May 14, 1963 H. D. SWARTZ 3,089,636

SELF-SEALING CONTAINER

Filed Feb. 1, 1952 2 Sheets-Sheet 1

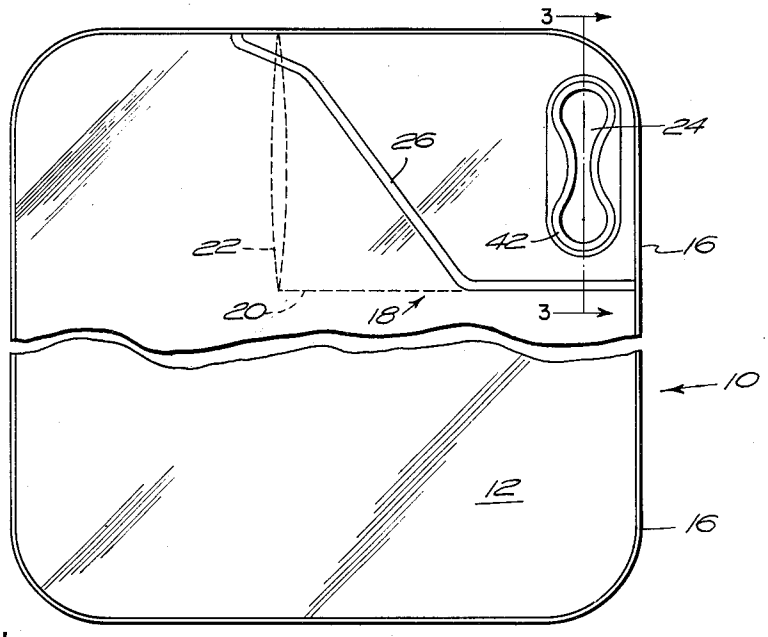

FIG. 1

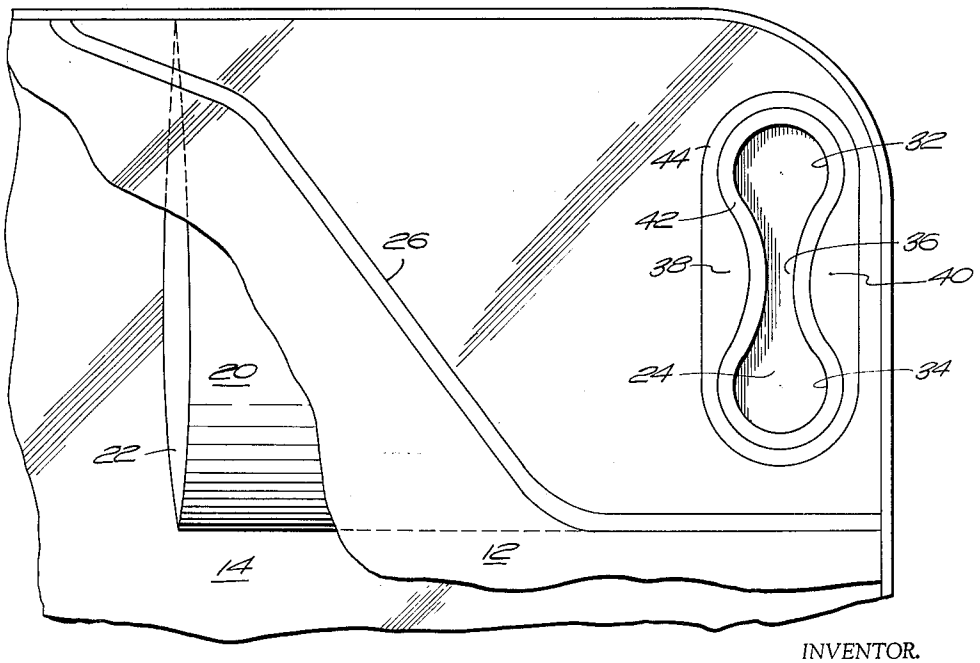

FIG. 2

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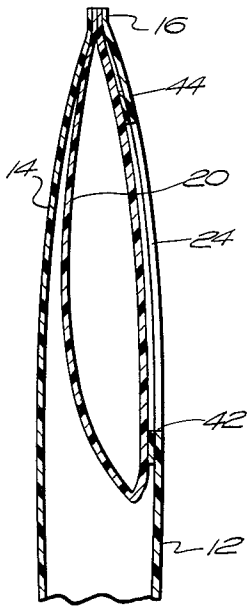

FIG. 3

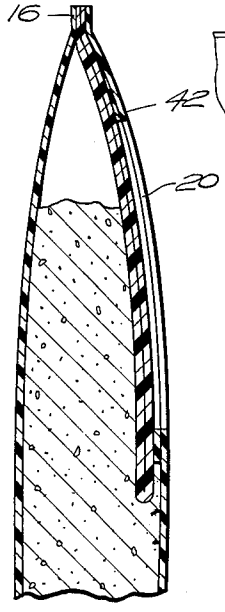

FIG. 4

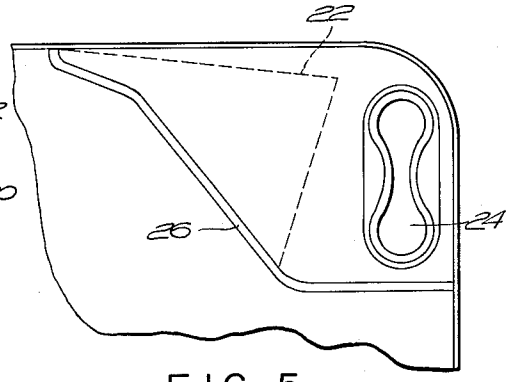

FIG. 5

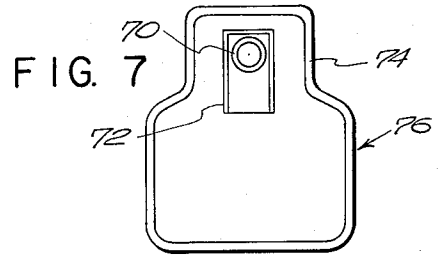

FIG. 7

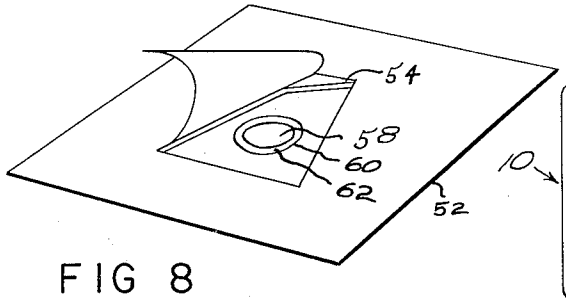

FIG 8

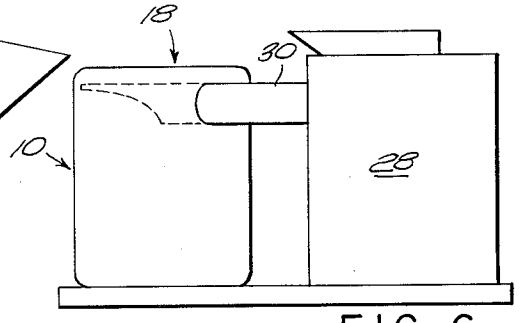

FIG. 6

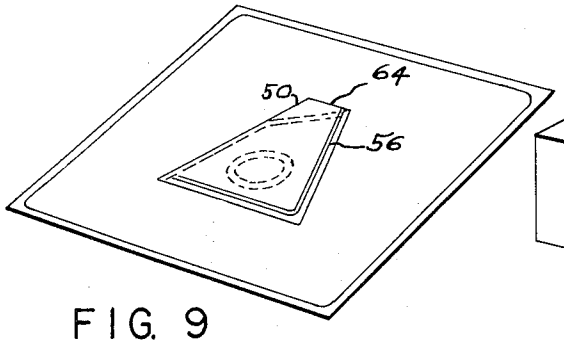

FIG. 9

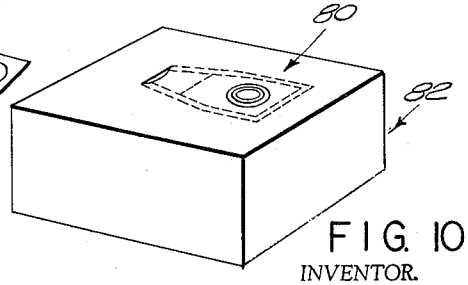

FIG. 10

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SELF-SEALING CONTAINER

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Filed Feb. 1, 1962, Ser. No. 170,473
5 Claims. (Cl. 229—62.5)

This invention relates in general to valve bags and similar self-sealing flexible and semi-rigid containers and more particularly concerns a new and improved container which is loaded through a self-sealing tubular valve element in communication with the interior of the container and an opening formed in a side wall of the container apart from any joint or seam.

I am aware that there are a number of commercially available valve bags which are loaded through a self-sealing valve having an opening located diagonally across a corner, or along an edge, seam or other joint of the bag. Such bags are normally filled by automatic or semi-automatic packing machines having tubular nozzles of various diameters and lengths that are inserted in the bag through the valve. The filling material, whether it is a liquid, powder or granular particles, for example, is forced rapidly into the bag until filled and the pressure of the fill against the valve automatically closes the valve when the nozzle and bag are separated.

In practice, the most troublesome problem associated with this type of bag is cracking and tearing of the bag along the seam at the valve opening. Since this part of the valve supports a substantial portion of the weight of the bag during the loading operation, it is subjected to rather high stresses and the seams at the opening frequently split so that the bag is no longer usable.

Accordingly, it is a general object of the present invention to provide a self-sealing valve for flexible or semi-rigid containers of improved construction and design.

Another object of this invention is to provide for use with flexible and semi-rigid containers an efficient valve element which is capable of withstanding considerable strain about its opening without tearing or cracking.

A more specific object of this invention is to provide a flexible, heat-sealable plastic valve bag characterized by a self-sealing valve element which may be readily opened for filling and which is capable of withstanding a considerable amount of strain without ripping, tearing or otherwise failing during or after the filling operation or in transit.

More particularly, this invention features a flexible or semi-rigid container having an opening formed through an outer wall or panel inwardly from the marginal edges of the wall or panel and spaced from the seams formed between adjacent panels. The opening is in register with and sealed to an opening formed in the wall of a flexible sleeve which communicates with the interior of the container and which collapses or folds against the opening in a self-sealing fashion under the pressure of fill. Filling is thus accomplished through the side or wall of the container rather than through a seamed edge which is structurally a weak area.

As another feature of this invention, the valve mouth has a unique configuration which permits convenient fitting of the bag onto the nozzle of a loading machine and which is adapted to support the weight of the loaded bag without tearing.

Still another feature of this invention relates to the general construction of the bag which permits the use of low cost sheet material exclusively throughout the bag and including the valve element.

But these and other features of the invention, along with further objects and advantages thereof, will become more readily apparent from the following detailed description taken in connection with the accompanying drawings in which:

FIG. 1 is a view in side elevation of a valve bag made according to the invention,

FIG. 2 is a detail view, somewhat enlarged, of the valve element in the FIG. 1 device,

FIG. 3 is a cross-sectional view taken along the line 3—3 of FIG. 2,

FIG. 4 is a view similar to FIG. 3 but showing the bag in a loaded condition,

FIG. 5 is a view similar to FIG. 2 but showing the valve in a folded and closed position,

FIG. 6 is a view in side elevation of the FIG. 1 valve bag attached to an automatic packing machine for filling,

FIG. 7 is a view in side elevation of a modification of the invention,

FIG. 8 is a view in perspective of a partly assembled modification of the invention,

FIG. 9 is a view similar to FIG. 8 but showing the completed container, and,

FIG. 10 is a view in perspective of still another modification of the invention.

Referring now to the drawings and more particularly to FIGS. 1–6, the reference character **10** generally indicates a valve bag fabricated from a flexible sheet material and preferably from a film of tough, flexible, heat-sealable plastic material such as polyethylene or the like. The bag **10** comprises a pair of generally rectangular panels which for purposes of this description may be identified as a front panel **12** and a rear panel **14**. These panels are attached to one another by means of a continuous, flat, marginal seal **16** of sufficient width to hold the panels firmly together even under high internal pressures.

At the upper right hand corner of the bag **10** there is located a self-sealing valve **18** through which the bag may be loaded with a pourable fill such as liquid, powder or granular material. The valve **18** is characterized by a sleeve element **20** formed from a single sheet of flexible material and preferably of the same heat sealable polyethylene film of which the panels **12** and **14** are fabricated. The sleeve element **10** is formed from a single rectangular panel folded back upon itself with the free ends sealed along the upper edge of the bag and between the upper margins of the panels **12** and **14**, and one end sealed along the side edge of the bag. The opposite end of the sleeve is open at **22** so that the sleeve defines a passage between the interior and exterior of the bag through an opening **24** formed through the face of the panel **12** and through one side of the sleeve **22**.

A flat seal **26**, originating at the side margin of the bag, secures a portion of the lower edge of the sleeve **20** to the inner face of the front panel **12** and extends diagonally to the upper left hand corner of the sleeve at the upper margin of the bag. This seal has the function of generally positioning the sleeve **20** in a straight condition and against the side of the bag having the opening.

In a typical power bag packer such as illustrated in FIG. 6, a feed unit **28** discharges a flow of fill out through a horizontal, tubular nozzle **30** which is inserted through the opening **24** in the side of the bag **10**. As the level of the fill reaches a certain predetermined height or the weight of the fill reaches a certain measure, the packer is stopped and the bag withdrawn. It will be understood that if the level of the fill reaches the valve area, the walls of the sleeve **20** will collapse and cover the opening **24** as

in FIG. 4, thereby sealing the bag effectively and automatically. The pressure of the fill may not only collapse the sleeve in the manner shown in FIG. 4 but also may fold the free open end of the sleeve back upon itself as in FIG. 5 or it may tuck into itself. In either of the latter two events, the seal 26 serves to keep the sleeve from becoming displaced and also obviates any chance of the sleeve being forced out through the opening 24.

In the preferred embodiment of the invention, the opening 24 roughly resembles the figure 8 to afford a hand grip for easy one hand mounting to the packer. As shown, the opening has enlarged upper and lower portions 32 and 34 connected by a restricted center portion 36 which form opposing tabs 38 and 40. The marginal edges of the opening 24 are sealed by a continuous flat seal 42 to the sleeve 20 and to a reinforcing ply 44 which may be included for added strength if desired and which also may be of polyethylene.

The sleeve arrangement at the location of the valve opening together with its unique configuration provides a number of distinct advantages not heretofore available in this type of bag. First of all, by locating the valve opening in the side of the bag rather than along an edge, as is presently the practice, the tearing and cracking of the sealed, stitched or glued seams, as frequently takes place on either side of the edge opening during filling, is eliminated. The shape of the opening is such that it will fit snugly about a loading nozzle having effectively the same diameter so that whatever stress develops between the nozzle and bag because of the weight of the fill will be distributed evenly about the marginal edges of the valve opening.

The tabs 38 and 40 may be readily grasped by the operator to open its valve mouth for filling. Also the construction permits the use of sheet material throughout the bag as well as extruded tubing or preformed sealed or glued tubes normally employed in bags of this type. When using preformed tubular material for the bag, it will be understood that a valve element must first be inserted and mounted before the ends of the bag are sealed. Furthermore, the side opening forms a more effective seal with the sleeve than is the case where the opening is at the edge of the bag and at the end of the tubular component. In the valve of the present invention, it will be appreciated that the greater the inner pressure is against the sleeve the more tightly will the sleeve close against the opening without stress to the seams. The action of the flattened sleeve pressed across the opening 24 by the fill forms an extremely efficient closure for the bag such that the loaded bag may be moved about in any position or even dropped without the loss of its contents through leakage.

While the illustrations show the valve located near a corner of the bag, it will be appreciated that it may be arranged anywhere within the margins of the panels 12 and 14. If the valve is moved towards the center of a panel as suggested in FIGS. 8 and 9, a sleeve 50 formed by folding and sealing a section of sheet material, may have one side bonded to the inner face of a panel 52 by a flat seal 54 which extends along the folded edge of the section and diagonally across an end. The loose flap that is formed may then be sealed in face to face relation with the bonded side by a marginal flat seal 56 as shown in FIG. 9. In the FIGS. 8 and 9 embodiment, a circular opening 58 is formed through the panel 52 and one side of the sleeve 50. As before, the opening may be reinforced by a ply 60 and the edges of the three plies bonded together by a continuous flat seal 62. It will be noted that the sleeve 50 has a tapered configuration so as to reduce the size of the sleeve opening 64 and thereby further enhance the sealing characteristics of the valve.

It will be understood also that the valve opening 24 in the FIG. 1 embodiment may be disposed angularly with respect to the sides of the bag rather than being formed

in the position shown. Likewise the flat seal 26 for bonding the sleeve to the panel 12 may be arranged in a variety of different ways.

In FIG. 7 there is illustrated a valve opening 70 and valve sleeve 72 located in a neck portion 74 of a flexible valve bag 76 which may be fabricated from a heat sealable plastic film such as polyethylene for example. As in the FIG. 8 embodiment, the sleeve 72 is bonded to the inner surface of one of the bag panels.

In FIG. 10 a valve 80 similar to that shown and described in reference to the FIG. 7 embodiment, is employed in a semi-rigid, three-dimensional container 82 extruded, molded or otherwise formed from a relatively stiff material that is preferably a heat sealable plastic composition. As in the previous embodiments, the valve 80 is located in the side of the container apart from any seam or joint which might crack or weaken under stress.

For liquid handling purposes, it has been found that a tighter, more efficient seal is obtained if the valve opening is made relatively small in relation to the size of the bag. For packing powder and granular material a relatively large opening functions efficiently. In order to prevent billowing of the bag, several pinholes 84 (FIG. 1) may be made in the panels 12 and 14. These pinholes allow excess air to escape from the bag but should not be provided where the bag is to be filled with liquid.

While the invention has been described with particular reference to the illustrated embodiments, it will be understood that numerous modifications will appear to those skilled in the art without departing from the spirit of my invention. For example, a variety of materials may be used to fabricate valve bags of the type described. A polyethylene coated paper may be used to advantage because of its strength and heat sealability characteristics. Various other sheet materials may also be used. Furthermore, the several components may be bonded into proper relation by cementing rather than by a heat sealing process. The container may, of course, be made in any desired configuration, such as circular or spherical, for example and the illustrated embodiments are to be taken in an illustrative rather than in a limiting sense.

Having thus described my invention, what I claim and desire to obtain by Letters Patent of the United States is:

1. A flexible valve bag, comprising a plurality of panels marginally attached to one another to form a bag, said panels being fabricated from a flexible material, at least one of said panels being formed with an opening therethrough, said opening being located within the margins of said one panel, a flexible sleeve disposed within said bag, said sleeve being closed at one end and open at an opposite end, one side of said sleeve being attached to the inner face of the panel in which is formed the opening, said one side of said sleeve being attached to said panel along a generally transverse line being located generally midway between the ends of said sleeve to define a foldable flap at the free end of said sleeve, said sleeve being formed with an opening through said one side, said sleeve opening being in register with said panel opening and the marginal edges of both of said openings being bonded to one another.

2. A flexible valve bag according to claim 1 wherein said panels and said sleeve are fabricated at least in part from a material that possesses heat sealing characteristics.

3. A flexible valve bag according to claim 2 wherein said material is polyethylene.

4. A flexible valve bag according to claim 1 wherein the marginal edges defining said opening include a pair of arcuate segments joined by at least one segment of reversed curvature to define a tab whereby access to said opening is facilitated.

5. A flexible valve bag, comprising a tube of flexible material, said tube being closed at both ends to form a bag, said tube being formed with an opening through a wall thereof, a flexible sleeve disposed within said bag, said sleeve being closed at one end and open at an op-

posite end, one side of said sleeve being attached to the inner face of the tube wall in which is formed the openings said one side of said sleeve being attached to said tube wall along a line extending lengthwise of said sleeve adjacent a portion of long side thereof and extending diagonally across the mid portion thereof to define a foldable flap at the free end of said sleeve, said sleeve being formed with an opening through said one side, said sleeve opening being in register with said tube wall opening and

the marginal edges of both of said openings being bonded to one another.

References Cited in the file of this patent

UNITED STATES PATENTS

810,349	Rogers	Jan. 16, 1906
2,696,342	Toborg	Dec. 7, 1954
2,799,314	Dreyer	July 16, 1957