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POLYVINYL CHLORIDE-POLYVINYL ACETATE BLENDS WITH KETONE SOLVENTS AND METH- ODS OF SPRAYING SAME

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The invention relates to a spraying composition and a method for spraying fabrics to produce materials suitable as window shades, lamp shades, and the like. More particularly, the invention relates to a spraying composition which can be utilized in the home to produce a window shade, lamp shade and the like from any desired fabric.

Heretofore the production of window shades and lamp shades from fabrics has been carried out by utilizing complicated and expensive equipment and techniques to treat a fabric with a resin. This resin treatment imparts to the fabric the desired characteristics of opacity, water repellancy, stiffness with some flexibility, resistance to cracking, etc., which is necessary to allow the fabric to be utilized as a lamp shade or a window shade. In the past, the use of complicated resin treating techniques requiring expensive machinery has been a necessity in the production of lamp shades or window shades from fabrics. This is true, since in order to produce a commercially acceptable lamp shade or window shade by resin treating a fabric, the resin must uniformly penetrate into the interstices of the fabric so that all portions of the fabric are uniformly treated with the resin. Heretofore in order to obtain the proper penetration of the resin into the interstices of the fabric as well as a uniform distribution of the resin throughout the surface of the fabric to convert the fabric into a material which is acceptable for use as a window shade or a lamp shade, it has been almost mandatory to utilize complicated and expensive resin treating techniques and equipment.

Furthermore, there has been a problem of poor adhesion of the resins to the fabric especially when vinyl resins have been utilized. Previously, this problem has been solved by utilizing in the treating compositions auxiliary materials having good adhesive properties. However, in many cases, these auxiliary materials deleteriously affect the fabric and destroy many of the beneficial properties imparted to the fabric by the resin. Despite these disadvantages, it has been necessary to utilize these auxiliary adhesive materials in resin treating compositions since the problem of adhesion of the resin to the fabric far outweighs the disadvantages that occur through the use of these auxiliary compounds. In any case, to provide the proper adhesion of the resin to the fabric, it has been necessary (even with the use of auxiliary adhesive agents) to carry out the treating step by means of complicated and expensive resin treating techniques and equipment.

It is an object of this invention to provide a resin spray composition for producing window shades and lamp shades, which is adapted for use in the home.

It is a further object of this invention to provide a simple method for producing window shades and lamp shades from fabrics which can be practiced in the home and which does not utilize complicated treating techniques and equipment.

It is a further object of this invention to provide a resin spray composition for producing window shades and lamp shades from fabrics which will readily penetrate into the interstices of the fabric without utilizing complicated treating techniques and equipment.

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It is a further object of this invention to provide a resin composition for treating fabrics which when applied to a fabric by means of a propellant will deposit resin uniformly throughout the fabric to produce a resultant fabric which is suitable for use as a window shade or lamp shade.

It is a further object of this invention to provide a resin composition for treating a fabric which when simply applied as a spray to produce a material suitable for use as a lamp shade or window shade will provide a tenacious and permanent bond between the resin and the fabric without utilizing auxiliary adhesive agents in the composition or complicated treating techniques and equipment.

Other objects of this invention will be obvious and will, in part, appear hereinafter.

I have determined that when a composition comprising a mixture of vinyl resins consisting of polyvinyl chloride and polyvinyl acetate, cyclohexanone, a volatile liquid organic solvent such as methyl ethyl ketone and a liquid propellant such as Freon 12 is sprayed onto a fabric by means of pressure cans of the "aerosol" type, the fabric is converted into a material suitable for use as a lamp shade or window shade. Furthermore, by means of utilizing this composition as a spray, the mixture of vinyl resins is deposited uniformly throughout both the exterior and interstices of the fabric. Further, by utilizing this resin composition as a spray, the resin mixture is firmly anchored to the fabric by means of a tenacious and enduring bond without the use of any auxiliary adhesive agent or complicated treating techniques. Hence the above composition provides a spray adapted for household use, which spray can be utilized simply and easily to treat a fabric of any suitable design to convert such fabric into a material suitable for use as a lamp shade or window shade.

The application of the vinyl chloride-vinyl acetate resin mixture to the fabric by means of the propellant imparts to the fabric the desirable properties of stiffness so that the fabric can lay flat without curling and warping out of shape coupled with a degree of flexibility so that cloth can be rolled up and down on a window shade roller without cracking or crackling, as well as possessing other desired properties. The appearance of the fabric itself is not changed by this treatment nor is its original lustre deleteriously affected. However, the treated fabric is rendered water-resistant and is endowed with crease resistance and crease recovery properties which it did not possess before the treatment.

The phenomena whereby a fabric is converted to a material suitable for use as a lamp shade or window shade by applying a resin by a simple spray technique without the use of complicated and expensive equipment, and which can be carried out by any housewife, is not completely understood; however, it is believed that the effects noted are in general attributable to the specific ingredients of the unique composition in combination with the technique of spraying which uniformly distributes the resin throughout the interstices and surface of the fabric. The penetration achieved by utilizing the composition of this invention as a spray firmly anchors the resin to the fabric so that a tenacious and enduring bond is formed between the resin and the fabric without the use of any auxiliary adhesives. The aforementioned beneficial results achieved by the spray composition of this invention are only obtained when this composition is applied as a spray, as evident from the fact that the aforementioned desired results are not obtained when the composition, apart from being applied with the propellant as a spray, is applied to a fabric by other means such as dipping, roller coating, or the like.

The resin ingredient should consist of a mixture of polyvinyl chloride resin and polyvinyl acetate resin. It is this mixture of polyvinyl chloride and polyvinyl acetate which imparts the desired properties of stiffness coupled with the desired measure of flexibility, crease resistance, water-resistance, etc. to the fabric so that it may be utilized as a window shade and lamp shade. It is believed the polyvinyl chloride imparts to the fabric a desired measure of stiffness so that the treated fabric may lie flat without curling or warping out of shape, whereas the polyvinyl acetate imparts the desired measure of flexibility to the treated fabric so that the resultant fabric can be rolled up and down on a window shade without cracking and/or creasing. Furthermore, I have determined that by applying this combination of resins to a fabric by the medium of a propellant at room temperature, the resins adhere with a tenacious bond to the fabric without requiring any external heat. Thus, this combination of resins so applied is particularly suited for simple household application.

For best results, the mixture should consist of from about 20% to about 60% by weight of polyvinyl chloride based on the total weight of the resin mixture and from about 40% by weight to about 80% by weight of polyvinyl acetate, based on the total weight of the resin mixture. Generally, the spray composition contains from about 3% to about 10% by weight of resin mixture based on the total weight of the composition. When amounts greater than 10% are utilized, there is a tendency to clog the nozzle of the "aerosol" can in which the composition is contained. Amounts of the resin mixture lower than 3% by weight may be utilized in accordance with this invention. However, by utilizing such small amounts of resin, a longer spraying time is needed to adequately treat the fabric to make it suitable for use as a lampshade or window shade.

The choice of a suitable solvent medium for the resin mixture is a matter of importance for the solvent medium must be one that is capable of evaporation at room temperature to leave the resin mixture properly deposited on the fabric. I have found that best results are achieved when the solvent medium consists of cyclohexanone mixed with a volatile liquid organic solvent. Preferably the organic liquid solvent should have a boiling point of below 120° C. and in some cases below 100° C. This solvent medium consisting of cyclohexanone and the organic liquid solvent, it is believed, functions to readily deposit, by means of the propellant, the resin on the fabric so that the resin is anchored to fabric both on the surface of the fabric and in the interstices of the fabric. In the composition of this invention, the composition preferably contains from about 8% by weight to about 41% by weight of cyclohexanone, and from about 4% by weight to about 30% by weight of the total weight of the composition of the liquid organic solvent. The liquid organic solvent preferred is methyl ethyl ketone. However, any conventional liquid organic solvent preferably having a boiling point below 120° C. may be used. These volatile liquid organic solvents include methyl amyl ketone, diethyl ketone, dimethyl ketone, diisopropyl ketone, methyl isobutyl ketone, acetone, hexane, heptane, aliphatic naphtha, toluene, as well as mixtures of these volatile organic liquids.

Small percentages of sweet smelling oils and perfumes may in some cases be included in the spray composition to cut down the strong odor of the solvents. Additionally, small amounts of any conventional ultra-violet light absorber may be included in the composition of the invention to give the fabric additional resistance to the degradation caused by constant exposure to sunlight or other light sources. Typical ultraviolet light absorbers which may be utilized in the composition of this invention include 2,2',4-trihydroxybenzophenone, 2-hydroxy-4-dodecyl oxybenzophenone, ortho-nitro phenol, orthonitro-aniline, methyl salicylate, triethylene glycol disalicylate, cresyl phosphate, or the like. The inclusion of a per-

fume and/or an ultra-violet light absorber in the spray composition of this invention is optional. If such additives are included in the spray composition of the invention, they should constitute no more than approximately 2% by weight of the final spray composition.

As previously explained, the composition of the invention is applied from pressure cans of the "aerosol" type, such as are in common use for household purposes. The general technology of such gas pressurized cans is well known and forms no part of this invention.

The resin composition is applied to the fabric from an "aerosol" can by means of a conventional liquid or gaseous propellant. The preferred class of propellants which can be utilized in accordance with this invention are lower molecular weight vaporizable liquid halogen substituted alkanes having at least one substituted fluorine atom which have a boiling point lower than about 50° C. These alkanes are commonly known as the Freons. Generally these Freons have boiling points of from about minus 50° C. to about 50° C. Typical Freons which may be utilized as propellants in accordance with this invention include tetrafluoromethane, trifluoromethane, trichloronofluoromethane, dichlorotetrafluoroethane, dichlorodifluoromethane, monochlorodifluoromethane and dichlorodifluoromethane. Best results have been achieved by utilizing Freon 12 (dichlorodifluoromethane) as the propellant for resin mixture in the combination of solvents described. Other conventional gaseous propellants, such as nitrogen, carbon dioxide, methane, propane, ethane, or the like may be used. In formulating the spray composition of this invention, it has been determined that the composition should contain from about 42% to about 85% by weight of propellant based on the total weight of the composition.

The householder may apply the spraying composition of this invention to any conventional fabric to convert the fabric into a material suitable for use as a lamp shade or window shade. Typical fabrics which may be utilized to produce lamp shades or window shades in accordance with this invention include such synthetic fibers as nylon, Orlon, Dacron, Acrilan, viscose rayon, cellulose acetate or the like, and such natural fibers as wool, cotton, silk, linen or the like in woven or knitted form. The fabric may also be made from a combination or blend of synthetic fibers and natural fibers. The fabrics may be dyed or printed, with any desired design.

The composition of the invention is sprayed through a nozzle of a pressurized container onto the fabric until the fabric is uniformly treated with the spray composition. After such treatment, the treated fabric is allowed to dry so that the volatile components of the composition volatilize and leave the resin mixture firmly anchored to the fabric. Drying may be accelerated, as by applying heat to the treated fabric. However, the application of external heat to dry a fabric sprayed with the composition of this invention is unnecessary since this spray composition is particularly suited to dry at room temperature. Therefore, drying can take place by leaving the treated fabric exposed at room temperature for a short period.

For a fuller understanding of the nature and objects of the invention, reference may be had to the following examples of composition which are given as further illustrations of the invention, and are not to be construed in a limiting manner.

Example I

Ingredient:	Percent by wt.
Polyvinyl chloride -----	2.0
Polyvinyl acetate -----	4.5
Methyl ethyl ketone -----	15.5
Cyclohexanone -----	32.0
Freon 12 -----	46.0

This spraying composition is applied to a fabric in the following manner. First, a sheet is prepared by cutting

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a woven or knitted fabric into a rectangular body having a width of about 2½ feet and a length of about 5½ feet. This sheet is placed on a roller by stapling the top side of this sheet to the roller. The roller is then hung from shade brackets and the fabric is opened to its full length so as to expose the entire surface of the fabric to the atmosphere. The above composition is applied to the fabric by means of an "aerosol" container which is held about 6 or 7 inches from the fabric. The entire surface of the fabric, both front and back sides, is evenly sprayed with the aforementioned composition. After the entire surface of the fabric is covered with the spraying composition, spraying is stopped and the fabric is dried by allowing it to stand overnight on the roller at room temperature with its entire surface exposed to the atmosphere. The treated fabric is rendered stiff, but coupled with the desired degree of flexibility so that the treated fabric may be rolled up and down on the window shade roller. Additionally, the treated fabric is rendered water-resistant, and has increased crease resistance as well as enhanced crease recovery. All of these properties which were produced by spraying with the composition of the invention make the fabric thus treated well suited for use as a window shade.

Example II

Ingredient:	Percent by wt.
Polyvinyl chloride	3.5
Polyvinyl acetate	5.5
Diethyl ketone	15.0
Cyclohexanone	35.0
Freon 12	41.0

This spray composition is applied to the fabric in the same manner as described in connection with Example I.

Example III

Ingredient:	Percent by wt.
Polyvinyl chloride	4.0
Polyvinyl acetate	6.0
Methyl ethyl ketone	15.0
Cyclohexanone	30.0
Freon 12	45.0

This spraying composition is applied to the fabric in the same manner as previously described.

It is believed that the advantages and improved results of the invention will be apparent from the foregoing detailed description of a preferred embodiment of the invention. Various changes and modifications may be made without departing from the spirit and scope of the invention as sought to be defined in the following claims.

I claim:

1. A spraying composition for application to fabrics to produce window shades, lamp shades and the like comprising approximately 3 to 10% by weight of said composition of a resin mixture consisting of approximately 20% to 60% by weight of said mixture of polyvinyl chloride and approximately 40% to 80% by weight of said resin mixture of polyvinyl acetate, a solvent mixture for the resin comprising approximately 8% to 41% by weight of said composition of cyclohexanone and approximately 4% to 30% by weight of said composition of a volatile

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liquid organic solvent having a boiling point below 120° C., and approximately 42% to 85% by weight of said composition of a propellant which is a non-solvent for the resin.

2. The spraying composition of claim 1, wherein the liquid organic solvent is methyl ethyl ketone.

3. The spraying composition of claim 1, wherein the propellant is selected from the group consisting of liquid and gaseous halogen substituted alkanes having at least one substituted fluorine atom, said alkane having a boiling point below approximately 50° C.

4. The spraying composition of claim 3, wherein the propellant is dichlorodifluoromethane.

5. A spraying composition for application to fabrics to produce window shades, lamp shades and the like comprising approximately 2% by weight of said composition of polyvinyl chloride, approximately 4.5% by weight of said composition of polyvinyl acetate, approximately 32% by weight of said composition of cyclohexanone, approximately 15.5% by weight of said composition of methyl ethyl ketone, and approximately 46% by weight of said composition of dichlorodifluoromethane.

6. The method of treating a fabric with a resin to convert the said fabric into a material suitable for use as a window shade, lamp shade and the like comprising spraying onto said fabric so as to deposit thereon a composition comprising approximately 3% to 10% by weight of said composition of a resin mixture consisting of from approximately 20% to 60% by weight of said mixture of polyvinyl chloride and approximately 40% to 80% by weight of said mixture of polyvinyl acetate, a solvent mixture for the resin comprising approximately 8% to 41% by weight of said composition of cyclohexanone and approximately 4% to 30% by weight of said composition of a volatile liquid organic solvent having a boiling point below 120° C., and approximately 42% to 85% by weight of said composition of a propellant which is a non-solvent for the resin, and thereafter allowing said sprayed fabric to dry at room temperature.

7. The method of claim 6, wherein the propellant is selected from the group consisting of liquid and gaseous halogen substituted alkanes having at least one substituted fluorine atom, said alkane having a boiling point below about 50° C.

8. The method of claim 7, wherein the propellant is dichlorodifluoromethane.

9. The method of claim 8, wherein said organic solvent is methyl ethyl ketone.

References Cited by the Examiner**UNITED STATES PATENTS**

2,351,182	6/1944	Bateman	117—68.5
2,373,954	4/1945	Frankfurter	117—161
2,517,646	8/1950	Ewing	260—32.8
2,537,136	1/1951	Henn et al.	260—32.8
2,553,124	5/1951	Williams et al.	260—32.8
2,617,780	11/1952	Lutz	117—161

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