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3,239,112

DISPENSING CLOSURE WITH REMOVABLE DIAPHRAGM

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Fig- 1

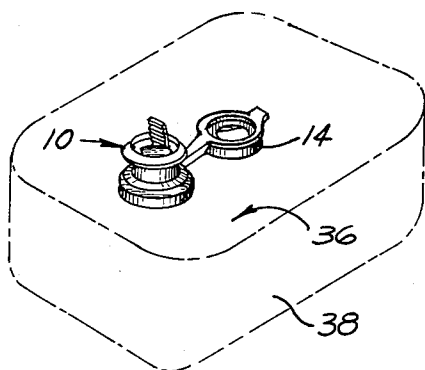


Fig- 3

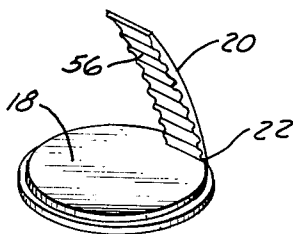


Fig- 2

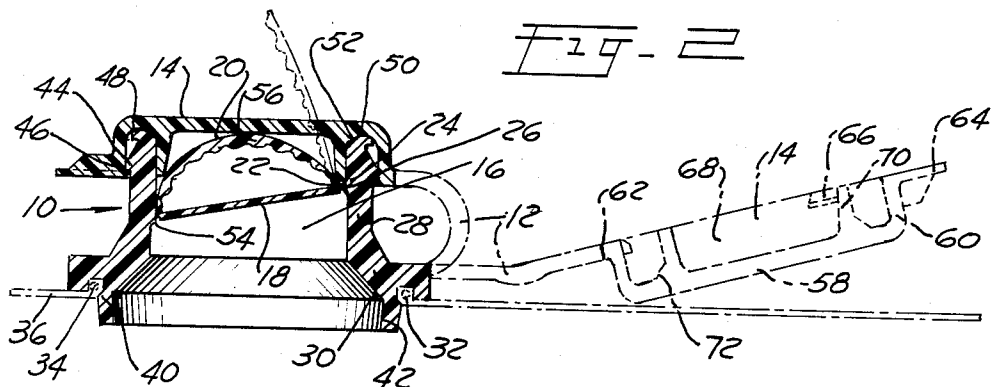


Fig- 4

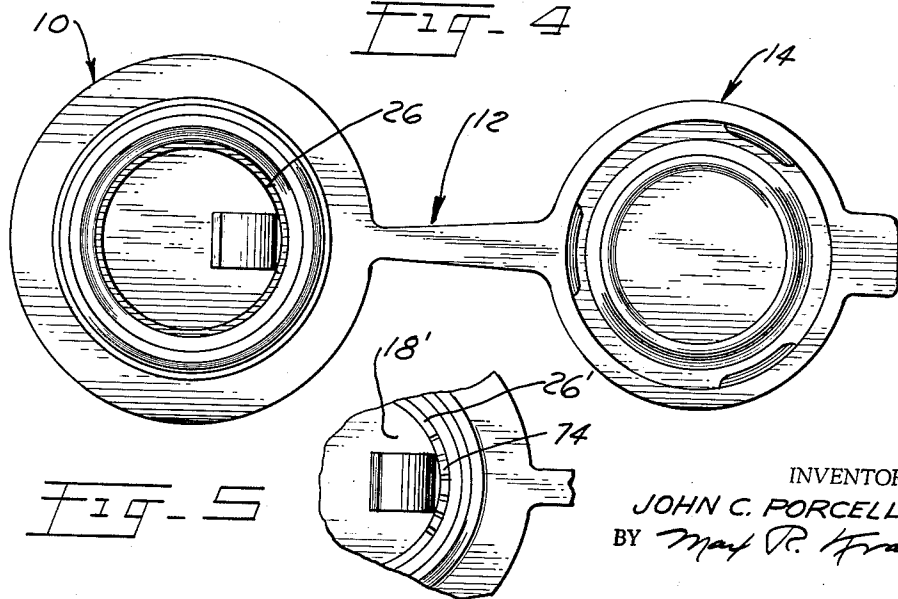


Fig- 5

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DISPENSING CLOSURE WITH REMOVABLE DIAPHRAGM

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This invention relates to improvements in a dispensing closure.

One of the objects of this invention is to provide a closure having a generally tubular pouring spout of resiliently flexible material provided with an integrally formed closure diaphragm spaced inwardly of the mouth of the spout and extending across the spout at an inclined or oblique angle and wherein the diaphragm is provided with an integral tab and a weakened tear line. The inclined or oblique angle position of the closure diaphragm permits the tab to be positioned close to the mouth of the spout and also permits the use of a tab of sufficient length to be manually grasped while permitting the tab to be positioned inside the mouth of the spout when the captive cap is applied.

Another object of this invention is to provide a structure of the foregoing character which, by reason of the inclined diaphragm and the attachment of the tab thereto at the portion of the diaphragm closest adjacent the mouth of the nozzle, permits a pull tab of a greater length to be used than if the diaphragm were positioned at right angles to the bore and attached adjacent the mouth of the nozzle in the same relative position.

Another object of this invention is to provide a structure of the foregoing character which permits the manufacture and use of a spout of a smaller size than that possible heretofore with diaphragms extending at right angles to the bore as in the prior art.

With this invention a small closure may be made and provided with a tab of sufficient length so that it can be manually grasped and pulled to remove the closure diaphragm along its weakened portion, yet, providing a sufficient storage space between the closure diaphragm and the captive cap when in closed position.

Other objects will become apparent as this description progresses.

In the drawings:

FIG. 1 is a view of the closure of this invention applied to a container.

FIG. 2 is a sectional view showing the cap applied in closed position and showing in dotted lines the position of the tab when the cap is detached.

FIG. 3 is a perspective view of the diaphragm and pull tab detached from the nozzle.

FIG. 4 is a top plan view of the parts with the cap detached from the nozzle, and

FIG. 5 is a view of a modification showing a modified inner seal or diaphragm.

The closure unit comprises a nozzle or spout generally indicated at 10, a flexible hinge 12 extending therefrom, and a cap or closure generally indicated at 14 connected thereto. Within the bore 16 of the nozzle and below the mouth of said nozzle and extending across the bore is a closure diaphragm generally indicated at 18 which extends across the bore at an inclined or oblique angle. Attached to said closure diaphragm 18, as an integral part thereof, is a pull tab 20. The root 22 of the pull tab is attached to said closure diaphragm at the portion closest adjacent to the mouth of the nozzle rather than to the other portion which is furthest away. As will be hereinafter explained, this is a very important fea-

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ture since it permits a greater portion of the tab to extend outwardly of the mouth to be manually engaged, and also permits a longer tab to be utilized in view of the extra storage space which is provided by virtue of the inclined or obliquely angled closure diaphragm 18. The closure diaphragm 18 is peripherally connected to the inner wall 24 of said bore along a weakened tear line 26. The diaphragm 18 is inclined at an angle of approximately 20° with a plane perpendicular to the vertical axis of the nozzle.

Referring more specifically to the other details of the spout 10, it comprises a tubular body 28 which tapers downwardly and then extends outwardly to form an annular enlargement 30. The annular enlargement is provided with an annular groove or recess 32 open at the bottom to receive the annular upturned or flange portion 34 of the wall 36 of the container 38 surrounding the opening 40 of the container. The inner side walls of the recess 32 are tapered so that they permanently interlock with the flange 34 of the container to permanently secure the nozzle 10 to the container. The tubular body 28 has a short annular portion 42 at the lower end which extends into the interior of the container. The internal diameter of the spout is greater at the lower end than at the upper end.

The upper portion of the nozzle has an annular peripheral bead or lip 44, with the lower horizontal portion 46 substantially at right angles to the longitudinal axis of the nozzle. Upwardly of the bead 44 the nozzle tapers inwardly and then slightly outwardly to terminate in an annular edge 48 adjacent the mouth 50 of the nozzle. The inside wall adjacent the mouth of the nozzle is bevelled as at 52.

The sealing member or closure diaphragm 18 is molded as an integral part of the nozzle 10 and extends transversely of the interior of the nozzle below the mouth 50 and particularly below the horizontal plane of the peripheral bead 44. The closure diaphragm extends at an inclined or oblique angle, with one side portion of the diaphragm closer to the mouth of the nozzle than the opposite portion. The closure diaphragm 18 thus has a diameter greater than the diameter of the bore 16. The inclined angular position of the closure diaphragm is a very important feature of this invention as will be understood.

The closure diaphragm 18 is of uniform thickness, except for the annular peripheral edge 26 where it connects with the tubular body 28. The peripheral edge 26 has a thinner body than the remainder of the diaphragm and the detachment takes place along the thinner peripheral edge 26, which is identified as the weakened tear line. The internal diameter of the nozzle immediately adjacent and below the closure diaphragm is slightly greater than that above the diaphragm and this provides a slight annular shoulder 54. This permits a larger peripheral edge 26 for the diaphragm so that a sturdier tear line is provided between the diaphragm and the nozzle.

When the diaphragm is detached, as will be described, the detachment is clean and occurs at the juncture of the annular shoulder 54 and the weakened peripheral edge 26, therefore, the inner wall of the nozzle at said juncture is left clean, smooth and unobstructed, and without any portion of the diaphragm or shoulder clinging or adhering thereto so as not interfere with the free discharge of the container contents through the nozzle.

A resilient and flexible pull tab generally indicated at 20 is integrally formed with the diaphragm 18 and the root portion of said tab is connected to said diaphragm closely

adjacent the wall of the spout and the weakened tear line and to that portion of the diaphragm closest to the mouth 50 of the spout. Attaching the tab close to the mouth of the nozzle permits the greatest amount of the tab to be exposed and the be manually engaged as it will extend the farthest outwardly of the mouth. The underside of the tab may be serrated or grooved, as indicated at 56. The connection between the root of the tab and the diaphragm is in alinement with the connection of the flexible hinge 12. The closure cap 14 is connected through the nozzle 10 by the flexible connecting strip or hinge 12 and the hinge extends from the enlargement 30 of the nozzle outwardly to the bottom of the outer cylindrical side wall or skirt of the cap.

The cap 14 has a substantially flat top 58 and a depending outer cylindrical side wall or skirt 60 provided with a thickened annular wall portion 62 at the bottom thereof to which the hinge 12 connects. The forward extension 64 is provided at the front thereof and same projects from the cap for manual engagement, for the purpose of lifting the cap from the nozzle. Extending radially inwardly from the side wall of the cap are a plurality of spaced beads or lips 66 which engage the underside of the peripheral bead or lip 46 of the nozzle to secure the cap in closed position.

In its central portion the cap 14 has a recess 68 having an inner cylindrical side wall 70 adapted to be tightly received within the upper or mouth portion of the nozzle to engage the inner wall of the nozzle, as best seen in FIG. 2. The outer surface of the cylindrical inner wall is bevelled as at 72 complementary to the bevelled edge 52 of the nozzle so that when the cap is in closed position a seal-tight fit is effected between the cap and the nozzle.

By virtue of the inclined or obliquely angled closure diaphragm 18 as best seen in FIG. 2, the pull tab has a greater storage space within the bore 16 of the nozzle when the cap 14 is in closed position, as contrasted to the diaphragm extending horizontally if positioned as close to the mouth as the portion to which the tab is attached. With the cap 14 in closed position the tab 20 is arched and confined within the bore and within the mouth of the nozzle and its free end engages the opposite side of the diaphragm. However, when the cap is removed from the nozzle the flexible pull tab 20 will unbend and straighten and rise to the position shown in dotted lines in FIG. 2, to extend above the top or mouth of the nozzle a sufficient length so that it may be grasped by the fingers and lifted, which will detach the diaphragm along the annular peripheral edge 26 so that it may be removed from the nozzle. Removal of the diaphragm is effected solely by the manually pulling outwardly of the pull tab, thereby eliminating the use of tools, mechanical devices or puncturing instruments. Further, the detachment is clean so that the nozzle is left smooth and unobstructed along the detaching line.

It will be readily appreciated that by virtue of the angled diaphragm 18 the diaphragm may be connected to the nozzle along one portion thereof closer adjacent to the mouth of the nozzle, thus, the tab has a greater surface extending outwardly of the mouth of the nozzle than would be otherwise obtainable. This arrangement permits the manufacture of nozzles having a diameter of less than $\frac{3}{4}$ inch, which would be difficult or impossible with diaphragms extending horizontally or at right angles to the bore of the nozzle.

FIG. 5 shows a modification in which the diaphragm 18' is provided with a plurality of spaced fine openings 74 along its peripheral weakened edge 26'. The fine openings permit the package to breathe even before the diaphragm or seal 18' is removed, and this is a desirable feature with certain types of powders or granular packed products which would not leak through the fine openings, and if leaked through the openings 74 would be confined by the cap 14.

The entire nozzle and cap structure may be integrally molded and may be made in any size or shape to conform to any requirement. Therefore, it has the advantage in that it can accommodate itself to a much smaller size spout than was heretofore possible with a diaphragm closure and a pull tab.

It will be understood that various changes and modifications may be made from the foregoing without departing from the spirit and scope of the appended claims.

What is claimed is:

1. In a spout-type container closure, a generally tubular pouring spout of resiliently flexible material formed with a bore terminating in a mouth opening through the outer end of the spout, a closure diaphragm spaced inwardly of the spout from said mouth opening and extending across said bore at an inclined angle, with a plane perpendicular to the vertical axis of the tubular spout, said diaphragm having a diameter greater than the bore, said diaphragm being integral with and constituting a homogenous portion of the material forming the spout, said diaphragm being peripherally connected with the inner wall of said bore along a weakened tear line spaced inwardly of the spout from its mouth, a resiliently flexible pull tab having a root portion connected with said diaphragm closely adjacent said wall and said weakened tear line, and adjacent that portion of the diaphragm which is closest adjacent the mouth of the spout said tab, except for its root portion, being disconnected from said wall and said diaphragm, and having a free end normally projecting outwardly through and beyond the mouth of the spout, and being normally disposed at an angle to said diaphragm and being disposed for resilient flexing towards the plane of said diaphragm into the mouth of the spout, the resiliency of the tab, upon being released causing it to assume its normal position with the free end outward of and beyond the mouth of the spout.

2. A structure defined in claim 1 in which the length of the tab is greater than the diameter of the bore of the spout so that when the tab is within the mouth of the spout it assumes an arcuate shape within the bore.

3. A structure defined in claim 1 in which the angle of inclination of the diaphragm is approximately 20°.

4. A combination of elements defined in claim 1, further comprising a closure cap removably disposed on said spout to cover said mouth and having a portion abutting against the tab to flex the tab towards the diaphragm into said mouth incident to the application of said cap to said mouth.

5. A combination of elements defined in claim 1, further comprising a closure cap removably disposed on said spout to cover said mouth and having a portion abutting the tab to flex the tab towards the diaphragm into said mouth incident to the application of said cap to said spout and wherein the tab has a length greater than the diameter of the bore of the spout, causing the tab to assume an arcuate shape within said bore.

6. In a spout-type container closure, a generally tubular pouring spout of resiliently flexible material formed with a bore terminating in a mouth opening through the outer end of the spout, a closure diaphragm spaced inwardly of the spout from said mouth opening and extending across said bore at an inclined angle with a plane perpendicular to the vertical axis of the tubular spout, said diaphragm having a diameter greater than the bore, said diaphragm being integral with and constituting a homogenous portion of the material forming the spout, and diaphragm being peripherally connected with the inner wall of said bore along a weakened tear line spaced inwardly of the spout from its mouth, a resiliently flexible pull tab having a root portion connected with said diaphragm closely adjacent said wall and said weakened tear line and adjacent that portion of the diaphragm which is closest adjacent the mouth of the spout, said tab having a length greater than the bore of the spout, said tab,

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except for its root portion, being disconnected from said wall and said diaphragm, and having a free end normally projecting outwardly through and beyond the mouth of the spout, and being normally disposed at an angle to said diaphragm and being disposed for resilient flexing towards the plane of said diaphragm into the mouth of the spout, a closure cap removably disposed on said spout to cover said mouth and having a portion abutting against the tab to flex the tab towards the diaphragm into said mouth and wherein the tab by reason of its length will assume an arcuate shape within said bore, the resiliency of the tab upon being released by the removal of the cap from the spout causing the tab to assume its normal position with the free end outward of and beyond the mouth of the spout.

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