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METHOD FOR CLING PACKAGING AN OBJECT

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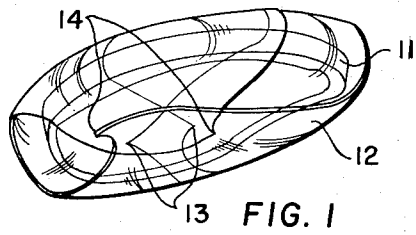


FIG. 1

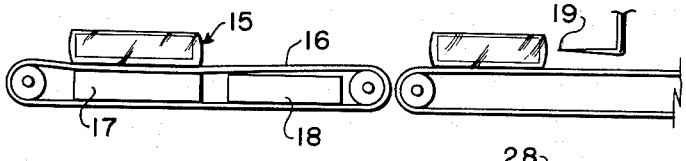


FIG. 2

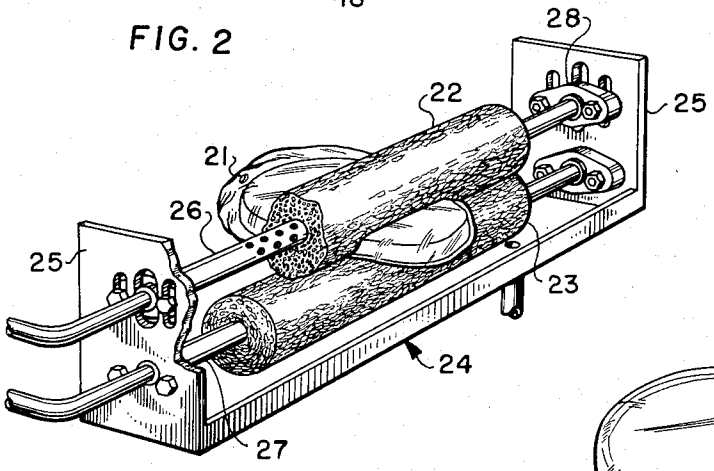


FIG. 3

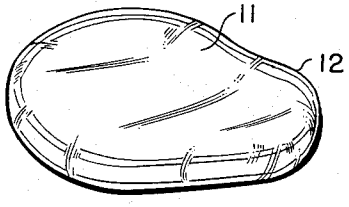


FIG. 4

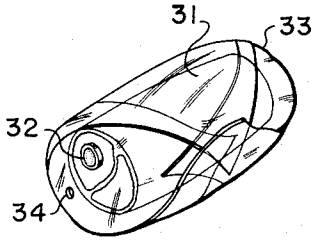


FIG. 5

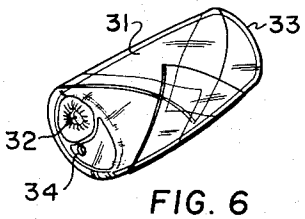


FIG. 6

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3,113,874

METHOD FOR CLING PACKAGING AN OBJECT

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This invention relates to a novel method of packaging and more particularly, to a novel method of packaging fresh meat within heat-shrinkable, organic, thermoplastic film.

Packaging of fresh meat portions in transparent film materials has been a wide-spread and almost instantaneous commercial success. Transparent film materials protect the product from dehydration and soiling and enable the consumer to view the product within the package. A particularly suitable and attractive transparent package is one in which the transparent wrapping material closely conforms to the contours of the object, forming a skin-tight covering, having no air spaces or pockets between the wrapping material and the product.

Such packages have been heretofore produced by employing a vacuum technique in which the object being packaged is placed within a bag of film material and the air evacuated from within the bag by means of a vacuum pump. As the air is withdrawn, the film collapses against and clings tightly to the product. The open end of the film bag is sealed after the air has been withdrawn. By employing a film having shrinkable properties, it is possible to shrink some of the wrinkles out of the collapsed film producing a fairly tight, smooth, skin-like covering.

Some vacuum or "cling" packages while especially attractive are unsatisfactory for a number of reasons. First of all, the vacuum operation is a relatively slow, time-consuming process, requires special equipment and generally requires the use of bags or pouches which are more expensive than ordinary sheet film. In addition, those portions of meat, having an exposed section of bone, are somewhat difficult to package, since in evacuating the air from within the bag, the film material is drawn against the bone, frequently tearing the film thereby destroying the integrity of the package.

When packaging sliced meat, it is usually necessary to provide some sort of backing material to support the soft, flexible material in a level, flat condition. Such backing materials, of course, are an additional expense and also conceal from view a portion of the product.

It is an object of the present invention to provide a method of packaging objects in flexible, heat-shrinkable film. Another object is to provide a method of packaging irregularly shaped objects within flexible film in such a manner that the film clings tightly to the object, and air pockets and spaces are virtually eliminated. A still further object is to provide a cling package without recourse to vacuum pumping. Additional objects include the elimination of the necessity for a support in producing a cling package containing flexible materials, and the reduction of torn packages due to bone punctures.

These and other objects of the present invention will appear more fully in the following specification and claims taken in conjunction with the accompanying drawings in which:

FIGURE 1 is an overhead perspective view of a flat object loosely wrapped within a sheet of transparent, shrinkable film;

FIGURE 2 is a side elevational view illustrating the heat sealing and film puncturing operations;

FIGURE 3 is a perspective view illustrating the shrinking and air removal operation;

FIGURE 4 is a perspective view of the completed package;

FIGURE 5 is a view of a "bone in" cut of meat loosely wrapped in shrinking film; and

FIGURE 6 is a view of the completed package with the meat forced over the exposed edges of bone material.

In the practice of our invention, the objects being packaged are wrapped in a flexible, heat-shrinkable material. Suitable flexible, heat-shrinkable materials are well-known to those skilled in the art and include, but are not limited to, such materials as heat-shrinkable polyolefins, e.g., oriented polypropylene, polyvinyl compounds such as oriented vinylidene chloride copolymers, polyesters, e.g., oriented polyethylene terephthalate and oriented rubber hydrochloride films.

The thickness of the film material may vary with individual requirements but films normally employed in packaging usually range from 0.5 mil to 5 mils in thickness.

Heat-shrinking properties are produced in many thermoplastic, polymeric materials by heating the solid polymer to an elevated temperature, but below the melting point of the material, drawing the heated polymer in opposite directions thereby stretching and orienting the molecules in the polymer, cooling the polymer while under this stretching tension to a temperature at which the polymer will retain its stretched or oriented state when tension is released. In effect, the polymeric molecules are aligned and stretched in the direction or directions in which they are drawn and "frozen" in this new position. The subsequent application of heat to the polymeric material "thaws" the polymer and permits the polymeric molecules to return to their original pre-oriented position or state. It is preferred that the films be oriented in both lateral and longitudinal directions, as this results in a nearly equal shrinkage in all directions.

In the specific examples below, there is employed irradiated, biaxially oriented polyethylene, prepared from Alathon 14 which is a polyethylene having an average molecular weight of 20,000 and a density of 0.916. The polyethylene is irradiated to an extent of about 12 megarad and then biaxially stretched 350 percent longitudinally and 350 percent laterally. The polyethylene film, so irradiated and oriented, has a shrink energy of about 150 pounds per square inch in both directions at 96° C. and has a tensile strength of at least 5000 pounds per square inch at 21° C. Detailed procedures for the preparation of irradiated, oriented polyethylene films are found in the United States patent application No. 713,848, filed February 7, 1958, in the name of Baird et al. (now U.S. Patent 3,022,543) and in United States Patent No. 2,877,500.

Referring now to FIGURE 1 of the drawings, there is illustrated a product 11 which is relatively soft and flexible, e.g., a boneless slice of meat. A square sheet of heat-shrinkable, plastic film 12 is placed over the upper surface of the product. This sheet is so positioned that its sides are oblique to the sides of the product. A first pair 13 of diagonally opposite marginal film corners of the surmounting sheet are brought together and overlapped at the underside of the product. The second pair 14 of diagonally opposite corners of the film sheet are then brought under the product and overlapped. The product is now completely enclosed within a loose wrapping of film.

The overwrapped package, designated generally as 15, is heat-sealed in the following manner. The multi-layer overwrap area (bottom) of the package is placed on a movable belt 16, as shown in FIGURE 2, which is formed of a continuous strip of Teflon (polytetrafluoroethylene). In place of Teflon, other heat-resistant and inert materials can be used. Moderate pressure (preferably less than

one pound per square inch) is applied to the top of the package.

The package is advanced without being displaced with respect to the belt over a hot plate 17 having a temperature of 165° C. The application of pressure to the top of the package over the hot plate speeds up heating and prevents delamination (separation) of the seal due to shrinking. After a short time, preferably about 2 to 5 seconds (3 seconds being employed in the example) the package is moved forward to a position over a cold plate 18 having a temperature of 5° C. The package remains over the cold plate until the sealed area is cooled (about 2 to 5 seconds). After cooling, the sealed package is removed from the belt. The overlapped film areas have been quickly sealed without discoloring the meat.

A small vent hole or opening through which air may escape is made in one end of the sealed package. A sharp point 19, the end of which is heated, is pushed against one of the sides of the package. The point is heated to a temperature above the fusing point of the thermoplastic material and produces a smooth, round, thickened aperture 21.

The shrinking apparatus illustrated in FIGURE 3 serves to shrink the film cover material, to remove air from the package, and to hold the product under sufficient tension so as to prevent curling during the shrinking operation. The shrinking apparatus consists mainly of two resilient, hot water soaked, sponge rolls 22 and 23 which are positioned one above the other. The distance between the rolls is adjustable so as to accommodate packages of different size. The rolls are supported upon a frame 24 having a pair of spaced, parallel, vertical members 25. The sponge rolls are disposed about a pair of supporting foraminous shafts 26 and 27 which shafts are journaled in bearings 28 located on the vertical members. Each shaft is open at one end and closed at the other end. Hot water is fed into the open end of each shaft, passes through the openings in the shafts and permeates through the sponge rolls.

After the overlapped edges of the package have been sealed and the vent made in one end, the package is then fed into the nip of the sponge rolls. The sponge rolls rotating in opposite directions apply pressure to all sides of the package as it passes through the rolls and presses the film into contact with all of the surfaces of the product and also squeezes the air in the package towards the rear of the package and ultimately out through the small opening 21. In feeding the package through the rolls, the end of the package with the vent hole is the last portion to pass through the rolls. The hot water on the rolls shrinks the film and this aids in the removal of air from within the package as the film progressively shrinks back in the direction of the vent hole. Excess film and wrinkles in the film are removed by shrinking. The pressure applied to the packaged product by the sponge rolls restrains the shrinking of the film sufficiently so as to prevent curling or bowing of the package caused by unequal shrinkage of the film over the product surfaces.

The finished package is shown in FIG. 4. The film sheet 12 fits tightly about the product 11 and forms a "second skin." Because of the transparency of the film and the absence of any backing board or tray, the product is completely visible. The close conformity of the film to the product prevents air from entering the package and affords greater protection against film breakage. The resulting package is similar to a vacuum cling package and possesses all the advantages of such a package. In fact, our process is, for all practical purposes, more effective in removing air from within the package than is the vacuumizing process, since in our process the film is forced into direct smooth contact with the meat as contrasted with the rivulets normally formed by the air streams drawn over the surface of the meat in the vacuumizing process.

Our method of packaging is not limited to flat products, but is also suitable for irregularly shaped and bulky products and especially for the so-called "bone in" cuts of meat. By "bone in" cuts, we mean those cuts of meat that have a portion of bone exposed on at least one of the surfaces of the meat. Such cuts are most often produced when a large piece of meat is cut into smaller pieces, and it is necessary to cut through a bone. The edges of the bone are quite rough and often jagged. It has been necessary, heretofore, when packaging such cuts in film material to apply some protective covering over the bone to prevent puncturing of the film. The packaging method of this invention will quickly produce a satisfactory package for "bone in" cuts without the necessity of taking any special precautions.

A "bone in" cut 31, having one exposed bone edge 32, is wrapped in film 33 in the manner indicated above and illustrated in FIGURE 1. The overlapped edges of the film are heat sealed and a vent hole 34 is made in the same side as or close to the edge of the bone in the same manner as disclosed above and illustrated in FIGURE 2.

The packaged product is fed through the heated sponge rolls, shown in FIGURE 3. The bone end of the package is the last portion of the package to pass through the rolls. The film covering is pressed into contact with the product and the air squeezed out of the package as the latter advances through the rolls. In addition, the pressure of the sponge rolls tends to partially reshape the soft meat so that the meat is pushed over or around the edges of the exposed bone. The meat, itself, then serves as a protective cover over the exposed bone surface.

FIGURE 6 illustrates a completed package of a "bone in" cut after passing through the sponge rolls. The film is tightly drawn against the surfaces of the meat. No air spaces or pockets exist between the film and the product.

It is possible to employ film bags and pouches in place of film sheets if this is desired. After loading the product into the pouch, the end of the pouch is sealed and a vent hole made at one end. The pouch is then fed through the sponge rolls as above.

While our invention has been described as being suitable for meat cuts, it is not so limited, but may be used to package other food and non-food products where it is desired to produce a skin-tight covering of flexible plastic material without the expense and effort required to produce a vacuum "cling" package.

While the preferred shrinking medium for use with packages containing meat cuts is hot water, it is also possible to employ other heated liquids or even hot air. The choice of the heating medium will depend upon the type of film used and the product being packaged.

The invention described in detail in the foregoing specification is susceptible to changes an dmodifications as may occur to persons skilled in the art and is not limited to the precise details of construction as shown and described herein. The terminology used in the specification is used for purposes of description and not of limitation, the scope of the invention being defined in the claims.

We claim:

1. Method for packaging an object comprising:
   (*a*) completely enclosing said object within a sealed heat shrinkable, thermoplastic film,
   (*b*) forming a vent hole in the film adjacent one end of the object,
   (*c*) feeding the package, vented end last, between a pair of counter-rotating, hot water soaked, resilient sponge rolls,
   (*d*) and thereby progressively and simultaneously
      (1) applying pressure against all surfaces of the package
      (2) forcing the film into close contact with all surfaces of the object

(3) forcing air out of the package through the vent hole and,

(4) shrinking the film into a tight-fitting, substantially wrinkle-free protective covering about the object.

2. A method of packaging according to claim 1, wherein said object is a relatively flat slice of fresh meat.

3. A method of packaging according to claim 1 wherein said object is a bone in cut of fresh meat and wherein the meat is forced over the exposed edges of bone.

References Cited in the file of this patent

UNITED STATES PATENTS

2,538,025	Moore et al.	Jan. 16, 1951
2,876,112	Vail	Mar. 3, 1959
2,888,788	Gebhardt	June 2, 1959
2,906,627	Payton et al.	Sept. 29, 1959
2,919,990	Podlesak et al.	Jan. 5, 1960
2,966.414	Foster	Dec. 27, 1960