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F. HARDING

3,221,789

PLASTIC VALVE BAG

Filed July 5, 1963

FIG. 2

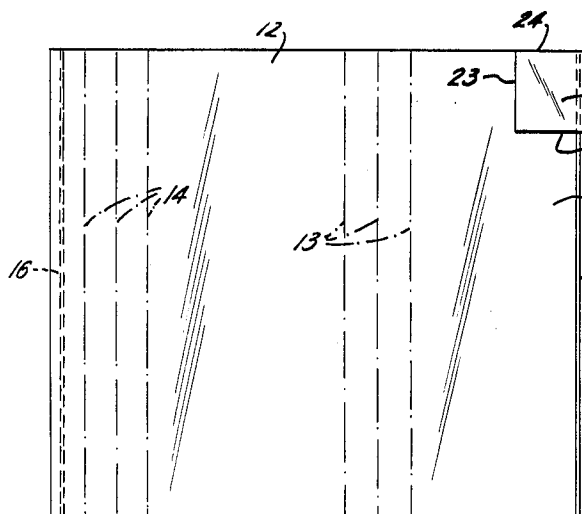


FIG. 1

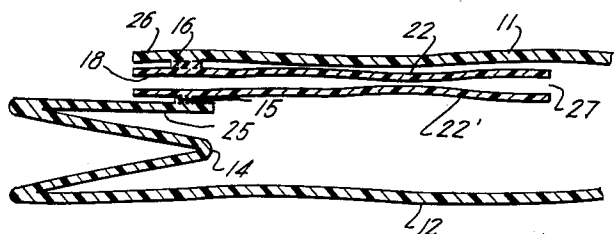
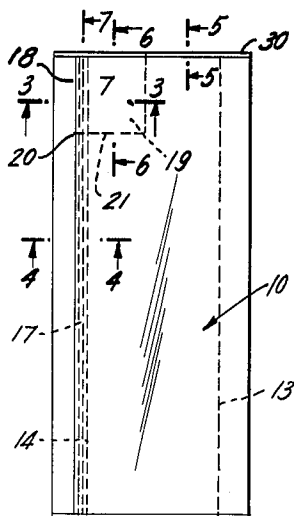


FIG. 3

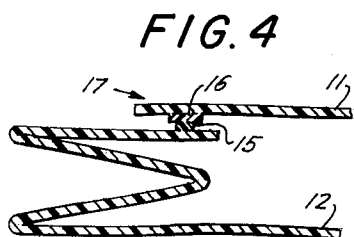


FIG. 4

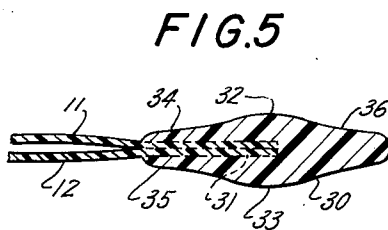


FIG. 5

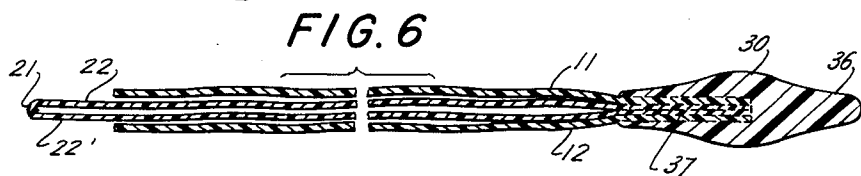


FIG. 6

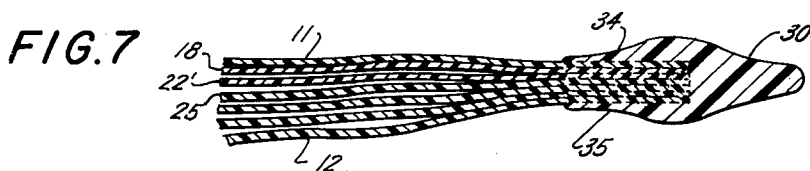


FIG. 7

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3,221,789

PLASTIC VALVE BAG

Francis Harding, Pensacola, Fla., assignor to St. Regis Paper Company, New York, N.Y., a corporation of New York

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This invention relates to bags, such as shipping sacks, formed of plastic sheet material, the invention being more particularly adapted for such bags, the walls of which comprise a single ply of thermoplastic flexible and pliable sheet material. Certain of the features of the invention are more particularly concerned with the provision of a valve in such bags, which is preferably formed of thermoplastic film material.

Desirable forms of apparatus and methods for manufacturing certain of the constructions hereof are disclosed and claimed in my co-pending application Serial No. 285,317, filed June 4, 1963.

The invention makes possible bag or shipping sack constructions of the above-indicated type, which are exceedingly durable, inexpensive to manufacture, and which have strong and securely sealed end closures, and preferably having a valve construction with a valve sleeve such that the valve is easily accessible, and at the same time the valve being securely closed against sifting of the contents after the bag has been filled.

Various further and more specific objects, features and advantages of the invention will appear from the description given below, taken in connection with the accompanying drawings, illustrating by way of example a preferred form of the invention.

In the drawings:

FIG. 1 is an elevational view of a valve bag of thermoplastic sheet or film material formed in accordance with the invention;

FIG. 2 is a developed view showing the wall portions of the bag as spread out and with a valve sleeve positioned thereon prior to folding of the sheet material into a bag and forming the longitudinal seam thereon;

FIGS. 3-7 inclusive are sectional views, taken respectively along correspondingly numbered section lines in FIG. 1, certain of the parts in these views being shown in somewhat enlarged form, for clearness.

Referring now to the drawings in further detail, the bag, as shown in FIG. 1, comprises a flattened tube 10, consisting of front and rear wall portions, as indicated at 11 and 12 in FIG. 2, these being connected at their sides by infolded gusset portions, as indicated at 13 and 14, the lines along which the sheet material is folded to form the gussets being indicated by dot and dash lines in FIG. 2.

The flattened tubular body portion of the bag with the gussets at the sides, may be formed by running a continuing sheet of thermoplastic material, such as of polyethylene, polypropylene and others suitable flexible pliable and high strength thermoplastic sheet or film material through a tubing machine, such as heretofore commonly used for forming multiwall paper shipping sacks with appropriate adjustments of the guide means for handling the plastic sheet material. At a suitable point in the tubing machine prior to cutting the formed tubing into bag lengths, strands of thermoplastic materials, such as hot extruded polyethylene as at 15, 16, may be applied to the edges which are to be brought into overlapped relationship and sealed together to form the longitudinal seam at the location indicated at 17 in FIG. 1. The extruded strand at 16 may preferably be in the form of a strip or narrow ribbon of the thermoplastic, and shown, for clearness, somewhat enlarged in FIG. 4, whereas the strand 15, as applied, may, for example, comprise a hot strand of

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polyethylene of circular cross-section. Since the ribbon 16 has some substantial width, the strand 15 will be able to come into sealing engagement therewith even though strand 15 may be offset somewhat with respect to the center line of the ribbon. After the edges of the sheet have been folded over to form the flattened tube, it will be understood that the overlapping edges of the sheet material with the strands 15 and 16 therebetween, may be firmly pressed together to form a securely-sealed longitudinal flattened seam.

Preferably, in accordance with the invention, the bag is to be formed with a valve opening, as indicated at 18, and a valve sleeve 19. That is, at the location of the valve opening, the sealing of the overlapping edge portions at the longitudinal seam, is interrupted from a point at or adjacent the top of the bag, down to a point such as indicated at 20 in FIG. 1, and the sleeve member 19 is inserted at this region. This sleeve may comprise an area of plastic film material, such as the thermoplastic materials, above referred to which generally will be considerably thinner and more film-like than the thermoplastic sheet forming the walls of the bag and in order that the sleeve will more readily and securely close the valve opening after the bag is filled. In a typical case the sleeve material may be about six thousandths of an inch in thickness for example and the bag walls about twice that thickness. This sleeve may comprise a rectangular sheet of the thermoplastic film folded over upon itself along the lower edge of the valve sleeve, that is, along the line indicated at 21, so as to provide front and rear wall portions, as at 22 and 22', of the sleeve (FIGS. 1 and 6). The inner edges of the sleeve, as at 23, within the bag, are, of course, not sealed together, and after the bag has been filled, these edges will assume a position flattened against each other and against one of the walls of the bag for closing the valve opening. The upper edges of the sleeve material, as at 24 (FIG. 2) are sealed together and sealed to the upper bag end closure, as hereinafter explained. As shown in FIG. 3, the rear wall portion 22' of the sleeve along adjacent the longitudinal seam line, will be secured by the thermoplastic strand 15 to the underlying edge 25 within the longitudinal bag seam. The front wall 22 of the sleeve, on the other hand, will become sealed to the overlying edge 26, adjacent the longitudinal seam line, by the thermoplastic strand 16. Thus in the completed bag, the sleeve 19 will be open (as indicated at 18 in FIG. 3) for receiving a filling spout, for example, of a bag filling machine. The inner end of the sleeve, as indicated at 27 (FIG. 3) will also be open to permit the filling spout to extend therethrough, or to permit the material which is to fill the bag to be discharged into the bag therethrough.

An end closure 30 may extend entirely across the upper end of the bag where the front and rear wall surfaces of the bag tube are brought flatwise together, as are also the gusset portions and portions of the sleeve which extend up into the end closure. Preferably the end closure is formed by extruding a strand of hot thermoplastic material such as polyethylene or the equivalent onto the bag end edges which are to be sealed together, the latter being somewhat preheated, and the strand of sealing material having a generally U-shaped cross-section which becomes attenuated and becomes compressed astride the bag end edge portions. A method and apparatus for forming and applying such end closures is disclosed in my co-pending U.S. application Serial No. 285,317, filed June 4, 1963.

FIG. 5 is a sectional view taken, for example, along line 5-5 of FIG. 1, and here it will be noted that the upper end edges of the front and rear wall surfaces 11 and 12 of the bag, protrude as at 31, into the mass of the end closure 30 and become here securely gripped and sealed in place integrally with, and at their upper edges at least

more or less homogeneously merged with the mass of the end closure. The mid-portions, as at 32, 33, of the end closure 30, as shown, preferably bulge outwardly somewhat at the region of the upper end edge portions of the bag walls, whereas as at 34, 35, the portions of the end closure which are down astride the bag walls, are tapered to a relatively thinner cross-section, so that the heat thereof, when applied, will not tend to lessen the strength of the thermoplastic sheet material of which the bag walls are made. Thus the end closure will have what may be referred to as a tear drop-line cross-section. The upper or outer portions of the closure 30, may be shaped, as indicated at 36, to form a blunt or rounded protective top edge for the closure, thick enough to be safe against tearing or rupture.

As shown by the cross-sectional view of FIG. 6, at the top edge of the bag at the region where the valve sleeve occurs, there will be four thicknesses, as indicated at 37, which become sealed together and to each other with the end closure 30 sealed astride same; that is, two thicknesses of the film material forming the valve sleeve, and two other thicknesses of sheet material which form the front and rear wall surfaces of the bag.

At section line 7—7 of FIG. 1, that is, at a location where a gusset occurs, as well as at the longitudinal seam and also where portions of the valve sleeve occur, a number of upper end edges totaling seven layers occurs which are all sealed together and to the closure 30, which is sealed astride same, and so that these upper end edges will be all integrally heat-sealed under such end closure and to each other, and with the extreme upper portions more or less merging homogeneously with the thermoplastic material of the closure. In applying the hot extruded thermoplastic end closure 30, the upper and lower surfaces thereof may be brought under such pressure that same will become of a substantially uniform cross-section throughout the length of the closure, and with the pressure particularly effective to press and seal together the upper end edges where gussets occur and also where, as in the case of the section at 7—7, a multiplicity of end edges becomes integrally sealed together.

When the bag is being filled by the introduction of a filling spout into the valve, oftentimes the portion of the bag just above the valve outlet will be subjected to considerable tension, as sometimes this portion will have to carry a considerable part of the weight of the bag and its contents. The provision of integral sealing means of the upper end edges of the numerous layers at this region, as shown in FIG. 7, provides an exceptionally strong area, well able to resist the forces and tensions which occur at this region during the filling operation. The fact that the strands 15 and 16 extend up into the end closure and become integrally joined thereto also contributes to the strength of the bag at this region. In view of the fact that portions 34 and 35 of the closure 30 are relatively thin at the edges thereof, but become thicker and thicker as the upper end edges of the bag portions are approached, and in view of the fact that such upper end edges become more and more securely and more nearly homogeneously merged with the plastic of the closure, there will be no abrupt strains on the sheet material such as might rupture same along the lower edges of the closure 30 if the latter were rigid and abrupt. In other words, the shifting of any tension or loads from the sheet material of the bag walls to the body of the closure, will be gradual rather than being abrupt and the thermoplastic end closure portions will be sufficiently flexible and yieldable, so that the lower edges thereof will not act as tear-strips, which would cut into the walls of the bag if such edges were rigid.

Although a particular embodiment of the invention is herein disclosed for purposes of explanation, further modifications thereof, after study of this specification, will be apparent to those skilled in the art to which the invention pertains. Reference should accordingly be had

to the appended claims in determining the scope of the invention.

What is claimed and desired to be secured by Letters Patent is:

1. A bag comprising: a sheet of flexible pliable thermoplastic material folded to form a flattened tube with edge portions of the sheet overlapped on the front surface along near but spaced from one edge of the tube, said portions being heat-sealed together to form a longitudinal seam, the sealing being interrupted for a distance near the top of the bag to provide a valve opening between the overlapped portions; a sleeve in said valve opening, said sleeve being formed of an area of flexible pliable thermoplastic film material folded upon itself along the lower edge of the valve and providing front and rear sleeve surfaces protruding from the opening of the valve into the bag, the rear surface of said sleeve at its outer end being heat-sealed along on the underlying overlapped portion, the front surface of the sleeve being heat-sealed along the under surface of the overlying lapped portion; and closure means for the top end of the bag formed of a flexible thermoplastic strip of generally U-shaped cross-section located along astride of and with its edges merging with and integrally joined to the top end edge portions of the flattened bag tube and the top end edges of said front and rear surfaces of the sleeve.

2. A bag comprising: a sheet of flexible pliable thermoplastic material folded to form a flattened tube with edge portions of the sheet overlapped along on one surface of the tube to form a longitudinal seam, extending along near but spaced from a side edge of the bag, a valve opening being provided between the overlapped portions near one end of the bag; a sleeve in said valve opening, said sleeve being formed of another sheet of flexible pliable thermoplastic film material and protruding from the opening of the valve into the bag, said overlapped portions being heat-sealed together, except at the valve opening, by two adjacent strands of plastic material located along and between the overlapped portions, one of said strands along the valve opening serving to heat-seal the rear surface of said sleeve along on the underlying overlapped portion, the front surface of the sleeve being heat-sealed along the overlying flap portion by the other one of said strands; and closure means for the adjacent end of the bag.

3. A bag construction in accordance with the foregoing claim 2 and in which said strands are superposed, one extending along on the other, and one of same being wider than the other.

4. A bag comprising: a sheet of flexible pliable thermoplastic material folded to form a flattened tube with edge portions of the sheet overlapped along on one surface of the tube and along a band extending parallel to and spaced inwardly from one side edge of the bag, said portions being heat-sealed together to form a longitudinal seam, the sealing being interrupted for a distance near the top of the bag to provide a valve opening between the overlapped portions; and closure means for an end of the bag formed of a flexible thermoplastic strip of generally U-shaped cross-section located astride of and embracing the end edges of the flattened bag tube including the end edges of said overlapped portions, said end edges within said strip being heat-sealed together and integrally merging with the thermoplastic material of the strip.

5. In a bag comprising a flattened tube of flexible, pliable thermoplastic sheet material having opposed front and rear wall surfaces with end edges thereof brought together in superposed, substantially co-terminous relation: an end closure means formed of a flexible thermoplastic strip of generally U-shaped cross-section located astride of and embracing said edges, said edges within said strip being heat-sealed together and integrally merging with the thermoplastic material of the strip, said strip being relatively thick at its mid-portions nearest said edges, and

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the branches of its U-shaped cross-section tapering to thinner cross-sections at the sides of the end portion of the bag, said U-shaped strip including its said tapering branches being compacted as a unitary solid thermoplastic mass integral with the entire end edge portions of the bag walls which are embraced thereby. 5

6. A bag comprising a sheet of flexible pliable thermoplastic material folded to form a flattened tube with edge portions of the sheet overlapped along on one surface of the tube to form a longitudinal seam extending 10 along near but spaced from a side edge of the bag, a valve opening being provided between the overlapped portions near one end of the bag, a sleeve in said valve opening, said sleeve being formed of another sheet of flexible pliable thermoplastic film material and protruding 15 from the opening of the valve into the bag, said overlapped portions being heat-sealed together except at the valve opening by a strand of plastic material located along and between the overlapped portions, said overlapped portions being heat-sealed at the valve opening 20 by two adjacent strands of plastic material, one of said strands along the valve opening serving to heat-seal the rear surface of said sleeve along on the underlying over-

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lapped portion, the front surface of the sleeve being heat-sealed along the overlying flap portion by the other one of said strands; and closure means for the adjacent end of the bag.

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FRANKLIN T. GARRETT, *Primary Examiner.*