

1

3,343,331

METHOD FOR CLING PACKAGING AN OBJECT

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No Drawing. Filed Apr. 30, 1964, Ser. No. 364,034

12 Claims. (Cl. 53--22)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to a novel method of packaging and more particularly, it relates to a novel method for cling packaging an object within a plastic film or coating.

In the packaging industry it is often desirable that a film fit snugly around the object being packaged. This is particularly desirable in the packaging of perishable foods where oxygen is undesirable and of small items such as pills, nuts, bolts, etc. wherein a particularly suitable and attractive package is one in which a 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 object.

In the past this result has generally been accomplished either by the use of pre-stretched films which are used as coverings and then shrunk by the application of heat or by the use of vacuum-forming techniques in which the air is evacuated from within the film material placed about the object being packaged by means of a vacuum pump, causing the film to collapse tightly around the object inside. There are, however, some materials which may not be heated and a number of techniques of packaging to which vacuum collapsing is not applicable.

Therefore, it is an object of the present invention to provide a new and improved method of packaging irregularly shaped objects within a flexible film in such a manner that the film clings tightly to the object, and air pockets and spaces are virtually eliminated.

Another more specific object of the present invention is to provide a novel method for cling packaging an object within a plastic film or coating without applying heat to the package.

Still another object of the present invention is to provide a novel method for cling packaging an object within a plastic film or coating without recourse to vacuum pumping.

Yet another object of this invention is to provide a novel method of packaging which utilizes the differential gas transmission characteristics of a plastic film or coating for collapsing the film tightly around an object.

The exact nature of the present invention as well as other objects and advantages thereof will be readily apparent to one skilled in the art from consideration of the following detailed description of the invention.

Generally, the present invention consists simply of performing the packaging operation in an atmosphere of a gas which diffuses more rapidly through the film used as the coating than does the surrounding atmosphere. More specifically, the present invention contemplates packaging the object in the presence of a suitable gas in a wrapping material having desirable differential gas transmission characteristics, that is, the wrapper should be highly permeable to the gas selected and relatively impermeable to oxygen and nitrogen. Thus when the package is removed from the gaseous environment of the packaging operation, the gas inside the film will diffuse out more rapidly than air or other gases can diffuse in, with the result that the film collapses tightly around the object inside.

A wrapper comprising two layers of polyvinylidene chlo-

2

ride film (Saran Wrap) using an adhesive made from chlorinated polypropylene and chlorinated paraffin has been found to have the desired properties, using helium as the gas inside the package. For example, to more clearly illustrate the effectiveness of the packaging operation in accordance with the teachings of this invention, tests were run in which aspirin tablets were laminated between two layers of polyvinylidene chloride film, wherein half of the pills were laminated in air and half were laminated with a current or jet of helium released between the films as the top film was being lowered onto the bottom film. In this manner the gas entrapped around the pills was air in some cases and helium in other cases. After six hours the entrapped helium had diffused through the film and the pills packaged with the helium were tightly enclosed whereas the other pills laminated under air were still loose.

In actual fact the pressure of the atmosphere on the collapsed package so reduces the free space in the package that in the absence of forces tending to restore the original configuration of the package, little space remains which oxygen can occupy. Consequently, there is no refill of air observed in such packages even in months time.

Obviously other films in combination with other selected gases may be employed in packaging the object in accordance with the process of this invention, the only requirement being that the rate of diffusion through the polymer film of the gas selected must be appreciably greater than the rate of diffusion of air through the film so that the collapsing of the package will occur in 24 hours or less. Helium has proved suitable in a number of cases, but other gases such as carbon dioxide or hydrogen might also be suitable.

The following tables show the premeability of various polymer films to a few gases. It may easily be seen that in most cases the permeability of the films to carbon dioxide and helium is much greater than oxygen or nitrogen.

TABLE I

Polymer Film	Gas Permeability*		
	Oxygen	Nitrogen	Helium
Polyvinylidene Chloride.....	.09	.01	4.6
Polychlorotrifluoroethylene.....	.57	.15	105.0
Polypropylene.....	14.00	-----	98.0

TABLE II

	Gas Permeability*		
	Oxygen	Nitrogen	Carbon Dioxide
Polyethylene Terephthalate.....	.25	.05	1.53
Polyethylene, low density.....	57	22	280
Polyethylene, high density.....	16	3.3	43
Polypropylene, oriented.....	9.6	1.2	32.5
Polychlorotrifluoroethylene.....	.57	.15	1.4
Polyvinylidene Chloride.....	.09	.01	.30

* Gas Permeability: MI Gas (S.T.P.) per cm.² per sec. per mm. per cm. Hg pressure $\times 10^{10}$ at 23° to 30° C.

Still other films contemplated for use in this process are regenerated cellulose ("cellophane"), cellulose acetate, and ethyl cellulose.

It should be readily apparent from the foregoing description that a new and improved method for packaging an object within a plastic film or coating has been provided. The principal advantages of the invention lie in the fact that tightly fitting snug packages free of undesirable contaminating gases may now be made by plastic film sealing in the absence of heat, steam or vacuum.

Obviously, many modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof, and therefore, only such limitations should be imposed as are indicated in the appended claims.

What is claimed is:

1. A method for cling packaging a rigid object having a fixed shape with a polymer film whereby a skin tight covering having essentially no spaces or pockets between the wrapping material and said object is obtained comprising:

- (a) placing said object in an atmosphere of a gas having a greater rate of diffusion through said film than does oxygen or nitrogen,
- (b) encapsulating said object with said polymer film and sealing said object while within said atmosphere so as to entrap a quantity of gas along with said object,
- (c) removing the package so formed from said gaseous atmosphere into a normal air atmosphere, and
- (d) allowing the entrapped gas to diffuse through the polymer film at a rate which causes the film to collapse tightly around the said enclosed object within 24 hours, whereby said tightly clinging wrapper closely conforms to the shapes and contours of said enclosed object.

2. A method for packaging according to claim 1 wherein said film is polyvinylidene chloride.

3. A method for packaging according to claim 1 wherein said film is polychlorotrifluoroethylene.

4. A method for packaging according to claim 1 wherein said film is polypropylene.

5. A method for packaging according to claim 1 wherein said film is polyethylene terephthalate.

5 6. A method for packaging according to claim 1 wherein said film is polyethylene.

7. A method for packaging according to claim 1 wherein said gas is helium.

8. A method for packaging according to claim 1 wherein said gas is carbon dioxide.

10 9. A method for packaging according to claim 1 wherein said gas is hydrogen.

10. A method for packaging according to claim 1 wherein said film is regenerated cellulose ("cellophane").

15 11. A method for packaging according to claim 1 wherein said film is cellulose acetate.

12. A method for packaging according to claim 1 wherein said film is ethyl cellulose.

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