July 14, 1970 L. F. IRLAND ET AL 3,520,337

FILLING METHOD FOR PRODUCT DISPENSING CONTAINERS

Filed Sept. 13, 1967 2 Sheets-Sheet 1

FIG. 1

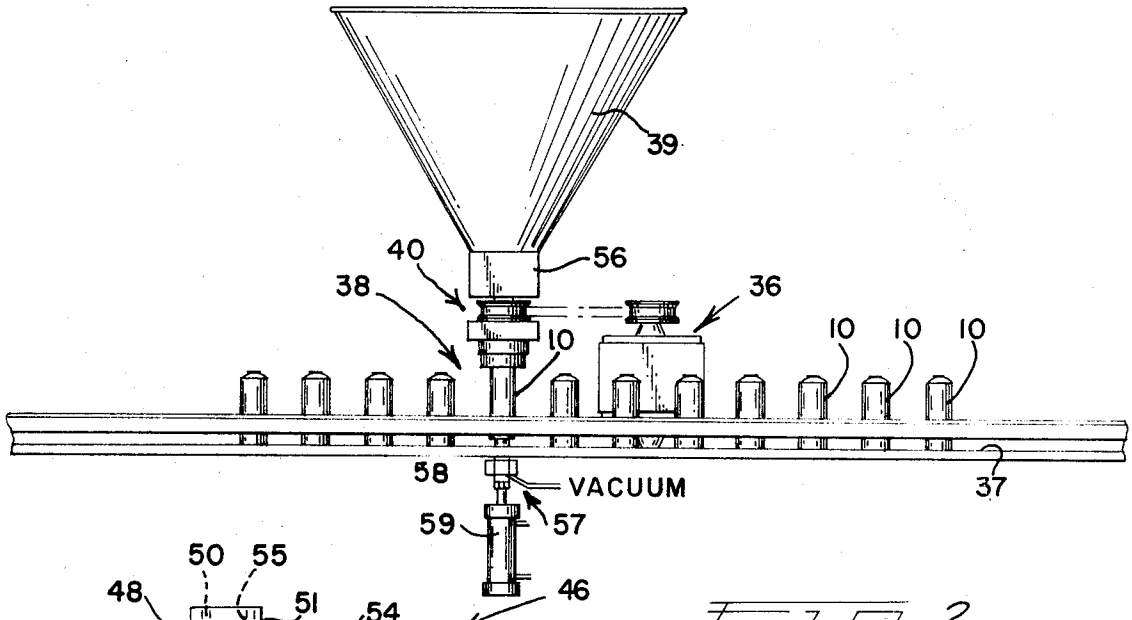
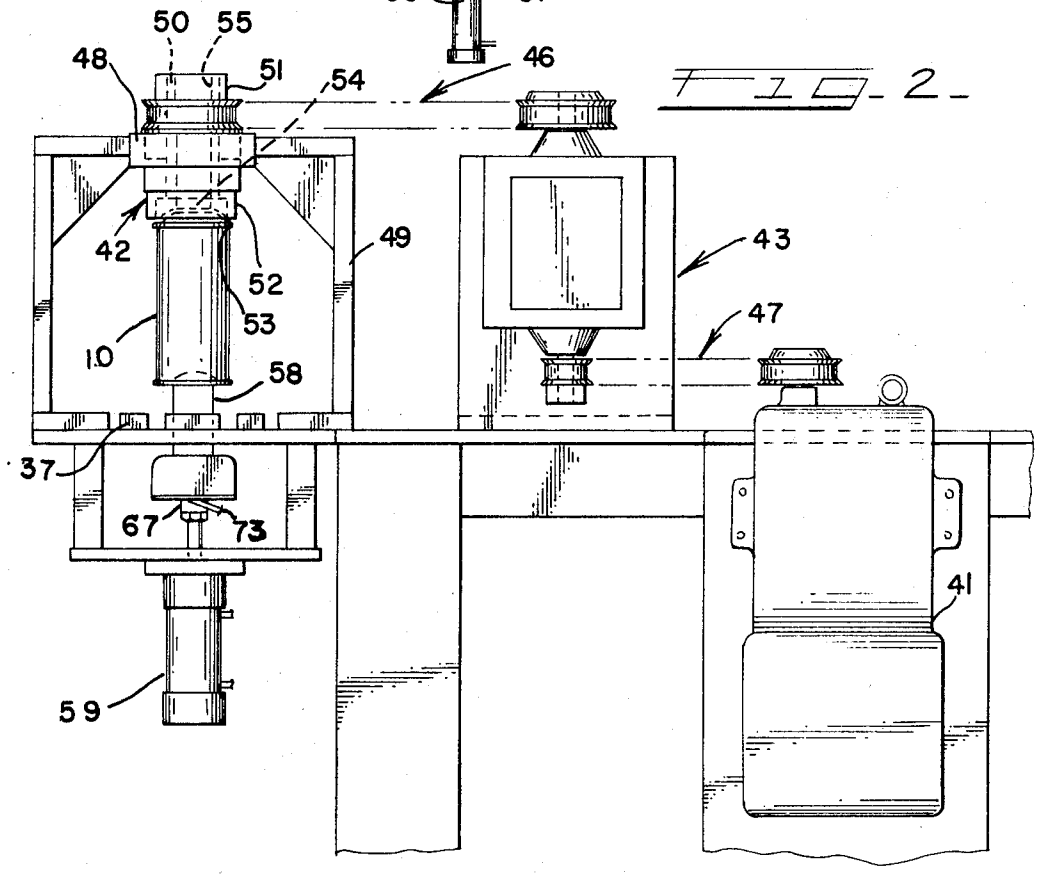


FIG. 2



INVENTORS
LEWIS F. IRLAND
JAMES F. FOX

BY Fred P. Kostka
ATT'Y.

July 14, 1970 L. F. IRLAND ET AL 3,520,337

FILLING METHOD FOR PRODUCT DISPENSING CONTAINERS

Filed Sept. 13, 1967 2 Sheets-Sheet 2

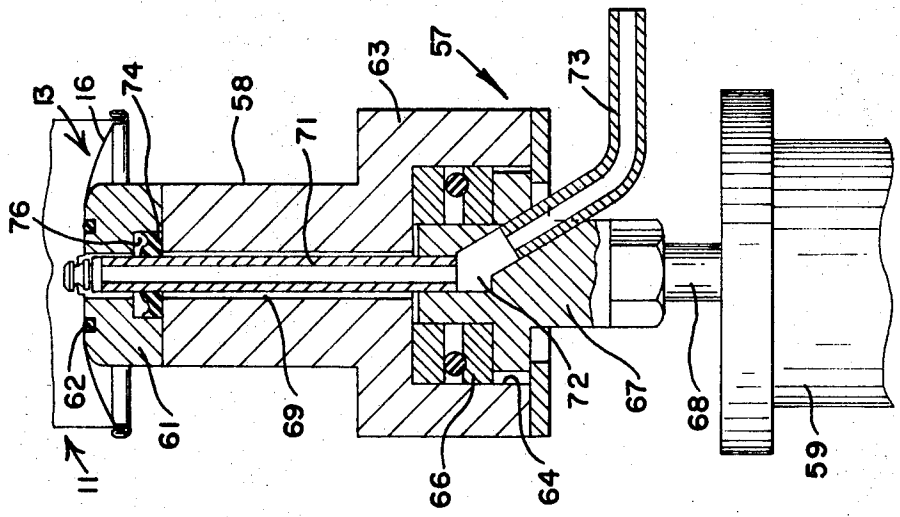


FIG. 3

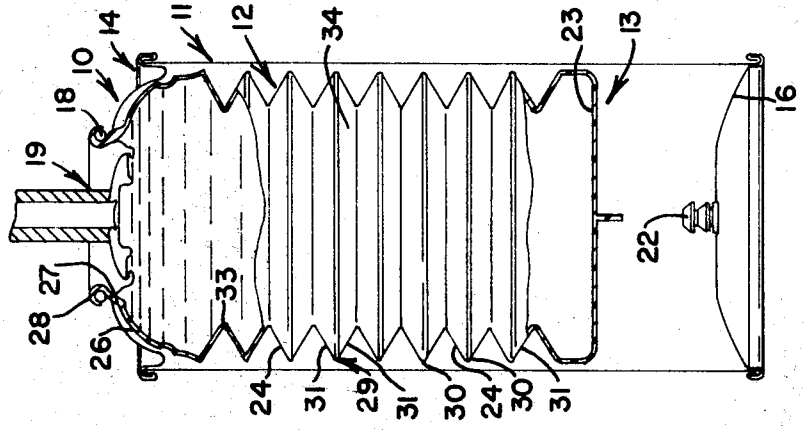


FIG. 5

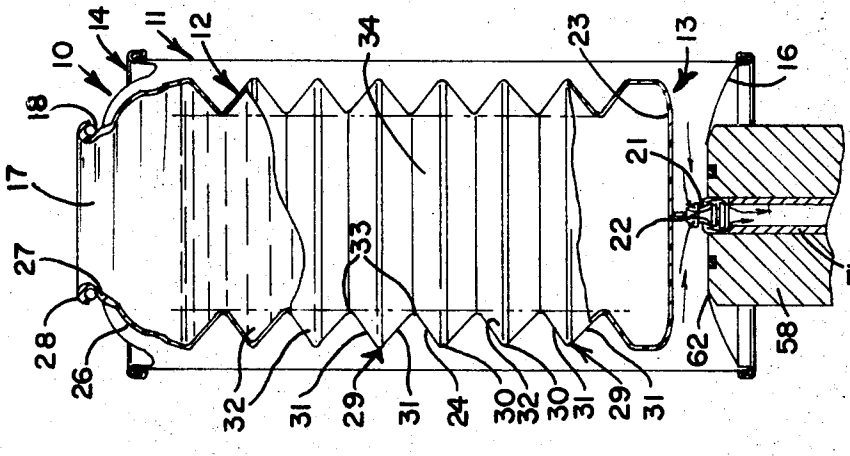


FIG. 4

INVENTORS
LEWIS F. IRLAND
JAMES F. FOX

BY Fred P. Fostka
ATT'Y.

United States Patent Office 3,520,337 Patented July 14, 1970

3,520,337

FILLING METHOD FOR PRODUCT DISPENSING CONTAINERS

Lewis F. Irland, Hinsdale, and James F. Fox, Chicago, Ill., assignors to Continental Can Company, Inc., New York, N.Y., a corporation of New York

Filed Sept. 13, 1967, Ser. No. 667,427
Int. Cl. B65b 1/04, 3/04
U.S. Cl. 141—3 3 Claims

ABSTRACT OF THE DISCLOSURE

A method for filling the product in a product dispensing container of the type including a collapsible product bag disposed in the interior of the container and defining therein a propellant chamber. The bag is constructed with lengthwise spaced circumferential means imparting radial rigidity and controlling the collapsing of the container under the influence of the propellant in the propellant chamber. The spaced circumferential means form restricted volumes which communicate with the central portion of the bag. The container including the bag attached therein is rotated during the filling of the product to create a centrifugal force causing the deposited product to flow into and completely fill the restricted volume. The propellant chamber is subjected to a partial vacuum to extend the bag from its normal static length. When a vacuum is applied, the bag is filled to a level below the upper lip or top of the bag to provide a volume sufficient to accommodate the volume of the product displaced therein when the bag returns to its normal static length upon release of the vacuum.

BACKGROUND OF THE INVENTION

Field of invention

The present invention relates to a method for filling a product in a product dispensing container of the general type having a product bag disposed in a container body charged with a propellant, and more particularly, to a method for filling a bag having fold means for rendering the bag collapsible and defining restricted volumes into which the product is deposited.

The prior art

Problems have been encountered heretofore in adequately filling containers of the fluid dispensing type incorporating a product bag. The problem is particularly acute when the bag is formed with fold means rendering the bag collapsible. The fold means define volume portions having crevices and the like into which the flow of the product is restricted. In the standard method employed heretofore the can is held stationary below the filling station and the product is deposited therein by gravity so that the flow or viscosity characteristics of the fluid is relied upon to completely fill all of the crevices of the restricted volume. Products of a high or marked viscosity would not always flow into these crevices and would form air pockets or voids. These air pockets are objectionable for the reason that under some circumstances the air entrapped therein may tend to render the product unsuitable for its intended use. Moreover, the voids reduced the product carrying capacity of the bag. Preferably, the product is filled to a maximum level which permits the dispensing valve assembly to be attached without causing spillage of the product over the top.

Difficulties have been encountered in filling the bag to this maximum level by prior filling methods without causing spillage over the open top into which the product is introduced. To eliminate this spillage, the product has been filled to a level well below the maximum so that the entire capacity of the bag was not used.

SUMMARY OF THE INVENTION

By the present invention it is proposed to fill the container bag of the general type described above in a manner overcoming the difficulties encountered heretofore. This is accomplished generally by spinning or rotating the container with the bag disposed therein during the filling of the product into the bag. Rotation of the container and bag imposes a centrifugal force on the product deposited in the bag, causing the product to flow into all of the crevices of the fold means and thereby fill all of the voids.

In another aspect of the invention the collapsible bag of the heretofore described type is extended from its static length and the product filled to a predetermined level to provide an empty volume for accommodating the product which is displaced therein after the extending force is removed and the bag returns to its static length.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary front elevational view of an apparatus which may be used in practicing the method of the present invention;

FIG. 2 is an enlarged fragmentary side elevational view of the mechanism used to rotate the container into which the product is deposited;

FIG. 3 is a fragmentary elevational view partially in cross-section to show underlying details of the means used to elevate the container into engagement with a chuck of the container rotating mechanism.

FIG. 4 is a cross-sectional view of the container showing the product deposited therein and the bag extended from a normal static length by a vacuum applied through the elevating means shown in FIG. 3; and

FIG. 5 is a cross-sectional view similar to FIG. 4 but showing the bag in the normal static length thereof with the product disposed therein after the vacuum has been released.

PREFERRED EMBODIMENT

Referring now to the drawings and in particular FIGS. 4 and 5, there is shown a product dispensing container **10** of the general type with which the filling method of the present invention is adapted to be used. The container **10** comprises generally a container body **11**, an inner collapsible bag **12** which carries the product to be dispensed, and a propellant chamber **13** defined between the exterior of the bag **12** and the interior of the container body **11**.

The container body **11** includes axially opposed top and bottom closures **14** and **16**, respectively. The top closure **14** may be generally dome-shaped and formed with an axial opening **17** bounded by a rolled rim **18**. The product is filled through the opening **17** into the collapsible bag **12**. After the bag is filled a product dispensing valve assembly **19** is attached to the rim **18** as shown in FIG. 5.

The bottom closure plate **16** is formed with an opening or vent **21** into which there may be inserted a propellant charging valve **22**. The propellant charging valve **22** is constructed to provide fluid communication between propellant chamber **13** and the container body exterior when positioned as shown in FIG. 4 and to close off communication therebetween when positioned as shown in FIG. 5. For a more detailed description of the charging valve assembly **19**, reference is made to co-pending U.S. patent application Ser. No. 676,294, filed Oct. 18, 1967, and assigned to the assignee of the present invention. The vent **21** may also be closed by a grommet (not

shown) which is inserted therein and through which the propellant may be inserted by a needle or the like.

The collapsible bag **12** is formed from a plastic material such as polyethylene and preferably by blow molding. The bag is constructed of a sufficient thickness to impart shape-retaining characteristics thereto. The collapsible bag **12** includes a bottom wall or panel **23** located in vertically spaced relationship with respect to the bottom closure **16**, a body wall **24**, and an upper end portion **26**. The upper end portion **26** includes an opening **27** bounded by a curled rim **28** which is attached to the top closure curled rim **18**.

To regulate the collapsing of the bag in a manner to eliminate indiscriminate inward folding of the wall causing entrapment of the product, the body wall **24** is provided with a plurality of lengthwise spaced circumferentially extending fold bands **29** which in the form shown include panels **31**. The panels **31** are arranged in substantially V-shaped configurations, each having an outer apex **30** about which the panels are foldable and an inner apex **33** which tends to radially rigidify the body wall **24**. The foldable bands **29** thus form interruptions in the body wall **24** in the form of plurality of lengthwise spaced annular volumes **32** of substantially V-shaped cross-section. The annular volumes **32** communicate with an axial or central volume **34** defined by an imaginary projected volume of the inner apices **33** of the fold bands **29**.

A bag formed from polyethylene by blow molding tends to fold about the outer apices when removed from the mold and cooled so as to assume a normal static length less than that of the original mold length. Such shortening occurs with substantially no decrease in the axial volume of the bag. This characteristic of the bag may be utilized to achieve maximum filling thereof as will be more fully described hereinafter.

It should be evident from the foregoing that with standard gravity product filling practices may be encountered in completely filling the annular volumes **32** to the extent of the exclusion of all of the voids or air products in the crevices defined at the apices **30**. These difficulties become particularly acute when the product to be dispensed is of a marked viscosity and which tends to cling on the wall structure rather than flow therealong into the crevices.

By the present invention these difficulties are obviated by rotating the container body **11** with the bag **12** attached therein during the introduction of the product to create a centrifugal force on the deposited product causing the latter to fill all of the crevices of the annular volumes **32**. The apparatus for accomplishing this result may be incorporated in a substantially conventional piston-type product filling machine **36** as shown in FIGS. 1 and 2. The filling machine **36** comprises generally a conveyor feed **37** which delivers the container **10** to a filling station **38** in timed sequence for filling of the product therein from a funnel **39**. After filling of the container **10** the latter may be delivered to a propellant charging station and a dispensing valve assembly applying station, both not shown.

The container **10** is fed to the filling station **38** in the assembled condition shown in FIG. 4 with the opening **21** in the bottom closure plate **16** free of any obstruction or with the charging valve **22** positioned to permit fluid communication between the propellant chamber **13** and the container exterior for reasons which will become apparent hereinafter. The dispensing valve assembly **19** as heretofore described is attached after filling the product in the bag **12**.

Located at the filling station **38** is a container spinning or rotating assembly **40** including generally a drive motor **41** which is connected to a container rotating head **42** via a speed control box **43** by way of belt and pulley drives **46** and **47**. The spinning head **42** includes a tubular shaft **50** which is journaled for rotation in a bearing **48** suitably fixed to framing **49** in vertically spaced relationship above the conveyor belt **37**. Holding the head **42** against vertical movement are upper and lower collars **51** and **52** respectively. The lower end of the spinning head **42** is formed to provide a chuck **53** which is engageable with the upper end of the container **10** to hold the latter for rotation therewith. The chuck **53** is formed with an axial bore **54** which is aligned with a bore **56** of the tubular shaft **50**. The spinning head **42** is mounted so that the shaft bore **56** and chuck opening **54** are longitudinally aligned with a spout **57** of the product filling funnel **39**.

The vertical spacing between the chuck **53** and the conveyor **37** is greater than the height of the container **10**. To lift the container **10** into engagement with the chuck **53**, there is provided an elevating spindle assembly **57** including a spindle **58** operatively connected to a pneumatic piston unit **59** as shown in FIG. 3. The spindle **58** may have fixed to the upper end thereof a head **61** contoured complementary to the underside of the container bottom closure **16**. Seated within the head **61** so as to be concentric with the bottom closure opening **21** is an O-ring **62** which serves to form a seal for reasons which will become apparent hereinafter.

The lower end of the spindle **58** is formed with an enlarged base **63** including a counter bore **64** in which there is seated a bearing assembly **66** rotatably supporting the spindle **58** on a union **67**. The union **67** is connected to a piston rod **68** of the pneumatic piston unit **59**.

Extending through an axial bore **69** in the spindle **58** and head **61** is a tube **71** which is seated at its lower end in one end of a passageway **72** formed in the union **67**. The passageway **72** at its other end receives a conduit or tube **73** which is flexibly connected to a source of vacuum which serves to reduce the pressure in the propellant chamber **13** for reasons more apparent hereinafter.

The upper end of the tube **71** extending through the head **61** of the spindle **58** is isolated from the lower end of the bore **69** by a sealing gasket **74** disposed within a counter-bore **76** formed in the underside of the head **61**. The sealing gasket **74** is of the general type permitting free rotation of the spindle **58** and head **61** about the tube **71** which is held stationary in the union **67**.

In operation the containers **10** are intermittently fed by the conveyor belt **37** to the filling station **38**. When a container **10** arrives at the filling station **38** the piston unit **59** is actuated to elevate the spindle **58** and head **61** into engagement with the bottom closure **16** thereby to lift the upper end of the container into engagement with the chuck **53** of the spinning head **52**. The product is deposited into the bag **12** from the funnel **39** through the axial aligned bores **54** and **56** which are aligned with the spout **57**.

To achieve maximum filling of the bag **12**, a vacuum may be applied to the propellant chamber **13** by way of the tubing **71** and **73**. In this connection, it is to be noted that the seal formed by the O-ring **62** engaging the underside of the bottom closure **16** forms an effective chamber about the vent **21**. In this manner the vacuum is applied to the propellant chamber **16** through the fluid passages provided in the valve **22**. Upon the application of a vacuum in the propellant chamber **13**, the bag **12** is lengthened from its normal static length to its original mold length. Such lengthening occurs by means of the panels **31** folding away from each other at the outer apices **30** without substantially folding about the inner apices **33**, so that the cross-sectional area of the inner core volume remains substantially unchanged.

Thereafter, the motor **41** is energized to rotate the spinning head **42** and thereby the container which is in engagement with the chuck **53**. Rotation of the container **10** imposes a centrifugal force on the product deposited in the bag **12** and causes the former to flow radially outward against the surfaces of the panels **31**. The speed of

rotation of the spinning head **42** and thereby the container **10** is regulated to achieve a centrifugal force adequate to cause the product to flow into and completely fill the crevices in the annular volumes **32** without destroying or modifying the shape of the bag **12**.

Spinning of the container while filling is continued until the product is at least at a level above that of the restricted volume **32** in the fold bands **29**, but under no circumstances to a level at which the product spills over the rim **18**. When the spinning is stopped additional volume may be available for the product so that the product may continue to be deposited until a level is reached at which the upper section **26** of the bag **12** is filled to the extent that the dispensing valve assembly **19** may be fastened to the container body **11** without causing spillage of the product over the rim **18**.

After filling to the desired level, the vacuum is released and the bag **12** tends to collapse to its normal static length causing a quantity of product proportional to the contraction of the bag **12** to be displaced into the upper portion **26** of the bag **12**. Accordingly, the level to which the bag **12** is ultimately filled is maintained sufficiently below the rim **18** to provide space for accommodating the upwardly spaced product. The presence of such a space within the bag **12** prior to release of the vacuum minimizes spillage over the rim **18** while at the same time permitting filling of the bag to its maximum volume.

After filling the bag **12**, the spindle **58** is lowered to again place the container **10** on the conveyor **37** for transfer to the propellant charging and dispensing valve assembly stations. To further minimize spillage during lowering of the filled container **10**, the release of the vacuum may occur after the container has been lowered onto the conveyor **37**.

What is claimed is:

1. The method of filling a viscous product in a product dispensing container of the type including a container body having a bottom closure, an open top which is adapted to be closed by a product dispensing valve assembly, a shape retentive collapsible bag of generally tubular cylindrical configuration of a normal static length and having a closed end and an open end, said bag being disposed in said container with said open end attached to said open top of said container and said closed end spaced from said bottom closure plate so as to define a propellant chamber within said container, said tubular cylinder including lengthwise spaced fold panel means rendering said bag controllably collapsible and defining lengthwise spaced annular volumes disposed about and communicating with an inner lengthwise extending volume; said filling method comprising depositing this product into said bag through said open end of said bag, rotating said container while this product is being deposited in said bag so as to create a centrifugal force sufficient to cause the product deposited in said bag to flow into and completely fill said annular volumes without causing distortion of said bag, discontinuing said rotation of said container when product fills said bag to a level adjacent the upper most one of said annular volumes, continuing the filling of said product into said bag to a predetermined level at which a dispensing valve assembly may be attached to the open top of said container without causing spilling.

2. The method as defined in claim **1** including the steps of extending the bag from said normal static length prior to depositing the product in said bag, filling said product into said bag to a level below said predetermined level after said rotation is discontinued to provide a space for accommodating the product, and releasing said bag from said extended length whereby the product is displaced upwardly and accommodated in said space.

3. The method as defined in claim **2** including the steps of applying a vacuum to the propellent chamber to extend said bag, and releasing said vacuum after said bag is filled to a level providing said space for accommodating the upwardly displaced product when the bag returns to said normal static length.

References Cited

UNITED STATES PATENTS

3,266,212 8/1966 Monroe ---------- 141—34

HOUSTON S. BELL, JR., Primary Examiner

U.S. Cl. X.R.

53—27; 141—34