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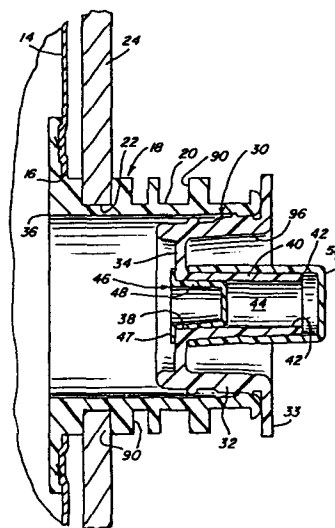
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Bag-in-a-box closure and flow-fitting therefor.

A closure plug for a bag-in-the-box fluid container, formed as a cylindrical flanged body having a unitary transverse wall, an axial opening in said transverse wall and a hollow tapered tube unitary with said wall surrounding the opening and extending within the body and parallel thereto. The tube tapers toward a narrow outlet exterior of the flanged end of the body. A dislodgeable inner plug is seated in the tube entrance blocking same and a cap is fitted over the outlet of the tube. Several connector fittings are disclosed which are coupled to the closure and carry a plunger dislodging the inner plug. The plug is maintained in sealing condition within the tube by the internal fluid pressure within the fluid container.



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Bag-in-a-box closure and flow-fitting therefor

This invention relates generally to "bag-in-the-box" containers for flowable materials such as liquids, powders and the like and more particularly, concerns the provision of an improved closure plug and a connector fitting adapted to be coupled thereto, said closure plug having internal dislodgeable means blocking access to the contents of the container, but offering access when dislodged by means applied from the exterior of the container.

Packaging of flowable materials such as liquids, powders and the like for direct dispensing thereof offers many difficulties, particularly if the materials are valuable, odiferous, corrosive or possessed of other noxious or disagreeable characteristics. Further, it often is desired that the container for such materials not only must be sealed but must be capable of being completely emptied of its contents, i.e., dispensed to the last drop. In many applications, throwaway packages are preferred to reduce waste and to obviate disposal problems in storing and disposal of containers of the rigid or semi-rigid category.

The development of the so-called "bag-in-the-box" packaging concepts have met with considerable success in providing solutions to the above dispensing packaging difficulties. The "bag-in-the-box" concepts involve the packaging of the flowable materials in flexible bags which themselves are disposed within corrugated paperboard containers for dispensing of the contents. These filled bags generally take the shape of the paperboard container within which they are disposed and are supported therein by the interior walls.

Use of such containers enables reduction both in bulk and weight, as well as affords the convenience of maximum space utilization for shipping.

"Bag-in-the-box" packaging generally has become popular because it enables dispensing without retention of much material in the container.

5 The aforementioned bag-in-a-box containers have found wide acceptance in the packaging of flowable powders, corrosive liquids, printing inks, dyes, milk, etc., but require security against leakage during transit and handling. Coupling to the dispensing system must assure that the flowable material does not escape from the package and/or the connection to the
10 system. Improved provision for security should be afforded but without significant increase in cost.

Accordingly the invention provides a sealed closure for a flexible container for flowable material such as liquids and powders, the container having a filling spout sealed to a
15 wall thereof, said closure including a unitary generally cylindrical tubular body having opposite ends, said body having an annular flange at one end and a transverse wall across the interior of said body at the opposite end, said transverse wall having a through passage and an elongate tube disposed within
20 the body unitary with said transverse wall and about said passage, said tube extending generally parallel to the axis of said body, said tube having an entrance opening to said one end thereof and an outlet opening to the opposite end, characterized in that a dislodgeable plug is sealingly seated within said
25 tube closing off the entrance, and a removable cap seated over said tube closing off the outlet, said plug being dislodgeable as a result of manipulation there against from the exterior of said closure.

30 The invention further provides a connect or fitting adapted sealingly to receive said tube and having a plunger receivable through said tube for dislodging said plug.

The preferred embodiments of this invention now will be described, by way of example, with reference to the drawings accompanying this specification in which:

5 Figure 1 is a partially exploded perspective view of a package comprising a flexible bag seated within a corrugated paperboard box with a flanged filling spout secured to the wall of the bag and passing through a wall of the box, the sealing plug of the invention being secured thereon and illustrated on one side for ease in viewing;

10 Figure 2 is an enlarged sectional view of the flanged filling spout with the sealing plug according to the invention installed therein;

Figure 3 is a longitudinal sectional view of a connector fitting for coupling the package to a dispensing
15 system;

Figure 4 is a view similar to Figure 3 but illustrating a modified connector fitting;

Figure 5 is an end view of the fitting illustrated in Figure 4;

20 Figure 6 is a fragmentary longitudinal section illustrating a further modification of the connector fitting;

Figure 7 is an enlarged end view of the fitting illustrated in Figure 6; and

25 Figure 8 is a diagrammatic sectional view of the installed filling spout closure plug and connector fitting illustrating a security spring lock installed thereon.

The invention to be described herein comprises a closure plug and a connector fitting for use on a flexible dispensing container, i.e., a flexible bag seated within a box
30 normally formed of corrugated paperboard, the bag holding packaging flowable materials such as liquids (ink, dyes, corrosive material) and powders. The closure plug is snap-fitted or

otherwise tightly coupled to the flanged filling spout which is sealed to a wall of the flexible bag and is commonly passed through a wall of the box. The connector fitting is adapted to be coupled to the closure plug and is provided with means
5 for gaining access to the interior of the bag via the closure plug. The fitting also is provided with means for coupling a conduit thereto for directing the flow of the material to a predetermined destination.

The closure plug includes a flanged cylindrical
10 hollow body having a transverse wall interior thereof adjacent one end of the body. An opening is formed in said transverse wall and an interior, tapered discharge tube is integral with said wall and surrounds said openings, extending generally parallel to the axis of the body toward the opposite end of
15 the body. A plastic flanged cup-like sealing plug is seated in the inner end of the discharge tube and a cap is secured over the narrower outer end thereof. The discharge tube need not be tapered but the sealing plug must be of a configuration enabling the fluid pressure interior of the bag to force the
20 sealing plug tightly therein.

The connector fitting is provided with means for sealingly accommodating the tapered discharge tube of the closure cap. Exterior means also are provided for gaining access to the interior of the flexible container by selective dislodgement
25 of the cup-like plug from the inner end of the tapered discharge tube by manipulation originating from the exterior of the closure plug. A conduit can be coupled to the fitting to direct the flowing material to a destination, say a dispensing system or the like.

30 Referring to Figure 1, a typical bag-in-a-box container 10 is illustrated as comprising a flexible bag 12 formed by

hermetically sealing the edges of a pair of superposed sheets of metallized plastic and liner. One wall 14 of bag 12 has an access opening 16 and carries a flanged spout 18 sealed thereto surrounding the opening 16. The flanged spout 18 includes an outwardly extending multiflanged tubular portion 20 which is adapted to be pulled through a suitable passage 20 formed in wall 24 of the box 26 which preferably is formed of corrugated paperboard material. The spout 18 is closed by force fitting, as by a snap-in connection, of the closure plug 30.

The closure plug 30 has an externally ribbed cylindrical tubular body 32 with an annular flange 33 at one end and a transverse wall 34 at its opposite end 36. A unitary transverse wall 34 includes a central opening 38 and an elongate hollow discharge tube 40 is formed as an unitary part of said wall 34 surrounding the opening 38 and extending interior of the body 32 generally concentric with and parallel to the axis thereof. The tube 40 is tapered in a direction so that the narrow portion is located at the delivery or outer end 42 of the discharge tube 40. The chamber 44 interior of the tube 40 is likewise tapered to place the narrow opening 42' adjacent the opening of body 32. A flanged cup-like sealing plug 46, preferably tapered, is seated tightly in the entrance 48 of the chamber 44 while a cap 50 is force-fitted over the delivery end 42 of discharge tube 40. The sealing cap 50 is slightly tapered to conform to the configuration of the discharge tube 40 at its end 42 so that it sealably receives said tapered delivery end 42. An additional function of the cap 50 is to prevent dirt or other foreign material from entering the chamber 44 from the exterior of the plug 30.

The cap 50 also serves to protect against the unauthorized use of a foreign object to gain access to the

plug 46 for the purpose of dislodging same and tapping into the content of the bag 12. The tapered fit between the discharge tube 40 and the internal plug 46 achieves a tight effectively self-sealing engagement against increased pressure due to sudden
5 surges resulting from handling and impact during manipulation of the package or from a pressure build-up interior of the flexible bag 12 occurring when the same is placed under adverse pressure and/or environmental conditions. The annular flange 47 on plug 46 serves as a stop limit to prevent its being forced
10 through the interior 44 of tube 40 by excess pressure interior of the bag 12.

The closure plug 30 assembled with the plug 46 and cap 50 is coupled to the flexible bag 12 by effecting a force-fit within the spout 18 after the bag 12 is filled with the flowable
15 material and the flange 33 abuts tightly against the spout 18. The plug 30 can rest against the interior of wall 24 of exterior box 26. The package 10 now is suitable for shipping and storage. A punch-out wall portion (not shown) can be provided and the spout 18 pulled through same.

20 For use, a tapping connector or fitting is provided. Referring to Figure 3, there is illustrated tapping connector fitting 60 adapted to be coupled sealably to the closure plug 30 for gaining access to the contents of the bag 12 and directing such contents to a predetermined location, say removed from the
25 package. The fitting 60 comprises a body 62 having an interior conical chamber 64 conforming generally to the configuration of the tapered discharge tube 40 and extending toward the opposite end 66 of the body 62. A threaded passage 68 is formed in body 62 opening to the opposite end 66 of the body 62 and carries
30 suitable threading for reception therethrough of plunger 70 having an enlarged threaded inner end 72 having an enlarged head 74.

Resilient sealing ring 76 is seated in groove 78 formed adjacent the entrance to chamber 64. A radial passage 80 is formed in body 62 to communicate with the interior of the internal passageway 68 and opens to threaded socket 82 capable of receiving a threaded male coupling 84. The plunger 70 comprises a cylindrical rod 86 which is disposed coaxially within the chamber 64 and passageway 68 and extends outward of the entrance to conical chamber 64. The inner diameter of the sealing ring 76 is selected to be slightly less than the greater diameter of the tapered discharge tube 40 of the closure plug 30. When the connector fitting 60 and plug 30 are assembled by removing the cap 50 and force-fitting tube 40 into the tapered chamber 64, the O-ring 76 is sealingly engaged against the outer wall of said discharge tube 40. The plunger 70 is received within the tube 40 and the end 86' of rod 86 forced against the plug 48 to dislodge same, thereby gaining access to the flowable material within the flexible bag 12 overcoming the pressure exerted by the fluid content of the bag. The outer diameter of the body 62 coextensive with the chamber 64 is selected to be slightly less than the inner diameter of the body 32 and closure plug 30.

Figure 4 illustrates a modified fitting 60' wherein the plunger 70' is integral with the fitting body 62' and the threaded socket 68' is formed concentric with the chamber 64'. Fitting 62' has a relatively short, axial passageway 94 therein eccentric relative to the central axis of the conical chamber 64' in fitting body 62' as an extension thereof communicating to the socket 68'. The plunger 70' is formed integral with the fitting body 62' and extends at its free end a predetermined distance outward of the entrance to chamber 64'. The body 62' is forced into the wall 96 defined between the tube 40 and the inner wall of body 32 of the closure 30. When the body 62' is seated

on said tube 40, the plunger 70' has forced the plug 46 from the entrance to chamber 44 of tube 40. The discharge of the contents of the bag 12 is effected through the concentric opening 68'. The flow from the discharge tube 40 is by way of the short, axial passageway 94. The internal O-ring 76 of fitting 60 is not required. The relationship of the passageways is illustrated in Figure 5.

Figure 6 illustrates another modified connector fitting, here represented by fitting 60". Fitting 60" differs from fittings 60 and 60' in that the body 62" of fitting 60" has an outer tapered portion, with the plunger 70" being unitary with the narrow end of the body 62". Axial openings 102 are formed in the body 62" adjacent the junction of plunger 70" therewith, said one or more openings 102 extend as internal coaxial passageways 94'. The passageways 94' terminate in rearwardly opening threaded socket 104. There is inserted a plug 105 having symmetrically arranged ribs or flutes 106. Axial passageways 94' are defined between the resultant ribs or flutes 106 and are eccentric relative to the center of the fitting 60".

In Figure 9 there is illustrated the safety locking clip 92 installed positively to resist vibrational and other axial forces tending to separate the respective fittings from their engagement with the closure plug 30. An annular groove or grooves 88 is provided in the portion of the body 62 which is exterior of the closure plug 30 when the fitting is fully engaged therein. The groove or grooves 88 cooperate with groove 90 formed in exterior of the spout 18 to enable U-shaped safety clip 92 to be seated in one of said outer selected grooves 90 and the annular groove 88 formed in the fitting body 60 for effecting a positive locking engagement. Clip 92 may be formed

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as a spring clip. Other retaining means can be applied to maintain the engagement of fitting 60 and closure plug 30 and spout 18. The circumferential surfaces of all the fitting bodies of the fittings which are illustrated herein are
5 provided with the aforementioned outer rings or grooves 88 or their equivalent. The rings formed in the spout members serve to engage the wall 14 about a circular opening formed in the wall of said outer container 16 through which the flanged spout member 18 is pulled when seating same.

10 This engagement maintains the position of the filling flanged spout member and facilitates the use of the container. The safety lock is shown as a U-shaped spring element 92 either formed as a metal stamping or a wire form that is radially engaged, a groove 80 in the fitting 60 and one of the grooves 90
15 on the flanged spout 18 which may be available. When applied, relative motion between said spout and fitting 60 is materially resisted. When the safety lock element is formed of spring metal, the cantilever spring action provided exerts a positive clamping force therebetween. The wire form, for example, can
20 even be made captive on one of the grooves of the fitting 60 with the free portion thereof capable of being secured onto the spout and anchored into a suitable groove 90 formed thereon.

The bag-in-a-box 10 is illustrated oriented on one side but in use, preferably is disposed in a canted rack (not
25 shown) with the spout 18 facing downward, wall 24 functioning as the bottom wall, so that container 12 can be substantially fully emptied of its content.

CLAIMS:

1.. A sealed closure for a flexible container for flowable material such as liquids and powders, the container having a filling spout sealed to a wall thereof, said closure including a unitary generally cylindrical tubular body having
5 opposite ends, said body having an annular flange at one end and a transverse wall across the interior of said body at the opposite end, said transverse wall having a through passage and an elongate tube disposed within the body unitary with said transverse wall and about said passage, said tube extending
10 generally parallel to the axis of said body, said tube having an entrance opening to said one end thereof and an outlet opening to the opposite end, characterized in that a dislodgable plug is sealingly seated within said tube closing off the entrance, and
15 a removable cap seated over said tube closing off the outlet, said plug being dislodgeable as a result of manipulation there-against from the exterior of said closure.

2. The closure according to claim 1 characterized in that the plug has a cavity opening to the interior of the flexible container capable of being forced into said tube by the interior fluid pressure within said container.

3. The closure according to claim 1 characterized in that the plug includes an annular flange capable of being forced against the inner end of the tube by the internal fluid pressure within the container to maintain a seal with said tube.

4. The closure according to any one of claims 1 to 3 characterized in that the tube and plug are conformingly tapered.

5. The closure according to any one of claims 1 to 4 characterized in that the tube is coaxial with said body.

6. The closure according to any one of claims 1 to 5 characterized in that the tube extends outward of the opposite end of the body.

7. The closure according to any one of claims 1 to 6 characterized in that the body has at least one exterior annular flange between the ends thereof.

8. The closure according to any one of claims 1 to 7 characterized in that the body is capable of being force-fitted into the filling spout.

9. The closure according to any one of claims 1 to 8 characterized by a connector fitting adapted sealingly to receive said tube and having a plunger receivable through said tube for dislodging said plug.

10. The closure according to claim 9 characterized in that the fitting has an end opening chamber conforming to the configuration of the outlet end of the tube for receiving same.

11. The closure according to claim 10 characterized in that a socket is formed in the fitting offset from the chamber and is constructed to permit coupling of a conduit thereto.

12. The closure according to claim 10 characterized in that there is an interior passage communicating between the chamber and a threaded socket enabling coupling of a conduit thereto.

13. The closure according to claim 10 characterized in that there is an interior passage and a socket communicating therewith and coaxial with both said chamber and said interior passage, said plunger being integral with said body and said interior passage being eccentric relative to the axis of the chamber.

14. The closure according to claim 13 characterized by a fluted passageway coupled to said chamber and leading coaxially to the exterior of the fitting connector.

15. The closure according to claim 9 characterized in that said fitting has a generally conical portion, said plunger being integral with said conical portion and an axial through passage formed in said conical portion, and a conical chamber formed in the end of the fitting in communicating relationship with said axial passage.

16. The closure according to claim 15 characterized in that there are axial circumferentially spaced flutes formed in the last mentioned conical chamber.

17. The closure means as claimed in claim 16 characterized in that the flutes are symmetrical about the axis of said conical chamber.

18. The closure according to claims 1-17 characterized in that the plug has a taper greater in degree than the entrance.

19. The closure according to any one of claims 1-18 characterized in that the engagement of said plug within said tube is self-sealing under increase in the pressure within the container.

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20. In combination, a container for storage of flowable materials such as liquids and powders or the like including a rigid box-like outer container having at least one wall, a sealed flexible inner container having a wall
5 provided with a tubular filling spout, the spout passing through said outer container wall and being engaged in place thereon and a sealing closure sealingly engaged within said spout, characterized by said closure having a discharge tube integral therewith, said discharge tube having an inlet, an outlet and extending axially
10 and a dislodgable plug sealingly seated in the inlet and maintained therein by the internal fluid pressure within said container.

21. The closure means as claimed in claim 20 and a connector fitting adapted to sealably couple to said closure, said connector fitting having a recess for receiving the outlet of said tube of the closure, and plunger means selectively
5 engageable with said plug when the connector fitting is coupled to the closure for dislodging the inner sealing means at the inlet of said tube.

FIG. 1

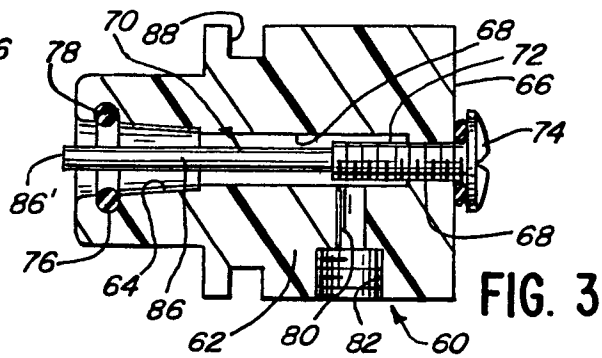
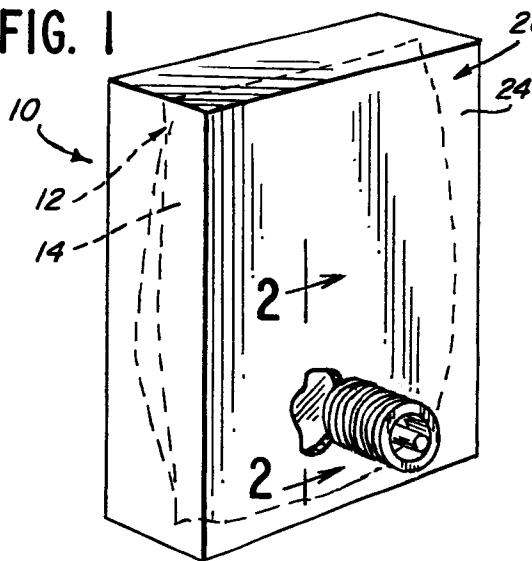


FIG. 3

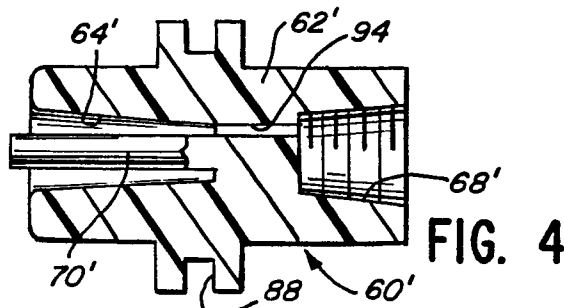


FIG. 4

FIG. 5

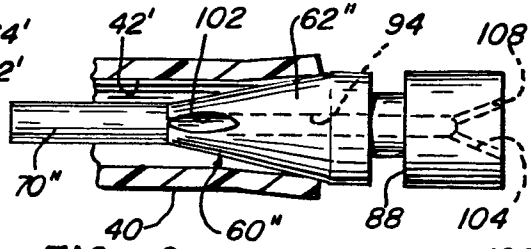
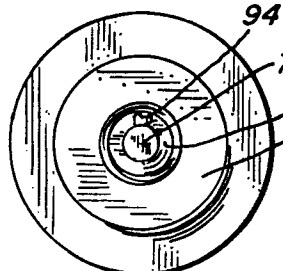


FIG. 6

FIG. 7

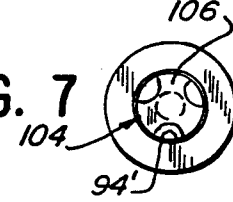


FIG. 2

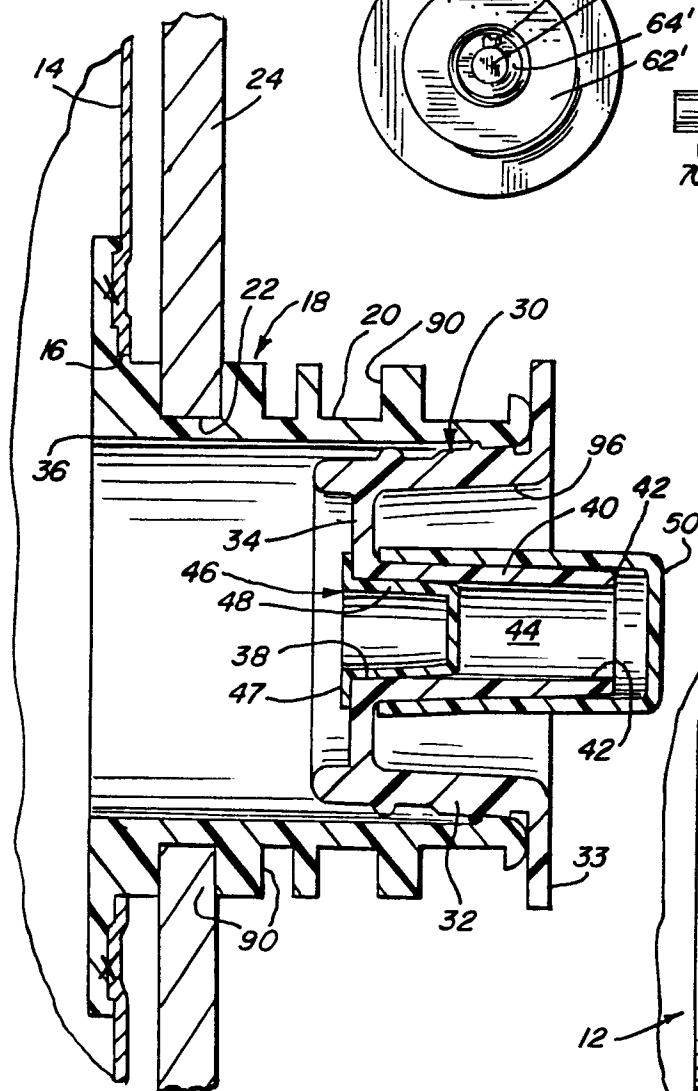


FIG. 8

