FOOD STORAGE AND DISPENSING CONTAINER SUITED FOR USE UNDER ZERO GRAVITY CONDITIONS

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ABSTRACT OF THE DISCLOSURE

A flexible container to be used by astronauts for storing, mixing with water and dispensing dehydrated food products under zero gravity conditions. Two rectangular plastic sheets are sealed together at their edges with filling and dispensing nozzles positioned side by side at the same end of the container between the end portion of the sheets. A portion of the container is removed to expose the nozzles.

The present invention relates to the packaging industry and more particularly to a container for storing and dispensing food products. The invention is particularly well suited for dispensing food products under the zero gravity conditions encountered in space vehicles where the inadvertent release of the package contents must be avoided.

Containers have been previously proposed for storing and dispensing food products under zero gravity conditions encountered in space exploration but they have been both complex in construction and expensive to produce primarily because of the relatively large number of seals required in their construction. Moreover, leaks were present in a substantial number of these containers.

In view of the deficiencies of the prior art this invention has the following objects: first, to provide a container of the described type which is rugged in construction, reliable in operation and can be manufactured with a relatively few heat seals thereby increasing product performance and reliability; second, the ability to use as a starting material pouches formed from roll stock having a generally rectangular outline; third, a provision for mounting a pair of nozzles in a first operation and for introducing the food product during a subsequent operation; fourth, a provision for accurately positioning and simultaneously sealing a pair of nozzles in position within the container; fifth, a provision for locating the nozzles so that a single jig or template can be used for orienting them in the container; sixth, a provision for allowing the material within the pouch to be easily and almost completely expelled.

These and other more detailed and specific objects will be apparent in view of the following specification and drawings wherein:

FIGURE 1 is a plan view of a pouch embodying the invention.
FIGURE 2 is a transverse section view taken on line 2—2 of FIGURE 1 on a greatly enlarged scale.
FIGURE 3 is a transverse section view taken on line 3—3 of FIGURE 1 on a greatly enlarged scale.
FIGURE 4 is a perspective view of a template employed in accordance with the invention for orienting and positioning a pair of nozzles prior to insertion into the container.
FIGURE 5 is a perspective view of a modified form of the invention.
FIGURE 6 is a partial vertical section view through the filling valve taken on line 6—6 of FIGURE 1.

In accordance with a preferred form of the present invention, the food storage and dispensing container comprises a plurality of superimposed aligned sheets of flexible liquid impervious materials joined at their edges and having a pair of adjacent nozzles at the same end of the container and located between the superimposed sheets. One of the nozzles acts as a filling nozzle and the other as a dispensing or feeding nozzle. The nozzles are secured to the walls of the container as by heat sealing. The end of the container opposite the nozzle is initially left open. The food product is inserted and the open end of the container is closed. When the container is to be used, a liquid such as water is introduced through the filling nozzles and is mixed with the food product in the container. The other nozzle is then withdrawn and the food product is dispensed.

To the accomplishment of the foregoing and related ends, this invention then comprises the features hereinafter fully described and particularly pointed out by the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principles of the invention may be employed.

As can be seen in the figures, the container indicated generally at 10 comprises a pair of rectangular sheets 10a and 10b of flexible fluid impermeable material such as a polymeric resinsheet material exemplified by polyethylene, polypropylene, heat sealable polyester film and the like sealed initially for example by heat seals along three edges at 12, 14 and 16 to provide a pouch which is open at one end. One particularly satisfactory sheet material consists of a laminate composed of a layer of 1 mill polyethylene film bonded to a layer of 2 mill fluorohalocarbon film such as that sold under the name of Alcell 53C by the General Chemical Division of the Allied Chemical Corp., Morristown, N.J., bonded to a layer of 0.75 mill polyester film such as M27 Mylar manufactured by the E. I. Du Pont Co. of Wilmington, Del., bonded to 2 mill polyethylene film with the 2 mill polyethylene film located on the inside surface of the container. One additional heating seal 18 is preferably provided parallel and intermediate the side seals 12 and 16. Seal 18 joins the end seal 14 and extends a relatively short distance centrally from the seal 14, for example, about one-quarter of the length of the package. The seal 18 helps to orient and position the nozzles as well as preventing leakage of liquid from one nozzle to the other. A pair of openings 15 and 17 are provided to define a line 19 along which a cut is made when the container is to be used as will be described more fully below.

Dispensing and filling nozzles are designated 20 and 22 respectively. The dispensing or feeding nozzle 20 which is used for expelling the food product from the package consists of a flat tube formed for example from polyethylene having a plurality of zig zag or accordion folds 32 and an upwardly extending terminal portion 34 which makes the nozzle easy to grasp and extend when it is used.

The nozzle 22 is a liquid filling nozzle composed of a cylindrical body portion having a central bore 36 communicating with a compartment 38 of a relatively larger diameter within which is provided a check valve comprising a ball 40 forced against the seat 42 by spring 44. The valve body 23 is secured to a short length of tube 46 for example by a ring or band 48 which is shrunk over the tube 46 by heating it.

In constructing the package, a pair of nozzles 20 and 22 are positioned upon tabs 24 and 26 respectively extending upwardly from a jig or template 28 supported upon a block 30. A suitable releasing agent 31 of the type well known to those skilled in the packaging field such as a sheet of lightweight woven fiberglass, to which polytetrafluoroethylene is applied on both sides, is positioned adjacent to the template 28 prior to mounting the nozzles
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The template 25 orients and supports the nozzles for placement within the container. After the nozzles have been mounted upon the tabs, a pouch 10 is drawn either manually or by means of suitable automatic equipment over the template in a downward direction as seen in FIGURE 4 with the nozzles on opposite sides of seal 18. After the nozzles 20 and 22 have been inserted as described above and illustrated in FIGURE 4, the portion of the sheets 10a and 10b is removed from the template 28 together with the releasing sheet 31. A transversely extending diagonal seal 50 is then made. It is preferably but not necessarily a heat seal. Seal 50 bonds the walls 10a and 10b together as well as sealing nozzles 20 and 22 in position. The releasing sheet 31 is then removed. In this way the nozzles are securely bonded to the walls of the container without a seal being formed between their own inner walls. The containers in this stage of completion are either immediately filled with a food product or set aside for filling at a later time.

Any of a great variety of food products, either liquid, solid or paste, can be used but the container is particularly well suited for use with dehydrated food products as shown at 52. After the food product 52 is inserted, a final transverse seal is made at 53. The food product 52 can be in block, bite-size chunk form or in the form of free-flowing powder. The following is but a few of the great variety of food products with which the invention can be used; powdered fruit, drink mix such as orange and grapefruit drink mix, breakfast cereal such as cornflakes, prepared food products such as potato salad, meat products such as meat loaf, rice, fish, tuna salad, food products which make up into a paste such as apple sauce, beverages such as coffee or tea extract together with sugar, dried cream, prepared dehydrated meat products such as pork sausage and many others.

A modified form of the invention is shown in FIGURE 5. This form of the invention is similar to that described above (the same numbers have been used to designate similar parts) except for the addition of a retaining member consisting of an adhesive 54 composed of a strip of adhesive tape having a sticky material on both upper and lower surfaces. The sticky material on the lower surface bonds the tape 54 to the wall of the container. The exposed sticky surface consists of a permanently tacky pressure-sensitive adhesive. A sheet 55 is used to cover the adhesive 54 before use. When the contents are expelled through the nozzle 20, the exposed adhesive surface on the tape 54 bonds the portion of the container which is being rolled up to itself thereby forming a roll 56 which the exposed adhesive surface of the tape 54 maintains in a tightly rolled condition. In this way the chances for small amounts of food material to remain trapped within the container is minimized. Accordingly, the waste of food material is minimized. We have found for example that the average amount of material expelled can be increased by as much as about 9%–10% by the use of a tape 54. This, of course, is a substantial advantage in both earth orbital or inter-planetary space exploration. It should also be appreciated that the angular relationship with the seal 50 will allow the last bit of material to be forced toward the nozzle 20 thereby assuring its complete removal.

The method of using the invention will now be described. First, a cut is made from the opening 17 toward the opening 15. The cut is made from right to left initially to the seal 18. When the valve 25 is used, a filling instrument (not shown) is inserted into the predetermined volume of liquid as from about typically 3–5 ounces is metered into the container for the purpose of reconstituting a dehydrated food product contained therein. The proper amount of liquid is introduced for the particular food product in the container. The package is then kneaded for the purpose of mixing the food product 52 with a liquid. Kneading is usually carried out for from about thirty seconds to one minute. The container is then allowed to stand for a period of about three to five minutes. Then the cut 19 is continued until the opening is reached. The feeding tube 20 is then withdrawn and placed in the mouth of the user and the food product is dispensed by squeezing the container.

The container has proved to be durable, easily constructed and is reliable in performance. Moreover, the numbers of containers in which leaks were found was so small as to be all but unmeasurable.

Packages made in accordance with the invention and filled with dehydrated food products were subjected to a variety of performance tests including oxidation tests in which packages were maintained in a test atmosphere composed of 95% oxygen and a relative humidity of 95% and at a pressure of 5 p.s.i.a. for a period of 336 hours, temperature cycling tests in which temperatures of 55°F–90°F were employed, and tests in which the packages were exposed to noise levels of up to 132 decibels for 30 minutes, acceleration tests in which packages were exposed to acceleration levels of 7.25 g's at an acceleration at from 20–20,000 cycles per second and shock accelerations of 20 g's in each of the three orthogonal axes. The packages performed well in all of these tests. None of the packages showed any detectable damage as a result of the exposure to these test conditions.

It is apparent that modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof. The specific embodiments described are given by way of example and the invention is limited only by the terms of the appended claims.

1. A flexible food storage and dispensing container comprising a plurality of superimposed aligned sheets of flexible fluid impervious material connected together along their edges, a pair of nozzles both adjacent one end of the container and both of said nozzles being positioned between said sheets of flexible material, a transversely extending seal line bonding the sheets together on each side of the nozzles, said nozzles being located between one edge of the container and the transversely extending seal line thereby totally enclosing the nozzles between the said aligned sheets, one of said nozzles comprising a filling nozzle having a duct means therein for introducing a liquid into the container, said filling nozzle including a check valve means for allowing the introduction of a liquid but preventing the flow of liquid out of the container, the other of said nozzles comprising a dispensing nozzle, each nozzle thereby forming a nozzle communicating with the interior of the container and being sealed thereto.

2. A flexible food storage and dispensing container comprising a plurality of superimposed aligned sheets of flexible fluid impervious material connected together along their edges, a pair of nozzles both adjacent one end of the container and both of said nozzles being positioned between said sheets of flexible material, a transversely extending seal line bonding the sheets together on each side of the nozzles, said nozzles being located between one edge of the container and the transversely extending seal line thereby totally enclosing the nozzles between the said aligned sheets, one of said nozzles comprising a filling nozzle having a duct means therein for introducing a liquid into the container, said liquid filling nozzle having a check valve therein constructed to allow the passage of liquid into the container but preventing the reverse flow of liquid from the container and the other said nozzle comprising a dispensing nozzle having a duct means therein for introducing a liquid into the container, each of the nozzles communicating with the interior of the container and being sealed thereto.

3. A flexible food storage and dispensing container comprising a plurality of superimposed aligned sheets of
flexible fluid impervious material connected together along their edges, a pair of nozzles both adjacent one end of the container and both of said nozzles being positioned between said sheets of flexible material, a transversely extending seal line bonding the sheets together on each side of the nozzles, said nozzles being located between one edge of the container and the transversely extending seal line thereby totally enclosing the nozzles between said aligned sheets, one of said nozzles comprising a filling nozzle having a duct means therein for introducing a liquid into the container, the other of said nozzles comprising a dispensing nozzle, each of the nozzles communicating with the interior of the container and being sealed thereto, said flexible sheet material comprising a laminated composite sheet formed from a plurality of organic resinous polymeric materials bonded together to provide a flexible liquid impervious container, said container having side edges, said transverse seal extending from one side edge thereof to the other side edge, said nozzles being positioned between the transverse seal and said one end of the container, the transverse seal bonding the nozzles to the walls of the container and bonding the walls of the container together on either side of the nozzles, said filling nozzle having a valve means therein to prevent the egress of fluid therethrough and the other of said nozzles being folded upon itself whereby it may be withdrawn so as to extend somewhat beyond the ends of the container when said dispensing nozzle is to be used.

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