

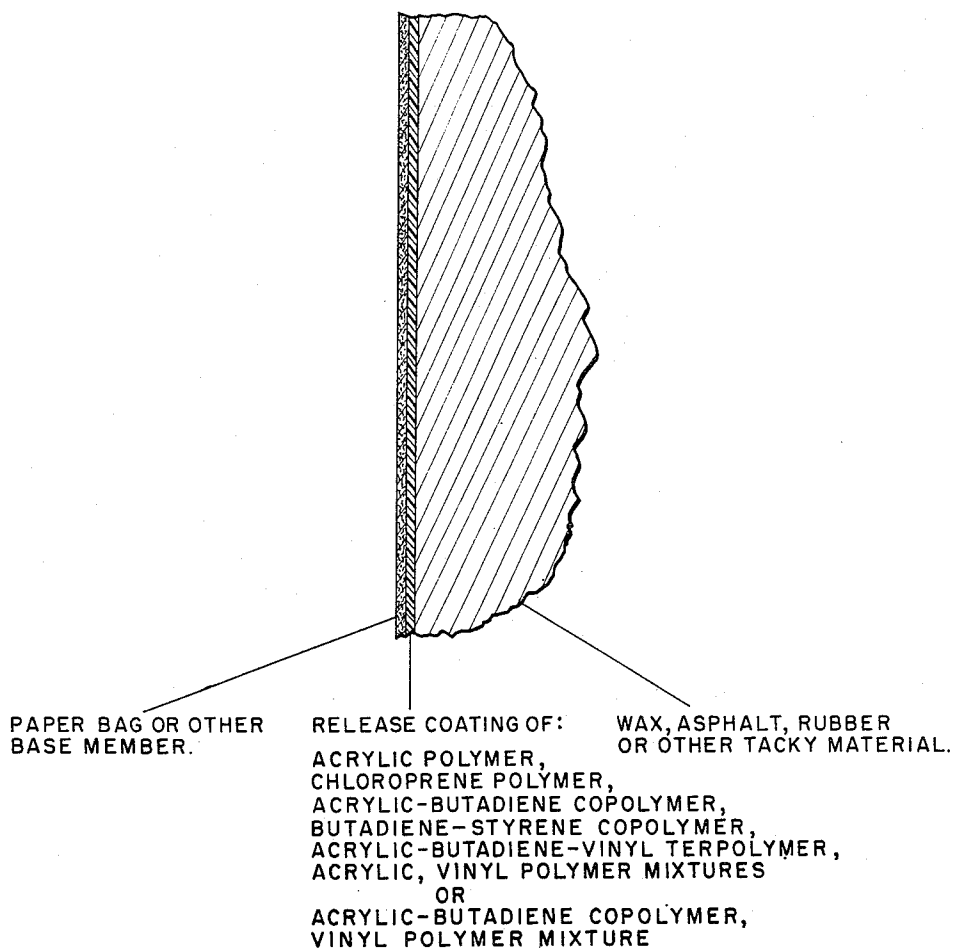
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CONTAINER FOR PACKAGING TACKY MATERIALS

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CONTAINER FOR PACKAGING TACKY MATERIALS

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This invention relates to containers for tacky materials such as wax, asphalt, rubber and the like which normally are solid at room temperature. The invention pertains particularly to paper bags and other fibrous cellulosic containers adapted to be employed for the packaging of the aforesaid tacky materials.

The packaging of wax, asphalt, rubber and like tacky materials is made difficult by the tendency of these materials to adhere to the inner surfaces of the containers in which they are packaged. Where the containers comprise paper bags or other fibrous, cellulosic wrappers, the tacky contents of the package often becomes firmly bonded to the adjacent fibrous surfaces.

As a result, when the container is stripped from its contents, portions of the container often remain behind firmly secured to the surface of the tacky material. This presents a problem, since for many uses the contents of the package must be free from contamination by the packaging material. Removal of the latter is a difficult and time consuming operation, however, and results in substantial loss of time and increased expense.

Accordingly, the inner surface of a container which is suitable for packaging tacky materials of the class described herein, should be coated with a film which meets the following requirements:

1. *Releasability*.—The coating must be capable of rapid and clean release from the tacky material upon stripping the container therefrom.

2. *Oil and grease resistance*.—The coating must possess good oil and grease resistance to prevent penetration of the packaged material through the container. This is particularly important when the tacky material is molten wax or asphalt.

3. *Inertness to the tacky material*.—The coating must be inert to the tacky substance to be packaged, so that no chemical or physical reaction occurs between them.

4. *Bond to the inner wall of the container*.—The coating must have the ability to form a strong bond to the inner surface of the container, thereby preventing its partial or total delamination therefrom. If the bond is not sufficiently strong, portions of the coating may be left on the surface of the tacky material when the package is opened. This would cause undesirable contamination of the material.

5. *Other physical properties*.—For best release from the package contents, the coating should be substantially dry, smooth and flexible at room temperature. Also, it should be continuous so that no uncoated portion of the inner walls of the container will be in contact with the tacky contents.

6. *Economics*.—The cost of the coating should be so small as not to add materially to the total cost of the container. Also, use of the coating, and of the container, should require a minimum of handling.

Various types of containers heretofore have been employed for packaging tacky materials, but these in the majority of instances have been unsatisfactory because the release coatings used have not met one or more of

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the foregoing requirements. Thus it is common practice to package wax and like materials in metal or fiber drums. However, removal of the wax from the drums usually requires a preliminary melting of the wax, which, in turn, incurs a substantial cost for labor and for heating and handling equipment.

Similarly, wax and like materials conventionally are formed into slabs which then are wrapped individually in paper sheets or placed in cartons. However, the formation of such slabs is an expensive operation, and use of this technique often results in the undesirable adhesion of the wax to the container, as has been discussed above.

More recently, asphalt, rubber and the like have been packaged in multiwall paper bags, or cartons, whose inner walls are coated with powdered materials such as clay, or with soapy or oily substances. Containers of this class are not entirely satisfactory, however, inasmuch as clean release of the container from the packaged material frequently is not obtained. As a consequence, contamination of the latter with the coating substances occurs.

Accordingly, it is the general object of this invention to provide for use in packaging tacky materials such as wax, asphalt and rubber, an improved and highly effective container which can be removed rapidly and easily from the tacky contents without contamination thereof.

We have discovered that a container which overcomes the deficiencies of the prior art containers, and which meets the foregoing requirements for containers of this class, comprises broadly a base member, and bonded to the inner surface of the base member a release coating comprising one or more members of a group of synthetic elastomers which are unique in having the common property of clean and rapid release from tacky materials.

This group of elastomers consists of the acrylic polymers, the chloroprene polymers, the acrylic-butadiene copolymers, the butadiene-styrene copolymers, the acrylic-butadiene vinyl terpolymers, mixtures of acrylic and vinyl polymers, and mixtures of acrylic-butadiene copolymers and vinyl polymers. These various elastomers may be used singly or in combination with each other. When applied to the inner surfaces of suitable base members, they form containers into which wax, asphalt, rubber, and like materials may be placed, handled and transported under all the usual atmospheric conditions of temperature and humidity without hazard of adherence of the container to the tacky contents.

Considering the foregoing in greater detail and with particular reference to the drawings, wherein is presented a fragmentary sectional view of a piece of a tacky object packaged in the herein described container:

As is evident from the drawing, the container of our invention comprises a base member to the inner surface of which is adherently united a release coating, the resulting container then being used to hold a quantity of wax, asphalt, rubber or other tacky material.

The base member may be fabricated from any suitable material such as cloth, wood, glass, metal, cardboard, or paper in the form of bags, boxes, cartons, or other suitable shapes. Preferably, however, the base member comprises a paper bag which may be used per se or as a liner for base members of other classes. Such a bag may be employed to advantage as the innermost of several nesting bags, providing a multiwall bag such as has been found particularly well suited for use in transporting and storing tacky materials.

When a paper bag or other paper packaging unit is employed as the base member, it should be made of a strong paper, preferably of unbleached kraft pulp. It should be well-sized to prevent excessive penetration of the coating. Also it should have a high finish, good

tear resistance, and good resistance to delamination. If desired, its physical properties may be improved by the inclusion of wet-strength resins, starch, or other conventional pulp additives.

The basis weight of the paper sheet employed for coating with an elastomeric composition as described herein may vary over a broad range, i. e. from about 30 lbs./ream (3000 square feet) to about 300 lbs. per ream, which is the value employed for heavy paper boards. It is preferred, however, to use a paper sheet having a basis weight of from 35 to 60 pounds per ream when the sheet is to be used as a liner for containers, as an inner ply for multiwall bags, or for conversion into a single ply bag. The inner surfaces of these and other suitable base members then are coated with a synthetic elastomer of the class consisting of the acrylic polymers, the chloroprene polymers, the acrylic-butadiene copolymers, the butadiene-styrene copolymers, the acrylic-butadiene-vinyl terpolymers, mixtures of acrylic and vinyl polymers, and mixtures of acrylic-butadiene copolymers and vinyl polymers.

By "acrylic polymer" is meant the class of compounds comprising polymerized acrylonitrile; alpha-substituted acrylonitriles, such as methyl acrylonitrile and other alkyl acrylonitriles; esters of acrylic acid, such as methyl acrylate, ethyl acrylate and the higher alkyl acrylates; and esters of the alpha-substituted acrylic acids, such as methyl methacrylate, ethyl methacrylate and the higher alkyl methacrylates. It also includes blends and copolymers of the above enumerated polymeric substances.

By "chloroprene polymers" is meant the product resulting from the polymerization of 2-chloro-1,3-butadiene, and its homologs.

The term "butadiene polymer" refers to polymerized butadiene, as well as to the homologs and analogs of this material containing the butadiene nucleus and having rubber-like physical properties.

By "vinyl polymer" is meant the class of polymeric compounds containing the vinyl radical such as styrene, vinyl acetate, vinyl chloride and vinyl-chloride acetate, vinylidene chloride, and mixtures thereof.

By "acrylic-butadiene copolymer" is meant the copolymer resulting from the polymerization of an acrylic compound such as is listed above with butadiene.

By "butadiene-styrene copolymer" is meant the polymeric substance resulting from the copolymerization of butadiene and styrene.

By "acrylic-butadiene-vinyl terpolymer" is meant the elastomer resulting from the copolymerization of an acrylic compound with butadiene and a vinyl compound.

The foregoing polymeric materials may be used singly or in combination with each other. Mixtures in any desired proportion of the acrylic and vinyl polymers, and of the acrylic-butadiene copolymers with the vinyl polymers, are particularly suitable. They should be employed, however, in the form of emulsions, or of solutions in suitable organic solvents. Suitable solvents for this purpose comprise, for example, the ketone solvents such as acetone or methyl ethyl ketone; or the ester solvents including methyl acetate, ethyl acetate, or the like.

The elastomers used in formulating these emulsions or solutions should be advanced to a viscosity level at which they are capable of forming a flexible solid film when deposited upon a surface. In general, a viscosity range of between about 50 and 100,000 centipoises at 25° C. is suitable. A preferred viscosity range is between about 125 and 5000 centipoises, at 25° C.

In certain instances it may be desirable to mix a thickening agent with the elastomeric coating composition in order to increase the viscosity to a value which is particularly suitable for a selected coating operation. Any compatible thickening agent may be used for this purpose. Examples are alpha-protein, ammonium alginate, the sodium salt of polyacrylic acid, casein, methyl cellulose and the like. These and other thickening agents,

used singly or in admixture with each other, may be added to the composition as required to raise the viscosity of the composition to the desired value.

For further adjustment of viscosity, water or other liquid media may be incorporated in the compositions. By this means a close control of viscosity may be achieved.

After adjustment of the viscosity of the polymeric coating composition to the selected value, it may be applied to the paper bag or other base member by any conventional method such as spraying, brushing, spreading or roll coating. Care should be taken, however, to insure that the coating be applied in such a manner as to produce a continuous film of uniform weight. Also, it should be applied in unit amounts sufficient to make possible an easy and clean release of the coated surface from the tacky material to be packaged. In general, an application of from about 3 to 30 pounds (dry basis), preferably from 6 to 15 pounds (dry basis), of coating per 3000 square feet of base member surface may be applied.

Coating compositions suitable for use as release coatings in the preparation of the herein described containers are illustrated further in the following examples, wherein parts are given as parts by weight (solids basis).

Example 1

	Parts
Acrylic polymer-----	100
Thickening agent-----	1

The acrylic polymer used was a blend of ethyl methacrylate and acrylonitrile in the form of an aqueous emulsion containing 50% solids, and having a viscosity of 15-20 centipoises at 25° C. and a specific gravity of 1.05. The thickener was a sodium salt of polyacrylic acid, supplied by the Rohm and Haas Company under the trade-name Acrysol GS.

The thickener was dissolved in water to form a solution of about 15% solids and the solution was then mixed at room temperature with the polymeric emulsion until a homogeneous mixture was obtained. The viscosity of the final mixture at 25° C. was 200 centipoises.

Example 2

	Parts
Acrylic polymer-----	100
Thickener -----	0.5

The acrylic polymer used was a blend of high alkyl acrylic esters in the form of an aqueous emulsion containing 40% solids, having a viscosity of 10-15 centipoises at 25° C., and a specific gravity of 1.04. The thickener was ammonium alginate in powdered form. The alginate was dispersed in water to form a dispersion containing 5% solids, and mixed with the polymer emulsion until a homogenous mixture was produced. The viscosity of the final composition was 450 centipoises.

Example 3

	Parts
Acrylic-butadiene copolymer-----	100
Thickener -----	3

The acrylic-butadiene copolymer was prepared by polymerizing together 33 parts acrylonitrile and 67 parts butadiene until a flexible film-forming resin was produced. This copolymeric resin then was employed in the form of an aqueous emulsion containing 40-45% solids, having a viscosity of 10-30 centipoises at 25° C. and a specific gravity of 0.98. It is manufactured and sold by the Goodyear Tire and Rubber Company of Akron, Ohio, under the trade-name Chemigum 245 CHS.

The thickener, Acrysol GS, was prepared and added to the emulsion in the manner described in Example 1. The viscosity of the final mixture was 380 centipoises.

Example 4

	Parts
Acrylic polymer -----	50
Vinyl-type polymer -----	50

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The acrylic polymer was the same high alkyl acrylic ester polymer described in Example 2. The vinyl type polymer was polyvinyl acetate in the form of an aqueous emulsion containing 55% solids, and having a viscosity of 800-1000 centipoises at 25° C. and a specific gravity of 1.2. It was supplied by E. I. du Pont de Nemours, Wilmington, Delaware, under the trade-name Elvacet 81-900.

Both compounds were mixed together with stirring until a homogeneous mixture was obtained. The viscosity of the resulting composition was 500 centipoises, which was suitable for coating application by a kiss-roll method without mixing in a thickener.

Example 5

	Parts
Acrylic monomer	32.5
Vinyl-type monomer	35.0
Butadiene-type monomer	32.5
Thickener	4.0

The three monomeric components of this composition were used as a terpolymer of acrylonitrile-styrene-butadiene in the form of an aqueous emulsion, containing 35-37% solids, having a viscosity of 11-14 centipoises at 25° C., and a specific gravity 1.02, supplied by Naugatuck Chemical, Naugatuck, Connecticut, under the trade-name Kralastic 4100-E.

The thickener was alpha-protein (isolated soya protein) solution, prepared by adding 4 parts of the protein to sufficient water to form a 15% aqueous slurry, heating the slurry to 38° C., adding 0.5 part of 28% ammonium hydroxide solution to solubilize the protein, and mixing until the protein was dissolved. The protein solution then was added to and mixed with the polymeric emulsion until a uniform mixture was obtained. The viscosity of the final mixture was 2000 centipoises.

Example 6

	Parts
Acrylic-butadiene type copolymer	45
Vinyl-type polymer	55
Thickener	1.5

The elastomeric components of this composition were used as a mixture of polyvinyl chloride with acrylonitrile-butadiene copolymer which had been produced by copolymerizing 15 parts of acrylonitrile with 30 parts of butadiene. The composition was in the form of an aqueous latex emulsion containing 48-50% solids, and having a viscosity of 10-15 centipoises at 25° C., and a specific gravity 1.09. It was marketed by B. F. Goodrich Chemical Company, Akron, Ohio, under the trade-name Geon 552. The thickener, Acrysol GS, was prepared and mixed with the emulsion in the manner described in Example 1. The viscosity of the final mixture was 145 centipoises.

Example 7

	Parts
Butadiene-styrene copolymer	100
Thickener	5

The butadiene-styrene copolymer, which had been produced by copolymerizing 40 parts of butadiene with 60 parts of styrene, was used in the form of an aqueous emulsion containing 48% solids and having a viscosity of 11 centipoises at 25° C. and a specific gravity of 1.01. It was supplied by the Dow Chemical Co., Midland, Michigan, under the trade-name Dow 512R.

The thickener, alpha-protein solution, prepared in the same manner as described in Example 4, was added to and mixed with the polymeric emulsion until a uniform mixture was obtained. The viscosity of the final mixture was 370 centipoises.

Example 8

	Parts
Chloroprene polymer	100
Thickener	3

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The chloroprene polymer was an aqueous emulsion of Neoprene latex Type 736, containing 34-36% solids, having a viscosity of 5 centipoises at 25° C. and a specific gravity of 1.05. It was manufactured by E. I. du Pont de Nemours, Wilmington, Delaware.

The thickener, alpha-protein solution, prepared in the same manner as described in Example 4, was mixed with 10 parts of extremely fine particle size zinc oxide, 3 parts of an anti-oxidant (symmetrical di-beta-naphthyl-para-phenylenediamine), and 0.5 part of a dispersing agent (water-soluble, polymerized sodium alkyl aryl sulfonate).

The above ingredients were mixed together in a ball-mill, the resulting mixture added to the polymeric emulsion, and stirred until a uniform product was obtained. The viscosity of the final coating composition was 110 centipoises.

All of the foregoing exemplary coating compositions are suitable for use in coating paper bags or other base members in accordance with the method described herein. In each case, they may conveniently be applied to one side of a paper web made from unbleached kraft paper and having a basis weight of 47 pounds per ream using any conventional coating apparatus. The coating may be dried to produce a continuous film which is firmly bonded to the base.

The product then is ready for fabrication into a container of the desired class, such as a multi-wall paper bag, a liner for a wood, metal or glass carton, or a single wall bag. In all of these applications, of course, the coated sheet is employed as the inner ply, with the coated surface being exposed to the materials to be packaged.

Wax, asphalt, rubber, or any other tacky material may be packaged successfully in the containers by filling the same with the molten material. The top of the container then is closed and the material allowed to harden. It then is ready for storage or shipment.

Because of the desirable properties of the coating the contents of the container do not penetrate or bleed through the container walls. Also, the container may be stripped off or otherwise removed rapidly and easily without adherence of the tacky contents to its side walls. Accordingly when the material is ready for use, it is available in a pure condition, uncontaminated by adhering fragments of the container.

It is to be understood that many modifications of the above embodiments of this invention will readily occur to those skilled in the art. All such modifications are intended to be included within the scope of this invention as defined in the appended claims.

We claim:

1. A package of wax comprising wax and a container for said wax, said container comprising a base member and intermediate said base member and said wax a coating adherently united to the surface of said base member, the coating consisting essentially of at least one member of the group of synthetic elastomers consisting of the acrylic polymers, the chloroprene polymers, the acrylic-butadiene copolymers, the butadiene-styrene copolymers, the acrylic-butadiene-vinyl terpolymers, the mixtures of the acrylic and vinyl polymers, and mixtures of the acrylic-butadiene copolymers and the vinyl polymers; the amount of coating employed being sufficient to insure easy and clean release of the container from the wax.

2. A package according to claim 1 wherein the coating consists essentially of an acrylic polymer.

3. A package according to claim 1 wherein the coating consists essentially of a blend of ethyl methacrylate and acrylonitrile.

4. A package according to claim 1 wherein the coating consists essentially of an acrylic-butadiene copolymer.

5. A package according to claim 1 wherein the coating consists essentially of a copolymer of acrylonitrile and butadiene.

6. A package according to claim 1 wherein the coating consists essentially of a mixture of acrylic and vinyl polymers.

7. A package according to claim 1 wherein the coating consists essentially of a blend of higher alkyl acrylic esters and polyvinyl acetate.

8. A package according to claim 1 wherein the coating consists essentially of an acrylic-butadiene-vinyl terpolymer.

9. A package according to claim 1 wherein the coating consists essentially of an acrylonitrile-butadiene-styrene terpolymer.

10. A package according to claim 1 wherein the coating consists essentially of a mixture of an acrylic-butadiene copolymer and a vinyl polymer.

11. A package according to claim 1 wherein the coating consists essentially of an acrylonitrile-butadiene copolymer and polyvinyl chloride.

12. A package of wax comprising wax and a container for said wax, said container comprising a fibrous cellulosic base member and a coating bonded to the inner surface thereof, the coating consisting essentially of at least one synthetic elastomer selected from the group consisting of the acrylic polymers, the chloroprene polymers, the acrylic-butadiene-copolymers, the butadiene-styrene copolymers, the acrylic-butadiene-vinyl terpolymers, mixtures of the acrylic and vinyl polymers, and

mixtures of the acrylic-butadiene copolymers and the vinyl polymers, the dry weight of the coating being from 3 to 30 pounds per 3000 square feet of container surface.

13. A package of wax comprising wax and a container for said wax, said container comprising a multiwall paper bag, the inside surface of the inner ply of the bag having firmly united thereto a coating consisting essentially of at least one synthetic elastomer selected from the group consisting of acrylic polymers, the chloroprene polymers, the acrylic-butadiene-copolymers, the butadiene-styrene copolymers, the acrylic-butadiene-vinyl terpolymers, the mixtures of the acrylic and vinyl polymers, and mixtures of the acrylic-butadiene-copolymers and the vinyl polymers, the dry weight of the coating being from 6 to 15 pounds per 3000 square feet of inner ply surface, and the coated surface of the inner ply being easily and cleanly releasable from the wax.

14. The wax package of claim 13 wherein the coating consists essentially of an acrylic-butadiene-vinyl terpolymer.

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