This invention relates generally to hair-dressing lacquer compositions, and more particularly to hair-dressing lacquer compositions of the aerosol type containing a pressure-generating solvent as an atomizing or spraying aid.

Hair-dressing lacquer compositions sprayable by self-generated pressure, wherein alkyl halides having high vapor pressure at room temperature comprise the pressure-generating solvent or propellant, are known in the art. Such lacquers are commonly called aerosol hair-dressing lacquers and have usually been based on shellac solutions. They have an entirely different function and purpose than permanent wave compositions and are clearly distinguishable thereover. More specifically, permanent wave compositions are almost invariably water solutions or suspensions of substances which are brushed or combed into the hair, after which the hair is curled, set and otherwise dressed, and upon drying the hair assumes a more or less permanent set and style of dress. The drying process to develop the permanent set requires a relatively long period of time. Hair-dressing lacquers, on the other hand, are intended for spray application to the outer strata of hair, after the hair has been permanently waved, brushed, combed, or otherwise dressed, to retain the hair in its previously dressed condition. Such lacquers provide a substantially invisible hair net which holds the locks and outer strata of hair together, and thus enhance and preserve the dressed condition of the hair.

To serve their purpose effectively, hair-dressing lacquer compositions must be very fast evaporating in contrast to permanent wave compositions and must have good adhesion to human hair without imparting stickiness or brittleness thereto. They should enhance the natural sheen of the hair, rather than have a dulling effect, and they should be easily removed from the hair upon normal washing or shampooing. Moreover, they should be readily sprayable from the usual aerosol-type containers without clogging the valve of the container. It is apparent, therefore, that a hair-dressing lacquer of the aerosol type must meet a rather exacting combination of requirements to be considered satisfactory. Unfortunately, these requirements are seldom satisfied by previously proposed hair-dressing lacquer compositions.

Now in accordance with this invention, it has been found that highly satisfactory aerosol hair-dressing lacquers are provided by compositions containing as essential ingredients from about 0.5 to about 3 parts by weight of ethyl cellulose having an ethoxyl content between about 45% and about 50% by weight, from about 0.5 to about 3 parts of a water-sensitive ethyl cellulose plasticizer, from about 15 to about 65 parts of a lower aliphatic alcohol having from 1 to 3 carbon atoms in the molecule, and from about 35 to about 80 parts of a pressure-generating solvent of the group consisting of dichlorodifluoromethane and mixtures of dichlorodifluoromethane and 1,1,1-trichloromonofluorocethane containing at least about 30% by weight of dichlorodifluoromethane, the combined weight of ethyl cellulose and water-sensitive plasticizer in said lacquer being between about 1 and about 5% by weight, and the ratio of ethyl cellulose to water-sensitive plasticizer being between about 50:50 and about 85:15 by weight.

Examples showing specific compositions within the scope of the invention are given in the following table:

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl cellulose (45.5% ethoxy—44 cp. viscosity)</td>
<td>2.5 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9</td>
</tr>
<tr>
<td>Ethyl cellulose (49.9% ethoxy—85 cp. viscosity)</td>
<td>1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8</td>
</tr>
<tr>
<td>Dichlorodifluoromethane</td>
<td>38 38 38 38 38 38 38 38 38</td>
</tr>
<tr>
<td>Trichloromonofluorocethane</td>
<td>20 20 20 20 20 20 20 20 20</td>
</tr>
</tbody>
</table>

All figures in columns 1-9, inclusive, represent parts by weight.

Formulation of satisfactory aerosol hair-dressing lacquers in accordance with this invention requires the proper selection of (1) ethyl cellulose, (2) suitable ethyl cellulose modifiers or plasticizers, (3) suitable ethyl cellulose solvents, and (4) suitable pressure-generating solvents or propellants, each within certain specified limits and proportions, as set forth hereinafter.

The ethyl cellulose used in the compositions will have an ethoxyl content between about 45% and about 50%, and preferably between about 47% and about 49%, by weight. Within this range of ethoxyl content, ethyl cellulose exhibits optimum solubility in the mixture of solvents and propellants found necessary for the practice of this invention and also retains optimum solubility upon evaporation of the propellant component of the compositions. Although any of the commercially available viscosity types of ethyl cellulose can be employed, it is preferred to use the lower viscosity types having viscosities of about 25 cps, or less as determined on 5% by weight solutions in 80:20 toluene:ethyl alcohol at 25° C. Compositions in accordance with this invention will contain between about 0.5 and about 3 parts, and preferably between about 1 and about 2 parts by weight of ethyl cellulose.

The aerosol hair-dressing lacquers of this invention require the use of a water-sensitive plasticizer or modifier for the ethyl cellulose, and any water-sensitive ethyl cel-
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Lulose plasticizer or mixture of plasticizers can be employed, as desired. Many such materials are known, and those skilled in the art are well acquainted with them. All water-sensitive ethyl cellulose plasticizers are characteristically hydrophilic by nature and have a marked affinity for water. Typical water-sensitive ethyl cellulose plasticizers include by way of example, but not in limitation, glycerol tritrate, sorbitol propionate, mannitol propionate, triethyl phosphate, polyhydric alcohols such as ethylene glycol, diethylene glycol, polyethylene glycol, propylene glycol, dipropylene glycol, tripropylene glycol, polyethylene glycol, glycerol, and the like, partial fatty acid esters of polyhydric alcohols such as glycerol diacetate, ethylene glycol monoesterate, diethylene glycol monolaurate, diethylene glycol monoleate, alkyl esters of hydroxy fatty acids such as triethyl citrate, triethyl car- bonylate, triethyl acetate, dimethyl tartrate, dipropyl tartrate, alkylated phenol-ethylene oxide condensation products such as nonyl phenol-ethylene oxide, or tertiary butyl phenol-ethylene oxide condensates, polyoxyethylat- ed fatty alcohols, and polyoxyethylated vegetable oils.

It is presently preferred to employ materials such as di- ethylene glycol monolaurate, triethyl citrate, or nonyl phenol-ethylene oxide condensates as the water-sensitive ethyl cellulose plasticizers.

Compositions in accordance with this invention will contain between about 0.5 and about 3 parts by weight of water-sensitive ethyl cellulose plasticizer. However, an important relationship which must be adhered to in practicing this invention is the ratio of ethyl cellulose to water-sensitive plasticizer, which ratio must be maintained between about 50:50 and about 85:15 by weight. It will be apparent, of course, that film softness and suppleness will increase as the proportion of water-sensitive plasticizer to ethyl cellulose increases within the limits set forth. Generally, optimum results have been obtained employing ratios of ethyl cellulose to water-sensitive plasticizer between about 60:40 and about 70:30 by weight. The combined weight of ethyl cellulose and water-sensitive plasticizer in the aerosol hair-dressing lacquer of this invention will be between about 1% and about 5%, and preferably between about 1% and about 3%, by weight, based on the total composition.

It is highly important that the ethyl cellulose solvent in the compositions of this invention be limited to a lower aliphatic alcohol having from 1 to 3 carbon atoms in the molecule, as exemplified by methyl alcohol, ethyl alcohol, propyl alcohol and isopropyl alcohol. Preferably these alcoholic solvents should be substantially free of water, as exemplified by 200 proof ethyl alcohol which is the preferred ethyl cellulose solvent. However, these alcoholic solvents can contain small amounts of water, up to about 8% by weight, particularly if the valve and aerosol dispenser are made of corrosion-resistant materials such as nylon in the case of the valve, or aluminum in the case of the dispenser. From about 15 parts to about 65 parts by weight of a lower aliphatic alcohol as set forth above will be employed in the compositions of this invention.

Between about 35 parts and about 80 parts by weight of a pressure-generating solvent or propellant will be employed in the compositions of this invention. The pressure-generating solvent can be either dichlorodifluoro methane and 1,1,1-trichloro-1,2,2-trifluoroethane containing at least about 30% by weight of dichlorodifluoromethane.

It will be understood, of course, that the aerosol hair-dressing lacquers of this invention can contain the usual small amounts of various optional ingredients such as perfumes, antisepsics, emollients, bleaching agents, coloring agents, and the like, as desired, without departing from the spirit or scope of the invention.

The compositions of this invention may be conveniently prepared by charging the ethyl cellulose, water-sensitive plasticizer and alcohol solvent to an uncapped aerosol container or dispenser which is then cooled by refrigeration to a temperature below the boiling point of the pressure-generating solvent. The pressure-generating solvent is then added as a liquid to the refrigerated mixture, the aerosol dispenser is capped, the charged dispenser is allowed to return to room temperature, and the contents of the dispenser are agitated or tumbled to obtain a solution. Alternatively, the ethyl cellulose, water-sensitive plasticizer and alcoholic solvent can be mixed together at room temperature to form a lacquer which is then charged to an uncapped aerosol dispenser and refrigerated below the boiling point of the pressure-generating solvent, after which the aerosol-generating solvents is added as a liquid, the dispenser is capped and allowed to come to room temperature. It is also possible to charge an uncapped aerosol dispenser at room temperature with a lacquer containing the ethyl cellulose, water-sensitive plasticizer and alcoholic solvent, cap the dispenser, and then pump the requisite amount of pressure-generating solvent under pressure at room temperature into the capped dispenser through the valve mechanism. Other variations will be apparent to those skilled in the art.

What I claim and desire to protect by Letters Patent is:

1. A substantially anhydrous aerosol hair-dressing lacquer of the pressure-generating solvent type containing as essential ingredients in a single phase mixture from about 0.5 to about 3 parts by weight of water-insoluble organosoluble ethyl cellulose having an ethoxy content between about 45% and about 50% by weight, from about 0.5 to about 3 parts by weight of a water-sensitive ethyl cellulose plasticizer, from about 15 to about 65 parts by weight of a lower aliphatic alcohol having from 1 to 3 carbon atoms in the molecule, and from about 35 to about 80 parts of a pressure-generating solvent of the group consisting of dichlorodifluoromethane and mixtures of dichlorodifluoromethane and 1,1,1-trichloro-1,2,2-trifluoroethane containing at least about 30% by weight of dichlorodifluoromethane, the combined weight of ethyl cellulose and water-sensitive plasticizer in said lacquer being between about 1% and about 5% by weight, and the ratio of ethyl cellulose to water-sensitive plasticizer being between about 50:50 and 85:15 by weight.

2. An aerosol hair-dressing lacquer in accordance with claim 1 wherein the water-sensitive plasticizer is diethyl- gylene glycol monolaurate.

3. An aerosol hair-dressing lacquer in accordance with claim 1 wherein the water-sensitive plasticizer is triethyl citrate.

4. An aerosol hair-dressing lacquer in accordance with claim 1 wherein the water-sensitive plasticizer is diethylene glycol monolaurate.

5. An aerosol hair-dressing lacquer in accordance with claim 1 wherein the water-sensitive plasticizer is diethylene glycol.

6. An aerosol hair-dressing lacquer in accordance with claim 1 wherein the water-sensitive plasticizer is a mixture of up to 100% diethylene glycol and up to 100% glycerol tritrate.

7. An aerosol hair-dressing lacquer in accordance with claim 1 wherein the lower aliphatic alcohol is 100% 200 proof ethyl alcohol.

8. A substantially anhydrous aerosol hair-dressing lacquer of the pressure-generating solvent type containing the following essential ingredients in a single phase mixture:

- Water-insoluble organosoluble ethyl cellulose (about 48% ethoxy, about 10 cp. viscosity) About 2
- Diethylene glycol monolaurate About 1
- 200 proof ethyl alcohol About 47
- Dichlorodifluoromethane About 50

(References on following page)
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