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A. SOESBERGEN
FLEXIBLE BAG TYPE SHIPPING CONTAINER AND METHOD
OF CLOSING AND SEALING SAME
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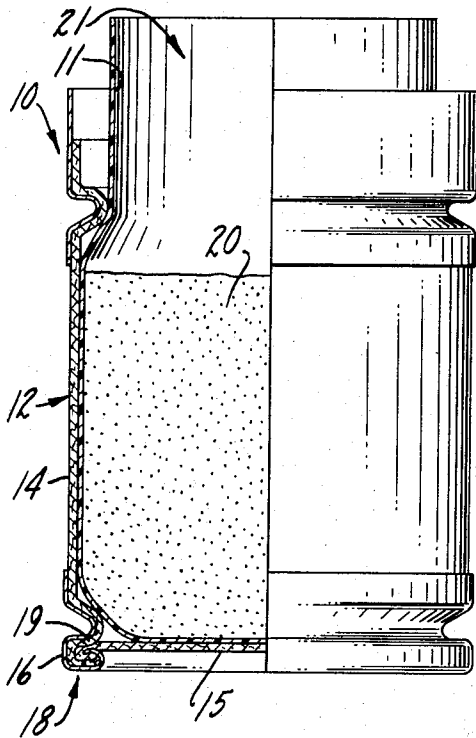


fig. 1.

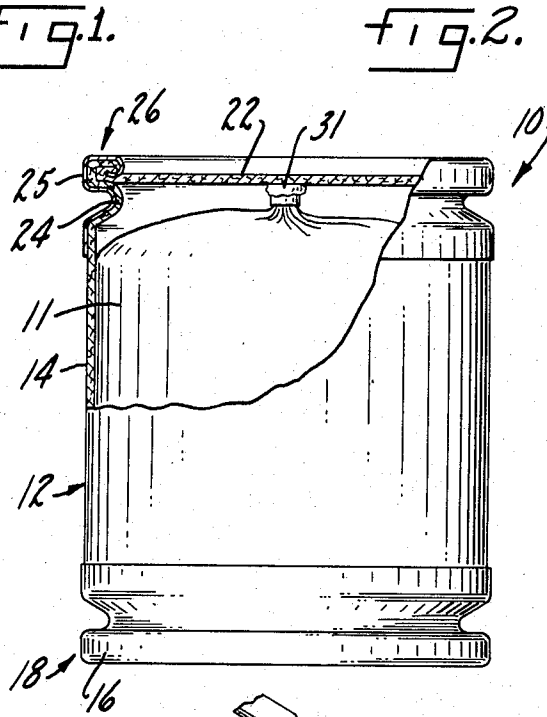


fig. 2.

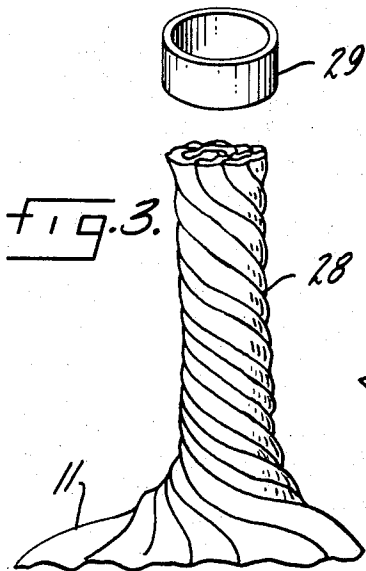


fig. 3.

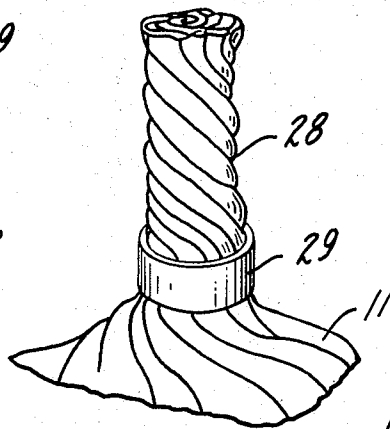


fig. 4.

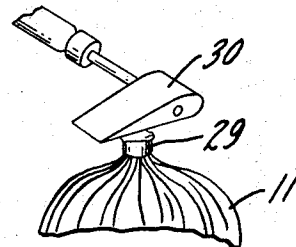


fig. 5.

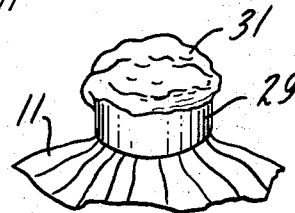


fig. 6.

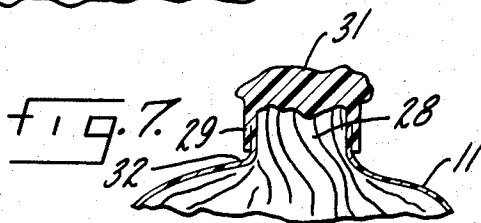


fig. 7.

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1

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FLEXIBLE BAG TYPE SHIPPING CONTAINER AND METHOD OF CLOSING AND SEALING SAME

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ABSTRACT OF THE DISCLOSURE

A shipping container and its method of production are described in which the goods to be shipped are enclosed within a flexible plastic bag contained in a rigid overpack, and in which the bag is sealed by drawing its open end into a skein which is slipped through a ring, and in which the free end of the skein is compacted against the ring under heat and pressure to form a monolithic seal.

The present invention relates generally to shipping containers and, more particularly, to containers of the flexible bag type which are commonly closed by gathering the material of the open end of the bag to form a skein and then tying such skein shut. In its principal aspects, the invention is concerned with improved methods for closing and sealing such bag type shipping containers, irrespective of whether or not such containers are ultimately enclosed within a rigid or semirigid overpack, and to improved containers formed thereby.

Various types of shipping containers have heretofore been developed for, and are now commonly used for, packaging, storing and/or transporting goods, which goods may, for example, take the form of solids (normally in the powdered, granular, or pulverized state), pastes or liquids. One type of container that has found considerable commercial acceptance is the flexible bag type, particularly one wherein the bag is formed of a thermoplastic material. Such a bag type container is commonly accommodated with a rigid or semirigid outer shell or overpack, although it is often possible to use such a bag without an overpack. However, in either case considerable difficulties have been encountered in providing an effective sealed closure for the bag itself.

In an effort to solve this problem, it has been proposed that the material of the free end of the bag be gathered or crumpled to form a skein or spout which is then tied shut by a cord or wire. However, this "solution" has not proved effective since the closure thus defined is not liquid-tight, nor does it prevent the passage of searching or penetrating powders or the like.

Yet another proposed "solution" to the problem has been that of flattening the mouth of the bag after it is filled and then heat-sealing the free edges or wall portions of the bag so as to adhere them to one another. This has not proved to be either practical or effective since the edges of the bag are often soiled, for example, during the filling operation, and the seal thus formed is not liquid-tight and is generally unreliable.

It is a general aim of the present invention to overcome the foregoing disadvantages and to provide an improved method for closing and sealing flexible bag type containers, which method is not only characterized by its simplicity, effectiveness and economy, but which also serves to produce improved bag type shipping containers having an effective, economical, durable and reliable seal. In this connection, it is also a general aim of the

2

present invention to provide such improved bag type shipping containers.

Other objects and advantages of the invention will become apparent as the following description proceeds, taken in conjunction with the accompanying drawing, in which:

FIGURE 1 is a vertical cross-sectional view here depicting a bag type container filled with a powdered substance prior to closure and sealing of the bag, the bag here being positioned within an exemplary rigid or semirigid overpack;

FIG. 2 is a vertical cross-sectional view similar to FIGURE 1, but here illustrating the bag in elevation closed and sealed in accordance with the present invention, and showing also the overpack closed by means of a separable end member;

FIG. 3 is an enlarged exploded perspective view illustrating the skein portion of the bag and a closing ring during the initial stages of the closing and sealing operation of the present invention;

FIG. 4 is a perspective view similar to FIG. 3 but here depicting the closing ring surrounding the skein portion of the bag during the intermediate stages of the closing and sealing operation of the invention;

FIG. 5 is a fragmentary perspective view during the final stages of the closing and sealing operation of the invention while heat and pressure are being applied to the skein;

FIG. 6 is a fragmentary perspective view of the skein portion of a flexible bag closed and sealed in accordance with the invention; and,

FIG. 7 is a fragmentary vertical section of the completed seal.

While the invention is susceptible of various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawing and will herein be described in detail. It should be understood, however, that it is not intended to limit the invention to the particular forms disclosed, but, on the contrary, the intention is to cover all modifications, equivalents and alternatives falling within the spirit and scope of the invention as expressed in the appended claims.

Referring now to the drawing, there is illustrated in FIGURE 1 an exemplary shipping container assembly, generally indicated at 10, here including a flexible bag type container 11 disposed within a rigid or semirigid outer shell or overpack 12. While those skilled in the art will, as the ensuing description proceeds, appreciate that the bag 11 could be formed of any of a wide range of different materials, the bag is preferably formed of a thermoplastic material such, for example, as polyethylene. Similarly, it will be understood that the outer shell or overpack 12 could be formed of a wide variety of different materials such as steel or similar metallic sheet material; fiberboard, paperboard, or similar fibrous materials; plastic, or other suitable natural or synthetic materials. Moreover, often the conditions will be such that no outer shell or overpack at all need be used.

However, in order to facilitate an understanding of one exemplary environment in which the present invention finds particularly advantageous use, the flexible bag 11 is here shown as accommodated within an overpack 12 having a fibrous sidewall 14 secured to a generally flat fibrous bottom wall or closure 15. As is conventional with this type of overpack, the free peripheral edge of the bottom wall 15 and the lower free extremity of the sidewall 14 are curled together with a suitable metallic reinforcing ring 16 to form a rigid reinforced chime 18. In this manner, the bottom wall 15 is firmly seated and clamped against the lower surface of a seat defining, inwardly extending, peripheral rib 19 formed in the sidewall 14 adja-

cent the lower end thereof. The bag 11 is, as best shown by reference to FIGURE 1, filled with goods 20 which may take any desired form. Once the bag 11 has been filled and positioned within the overpack, the mouth, generally indicated at 21 in FIGURE 1, of the bag is then closed and sealed in accordance with the invention, and the upper end of the overpack 12 is also closed. To effect closure of the overpack, a fibrous top wall or closure 22 (FIG. 2), which may be identical to the bottom wall 15, is inserted into the upper end of the side wall 14 and bottomed against an inwardly extending peripheral bead 24. The free peripheral edge of the top wall 22, the free upper extremity of the sidewall 14 and an upper metallic reinforcing ring 25 are then curled together in a conventional manner to form an upper chime 26, with the top wall 22 being firmly seated and clamped against the upper bead 24.

In accordance with the present invention, provision is made for closing and sealing the upper end of the flexible bag 11 in a simple, economical, and yet effective manner, irrespective of whether or not the bag 11 is in, or is to be placed in, the overpack 12, and wherein the seal thus formed is liquid-tight and unpenetratable by powdered, granular or particulate goods, and is not compromised by the presence of foreign matter on the inner surfaces of the bag 11 in the vicinity of its mouth 21. To accomplish this, and as best shown in FIG. 3, the material of the bag 11 in the region of the mouth is gathered or crumpled together to form a skein 28 which may then be twisted in the manner illustrated. Once the skein 28 is formed, an annular closing ring 29 is slipped downwardly about the skein to the position shown in FIG. 4. The closing ring 29 is preferably formed of a material which is solid and substantially rigid at normal room temperature.

In carrying out the method of the present invention, and in order to form a unitary seal void of discharge passages, interstices, or the like totally closing the upper end of the bag 11, heat and pressure are then applied to the portion of the skein 28 projecting above the ring 29, with the pressure preferably being applied in a generally axial direction towards the ring 29, thereby melting and compacting the portion of the skein disposed above the ring 29. To this end, and as best shown by reference to FIG. 5 a soldering bit 30 or the like may be employed to apply both heat and pressure. The molten or softened material of the compacted skein portion is then allowed to cool and solidify, thus forming a solid monolithic seal 31 (FIGS. 2, 6 and 7) above and in engagement with the ring 29.

It has been found in the practice of the present invention that the ring 29 materially facilitates and enhances the closing and sealing operation since the ring defines an anvil-like surface which affords a reaction force to the pressure applied to the skein and bag material.

In the event that the bag 11 is only partially filled or, if for any other reason there is more material in the skein portion than would normally be required to form the seal 31, the excess material may be cut off either before, during or after the application of heat and pressure.

For the purpose of further enhancing the effectiveness of the seal, it has been found that where the closing ring 29 is also formed of a thermoplastic material, a portion of the ring itself is softened and fused together with the bag or skein material (FIG. 7), thus forming a still more effective and solid seal 31. For example, very satisfactory results have been attained where the ring 29 is formed of the same material as the bag 11; e.g., polyethylene.

In order to enable dispensing of the goods 20 from within a bag 11 which is closed and sealed in accordance with the invention, it is simply necessary to cut the wall of the bag at a point below the seal 31 and collar 29, for example, in the region indicated at 32 in FIG. 7. And, of course, should one desire to reseal the bag after dispensing only a portion of its contents, it is only necessary to again gather or crumple the emptied portion of the bag to form another skein, and thereafter apply another ring 29, heat and pressure, thus forming another seal 31.

Those skilled in the art will appreciate that there has herein been described not only an improved method for closing and sealing flexible bag type containers but, also, an improved sealed container in which the anvil-like closing ring provides sufficient reaction force to the axially applied pressure of the bit 30, that an effective fused seal 31 is formed at the bag mouth. Moreover, where the ring 29 is also formed of fusible material, the seal thus formed is even further enhanced.

I claim as my invention:

1. A method of closing and sealing a flexible bag formed of fusible material comprising the steps of gathering the material of the bag adjacent its free end so as to form a skein, placing a ring formed of a fusible material that is solid and rigid at normal room temperature about the skein with a portion of the skein projecting through and above the ring, applying heat and pressure to the free projecting portion of the skein with such pressure being applied in a generally axial direction relative to the ring so as to fuse and compact the ring together with the free projecting skein portion; and allowing the fused and compacted ring and skein portion to cool and solidify thereby forming a solid seal.

2. A method as set forth in claim 1 further characterized in that the ring and bag are formed of the same material.

3. A method as set forth in claim 2 further characterized in that the material is thermoplastic.

4. A shipping container for holding goods, said container comprising, in combination, a flexible bag formed of fusible material and enclosing the goods to be packaged, the free end of said bag projecting beyond said goods being gathered together and defining a skein, a ring formed of a fusible material which is solid and rigid at normal temperature disposed about said skein with a portion of said skein passing through and projecting beyond said ring, the projecting portion of said skein and said ring being fused together and compacted so as to form a solid unitary seal.

5. A shipping container as set forth in claim 4 further characterized in that said bag and said ring are formed of thermoplastic material.

6. A shipping container as set forth in claim 4 further characterized in that said bag is enclosed within a rigid overpack.

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