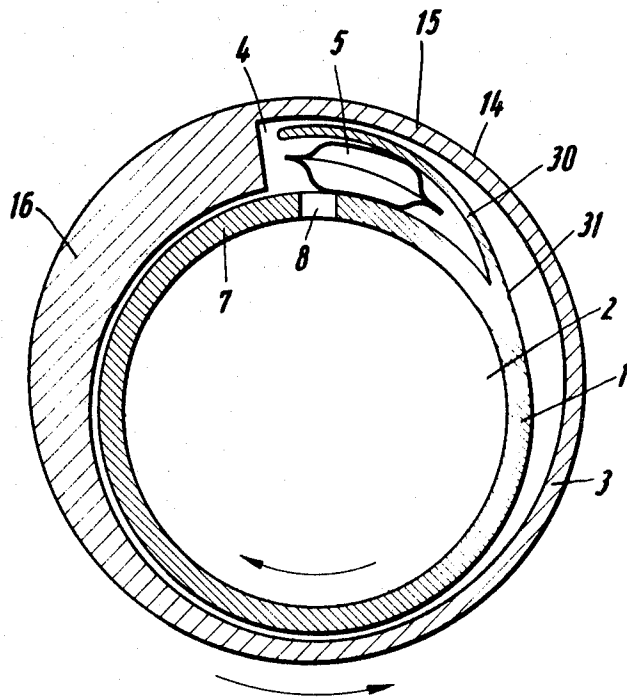


Fig. 7

ERNST A. MÜHLBAUER Inventor:

JOHN LEZDEY ATTORNEY

DUPLEX CAPSULE FOR DENTAL FILLING INGREDIENTS

This invention relates to containers and especially to containers for storing separately ingredients which are to be later mixed together to produce a dental filling substance.

More particularly, the invention relates to a container comprising a container body providing a mixing chamber adapted to contain a first component and a closure member partially encompassing the container body and cooperating with a perforated wall of said container body to define a chamber accommodating a bag of foil material containing a liquid second component, the construction being such that the chamber is adapted by a relative movement of the closure member with respect to the container body to be so reduced in volume that the bag of foil material is destroyed and its liquid contents are forced into the mixing chamber through the at least one opening formed in the perforated wall of the container body.

A duplex capsule of this general type is disclosed, for example, in published German Patent applications Nos. 1,276,866 and 1,287,251, (laid open to public inspection). In these known constructions, the closure member is so constructed and arranged with respect to the container body that the chamber accommodating the bag of foil material is defined by a perforated end wall of the container body and the closure member in such manner that, by telescopically pressing the closure member and container body together, a pressure may be applied to the bag of foil material to cause the latter to burst and the liquid contained therein to be forced into the mixing chamber formed in the container body. The effort necessary to perform this operation is so high that a special tool must be used. A special tool can be dispensed with when in accordance with a further known construction, the closure member and container body are provided with interengaging screw threads, whereby in one screwed-on position of the closure member on the container section, the chamber defined by the perforated end wall of the container body and closure member has a volume sufficient to accommodate the bag of foil material containing the liquid second component for storage, while further tightening of the screwed closure member results in the desired reduction of the chamber volume required to cause the bag to burst. However, such a provision considerably adds to the manufacturing costs.

It is therefore an object of this invention to provide a duplex capsule of the general class referred to above which is easy to handle and to operate and wherein the relative movement between the closure member and container section can be brought about without excessive effort and is yet cheaper to manufacture than a construction using the screwed connection.

In accordance with this invention, this object is achieved by providing the chamber accommodating the frangible bag between the relatively rotatable sidewalls of the container body and closure member and by providing at least one of these relatively rotatable sidewalls with a shape and/or with a relation to the other one different from a rotational shape in concentric relation. In other words, at least one of the two sidewalls should differ from a rotational shape or, when both sidewalls are rotational, they should not be concentric. Thus, at least one of the relatively rotatable sidewalls of the container body and closure member is taught by the present invention to differ from a cylinder cone, or other rotational body which is concentric with respect to the other.

This principle is, in one advantageous embodiment of this invention, put into practice by providing the container body with a substantially cylindrical wall and the wall of the closure member with a chamber extension which forms a pocket defined by a wall section of increased radius smoothly merging into a radius corresponding to that of the container body, there being provided means which assure that the bag of foil material will more firmly adhere to the perforated wall area of the container body than to the closure member. The bag of foil material is disposed within the chamber defined by the pocket formed in the closure member wall adjacent to the perforated wall area of the container body. When the closure member is

rotated with respect to the container body, the bag, which more firmly adheres to the wall of the container body than to that of the closure member, is pressed against the perforated container wall until it finally bursts at the location of the perforation or perforations. Upon further rotation, the bag is squeezed into the mixing chamber. In its final condition, the outer face of the bag of foil material is engaged by a cylindrical portion of the wall of the closure member having a radius not substantially in excess of that of the container body. Consequently, the bag is pressed in between two cylindrical walls and is reliably squeezed out except for a residual quantity which is the same in each instance. The increased adherence of the bag to the container body wall may be obtained in this as well as in any other embodiment by pasting, by roughening the container body wall or by the provision of a slight step in the container body wall against which the circumferentially leading edge of the bag of foil material rests.

It is practical in this conjunction to have the wall of the closure member extend in the form of a spiral. As an alternative, a tangential section of transition may be provided between the closure member sections of larger and smaller radius.

In a further embodiment of the invention, the perforated portion of the container body wall has a circumferential section of a tangential of spiral shape and the closure member wall has a circumferential portion of equal length and matched tangential or spiral shape. Owing to the matched configuration of these two circumferential portions of the container body and closure member walls, a filled bag may be interposed therebetween when these wall portions are circumferentially spaced apart and can be completely squeezed out when ruptured by a relative rotation of the closure member and container body to the extent that the bag is compressed between the two matched wall portions.

The container body and closure member are preferably provided with cooperating guide surfaces which will ensure a correct position of the wall portions which cooperate to form the pocket. These guide faces normally take a cylindrical shape. They may be entirely or partially disposed in the same portion along the axis as the walls defining the pocket, provided they are circumferentially spaced therefrom. It is, however, advantageous to have the guide surfaces disposed at a location axially spaced from the chamber, and they may take, for example, the shape of a pin extension at the end of the container body and a matched bore in the closure member and/or of a collar in the extension of the wall portions defining the pocket and a matched hollow cylindrical section provided on the side of the closure member facing the opening.

In addition to providing for the bag of foil material to more firmly adhere to the container body, means may be provided which reduce the friction between the outer face of the bag and the inner wall of the closure member, such as, for example, a lubricant or antifriction means either applied to the outer face of the bag and/or to the inner face of the closure member or constituting the material of which these parts consist. Thus, the inner face of the bag (which is that facing the container body wall) may be coated with an adhesive, while the outer face may be coated with polyethylene or polytetrafluoroethylene.

In a particularly advantageous embodiment of the invention, the correct position of the bag during a relative rotation of the container body and closure member is ensured by a tongue fixed to the container body and which extends into the gap between the bag accommodated in the pocket and the wall of the closure member.

The container body and the tongue may, with advantage, be integrally formed of a plastically or elastically deformable material, and in this conjunction, the tongue may be of reduced thickness as compared to the container body walls in order to ensure that the latter are sufficiently rigid, while the tongue is sufficiently flexible. Instead, the tongue may be adhesively bonded to the container body. Normally it is sufficient to connect one end of the tongue to the container body, the said end being preferably that one which is the leading end

thereof when the closure member is relatively rotated with respect to the container body. When so arranged, the tongue will be circumferentially subjected to tensile stress only. However, the tongue could instead take the form of a strip secured to the container body at both ends of the pocket. Thus, it could take the form of a flexible adhesive tape applied to the container body circumferentially thereof with the bag of foil material interposed between the strip of tape and the container body.

A few advantageous embodiments of the invention are now described by way of example and explained in more detail with reference to the schematic drawings, wherein

FIG. 1 is a cross section through a first embodiment;

FIG. 2 is a longitudinal section thereof;

FIG. 3 and 4 are sections similar to FIG. 1 and 2, respectively but illustrating a second embodiment.

FIG. 5 is a cross section through a third embodiment;

FIG. 6 is a partially sectioned view of a further embodiment; and

FIG. 7 is a cross section through still another embodiment of the invention.

The duplex container shown in FIG. 2 comprises a container body 1, defining a chamber 2 which receives one of the components and is later to serve as the mixing chamber and is closed at its left end (not shown), and a closure member 3 cooperating with the container body to form a chamber or pocket at 4 for receiving the bag 5 of foil material, a portion 6 of the closure member 3 defining one end of the mixing chamber. The wall 7 of the container body which cooperates with the closure member to define the bag-receiving chamber 4 is perforated, such as by a round bore, at 8. The cross section shown in FIG. 1 is taken at the level of this opening 8. The container body 1 and closure member 3 are relatively rotatable and guided for such relative rotation at 9 by guide means comprising an annular flange 10 formed on the container body and a concentric recess 11 of the closure member and at 12 by guide means comprising the wall 7 of the container body and a concentric portion 13 of the closure member. As shown in FIG. 1, however, the wall portion 14 of the closure member 3 which defines the bag-receiving chamber 4 on one side is not concentrically disposed with respect to the container body axis as are the guide means. Instead, the radius of this wall 14 gradually decreases, starting from the portion 15, as viewed in clockwise direction toward portion 16. This gradual reduction of the diameter can, for example, be obtained by making the inner face of wall 14 spiral shaped. In the area 15, i.e. in the area of chamber 4, the wall 14 has preferably a cylindrical shape in order to provide a gap of constant width between the inner wall 7 and the outer wall 14 for accommodating the bag 5. The remainder is preferably spiral shaped.

The wall portion 11 of the closure member may be provided with a slightly inwardly projecting flange at 17 capable of being locked by snap action behind the annular flange 10 when the closure member is telescoped over the respective end of the container body whereby inadvertent disassembly is prevented.

In FIG. 1 and 2, the duplex container is illustrated in its initial condition, i.e. as assembled during manufacture and as furnished to the dentist. When required for use, the dentist turns the closure member with respect to the container body as indicated by an arrow in FIG. 1. This causes the spirally tapering wall section 14 to slide over the bag 5 and to gradually compress it until it bursts in the area of the opening 8 and its contents are caused to be forced into the mixing chamber 2. By the time the wall section 16 of the closure member is disposed in contact with the outer face of bag 5, the latter has been completely emptied. In order to ensure that the bag is completely compressed, wall portion 16 is preferably given a cylindrical shape on a circumferential length at least substantially equal to that of the bag, the inner radius of this wall portion being substantially equal to, or slightly more than, the outer radius of wall 7. Suitably, this cylindrical portion of

wall 14 commences approximately diametrically opposite to the area 15, whereby the advantage is offered that the closure member is supported at a location diametrically opposite to that portion which applies the rupturing pressure on bag 5, independently from the guide means 9 and 12. The spiral-shaped portion of wall 14 need not be of a uniform taper. The arrangement may rather be such that the reduction in diameter is small in that area which is to apply the ultimate rupturing pressure to bag 5 because this phase of operation requires the maximum effort. In the subsequent area, which is to cause the bag to be squeezed out, i.e. which is to compress the bag into a finally flat condition, the reduction of diameter may be more pronounced.

Special means may be provided for maintaining the bag 5 in a position in front of opening 8. Thus, bag 5 may be coated with an adhesive on the inside during manufacture. Alternatively or additionally, the outer wall may be produced of, or have its outer face coated with, a material having a low coefficient of friction, such as polyethylene or polytetrafluoroethylene. It may also have a lubricant applied to its outer face. Instead, of course, a lubricant may be applied to the inner face of wall 14 during manufacture. Finally, it is possible to maintain the bag 5 in its place by mechanical means. Thus, FIG. 1 shows the container body wall 7 formed with a shoulder 18 disposed in front of the bag circumferentially. As an alternative, the annular shoulder 10 may be provided with a recess 19 engaging part of the bag preventing it from being circumferentially displaced. (FIG. 6).

Wall 14 need not be of a prismatic shape. Thus, the circumferential variation of the diameter of wall 14 may commence at the axial end of this wall so as to squeeze the liquid contained in the bag toward the opening 8. This results in a slightly concave configuration of the wall, as schematically indicated at 15 in FIG. 6. Wall 15 can also be provided with edges on the inside which extend circumferentially or converge toward the center, i.e. toward the area of the opening, whereby, on one hand, a displacement of the bag axially outwardly of recess 19 is prevented and maintenance thereof in its desired position is enhanced and, on the other, the pressure acting on the liquid in the direction toward opening 8 is increased.

Opening 8 may be provided with sharp edges or may, in some other way, be so shaped that the bag will become rent under the shear acting between the edges of the opening and the bag, whereby bursting thereof is facilitated.

The closure member 3 of this embodiment has the two functions of forming a bag-receiving chamber 5 and to close the end of the mixing chamber 2. This offers the advantage that this duplex container can be made of as little as three parts, viz the container body 1, the closure member 3 and the bag 5.

Alternatively, the closure member 3 shown in FIG. 3 and 4 can be limited to the first of the two functions referred to, in which case a separate closure 20 is provided for providing access to the mixing chamber. In this embodiment, chamber 4 is formed by cylindrical outer and inner walls 7 and 14, respectively, which are eccentric in the illustrated embodiment. Wall 7 is shown concentric with respect to the container body axis, while the central axis 21 of the wall 14 formed by the closure member is eccentrically offset with respect to the container body axis. The guide means 9 and 22 are centered on the container body axis and guide means 9 are constructed and arranged as in the embodiment of FIG. 2. Guide means 22 are provided by a bore of closure member 3 and by a cylindrical projection 23 on the container body end wall. The cylindrical projection or pin 23 has a radial collar 24 which retains the closure member 3 in its position. The collar 24 may be produced by plastically deforming the projection when the closure member 3 has been put in place on the container body 1.

This embodiment in which the walls defining the pocket are cylindrical offers the advantage that the compression molds used for producing the parts are of a simple construction.

FIG. 5 shows a cross-sectional shape of the outer wall 14 and the inner wall 7 defining the pocket 4 similar to that of FIG. 1 with the exception that wall 7 also differs from a circle. The angular section 25 of wall 7, in which opening 8 is disposed and bag 5 is located, is spiral shaped. An identical spiral shape is presented by the inner face of the outer wall 14 in the angular portion 26. In the final stage of the turning movement of the closure member 3, these two spiral-wall portions of walls 7 and 14 are in mutually opposed relation whereby it is assured despite of the fact that these walls differ from a circular shape, the contents of bag 5 are squeezed out entirely.

The angular portion 25 of wall 14 may take any desired shape, e.g. that of the circular cylinder with the inner diameter so selected that pocket 4 offers sufficient space for accommodating bag 5. The intermediate portion 27 of this wall is spiral shaped to connect the large inner diameter portion 25 with the spiral-shaped portion 26, the pitch of the spiral in this portion 27 being relatively small whereby little effort is required in order to cause bag 5 to burst. In the embodiment of FIG. 7, the means for retaining the bag 5 in proper position comprise a tongue 30 which has that end 31 thereof connected to the container body 1 which is the leading end in the case of relative rotation between the container body 1 and the closure member 3. Relative rotation between these two parts is guided by guide means not shown and takes place about the central axis of the cylindrical container body 1. In the illustrated embodiment, the tongue and container body are formed of the same slightly resilient synthetic.

Tongue 30 is remarkably thinner than wall 7 of container 1 so as to be sufficiently resilient to permit it to rest snugly against the pocket 4 defining wall 7 of the container body in order to completely empty the bag 5. In this bag-emptying position, the tongue is markedly flexed at the junction 31. In order to keep the bending stress low, the tongue may preferably meet the container body wall tangentially or at least at an acute angle. This, however, is not necessary when the material is sufficiently yieldable.

The function of tongue 30 is to resist the frictional forces involved in the relative rotation of the closure member and container body and to thereby protect bag 5 from such forces. The bag is thus subjected to purely radial compression, whereby any risk is eliminated that the bag becomes dislocated from its desired position. In order to achieve this purpose it is not necessary that the tongue should cover up the entire bag 4. It may be sufficient in some instances to have the length of the tongue so limited as to thereby cover the leading portion of bag 5 only.

On the other hand—as has been explained above—the tongue may be markedly longer and may even take the form of a strip extending beyond both circumferential ends of the bag and the entire circumferential length of the pocket 4. Thus, it could be in the form of a strip of adhesive tape bonded to the container body wall 7 forwardly and rearwardly of pocket 4, as viewed in a circumferential direction.

The tongue, strip or tape may further be firmly connected, to bag 5 or may even be an integral part thereof. Thus, for example, a section of foil material which constitutes a part of bag 5 might have a tongue extension on one side which is firmly connected, e.g. adhesively bonded, to container body 1.

In the embodiments of FIG. 1 to 6, the opening 8 is in the form of a single bore disposed substantially opposite to the center of the area occupied by the bag. The opening may, of course, be disposed in some other position. Thus, it could be disposed at the trailing end of the pocket (FIG. 7), particularly when the squeezing action on the bag initially occurs at the leading end of the bag in the sense of rotation of the container

body relative to the closure member. Instead, the opening may take the form of a slot extending either axially or circumferentially. Finally, the opening may be provided to present a sharp trailing edge which is somewhat raised as compared to the leading edge, whereby bursting of the bag is facilitated. Bursting of the bag is further enhanced by providing the opening with sharp lateral edges which converge in a wedgelike manner toward the trailing end of the container body opening.

As distinguished from the embodiments discussed above, in which the pressure applied to the bag is substantially radial, other embodiments may be so constructed and arranged as to provide for circumferential compression of the bag, such as by providing the substantially cylindrical walls of the closure member and container body with respective radially extending surface portions which circumferentially define the bag-receiving pocket and are adapted to be moved toward each other by relative turning movement of the closure member and container body to thereby reduce the volume of the pocket. Instead, the arrangement could be such that the bag is adhesively maintained in a position snugly in contact with the container body wall while a squeezing means is moved along the outer face of the bag to progressively squeeze and empty it, starting out from one circumferential end thereof. Although such squeezing means may be in the form of an edge on the closure member wall, a roller may be preferred in order to reduce friction.

I claim:

1. A container for storing two ingredients or components which are to be later mixed together to produce a dental filling substance or the like which comprises a container body having a first chamber adapted to hold a first component, said chamber having a sidewall with at least one perforation; a rotatable closure member partially encompassing and eccentric to said container body, said closure member cooperating with said perforated wall to define a second chamber for holding a bag of frangible material containing a liquid second component, said second chamber having a wall section of diminishing radius whereby upon rotation of said closure member the volume of the second chamber is reduced and the bag is pressed against the perforated wall so as to burst and deliver the liquid into the first chamber.

2. The container of claim 1 wherein the wall of said container body is substantially cylindrical and said second chamber includes a chamber extension which forms a bag-accommodating pocket defined by a wall section of increased radius merging into a radius corresponding to that of said container body, including means for adhering said bag to the perforated wall area of the container body.

3. The container of claim 2 wherein a portion of the closure member wall is substantially spiral shaped.

4. The container of claim 1 wherein the perforated area of said container body wall has a tangential or spiral shape and the closure member wall adjacent said perforated area has a portion of substantially equal length and spiral shape.

5. The container of claim 1 wherein said bag is adhesively bonded to the perforated portion of the container body wall.

6. The container of claim 1 including having substances capable of reducing friction on the outer face of said bag and on the inner face of said closure member.

7. The container of claim 1 including cooperating guide surfaces on said container body and said closure member.

8. The container of claim 1 including a tongue is secured to said container body and extending between said bag.

9. The container of claim 8 wherein said container body and said tongue are integrally made of a plastically deformable material.

* * * * *