Feb. 27, 1968 R. W. MAYO 3,370,773

COMPOSITE CONTAINER

Filed Jan. 6, 1966

FIG. 4

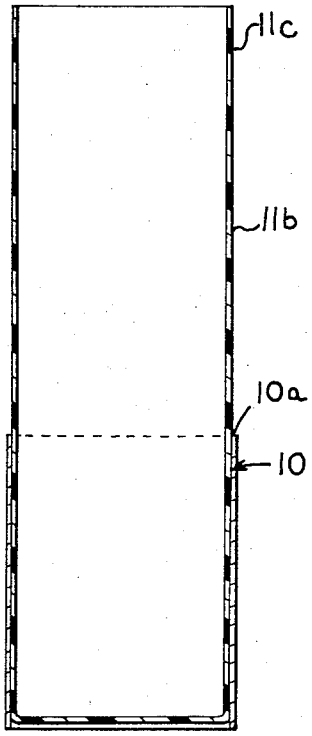


FIG. 1

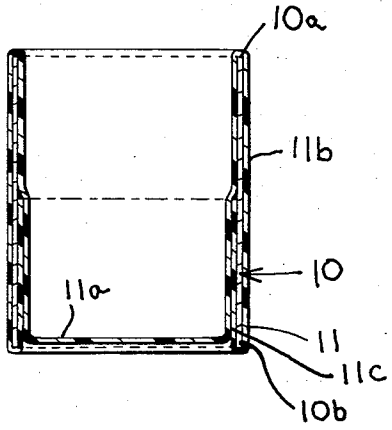


FIG. 2

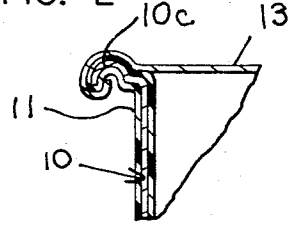
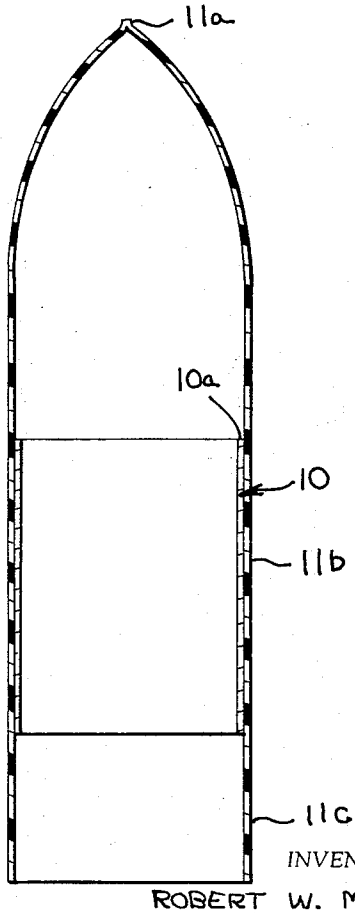


FIG. 3



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United States Patent Office 3,370,773 Patented Feb. 27, 1968

3,370,773

COMPOSITE CONTAINER

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Filed Jan. 6, 1966, Ser. No. 519,148
1 Claim. (Cl. 229—14)

ABSTRACT OF THE DISCLOSURE

This application discloses a composite container comprising a paperboard sleeve which is open at both ends and a flexible bag formed from an impervious film, the bag being of a length which is more than twice the length of the sleeve and being fitted within the sleeve with its closed end adjacent to one end of said sleeve and extending beyond the other end of said sleeve, the bag then being reversely folded around the outside of the sleeve and extending back toward said one end of the sleeve, the terminal portion of said bag being again reversely folded to extend along the inside of the sleeve in the region between the sleeve and the closed end of the bag.

This invention relates to a composite container, and more particularly to a container construction permitting a wide latitude of selection of container materials to provide an economical container construction for the packaging of commodities that heretofore have required the use of expensive container materials or constructions.

The wide variety of commodities that are packaged at present have required an equally wide variety of suitable materials to produce the most economical and practical container for the particular commodity; however, existing container constructions have not been able in many cases, to provide an economical container which will meet all of the particular requirements imposed by a particular commodity or by the environment in which the packaged commodity is to be employed. For example, a so-called fibre can utilize a sleeve formed of paperboard as the primary material to supply the required mechanical strength in the finished can but, due to the fact that paper has substantially no strength when subjected to water or other liquid contact or even a high humidity atmosphere, it has been necessary to provide both inner and outer linings of aluminum foil or plastic to protect the paper material from attack by moisture in the commodity to be packaged or from existing humidity encountered at any stage in the marketing process. A further extreme example is the fact that an aluminum or bare steel can might be a desirable packaging media from the standpoint of weight and cost for the packaging of acids, yet neither material can be employed for packaging certain acids without providing an internal liner or coating of a material that will protect the metal from acid attack.

The application of liners and coatings to give any particular primary container material environmental protection involves numerous mechanical problems. In a laminated fibre can, where the aluminum foil is provided on the inside and/or outside of the containers by an application of a spiral wrap, it is necessary to resort to complicated arrangements for sealing the joints of the spiral wrap and, if such sealing is not completely successful, or if a small pinhole exists in an aluminum or plastic protecting film, such defect will destroy the container in use due to the well-known wicking properties of paperboard.

Even when the primary container material is an organic plastic, it may not be suitable for packaging certain foods, pharmaceuticals or perfumes, due to the fact that certain gases or oils readily permeate certain plastics, hence the packaged commodity deteriorates.

Even when the primary material selected for a package may have adequate physical strength, and is not susceptible to attack by the commodity to be packaged, or the external environment, other problems in the form of government regulations prevent the use of the most economical packaging material. For example, powdered food products could be packaged in a container formed of paperboard but, due to the well-known F.D.A. regulations, the paper stock employed in such paperboard must be formed essentially from virgin pulp, the so-called food grade paperboard, thus eliminating many of the cheaper grades of paperboard available on the market which have incorporated therein varying amounts of pulp derived from waste paper.

The foregoing examples illustrate that the ideal container necessarily requires that the surfaces of the container exposed to the product, or to the environment, must be formed by a material that is not subject to attack or permeation by the commodity to be packaged, the environment through which the package passes, or legal objections. Accordingly, in describing and claiming this invention, the term "attackable" materials will be employed to designate materials that could not normally be used in a container because of any one or more of the aforestated deficiencies. As a corollary, the term "non-attackable" materials will be utilized to designate those materials which are compatible with the commodity to be packaged, are not susceptible to deleterious attack or permeation by such commodity or the environment to which the package is subjected, nor are subject to any legal objections based on government or other administrative regulations.

Accordingly, it is an object of this invention to provide an improved container construction for packaging commodities wherein the primary component of the container is formed from economical "attackable" materials, and the surfaces of the container are defined by a flexible film of "nonattackable" materials.

A particular object of this invention is to provide an improved container construction wherein the physical strength of the container is provided by a sleeve member formed of an "attackable" material, and both the external and internal surfaces of the container are defined by a unitary bag formed from a deformable "nonattackable" material.

A specific nature of this invention as well as other objects and advantages therein will become apparent to those skilled in the art from the following detailed description taken in conjunction with the annexed sheet on which there is shown two embodiments of this invention.

On the drawings:

FIGURE 1 is a vertical sectional view of a cylindrical container body element constructed in accordance with this invention;

FIGURE 2 is a fragmental vertical sectional view illustrating the assemblage of an end to the container body of FIGURE 1;

FIGURE 3 is a vertical sectional view illustrating the assemblage of the container body of FIGURE 1 in accordance with one modification of this invention;

FIGURE 4 is a view similar to FIGURE 3 but illustrating the assemblage of a container body in accordance with another modification of this invention.

As shown on the drawings:

Reference numeral **10** indicates a sleeve element formed in accordance with any conventional procedure from an "attackable" material, the term "attackable" having the meaning defined above. For example, the sleeve **10** may be formed from a paperboard which in turn can be formed from pulp having any desired content of waste material so long as the resulting physical strength of the board is adequate for the desired container. The sleeve **10** may

be formed by either the spiral or convolute winding of a strip of such paperboard material on a mandrel and the joints between the adjacent strips may be or may not be adhesively secured together, so long as the resulting sleeve provides the desired physical strength for the particular container application.

Both the external and internal surfaces of the sleeve **10** are defined by a bag **11** which is formed from a deformable nonattackable material preferably in the form of a thin film. For example, bag **10** may be formed by extrusion of a tube of polyethylene, polystyrene, polypropylene, polyvinyl chloride or any other suitable organic plastic material which is then blown to provide a diameter approximating that of the sleeve **10** and also providing the desired minimum thickness for the bag **11**. The closed end **11***a* of the bag **10** may be produced by a heat or an adhesive seal. In any case, since the bag **11** is formed as a separate element, there will be an opportunity provided to pressure test the bag **11** to insure that no pinholes, tears or other defects exist in the bag which would make it ineffective as a protective covering for the attackable sleeve **10**.

The closed end **11***a* of the bag **11** is disposed within the sleeve **10** substantially adjacent to one end of such sleeve, here shown as the bottom end. The overall length of bag **11** is on the order of twice the length of the sleeve **10** so that approximately one-half of the length of bag **11** would extend beyond the length of the sleeve **10**. This excess length of the sleeve **11**, indicated as **11***b*, is then reversely folded over the top end of the sleeve **10** and thus disposed in overlying relationship with the entire external surface of the sleeve **10**. Preferably, the excess length **11***b* is long enough so that the extreme end portion thereof, designated as **11***c*, may be reversely folded over the bottom end of sleeve **10** to extend some distance upwardly within the interior of sleeve **10**. In this manner, it is assured that all external surfaces of the sleeve **10**, including both end faces **10***a* and **10***b* thereof are completely enclosed by the bag **11**. Therefore, the material of sleeve **10** is completely protected from contact with, or attack by either the commodity to be packaged within the container or the external environment through which the container passes in its normal journey from the container maker, to the commodity packager and thence to the eventual consumer.

Container ends **13** may be applied to either or both ends of the enclosed sleeve **10** by conventional manufacturing techniques. For example, as shown in FIGURE 2, a metallic end **13** formed from aluminum or tin plate may be crimped over a suitably swaged end portion **10***c* of the sleeve **10**. If plastic ends are suitable for the particular packaging application, such ends may obviously be applied by heat or adhesively sealing the same to those portions of the bag **11** which overlie the ends of sleeve **10**.

The initial assemblage of the bag **11** to the sleeve **10** may be accomplished in either of two manners respectively illustrated by FIGURES 3 and 4 depending upon the particular physical characteristics of the flexible plastic material from which the sheet **11** is formed. If such material has the property of being heat shrinkable, such as possessed by stress-oriented polyethylene or polypropylene films, then the bag **10** is originally formed with a sufficiently large diameter to permit the sleeve **10** to be freely inserted within the open end of the bag as illustrated in FIGURE 3. Heat is then applied to those portions of the bag **11** which overlie the sleeve **10** to shrink same into tensioned engagement with the sleeve **10**. Following this step, the closed end **11***a* of the bag **11** is pushed downwardly into the sleeve **10** to occupy the position shown in FIGURE 1. This construction, of course, improves the strength characteristics of the complete container.

Alternatively, if the material from which bag **11** is formed is somewhat resilient, or is capable of expansion, then the assembly method illustrated in FIGURE 4 may be employed. If the bag **10** is formed from a resilient material, such as a rubber or rubber-like composition, then the bag **10** will be formed of a diameter such that the insertion of the closed end of bag **11** within the sleeve **10** will cause the inserted portion of the bag to snugly conform to the wall surfaces of sleeve **10**. Generally, however, it will be desirable from an economic standpoint to form the sleeve **11** with a minimum wall thickness, on the order of 0.5 to 5 mils, so that no substantial degree of resilience will generally be exhibited by the bag **11**. With such materials, it will be preferable to form the bag **11** to a diameter slightly smaller than the internal bore of the sleeve **10**, then insert the closed end of the bag **11** in the sleeve **10**, apply an adhesive (not shown) either to the external surfaces of the bag **11** or the internal surfaces of sleeve **10** and expand bag **11** by the application of a slight internal pressure to snugly conform and adhere to the internal surfaces of sleeve **10**. In either event, the excess length of the bag is then reversely folded around the top end **10***a* of the sleeve **10**, and the assemblage of the bag **11** to the sleeve **10** completed in the manner indicated in FIGURE 1.

From the foregoing description, it will be apparent that this invention provides a composite container construction providing the utmost flexibility in selecting low cost materials and yet resulting in a container that is not susceptible to attack by container contents or container environment, and which is not subject to any legal objections based on the contact of certain materials with food, drugs or pharmaceutical commodities. Additionally, the flexible portion of the bag is capable of at least a limited degree of expansion and contraction within confines of the surrounding sleeve in the manner of a free piston. Thus product expansion during heating, for example, during pasteurization is not effective to establish the high internal pressures which would prevail in conventional composite container constructions and/or product contraction upon cooling following a heating step will not result in the establishment of a vacuum such as would prevail in such conventional container constructions. It will be apparent that numerous modifications of this invention can be employed without departing from the scope of the following claim.

What is claimed is:

1. A composite container for "attack" commodities comprising a hollow paperboard sleeve open at both ends and formed from an "attackable" material, and a bag formed from a flexible "nonattackable" organic plastic film material, said bag having an overall length more than double the length of the sleeve, said bag having its closed end inserted within said sleeve with the closed end of the bag disposed substantially adjacent to one end of the sleeve, said bag extending from said one end beyond the other end of the sleeve and being reversely folded around the outside of the sleeve and extending back toward said one end to enclose the edge of the other end of the sleeve and to overlie the external surface of the sleeve, the terminal portion of said bag again being reversely folded and extending back along the inside of the sleeve in the region between the sleeve and the closed end of the bag to enclose the edge of said one end of the sleeve.

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