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W. F. LODDING ET AL

3,351,242

DISPENSING CLOSURE

Filed Feb. 9, 1966

FIG. 1

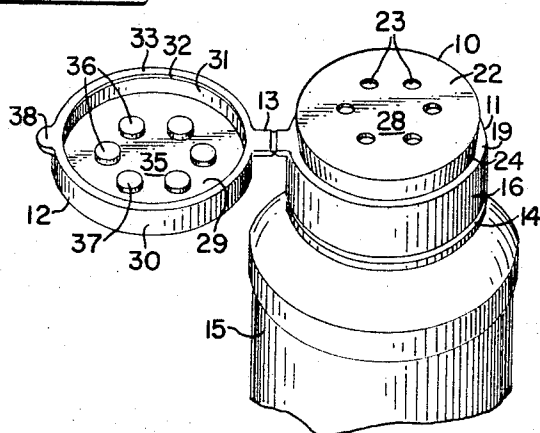


FIG. 2

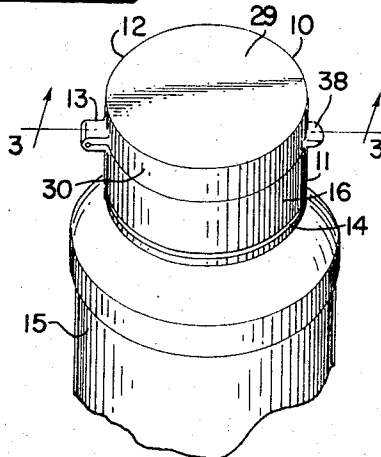


FIG. 3

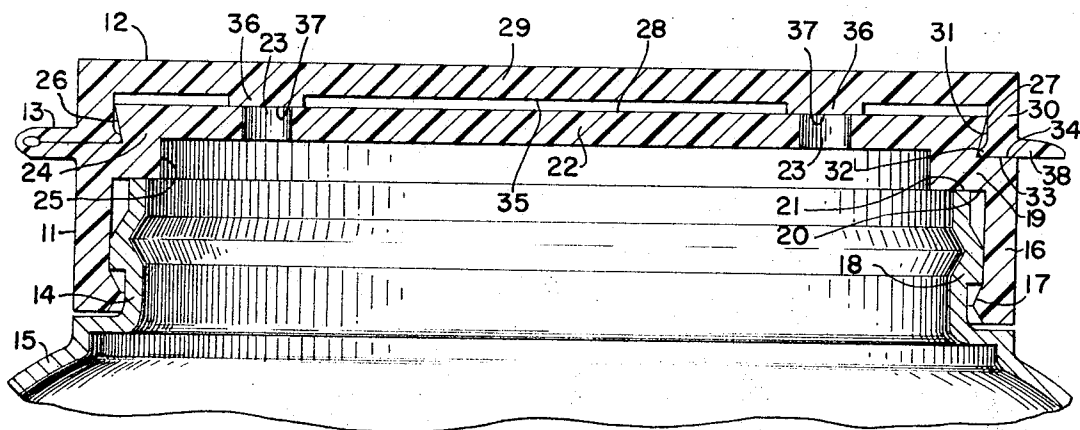


FIG. 4

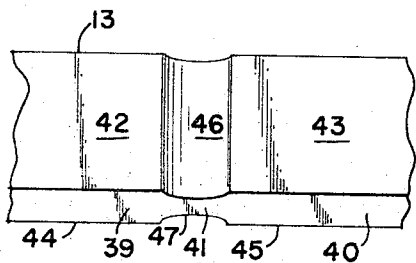
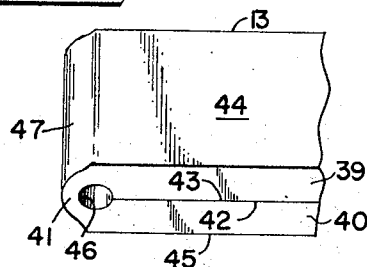


FIG. 5



INVENTORS  
WILLIAM F. LODDING  
MINDAUGAS J. KLYGIS

BY *Jerome M. Tepsitz* ATT'Y

3,351,242

**DISPENSING CLOSURE**

William F. Lodding, Wilmington, Del., and Mindaugas J. Klygis, Chicago, Ill., assignors to Continental Can Company, Inc., New York, N.Y., a corporation of New York

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8 Claims. (Cl. 222—189)

**ABSTRACT OF THE DISCLOSURE**

A dispensing closure having a one-piece construction, including a sifter portion having a transverse sifter plate provided with a plurality of dispensing openings and a cover portion integrally attached to the sifter portion by means of a flexible, hinged, connecting strap. The cover portion is adapted to be brought into sealing engagement with the sifter portion and is provided with a plurality of downwardly depending projections corresponding in number and arrangement to the dispensing openings in the sifter plate, the bottom surface of the projections being of a larger diameter than the openings, which projections, when the closure is in a closed position, seal each dispensing opening individually while contacting the sifter plate only in the area immediately contiguous to the dispensing opening.

This invention relates to dispensing closures for containers, and more particularly to a one-piece sifter-type dispensing closure adapted to dispense powdered contents from a container and, at the same time, to provide for proper sealing of the container during periods between dispensing operations.

It is conventional to form dispensing closures of a two-piece construction including a pair of caps which are generally telescoped relative to each other. One of the caps, generally an innermost cap, is secured to the neck of a container to prevent rotation of the inner cap with respect to the container. The second of the caps, generally the outermost cap, is telescoped externally of the innermost cap and the container neck, and is mounted for rotation relative to both the innermost cap and the neck of the container. Both the inner and outer caps are provided with dispensing openings which are in registration in a dispensing position and are out of the registration with each other in a non-dispensing position. The primary disadvantage of this two-piece construction is the relatively high cost of individually manufacturing each of the two cap elements and thereafter preassembling them, as is customary, and then assembling the preassembled caps upon the container.

It has also been proposed to form dispensing closures having a one-piece construction, including a sifter portion having a transverse sifter plate provided with a plurality of dispensing openings, and a cover portion integrally attached to said sifter portion by means of a flexible connecting strap. The cover portion is adapted to be brought into sealing engagement with the sifter portion so as to close and seal the dispensing openings in the closed position of the closure, and to be removed from sealing engagement with the sifter portion so as to expose the dispensing openings in the open position of the closure. This type of dispensing closure, although more economical to manufacture than the two-piece construction, has not heretofore proven to be altogether satisfactory. For one thing, this type of closure has customarily been made so that all of the dispensing openings are closed and sealed by a single large transverse surface of the cover portion, generally the bottom surface of the end panel thereof, designed to contact the entire area of the

sifter plate. Such construction does not provide a very efficient or dependable top seal for the dispensing openings, since any irregularity either on the surface of the sifter plate or on the transverse contacting surface or any excess dispensed particles remaining on the sifter plate from the dispensing operation could interfere with or destroy the entire top seal. Furthermore, the resilient nature of the flexible connecting strap which has customarily been employed with this type of closure provides the closure with inherent forces tending to urge the cover portion away from its closed sealed position. In order to compensate for these deficiencies and to insure an adequately secure seal it has been customary to form this type of closure with the cover portion extremely tight-fitting with respect to the sifter portion with the result that the closure is rather difficult to open.

It is an object of this invention to provide a sifter-type dispensing closure for containers which can be molded in one piece and which is adapted to effect a tight, secure, and efficient seal of the container and, at the same time, to be readily opened with relatively slight effort so as to expose a sifter plate containing a plurality of dispensing openings for dispensing powdered contents from the container.

Another object of this invention is to provide a one-piece sifter-type dispensing closure for containers, which includes a sifter portion having a sifter plate provided with a plurality of dispensing openings and a cover portion integrally attached to said sifter portion by means of a flexible connecting strap, said cover portion being adapted to be brought into sealing engagement with said sifter portion so as to close and effectively seal said dispensing openings and, at the same time, to be readily removable from such sealing engagement with relatively slight effort so as to expose said dispensing openings, said connecting strap being so designed as to exert relatively little resilient force tending to urge said cover portion away from its closed sealed position.

A further object of this invention is to provide a one-piece sifter-type dispensing closure, such as described in the preceding objects, which includes a separate sealing surface for each individual dispensing opening adapted to contact the sifter plate only in the area immediately contiguous to the dispensing opening.

Other objects and advantages of this invention will be apparent from the following detailed description taken in conjunction with the accompanying drawings wherein:

FIGURE 1 is a top perspective view of a container having secured to its neck the dispensing closure of the present invention shown in its open dispensing position;

FIGURE 2 is a top perspective view similar to FIGURE 1 showing the dispensing closure in its closed non-dispensing position;

FIGURE 3 is an enlarged fragmentary vertical sectional view taken along the line 3—3 of FIGURE 2;

FIGURE 4 is an enlarged fragmentary perspective view of the connecting strap of the dispensing closure in the open position and shows the specific details of the hinge portion thereof; and

FIGURE 5 is an enlarged fragmentary perspective view of the connecting strap in the closed position of the closure.

Referring to the drawings there is illustrated therein an integral dispensing closure 10 constructed in accordance with the present invention and comprising a sifter portion 11, a cover portion 12, and a relatively thin flexible connecting strap 13 integrally connecting the sifter portion and the cover portion. The dispensing closure is made of a flexible, resilient, plastic material such as polyethylene or other material having similar physical properties and is molded in one piece by conventional injection molding techniques. The closure 10 is shown

attached to the neck 14 of a container 15 made of plastic, metal, glass, or the like.

The sifter portion 11 comprises a vertical, cylindrical wall 16 which is provided on its inner surface with an inwardly extending circumferential bead 17 adapted to snap over and cooperate with an outwardly extending circumferential bead 18 on the neck 14 of the container 15 so as to secure the closure to the container neck as shown in FIGURE 3. An annular rim 19 extends inwardly from the top of the cylindrical wall 16 and is positioned so that its lower surface 20 makes sealing contact with the upper surface 21 of the container neck.

A circular sifter plate 22 is disposed in a plane lying above and parallel to the annular rim 19. The sifter plate 22 is of uniform thickness and has an outside diameter less than that of the vertical cylindrical wall 16. The sifter plate 22 is provided with a plurality of dispensing openings 23 for dispensing the contents of the container. An annular wall 24 depends downwardly from the periphery of the sifter plate 22 and extends from said sifter plate to the annular rim 19. The annular wall 24 has a vertical inner surface 25 and an upwardly and outwardly sloping frusto conical outer surface 26 which forms an outwardly protruding peripheral lip 27 at its juncture with the upper surface 28 of the sifter plate 22.

The cover portion 12 comprises a circular end panel 29 and a depending peripheral skirt 30. The inner wall 31 of the skirt 30 is provided with an inwardly extending circumferential bead 32. When the closure is brought into the closed position shown in FIGURES 2 and 3, the circumferential bead 32 snaps over the peripheral lip 27 of the sifter plate 22 and frictionally engages the outer surface 26 of the annular wall 24. As shown in FIGURE 3, when the closure is in the closed position the bottom surface 33 of the skirt 30 makes sealing contact with the upper surface 34 of the annular rim 19, and the end panel 29 overlies the sifter plate 22 with the bottom surface 35 of the end panel spaced apart from the upper surface 28 of the sifter plate.

The bottom surface 35 of the end panel 29 is provided with a plurality of downwardly depending projections 36 corresponding in number and arrangement to the dispensing openings 23 in the sifter plate 22. When the closure is in the closed position the projections 36 seal each dispensing opening 23 individually while contacting the sifter plate 22 only in the area immediately contiguous to the dispensing opening. In the preferred embodiment of the invention illustrated in the drawings, the projections 36 are cylindrical in shape with circular bottom surfaces 37, each of said bottom surfaces having a diameter greater than that of the corresponding dispensing opening 23 and overlying said dispensing opening in sealing contact with the immediately contiguous area of the upper surface 28 of the sifter plate 22. It is to be understood, however, that the projections 36 may have a shape other than that shown in the drawings or may be in the form of plugs which fit inside the dispensing openings. This latter arrangement is less preferred, however, since this would tend to make the closure more difficult to open.

The cover portion 12 is preferably provided with a tab 38 for grasping the cover portion to facilitate its movement into and out of sealing engagement with the sifter portion 11. The tab 38 forms an integral lateral extension of the bottom surface 33 of the skirt 30 of the cover portion and is located diametrically opposite the connecting strap 13.

Referring to FIGURES 4 and 5 of the drawings, the connecting strap 13 integrally connecting the cover portion 12 to the sifter portion 11 consists of two web portions 39 and 40 integrally joined together by a narrow intermediate hinge portion 41. The two web portions 39 and 40 are of greater thickness and rigidity than the hinge portion 41 and have upper surfaces 42 and 43, respectively, and lower surfaces 44 and 45, respectively.

The upper surface 42 of the web portion 39 is an integral lateral extension of the bottom surface 33 of the skirt 30 of the cover portion 12, while the upper surface 43 of the web portion 40 is an integral lateral extension of the upper surface 34 of the annular rim 19 of the sifter portion 11. The hinge portion 41 is of reduced thickness and greater flexibility as compared with the two web portions 39 and 40 and has an upper surface 46 and lower surface 47. The hinge portion 41 at each side thereof contiguous to each of the web portions 39 and 40 gradually increases in thickness to that of the web portions by its upper surface 46 sloping outwardly to meet the upper surfaces 42 and 43 of the web portions 39 and 40, respectively, and by its lower surface 47 sloping outwardly to meet the lower surfaces 44 and 45 of the web portions 39 and 40, respectively. Between these two side segments of varying thickness the hinge portion 41 has a generally uniform thickness.

As shown in FIGURE 5, when the closure is brought into closed position all of the bending in the connecting strap 13 occurs in the more flexible hinge portion 41 thereof while the two web portions 39 and 40 remain substantially rigid. The reduced thickness and greater flexibility of the hinge portion 41 as compared with the two web portions allow the connecting strap to be folded over sharply upon itself so that the upper surface 42 of the web portion 39 is in superimposed relation with the upper surface 43 of the web portion 40.

The closure of the present invention is so designed that it may be readily injection molded in one piece. The closure is preferably shipped to the packer in its closed position with the cover portion snapped into position on the sifter portion since this requires less shipping space and also lessens the chances of the connecting strap being severed during shipment.

After the container has been filled the container is sealed by snapping the closure in its closed position on to the neck of the container. As shown in FIGURE 3, the inwardly extending circumferential bead 17 on the sifter portion of the closure cooperates with the outwardly extending circumferential bead 18 on the container neck so as to secure the closure in sealing engagement with the container neck. The retaining force exerted by the circumferential bead 32 on the skirt 30 of the sifter portion is sufficient to maintain the cover and sifter portions of the closure in sealing engagement. Hence an efficiently sealed package is obtained.

The sealing engagement between the cover and sifter portions of the closure is effected primarily by the bottom surfaces 37 of the projections 36 on the cover portion covering the dispensing openings 23 on the sifter plate 22 and making sealing contact with the sifter plate in the areas immediately contiguous to the dispensing openings, and secondarily by the bottom surface 33 of the skirt 30 of the cover portion making sealing contact with the upper surface 34 of the annular rim 19 of the sifter portion. Due to the limited contact being made between the cover portion and the sifter plate, there is little likelihood for surface irregularities in either of these members interfering with the seal. Furthermore, the construction of the connecting strap 13 allowing the strap to be folded over sharply upon itself results in the strap exerting relatively little resilient force tending to urge the cover portion away from its closed sealed position. For these reasons the retaining force exerted by the bead 32 of the cover portion against the annular wall 24 of the sifter portion need only be relatively slight in order to insure that the sealing engagement between the cover portion and the sifter portion be adequately maintained.

When it is desired to dispense some of the contents from the container the closure may be readily opened by exerting an upward pressure on the tab 38. Since the frictional retaining force holding the cover portion in sealing en-

gement with the sifter portion is relatively slight, very little effort is required to disengage these members. For example, the container may be grasped in one hand and upward pressure exerted on the tab by one finger of that same hand thereby leaving the other hand free to perform other functions. As the cover portion is pivoted into the open position of the closure shown in FIGURE 1, the sifter plate 22 becomes exposed and the contents of the container may be dispensed through the dispensing openings 23. The cover portion meanwhile remains connected to the package by means of the connecting strap 13. After the desired amount has been dispensed, the cover portion is returned to its closed sealed position as shown in FIGURE 2. Due to the limited contact of the cover portion with the sifter plate 22 provided by the closure construction of the present invention, there is very little likelihood of the efficiency of the reseal being hindered by any excess dispensed particles remaining on the sifter plate from the dispensing operation.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawings and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. An integral dispensing closure made of flexible, resilient material and comprising a sifter portion including means for securing said closure in sealing contact with the neck of a container, a cover portion in frictional sealing engagement with said sifter portion, and a relatively thin flexible connecting strap integrally connecting said sifter and cover portions, said sifter portion including a sifter plate of uniform thickness provided with a plurality of dispensing openings, said cover portion including a solid end panel overlying said sifter plate and in spaced relation thereto, said end panel being provided with a plurality of downwardly depending projections corresponding in number and arrangement to the dispensing openings in said sifter plate, the bottom surface of each of said projections being larger than the corresponding dispensing opening and overlying said dispensing opening in sealing contact with the immediately contiguous area of the sifter plate, said cover portion being readily separable from sealing engagement with said sifter portion by upward vertical movement away from said sifter plate.

2. The closure defined in claim 1 wherein said connecting strap consists of two web portions of relatively greater thickness and rigidity integrally joined together by a narrow intermediate hinge portion of reduced thickness and greater flexibility, said hinge portion allowing said connecting strap to be folded over sharply upon itself so as to place the two web portions in superimposed relation.

3. The closure defined in claim 1 including means for grasping said cover portion to facilitate its removal from sealing engagement with said sifter portion, said grasping means being located diametrically opposite said connecting strap.

4. A combined dispensing closure and container, said container including a body terminating in a neck, said neck being provided with means for securing said closure in sealing contact therewith, said closure being made of flexible resilient material and comprising a sifter portion including means cooperating with said means on said container neck to secure said closure in sealing contact with said container neck, a cover portion in frictional sealing engagement with said sifter portion, and a relatively thin flexible connecting strap integrally connecting said sifter and cover portions, said sifter portion including a sifter plate of uniform thickness provided with a plurality of dispensing openings, said cover portion including a solid end panel overlying said sifter plate and in spaced relation thereto, said end panel being provided with a plurality of downwardly depending projections corresponding in number and arrangement to the dispensing openings in said

sifter plate, the bottom surface of each of said projections being larger than the corresponding dispensing opening and overlying said dispensing opening in sealing contact with the immediately contiguous area of the sifter plate, said cover portion being readily separable from sealing engagement with said sifter portion by upward vertical movement away from said sifter plate.

5. The combined dispensing closure and container defined in claim 4 wherein said connecting strap consists of two web portions of relatively greater thickness and rigidity integrally joined together by a narrow intermediate hinge portion of reduced thickness and greater flexibility, said hinge portion allowing said connecting strap to be folded over sharply upon itself so as to place the two web portions in superimposed relation.

6. The combined dispensing closure and container defined in claim 4 including means for grasping said cover portion to facilitate its removal from sealing engagement with said sifter portion, said grasping means being located diametrically opposite said connecting strap.

7. An integral dispensing closure made of flexible resilient material and comprising a sifter portion, a cover portion, and a relatively thin, flexible connecting strap integrally connecting said sifter and cover portions, said sifter portion comprising a vertical cylindrical wall provided on its inner surface with means for securing said closure to the neck of a container, an annular rim extending inwardly from the top of said cylindrical wall and adapted to make sealing contact with the upper surface of the container neck, a circular sifter plate of uniform thickness disposed in a plane lying above and parallel to said annular rim, said sifter plate having an outside diameter less than that of said cylindrical wall and being provided with a plurality of dispensing openings, and an annular wall depending downwardly from the periphery of the sifter plate and extending from said plate to said rim, said cover portion comprising a circular end panel and a downwardly depending peripheral skirt, said skirt having its inner wall in frictional engagement with said annular wall and its bottom surface in sealing contact with the upper surface of said annular rim, said end panel overlying and spaced apart from said sifter plate and being provided with a plurality of projections corresponding in number and arrangement to the dispensing openings in the sifter plate, the bottom surface of each of said projections being larger than the corresponding dispensing opening and overlying said dispensing opening in sealing contact with the immediately contiguous area of the sifter plate, said cover portion being readily separable from sealing engagement with said sifter portion by upward vertical movement away from said sifter plate, annular wall and annular rim.

8. A combined dispensing closure and container, said container including a body terminating in a neck, said neck being provided with means for securing said closure thereto, said closure being made of flexible resilient material and comprising a sifter portion, a cover portion, and a relatively thin, flexible connecting strap integrally connecting said sifter and said cover portions, said sifter portion comprising a vertical cylindrical wall provided on its inner surface with means cooperating with said means on said container neck to secure said closure to said container neck, an annular rim extending inwardly from the top of said cylindrical wall and making sealing contact with the upper surface of said container neck, a circular sifter plate of uniform thickness disposed in a plane lying above and parallel to said annular rim, said sifter plate having an outside diameter less than that of said cylindrical wall and being provided with a plurality of dispensing openings, and an annular wall depending downwardly from the periphery of the sifter plate and extending from said plate to said rim, said cover portion comprising a circular end panel and a downwardly depending peripheral skirt, said skirt having its inner wall in frictional engagement with said annular wall and its bottom

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surface in sealing contact with the upper surface of said annular rim, said end panel overlying and spaced apart from said sifter plate and being provided with a plurality of projections corresponding in number and arrangement to the dispensing openings in the sifter plate, the bottom surface of each of said projections being larger than the corresponding dispensing opening and overlying said dispensing opening in sealing contact with the immediately contiguous area of the sifter plate, said cover portion being readily separable from sealing engagement with said sifter portion by upward vertical movement away from said sifter plate, annular wall, and annular rim.

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ROBERT B. REEVES, *Primary Examiner*.HADD S. LANE, *Examiner*.