

June 4, 1963

J. W. HARRISON ET AL
PACKAGE

3,092,246

Filed March 28, 1960

2 Sheets-Sheet 1

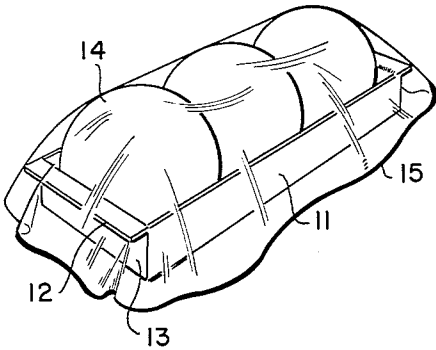


FIG. 1.

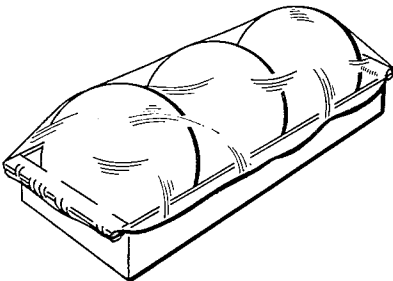


FIG. 2.

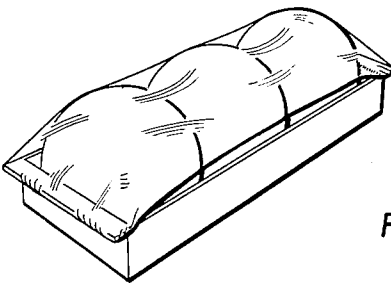


FIG. 3.

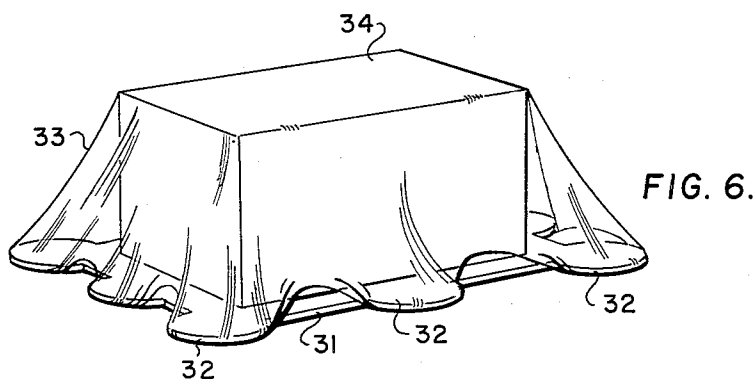
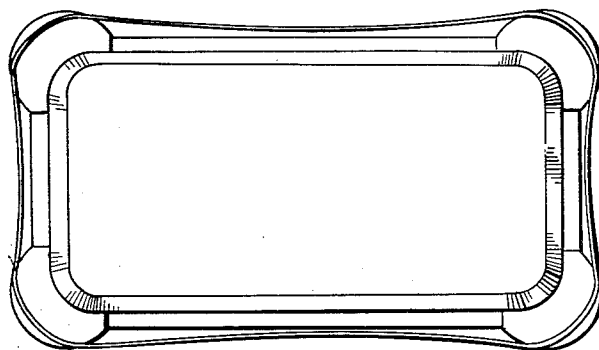
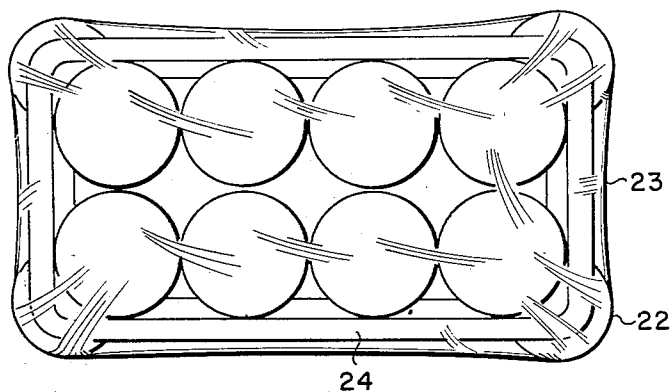
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2 Sheets-Sheet 2



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PACKAGE

John W. Harrison and Robert D. Lowry, Winchester, Mass., assignors to W. R. Grace & Co., Cambridge, Mass., a corporation of Connecticut
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4 Claims. (Cl. 206—45.33)

This invention relates to a novel method of packaging and to the packages resulting therefrom. More particularly, the invention relates to improvements in covering the open faces of trays or containers containing horticultural products with a tough, transparent film material.

Previously it has been known to package goods, particularly fresh produce, in trays or containers and to completely overwrap the goods within the container with a sheet of film. The film edges are usually folded across the bottom of the container and are secured either by means of tapes, glue or by heat sealing the ends of the film together. This requires much more material for the cover sheet than is necessary in the present invention. In addition, it detracts from the appearance of the package, as it introduces an unsightly excess of cover sheet material which must be bunched or folded beneath the container. The folding of the extra material is an awkward and time consuming step. Furthermore, when fresh fruits and vegetables are completely wrapped in a transparent film, it is necessary that the film or container be perforated to permit air to pass into the package, otherwise the contents will soon spoil.

Therefore, it is an object of the present invention to provide a neat and attractive protective transparent cover over the open face of a tray or container.

Another object is to reduce the amount of film material required in the package.

Yet another object is to provide a package which is suitable for horticultural products.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter. It should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various modifications within the scope of the invention will become apparent to those skilled in the art from the detailed description.

Referring to the drawings:

FIGURE 1 is a perspective view of a container or tray containing produce and covered with a sheet of transparent, heat shrinkable polyethylene film.

FIGURE 2 is a perspective view of the container after the film has been shrunk at both ends and at the four corners of the container.

FIGURE 3 is a perspective view of the completed package after the top and sides of the film have been shrunk.

FIGURE 4 is a top view of a modified container covered with a sheet of film which is shrunk under each of the four corners.

FIGURE 5 is a bottom view of the container in FIGURE 4.

FIGURE 6 is a perspective view of a rigid backing board with spaced projections and having film shrunk under the projections.

In the examples shown below there was employed heat shrinkable, irradiated, biaxially oriented polyethylene, specifically Alathon 14, molecular weight 20,000, density 0.916 and having a melt index of 1.8 which has been irradiated to an extent of about 12 megarads and then biaxially stretched 350% in both a lateral and longitudinal direction. The irradiated biaxially oriented polyethylene

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had a shrink energy of about 150 p.s.i. in both directions at 96° C.

Container 11 shown in FIGURE 1 is a relatively shallow fiber tray of the type commonly used in food packaging. The two short sidewalls or ends 13 of the tray have lip-like projections 12 at their upper edges. Inside the container are placed the articles 14 to be packaged, in this case apples.

The cover sheet 15 is formed of polyethylene film which has been irradiated and biaxially oriented. The film is transparent and is approximately 1 mil in thickness. The area of the cover sheet is somewhat larger than the area defined by the side walls of the container. The film should extend 1 inch beyond either of the long sides and 1½ inches beyond the short sides or ends of the container.

The film is placed over the produce in the container and the excess film at each end of the tray is pinched against or held against the lip-like projections of the container by any suitable holding means. Heat is applied to the excess film below the lip of the container and to the film at the four corners of the tray. The film shrinks tightly under the lip and against the four corners as is shown in FIGURE 2. The cover sheet is now locked to the container. Heat is applied to the top of the cover sheet to remove any wrinkles in the film and to tighten the package and also to shrink the free edges of the film above the long sides of the tray as shown in FIGURE 3. This package holds the product tightly within the container, permits easy viewing of the contents and also allows air to enter the package through the opening between the edge of the film and the long sides of the tray.

The source of heat employed to shrink the film is a hot air blower which has a gas temperature of 500° F. Other temperatures can be employed provided they are high enough to shrink the film. Other heat sources such as heated metal surfaces can be utilized to shrink the film.

Trays or containers may be made of pressed fiber, compressed pulp, aluminum and plastic materials which have sufficient rigidity and dimensional stability to serve as containers. The term container as used herein refers to such articles as are known in the art by that name and also specifically includes rigid, flat supporting structures such as backing boards.

Packages produced according to this invention are especially suitable for products which require some ventilation to achieve a normal or satisfactory shelf life. Fruits such as oranges, pears and apples and vegetables such as potatoes, onions and mushrooms are only some of the more obvious examples. Products not requiring ventilation can also be packaged according to this invention.

Included within the scope of this invention are variations in design or shape of the container, particularly those which would result in an improvement in the holding power of the film at the corners of the package.

One such variation in the shape of a container which improves the holding power of the film at the corners is that shown in FIGURE 4 wherein a substantially rectangular shallow container 21 has at each of its four corners a rounded flat projection 22 which protrudes horizontally from the container. These projections are sufficiently rigid so that they will not deform under the strain of the shrinking film.

A sheet of irradiated, biaxially oriented film 23 is placed over the container and the film is heat shrunk under the rounded projections of the container. The film as a result of the shrinking is tightly drawn under the projections of the container and is firmly locked to the container. A further application of heat to the top of the sheet will remove any wrinkles in the film and tighten the package. This package allows ventilation of the contents without the need of applying such a quantity of heat

as to shrink the film edges above the sides of the tray. Air can move freely into the package through the gaps between the edge of the film and the container side walls. The gaps occur because the edge of the film is held a distance away from the side walls by the rounded projections at each of the four corners. The film edges between the projections may be shrunk upwards to provide more ventilation.

Another variation in the overall shape of the container that will further improve the holding power of the film is the placing of multiple projections spaced at regular intervals along the edges of the container. In place of a shallow tray, one may employ flat rigid backing boards. FIGURE 6 discloses a package which comprises a flat backing board 31 having projections 32 spaced regularly about the edges of the board and having a sheet of irradiated, biaxially oriented polyethylene film 33 drawn over the object 34 being packaged and heat shrunk under the projections so as to lock the film securely to the backing board. The remainder of the film is heat shrunk to remove wrinkles and form a tight package.

The projections under which the film is shrunk may have any shape, e.g. semi-circular, rectangular or any combination of shapes. The only requirement is that the projection be large enough so that the film may be shrunk and locked thereunder and strong enough so as not to deform under the strain of the shrinking film.

Packages produced according to this invention require considerably less cover material than is required in the conventional overwrap package. The cover wrapping is easily applied and does not require any folding, heat sealing, or tying operations. Packages so produced inherently permit ventilation of the contents.

Film materials suitable for use in the present invention are solid polymers of olefins having 2 to 3 carbon atoms, i.e., polyethylene and polypropylene which polymers have been biaxially or monoaxially oriented.

More specifically, there is employed in the invention polyethylene film or tubing which has been irradiated to an extent of 2 to 100 megarads, preferably 6 to 20 megarads. The irradiation can be accomplished in conventional fashion, e.g., by the use of a high voltage resonant transformer such as the 2,000,000 volt General Electric resonant transformer, or high energy particle generators of 50,000 to 50,000,000 volts or a Van de Graaf electron generator. In addition to the use of electrons for irradiating the polyethylene, there can be employed beta and gamma rays. There can be employed any of the irradiation procedures disclosed in Baird et al. application Serial No. 713,848, filed February 7, 1958 (now U.S. Patent 3,022,543) or Rainer Patent 2,877,500. The disclosures of the Baird et al. application and the Rainer patent are hereby incorporated by reference.

Orientation of the film may be accomplished by monoaxial or biaxial stretching. Such film may be stretched 100% to 700% longitudinally and 100% to 900% laterally. The biaxial stretching can be carried out by blowing the irradiated polyethylene tubing as disclosed in the Baird et al. application.

The biaxially oriented polyethylene prepared by such a procedure has a high shrink energy, e.g. 100 to 500 p.s.i. at 96° C.

There can be employed as a starting polyethylene for the irradiation procedure high, medium, or low density polyethylene prepared by high or low pressure techniques. The starting polyethylene can have a molecular weight of 7,000; 9,000; 12,000; 19,000; 21,000; or 35,000 or even higher.

In place of irradiated polyethylene there can be employed irradiated or non-irradiated polypropylene. The polyethylene or polypropylene in either case must be monoaxially or biaxially oriented.

Another suitable film material is heat shrinkable polyvinyl chloride.

The invention described in detail is susceptible to changes and modifications both as to method and resulting articles without departing from the principle and spirit thereof.

What we claim as new and desire to secure by Letters Patent is:

1. A package which comprises a product to be packaged, rigid means to support said product, said means having a plurality of separate, spaced projections extending laterally from said means, a cover sheet of heat shrinkable film material covering said product and having its edges tightly shrunk under said projections locking said cover sheet about said projections, and having its top portion shrunk to form a tight, wrinkle-free package.

2. A packaged product which comprises a container having a bottom wall, a pair of opposed, upwardly extending end walls having at the upper edge thereof an outwardly projecting flange, a pair of opposed, upwardly extending unflanged side walls, a product supported therein and a cover sheet of heat shrinkable material having an area large enough to cover the product and to extend beyond the upper edges of the container walls, said cover sheet having its outer edges shrunk firmly against the four corners of said container and under the said projecting flanges, said cover sheet having its free edges shrunk back and above the side walls of the container.

3. A packaged product which comprises a rectangular container having a bottom wall, upwardly extending side walls and having separate, spaced rounded projections extending outwardly and horizontally from the top of said side walls at the four corners of the container, a product supported therein and having a cover sheet of heat shrinkable film, which film covers the product and the edges of which are shrunk under the four projections tightly locking the film to the container.

4. A package which comprises a rigid flat backing board having a plurality of outwardly extending lateral projections spaced at intervals about the edge of said backing board, a product supported on said backing board, a cover sheet of heat shrinkable material having its edges shrunk under the projections and having its top portion shrunk to tighten the package and to remove wrinkles from the cover sheet.

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