Nov. 9, 1965 N. Y. ARNOLD 3,216,647

INDUSTRIAL BAG

Filed Aug. 10, 1961 3 Sheets-Sheet 1

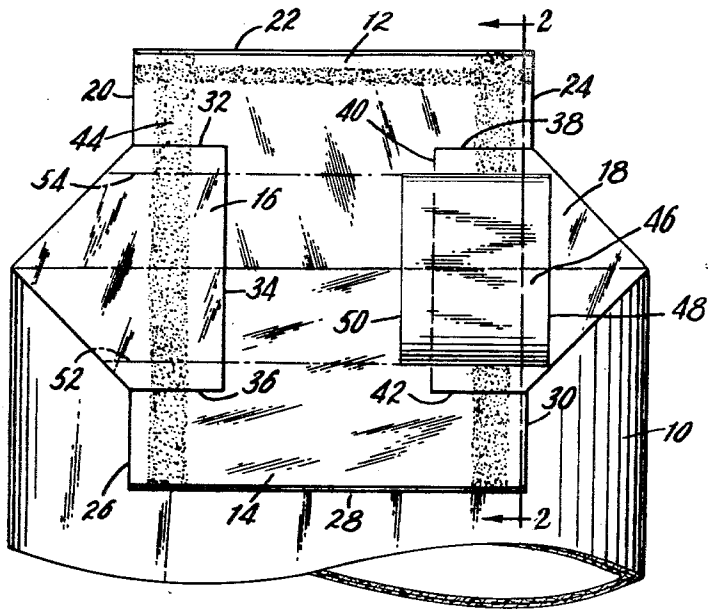


Fig. 1.

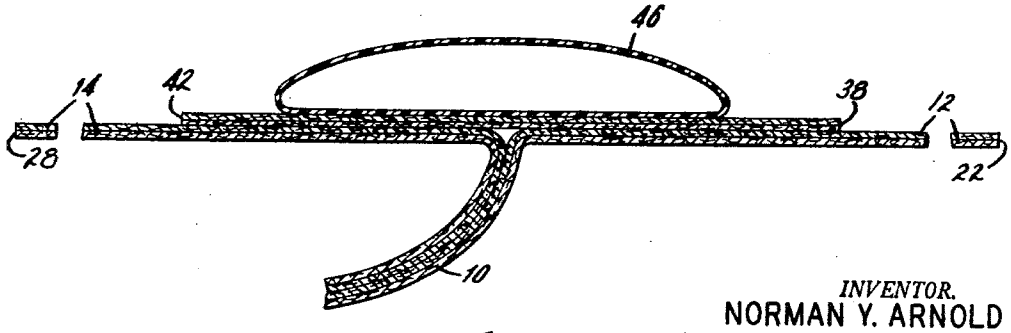


Fig. 2.

INVENTOR.
NORMAN Y. ARNOLD
BY Walter C. Kehm
ATTORNEY

Nov. 9, 1965 N. Y. ARNOLD 3,216,647

INDUSTRIAL BAG

Filed Aug. 10, 1961 3 Sheets-Sheet 2

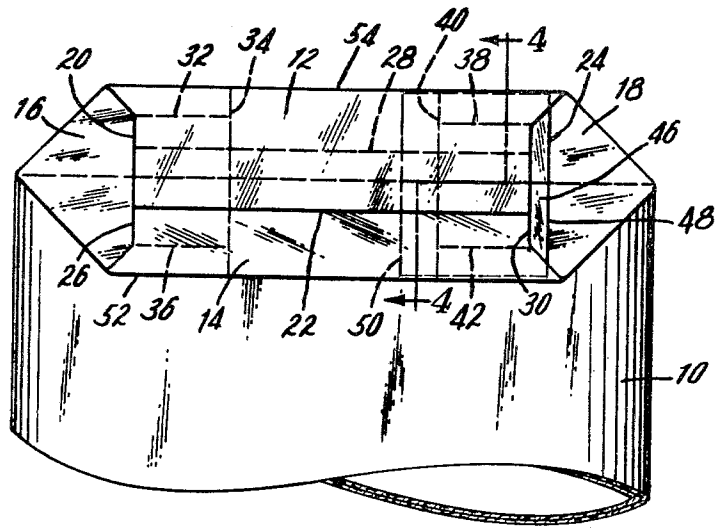


Fig. 3.

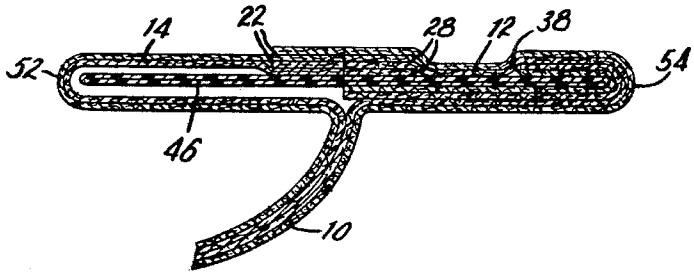


Fig. 4.

INVENTOR.
NORMAN Y. ARNOLD

BY Walter C. Kehm

ATTORNEY

Nov. 9, 1965 N. Y. ARNOLD 3,216,647

INDUSTRIAL BAG

Filed Aug. 10, 1961 3 Sheets-Sheet 3

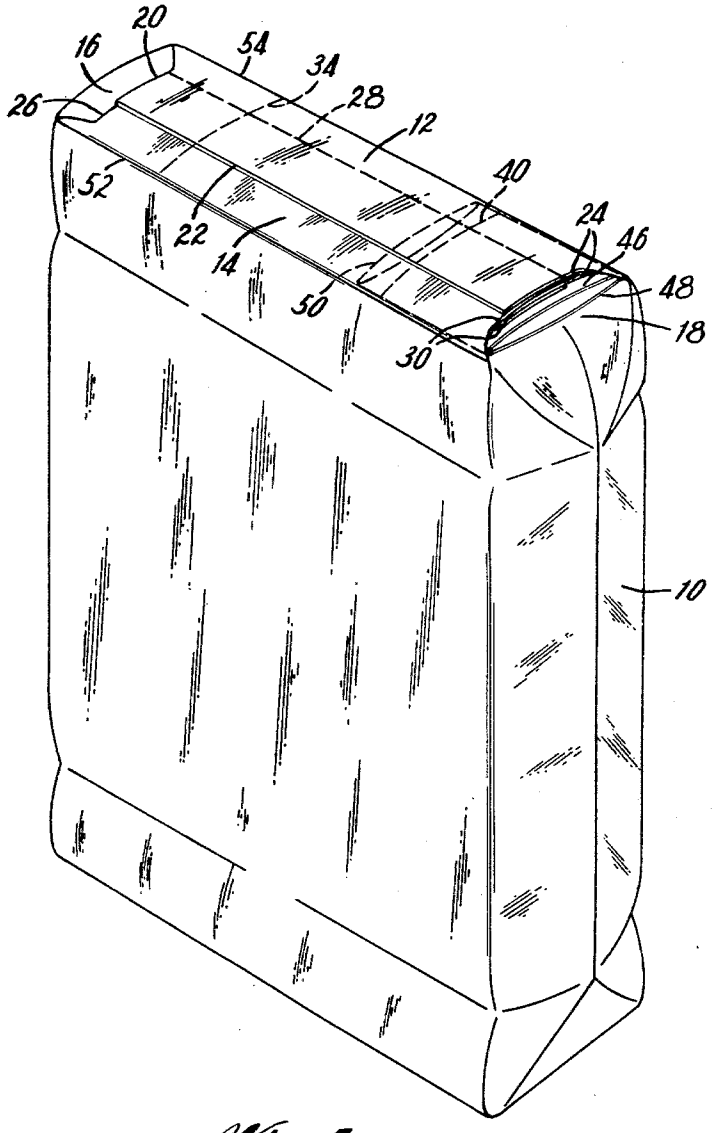


Fig. 5.

INVENTOR.
NORMAN Y. ARNOLD

BY Walter C. Kehm

ATTORNEY

United States Patent Office

3,216,647
Patented Nov. 9, 1965

3,216,647

INDUSTRIAL BAG

Norman Y. Arnold, Westfield, N.J., assignor to Union Carbide Corporation, a corporation of New York

Filed Aug. 10, 1961, Ser. No. 130,548
6 Claims. (Cl. 229—62.5)

This invention relates to industrial bags. It more particularly refers to industrial bags having filling valves therein.

Industrial bags are often made in such a manner as to present a substantially uniform cross section from end to end. This construction enables a bag user to stack a large number of bags in relatively stable relation. Bags having a uniform cross section are readily palletized and exhibit ease of handling.

Bags with substantially uniform cross section generally have an end closure which consists of four flaps, each inwardly folded and joined to each other flap juxtaposed thereto. These four flaps can be considered as an opposite pair of end flaps and an opposite pair of side flaps. It is usual practice to provide the side flaps larger than the end flaps, to dispose the inwardly folded end flaps between the inwardly folded side flaps and the body of the bag, and to overlap the two side flaps. In the case of paper bags glue is applied to the appropriate portion of these flaps and the flaps are folded and held in place until the glue is dry.

Sometimes a paper filling valve is included in one end closure of an industrial bag in order to facilitate filling the bag with a material being packaged therein. Such filling valves are conventionally glued in position between an end flap and the side flaps adjacent thereto. These filling valves are usually tubular and extend out of the bag from a position juxtaposed to an end flap thereof. After a bag has been filled, the filling valve is collapsed and doubled upon itself in an attempt to seal the end closure and prevent sifting of the contents of the bag.

The closure effected by the use of a paper filling valve as conventionally employed in this art is not wholly satisfactory since a truly sift-proof end closure is not thereby provided.

It is therefor an object of this invention to provide an industrial bag having a novel filling valve therein.

It is another object of this invention to provide an industrial bag having a truly sift-proof filling valve therein.

It is a further object of this invention to provide an industrial bag having a filling valve therein which filling valve is easily assembled into an end closure of the bag.

It is a still further object of this invention to provide a method of making an industrial bag having a novel filling valve therein.

Other and additional objects of this invention will become apparent from a consideration of this entire specification including the claims appended hereto.

This invention includes the provision of a tubular sleeve of a limp, flexible, conformable thermoplastic film as a filling valve in an industrial bag. It is within the spirit and scope of this invention that the tubular filling valve referred to herein can be seamed or seamless. Seamless tubes of thermoplastic film can be made for example by melt extrusion through an annular die, or by casting a solution of the thermoplastic resin on a cylindrical mandrel. Seamed tubes of thermoplastic film are made from flat film formed by slot-die extrusion, calendering or casting on a flat surface, for example. The flat film thus formed is folded upon itself and, if desired, the juxtaposed edges thereof are joined by a heat-seal or other means, or the edges may be left overlapped. Preferably, the filling valve is substantially uniform in cross-section along its longitudinal axis; that is, it has a uniform inside diameter. Additionally, the filling valve should also have a substantially uniform and uninterrupted circumference in order to facilitate its placement in an end closure of an industrial shipping bag.

In this invention, a preformed tube of thermoplastic material, seamed or seamless, is flattened and one wall thereof adhered to one end flap of a partially assembled bag end closure. The side flaps of the end closure are then folded over the flattened tube of thermoplastic material, adhered to each other, adhered to the end flap not having a flattened thermoplastic tube (valveless end flap) adhered thereto, and adhered to a wall of the flattened thermoplastic film tube. Adhesion is readily accomplished by gluing for example. The end closure thus assembled therefore is sealed except for the entry provided therethrough through the tube of thermoplastic film. A thermoplastic film tube (filling valve) included in an end closure according to this invention depends from the end flap to which it is adhered into the bag body for at least a short distance and need not extend out of the bag at all. After a bag having an end closure with a filling valve according to this invention is filled with a packaged material, the contents of the bag are caused to bear against the portion of the filling valve depending on the bag body. Because of the conformable, limp nature of the thermoplastic film utilized, the pressure or force exerted by the bag contents upon the filling valve tube cause it to collapse upon itself in a tight sift-proof relationship which conforms to the contour of the surface of the bag contents bearing thereon.

This invention will be further explained in more detail with reference to the accompanying drawings in which:

FIG. 1 is a plan view of a partially assembled end closure for a bag embodying this invention;

FIG. 2 is a section taken along the line 2—2 in FIG. 1 looking in the direction of the arrows;

FIG. 3 is similar to FIG. 1 showing a fully assembled end closure;

FIG. 4 is a section taken along the line 4—4 in FIG. 3 looking in the direction of the arrows; and

FIG. 5 is an isometric view of a fully assembled, filled bag having an end closure according to this invention.

An end closure for an industrial bag is made by appropriately slitting a tubular web of the material from which the bag is to be made; properly folding the flaps formed by the above slitting step; and adhering the juxtaposed flaps together. It is usually most convenient to flatten the tubular web preparatory to the slitting operation thereby enabling two cutting edges to make the four slits required. However, it is recognized that the appropriate slits can be made if desired while the tubular web is in an expanded or tubular form, or that the tubular web can be flattened, doubled upon itself along the axis of the tube and a single cutting edge used to make all four slits.

Regardless of now the appropriate slits are made, the slit end of the tubular web of bag forming material, preferably paper, is folded open so that when viewed in plan the configuration shown in FIGS. 1 and 2 is presented. Thus the folded open, partially assembled end closure

for an industrial bag comprises a body portion **10**, two outwardly directed side flaps **12** and **14**, and two inwardly directed end flaps **16** and **18**. As shown in FIG. **1**, each of the side flaps **12** and **14** are generally rectangular in shape bounded on three meeting sides by the cut edges **20**, **22** and **24**, and **26**, **28** and **30** respectively, and each of the end flaps **16** and **18** are pentalateral in shape bounded on three meeting sides by the cut edges **32**, **34** and **36**, and **38**, **40** and **42** respectively. An adhesive **44** is provided on the plan exposed surface of the side flap **12** preferably near each cut edge **20**, **22** and **24** thereof; on the plan exposed surface of at least one end flap **18**, but suitably on both end flaps **16** and **18**, on that quadrilateral portion of the end flap bounded on three meeting sides by the cut edges **38**, **40** and **42**; and on the plan exposed surface of the side flap **14** adjacent each of the opposite cut edges **26** and **30** thereof. A flattened tube of thermoplastic film **46**, as described above, is positioned on the plan exposed surface of the end flap **18** such that the two opposite cut edges **38** and **42** of the end flap **18** are generally symmetrical to the axis of the tube **46**. The flat width of the tube **46** should be less than the maximum distance between the two opposite cut edges **38** and **42** of the end flap **18**. The length of the tube **46**, along the axis thereof, should be such that the inward end **50** of the tube **46** extends towards the end flap **16** further than the most inwardly directed edge **40** of the end flap **18**. It is usually convenient to position the tube **46** such that the outward end **48** thereof protrudes slightly past the corresponding side flap edge **24** or **30** is at least coincident therewith and so that the longitudinal axis of the filling take is substantially parallel to and equidistant from the outer edges of the pair of infolded side flaps **12** and **14**.

FIGS. 3 and 4 show the side flap **14** folded about the line **52** to an inwardly directed position on the end flap **16** and on the tube **46**, and the side flap **12** folded about the line **54** to an inwardly directed position on the end flap **16**, on the tube **46** and on the side flap **14**. The side flaps **12** and **14** are held in this position for a time sufficient to permit the adhesive **44** described above to dry or otherwise set up. The end closure is then completely assembled containing a filling valve tube **46** which tube **46** provides access from exterior of the bag to the interior thereof.

An end closure can be formed at the of the bag opposite to the filling valve-containing end closure, by appropriately folding and adhering side flaps and end flaps in a manner similar to the assembly of the filling valve-containing end closure except that there need not be a thermoplastic film tube (filling valve) included in this end closure.

The bag body is a tubular web of material, conveniently paper, which usually is made from a flat sheet folded upon itself and the juxtaposed ends thereof adhered together. The specific material used as the web from which a bag according to this invention will be constructed is not critical nor is the number of plies of material used a limiting factor on the scope of this invention. Standard good bag making practice is the determinant of both the material of the web and the number of plies of such material. It should be noted that FIGS. **1** through 4 of the accompanying drawing show a two ply paper web and bag, but this should be considerd as exemplary rather than limiting. It is also well within the scope of this invention to use a heterogeneous web, that is different plies of different materials, or to laminate or coat one or more plies of material with a different material, as is also good bag making practice, for example polyethylene laminated to or interspersed between paper plies. It is also within this invention to use a flexible but strong thermoplastic film alone as the bag forming material.

The composition of the filling valve tube **46** is critical within limits. The tube **46** must be made of a limp,

flexible, conformable material which, when formed into a tube and the tube collapsed, has the property of forming a shift-proof seal. Relatively thin films of thermoplastic materials have been found to be generally excellent in this application. In particular polyolefin, such as polyethylene for example, films of less than about 4 mils thickness have been used with great success. Other thermoplastic materials which form limp, flexible, conformable films are exemplified by polypropylene, ethylene-propylene copolymers, plasticized vinyl chloride polymers and copolymers, plasticized vinylidene chloride polymers and copolymers and others. The filling valve tube **46** can be adhered to the appropriate end flap **18** and side flaps **12** and **14** by any conventional technique such as laminating or gluing for example.

Specifically, an industrial bag utilizing a tubular filling valve according to this invention was made in the size known to the trade as a 50 pound bag. The web was two plies of heavy kraft paper and the tubular filling valve **46** was made of seamless polyethylene tubing (0.92 gams per cubic centimeter density) 1 mil thick.

It was found when filling a bag with a tubular filling valve according to this invention that the filling spout conventionally used in such filling operations entered the bag through the tubular filling valve easily with no tearing of the thermoplastic film. It was also found that a bag having a tubular filling valve of limp, conformable, flexible material according to this invention when filled with a bulk material was substantially sift-proof through the tubular filling valve.

What is claimed is:

1. A structure comprising, in combination:

(a) an industrial shipping bag, having a pair of end closures in opposite ends of said industrial shipping bag, each of said end closures being formed by a pair of opposed infolded end flaps and a pair of opposed infolded side flaps;

(b) a flattened, tubular filling valve comprised of flexible, collapsible thermoplastic film having a substantially uniform cross-section along its longitudinal axis and a substantially uniform and uninterrupted circumference throughout supported by at least one of said end closures by one infolded end flap in said closure of said industrial shipping bag and adhered to one side of said flattened tubular filling valve, and at least one of the said opposed infolded side flaps adhered directly to the other side of said flattened tubular filling valve and with the inwardly protruding end of said flattened tubular filling valve extending beyond the transverse edge of said infolded end flap into the body of said industrial shipping bag in an amount sufficient to cause the internally extending portion of said flattened tubular filling valve to collapse and form a sift-proof seal within the body of said industrial shipping bag when the contents of said industrial shipping bag press upon the internally extending portion of said flattened tubular filling valve; the opposite end of said flattened tubular filling valve being extended outwardly to a point substantially coextensive with the edges of said opposed infolded side flaps, to form an access into the interior of said industrial shipping bag through which bulk materials can be conveyed.

2. The structure of claim **1** wherein the flexible collapsible thermoplastic film is polyethylene.

3. The structure of claim **1** wherein the flexible collapsible thermoplastic film has a wall thickness of about 1.0 mils.

4. The structure of claim **1** wherein the industrial shipping bag is constructed of paper.

5. The structure of claim **1** wherein the industrial shipping bag is constructed of thermoplastic film.

6. The structure of claim **1** wherein the longitudinal axis of said flattened tubular filling valve is substantially

parallel to and equidistant from the outer edges of the pair of opposed infolded side flaps.

References Cited by the Examiner

UNITED STATES PATENTS

2,660,100	11/53	Doyle	93—35
2,799,314	7/57	Dreyer et al.	
2,906,446	9/59	Williams	229—62.5
2,955,517	10/60	Honsel	93—55
2,968,432	1/61	Craighead	229—62.5
2,977,038	3/61	LaFave	229—62.5
3,004,698	10/61	Ashton	229—62.5

FOREIGN PATENTS

1,070,991	10/59	Germany.

FRANKLIN T. GARRETT, *Primary Examiner.*