COLOR-SAFE, FAST DRYING, AQUEOUS WRINKLE RELAXING AND REDUCING COMPOSITION SPRAY-APPLIED ON CASUAL TO FINE CLOTHING AND FABRICS

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ABSTRACT
This invention is a wrinkle relaxing and reducing composition that mimics the dewrinking effects of steam. Quality water is used as the primary fabric relaxant and wrinkle reducer. A surfactant or combination of surfactants superweits the fabric allowing the water to work. An acid or several acids lower the pH to ensure that composition is color-safe. Optional hydrophilic fragrance(s) mask the alcohol odor and helps to identify the product. An alcohol or alcohols lower viscosity and hastens the drying process. The mechanical action of gently shaking or brushing fabric with free hand or forming fabric just after application of composition further enhances wrinkle elimination or reduction. Adding optional odor eliminating compounds and/or optional quaternary ammonium compounds keeps fabrics fresh longer, or refreshes malodorous garments by eliminating odorous compounds and/or reduces static cling, respectively, without significantly increasing residues. The composition is applied in any reasonable manner but preferably spray applied using a commercially available pre-compression sprayer or aerosol pressure container on fabrics in the home or in a commercial setting to relax and reduce wrinkles in casual to fine clothing and/or fabrics, respectively. It is color-safe, extremely fast drying, environmentally friendly and safe for use commercially and in the home. The invention also includes the application of the composition on a “forgotten load” garment or reusable or individually packaged fabric carrier sheet which is placed in the home dryer to relax and reduce wrinkles in casual to fine clothing in “forgotten” dryer loads and for “bulk” or commercial dewrinking.
COLOR-SAFE, FAST DRYING, AQUEOUS WRINKLE RELAXING AND REDUCING COMPOSITION SPRAY-APPLIED ON CASUAL TO FINE CLOTHING AND FABRICS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Provisional Applications filed with the USPTO on Sep. 19, 2000, Oct. 5, 2000, Feb. 6, 2001 and Jun. 4, 2001, having Application Nos. 60/233673, 60/237680, 60/266502 and 60/295477, respectively.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable.

REFERENCE TO A MICROFICHE APPENDIX


BACKGROUND OF THE INVENTION

[0004] This invention is a composition of matter. It is packages of such composition (which may vary in size and secondary purpose), or other articles of manufacture which include such composition, or apparatus for use in or peculiar to such method or process. This invention is also a fluid treatment and chemical modification of textiles and fibers, more specifically, a composition for enhancing the appearance of consumer textile goods. The composition is spray applied on fabrics to relax and reduce wrinkles in casual to fine clothing or fabrics. This invention is also a fluid treatment and chemical modification of commercial textiles and fibers, more specifically, a composition for enhancing the appearance of, and ease of manufacturing, processing, handling, maintaining or installing commercial fabrics and textiles. It is sprayed or otherwise applied on textiles, fabrics or other woven industrial/commercial complexes to relax and reduce wrinkles.

[0005] The present composition is color-safe, fast drying, environmentally friendly and safe for use on clothing and in the home. The composition may be pump spray applied, applied by pressurized aerosol spray canister, or by any other acceptable method. Preferably, a commercially available pre-compression trigger sprayer with multiple volume-per-stroke settings is used to deliver a fine atomized mist of the composition. Commercial fabrics are dewrinkled by delivering the composition via pressurized aerosol canister, atomizing sprayer, pre-compression sprayer or by any other acceptable method. Adding an optional malodor eliminating compound to the composition keeps fabrics fresh longer and/or refreshes malodorous garments by eliminating malodorous compounds. Adding a specific optional quaternary ammonium compound to the composition helps to reduce static cling without imparting a tacky residue.

[0006] The invention also includes the composition having reduced alcohol applied to near saturation on a garment that is part of a “forgotten” dryer load, or on a manufactured fabric carrier sheet which is then placed in the home dryer to dewrinkle “forgotten” dryer loads. A similar process may be used for “bulk load” commercial dewrinkling.

[0007] Wrinkle relaxing and reducing compositions are well established in the art. However, the prior art has proved to be less than satisfactory in meeting its objective of relaxing and reducing wrinkles in fabrics, including fine fabrics such as silk. The prior art has not met its objective of the development of a wrinkle reducing and relaxing composition that works effectively to dewrinkle, that does not leave a significant residue and which dries quickly—all at “household speeds.” Relating the prior art, Schwartz et al., U.S. Pat. No. 3,674,688, established a compound and process by combining alcohol and water with a cationic surfactant, preferably a quaternary ammonium compound. This composition is to be spray applied and the fabric manipulated to remove wrinkles. Thereafter, the composition is expected to take fifteen to sixty minutes to dry. The authors believe that wrinkle relaxing reducing compositions with extended drying times are inconvenient and ineffective for use as a laundry aid. Targoz, U.S. Pat. No. 5,573,695, noted correctly, “... the portions of a garment wetted by the Schwartz et al composition mars the appearance of the garment with excessive wetting having the potential for causing shrinkage ... .” It is generally recognized in the art that extended drying times may cause shrinkage, increase the likelihood of fabric distortion, cause fugitive dye bleeding, create an environment for spotting or rings, attract dust and dirt, foster cellulosic bloating and create the circumstances whereby newly introduced or existing dust or dirt dissolves into the fabric, soiling the otherwise freshly laundered fabric. The art also recognizes that compositions with extended drying times are not practical when used to dewrinkle commercial fabrics.

[0008] Jacobson et al., U.S. Pat. No. 4,661,268, formulated a composition wherein a water and alcohol solution is enhanced by the presence of at least two or three surfactants: a silicone-glycol copolymer surfactant, and/or a fluorinated alkyl ester surfactant either or both of which are to be combined with a quaternary ammonium salt surfactant. The Jacobson composition is to be spray applied in a fine mist and the fabric is then manually set and held until dry. Citing Targoz, U.S. Pat. No. 5,573,695, “The animal-based surfactants prove disadvantageous in the adequate lubrication of fibers and elimination of negative charge ... particularly in the treatment of fine fabrics such as silk.” In addition, the authors note that both animal-based surfactants and hereofore all quaternary ammonium salt surfactants are semi-volatile and dry leaving a tacky residue. A tacky residue is unacceptable to the consumer. It fosters staining and enhances prospects for soil. As such, the Jacobson composition is unsatisfactory for use as a home laundry aid or in commercial settings.

[0009] Agbomeirele et al., U.S. Pat. No. 5,100,566, formulated a water and alcohol solution having the addition of anionic silicones which is applied to fabrics to reduce wrinkles. This composition required an extended drying time. In addition, Targoz notes that, “... silicone-based compositions have not found satisfactory use with fine fabrics such as silks and the like.” Silicone-based compositions also leave objectionable residues. And, fine organic fabrics such as silks suffer by oversaturation as any cellulosic fiber is subject to cellulosic bloating when oversaturated. Cellulosic bloating occurs when saturated fibers release soluble lignin, a natural dyestuff Lignin moves to and concentrates at the point of evaporation, resulting in stains and/or ring-like discoloration stains. Therefore, the Agbomeirele et al composition would require extensive drying time and also increase the potential for staining.
In Kaufman et al., U.S. Pat. No. 3,600,325, an aerosol spray composition of alcohols and water is generally found to be less than effective for two reasons: 1) again, the purported need for large quantities of the composition to relax wrinkles; and, 2) again, extended drying times.

Church, U.S. Pat. No. 4,806,254, used large quantities of alcohol, glycerine and a nonionic surfactant in a composition which was ultimately found to need extensive drying time and to be less than useful on fine fabrics. Additionally, the art recognizes that glycerine extends drying times and may likely impart an objectionable residue on fabrics.

Targoz, in U.S. Pat. No. 5,573,695, relates the state of the art up to the year 1996. He states that, "... a need still exists in the art for effective, fast drying compositions of powders which quickly and readily relax wrinkles from textile fabrics and the like without leaving residues thereon." His solution was the development of a high purity deionized water and alcohol mixture containing a vegetable oil based cationic quaternary ammonium surfactant and another surfactant, spray applied on fabrics in a fine mist. Although Targoz advanced the art, his composition ultimately missed his goal. While the small quantity of surfactant used is effective relative to the surfactant's ability to enhance wetting, the composition contains nowhere near enough surfactant to eliminate significant static cling. And, you can not have it both ways. To effectively eliminate static cling a garment needs to be comparatively saturated with surfactant. The small amount of the cationic surfactant Targoz proposes can not achieve the static free state he promises. Increasing the amount of surfactant brings the negative implications of additional residues.

More importantly, the Targoz composition has a pH that is at best neutral or slightly basic. His composition has a high enough pH that fugitive dyes may bleed and run, ruining fabrics, especially the fine fabrics such as silks that Targoz claims to be able to safely dewrinkle. Neutral pH may not promote fugitive dye bleeding, however it would not prevent it in sensitive fabrics. Raising pH at all past neutral is a very definite danger insofar as fugitive dye bleeding is concerned. Buffered to a pH of 4.5, the present composition has a novel and practical solution to this problem. The present composition will safely dewrinkle without dyes bleeding.

Finally, Trinh et al, in U.S. Pat. No. 6,001,343, relates to a stable, aqueous wrinkle relaxing and reducing composition to be applied on casual to fine clothing and fabrics. Designed to mimic the tremendous dewrinkling effect of live steam, the authors view its active ingredient to be water. The composition is akin to a "shot of cold steam." The composition is color safe, which is a novel and practical improvement in the art. Unlike the prior art, the present composition leaves almost no residue. This composition is also novel and practical as it represents the most economical application of the active agent in that water is uniformly applied on an almost microscopic scale: the consumer applies micron sized particles and therefor uses only what is required to effectively dewrinkle. Very small concentrations of chemicals work effectively because of our approach. Application of such a small but effective scale virtually eliminates residue, and the fabric dries quickly. In contrast, the prior art used gross chemical application.

Using the present composition, the user may effectively spot treat localized areas. Optional malodor eliminating compounds keep fabrics fresh, longer, or refresh malodorous garments. Adding a specific optional quaternary ammonium compound to the composition helps reduce static cling without imparting a tacky residue. The mechanical action of gently shaking the garment on a clothes hanger or by the consumer's "free hand" brushing against the garment soon after application of composition further enhances wrinkle relaxation or reduction, especially with stubborn wrinkles. The mechanical action of hand stretching or forming a garment or fabric just after application of the composition allows for the formation of creases where desired. Additionally, the invention is the composition with reduced alcohol applied to near saturation on a garment that is part of a "forgotten" dryer load, or on a manufactured fabric carrier sheet which is then placed in the home dryer to dewrinkle "forgotten" dryer loads. A similar process may be used for "bulk load" commercial dewrinkling. This invention also pertains to dewrinkling commercial textiles and fibers.
BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0017] Not Applicable.

DETAILED DESCRIPTION OF THE INVENTION

[0018] Wrinkle relaxing and reducing compositions are well established in the art. However, the prior art has proved to be less than satisfactory in meeting the objective of relaxing and reducing wrinkles in fabrics, including fine fabrics such as silk. The prior art fell short of providing a safe, color safe, fast drying, environmentally friendly, wrinkle relaxing and reducing composition in a commercial setting and as a practical laundry aid. Beginning a new century, a new millennium, home, school and workplace fashions have changed. Starch and formal pressed, formal wear is no longer the norm. Causal to fine apparel is now accepted for all but the most formal occasions.

[0019] The present invention is a markedly novel and improved practical approach relative to the art. The present invention also brings forth a novel approach to the art of reducing and relaxing wrinkles. Please, consider that steam- ing fabrics is one of the best ways to achieve absolute wrinkle reduction and relaxation. In the steaming process the water vapor (steam) is the active which penetrates the fabric weave to swell and relax fibers into their original relaxed state. The present invention attempts to mimic the de-wrinkling effect of steam by causing extremely fine particles of the composition to penetrate fibers to swell and re-align fibers to their original relaxed configuration/orientation. The prior art seems confused in that the prior art often describes alcohols, silicones, surfactants and other ingredients as “fiber lubricants” and sometimes describes water as merely the “carrier” for these “active” chemicals. Although novel, this invention specifically recognizes that water plays the primary role in relaxing and reducing wrinkles.

[0020] The present composition is introduced to the fibrous fabric weave by a spray of fine mist, “cold steam,” preferably from a pre-compression trigger sprayer. Alcohol and a surfactant speed the introduction of water to the fabric fibers. Water then swells fibers, causing the fabric to take on its original, unwrinkled shape. Alcohol hastens drying.

[0021] Surfactants when added to water help reduce surface tension and enhance the introduction of water to the fabric medium. Linear alcohol ethoxylates are extremely effective wetting agents at very low concentrations and are subject to acceptable biodegradation rates. Linear alcohol ethoxylates are characterized as “super-wetters.” Linear alcohol ethoxylates, when subjected to the Draves Wetting Test at concentrations by volume at our preferred concentration, came in with a “wetting out time” of only ten seconds. Using these “super-wetters” in very low, but effective concentrations virtually eliminates residue. Our minimalist approach and the effectiveness of the ingredients ensures the lowest residue possible. Our minimalist approach also ensures the fastest drying times. For example, a 1.5 cubic centimeter sample of the present preferred composition was air dried under household conditions on a clear glass plate. One strained to see the minute amount of resulting residue.

[0022] Our preferred linear alcohol ethoxylates are so effective at reducing surface tension, with only minute amounts of surfactant very fine droplet/particles of the present composition can be introduced uniformly, effectively to the fibers of a fabric or garment—no more/no less than is necessary to effectively dewrinkle. Minute amounts of the present composition are effective at the goal of dewrinkling, and minute amounts of the composition contain very, very small amounts of surfactant. The same is true when the present composition is used in a commercial setting. By adding an optional malodor eliminating compound to the composition, the composition keeps fabrics fresh, longer, or refreshes malodorous garments by eliminating odorous compounds without significantly increasing residues. And, adding a specific optional quaternary ammonium compound, preferably benzethonium chloride, to the composition, the composition reduces static cling, without significantly increasing residues. Even more preferably, the optional quaternary ammonium compound dries to a crystalline solid, non-tacky residue. The only such quaternary ammonium compound to dry to a crystalline solid is benzethonium chloride.

[0023] The present composition preferably utilizes a pre-compression trigger sprayer. The pre-compression trigger sprayer sprays a uniform fine mist onto the fabric or garment without drips, splitting or non-uniform droplets which may cause spots on fabrics, especially fine fabrics. Modern pre-compression trigger sprayers deliver a uniform mist with droplet particle sizes in the range of several microns. The smaller the droplet, the greater likelihood of effective delivery of the present composition without waste, spotting or oversaturation. The smaller the droplet the more likely it is that the present composition mimics the effect of steam. Hence, all prior compositions would have likely been applied either by aerosol cans (which work but are no longer generally accepted/viable delivery mechanisms), or by spray heads that “split” at low trigger pressures or at the end of some or all of the trigger strokes.Splitting causes local oversaturation, spotting and possibly local discoloration, especially with fine fabrics.

[0024] Targozi would have experienced spitting of his composition. The Trinh et al composition presently marketed does experience spitting. The present composition, delivered by a pre-compression trigger sprayer sprays only enough of the composition to the fabric to provide effective wrinkle reduction and relaxation, much like steaming. And, one may effectively apply additional spray “shots” of the present composition to heavy fabrics and not significantly increase the risk of spotting. Then, over a short time and/or enhanced by a slight manipulation of the fabric, wrinkles are gone.

[0025] The composition is spray applied to garments from approximately ten to sixteen inches. The ideal pre-compression trigger sprayer for this composition has multiple volume-per-stroke settings providing variation to the amount of the composition being applied. This preferred, “regulated” pre-compression trigger spray would have settings for fine fabrics, causal wear, heavy fabrics and off.

[0026] In the prior art alcohol is often characterized as a “fellow lubricant,” something that imparts a lubricating coating to fabric fibers. In this invention, alcohol is recognized in two important ways: first, because it reduces the viscosity of the composition. A reduction in viscosity results because alcohol lowers the vapor pressure of the composi-
Lowering viscosity enhances wetting of fibers because it promotes small droplet formation as the composition leaves the pre-compression sprayer. Lower viscosity also promotes an ease of penetration of the fabric. Next, and more importantly, however, is the role of alcohol in drying the fabric, very quickly, after the composition is applied. Drying is due to alcohol’s lowering the vapor pressure at the fabric surface. Testing of the present composition has demonstrated the fastest drying times heretofore claimed in the art. Comparative tests between the present composition and Trinh et al clearly demonstrate a drying rate that is less than one half the drying time of Trinh et al. The present composition provides a practical drying period from application to use that allows the user to wear the garment shortly after dwrinkling, or at “household speed.” Tests have demonstrated drying times of thirty to sixty seconds for fine fabrics and from less than one minute to several minutes drying time with heavier fabrics. Clearly, the present composition delivers the most practical drying times in the art.

What we claim as our invention is:

1. A wrinkle relaxing and reducing composition to be applied on casual to fine clothing and commercial fabrics, comprised of water ranging from 67 to 93 percent by volume; a surfactant or surfactants ranging between 0.005 and 5.0 percent by volume; an acid or acids added in a percent by volume sufficient to lower the pH of the composition to a range from between 3 to 6; one or more alcohols in a percent by volume ranging from 6 to 18; and, a water soluble fragrance or combination of water soluble fragrances useful to mask the alcohol odor and help the consumer to identify the product.

2. The composition of claim 1, wherein said water is distilled, deionized or softened quality water ranging from 77 to 92 percent by volume.

3. The composition of claim 2, wherein said surfactant is a linear alcohol ethoxylate non-ionic surfactant ranging from 0.2 to 0.05 percent by volume, preferably at 0.01 percent by volume.

4. The composition of claim 3, wherein the acid is pure glycolic acid in a percent by volume between 2.0 and 0.001, preferably between 1.0 and 0.001 percent by volume, more preferably at 0.025 percent by volume and n-Propanol from 7.9 to 14.9 percent by volume.

5. The composition of claim 4, wherein said acid is selected from a group that consists of (1) pure glycolic acid in a percent by volume between 2.0 and 0.005, preferably between 0.5 and 0.01 percent by volume and (2) a lower aliphatic alcohol mixture in a percent by volume from between 4 and 1; preferably from between 3 and 0.5 percent by volume and (3) n-Propanol from 5.9 to 14.9 percent by volume, whereby the pH of the composition is approximately 4.5 ensuring that the composition is color safe.

6. The composition of claim 4, wherein said acid is selected from a group that consists of (1) pure glacial acetic/acrylic acid in a percent by volume between 0.9 and 0.001, preferably between 0.005 and 0.01 percent by volume and (2) a lower aliphatic alcohol mixture in a percent by volume from between 3 and 1; preferably from between 2 and 0.5 percent by volume and (3) n-Propanol from 5.9 to 12.9 percent by volume, whereby pH of the composition is approximately 4 to 5 ensuring that the composition is color safe.

7. The composition of claim 4, wherein said acid is selected from a group that consists of (1) pure citric acid in a percent by volume between 3.0 and 0.001, preferably between 1.7 and 0.002 percent by volume and (2) a lower aliphatic alcohol mixture in a percent by volume from between 3 and 1; preferably from between 2 and 0.5 percent by volume and (3) n-Propanol from 5.9 to 12.9 percent by volume, whereby pH of the composition is approximately 4 to 5 ensuring that the composition is color safe.

8. The composition of claim 4, wherein said acid is selected from a group that consists of (1) pure tartaric acid in a percent by volume between 2.0 and 0.001, preferably between 1.0 and 0.005 percent by volume and (2) a lower aliphatic alcohol mixture in a percent by volume from between 4 and 1; preferably from between 2 and 0.5 percent by volume and (3) n-Propanol from 7.9 to 11.9 percent by volume, whereby pH of the composition is approximately 4 to 5 ensuring that the composition is color safe.

9. The composition of claim 4, wherein said acid is selected from a group that consists of (1) pure phosphoric acid in a percent by volume between 0.09 and 0.001, and (2)
a lower aliphatic alcohol mixture in a percent by volume from between 4 and 1; preferably from between 2 and 0.5 percent by volume and (3) n-Propanol from 9.9 to 14.9 percent by volume, whereby pH of the composition is approximately 4 to 5 ensuring that the composition is color safe.

10. The composition of claim 4, wherein said acid is selected from a group that consists of (1) a combination of sulfuric, sulfamic, citric, glacial acetic, glycolic, tartaric, oxalic and phosphoric acids in a percent by volume between 4.0 and 0.001, preferably between 3.4 and 0.01 percent by volume and (2) a lower aliphatic alcohol mixture in a percent by volume from between 3 and 0.1; preferably from between 2 and 0.5 percent by volume and (3) n-Propanol from 5.9 to 12.9 percent by volume, whereby pH of the composition is approximately 4 to 5 ensuring that the composition is color safe.

11. Optionally, the composition of claim 4, wherein a pure concentrated odor eliminating compound is added in a percent by volume between 5.0 and 0.001, preferably between 0.4 and 0.09 percent by volume; and even more preferably in a percent by volume of 0.1 of Ordene #987-260C, developed by Belle Aire Fragrances, to keep fabrics smelling fresh longer, or to refresh malodorous garments by eliminating malodorous compounds.

12. Optionally, the composition of claim 4, wherein a pure quaternary ammonium compound, preferably Hyamine #1622, a product of Lonza, the only quaternary ammonium compound that drips to a non-tacky solid, is added in a percent by volume of between 2.0 and 0.001, preferably between 1.0 and 0.09 percent by volume; and even more preferably in a percent by volume from between 0.2 and 0.05 to reduce or eliminate static cling without significantly increasing residues.

13. Optionally, the composition of claim 4, wherein a pure quaternary ammonium compound, preferably Hyamine #1622, is combined with a linear alcohol ethoxylate added in an equal combined percent by volume between 2.0 and 0.001, preferably between 0.4 and 0.09 percent by volume; and even more preferably in a percent by volume of 0.05 percent by volume each to wet and reduce static cling.

14. A method of applying the composition of claim 4, on household or commercial fabrics uniformly to a fabric, more preferably to spray apply the composition uniformly to fabric, and even more preferably to apply a uniform line mist using a pre-compression sprayer on fabrics or garments from approximately eight to twenty four inches, preferably from eight to sixteen inches; and, then allowing the fabric to dry in a relaxed state.

15. The method and composition of claim 14, wherein the step of applying a uniform mist spray employs a commercially available pre-compression sprayer applying approximately one ml per stroke, even more preferably applying a uniform mist spray employs a multiple volume-per-stroke, constant particle size, pre-compression trigger sprayer, having settings marked specifically for a range of fabrics from casual wear at large volume spray to silks at small volume spray and to off at no volume for traveling without leaking.

16. The method and composition of claim 14, wherein a step for enhanced wrinkle relaxation, reduction or elimination after applying a uniform mist spray on a fabric or garment consists of a mechanical action on the fabric just after application of the composition which consists of the applicator/consumer's "free hand" brushing across the fabric.

17. The method and composition of claim 14, wherein a step for enhanced wrinkle relaxation, reduction or elimination after applying a uniform mist spray on a fabric or garment consists of a mechanical action on the fabric just after application of the wrinkle reducing composition that consists of the applicator/consumer gently shaking the clothes hanger upon which a treated garment is hanging.

18. The method of claim 14, wherein a fifth step for enhanced wrinkle relaxation, reduction of elimination after applying a uniform mist spray consists of the applicator/consumer's hand forming the fabric (pleats are an example).

19. A “forgotten” dryer load and/or “bulk” dewrinkling method of applying the present composition on a delivery mechanism comprising the steps of applying the composition to any “forgotten load” garment, a woven carrier and/or delivery sheet and placing same in household clothes dryer with the “forgotten load” or with the “bulk” load and volatizing the present composition through dryer load or bulk load, penetrating fabric which is then removed to dry in a relaxed state.

20. The composition of claim 4, packaged in various sized containers to include but not be limited to: commercial, refill, standard household, travel, aerosols, hotel/motel and complimentary.

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