Feb. 22, 1966 C. D. RHODES 3,236,438

THERMOPLASTIC VALVED BAGS

Filed Feb. 19, 1963

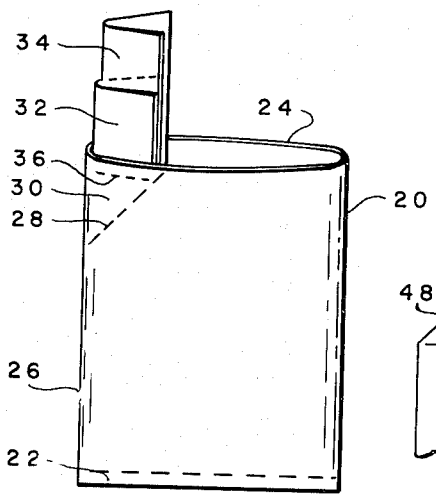


Fig. I

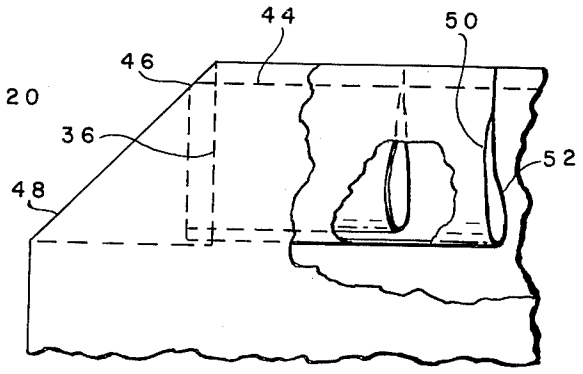


Fig. IV

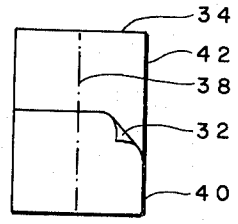


Fig. II

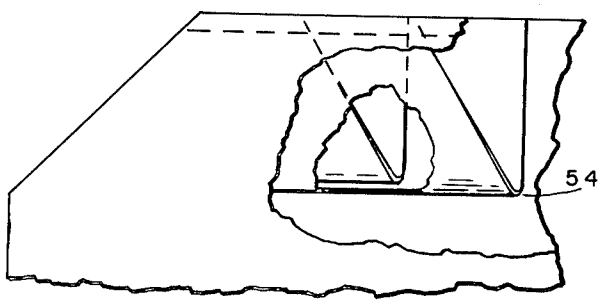


Fig. V

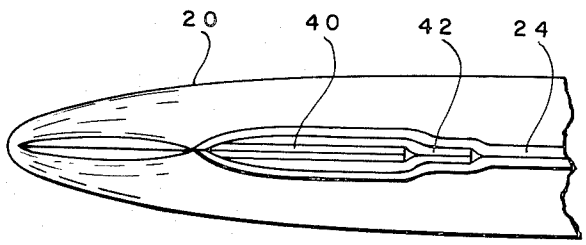


Fig. III

CHESTER D. RHODES *INVENTOR.*

BY James C. Logomasini

ATTORNEY.

United States Patent Office 3,236,438 Patented Feb. 22, 1966

3,236,438

THERMOPLASTIC VALVED BAGS

Chester D. Rhodes, Wilbraham, Mass., assignor to Monsanto Company, a corporation of Delaware

Filed Feb. 19, 1963, Ser. No. 259,708
2 Claims. (Cl. 229—62.5)

This application is a continuation-in-part of copending application S.N. 157,028, filed November 16, 1961, now Patent Number 3,087,670 which is a continuation of application Serial No. 788,970, filed January 26, 1959, and now abandoned.

The present invention relates to novel bags and to methods for preparing same.

In the copending application a novel valved thermoplastic bag is described wherein a valve sleeve member is heat sealed inside a corner portion of a tubular thermoplastic bag blank. The valve sleeve member of that bag is of substantially thinner gauge than the rest of the bag and consequently a novel self-closure effect is attained. It has now been found that the self-closure effect can be further improved by utilizing a plurality of sleeve members rather than the unitary valve member described in the copending application.

Accordingly, it is a primary object of the present invention to provide novel self-closing valved bags of substantial volumetric capacity which are fabricated from thermoplastic materials and methods for preparing same.

Other objects of the present invention will in part be obvious and will in part appear hereinafter.

These and other objects are attained in a valved bag comprising, in combination, a tubular body of thermoplastic film that is heat sealed across its top, a top corner of said tubular body being folded into the bag and constituting a valve flap, and a plurality of valve sleeves of thermoplastic film which are heat sealed at one end to the valve flap and at a lengthwise portion thereof partially across the top of the bag.

The objects and advantages of the invention will be apparent from the following detailed description thereof when read in conjunction with the attached drawings in which:

FIGURE I is an elevation of a blank from which the valved bag is to be prepared;

FIGURE II is a plain view of the valve sleeves illustrated in FIGURE I before its attachment to the bag blank;

FIGURE III is a fragmentary top plan view illustrating the manner in which the valved sleeves and a contiguous corner of the tubular blank illustrated in FIGURE I are folded into the mouth of the bag blank prior to heat sealing the top of the bag;

FIGURE IV is a fragmentary perspective side view of the sealed valve bag from FIGURE III with parts broken away;

FIGURE V is a fragmentary perspective side view of an alternate embodiment of a sealed valve bag with parts broken away illustrating triangularly cut sleeve members.

Referring to FIGURE I, **20** is a tube of thermoplastic film which is heat sealed at its bottom **22** and which has a top peripheral edge **24**. The upper left-hand corner of tube **20** (defined by side **26**, top peripheral edge **24** and folded line **28**) is designated as **30** and is destined to become the valve flap in the finished bag. The valve sleeves **32** and **34** are heat sealed to tube **20** adjacent edge **24** at **36**. The valve sleeve **32** is fabricated from thermoplastic film which is either equal to or thinner than the gauge employed for the fabrication of tube **20**. Valve sleeve **34** is longer than the valve sleeve **32** and is fabricated from thermoplastic film having a substantially thinner gauge than that employed in tube **20**. In general, valve sleeve **34** will be fabricated from 1–2 mil film which will be membrane-like in effect, whereas tube **20** will be fabricated from 5–10 mil film with valve sleeve **32** lying in thickness somewhere between these two ranges. If desired, the number of valve sleeves may be increased with the longest sleeve member preferably being the thinnest in gauge. In FIGURE II valve sleeves **32** and **34** are shown with a common center fold line designated as **38** and common vertical edges designated as **40** and **42** respectively.

In FIGURE III valve sleeves **32** and **34** and corner **30** of tube **20** are folded into the mouth of tube **20** so that the common sleeve edges **40** and **42** are positioned within and in juxtapositioned relationship with the peripheral edge **24** of tube **20**. While in the position illustrated in FIGURE III, the edge assembly of **24**, **40**, **42** and **24** is heat sealed to form a unified top seal **44** as illustrated in FIGURE IV. It will be noted that the terminal end **46** of top seal **44** extends to the left of seal **36** which was employed to join valve sleeves **32** and **34** adjacent and parallel to edge **24** of tubular blank **20** (see FIGURE I). This feature of the seal is an important element of the present invention and its significance is discussed in the next paragraph below. The valve of the finished bag consists of a valve flap **28**, valve sleeves **32** and **34** and a valve opening **48**.

The manner by which the valve bags are filled may be described with reference to FIGURE IV. It will be noted that the major portion of the thinner gauge film of the valve sleeves lies to the right of the heat seal **36** and is supported at the area of seal by an underlying section of the higher gauge film from which the body of the bag is fabricated. When the bag is filled, the contents of the bag press the plurality of valve sleeves against the main top portion of the tube to effect a closure. By using more than one sleeve member, a multiple plugging or self-closure effect is attained which is superior to that obtainable with a unitary valve sleeve member. By fabricating the final or longest sleeve member of substantially thinner gauge to be membrane-like in effect, a tight closure will be effected. Consequently, the thickness of the longest valve sleeve member is very important. By the longest member is meant that member which projects furthermost laterally across and parallel to the edge **24** of the tube **20**. Generally, tube **20** has to be extremely strong and therefore thick enough to support heavy loads. If the longest valve sleeve member were to be constructed of the same thickness film as tube **20**, it may be possible to eliminate the heat seal **36** but to do this would greatly diminish, if not destroy, the valve's unique self-closing feature. For example, the pressure of the contained material will immediately collapse the membrane-like valve sleeve member and plug up the valve opening regardless of the direction the bag may be turned. It is also desirable that valve sleeve **32** and any other intermediate sleeve be of thinner gauge than the body of the bag to increase the plugging or self-closing effect. In general, as the gauge or thickness of the valve sleeves is increased, their flexibility and self-closing effect tends to decrease. The preferable and optimum closure effect is obtained wherein the various valve sleeves decrease in gauge as their length increases, with the longer sleeve sections arranged to nest within the shorter sections, the final or longest member being of sufficiently thin gauge to be membrane-like in effect. It is, of course, possible to separately seal the thinner gauge sleeve members to the open end or ends of the heavier gauge sleeve members. However, this tends to increase the operational steps necessary to fabricate the bag.

As shown in FIGURE IV, the edges **50** and **52** of the valve member **34** are folded parallel to one another. It is sometimes desired and preferable to cut one of the edges, as shown in FIGURE V, triangularly with an apex at **54** to obtain a stronger and more uniform heat seal along the top of the bag. This may be similarly done with the other valve members making up the valve sleeve bag. In the subsequent discussion of the invention and in the claims, this geometric form will be referred to as a "corner truncated rectangle." When the valve sleeve members are cut in this fashion, the assembly of layers of thermoplastic film change more gradually and more uniformly in thickness than the corresponding assembly illustrated in FIGURE III.

The valved thermoplastic bags can be fabricated from such heat-sealable plastic materials as polyethylene, polystyrene, polyethylene terephthalate, polyvinyl chloride, polyvinyl acetate, polyvinylidene chloride, polyisobutylene, polypropylene, polytetrafluoroethylene and the like.

The preferred material of construction is polyethylene, a solid, tough polymer of ethylene which can be manufactured in film-form in thicknesses less than one mil. It is light in weight, extremely low in water absorption and moisture permeability and consequently is an excellent material for packaging uses. In addition layers of polyethylene can be heat sealed or fused together to present a strong bond. It is also preferable to utilize the same material for the construction of both the bag and the various sleeve members since optimum fusion of two or more layers of film can only be accomplished if the fusion temperatures of the various joining layers are approximately within the same temperature range.

The valved bags of this invention ordinarily will have a substantial volumetric capacity, e.g., at least 1 cubic foot, and are designed primarily to carry from about 50 to about 100 pounds of such common pulverulent materials such as cement, flour, fertilizer, carbon black, chemicals and the like. The walls of the bag ordinarily will have a thickness of the order of 5–10 mils, although obviously the walls may be either thinner or thicker as indicated by the use to which the bags are to be put. If desired, the walls of the bag can be fabricated from a plurality of plies of thin thermoplastic film. The valve sleeves ordinarily will be thinner than the walls of the bag. In general, the longest sleeve will be fabricated from film which is about .5 to 4 mils thick depending on the strength and flexibility of the material, and in the case of polyethylene, thicknesses of 1–2 mils are generally sufficient to effect a membrane-like flexibility in the material.

The above descriptions and particularly the drawings are set forth for purposes of illustration only. Many variations and modifications thereof will be obvious to those skilled in the art and can be made without departing from the spirit and scope of the invention herein described.

What is claimed is:

1. A valve bag comprising, in combination, a tubular body of thermoplastic film that is heat sealed across its top, a top corner of said tubular body being folded into the bag and constituting a valve flap and a plurality of valve sleeves of thermoplastic film of various lengths which are thinner gauge than the thermoplastic film of said tubular body and which are heat sealed at one end to the valve flap and at a lengthwise portion thereof partially across the top of the bag, the longest sleeve being of minimum gauge and substantially thinner gauge than the gauge of said tubular body so as to be membrane-like in effect, the thickness of the tubular body in relation to the thicknesses of the various valve sleeves and the relative thicknesses and lengths of the various valve sleeves being such to effect multiple plugging thereby obtaining a tight closure.

2. A valve bag comprising, in combination, a tubular body of thermoplastic film that is heat sealed across its top, a top corner of said tubular body being folded into the bag and constituting a valve flap and a plurality of valve sleeves of thermoplastic film of various lengths which are of thinner gauge than the thermoplastic film of said tubular body and which are heat sealed at one end to the valve flap and at a lengthwise portion thereof partially across the top of the bag, the longest sleeve being of minimum gauge and substantially thinner gauge than the gauge of said tubular body so as to be membrane-like in effect; the unsealed edges of each valve sleeve being formed in triangular relationship to obtain a stronger and more uniform heat seal across the top of the bag.

References Cited by the Examiner

UNITED STATES PATENTS

2,542,170	2/1951	Weeks.	
2,708,067	5/1955	Paton	229—62.5
3,065,899	11/1962	Means	229—62.5
3,087,670	4/1963	Rhodes	269—62.5

FOREIGN PATENTS

1,025,255	2/1958	Germany.

FRANKLIN T. GARRETT, *Primary Examiner.*

EARLE J. DRUMMOND, *Examiner.*