United States Patent

Shelton

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[54] PACKAGE FOR HIGHLY VISCOUS TACKY MATERIALS

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[73] Assignee: **Esso Research and Engineering Company**

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[52] **U.S. Cl.**.....**220/63**, 150/50, 206/84

[51] **Int. Cl.**.....**B65d 25/14**

[58] **Field of Search**.....220/63; 150/50; 206/84

[56] **References Cited**

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[57] **ABSTRACT**

A packaging container for highly viscous low molecular weight tacky polymers comprising a container having at least one removable end and a removable polymeric liner coated with a release agent.

9 Claims, 3 Drawing Figures

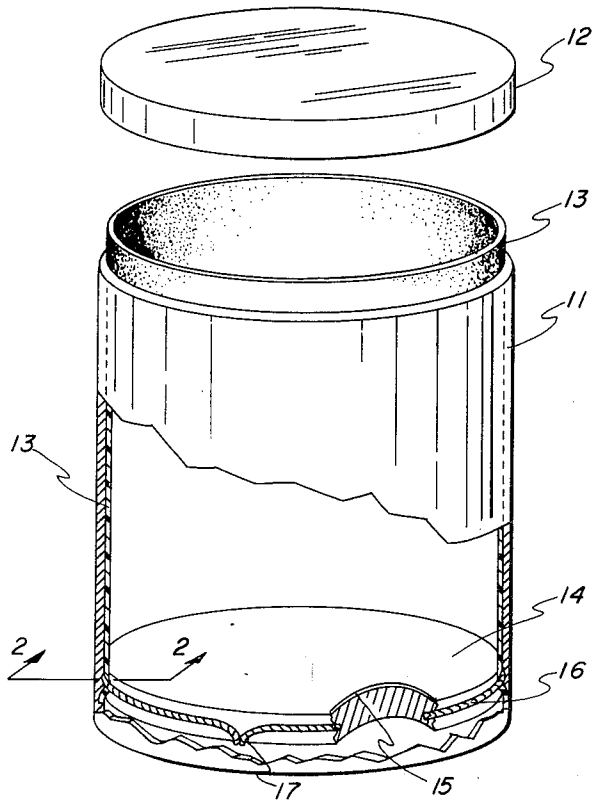
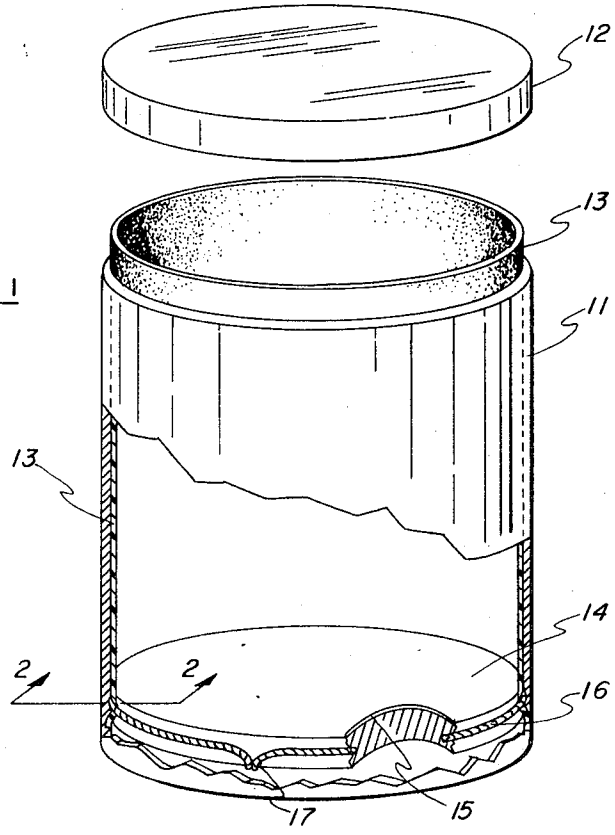


FIGURE 1



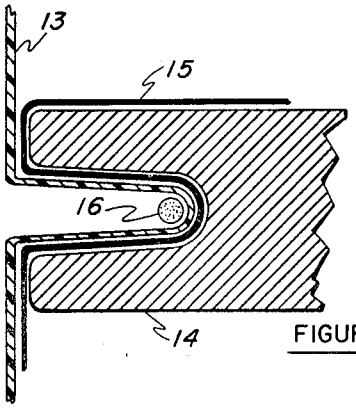


FIGURE 2

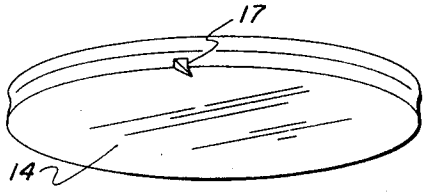


FIGURE 3

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PACKAGE FOR HIGHLY VISCOUS TACKY MATERIALS

BACKGROUND OF THE INVENTION

Most highly viscous tacky polymers such as low molecular weight polyisobutylene are mixed and packaged "hot," e.g., greater than 250° F., so that the material will flow to some extent or at least be pourable. Containers for these types of materials must be able to withstand the hot packaging temperatures of approximately 200° to 400° F. and at the same time permit the contents to be readily removed for final use.

These materials are presently packaged in expensive metal containers which are of much lighter weight than is desired for product protection and durability since the container must be peeled from the product in use. These containers are generally coated with a release coat which must be manually applied after the can is manufactured and is therefore generally of poor quality.

SUMMARY OF INVENTION

It has now been found that low molecular weight tacky polymers may be readily removed from their containers by providing the container with a removable release agent-coated inner liner having a readily detachable bottom member.

BRIEF DESCRIPTION OF DRAWING

The various objectives and features of the invention will be fully understood by reference to the accompanying drawings, which show a preferred embodiment thereof:

FIG. 1 is a perspective view of the packaging container constructed in accordance with the teachings of the present invention.

FIG. 2 is a vertical cross-sectional view of the securing means taken substantially along the line 2—2 of FIG. 1.

FIG. 3 is a perspective view of the bottom member of the inner liner showing the securing slit for the cord.

THE INVENTION

It has now been discovered that it is possible to prepare an improved packaging container which when used for highly viscous low molecular weight tacky polymers affords much greater product protection, is more durable, results in practically no loss of product by attachment to the container or by leakage, and yet allows removal of its contents within shorter times and with much greater facility than had previously been possible.

The container of this invention is suitable for use for such tacky polymers as polyisobutylene having a Staudinger molecular weight of 8,000 to 12,000, polybutenes having Staudinger molecular weights of about 3,000 to 6,000, low molecular weight butyl rubbers and halogenated butyl rubbers and like compounds which are normally not pourable at room temperature, but exhibit cold flow at room temperature and are sufficiently tacky to be removed from conventional containers only with difficulty.

The packaging container comprises a container body supplied with an inserted inner liner substantially longer than said container body, said liner having attached to it a readily removable bottom member. By the term "container body" is meant any suitable container having vertical side walls and at least one end which can be removed or opened. The container may be in any conventional shape, i.e., cylindrical, box, etc. However, the cylindrical shape is preferred because of stress factors. Illustrative of the container materials which may be used are fiberboard, corrugated boxes, metal drums and the like.

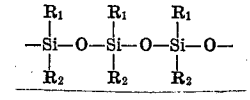
The inner liner may be any suitable material capable of withstanding hot packaging conditions without becoming embrittled or being subject to degradation or any substantial softening, i.e., softening to the point of adhering to the polymer being packaged. Various polymeric films have been found to be useful for this purpose. Typical of the types of film which may be used are polyester films and heat stabilized nylon.

Preferably, the polymeric film has a thickness of about 0.5 to about 5 mils; more preferably, about 1 to about 3 mils.

A particularly suitable polyester film is the reaction product of ethylene glycol and terephthalic acid which is known to the trade by the duPont trademark "Mylar."

Heat stabilized nylons are well known and are prepared by specially heat treating a nylon film. Particularly preferred are the nylons prepared from a C_6 monomer, i.e., "nylon 6." Illustrative of such heat stabilized nylon films is Allied Chemical's Capran 80, which has the following physical properties: at 72° F., tensile strength of 10,000–14,000 p.s.i., yield strength of 5,000–8,000 p.s.i., tear strength of 70–100 g., elongation of 400–600 percent, negligible solubility in water, crystalline melting point of 424°–428° F.; at 300° F., tensile strength of 6,000–7,000 p.s.i., yield strength of 2,500–2,700 p.s.i., and elongation of 400–500 percent.

In order that the polymeric films release properly from the packaged polymer, it is necessary to coat the film with a release agent. Various release agents may be used in the practice of this invention. Preferably, the release agents are silicone fluids having a viscosity of about 10 to about 30,000 centistokes at 77° F., preferably about 50 to about 1,000 centistokes, most preferably about 100 to about 500 centistokes. The materials are well known to the art, having carbon to silicon linkages such as disclosed in U.S. Pat. Nos. 2,448,756; 2,484,595 and 2,541,137 **incorporated herein by** 2,541,137, These polymers have the general structure:



wherein R_1 and R_2 are selected independently from methyl and hydrogen wherein either R_1 or R_2 is methyl and the other is methyl or hydrogen. Where both R_1 and R_2 are methyl, the fluids are known as dimethyl silicones or dimethyl siloxanes. The hydrogen attached to the silicon is termed a silanic hydrogen.

The silicone fluids of this invention may, if desired, be cured after application to the polymeric film. The fluids may be applied as the neat oil or from a solvent solution. The solvent may be C_6–C_8 alkanes such as hexane, heptane or 2-ethyl hexane, C_6 to C_8 aromatics such as benzene, toluene or xylene or any of the well-known chlorinated solvents such as methylene chloride or chlorobenzene. Generally, the silicone fluid is present in the solvent at about 30 wt. %.

Where either R_1 or R_2 of the silicone fluid is hydrogen, that is a methyl silicone having silanic hydrogens, the fluid is moisture curable below 50° C. in the presence of a catalyst such as dibutyl tin dilaurate, or dibutyl tin di-2-ethyl hexoate. High temperature cures are accomplished in the presence of catalysts such as zinc octoate.

Where both R_1 and R_2 are methyl, the fluid may be moisture cured by the addition of a silanol and a catalyst such as an organic titanate, e.g., tetraisobutyl titanate and tetra-2-ethylhexyl titanate.

The dimethyl silicones are also available as hydroxy terminated polymers which may be cured in the presence of organic titanates without the addition of silanols to the polymer.

Illustrative of the dimethyl silicones are Union Carbide and Carbon's L–45 series fluids and General Electric Company's SF 96 series fluids, both products being available in a wide range of viscosities up to about 100,000 cs. at 77° F. Illustrative of silicone fluids having silanic hydrogens are Union Carbide and Carbon's L–31, a silicone fluid having a viscosity of about 35 cs. at 77° F. and Y–4006 fluids and Dow Corning's Dow Corning 23 silicone fluid. The Y–4006 and Dow Corning 23 fluids are supplied at 30 wt. % neat oil in xylene. Illustrative of the hydroxy terminated dimethyl silicones are Union Carbide and Carbon's W–900 and Y–1480.

It has been found that the thickness of the release agent coating is not critical. However, it is essential that the coating

be continuous. For example, a continuous coating whose thickness is in the angstrom range will suffice, whereas a discontinuous coating of several mils will not release properly.

Though many coated release papers are available on the market, such as silicone coated glassine, silicone coated parchment and silicone coated latex treated stock, and are effective as release surfaces, they are not generally suited for use in the practice of this invention since they become excessively embrittled by the heat history of hot packaging and can be removed only in small pieces.

Surprisingly, it has been found that cellophane is a satisfactory release surface for the purpose of this invention. It is not embrittled by packaging heat history and may be removed from the packaged polymer without the aid of a release agent.

The cellophane may be removed from the packaged polymer by wetting with water. The water breaks the bond between the polymer and the cellophane, and the cellophane, having sufficient cohesive strength, is removed in one piece. Preferably, the cellophane film is about 0.5 to about 5 mils in thickness, more preferably about 1 to about 3 mils.

The term "cellophane" as used in this specification and claims means films produced from wood pulp by the viscose press, known in the trade as "uncoated type" cellophanes.

Illustrative of suitable cellophane films are the cellophanes known to the trade as type PD, type PUD and type PUD-O cellophanes which are available from E. I. duPont de Nemours and Co.

Although other release papers have been found to be not generally suitable for use in the practice of this invention, it has surprisingly been found that clay coated kraft paper having a basic weight of at least about 30 lbs. per 1,000 ft.^{2}, and preferably at least about 50 lbs. per 1,000 ft.^{2}, coated with a previously discussed silicone release agent, is a suitable release surface for the purpose of this invention.

Further, kraft paper having the same basic weight requirements as above, if coated with finely divided mica, is also a suitable release surface. The finely divided mica should have a platelet shape with a thickness of about 20 to about 200 angstroms and about 100 times thickness in diameter. Preferably, the mica is a synthetic mica. Synthetic mica is a fluorine derivative of phlogopite made by treating potassium fluorosilicates with alumina under pressure and heat or by melting basic oxides, fluorides and feldspar together.

Illustrative of the synthetic mica coatings which may be used is a product known in the trade by the Minnesota Mining & Manufacturing Co. trademark "Burnil" Brand Microplates. "Burnil" Brand Microplates are extremely thin platelets of synthetic mica. The average particle size is about 20–100 angstroms in thickness and about 100 times thickness in diameter. The platelets have a melting point of 1,800° F., a density of 2.7 g./cc. and a refractive index of 1.5.

The readily removable bottom member, which in the case of a cylindrical container would be a disc, is constructed so as to have a peripheral groove, as best illustrated in FIG. 2. One simple method of constructing this bottom member is by lamination of two equally shaped pieces of fiberboard in such a fashion that some 1 ½ inches of the periphery remains unglued. Other similar techniques (e.g., stapling) are equally applicable.

This member has its upper side, i.e., the side which will be exposed to the substance to be packed, covered with a sheet of the same material treated in the same fashion as that used for the inner liner. This sheet extends beyond the periphery of the member and is positioned so as to overlap the peripheral groove. The bottom member is then inserted within the inner liner and the sheet and liner secured within the peripheral groove so as to form a receptacle or bag sealed at one end.

Securing the liner and bottom may be accomplished by any suitable means; however, the preferable method involves wrapping a cord around the exterior of the liner and tightening so as to draw both the liner and the covering sheet into the groove of the bottom member. The ends of the cord can then be secured in a slit placed in the lower edge of the bottom member (as shown in FIG. 3), thereby allowing ready removal of both the cord and bottom member when desired. The slit should be approximately equal to the thickness of the cord to insure the cord being held in place.

The cord should be one capable of withstanding the relatively high temperatures of the substance to be packed without losing its effectiveness. For polymeric materials this would mean having a melting point above this temperature. Some examples of cords useful in this invention are monofilament and braided heavy gauge nylon, polyester, and soft metal wire.

In the preferred embodiment of this invention as shown in the drawings, the packaging container comprises a cylindrically shaped body **11** having a removable end **12** the interior of which is coated with a silicone release agent, and being equipped with an inner liner of heat stabilized nylon **13** continuously coated with the silicone release agent and extending beyond the container body some 3 or 4 inches, a disc with a peripheral groove inserted in said inner liner **14**, said disc having its upper surface covered with a sheet of the coated nylon which extends beyond the disc and overlaps the peripheral crevice **15**, and a nylon cord **16** wrapped around the exterior of the liner and tightened to pull both liner and sheet into the peripheral groove. The cord is then secured in a slit **17** in the lower edge of the disc. The container is then filled with the polymer, the extending portion of the inner liner folded over the container body, and the removable end put in place and sealed by means of tape, plastic or metal straps, and the like.

While the foregoing description and accompanying drawings illustrate a preferred manner of employing this invention, many different embodiments may be made without departing from the spirit and scope thereof and it is to be understood that the present invention is not limited to the specifically disclosed examples thereof.

What is claimed is:

1. A packaging container which comprises:

a. a tubular container body having at least one removable end closure, the interior of said end closure being continuously coated with a release agent;

b. a liner disposed in and substantially longer than said container body, said liner being composed of a material capable of remaining nonembrittled, nondegraded and substantially unsoftened at temperatures equal to those of any substance to be packaged in said container, which material has been continuously coated with a release agent;

c. a removable bottom member inserted within said liner, said member having a peripheral radially outwardly opening groove and having disposed on its upper side and overlying said peripheral groove a sheet of the material set forth in (b), said sheet also being coated with said release agent; and

d. means for securing said liner and said sheet in the peripheral groove so as to form a receptacle sealed at one end.

2. The packaging container of claim **1** wherein said material is selected from the group consisting of a heat stabilized nylon an ethylene glycol-terephthalic acid polyester, and a clay coated kraft paper.

3. The packaging container of claim **1** wherein said securing means is a polymeric cord having a melting point above the temperature of any substance to be packaged in said container.

4. The packaging container of claim **1** wherein said container is cylindrical.

5. The packaging container of claim **1** wherein said release agent is a silicone release agent.

6. The packaging container of claim **5** wherein said silicone release agent is selected from the group consisting of dimethyl silicones, methyl silicones containing silanic hydrogens, and hydroxy dimethyl silicones.

7. The packaging container of claim **5** wherein said silicone release agent has a viscosity at 77° F. of from 10 to 30,000 cs.

8. The packaging container of claim 5 wherein said silicone release agent has a viscosity at 77° F. of from 50 to 1,000 cs.

9. The packaging container of claim 5 wherein said silicone release agent has a viscosity at 77° F. of from 100 to 500 cs.

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