

Feb. 27, 1962

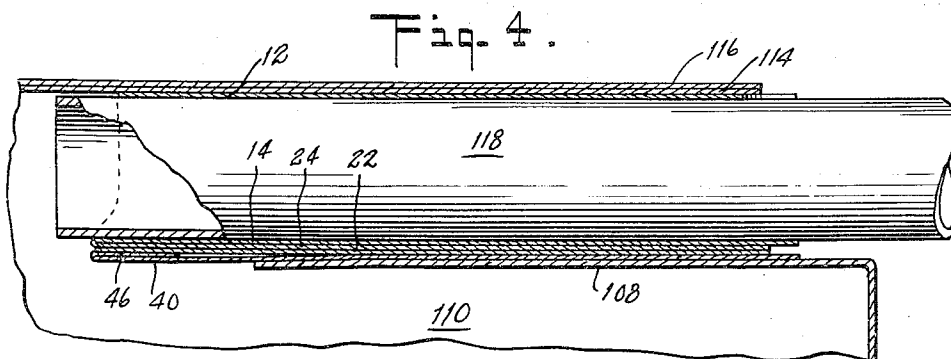
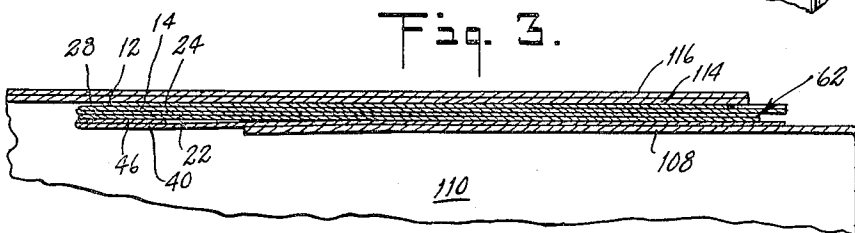
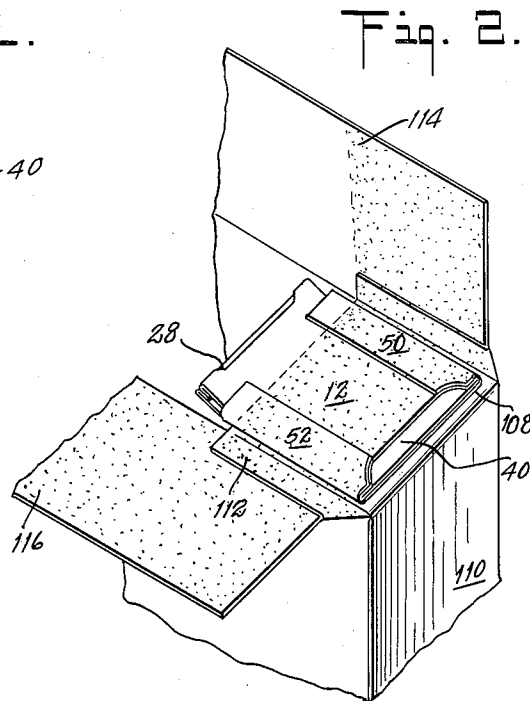
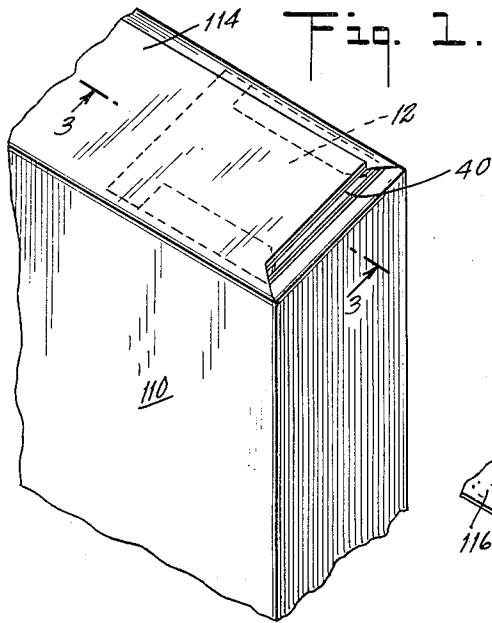
O. L. VINES

3,022,932

BAG VALVE

Filed June 10, 1960

4 Sheets-Sheet 1



INVENTOR.
OSCAR L. VINES
BY *H. K. Henningsen*
ATTORNEY

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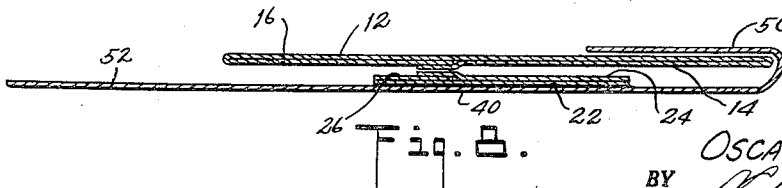
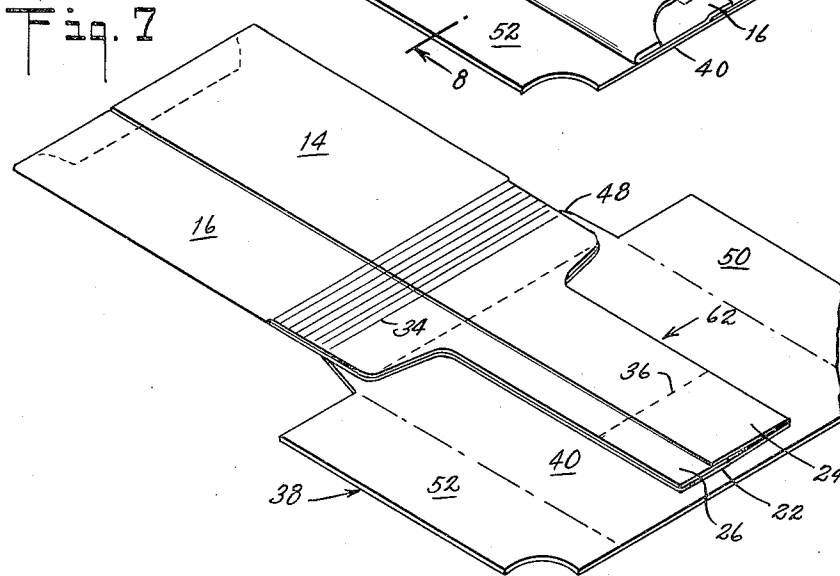
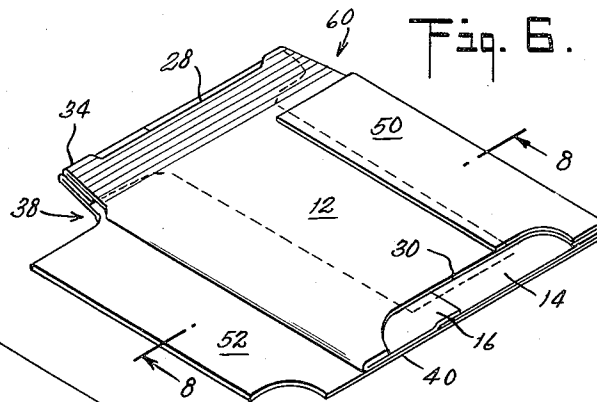
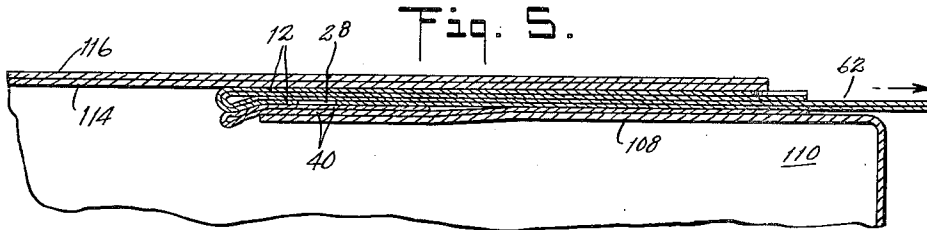
O. L. VINES

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BAG VALVE

Filed June 10, 1960

4 Sheets-Sheet 2



INVENTOR.
OSCAR L. VINES
BY *P. Henningsen*
ATTORNEY

Feb. 27, 1962

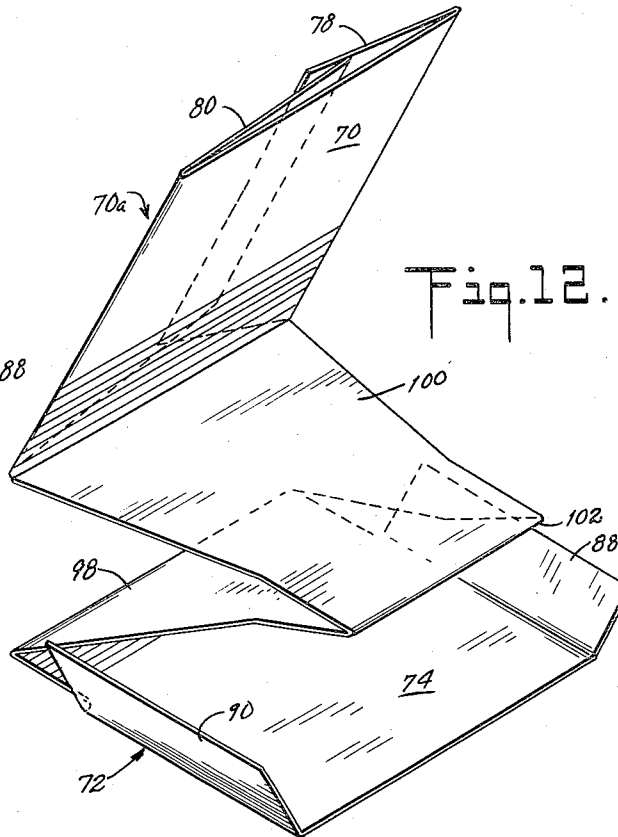
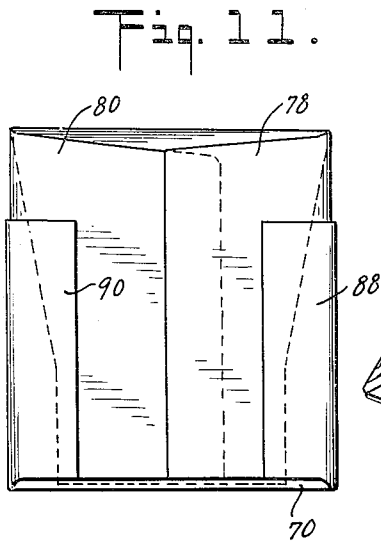
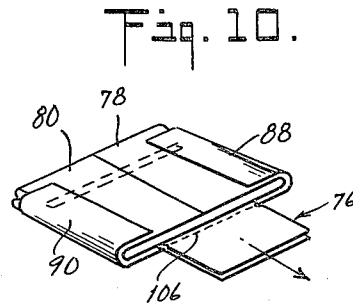
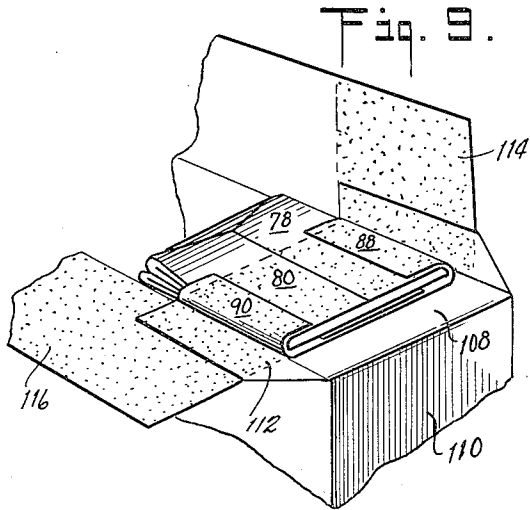
O. L. VINES

3,022,932

BAG VALVE

Filed June 10, 1960

4 Sheets-Sheet 3



INVENTOR.
OSCAR L. VINES
BY *P. Hennig*
ATTORNEY

Feb. 27, 1962

O. L. VINES

3,022,932

BAG VALVE

Filed June 10, 1960

4 Sheets-Sheet 4

Fig. 13.

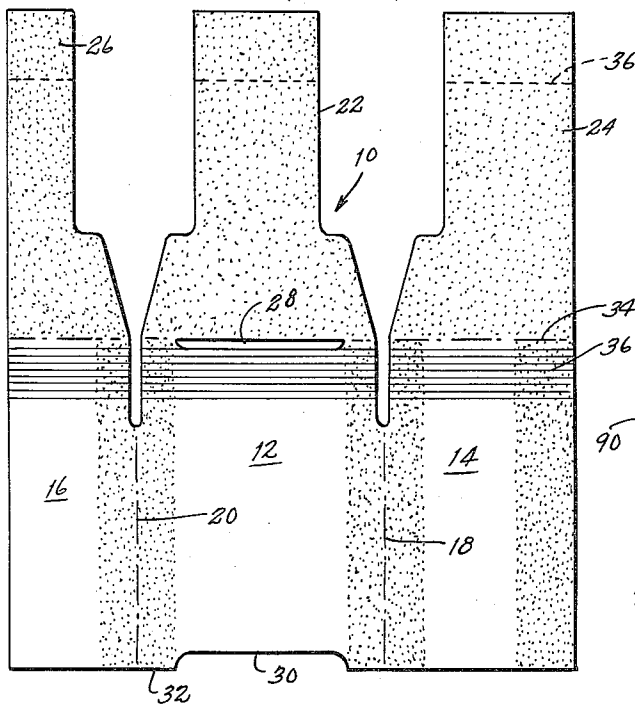


Fig. 15.

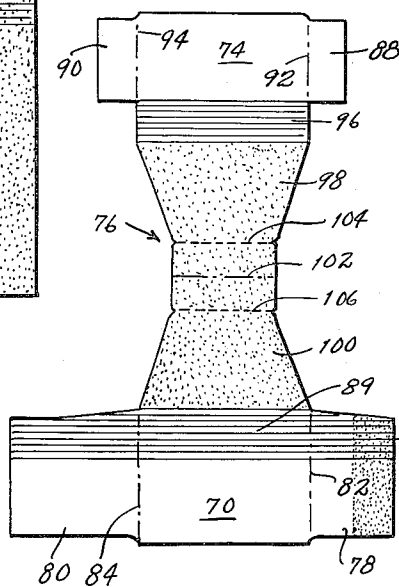
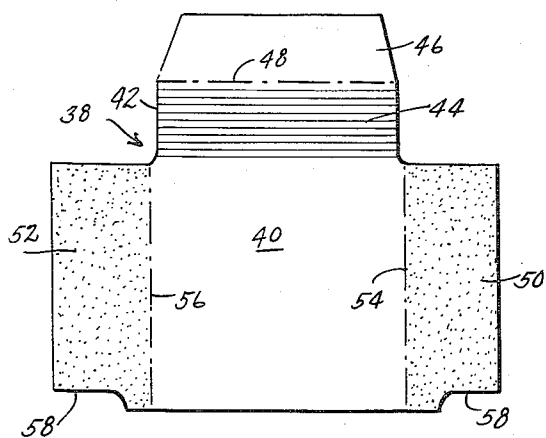


Fig. 14.



INVENTOR.
OSCAR L. VINES
BY *[Signature]*
ATTORNEY

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3,022,932

BAG VALVE

Oscar L. Vines, 47 5th Ave., New York 3, N.Y.

Filed June 10, 1960, Ser. No. 35,248

5 Claims. (Cl. 229-62.5)

This invention relates to bag valves, and particularly to valves which may be closed without difficulty and with the greatest degree of certainty after the bag has been filled.

It is conventional to fabricate heavy duty paper bags, either of single or multi-ply wall construction, such as used for cement, fertilizer, and other powdered and granular materials with closed ends, one of which is provided with a filling valve communicating with the inside of the bag by means of which a filling spout can be inserted to fill the bag. The valves have ordinarily been little more than paper tubes pasted into the end folds of the bag. After the filling operation, the bags so constructed are usually manipulated to force the contents against the valved end to flatten the walls of the valve tube into contact with each other and thereby seal the valve, as nearly as possible, against leakage. This type of valve has proven more or less satisfactory, but a certain amount of leakage occurs through the valve nevertheless.

The bags referred to herein are usually formed of relatively heavy sheets of kraft or jute fiber or the like, although bags of other material, including plastic sheet material, are also contemplated. In the case of most plastic sheet material whether used for the bag, the valve or both, heat and pressure may be used in lieu of an applied adhesive for joining the various elements.

It is characteristic of most of these bags that the valves immediately after being formed tend to gape, and this condition persists to a considerable extent even after the bags are filled. This tendency has been found to be the primary cause of much of the leakage through the valve. To rectify this difficulty, the newly filled bags are usually pressed to flatten the walls of the valve into contact with each other. However, the filling operation, which is effected pneumatically, acts to expand the bags in all directions and in so doing, tends to enlarge the valve openings and renews the danger of sifting, or the ingress of atmosphere, moisture and foreign matter which often impairs the quality and destroys the usefulness of the contents of the bag. From the foregoing, it is clear that the valves in current use lack means to prevent either the escape of some of the contents or the entrance of destructive influences from the outside, and that the several inherent difficulties can be corrected only by an improvement in the valve structure.

A number of expedients have been suggested to improve the sealing function of the bag valves. Some of these suggestions have involved the concept of auxiliary sealing flaps associated with the inner end of the valve, and others have sought to mutilate the valve tube and thereby clog the valve as the bag is withdrawn from the filling spout after the bag has been filled. These expedients, on the whole, operate with such uncertainty as to destroy their utility.

It is, therefore, the primary object of this invention to provide a bag valve in which the tube is open from end to end for the free insertion of the filling spout, as

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in the conventional valve, but which may be positively and effect vely closed when the spout is withdrawn.

It is a further object of this invention to provide a bag valve which is simple in construction, which will require no modification in the construction of the bag or in the manner in which the valve is assembled with the end folds of the bag, and which will cooperate in a conventional manner with the filling spout during the filling operation.

It is a still further object of this invention to provide an improved bag valve which requires no more material than conventional valves and whose fabricating cost does not exceed that of conventional valves.

Briefly, the bag valve herein is in the form of a flattened tubular member adapted to receive a filling nozzle. The tubular member has a discharge opening at one end thereof which is adapted to communicate with the interior of a bag when the valve is glued into the end folds of the bag. A sheath having a base panel is connected to the tubular member adjacent the discharge opening, and a pull tab is connected at the junction of the tubular member and the base panel whereby the tubular member and the base panel are rolled inwardly upon themselves when the pull tab is pulled outwardly. This results in the filling opening being turned under in face-to-face contact with the base panel. As the result of this disposition of the filling opening the valve is positively sealed such that even the finest material within the bag cannot sift through the valve and extraneous matter cannot enter the bag through the valve.

The invention will be better understood by reference to the following specification which is written in light of the drawings forming a part hereof. In these drawings like reference numerals indicate like parts, and in which:

FIG. 1 is a perspective view of a fragment of a filled and closed bag having the valve herein glued into its end flaps;

FIG. 2 is a view similar to FIG. 1 showing, however, the outer end flaps of the bag opened;

FIG. 3 is an enlarged sectional view taken on line 3-3 of FIG. 1;

FIG. 4 is a view corresponding to that of FIG. 3 showing, however, a filling nozzle inserted through the valve;

FIG. 5 is a sectional view through the valve to show the disposition of the parts thereof when the pull tab is being pulled outwardly and the valve is partially closed;

FIG. 6 is a perspective view of the parts of one form of the valve at an intermediate stage of fabrication;

FIG. 7 shows the parts of FIG. 6 in an advanced stage of fabrication;

FIG. 8 is a sectional view on line 8-8 of FIG. 6, the overlap of the glued joints being omitted to avoid complicating the view;

FIG. 9 is a view corresponding to FIG. 2 showing, however, a modified valve structure;

FIG. 10 is a view of the valve of FIG. 9 showing the disposition of the parts when the pull tab is pulled outwardly;

FIG. 11 is a top plan view of the valve of FIG. 9;

FIG. 12 is a perspective view showing the manner in which the blank is folded to form the valve of FIG. 9;

FIG. 13 is the blank for forming the tubular element of the valve of FIGS. 1 through 8;

FIG. 14 is the blank constituting a sheath element used with the tubular element of FIG. 13; and

FIG. 15 is the blank from which the valve of FIG. 9 is formed.

A two piece bag valve is illustrated in FIGS. 1 through 8 and 13 and 14 while a one piece valve is illustrated in FIGS. 9 through 12 and 15.

We shall first make reference to the two piece structure and the best introduction thereto lies in an examination of the blanks shown in FIGS. 13 and 14 of which the valve is constructed. These blanks, as well as that of FIG. 15, are formed of any suitable strong but flexible sheet stock such as paper, plastic, etc.

As shown in FIG. 13, the tube portion 10 of the valve structure is formed by cutting a piece of stock to form a face panel 12, a right back panel 14 and a left back panel 16. These panels, as shown, are generally rectangular in shape. The face panel 12 is separated from the right back panel 14 by a longitudinal fold line 18. By the same token, the face panel is also separated from the left back panel 16 by a fold line 20. If desired, the fold lines 18 and 20 may be formed by creasing or scoring. Each of the panels 12, 14 and 16 is formed with a tab extension. Thus, the face panel 12 has a center tab extension 22, the right back panel 14 has a right tab extension 24 and the left back panel 16 has a left tab extension 26. The size and shape of the right back panel 14 and its extending tab 24 and the left back panel 16 and its extending tab 26 are such that when the blank is folded along the longitudinal fold lines 18 and 20 to bring the right back panel 14 into overlapping relation to the left back panel 16, the right and left back panels together will be substantially coextensive in size and shape with the face panel 12. The same is true of the tab extensions 24 and 26 which will correspond in size and shape to the center tab 22. At the junction of the face panel 12 and the center tab 22 is a slot 28 which ultimately forms the filling opening at the inner end of the valve. A corresponding cut-out 30 is formed in the outer edge 32 of the face panel 12 and this cutout ultimately marks the spout entrance at the outer end of the valve. The shape of the cut-out 30 facilitates the insertion of the filling nozzle.

A transverse fold line 34 is formed across the three panels at the junction of their respective extension tabs, and immediately below the transverse fold line 34 and the slot 28 the panels may be transversely scored along a plurality of lines 36, or otherwise treated, if it appears desirable to add some additional flexibility to the material at this point for a purpose which will appear hereinafter. The extension tabs 22, 24 and 26 are transversely scored or perforated along the line 36.

When the tube section of the valve is folded, as explained hereinafter, it is utilized in conjunction with a sheath member 38, the form which is shown in FIG. 14. The sheath member is cut to provide a base panel 40 which is generally square. Extending outwardly from the base panel is a neck portion 42 to which additional flexibility may be imparted, if desired, by any suitable treatment such as by forming therein a plurality of transverse score lines 44. The extremity of the sheath constitutes a glue flap 46 which is separated from the neck 42 by a fold line 48.

Extending laterally from the right of the base panel 40 is a right wing 50 and extending from the opposite edge thereof is a left wing 52. These wings are separated from the base panel 40 by fold lines 54 and 56, respectively. The outer edges of the wings 50 and 52 are cut back along the lines 58 which correspond to the shape of the spout entrance cut-out 30 in the outer edge 32 of the tube blank 10.

The tube blank 10 and the sheath 38 are assembled into a bag valve, as shown in FIGS. 6 and 7. Glue is applied to the stippled areas of the tube blank 10 as shown in FIG. 13. The blank is then folded on the longi-

tudinal fold line 20 such that the left back panel 16 and its extension tab 26 are brought into contact, respectively, with the face panel 12 and the center extension tab 22. Thereafter, the right back panel 14 is folded on the longitudinal fold line 18 such that it and its extension tab 24 will overlie respectively the balance of the face panel 12 and the center tab 22. It will be noted that the right back panel 14 and its extension tab 24 are wider than the left back panel and its extension tab such that when the right back panel 14 and its extension tab 24 are turned over, as stated, they will also overlie respectively a portion of the left back panel 16 and its extension tab 26; the glue strip along the outer edge of the right back panel 14 being confined entirely to the area of this latter overlap.

It is now apparent that the blank of FIG. 13 is formed into a tube portion 60 (FIG. 6) constituted of the unglued portions of the face panel 12 and the lateral panels 14 and 16; its open ends being located at the spout entrance 30 and the filling opening 28. The extension tabs 22, 24 and 26 when so folded and glued comprise a pull tab portion 62 (FIG. 6).

After the tube has been formed as described above, the sheath 38 is attached to the tube. The manner in which this attachment is effected is also shown in FIG. 6. The glue flap 46 is rotated inwardly on the fold line 48 and glue is applied to the now exposed face of the intumed flap. Glue is also applied respectively to the right and left wings 50 and 52, as shown by the stippled shading in FIG. 14. The glue flap 46 of the sheath is attached to the folded and glued tube of FIG. 13 such that the fold line 48 of the sheath is at the inner edge of the filling opening slot 28 of the tube.

The tube portion 60 (FIG. 6) is now folded inwardly along the transverse fold line 34 such that the tube portion thereof overlies the pull tab portion 62. The right and left wings 50 and 52 of the sheath are now turned inwardly over the tube portion 60 along their respective fold lines 54 and 56 such that these wings are glued to the subjacent face of the tube portion. When so turned and glued, the cut back edges 58 of the wings 50 and 52, respectively, will correspond with the spout entrance cut back 30 at the outer end of the valve. Furthermore, it is important to observe that the wings 50 and 52 of the sheath element are inset from the fold line 34 a substantial distance which, in any event, is sufficient to permit valve closure without interference by the wings.

As the valve is now constituted, the inwardly projecting walls of the tube portion can be drawn into the tube by pulling on the pull tab 62. This action can be seen in FIG. 5 where the pull tab 62 has been pulled outwardly and the walls of the tube portion 60 and the neck 42 of the sheath element 38 have been rolled inwardly into contact with each other until the filling opening slot 28 is drawn inwardly where it now lies between the infolded neck 42 of the sheath element and the intumed wall of the tube portion in which it is formed.

Whereas the valve described hereinabove is formed of two blanks which are glued together in the final fabrication thereof, the valve of FIGS. 9 and 10 is formed of a single blank shown in FIG. 15. An introduction to this modified form of valve is obtained best by reference to FIG. 15. In the single piece valve, the tubular portion of the valve is formed by a tube panel 70 and the sheath element 72 is formed by a base panel 74. These panels are interconnected by a pull tab panel 76.

The tube panel 70 is a generally square panel from which extends a right lateral wing 78 and a left lateral wing 80. The wings 78 and 80 are adapted to rotate inwardly on fold lines 82 and 84, respectively. Extending across the tube panel 70 and the lateral wings 78 and 80 are a series of score lines 86 which render this section of the blank more flexible. Any other suitable means may be employed to render these areas more flexible if added flexibility is deemed desirable.

The base panel 74 corresponds generally in size and

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shape to the tube panel 70. A pair of glue flaps 88 and 90 are formed at the lateral edges of the base panel 74. These flaps are adapted to rotate inwardly on fold lines 92 and 94 respectively. The inner end of the base panel 74 is also preferably rendered flexible as by impressing therein a series of score lines 96. The interconnecting pull tab panel 76 is formed in symmetrical halves 98 and 100 which are adapted to fold into face-to-face contact by rotation about a fold line 102. Equidistant at opposite sides of the fold line 102 are a pair of score lines 104 and 106 which form a weakened line across the pull tab when the blank is folded.

The blank of FIG. 15 is folded as shown in FIG. 12 to form a tubular member 70a. The left lateral wing 80 is folded inwardly on the line 84 such that it lies against the tube panel 70. Glue is applied to the outer edge of the right lateral wing 78 and this wing is then turned inwardly on the fold line 82 such that the right lateral wing is attached to the left lateral wing and thereby, together with the tube panel 70, form a flattened tube structure. Glue is applied to the entire face of the pull tab panel 76 and the panel is folded on the fold line 102. Thereafter the tubular member 70a is folded back against the pull tab and the base panel 74 is folded rearwardly such that the pull tab is sandwiched between the tube panel 70 and the base panel 74. The glue flaps 88 and 90 are now rotated upwardly about the fold lines 92 and 94 respectively and, having glue applied thereto, they are adhesively attached to the outer face of the right lateral wing 78 and the left lateral wing 80 respectively.

The manner in which the valve is fixed into the end folds of the bag may vary depending on the structure of the bag or the particular fabricating procedure that is employed. It has been stated that valves of the kind dealt with herein are usually employed in multi-walled bags. In the interest of simplification, however, FIGS. 2 and 9 illustrate an end structure of a single walled bag. In FIG. 2 the valve formed of the blanks of FIGS. 13 and 14 is shown attached to the intumed end flap 108 of a bag 110. Ordinarily the end flaps are somewhat wider than the width of the bag such that the lateral edges 112 will cooperate with the side flaps 114 and 116 to form a more effective seal. After the valve has been glued to the end flap 108 as shown in FIG. 2, the side flap 114 is turned inwardly and is glued to the valve in the area extending toward the outside of the bag from the free end of the intumed end flap 108. Thereafter the side flap 116 is turned inwardly and is glued to the outer face of the side flap 114. When the bag is so sealed, the valve will be disposed in the end flap structure as shown in FIG. 3. The shaded areas in FIGS. 2 and 9 are those to which the adhesive is applied.

In order to fill the bag through the valve the bag is suspended on a conventional filling tube or nozzle 118. As shown in FIG. 4, the filling nozzle is inserted between the face panel 12 and the underlying back panels 14 and 16; the right back panel 14 only being visible in FIG. 4. When the filling operation is completed the bag is removed from the filling tube and the pull tab 62 is drawn outwardly, as shown in FIG. 5. The inner end of the valve is free of the flaps of the bag, as explained, care being taken that the end projecting into the bag is glued neither to the end flap 108 of the bag on which it rests nor to the side flap 114 which overlies it. Therefore, when the pull tab 62 is pulled outwardly, the inner walls of the valve will roll upon themselves such that the slot 28 is drawn between the valve panels to effect a complete seal, as previously explained. As shown in FIG. 5, the slot 28 will be disposed against the base panel 40, both the base panel 40 and the walls comprising the tubular member being drawn into the valve structure by manipulation of the pull tab. The extending end of the pull tab may now be torn off along the weakened line 36 and the tab section thus separated can be used in an inventory control system. The perforated lines 36 and 106

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in FIGS. 6 and 10, respectively, also serve as an indicator that the valves are fully closed when these lines are in registration with the outer end of the valve structures.

As shown in FIG. 9, the valve fabricated from the blank of FIG. 15 is glued into the end folds of the bag in exactly the same manner above described in respect to the valve fabricated from the blanks of FIGS. 13 and 14. The filling and sealing procedure is also the same. Thus, after the bag has been filled, the pull tab 76 is pulled outwardly and the filling slot of the valve will be withdrawn into the valve structure, as in the form previously described.

In respect to both forms of the valve, it will be noted that the path from the filling opening within the bag to the exterior is completely blocked by the reverse fold which is produced when the pull tabs are drawn outwardly. Not only is the discharge passage of the valve completely covered by the infolded valve walls which alone produces an effective seal, but the reverse bend of the tubular member also makes an important contribution to the sealing effect.

As the inner end of the tubular members and the sheath members are rolled inwardly upon themselves, the normally open lateral infolded edges are jammed against the wings of the sheath. This securely closes these lateral intumed edges and precludes all possibility of leakage between the confronting faces of the tubular member and the underlying sheath member. Thus, in FIG. 7, the inwardly extending lateral edges of the tubular member 60 and the sheath element 38, when these elements are rolled back upon themselves in the closing operation, will be jammed against the wings 50 and 52 of the sheath element. Similarly, in FIG. 12, when the valve is closed, the corresponding lateral edges of the tubular member 70a and the sheath element 72 are jammed against the wings 88 and 90 of the sheath element to effect a seal.

While the fundamentally novel features of the invention have been illustrated and described in connection with two specific embodiments thereof, it is believed that these embodiments will enable others skilled in the art to apply the principles of the invention in forms departing from the exemplary embodiments herein, and such departures are contemplated by the following claims.

I claim:

1. A valve for bags comprising a flattened tubular member adapted to receive a filling nozzle, said tubular member having a discharge opening at one end thereof adapted to communicate with the interior of a bag, a sheath having a base panel connected to said tubular member adjacent to and along a line substantially parallel to said discharge opening, said sheath also being connected to said tubular member along the lateral edges of the latter at a point inset from said connection between said base panel and said tubular member, and a pull tab connected at the junction of said tubular member and said base panel whereby said tubular member and said base panel are rolled inwardly upon themselves when said tab is pulled outwardly and said filling opening and said base panel are turned under in face-to-face contact, said pull tab at its connection at the junction of said tubular member and said base panel being substantially as wide as said junction whereby force applied to said pull tab is distributed across the width of said junction when said tab is pulled outwardly.
2. The invention of claim 1 in which a pliable zone extends across said base panel and the walls of said tubular member adjacent to and on opposite sides of said junction, whereby the inward rolling action of said tubular member and said base panel is facilitated when said tab is pulled outwardly.

3. The invention of claim 1 in which said sheath has wings at the lateral edges of said base panel inset from the connection of the latter to said tubular member and said wings are intumed upon said tubular member and are adhesively attached thereto such that the lateral edges

of said tubular member and said base panel are free beyond said wings.

4. The invention of claim 1 in which said tubular member and said sheath comprise separately formed elements which are adhesively attached to each other at said connections.

5. The invention of claim 1 in which said tubular member and said sheath comprise a unitary element formed of a single blank.

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