

[54] **FABRIC CONDITIONERS**

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117/199.5 CQ

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[58] **Field of Search** **252/8.8, 8.75, 8.7, 524,**
252/528, 542, 547; 117/139.5 C, 139.5 Q

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[57] **ABSTRACT**

A fabric conditioning formulation is disclosed which is
an aqueous emulsion of a cationic fabric softening ma-
terial. This invention discloses the use of low tempera-
ture stabilizers for such emulsions including moderate
molecular weight quaternary ammonium compounds
and a number of nonionic and amphoteric materials.
Preferably the moderate molecular weight ammonium
compound is used in combination with one or more of
the nonionic, anionic, or amphoteric substances. Opti-
cal brightening agents suitable for use in fabric soften-
ing formulations are also discussed.

16 Claims, No Drawings

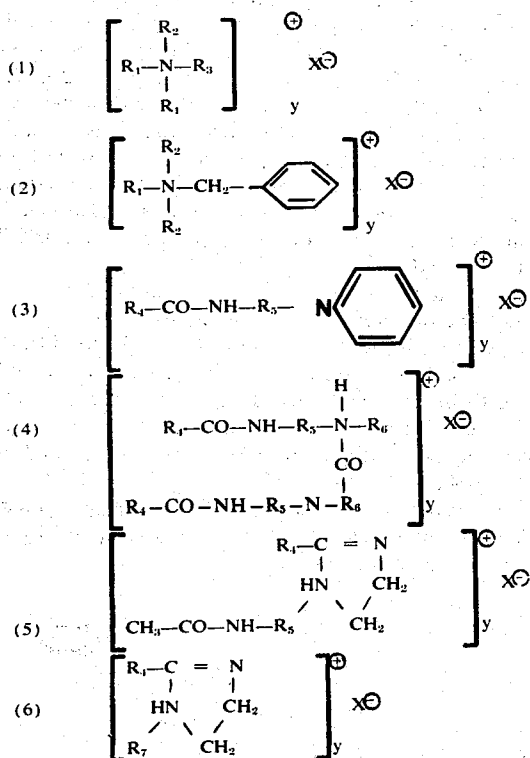
FABRIC CONDITIONERS

This application is a continuation in part of our co-pending application Ser. No. 295,543 filed July 16, 1963.

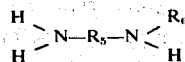
The present invention relates to novel fabric conditioning formulations, and in particular, to fabric conditioning formulations which provide improved brightness in the conditioned fabric, and to aqueous emulsions of fabric conditioning compounds having improved stability under cyclic freezing and thawing conditions.

An important problem in the formulation of practical fabric conditioners is that many common fabric conditioning compounds tend to quench or reduce the brightening activity of optical brighteners which may remain from the detergent used in the washing cycle. Experimentation with various optical brighteners has heretofore led to the conclusion that when admixed with, or contacted by, a fabric conditioner, optical brightening activity is reduced. Thus, the common fabric conditioning compounds appear to be antagonistic toward the usual optical brightening compounds.

According to the present invention, certain novel combinations of fabric conditioners and optical brighteners have been discovered which are not subject to this disability. The novel formulations of the present invention comprise a mixture containing from 99.5 to 80 parts by weight of a fabric conditioner selected from the group consisting of:

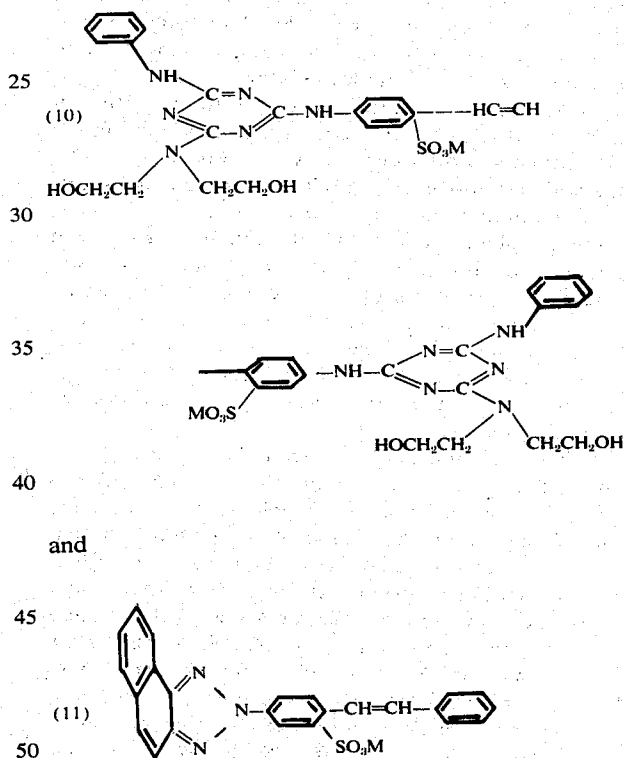


7. diethyl amino ethanol-stearamide-ethyl sulfates;
8. the reaction product of an amine having the formula R_1NH_2 and an epichlorohydrin; and
9. the reaction product of 2 moles of an acid of the formula R_4COOH and an alkylene diamine of the formula



In the foregoing formulas, R_1 is an aliphatic hydrocarbon group containing from 16 to 20 carbon atoms; R_2 is an alkyl group containing from 1 to 3 carbon atoms; R_3 is selected from the group consisting of R_1 and R_2 ; R_4 is an aliphatic hydrocarbon group containing from 15 to 19 carbon atoms; R_5 is an alkylene group containing from 1 to 2 carbon atoms; R_6 is a hydroxy-alkyl group containing from 1 to 3 carbon atoms; R_7 is an alkyl group of 1 to 3 carbon atoms; X is an anion selected from the group consisting of halides, sulfates, alkyl sulfates having 1 to 3 carbon atoms in the alkyl group, and acetates, and y is the valency of X .

One of more of the foregoing fabric conditioners may be mixed with from 0.5 to 20 parts by weight of at least one optical brightener selected from the group consisting of:



wherein M is a cation selected from the group consisting of hydrogen and an alkali metal.

Surprisingly, mixtures of the foregoing type not only overcome the reduction in brightening normally caused by the cationic fabric conditioners, but also provide optical brightening in addition to the brightening obtained by the use of a fluorescent dye-detergent composition in the preceding washing step.

A further aspect of the present invention relates to the emulsions of the above fabric conditioning compounds, with or without added brighteners, having improved stability when subjected to cyclic freezing and thawing conditions. It has been observed that such emulsions frequently gel irreversibly when subjected to cyclic freezing and thawing conditions. The tendency

to irreversibly gel is accentuated by the presence of optical brighteners of the type described above.

Certain non-ionic and amphoteric compounds have been found effective as emulsion stabilizers to mitigate the tendency of emulsions of the foregoing type to gel irreversibly under cyclic freezing and thawing conditions. These stabilizers, when added in concentrations ranging from a fraction of a per cent to 2 to 3 per cent by weight of the total formulation, stabilize the emulsion and prevent the formation of an irreversible gel in the manner described above. Such stabilizers, however, have the disadvantage that they tend to reduce the fabric conditioning efficiency of the active ingredients, particularly when present in a concentration in excess of about 1%.

As stated, in formulating emulsions which contain both a fabric conditioner and an optical brightener of the type described above, it has been noted that the problem of irreversible gelation is aggravated. While the addition of larger amounts of stabilizer would overcome the stability problem, the use of sufficient stabilizer to prevent irreversible gelation of an emulsion of a fabric conditioning compound and an optical brightener would seriously interfere with the fabric conditioning properties of the formulation.

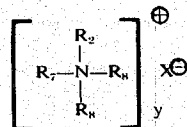
According to this further aspect of the invention, it has been discovered that aqueous emulsions of fabric conditioners of the foregoing type can be stabilized by the addition of from about ¼% to about 2% of a short-chain quaternary ammonium compound, i.e., one containing aliphatic radicals having from 10 to 14 carbon atoms. The short-chain quaternary ammonium compounds may be used as emulsion stabilizers either alone or in conjunction with other known emulsion stabilizers. Such emulsions are superior fabric conditioners because the quaternary ammonium compounds do not adversely affect the fabric softening properties of the active compounds.

It has been further discovered that by using such short-chain quaternary ammonium compounds as emulsion stabilizers, it is possible to prepare stable emulsions of fabric conditioning compounds containing an optical brightener which retain superior softening and brightening properties. Because the short-chain quaternary ammonium compounds do not interfere with the fabric conditioning compounds of the active ingredients, it is possible to use them in emulsions containing both fabric conditioning compounds and optical brighteners in amounts sufficient to prevent irreversible gelation without affecting the ultimate fabric softening properties of the emulsion. In this event, however, it is generally preferred to use mixtures of short-chain quaternary ammonium compounds and other emulsion stabilizers, inasmuch as emulsions containing

high concentrations of the short-chain quaternary ammonium compounds tend to separate on standing.

Stable fabric conditioning emulsions of the present invention consist essentially of the following compounds in approximately the following proportions, wherein the percentages are based on the weight of the total composition:

- An active fabric conditioning compound selected from the group consisting of compounds (1) through (9) above, inclusive, the total amount of said compounds being from about 4% to 7%;
- from about ¼% to about 2% of a low temperature stabilizing agent which is a short-chain quaternary ammonium compound having the generic formula:

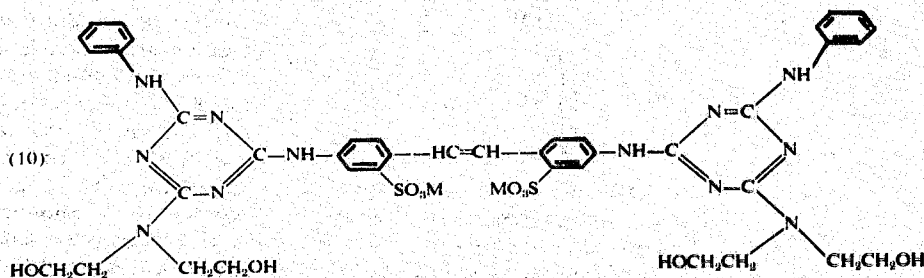


wherein R_7 is an aliphatic hydrocarbon group containing 10-14 carbon atoms, and each R_8 is selected from the group consisting of R_2 and R_7 , and R_2 , X and y are as defined above;

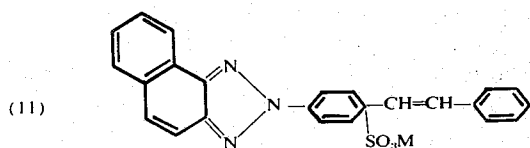
- from about 0.005% to about 0.10% of an ionizable salt selected from the group consisting of inorganic salts and salts of organic acids containing from 1 to 4 carbon atoms;
- no more than about 1.0% of a lower aliphatic alcohol;
- up to about 1% of a supplemental low temperature stabilizing agent selected from the group consisting of N-lauryl-β-amino propionic acid, dimethyl cocoamine oxide, the polyoxyethylene ester of tall oil having from 8 to 30 ethylene oxide units, polyoxyethylene sorbitan monolaurate having 6 to 20 ethylene oxide units, dodecyl methyl sulfoxide, the condensates of straight and branched chain unsubstituted aliphatic alcohols having 8 to 20 carbon atoms with from 1 to 30 moles of ethylene oxide, and alkyl phenol-ethylene oxide condensates having 8 to 12 carbon atoms in the alkyl chain and 8 to 30 ethylene oxide units; and
- an amount of water sufficient to make 100%.

While the foregoing represents the formula of a simple emulsion which may be used as a fabric conditioning formulation, it may be desirable, as mentioned above, to include an optical brightener. In this event, the formulation consists essentially of the ingredients mentioned above in paragraphs (a) to (d) and the following additional ingredients:

- from about 0.10% to about 0.30% of an optical brightener of the stilbene dye type selected from the group consisting of:



and



wherein M is a cation selected from the group consisting of hydrogen and an alkali metal;

- h. from 0.20% to 1.0% of a supplemental low temperature stabilizing agent selected from the group consisting of N-lauryl-β-amino propionic acid, dimethyl coco amine oxide, the polyoxyethylene ester of tall oil having 8 to 30 ethylene oxide units, polyoxyethylene sorbitan monolaurate containing 6 to 20 ethylene oxide units, dodecyl methyl sulfonate, the condensates of straight and branched chain unsubstituted aliphatic alcohols having 8 to 20 carbon atoms with from 1 to 30 moles of ethylene oxide, and alkyl phenol-ethylene oxide condensates having from 8 to 12 carbon atoms in the alkyl group and 8 to 30 ethylene oxide units;
- i. an organic acid selected from the group consisting of aliphatic acids containing from 1 to 3 carbon atoms and hydroxy aliphatic acids containing from 1 to 4 carbon atoms in an amount sufficient to produce a pH in the final solution of not greater than about 7; and
- j. an amount of water sufficient to make 100%.

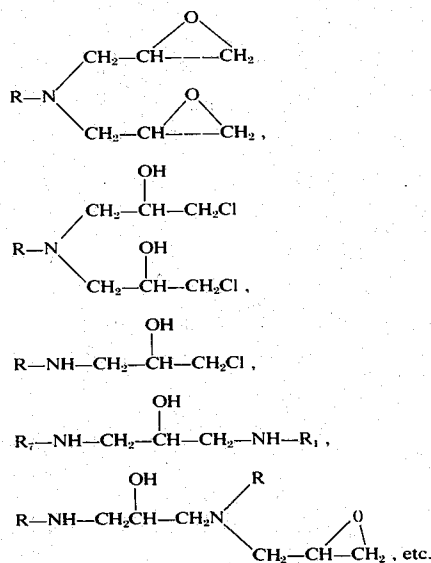
By the term "consisting essentially of" used in defining the foregoing compositions, it is intended that the composition may contain such optical additional ingredients as are commonly included in fabric conditioning emulsions, to improve the consumer acceptance thereof, but which do not materially affect the fabric softening properties of the emulsions. Typical optional ingredients include, but are not limited to, perfumes, colorants and germicides.

The active fabric softening compounds, (1) through (9) of the foregoing formulations, are known in the art. In the preferred embodiments of the foregoing formulations, the fabric conditioning compound is a long-chain quaternary ammonium compound, (1) above, or an alkylene amide compound, (9) above, or a mixture thereof. The long-chain quaternary ammonium compounds (1) which may be used in the preferred embodiment are those containing from 2 to 3 long-chain aliphatic hydrocarbon groups and 1 to 2 lower alkyl groups on the quaternary ammonium nitrogen. The long-chain aliphatic group may contain 16 to 20 carbon atoms, may be straight or branched chain, and may be saturated or unsaturated. For commercial convenience, such materials are commonly derived from tallow, which contains substantial amounts of C₁₈ fatty acids.

As is well known in the art, the fabric conditioning properties of the quaternary ammonium compounds (1) are affected by the length of the long-chain aliphatic hydrocarbon radical. Thus, radicals of shorter chain length, i.e., below about 16 carbon atoms, are not preferred because they are substantially less effective as fabric conditioners. If the quaternary ammonium compound contains long chain radicals, having more than 20 carbon atoms, it tends to impart an undesirable

water repellancy to the fabric. Experience has shown that compounds containing from 16 to 20 carbon atoms in the aliphatic group provide a satisfactory balance in the fabric conditioning property.

- 5 The lower alkyl group of the quaternary ammonium compound (1) should contain from 1 to 3 carbon atoms, and may be a straight or branched chain group. The most important groups are methyl, ethyl, propyl and isopropyl radicals.
- 10 The anion portion of the long chain quaternary ammonium compounds (1) may be a halide, particularly chloride, bromide, or iodide, a sulfate or an alkylsulfate such as methyl sulfate, or an acetate.
- 15 Preferred long chain quaternary ammonium compounds (1) for use in this invention have two long chain aliphatic and two lower alkyl groups. Typical compounds are dihexadecyl dimethyl ammonium bromide, distearyl diethyl ammonium chloride, distearyl dipropyl ammonium chloride and ditallow dimethyl ammonium methyl sulfate. Quaternary ammonium compounds containing three long chain aliphatic groups may be used, but lesser quantities may be required, as the fabric conditioning properties are affected by the number of long chain aliphatic groups. A typical compound of this category is tristearyl monomethyl ammonium chloride.
- 20 The reaction product of a fatty amine and epichlorohydrin, compound (8), probably contains a number of chemical entities having fabric softening ability. Potential reaction products formed by these materials include



Because of the bifunctional properties of the reactants, numerous other species are also possible and may be present.

The fatty acid amides, compound (9), which may be used in the preferred embodiments are the products of the reaction of one mole of a long-chain fatty acid with two moles of a hydroxyalkyl alkylamine diamine. The long-chain fatty acid should contain from 16 to 20 carbon atoms as described above with respect to the long-chain aliphatic hydrocarbon portions of the quaternary

ammonium compounds (1). The hydroxyalkyl group may contain from 1 to 3 carbon atoms, typical groups being methanol, ethanol and propanol radicals. The alkylene group may be either methylene or ethylene. The preferred compounds contain about two fatty acid groups having a typical formula such as N,N'-distearoyl-N'-hydroxyethyl ethylene diamide. While reaction product of the fatty acid and alkanol alkylene diamine is nominally a diamide, spectral analysis shows that a number of chemical species are present in the material. A typical analysis indicates that the product contains about 25% cationics such as imidazoline, the balance being esters and amides.

The foregoing fabric conditioners may be used alone in the preferred formulations, if desired. It has been discovered, however, that improved fabric conditioning properties are obtained if the quaternary ammonium compounds and the diamides mentioned above are used together in the weight ratio of about 1:4 to 4:1.

In place of the preferred compounds (1) or (9), or mixtures thereof as described above, compounds (2) through (8) may be used alone or in combination with any of the fabric conditioners described herein. In each case, the fabric conditioning compounds are characterized by a cationic nitrogen atom carrying one or more long-chain aliphatic or carboxy hydrocarbon groups, having 16 to 20 carbon atoms. These long-chain groups are as described above with respect to the preferred compounds (1) and (9). The compounds (2) to (8) also contain various other functional groupings of lower alkyl, lower alkylene, lower hydroxyalkyl and lower acyl radicals. These lower groups generally contain from 1 to 3 carbon atoms, and are analogous in description to the lower alkyl, lower hydroxyalkyl and lower alkylene groups discussed above in connection with compounds (1) and (9).

Where the active fabric conditioner is used in the aqueous emulsion, described in the foregoing formulations, the concentration of the fabric conditioning compound in the formulation does not affect the fabric conditioning properties of the emulsion. However, the preferred emulsions contain between about 4 and 7% by weight of the active ingredient. If excessively high concentrations of fabric conditioning compounds are used, the emulsion becomes a hard gel and is not desirable for household use. On the other hand, a weak solution is not preferred because of the large amounts of emulsion which would then be required to provide an effective amount of the fabric conditioning compound in the rinse water. Experience has indicated that emulsions containing from 4% to 7% of the fabric conditioning compounds are most acceptable from the consumer's standpoint.

As stated, an important feature of the present invention is the use of an emulsion of the foregoing fabric conditioner in aqueous emulsions in which a short-chain quaternary ammonium compound is provided to stabilize the emulsion against irreversible gelation at low temperatures. The short-chain quaternary ammonium compounds are particularly desirable as low temperature stabilizers because they have the property of preventing irreversible gelation during cyclic freezing and thawing. At the same time, they do not interfere with the fabric conditioning properties of the active ingredients. Hereinafter and in the appended claims, these compositions will be designated as low temperature stabilizing agents.

For use in conjunction with the usual commercial emulsions, containing from about 4 to 7% of a fabric conditioning compound, about $\frac{1}{4}$ to about 2% of the low temperature stabilizing agent should be provided. In the preferred formulation, the amount of low temperature stabilizing agent is between $\frac{1}{4}$ and 1%.

Amounts less than one-fourth percent of the low temperature stabilizing agent may be used, particularly if the formulation contains relatively small amounts of the fabric conditioning compounds. However, such small concentrations of the short-chain quaternary ammonium compounds have relatively little stabilizing value.

The maximum usable concentration of the low temperature stabilizing agent depends on the high temperature stability of the resulting emulsion. If amounts of short-chain quaternary ammonium compounds in excess of about 2% are used, it has been found that the resulting emulsion will tend to separate on standing at room temperature. It is preferred that the amount of short-chain quaternary ammonium compound be less than 1% since emulsions containing more than 1% of the short-chain quaternary ammonium compound tend to separate on standing when moderately warmed, i.e., at about 125°F.

Short-chain quaternary ammonium compounds which may be used to provide improved emulsion stability at low temperatures have from 1 to 3 short-chain aliphatic hydrocarbon radicals containing from 10 to 14 carbon atoms, and from 1 to 3 lower alkyl radicals containing from 1 to 3 carbon atoms. The short-chain aliphatic hydrocarbon radicals may be straight or branched chain, and may be saturated or unsaturated. For commercial convenience, the aliphatic hydrocarbon radicals are usually derived from natural sources such as coconut oil, although synthetic sources may be used. The lower alkyl radicals may be straight or branched chain such as methyl, ethyl, propyl or isopropyl. The anion portion of the quaternary ammonium compound may be a sulfate or halide, especially bromides, chlorides or iodides.

Preferred compounds have two aliphatic radicals and two lower alkyl radicals. Illustrative compounds are didecyl diethyl ammonium chloride, and ditetradecyl dimethyl ammonium chloride. A preferred compound is dicoco dimethyl ammonium chloride. Mono- and tri-substituted quaternary ammonium compounds may be used, such as monococo triethyl ammonium chloride, and tricoco monomethyl ammonium chloride. Such compounds have greater or lesser value as emulsion stabilizers depending on the number of aliphatic groups on the ammonium nitrogen. Accordingly, greater or lesser amounts of these compounds may be used.

Nonionic or amphoteric compounds also possess low temperature stabilizing properties in fabric conditioning emulsions. These are referred to as supplemental stabilizers in the emulsion of this invention, in amounts up to 1% to supplement the effectiveness of the above short chain quaternary ammonium stabilizer. Such supplemental stabilizers are especially advantageous where the emulsion may require excessive amounts of the short-chain cationic stabilizer, such as an excess of about 1% to 2%, as discussed above. Under these circumstances, up to 1% of a material selected from the group consisting of N-lauryl- β -amino propionic acid, dimethyl coco amine oxide, the polyoxyethylene ester of tall-oil having from 8 to 30 ethylene oxide units,

polyoxyethylene sorbitan monostearate having from 6 to 20 ethylene oxide units, dodecyl methyl sulfoxide, ethylene oxide condensates of straight and branched chain unsubstituted aliphatic alcohols having from 8 to 20 carbon atoms and from 1 to 30 ethylene oxide units, and alkyl phenol-ethylene oxide condensates having 8 to 12 carbon atoms in the alkyl chain and 8 to 30 ethylene oxide units. Amounts greater than 1% of the foregoing compounds are generally not preferred as emulsion stabilizers, as large amounts of these stabilizers adversely affect the fabric softening ability of the fabric conditioning-active ingredients which are present.

In addition to providing for the presence of a stabilizer in the emulsion of the fabric conditioning compounds, certain other limitations on the emulsion composition must be observed in order to insure adequate stability. It has been discovered that in order to obtain satisfactory emulsions, the amount of ionizable salts present should be between 0.005% and 0.10% and further, the amount of lower aliphatic alcohols present should be less than 1.0%.

The amount of ionizable salts present in the fabric conditioning formulations has been found to exert an influence on the viscosity of the emulsion. Thus, at extremely low concentrations, i.e., less than 0.005%, decreasing the amount of ionizable salts increases the viscosity of the emulsion. On the other hand, at higher concentrations, i.e., in amounts in excess of 0.10%, increasing the amount of ionizable salts tends to thicken or solidify the emulsion. An emulsion of optimum fluidity is obtained if the formulation contains between 0.005% and 0.10% of ionizable salts.

Typical ionizable salts affecting the fluidity of the emulsion are the salts of the mineral acids with strong bases, such as ammonium and the alkali metals. Most commonly, such salts include sodium, potassium and ammonium sulfates, and halides, phosphates and other such salts resulting as by-products in the manufacture of the various raw materials used in preparing fabric conditioning emulsions. If hard water is used in the preparation of the fabric conditioning emulsions the ionizable salts therein have also been observed to affect the viscosity of the emulsions. These include the divalent and trivalent metal salts, such as calcium chloride, barium chloride, and other alkaline earth salts, and aluminium chloride and ferric chloride, as well as nitrates, sulfates, and phosphates of the aforementioned metals. Other ionizable salts affecting the fluidity of the emulsions are the soluble salts of the abovementioned metallic ions with organic acids containing from 1 to 4 carbon atoms. These include the aliphatic acids such as formic, acetic, propionic and the substituted acids such as the hydroxy aliphatic acids, i.e., citric acids, tartaric, malonic and maleic acids.

In the preferred practice of this invention fabric conditioning formulations are prepared from ingredients selected so that they will be substantially free of salts.

To the resulting, substantially saltfree emulsion, a controlled amount of an ionizable salt is added. Salts of the hydroxy aliphatic acids are particularly desired for the purpose.

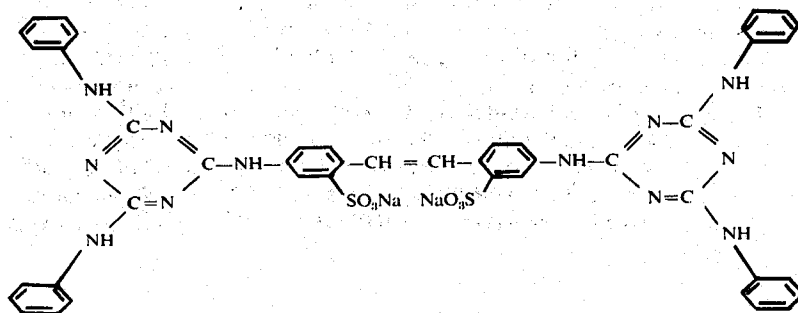
An unexpected discovery of the present invention is that lower aliphatic alcohols adversely affect the low temperature stability of emulsions of fabric conditioning compounds. While in the normal case one would expect that such alcohols as methyl alcohol, ethyl alcohol, or isopropyl alcohol would improve the low temperature stability of an aqueous emulsion, it has been discovered that in the emulsions of the instant invention, the presence of excessive amounts of alcohol adversely affects low temperature stability. In the preferred formulations, the emulsion is substantially free of alcohol. Inasmuch as many of the commercially available raw materials used in the formulating emulsions contain small amounts of alcohol, it is not practical in many instances to prepare alcohol-free emulsions. Satisfactory results are obtained, generally, provided that the amount of alkyl alcohol is below about 1%.

The foregoing techniques for improving the physical stability of a fabric softening emulsion are preferably used jointly, especially when an optical brightener is present. It will be appreciated that any one of the foregoing methods may be used to improve emulsion stability desired.

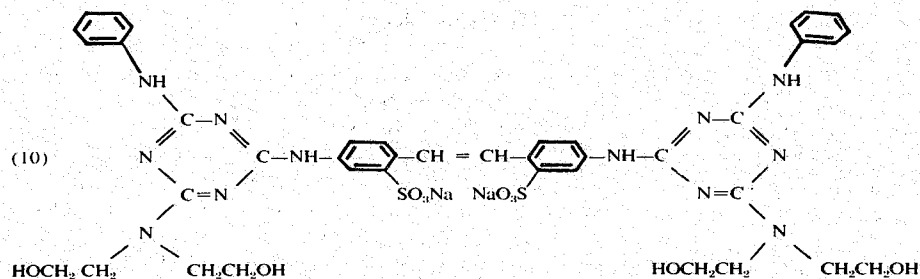
As stated, an important part of this invention relates to fabric conditioning formulations to which an optical brightener has been added. Such formulations may be prepared in either the dry state or as emulsions. While formulators of fabric conditioning compounds have realized the desirability of adding an optical brightener to the compounds, it has been found that many combinations of optical brightener and fabric conditioners result in a marked reduction in the effectiveness of the brightener.

The reasons for this result are not understood. The fabric conditioners such as described above are water-insoluble compounds, and accordingly, it is thought to be unlikely that any substantial amount of the conditioner is deactivated by the formation of a complex between the large ionized cations of the fabric conditioner with the large ionized anions of the optical brightener. One possible explanation for this result may lie in the mechanism by which the fabric conditioner and optical brightener are bonded to the cloth fabric being treated.

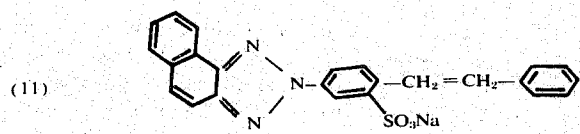
Whatever the explanation of this adverse interaction, many seemingly contradictory results have been observed. For instance it has been observed that when a mixture of a quaternary ammonium fabric conditioner and an amide type fabric conditioner, such as compounds (1) and (9) described above, are admixed with a stilbene dye having the structure:



many repeated applications are required before acceptable brightening activity is obtained, although the dye, in the absence of the fabric conditioners, is known to be extremely effective. By contrast, when the fabric conditioners are mixed with a stilbene dye having the formula:



optical brightening is obtained after only one or two rinsings. A second optical brightener according to the present invention which has been found to yield such unexpected results has the formula:



In the foregoing dyes, the sodium cation attached to the sulfonate group may be replaced by hydrogen or another alkali metal.

Mixtures of the foregoing dyes and fabric conditioners may be used in either dry form or in aqueous emulsions as has been already mentioned. When prepared into a dry, or granulated fabric conditioning formulation, the composition should contain from 0.5 to 20 parts by weight of the optical brightener, and from 99.5 to 80 parts of the fabric conditioner.

Satisfactory results may be obtained by a simple dry blending of the granulated solids. However, other methods of preparation, such as co-melting the solids, may also be used.

The relative proportions of the fabric conditioner and optical brightener employed will depend on the relative need for softening and whitening of the fabric. Where the primary objective is softening, and relatively little whitening is needed, the ratio of softener to brightener will be relatively high. Conversely, where it is desired to provide a substantial amount of whitening during the fabric conditioning step, the ratio of fabric conditioner to optical brightener will be considerably lower. The percentages of fabric conditioner and dye may be adjusted within the above-stated limits to suit the requirements of each case.

In addition, the solid granulated products may contain solid diluents. Such diluents, of course, should not be present to such an extent that unreasonable amounts of the product would be required to provide satisfactory fabric softening; however, the diluted mixture may

contain as little as 1% of the active fabric conditioner. Suitable diluents should be substances that do not interfere with the function of the optical brightener or fabric conditioner. These include, but are not limited to, the soluble alkali and alkaline earth salts of the mineral acids, such as sodium chloride, potassium chloride,

as well as sulfates, borates, citrates, phosphates, urea and the like.

When mixtures of the foregoing optical brightener and fabric conditioner are used in emulsions, it has

been found that the emulsion rapidly tends to become a heavy, viscous mass. One factor accounting for this result is that the commercially available sources of optical brighteners of the foregoing type contain substantial amounts of ionizable salts. Thus, in one case, an optical brightener containing 68% active material, when added at a concentration of 0.2% by weight, provides almost 0.1% ionizable salts. As discussed above, such high levels of salts cause the emulsion to become undesirably viscous. This may be avoided by the selection of salt-free raw materials.

Incorporation of the foregoing optical brighteners, even in the salt-free form, however, gives rise to a physical instability problem. At temperatures below freezing (about 30° F.) the emulsion thickens to a gel-like consistency, and does not return to a fluid state upon subsequent storage at room temperature.

To overcome this difficulty, additional amounts of low temperature stabilizer are required. For this purpose, the short chain quaternary ammonium compounds may be used, provided that the concentration of the short chain quaternary ammonium compounds is not so high as to adversely affect the stability of the resulting emulsion. However, in the usual case it is not possible to provide a sufficient amount of a short chain quaternary ammonium compound to completely stabilize the emulsion. Accordingly, the addition of a low level of a second, or supplementary, emulsion stabilizer is preferred.

The emulsion stabilizers are the amphoteric and non-ionic compounds described above, which, as pointed out, are effective stabilizers in their own right and may be used above if desired. Compounds which may be used include: N-lauryl-β-amino propionic acid, dimethyl coco amine oxide, the polyoxyethylene ester of tall oil containing 8 to 30 ethylene oxide units, polyoxyethylene lauryl ether containing 1 to 30 ethylene oxide units, polyoxyethylene sorbitan monolaurate contain-

ing 6 to 20 ethylene oxide units, dodecyl methyl sulfoxide, ethylene oxide condensates of straight and branched chain unsubstituted aliphatic alcohols containing 1 to 30 ethylene oxide units and alkylphenol ethylene oxide condensates having 8 to 12 carbon atoms in the alkyl chain and 8 to 30 ethylene oxide units. Examples of compounds which are not useful include the disodium salt of N-tallow, β -amino dipropionate and the sodium salt of N-lauryl β -amino dipropionate (both amphoteric compounds) and polyoxyethylene stearate, N-sorbitan monolaurate (both nonionic compounds).

As stated, the aforementioned amphoteric and nonionic compounds depress the activity of the fabric conditioning compounds when such stabilizers are used in effective concentrations. According to the present invention it has been discovered that, when used in combination with short chain quaternary ammonium compounds, a concentration of the above-mentioned nonionic or amphoteric compounds of about 0.20% to 1.0% imparts good stability to emulsions of fabric conditioning compounds and optical brighteners. Amounts in excess of about 1.0% show an appreciable adverse effect on the fabric conditioning properties of the active compounds and are therefore not preferred. On the other hand, a sufficient amount must be present to provide effective emulsion stabilization. It has been found that the optimum balance is obtained when the nonionic or amphoteric compounds are present in a range of about 0.20% to 1.0%.

When optical brighteners are used in conjunction with fabric conditioners it has also been observed that the pH of the emulsion affects the stability. In general, any pH below 7 provides adequate stability; however optimum is obtained between a pH range of about 3.0 to 4.5. At pH values above 7, the emulsion tends to precipitate upon standing. In general, the lower the pH, the more uniform is the absorption, but the rate of absorption is lower. A pH range of about 3.0 to 4.5 provides an optimum balance between stability, uniformity of absorption and rate of absorption.

Certain of the raw materials, especially the commercially available fatty acid amides, are quite alkaline because they usually contain free amines. Accordingly, it is necessary to acidulate the emulsion with an organic acid to a pH below 7, and preferably to a pH between about 3.0 and about 4.5.

Acids which may be used for this purpose are the lower aliphatic acids containing from 1 to 3 carbon atoms, for example, acetic and propionic acids, and the hydroxy aliphatic acids containing from 1 to 4 carbon atoms such as citric, tartaric, malonic and maleic acids. The hydroxy aliphatic acids are preferred because they are free from objectionable odors.

In connection with the adjustment of the pH of the emulsion, it should be noted that in the absence of an optical brightener, the pH control is not necessary. Nevertheless, it may be desirable to add a small amount of an acidulating agent to the emulsion even when optical brighteners are not used to neutralize the free amines in the fatty acid amides. These amines are known to be irritating to the skin, and accordingly, sufficient acid may be added with the fatty acid amide to reduce skin irritation.

No special methods of manufacture are required in preparing emulsions of the type described above. A simple blending operation combined with moderate agitation will suffice for most cases.

In an illustrative process, the fabric conditioning emulsion is prepared by first co-melting fabric conditioning compounds (1) and (9) together with the short chain quaternary ammonium compound used as a low temperature stabilizer at a temperature of 160° to 170° F. The optical brightener, a supplementary emulsion stabilizer, such as the ethylene oxide condensate of tridecyl alcohol is added to the hot melt in that order. The resulting mixture is then dispersed, while still in a molten condition, in water containing the supplementary salt if needed, and acidulant (e.g. sodium citrate and citric acid) at 170°F., and the hot solution is agitated to promote a thorough dispersion. Thereafter the dispersion is cooled to room temperature, and the minor ingredients such as the colorants and perfume are added.

For a better understanding of the fabric conditioning emulsions of the present invention, reference may be had to the following examples.

EXAMPLE 1

Samples of a 5% emulsion of distearyl dimethyl ammonium chloride in the presence of 0%, 0.5% or 1% of dicoco dimethyl ammonium chloride were placed in storage at 10°F. and cycled daily to room temperature. The samples were prepared from a distearyl dimethyl ammonium chloride containing 0.09% sodium chloride and 15.2% alcohol, and from a dicoco dimethyl ammonium chloride containing 0.09% sodium chloride and 15.2% alcohol. The resulting emulsions contained 0.0045% to 0.0054% sodium chloride and 0.76% to 0.91% isopropyl alcohol.

After seven cycles, the physical state of the emulsion was noted.

Concentration of (C ₁₂ H ₂₅) ₂ (CH ₃) ₂ N ⁺ Cl ⁻	Physical State
0.0%	Nonpourable, solid gel
0.5%	Fluid and stable
1.0%	Fluid and stable

EXAMPLE 2

Example 1 was repeated substituting a 5.6% emulsion of N,N'-distearyl N'-ethanol ethylene diamide for the emulsion of distearyl dimethyl ammonium chloride of Example 1. The resulting emulsion contained 0.076% alcohol and 0.005% salt. The following observations were made after seven 24 hour cycles.

Concentration of (C ₁₂ H ₂₅) ₂ (CH ₃) ₂ N ⁺ Cl ⁻	Physical State
0.0%	Nonpourable gel
0.5%	Fluid and stable

EXAMPLE 3

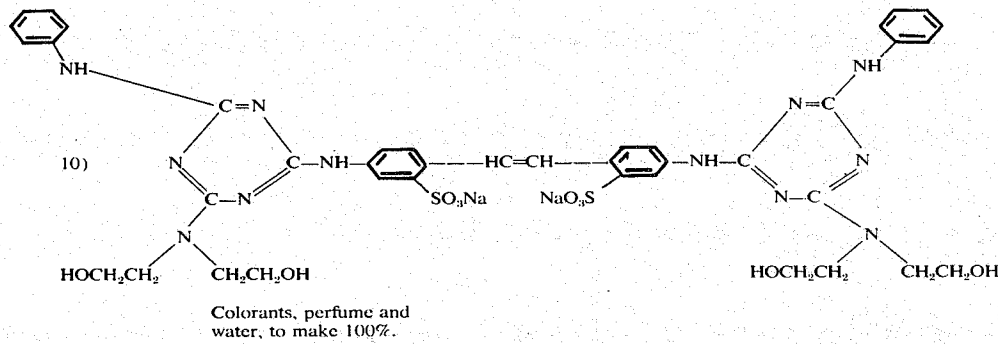
Example 1 was repeated using an emulsion containing 2.8% distearyl dimethyl ammonium chloride and 2.8% N,N'-distearoyl N'ethanol ethylene diamide in place of the emulsion of Example 1. The emulsion contained 0.54% alcohol and 0.033% sodium chloride. The following observations were made after seven 24 hour cycles.

Concentration of (C ₁₂ H ₂₅) ₂ (CH ₃) ₂ N ⁺ Cl ⁻	Physical State
0.0%	Nonpourable gel
0.5%	Fluid and stable

EXAMPLE 4

A series of formulations were prepared having the following basic composition:

Distearyl dimethyl ammonium chloride	2.91% (by weight)
N,N'-distearoyl, N'ethanol ethylene diamide	2.53
Dicoco dimethyl ammonium chloride	0.59
The condensate of 1 mole of tridecyl alcohol with 10 moles of ethylene oxide	0.25
Citric acid monohydrate	0.24
Sodium citrate dihydrate	0.012
An optical brightener of the formula	0.20



Emulsions having the above formula were successively prepared with NaCl, CaCl₂ or AlCl₃ added as an ionizable salt at concentrations of 0.01%, 0.05%, 0.10% and 0.20% by weight. After one week's storage at room temperature, it was observed that formulations containing 0.10% and 0.20% of the added ionizable salt showed marked thickening and solidification. Emulsions having a lower concentration of the ionizable salts

retained their original viscosity. The valence of the cation of the added ionizable salt did not appear to be a significant factor.

EXAMPLE 5

Certain of the ingredients of the fabric conditioning formulation, particularly the quaternary ammonium compounds, contain minor amounts of isopropanol. Thus, the distearyl dimethyl ammonium chloride may contain up to 18% alcohol and the dicoco dimethyl ammonium chloride contain about 17% alcohol.

A series of formulations were made using the basic formula of Example 4, in which the amount of alcohol accompanying the distearyl dimethyl ammonium chloride was 0%, 15% and 18%. Formulations in which the total alcohol content was 0.10%, 0.54% and 0.62% resulted. After storage at 10°F. for 1 week it was observed that the formula containing the least amount of alcohol returned to the fluid state most readily.

EXAMPLES 6-11

A number of illustrative fabric conditioner-fluorescent dye formulations in powdered form are set forth as follows. Each of the formulations was prepared by dry blending of the ingredients in the proportions set forth:

TABLE NO. 1

Example No.	Powdered Fabric Conditioning Formulations
6	96 gms. distearyl dimethyl ammonium chloride 4 gms. salt-free optical brightener

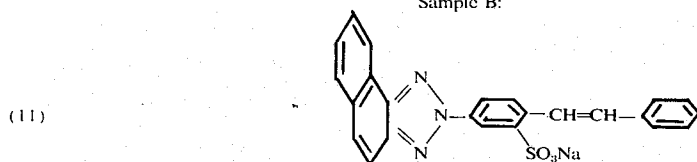
TABLE NO. 1-Continued

Powdered Fabric Conditioning Formulations	
Example No.	
7	of Formula (10) above 96 gms. distearoyl ethanol diamide 4 gms. optical brightener of Formula (11) above
8	1 gm. sodium chloride 80 gms. quaternary ammonium complex of a modified long chain amide 20 gms. salt-free optical brightener of Formula (10) above
9	25 gms. distearyl di-methyl ammonium chloride. 1 gm. salt-free optical brightener of Formula (10) above
10	74 gms. urea 96 gms. hectadecyl imidazoline sulfate 4 gms. salt-free optical brightener of Formula (10) above
11	96 gms. ditallow dimethyl ammonium methyl sulfate 4 gms. salt-free optical brightener of Formula (10) above

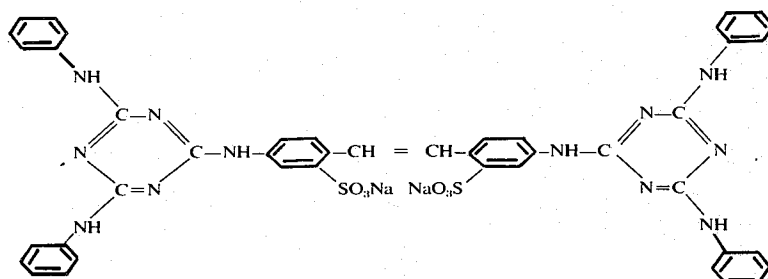
Example No. 12

To illustrate the performance of various optical brighteners when used in conjunction with fabric conditioners, four formulations of the composition set forth in Example 4 were prepared. One formulation, Sample A, contained 0.20% of the optical brightener of Formula (10) as shown in Example 4. In the remaining samples the optical brightener of Formula (10) was omitted, and in place thereof, 0.20% of an optical brightener was substituted according to the following schedule:

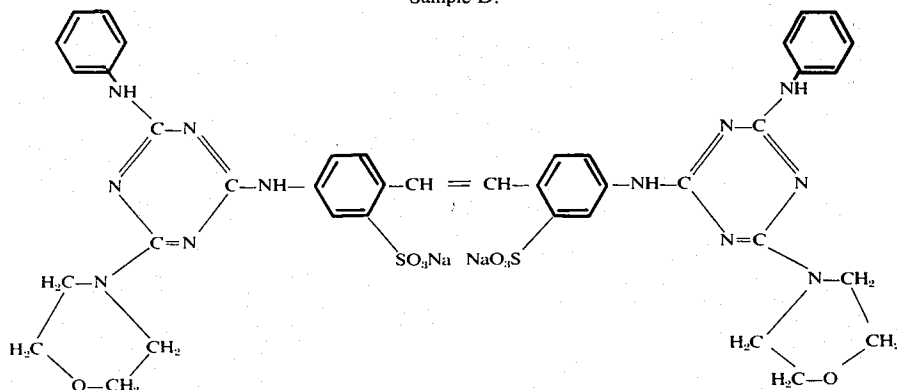
Sample B:



Sample C:



Sample D:



The swatches of cotton cloth were washed in a Terg-O-Tometer using "all," a commercially available non-ionic detergent, which contained no brightener. After washing for 15 minutes at 120° F. and 150 oscillations/min., the swatches were rinsed twice for 3 minutes in plain water at 120° F. and then rinsed for 3 minutes at 100° F. in water at 120° F. containing one of the above samples of a fabric conditioner emulsion of a concentration of 1.1 oz/16 gal. After the final rinse the swatches were dried for one-half hour in a commercial home drier. The above washing, rinsing and drying cycles were repeated 10 times.

After the first, second, fifth and tenth washing cycles, three of the cotton swatches were removed from the final rinse water, tagged and separately dried and the three dried swatches were ironed with an electric iron at the "wool" setting.

The fluorescence value of each of these swatches was measured in a Beckmann DU Spectrophotometer having a reflectance attachment and adapted for fluorescence measurements by use of a Wratten 2B filter. The fluorescence stimulating wave length was 380mμ. The fluorescence values were measured on each side of each cloth. The average of six readings, two sides of each of three cloths, is set forth in the following table.

Fabric Conditioner	Brightness After Washing			
	1 cycle	2 cycles	5 cycles	10 cycles
Sample A	12.7	20.8	28.6	36.6
Sample B	15.5	19.8	29.8	34.8
Sample C	10.9	13.1	18.8	22.0
Sample D	10.2	14.0	19.3	24.1

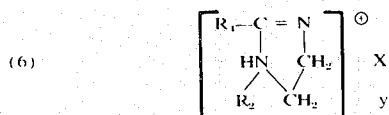
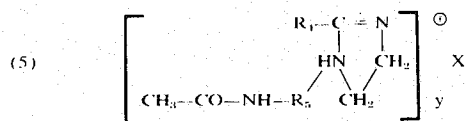
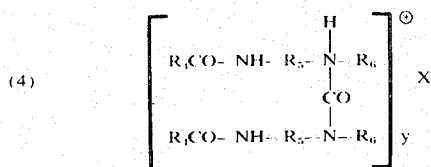
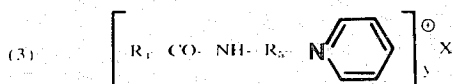
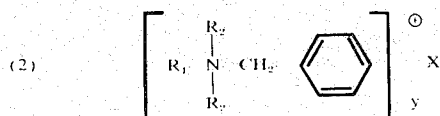
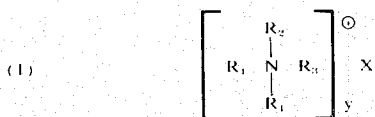
From these data it may be seen that effective brightening develops much more rapidly when using optical brighteners of Formulas (10) and (11) above (Sample A and Sample B, respectively) than when using other types of brighteners.

While the invention has been described in the foregoing specification with respect to particular examples and compositions, it will be recognized by those skilled in the art that many variations of the present invention are possible. Accordingly, the present invention is not to be limited save by the spirit of this disclosure and the following claims.

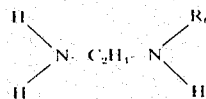
We claim:

1. An aqueous emulsion consisting essentially of the following components in approximately the following proportions by weight:

a. a fabric softening compound selected from the group consisting of

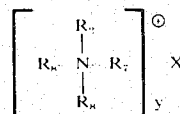


7. diethyl amino ethanol-stearamide-ethyl sulfates; and
8. the reaction product of about 2 moles of an acid of the formula R_1COOH and about 1 mole of an alkylene diamine having the formula:



15 said reaction product being a mixture of amides, esters and imidazolines wherein R_1 is an aliphatic hydrocarbon group containing from 16 to 20 carbon atoms, R_2 is an alkyl group containing from 1 to 3 carbon atoms, R_3 is selected from the group consisting of R_1 and R_2 , R_4 is an aliphatic hydrocarbon group containing from 15 to 19 carbon atoms, R_5 is an alkylene group containing from 1 to 2 carbon atoms, R_6 is a hydroxyalkyl group containing from 1 to 3 carbon atoms, X is an anion selected from the group consisting of halides, sulfates, alkyl sulfates having 1 to 3 carbon atoms in the alkyl group, and acetates, and y is the valency of X , the
25 total amount of compounds (1) to (8) present being between 4% and 7%;

b. from about one-fourth % to about 2% of a low temperature stabilizing agent of the formula:



35 wherein R_7 is an aliphatic hydrocarbon group containing from 10 to 14 carbon atoms, each R_8 is selected from the group consisting of R_2 and R_3 , and R_2 , X and y are as hereinabove defined;

45 c. from about 0.005% to about 0.10% of inert ionizable salts selected from the group consisting of inorganic salts and salts of organic acids containing from 1 to 4 carbon atoms;

d. not more than about 1% of a lower unsubstituted aliphatic alcohol;

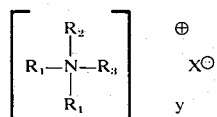
e. from 0 to 1% of a supplementary emulsion stabilizer selected from the group consisting of N-lauryl- β -amino propionic acid, dimethyl coco amine oxide, the polyoxyethylene ester of tall oil having 8 to 30 ethylene oxide units, polyoxyethylene sorbitan monostearate containing 6 to 20 ethylene oxide units, dodecyl methyl sulfoxide, the condensates of straight and branched chain unsubstituted aliphatic alcohols having from 8 to 20 carbon atoms with
55 from 1 to 30 moles of ethylene oxide, and alkyl phenol-ethylene oxide condensates having 8 to 12 carbon atoms in the alkyl chain and 8 to 30 ethylene oxide units;

f. an amount of water sufficient to make 100%.

2. The formulation according to claim 1 wherein said low temperature stabilizing agent is present in an amount between about one-fourth % and about 1%.

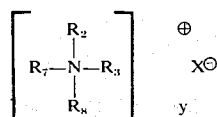
3. An aqueous emulsion consisting essentially of the following components in approximately the following proportions by weight:

- a. from about 4% to about 7% of a fabric softening compound of the formula:



wherein R_1 is an aliphatic hydrocarbon group containing from 16 to 20 carbon atoms, R_2 is an alkyl group containing from 1 to 3 carbon atoms, R_3 is selected from the group consisting of R_1 and R_2 , X is an anion selected from the group of halides, sulfates, alkyl sulfates having from 1 to 3 carbon atoms in the alkyl group, and acetates, and y is the valency of X ;

- b. from about one-fourth % to about 2% of a low temperature stabilizing agent of the formula:

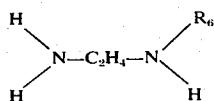


wherein R_7 is an aliphatic hydrocarbon group containing from 10 to 14 carbon atoms, each R_8 is selected from the group consisting of R_2 and R_7 , and R_2 , X and y are as hereinabove defined;

- c. from about 0.005% to about 0.10% of inert ionizable salts selected from the group consisting of inorganic salts and salts of organic acids containing from 1 to 4 carbon atoms;
- d. not more than about 1% of a lower unsubstituted aliphatic alcohol;
- e. from 0 to 1% of a supplementary emulsion stabilizer selected from the group consisting of N-lauryl- β -amino propionic acid, dimethyl coco amine oxide, the polyoxyethylene ester of tall oil having 8 to 30 ethylene oxide units, polyoxyethylene sorbitan monostearate having 6 to 20 ethylene oxide units, dodecyl methyl sulfoxide, condensates of straight and branched chain unsubstituted aliphatic alcohols having 8 to 20 carbon atoms with from 1 to 30 moles of ethylene oxide, and alkyl phenol-ethylene oxide condensates having 8 to 12 carbon atoms in the alkyl chain and 8 to 30 ethylene oxide units;
- f. an amount of water sufficient to make 100%.

4. An aqueous emulsion consisting essentially of the following components in approximately the following proportions by weight:

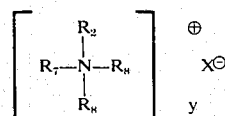
- a. from about 4% to about 7% of a fabric softening compound which is the reaction product of about 2 moles of an organic acid of the formula $R_4\text{COOH}$ and about 1 mole of an alkylene diamine having the formula:



said reaction product being a mixture of amides, esters and imidazolines wherein R_4 is an aliphatic hydrocarbon radical containing from 15 to 19 carbon

atoms, and R_6 is a hydroxyalkyl group containing from 1 to 3 carbon atoms;

- b. from about $\frac{1}{4}$ to about 2% of a low temperature stabilizing agent of the formula:



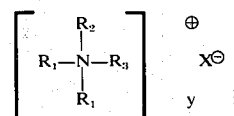
wherein R_7 is an aliphatic hydrocarbon group containing from 10 to 14 carbon atoms, each R_8 is selected from the group consisting of R_2 and R_7 , and R_2 , X and y are as hereinabove defined;

- c. from about 0.005% to about 0.10% of inert ionizable salts selected from the group consisting of inorganic salts and salts of organic acids containing from 1 to 4 carbon atoms;
- d. not more than about 1% of a lower unsubstituted aliphatic alcohol;
- e. from 0 to 1% of a supplemental emulsion stabilizer selected from the group consisting of N-lauryl- β -amino propionic acid, dimethyl cocoamine oxide, the polyoxyethylene ester of tall oil having 8 to 30 ethylene oxide units, polyoxyethylene sorbitan monostearate having 6 to 20 ethylene oxide units, dodecyl methyl sulfoxide, condensates of straight and branched chain unsubstituted aliphatic alcohols having 8 to 20 carbon atoms with from 1 to 30 moles of ethylene oxide, and alkyl phenol-ethylene oxide condensates having 8 to 12 carbon atoms in the alkyl chain and 8 to 30 ethylene oxide units;
- f. an amount of water sufficient to make 100%.

5. A composition according to claim 4 wherein said low temperature stabilizing agent is present in an amount from $\frac{1}{4}$ to 1%.

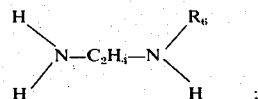
6. An aqueous emulsion consisting essentially of the following components in approximately the following proportions by weight:

- a. from about 4 to about 7% of a mixture of
- i. a fabric softening compound of the formula



and

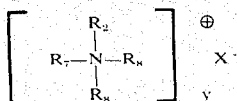
- ii. a fabric softening compound which is the reaction product of about 2 moles of an acid having the formula $R_4\text{COOH}$ and one mole of an hydroxyalkyl alkylene diamine and having the formula:



said compounds (i) and (ii) being present in a ratio between about 1:4 and 4:1, wherein R_1 is an aliphatic hydrocarbon group containing from 16 to 20 carbon atoms, R_2 is an alkyl group containing from 1 to 3 carbon atoms, R_3 is selected from the group consisting of R_1 and R_2 , R_4 is an aliphatic hydrocarbon group containing from 15 to 19 carbon atoms, R_6 is a hydroxyalkyl group containing from 1 to 3 carbon atoms, X is an

anion selected from the group consisting of halides, sulfates, alkyl sulfates having 1 to 3 carbon atoms in the alkyl group, and acetates, and y is the valency of X ;

b. from about $\frac{1}{4}$ to about 2% of a low temperature stabilizing agent of the formula:



wherein R_7 is an aliphatic hydrocarbon group containing from 10 to 14 carbon atoms, each R_8 is selected from the group consisting of R_2 and R_7 , and R_2 , X and y are as hereinabove defined;

c. from about 0.005% to about 0.10% of an inert ionizable salt selected from the group consisting of inorganic salts and salts of organic acids containing from 1 to 4 carbon atoms;

d. not more than about 1% of a lower unsubstituted aliphatic alcohol;

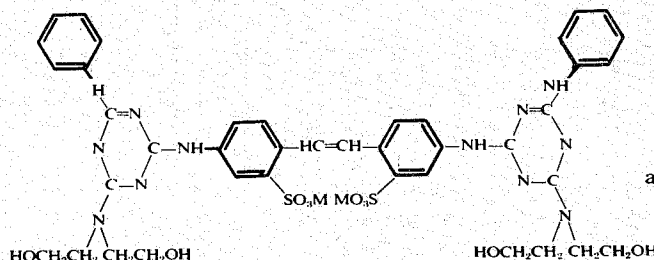
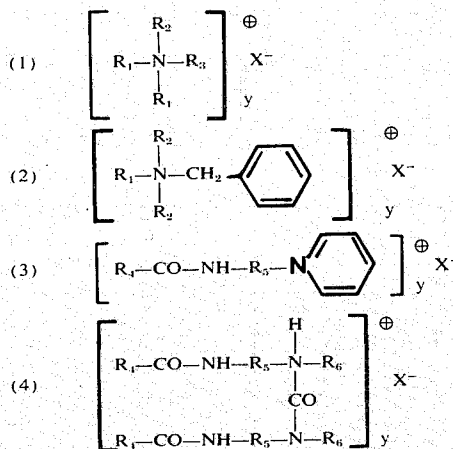
e. from 0 to 1% of a supplementary emulsion stabilizer selected from the group consisting of N-lauryl- β -amino propionic acid, dimethyl cocoamine oxide, the polyoxyethylene ester of tall oil having 8 to 30 ethylene oxide units, polyoxyethylene sorbitan monostearate having 6 to 20 ethylene oxide units, dodecyl methyl sulfoxide, condensates of straight and branched chain unsubstituted aliphatic alcohols having 8 to 20 carbon atoms with from 1 to 30 moles of ethylene oxide, and alkyl phenol-ethylene oxide condensates having 8 to 12 carbon atoms in the alkyl chain and 8 to 30 ethylene oxide units;

f. an amount of water sufficient to make 100%.

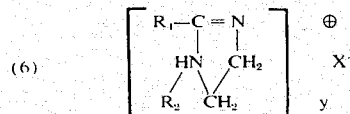
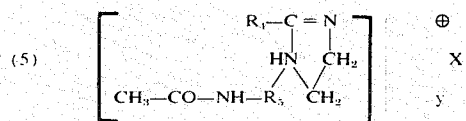
7. A composition according to claim 6 wherein said supplementary emulsion stabilizer is present in an amount between about $\frac{1}{4}$ and about 1%.

8. A fabric conditioning formulation consisting essentially of an aqueous emulsion of the following components in approximately the following proportions by weight:

a. a fabric softening compound selected from the group consisting of

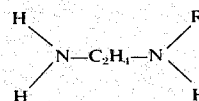


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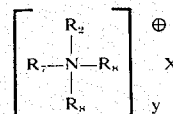
7. diethyl amino ethanol-stearamide-ethyl sulfates;

8. the reaction product of about 2 moles of an acid of the formula R_4COOH and about 1 mole of an alkylene diamine having the formula:



said reaction product being a mixture of amides, esters and imidazolines wherein R_1 is an aliphatic hydrocarbon group containing from 16 to 20 carbon atoms, R_2 is an alkyl group containing from 1 to 3 carbon atoms, R_3 is selected from the group consisting of R_1 and R_2 , R_4 is an aliphatic hydrocarbon group containing from 15 to 19 carbon atoms, R_5 is an alkylene group containing from 1 to 2 carbon atoms, R_6 is a hydroxyalkyl group containing from 1 to 3 carbon atoms, X is an anion selected from the group consisting of halides, sulfates, alkyl sulfates having 1 to 3 carbon atoms in the alkyl group, and acetates, and y is the valency of X , the total of said compounds (1) through (8) being from about 4% to about 7%;

b. from about $\frac{1}{4}$ to about 2% of a low temperature stabilizing agent of the formula:

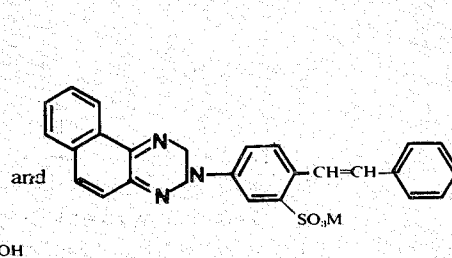


wherein R_7 is an aliphatic hydrocarbon group containing from 10 to 14 carbon atoms each R_8 is selected from the group consisting of R_2 and R_7 , and R_2 , X and y are as hereinabove defined;

c. from about 0.005% to about 0.10% of an inert ionizable salt selected from the group consisting of inorganic salts and salts of organic acids containing from 1 to 4 carbon atoms;

d. not more than about 1% of unsubstituted lower aliphatic alcohols;

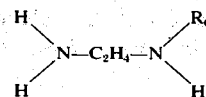
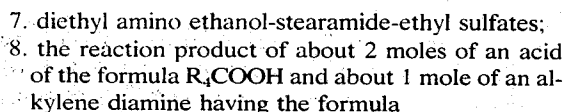
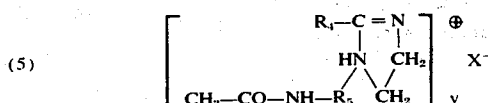
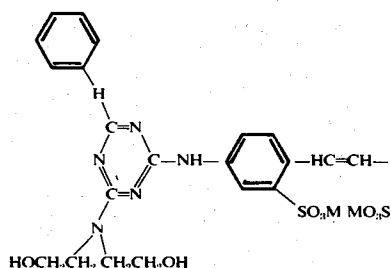
e. an optical brightener selected from the group consisting of:



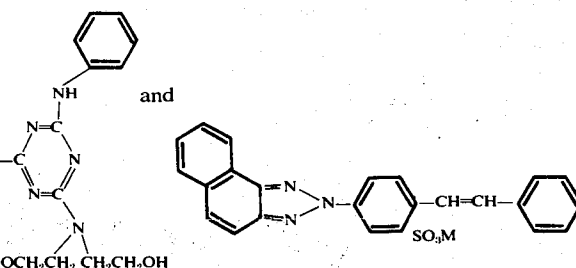
f. from 0.20% to 1% of a supplementary emulsion stabilizer selected from the group consisting of N-lauryl- β -amino propionic acid, dimethyl coco amine oxide, the polyoxyethylene ester of tall oil having 8 to 30 ethylene oxide units, polyoxyethylene sorbitan monostearate containing 6 to 20 ethylene oxide units, dodecyl methyl sulfoxide, the condensates of straight and branched chain unsubstituted aliphatic alcohols with from 1 to 30 moles of ethylene oxide and alkyl phenoethylene oxide condensates having 8 to 12 carbon atoms in the alkyl chain and 8 to 30 ethylene oxide units;

g. an organic acid selected from the group consisting of unsubstituted carboxylic acids containing from 1 to 3 carbon atoms and hydroxy carboxylic acids containing from 1 to 4 carbon atoms in an amount sufficient to produce a pH below 7.0 in the resulting emulsion;

i. 80 to 99.5 parts by weight of at least one cationic fabric softening compound selected from the group consisting of



20 said reaction product being a mixture of amides, esters and imidazolines wherein R_1 is an aliphatic hydrocarbon group containing from 16 to 20 carbon atoms, R_2 is an alkyl group containing from 1 to 3 carbon atoms, R_3 is selected from the group consisting of R_1 and R_2 ,
25 R_4 is an aliphatic hydrocarbon group containing from 15 to 19 carbon atoms, R_5 is an alkylene group containing from 1 to 2 carbon atoms, R_6 is a hydroxyalkyl group containing from 1 to 3 carbon atoms, X is selected from the group consisting of halides, sulfates, alkyl sulfates having 1 to 3 carbon atoms in the alkyl
30 group, and acetates, and y is the valency of X; and
ii. from about 0.5 to about 20 parts by weight of at least one optical brightener selected from the group consisting of:



c. an emulsion stabilizer selected from the group consisting of quaternary ammonium compounds of the formula $(N-R_2R_7R_8R_8)_yX$ wherein R_2 is as defined above, R_7 is an aliphatic hydrocarbon group containing from 10 to 14 carbon atoms and each R_8 is selected from the group consisting of R_2 and R_7 and X and y are as hereinabove defined, N-lauroyl- β -amino propionic acid, dimethyl cocoamine oxide, the polyoxyethylene esters of tall oil having 8-30 ethylene oxide units, polyoxyethylene sorbitan monostearate having 6 to 20 ethylene oxide units, dodecyl methyl sulfoxide, condensates of straight and branched chain unsubstituted aliphatic alcohols having 8-20 carbon atoms with from 1-30

27

28

moles of ethylene oxide, the alkyl phenol-ethylene oxide condensates having 8-12 carbon atoms in the alkyl chain and 8-30 ethylene oxide units, the amount of said emulsion stabilizer being sufficient to reduce the tendency of said emulsion to form an irreversible gel when subjected to freezing temperatures; and

d. from about 0.005% to about 0.10% of said emulsion being an inert inionizable salt selected from the group consisting of inorganic salts and salts of organic acids containing from 1 to 4 carbon atoms; and

e. said emulsion having a pH less than about 7.

10. A composition according to claim 9 wherein not more than about 1% by weight of said emulsion is lower alkyl alcohols.

11. A composition according to claim 9 wherein said cationic fabric softening compound is di-tallow dimethyl ammonium halide.

12. A composition according to claim 11 wherein said optical brightener is the compound of formula (10) in which M is hydrogen.

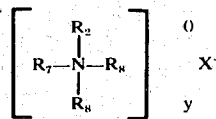
13. A composition according to claim 12 wherein said emulsion stabilizer is a straight or branched unsubstituted aliphatic alcohol having from 8-20 carbon atoms condensed with from 1-30 moles of ethylene oxide.

14. A composition according to claim 12 wherein said emulsion stabilizer is an alkyl phenol-ethylene oxide condensate having 8-12 carbon atoms in the alkyl chain and from 8-30 ethylene oxide units.

15. A composition according to claim 12 wherein said emulsion stabilizer is a quaternary ammonium compound of the formula $N(R_2R_7R_8R_9)_yX$ wherein R_2 , R_7 , R_8 , y and X are as defined above.

wherein R_1 is an aliphatic hydrocarbon group having from 16 to 20 carbon atoms, R_2 is an alkyl group having from 1 to 3 carbon atoms, R_3 is selected from the group consisting of R_1 and R_2 and X is an anion selected from the group consisting of halides, sulfates, alkyl sulfates having 1 to 3 atoms in the alkyl group and acetates and y is the valency of X ;

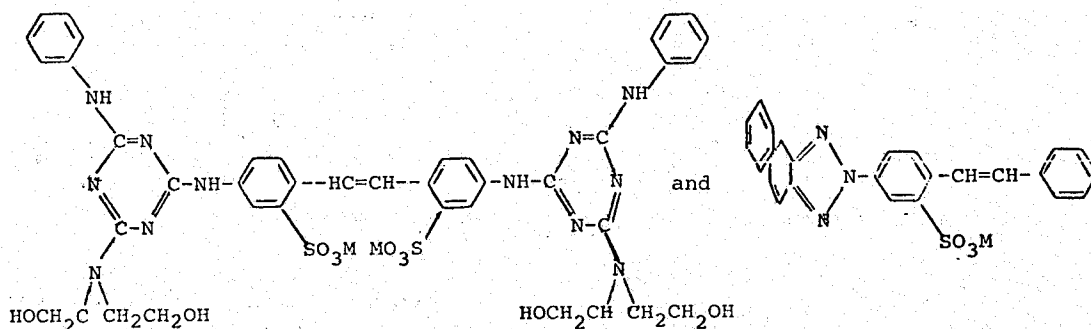
b. from about 1/4 to about 2% of a low temperature stabilizing agent of the formula



wherein R_7 is an aliphatic hydrocarbon group containing from 10 to 14 carbon atoms, each R_8 is selected from the group consisting of R_2 and R_7 , and R_2 , X and y are as hereinabove defined;

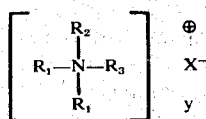
c. from 0.20 to 1% of a supplementary emulsion stabilizer selected from the group consisting of N-lauroyl-B-amino propionic acid, dimethyl coco amine oxide, the polyoxyethylene ester of tall oil having 8 to 30 ethylene oxide units, polyoxyethylene sorbitan monostearate containing 6 to 20 ethylene oxide units, dodecyl methyl sulfoxide, the condensates of straight and branched chain unsubstituted aliphatic alcohols with from 1 to 30 moles of ethylene oxide and alkyl phenol-ethylene oxide condensates having 8 to 12 carbon atoms in the alkyl chain and 8 to 30 ethylene oxide units;

d. An optical brightener selected from the group consisting of:



16. A fabric conditioning formulation consisting essentially of an aqueous emulsion of the following components in approximately the following proportions by weight:

a. from 4% to 7% by weight of a fabric softening compound having the formula



wherein M is a cation selected from the group consisting of hydrogen and an alkali metal, the total amount of said optical brighteners being from about 0.10 to about 0.30%; and

e. an aqueous vehicle consisting essentially of water sufficient to make 100%, said emulsion having a pH less than about 7.0; and

f. there being present in said emulsion an inert ionizable salt selected from the group consisting of inorganic salts and salts of organic acids containing from 1 to 4 carbon atoms in an amount between about .005% and about 0.10%.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,904,533

Page 1 of 3

DATED : September 9, 1975

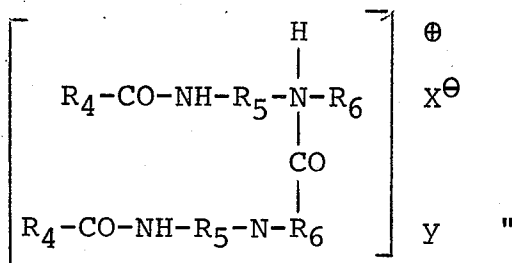
INVENTOR(S) : Oscar W. Neiditch and Jerome Rudy

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

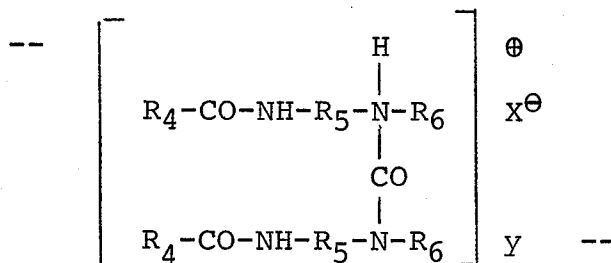
Col. 1, Line 22, "apppear" should read -- appear --

Col. 1, Line 44, the "N" in formula (3) should be a part of the aromatic ring

Col. 1, Lines 47-52, "



should read



Col. 1, Line 63, "7." should read -- (7) --

Col. 1, Line 64, "8." should read -- (8) --

Col. 1, Line 66, "9." should read -- (9) --

Col. 2, Line 57, "brighteneing" should read -- brightening --

Col. 4, Lines 8, 12, 25, 29, 31, 45 and 53, "a.", "b.", "c.", "d.", "e.", "f." and "g." should read -- (a) --; -- (b) --; -- (c) --; -- (d) --; -- (e) --; -- (f) --; and -- (g) --

Col. 5, Lines 12, 25 and 32, "h.", "i.", and "j." should read -- (h) --; -- (i) --; and -- (j) --

Col. 5, Line 35, "optical" should read -- optional --

Col. 5, Line 42, "softening" should read -- conditioning --

Col. 6, Line 23, insert -- also -- between "may" and "be"

Col. 6, Line 62, "embodiments" should read -- embodiment --

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,904,533

Page 2 of 3

DATED : September 9, 1975

INVENTOR(S) : Oscar W. Neiditch and Jerome Rudy

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 6, Line 64, "alkylamine" should read -- alkylene --
Col. 7, Line 42, insert -- % -- after "4"
Col. 7, Line 57, "shortchain" should read -- short-chain --
Col. 8, Line 2, insert -- % -- after "4"
Col. 8, Line 3, insert -- % -- after "1/4"
Col. 8, Line 6, insert -- % -- after "1/4"
Col. 10, Line 1, "saltfree" should read -- salt free --
Col. 18, Line 19, "Beckmann" should read -- Beckman --
Col. 20, Line 1, "7." should read -- (7) --
Col. 20, Line 3, "8." should read -- (8) --
Col. 22, Line 3, insert -- % -- after "1/4"
Col. 22, Line 37, insert -- % -- after "1/4"
Col. 22, Line 41, insert -- % -- after "4"
Col. 22, Line 45, "x θ " should read -- X⁻ --
Col. 23, Line 4, insert -- % -- after "1/4"
Col. 23, Line 24, "polyoxyeethylene" should read
-- polyoxyethylene --
Col. 23, Line 36, insert -- % -- after "1/4"
Col. 24, Line 16, "7." should read -- (7) --
Col. 24, Line 17, "8." should read -- (8) --
Col. 24, Line 33, "2carbon" should read -- 2 carbon --
Col. 24, Line 40, insert -- % -- after "1/4"
Col. 24, Line 60, the first "H" in the formula should read
-- NH --
Col. 25, Line 14, "phenoethylene" should read
-- phenol-ethylene --
Col. 25, Line 34, "Y" of formula (1) should read -- y --
Col. 25, Line 54, -- N -- should be inserted in formula (3)
within the aromatic ring
Col. 26, Line 7, "7." should read -- (7) --
Col. 26, Line 8, "8." should read -- (8) --
Col. 26, Line 35, the first "H" of the formula should read
-- NH --

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,904,533

Page 3 of 3

DATED : September 9, 1975

INVENTOR(S) : Oscar W. Neiditch and Jerome Rudy

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 26, second formula, -- there should be a bond from the
third aromatic ring to SO₃M --

Col. 28, Line 8, "1/4to" should read -- 1/4% to --

Signed and Sealed this

twenty-fourth Day of February 1976

[SEAL]

Attest:

RUTH C. MASON

Attesting Officer

C. MARSHALL DANN

Commissioner of Patents and Trademarks