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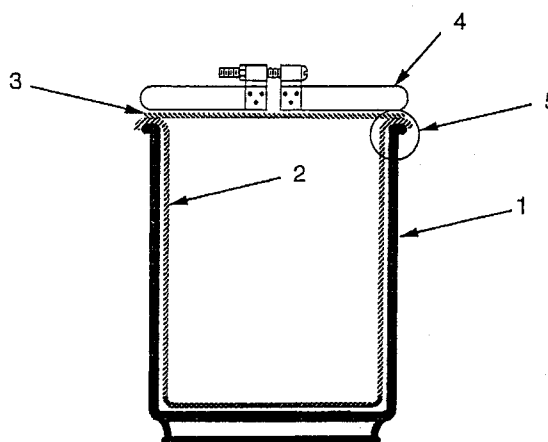
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54 **Liner packaging for reactive hot melt adhesive.**

57 An improved moisture proof package suitable for shipping, storing and dispensing moisture curable hot melt adhesive comprising a primary container (2) formed from a rigid plastic material into which the molted adhesive is poured; the primary container being positioned within a secondary container (1), the secondary container (1) being of substantially the same size and configuration as the primary container (2); the open surface of the primary container (2) being completely sealed with a flexible moisture barrier film (3); and a lid (4) completely covering the exposed surface of the secondary container (1), forming a seal around the periphery thereof.

Figure 1



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Moisture curing hot melt adhesives, particularly isocyanate containing adhesives, have been used in laminate construction, automobile construction, appliance construction, etc., in bonding such materials as woods, plastics, metals, composites, paper, paper board, film, etc. The major benefit of the use of isocyanate containing hot melt adhesives is the mechanical strength and thermal stability of the cured adhesive bond.

A large number types of isocyanate containing hot melt adhesives are known. Such adhesives can either contain free isocyanate compounds or can contain isocyanate compound bonded in preformed materials such as isocyanate terminated pre-polymers. The most convenient adhesives of such are moisture curing one part isocyanate compounds, which when applied to a work piece, react with water from the atmosphere or humidity created in the atmosphere in the vicinity of the bond line to initiate curing.

Since these moisture curable compositions are cured by reaction with moisture, it is highly desirable to restrict and preferably avoid exposure of these compositions to moisture prior to use, so as to avoid premature curing of the adhesive and also to ensure a required uniformity of performance of the composition when used. It is therefore desirable to package and store the composition in a moisture proof/resistent package.

Not only should the container be moisture proof/resistent, it must also be readily adaptable for use with the automatic dispensing systems utilized in commercial manufacturing operations.

In the dispensing and application of molten hot melt adhesive to the site of intended use, the adhesive is commonly heated to an elevated temperature sufficient to cause the adhesive to melt and to attain a viscosity compatible with dispensing using common hot melt dispensing equipment. Most commonly, hot melt isocyanate containing adhesives are used with moveable platens heated to temperatures of at least about 150 °F, usually about 250 °F, that dispense the adhesive from cylindrical containers directly from the containers in which they are shipped. These containers are most commonly one gallon tubes, five gallon pails, ten gallon fiber board containers, fifty-five gallon drums, etc. This dispensing equipment consists of an apparatus which extrudes the adhesive from the pail. A heated platen, configured to take the shape of the adhesive container, contacts the adhesive in the pail and pumps the adhesive to the dispensing equipment.

More specifically, the heated platens are mounted in a frame and are vertically positioned above a support for the cylindrical adhesive container. The platen is then mechanically lowered onto the surface of the hot melt adhesive held within the con-

tainer. The adhesive is heated, melted and then the platen is mechanically driven through the adhesive as it melts. The molten adhesive is withdrawn from the container through a hose or other heated conduit and is generally pumped mechanically to a dispensing nozzle or orifice that is commonly valved to permit the unit to be controlled with intermittent application of the molten adhesive to a bond or use site. Current manufacturers of heated platen type isocyanate dispensing equipment are Nordson, model number 506, and Mercer, model number 1030 HS. Dispensing equipment is also described, for example, in U.S. Patent Nos. 4,898,302; 5,143,255 and 4,586,636.

Heretofore, moisture curing hot melt adhesives have been packed in a cylindrical container body commonly having an open end covered by a lid or other sealing means. The lid is commonly press-fit or frictionally attached to the open end of the container. The lid fits over the open end and extends down the container body to form a seal. The lid commonly uses the same cross-sectional shape as the container body to insure a seal and to protect the adhesive from the environment. The lid can also contain means for fixing the lid securely on the container until removal is desired. Such means include tear strips, pull-tabs, perforated joints, etc. Nonetheless, the seal formed by these lids is not completely moisture proof and may allow sufficient moisture into the package so as to create premature curing or gelling of the upper surface layer of the adhesive. When such curing occurs, the adhesive cannot be pumped out of the container by conventional methods and, if partially pumped, the equipment will clog requiring extensive cleaning.

In some cases, attempts have been made to overcome this problem by inserting, inside the container, an internal flexible film barrier, often in the form of a bag. The latter approach is not without its disadvantages. These films often tear when contacted with the platen. Additionally, during filling the film does not remain on the inside surface of the container but rather becomes entrapped in the molten adhesive mass where it forms folds which then become embedded within the portion of the adhesive remaining in the container as the adhesive recools. When it is then desired to remelt the adhesive for use at a later time, the presence of this entrapped folded film poses a hinderance for the operation of the heated platen. The folds must be pulled out of the surface of the adhesive in the container, a task that is virtually impossible to do without tearing the bag.

Moreover, no matter how tight the seal, because the hot melt adhesive container is filled while the adhesive is molten (i.e., flowable) and then the drum is sealed, the adhesive contracts as the prod-

uct cools, forming a vacuum which results in a pressure differential between the outside atmosphere and the inside contents, causing a driving equilibrium to force air (containing moisture) into the container until the pressure equilibrates.

Finally, because the hot melt adhesive is filled directly into the container, residual amounts remain after use making reconditioning or recycling of the containers impracticable.

Improved moisture proof packages suitable for shipping, storing and dispensing moisture curable hot melt adhesives may be prepared by filling the molten adhesive directly into a primary container, said primary container formed from a rigid plastic material; inserting the primary container into the secondary container, said secondary container being of substantially the same size and configuration as the primary container, completely sealing the open surface of the primary container with a flexible moisture film barrier and then attaching a lid to the secondary container, sealing the periphery thereof.

The resulting package ensures superior moisture resistance. Moreover, as the molten adhesive cools after filling the flexible film barrier in the primary container contracts becoming concave, thereby avoiding any pressure differential between the atmosphere and the container adhesive.

In a preferred embodiment, the flexible film barrier comprises a metal foil or film substrate or a laminate in which the metal is the principal moisture barrier layer. In accordance with this embodiment, the metal film conducts a sufficient amount of heat to insure a superior barrier seal between the flexible film and the lip of the primary container when the peripheral edges are heated during the sealing operation.

Figure I is a cross-sectional view of a pail and liner according to the present invention. In the Figure, 1 represents the secondary container, 2 the primary container, 3 the flexible barrier and 4 the lid.

Figure II is a closer view of the portion of the package shown by 5 in Figure I. In this view, 1, 2 and 3 are as in Figure I while 7 represents the lip of the primary container and 6 represents the actual sealed area which extends around the peripheral edge of the entire container.

The most commonly used moisture cureable adhesives contain isocyanate. The isocyanate containing adhesives can contain free mono, di, tri, tetra, etc. substituted isocyanate compounds in a free or combined state. Free isocyanate compounds are commonly contained in the adhesive, wherein the isocyanate compounds are not prereacted before application. Alternatively, the isocyanate compounds can be prereacted, for example, in the production of isocyanate end-capped

prepolymers, and blended into the hot melt adhesives of the invention prior to application. Isocyanate compounds commonly used in the applications of the invention include diphenylmethane diisocyanate (MDI), toluene diisocyanate (TDI), isophorone diisocyanate (IPDI), tetramethylxylene diisocyanate compounds (TMXDI), meta-vinyl-benzene isocyanate (m-TMI), etc.

As noted above, the isocyanate containing adhesives can be packaged as either one part adhesives, wherein all reactive components are held within a single adhesive container or packaged in two parts, wherein the isocyanate compounds are packaged within a first contained part and the reactive compounds that participate in a curing reaction with the isocyanate compounds are contained in a second container part. It is the one part isocyanate adhesives that are most suitable for packaging in accordance with the teachings of the present invention; however, the package may also be utilized to package reactive compounds in two part systems.

The packaging system used to protect the adhesive can be of any volume convenient for production and handling. Preferably the volume is at least one gallon, but may be as large as fifty-five gallons. Other convenient volumes can be five gallons, ten gallons, fifteen gallons, twenty gallons, etc.

The container can take any convenient shape, including box like, cylindrical, cylindrical with an oval cross-sectional shape, octangular cross-sectional, etc. The primary limitation on the configuration of the container body is that a platen passes through the container body from one open end to the second open end, while remaining sealingly engaged with the inside diameter of the periphery. The platen is commonly shaped to conform to the cross-sectional shape of the container and is generally circular.

The primary container (2) is preferably prepared from a relatively crystalline thermoplastic material, for example, high density polyethylene or polypropylene. In order to create the most moisture proof package, the primary container has a size and configuration substantially the same as that of the secondary container with a lip or peripheral edge (7) configured to extend over the edge of the secondary container. This configuration can most readily be achieved by vacuum forming the primary container in a mold having the identical size and configuration as the secondary container.

The secondary container (1) can be prepared from any material that is substantially non-reactable with isocyanate compounds and is stable with the temperatures attained with heated platens and hot melt adhesives. The composition of the secondary container may vary depending upon the isocyanate content of the hot melt. In any case, the materials

utilized in the container must have a low vapor transmission rate so as to properly contain and store the urethanes in combination with the primary container. The materials utilized for this secondary container may be metal, plastic, corrugate or any other suitable alternative. Containers can be prepared from paperboard, foil lined fiberboard, common metal container materials, reinforced thermosetting materials, thermoplastics, ceramic materials, wood and bonded pressed wood shaped containers, etc. Preferred containers are manufactured from steel, paperboard, corrugated paperboard, or fiberboard, for reasons of each of handling, filing and dispensing.

The composition of the flexible film barrier (3) will also vary depending on the isocyanate content, and consequent moisture sensitivity, of the urethane being packaged. Generally, the film will comprise a material which has a low vapor transmission rate, including metal foil or film, plastics such as polyester or polyethylene or laminates formed from foil covered paper or foil covered plastic.

The flexible film is cut to cover the entire top surface of the primary container and is attached to the primary container using conventional methods such as mechanical heated platens, hot air, sonic or induction sealing or the like. In a preferred embodiment, the flexible barrier contains at least one metallic layer which increases the heat absorption and ensures a quicker and better seal between the flexible film and the lip or peripheral edge of the primary container (6).

The thus formed packaging system is completed by the addition of a conventional lid (4). The lid may be made from the same or different material as the secondary container but should be configured so as to ensure as air tight a seal as possible with the secondary container. The lid may comprise one or more components. The preferred lid for use herein comprises a flat gasketed lid with a silicone seal around the inner periphery. This flat lid is then secured onto the primary container with a lug or bracket to provide the desired air and moisture resistant seal.

Claims

1. An improved moisture proof package suitable for shipping, storing and dispensing moisture curable hot melt adhesive comprising a primary container formed from a rigid plastic material into which the molted adhesive is poured; the primary container being positioned within a secondary container, the secondary container being of substantially the same size and configuration as the primary container; the open surface of the primary container being com-

pletely sealed with a flexible moisture barrier film; and a lid completely covering the exposed surface of the secondary container, forming a seal around the periphery thereof.

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2. The package of Claim 1 wherein the primary container is prepared from a relatively crystalline thermoplastic material.

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3. The package of Claim 2 wherein the primary container is prepared from high density polyethylene or polypropylene.

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4. The package of Claim 1 wherein the secondary container is prepared from a material selected from the group consisting of paperboard, foil lined fiberboard, metal, reinforced thermoset, thermoplastic, ceramic, wood and bonded pressed wood.

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5. The package of Claim 1 wherein the flexible film barrier comprises a metal foil or film, plastic or laminate thereof.

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6. The package of Claim 5 wherein the flexible film barrier contains at least one metallic layer.

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7. The package of Claim 1 wherein the lid comprises a flat gasketed lid with a silicone seal around the inner periphery, the lid being secured onto the primary container with a lug or bracket to provide an air and moisture resistant seal.

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Figure 1

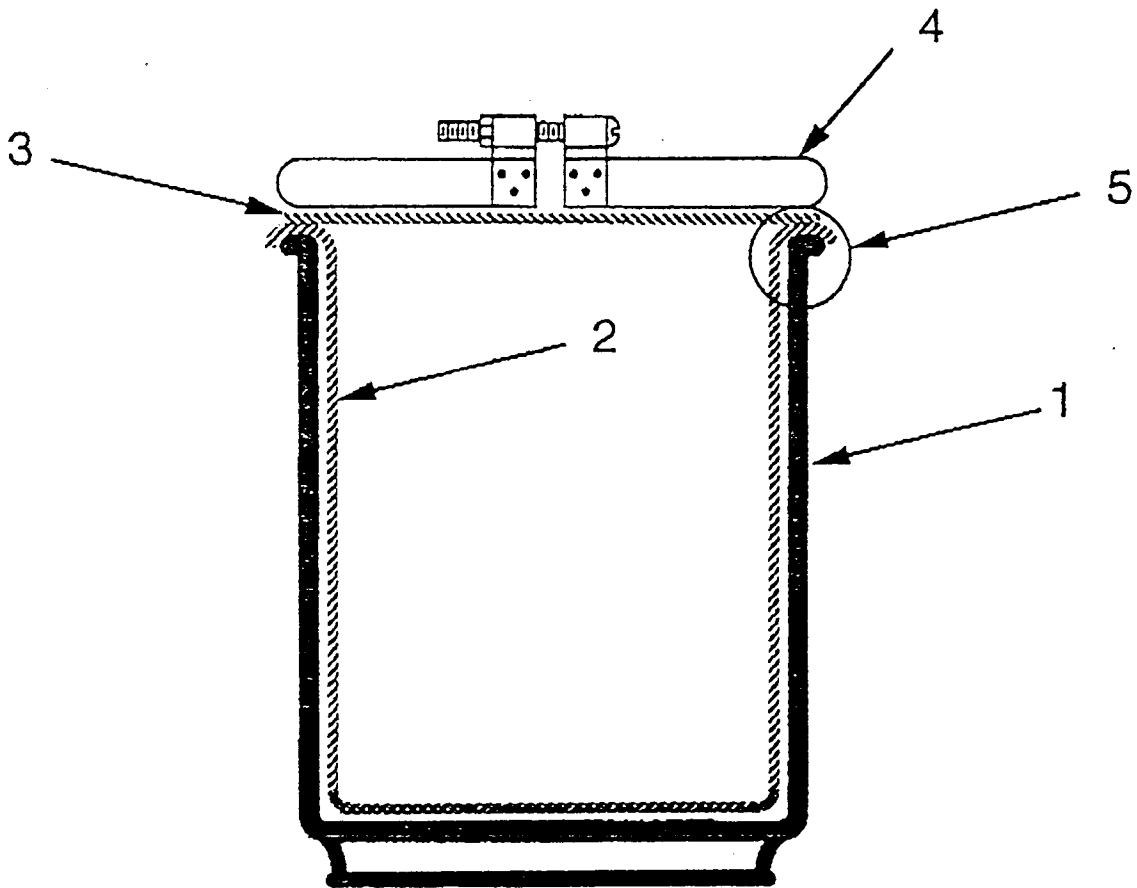
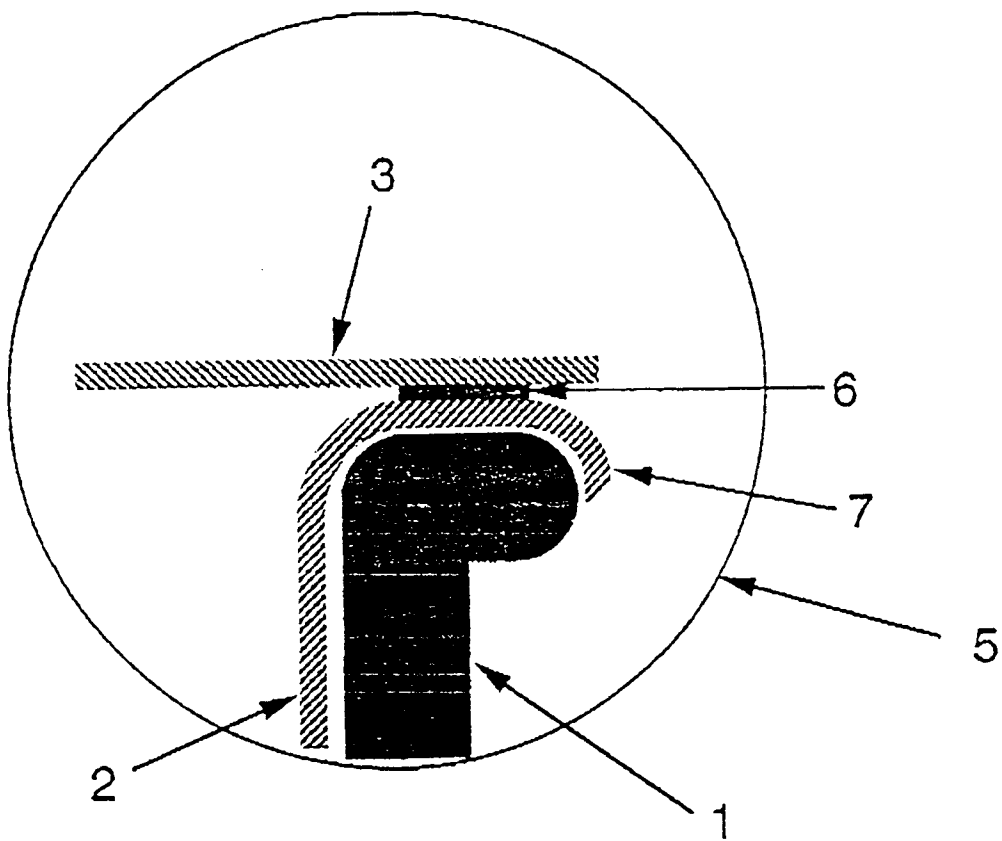


Figure 2





| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
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| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
| Y | WO-A-91 17926 (DU PONT DE NEMOURS) * page 5, line 20 - page 6, line 5 * * page 8, line 23 - line 27; figure 1 * --- | 1-6 | B65D77/04 |
| Y | GB-A-2 239 444 (RHONE-POULENC) * page 1, line 19 - line 24 * * page 5, line 13 - line 16; figure 1 * --- | 1-6 | |
| A,P | PATENT ABSTRACTS OF JAPAN vol. 18 no. 503 (M-1677) ,21 September 1994 & JP-A-06 171601 (MITSUI TOATSU) 21 June 1994, * abstract * --- | 1 | |
| A | EP-A-0 492 522 (STO) * column 4, line 34 - line 51; figure 1 * --- | 1 | |
| A | US-A-3 866 794 (KERR) * column 3, line 31 - line 40; figures 2,3 * --- | 7 | |
| A | US-A-5 050 764 (VOSS) * column 3, line 20 - line 23 * ----- | 7 | TECHNICAL FIELDS SEARCHED (Int.Cl.6) B65D |
| The present search report has been drawn up for all claims | | | |
| Place of search | Date of completion of the search | Examiner | |
| THE HAGUE | 4 April 1995 | Bridault, A | |
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