ABSTRACT

A product package includes a product receiving cavity formed from a first, heat shrinkable film and a second, non-heat shrinkable film sealed to the first, heat shrinkable film. The second film can be provided with indicia which remains intact following completion of the product packaging. In accordance with a method aspect of the invention, the package is produced utilizing a form, fill and seal system. In one embodiment, a soft, deformable refrigerated dough is packaged.
PACKAGING EMPLOYING BOTH SHRINKABLE AND NON-SHRINKABLE FILMS

FIELD OF THE INVENTION

The invention pertains to the art of packaging and, more specifically, to packaging of various products between first and second plastic films in a form, fill and seal system wherein one of the films is shrinkable, but not the other film.

BACKGROUND OF THE INVENTION

Mainly because of cost efficiencies and packaging versatility, vertical and horizontal form, fill and seal packaging systems have become increasingly popular, even in the food industry. For instance, vertical form, fill and seal systems (VFFS) have been used in connection with making sealed bags, such as potato chip and other types of snack bags, while horizontal form, fill and seal (HFFS) packaging systems have been known for use in effectively packaging frozen foods. By way of an example, a HFFS system can be employed to create product cavities or pouches in a lower film, with the pouches being filled with frozen dough products and sealed with an upper film. Prior to fully sealing the pouches, a vacuum is typically drawn in order to reduce the available headspace of the package. Although evacuating the headspace is appropriate for frozen dough products, employing a vacuum on a refrigerated dough product would inherently destroy nucleation sites for leaveners in the dough, and, consequently, the overall product.

Another problem with packaging dough in a flexible package, particularly refrigerated dough which has been pre-cut into products to be cooked, such as biscuits, concerns the use of the flexible package as the sole primary package. Basically, the dough will deform in response to gravity and external pressure/weight applied to the dough. This could occur even in loaded shipping bags. Obviously, the deformation of the dough would undesirably result in inconsistently shaped cooked products. Certainly, this problem can be a concern in connection with numerous products, including products outside the food art. Although this problem could be solved by further packaging the flexible package into a carton or the like, this option would negate the cost savings.

Based on the above, it would be advantageous to enable various products, including soft, deformable food products such as both low and high pressure dough products, to be effectively stored and sold in flexible packaging, while minimizing any product deformation.

SUMMARY OF THE INVENTION

The invention is directed to a method for packaging products between first and second films in a form, fill and seal system, as well as the associated product, wherein one of the films is heat shrunk at least 5% about the product while the other film exhibits no appreciable shrinkage. In making a product in accordance with an aspect of the invention, a flexible product receiving cavity is initially formed in a first film and a product is loaded into the cavity. A second film is positioned across the loaded product receiving cavity and then joined to the first film about a peripheral portion of the product cavity to create a package containing the product. In accordance with a main aspect of the invention, the package is heated to cause the first film to shrink about the product while the second film exhibits no appreciable shrinkage.

When the first film is shrunk without permitting venting from inside the package, i.e., the package is completely sealed, an external pressure is effectively applied about the package which, in effect, limits the extent that the package and product can be physically deformed, thereby enhancing the stability of the overall product. Basically, the applied force is essentially transferred to static pressure within the package. However, if the first film is shrunk while accommodating venting from inside the package, the majority of the product can be tightly wrapped by the first, shrinkable film. In either case, as the second film is specifically designed not to shrink, product information, advertising and similar indicia can be applied to the second film, even prior to joining the first and second films, without the risk of the indicia being visually distorted, regardless of any product deformation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 schematically illustrates a horizontal form, fill and seal (HFFS) system constructed in accordance with the invention.

FIG. 2 is a perspective view of a packaged dough product prior to heat shrinking of the package in accordance with the invention.

FIG. 3 is a perspective view of the packaged dough product of FIG. 2 after heat shrinking.

DETAILED DESCRIPTION OF EMBODIMENTS

With initial reference to FIG. 1, a horizontal form, fill and seal (HFFS) system employed in connection with the packaging method of the present invention is generally indicated at 2. As shown, system 2 has associated therewith a first or lower film 5 which runs from a payout reel 7 in the direction of arrow A to a take-up reel 8. As will become more clearly evident below, the majority of film 5 is used in connection with packaging products in accordance with the invention and take-up reel 8 receives the left over or scrap film. In a preferred form of the invention, take-up reel 8 merely receives lateral edge portions of lower film 5, such as an inch (approximately 2.54 cm) of either side of film 5 while the remainder of the film 5 is employed in the final packaging. In any case, lower film 5 is first directed to a heating station 10 and is directed between upper and lower heating units 12 and 13. In general, heating station 10 can employ various types of heater units 12, 13 known in the art, such as radiant, conduction and/or convection heaters. Basically, it is simply desired to heat lower film 5 for delivery to forming station 18. In forming station 18, a thermoforming unit 19 is employed to produce product cavities 20 in lower film 5. To this end, thermoforming unit 19 includes a lower cavity mold 21 having a main body 22 formed with recessed cavities 23. A linear actuator 24 is connected to main body 22 and is configured to vertically shift main body 22 during the forming of product cavities 20. For use in connection with the forming process, fluid communication lines, such as that indicated at 25, extend through main body 22 to recessed cavities 23. In conjunction with lower cavity mold 21, thermoforming unit 19 includes an upper cavity mold 30 which also includes a main body 31 from
which extend various projection molds 32 that conform to recessed cavities 23. In a manner similar to lower cavity mold 21, upper cavity mold 30 is connected to a linear actuator 33 used to vertically shift upper cavity mold 30 during a thermoforming operation.

[0012] In general, thermoforming devices such as that employed in connection with forming station 18 are widely known in the art and do not form part of the present invention. However, for the sake of completeness, it should be understood that the function of forming station 18 is to receive heated lower film 5 between lower cavity mold 21 and upper cavity mold 30 at which time the movement of lower film 5 is temporarily stopped, projection molds 32 are mated with recessed cavities 23 in order to reshape lower film 5 to include product cavities 20. To aid in this shaping operation, fluid communication lines 25 can be hooked to a vacuum source in order to draw lower film 5 against recessed cavities 23 as well as to subsequently apply a positive pressure to aid in removing the formed product cavities 20 from lower cavity mold 21 after the thermoforming process is complete.

[0013] Once product cavities 20 are formed in lower film 5, lower film 5 advances to a loading or filling station generally indicated at 40. At this point, it should be recognized that filling station 40 can take various forms without departing from the invention. As illustrated, filling station 40 includes a vertical loading unit 42 including a platform 43 from which extend various loading arms 44 used to transport products, such as that indicated at 46, into the individual product cavities 20.

[0014] After products 46 are loaded into product cavities 20, lower film 5 is advanced to a sealing station 52. At this point, depending on the product being packaged, it may be potentially advantageous to reduce package headspace volume associated with product cavities 20 prior to completing the packaging operation. Certainly, the headspace can be reduced in various ways. For instance, an external force can be applied to lower film 5, such as by providing either a fixed or movable plate (not shown) which abuts lower film 5. In another embodiment, a housing including a pressure chamber at sealing station 52 can be employed, such as disclosed in co-owned U.S. Patent Application entitled “HFS Packaging Method Employing Positive Differential Pressure” filed on even date herewith and incorporated herein by reference. In any case, whether package headspace is reduced or not, at sealing station 52, a second or upper film 56 is provided over first film 5 and sealed thereto. As will become more fully evident below, the product cavities 20 can be completely sealed or some accommodation for venting can be provided, such as a small seal gap. In the embodiment shown, second film 56 is drawn from a payout reel 57 and delivered through a printing unit 60. Printing unit 60 is used to provide product information, advertising and similar indicia directly on upper film 56 as generally indicated at 61 in FIG. 2. After following various guide rollers 63 to sealing station 52, the remainder of upper film 56 is directed to a take-up reel 65. At sealing station 52, upper film 56 is sealed, either completely or partially, to lower film 5 across product cavities 20 in order to create an overall product package indicated at 68. Thereafter, package 68 is directed to a package shrinking station 69 including a heat source generally indicated at 70. At shrinking station 69, package 68 is heated. At this point, it should be noted that heat source 70 can take various forms, including radiant, convection or conduction heat sources, without departing from the invention. In one embodiment, a heat bath is employed wherein packages 68 are introduced into a heated liquid. However, other heating arrangements could be employed, such as subjecting package 68 to a heated stream of air or passing package 68 across a radiant heat bed. Although the heating time can vary depending on various factors including the thickness of film 5, the temperature associated with heat source 70 and the size of package 68, the time period is preferably established to correspond to the rate of other unit operations in the overall process. In any case, after being heated at shrinking station 69, package 68 proceeds to a cutter station 72 wherein a blade element 73 is shifted vertically through the use of a linear actuator 74 against an anvil member 75 in order to cut each package 68 from the overall web defined by the mated lower film 5 and upper film 56. At this point, package 68 is ready to ship for sale to a consumer.

[0015] Important in accordance with the invention is that first or lower film 5 is made of a heat shrinkable material, while the material employed for second or upper film 56 is non-shrinking, i.e., exhibits no appreciable shrinkage upon heating. More specifically, film 5 will shrink in accordance with the invention a minimum of 5% and up to 50%, preferably 7-38% and more preferably 13-27%. Known films can be utilized for this purpose, such as CURLON Grade 9506-J, 9580-W and 9581-W flexible films produced by Curwood, a Bemis Company, for the food industry. These films can vary in thickness between approximately 2.75-6.0 mils, although even thicker films could be utilized. The percentage of film shrinkage is not only a function of the particular film employed, but also the applied temperature. To date, application temperatures ranging from about 80° C. to about 115° C. have been effectively employed. Obviously, a different material is used for non-shrinking film 56. Again, there are various known film products having the necessary criteria, including 1834-K (which is a clear film) and 1839-K (which is a white film) made by Curwood. These films can also range in thickness, while a 3.5 mil 834-K film was found to be effective.

[0016] When product cavities 20 are completely sealed, shrinking film 5 establishes an external pressure which is effectively applied about package 68, in effect limiting the extent that package 68 and product 46 can be physically deformed, thereby enhancing the stability of the overall product. This arrangement can be particularly beneficial when packaging a soft or pliable product, such as a refrigerated dough product. Basically, the applied compression force is essentially transferred to static pressure within the package 68. If venting is permitted, the first film 5 will shrink to conform to the shape of the majority of the product in the cavity 20. In either case, as the second film 56 is specifically designed not to shrink, the product information, advertising and similar indicia 61 can be applied to upper film 56, even prior to full or partial sealing of package 68, without the risk of the indicia 61 being visually distorted. This non-distortion of indicia 61 is perhaps best illustrated in comparing package 68 of soft, deformable refrigerated dough before and after being shrunk as shown in FIGS. 2 and 3 respectively wherein the indicia 61 remains intact throughout the shrinking operation. To illustrate the non-distortion advantages of the invention, the chart below illustrates the results of a test wherein an approximately 2 lb. weight was applied to a control package made with non-shrinking films and a package made in accordance with the invention. As clearly reflected in the chart, the control package height declined and the width increased, while the package made in accordance with the present invention exhibits no significant height or width variations.
No Shrink vs. Plus Shrink

Average Sample Height and Width

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Although described with reference to certain embodiments of the invention, it should be understood that various changes and/or modifications can be made to the invention without departing from the spirit thereof. For instance, although the referenced embodiment illustrates the shrinking station to be employed following the sealing station, since only the lower film is being shrunk, it is possible to reposition the shrinking station before the sealing station even though certain advantages in reduced headspace would be compromised. In addition, although the invention has been described with particular reference to packaging a food product, particularly a deformable, soft food product such as a refrigerated dough which can benefit greatly from pressurized packaging, it should be recognized that the invention can be employed with a wide range of products which can be packaged under pressure, evacuated or just placed in a protective wrapping. Although the invention should not be considered limited in this regard, other food products can include sardines, asparagus, soup, pet food, fruit snacks, cereals such as Cheerios®, and chips, while a host of non-food products, including stuffed toy animals, decks of cards, sponges, toilet paper, towels, clothing and play dough, can be advantageously packaged. Furthermore, the invention can be employed with horizontal or vertical form, fill and seal systems, as well as other flexible packaging systems. In any event, the invention is only intended to be limited by the scope of the following claims.

1. A method of packaging a product comprising:
loading product in a product receiving cavity defined between first and second films;
sealing the second film to the first film about the product receiving cavity to create a package containing the product; and
heating the package to cause the first film to shrink at least 5% about the product while the second film exhibits no appreciable shrinkage.

2. The method of claim 1, wherein heating the package causes the first film to shrink between 5-50%.

3. The method of claim 2, wherein the first film is shrunk between 7-38%.

4. The method of claim 3, wherein the first film is shrunk between 13-27%.

5. The method of claim 1, further comprising: providing indicia on the second film, wherein the indicia remains intact after the package is heated.

6. The method of claim 1, wherein the product is soft, deformable product.

7. The method of claim 6, wherein the product is a refrigerated dough.

8. The method of claim 7, wherein the product receiving cavity is completely sealed and the refrigerated dough expands within the package, causing the internal pressure to increase relative to ambient pressure.

9. The method of claim 1, wherein the packaging is performed with a horizontal form, fill and seal assembly.

10. The method of claim 9, further comprising:
forming the product receiving cavity in the first film; and
positioning the second film across the product receiving cavity after loading the product in the product receiving cavity.

11. The method of claim 10, further comprising: thermoforming the product receiving cavity in the first film.

12. The method of claim 1, wherein the package is heated through conduction heating.

13. The method of claim 12, wherein the package is heated by contacting the package with a hot fluid.

14. The method of claim 1, wherein the package is heated through at least one of radiant and convection heating.

15. The method of claim 1, wherein the second film is sealed to the first film while maintaining a vent for the package such that, upon shrinking of the first film, the first film conforms to a shape of the product in the product receiving cavity.

16. A product package comprising:
a product receiving cavity formed, at least in part, from a first, heat shrinkable film;
ap product within the product receiving cavity; and
an indicia containing second, non-heat shrinkable film sealed to the first, heat shrinkable film, thereby retaining the product in the product receiving cavity, wherein the first, heat shrinkable film is shrunk about the product, while the second, non-heat shrinkable film retains the indicia intact.

17. The product package according to claim 16, wherein the product is a soft, deformable product.

18. The product package according to claim 17, wherein the product comprises a refrigerated dough.

19. The product package according to claim 18, wherein the product receiving cavity is completely sealed and the refrigerated dough expands within the package such that the package has an internal pressure greater than ambient pressure.

20. The product package according to claim 16, wherein the package is vented such that the first film is shrunk to conform to a shape of the product in the product receiving cavity.