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3,133,691

VENT FOR THERMOPLASTIC BAG

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FIG. 1.

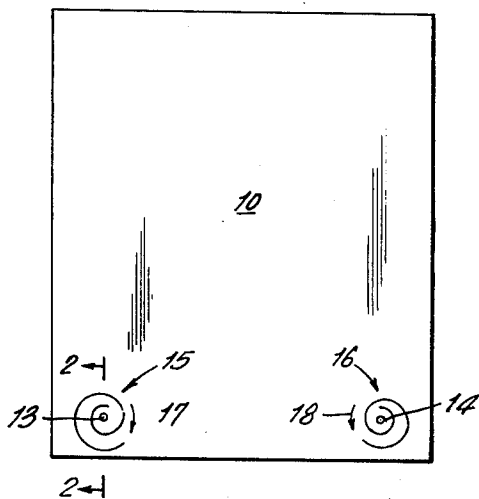


FIG. 2

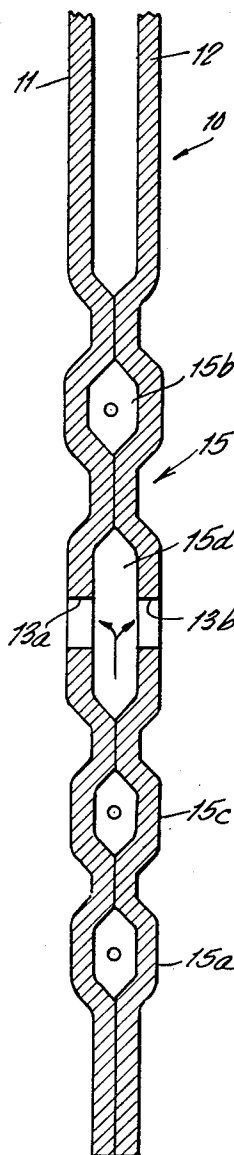


FIG. 4.

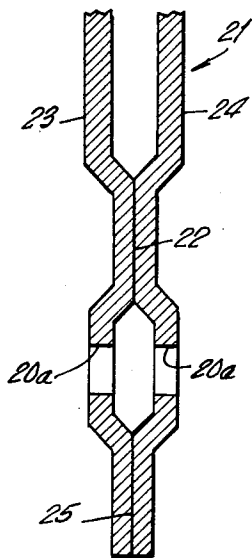


FIG. 3.

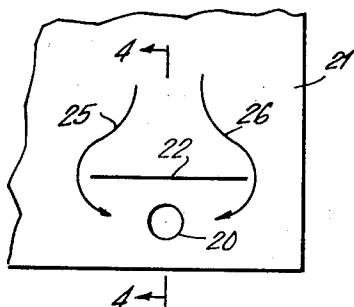


FIG. 5.

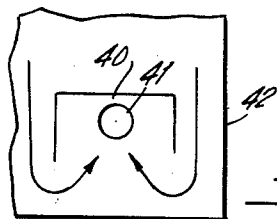
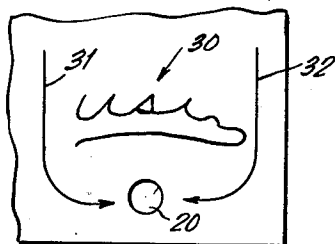


FIG. 6.

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VENT FOR THERMOPLASTIC BAG

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6 Claims. (Cl. 229—53)

This invention relates to a vent for a thermoplastic bag, and more specifically relates to a labyrinth-type of seal about openings in selected areas of thermoplastic bags which permits trapped air to escape upon filling the bag followed by self-sealing of the vent to prevent introduction of moisture or other fluids from the external environment of the bag into the contents of the bag.

Thermoplastic bags, primarily formed of polyolefin material and having thicknesses on the order of 5 mils or more, are well known in the art and are often referred to as heavy duty bags.

It has been difficult to use this type of bag in certain areas, as for containing cement or the like or "Sakrete" type materials constituting construction, ornamentation, and patching concretes, plastics, and casting gypsums, limes and the like. The nature of these hygroscopic sand-like dilatant compounds poses two serious problems to the packaging and storage capabilities of the heavy duty type thermoplastic bag. First, the nature of the filling and stacking procedures presently used require that the bag be vented to permit air to be evacuated from the package so that the bag can be flattened for stacking. Secondly, in packing such materials, it is necessary to prevent moisture in the form of water or water vapor from entering and spoiling the contents by chemical or physical reactions that might occur between the contents and the water.

The present invention provides a novel venting orifice for a heavy duty bag which is guarded by a labyrinth sealed about the opening as by various types of heat seals between the two panels of the bag which permits exhausting of air or gas to permit filling and flattening of the bag after filling, and further serves to be self-sealed after filling to prevent later introduction of water or water vapor into the interior of the bag.

The exhaust end of the labyrinth, therefore, contains a hole, slit or pierce which can be of any size from, for example, $\frac{3}{8}$ of an inch in diameter to 0.010 inch in diameter. The labyrinth seal or valve can then be repeated in a given bag any desired number of times with the exact number depending upon the exhausting rate of air or other trapped gaseous fluid which is desired.

In essence, the labyrinth provides an exhausting passage of considerable length in a relatively small area. Since the passage size is comparatively small, very little of the contents fill the labyrinth sufficiently to prevent passage of the air. Nevertheless, immersion in water reveals that the labyrinth is sufficiently small to prevent backflow to the bag interior.

In the case of cement particularly, the small amounts of cement which enter the labyrinth during air exhaustion have been found to absorb sufficient moisture from the area adjacent the exit hole that these small portions cure or set-up in the labyrinth, thereby permanently sealing the labyrinth passage against further entry of water.

Accordingly, a primary object of this invention is to provide a novel vent for thermoplastic bags.

Another object of this invention is to permit a novel vent structure for thermoplastic bags to permit utilization of the bags in the packaging of water curable materials.

Another object of this invention is to provide a novel vent for the walls of a thermoplastic bag which permit

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evacuation of air within the bag to permit a filled bag to conform to a particular shape during stacking.

These and other objects of this invention will become apparent from the following description when taken in connection with the drawings, in which:

FIGURE 1 shows a front plan view of a bag having two openings protected by respective labyrinths and communicating with the labyrinth passages in accordance with the invention.

FIGURE 2 is a cross-sectional view of FIGURE 1 across the lines 2—2 in FIGURE 1.

FIGURE 3 shows a second embodiment of a labyrinth arrangement applied to a portion of a bag.

FIGURE 4 is a cross-sectional view of FIGURE 3 when taken across the lines 4—4 in FIGURE 3.

FIGURE 5 is a plan view of a further embodiment of the invention.

FIGURE 6 is a plan view of a still further embodiment of the invention.

Referring first to FIGURES 1 and 2, I have illustrated therein a heavy duty bag 10 which has two panels 11 and 12 of heavy duty thermoplastic material such as polyethylene or polypropylene having thicknesses of 5 mils or greater.

In accordance with the invention, two holes 13 and 14 are punched through panels 11 and 12 where the opening 13 is shown in FIGURE 2 as opening 13a in panel 11, and opening 13b in panel 12. It will be noted that only one of the panels need have an opening formed therein, although a direct punching of the bag and formation of two opposing openings lends itself to simplified manufacturing techniques. Moreover, while FIGURE 1 shows two independent vents 13 and 14, any number of vents could be used.

In accordance with the invention, spiral seals 15 and 16 are impressed around openings 13 and 14 respectively to provide a spiral channel leading from the interior of bag 10 to the openings 13. Seals 15 and 16 can be formed by using a spiral heated seal bar wherein the spiral seal and opening could be made at one and the same time.

It will be apparent that air, as indicated by the arrows 17 and 18 in FIGURE 1, will now enter the spiral labyrinths 15 and 16 respectively during the filling of bag 10, or after the bag is filled and begins to be compressed as during the stacking of the bags.

Referring to FIGURE 2, the flow of air is shown schematically by dots and crosses where a dot indicates flow of air out of the plane of the drawing, while a cross indicates flow of air into the plane of the drawing. Thus, air will enter the lower convolution 15a, will circulate around to convolution 15b, will continue to circulate to convolution 15c and will then be led to the chamber 15d surrounding openings 13a and 13b to be vented through these openings, as indicated.

It has been discovered that the labyrinth arrangements surrounding openings such as openings 13 and 14 in FIGURE 1 need not be as long as shown in FIGURE 1, and yet will still operate effectively.

By way of example, the arrangement shown in FIGURE 3 for an opening 20 in a bag 21 can be formed by a single seal line 22 which seals panels 23 and 24 of bag 21 together. It will be noted that the lower end of the bag 21 has been sealed closed, or is a folded-over joint, during the prior operation whereby a labyrinth is formed around opening sections 20a and 20b of opening 20 for panels 23 and 24 respectively to require the flow of air to be as shown by arrows 25 and 26 in FIGURE 3.

The length of seal 22 has been found to be sufficiently long when it is of the order of 1 inch long with the opening 20 being, by way of example, $\frac{1}{4}$ inch in diameter. The spacing between the bar and the center of opening

20 has been found to give satisfactory results when it is of the order of 1/2 inch.

It will be further noted that instead of a straight line 22, an inscription such as the inscription "USI," shown in FIGURE 5, at the top of opening 20 could also be utilized where the inscription is sealed into the adjacent panel sections of the bag. Thus, in FIGURE 5, the inscription 30 will define two paths of flow 31 and 32 to opening 20.

It will be apparent that many forms of seals can define the labyrinth through which air flow to an opening must be taken. By way of example, in FIGURE 6, a U-shaped seal 40 is impressed around opening 41 in bag 42.

Regardless of which configuration is utilized, it will be seen that a restricted path for air flow is defined from the interior of the bag to the opening in the bag walls. Accordingly, air can be vented through these openings during the filling of the bag or stacking of the bag.

Assuming now that the interior of the bag is filled with a hygroscopic material such as cement, it will be further apparent that after filling, water vapor from areas external of the bag will enter the openings and a portion of the labyrinth and react with the cement therein to cure the cement and thus permanently seal the labyrinth against further introduction of water vapor or water.

Therefore, the novel bag serves as a means for almost permanent storage of cement, as contrasted to prior practices in the industry wherein cement could only be manufactured on immediate demand for use. That is to say, it is common practice to use porous paper bags for cement which prevents their storage over long periods of time. With the present invention, however, the water and moisture impervious bag can be utilized to store the cement with the novel vent permitting simplified filling and stacking of the bag, and thereafter being self-sealed to complete the watertight integrity of the bag.

Although this invention has been described with respect to its preferred embodiments, it should be understood that many variations and modifications will now be obvious to those skilled in the art, and it is preferred, therefore, that the scope of this invention be limited not by the specific disclosure herein but only by the appended claims.

What is claimed is:

1. In a heavy duty bag of thermoplastic material; said bag being formed of a first and second opposing panel having three edges thereof sealed and a fourth edge open to permit filling of said bag; respective vent openings in said panels adjacent the edge of said bag opposite said open edge; said vent openings being enclosed by a channel formed by sealing said panels to one another adjacent said openings; said channel defining a circuitous path for flow of fluid through said openings between the interior of said bag and the exterior of said bag.

2. A vent for the wall of a bag of moisture impervious material; said vent comprising an opening through one of the walls of said bag; portions of the opposing panels of said bag being secured to one another adjacent said opening to form a circuitous passage for fluid flow through said opening between the interior of said bag and the exterior thereof; and a second opening in the opposite wall of said bag, said wall openings being disposed in substantial alignment.

3. A vent for the wall of a bag of moisture impervious material, said bag including front and rear opposing panels; said vent comprising an opening through each of said panels; portions of said opposing panels being secured to one another adjacent said openings to form a circuitous passage for fluid through said openings between the interior of said bag and the exterior thereof.

4. The device substantially as set forth in claim 3 wherein said secured portions of said bag are straight portions above said openings.

5. The device substantially as set forth in claim 3 wherein said secured portions of said bag are cup-shaped; said cup-shaped secured portions having said openings received therein.

6. The device substantially as set forth in claim 3 wherein said secured portions of said bag are specially wound around said openings.

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