

UNITED STATES PATENT OFFICE

2,195,564

MANUFACTURE AND TREATMENT OF TEXTILE MATERIALS

Donald Finlayson and Richard Gilbert Perry,
Spondon, near Derby, England, assignors to
Celanese Corporation of America, a corporation
of Delaware

No Drawing. Application April 20, 1937, Serial
No. 137,982. In Great Britain January 18,
1937

21 Claims. (Cl. 28-1)

This invention relates to the manufacture and treatment of textile threads, fibres and like materials, and is especially concerned with the manufacture and treatment of such materials having a basis of cellulose acetate or other organic derivative of cellulose.

In the processing of textile threads, fibres and like materials difficulties frequently arise, which may be more or less serious according to the nature of the materials treated, on account of the accumulation of static electricity on the materials. Thus, in the processing of staple fibres to spun yarn, and especially staple fibres having a basis of organic derivatives of cellulose, such electrification may cause the fibres to spread and cling to adjacent parts of the apparatus. A similar difficulty may be encountered in the weaving and knitting of textile yarns, especially such as contain organic derivatives of cellulose, where electrification may cause the individual filaments or fibres of the yarns to spread and thus give rise to breakage of filaments and uneven fabrics.

It has now been discovered that the mechanical processing of textile threads, fibres and the like, especially of materials having a basis of organic derivatives of cellulose may be facilitated by the presence in or on the textile materials of certain compositions comprising soaps of organic bases, and according to the present invention, the electrification of textile materials is prevented or reduced by depositing on the materials compositions containing soaps of organic bases, and especially soaps of alkylolamines, in conjunction with pine oils, or by depositing on the materials soaps of tetra-substituted ammonium bases.

Soaps of organic bases which may be employed may be, for example, soaps of mono-, di or tri-alkylolamines, e. g., soaps of mono-, di and tri-ethanolamines, propanolamines and dioxypopylamines. The soaps of tetra-substituted ammonium bases may be, for example, tetramethyl and tetra-ethyl ammonium soaps. Of particular value are the soaps of trimethyl benzyl ammonium hydroxide.

The soaps employed may be soaps of higher fatty acids, e. g., oleic acid, stearic acid, palmitic acid and ricinoleic acid, or may be soaps of resin acids or hydro-aromatic acids, e. g., naphthenic acid. The soaps may be true soaps, i. e., containing the molecular equivalent of organic base and acid, or they may contain an excess of organic base or of acid.

The pine oil employed according to the present invention may be pure pine oil or any of the

commercial pine oils, and may contain varying proportions of terpineol and bornyl ester. Or there may be employed, in lieu of pine oil itself, terpineol, which is an important constituent of pine oil. Where soaps of tetra-substituted ammonium bases are employed it is not necessary that the compositions should also contain pine oil, since such soaps give excellent results even when employed in the absence of such oils.

The soaps of tetra-substituted ammonium bases, or mixtures of such soaps or soaps of other organic bases with pine oils, may be employed according to the present invention in solution or suspension in water or in organic liquids, e. g., carbon tetrachloride, petroleum ether, light paraffin oils, methylated spirits and glycol ethers as, for instance, diethylene glycol mono-ethyl ether. Of particular value, however, are solutions of pine oils and alkylolamine soaps in cyclohexanone and in diethylene glycol mono-n-butyl ether. If desired, mixtures of organic solvents and water may be employed. Preferably the soaps of tetra-substituted ammonium bases, or mixtures of such soaps or soaps of other organic bases with pine oil, are applied to the materials in media which can be at least in part readily removed from the materials, e. g., by evaporation, so that the materials may be sufficiently dry for the mechanical processing.

Mixtures of soaps of organic bases, such as alkylolamine soaps, with pine oils may for example contain a proportion of pine oil of 15-30% or more of the weight of the soap, and such mixtures may be applied to the textile materials, for example in the form of aqueous solutions or suspensions containing 5-10 or 20% of the mixture, in such proportions that the materials carry about 1-2 or 5% of their weight of the mixture of soap and pine oil. However, higher concentrations of soap and pine oil may be employed. Thus solutions of alkylolamine soaps and pine oil in cyclohexanone in which the total concentration of alkylolamine soap and pine oil is 40-50% may be employed. Such solutions may advantageously be applied so that the materials carry about 2-4% of their weight of the solution.

Typical compositions containing pine oil and a soap of an organic base which may be employed according to the present invention are compositions obtained by mixing together 10 parts by weight of oleic acid, 5 parts by weight of triethanolamine, and 3-5 parts by weight of pine oil, and dissolving the mixture in 180-200 parts of water or 15-20 parts of cyclohexanone, or 25-30 parts of cyclohexanone mixed with about

5 parts of water or 15-20 parts of diethylene glycol mono-n-butyl ether mixed with about 5 parts of water.

As indicated above, excellent results have been obtained with the aid of soaps of tetra-substituted ammonium bases without the addition of pine oil. Satisfactory results can be obtained by treating textile materials with solutions or suspensions containing 5-10 or 20% of the tetra-substituted ammonium soap. The proportion of such solutions or dispersions applied to the textile materials may be small, e. g., up to 2%, or higher proportions may be applied, e. g., proportions up to 5 or 10%.

The soap compositions employed according to the present invention may contain, if desired, substances additional to those specified above. Thus, for example, the compositions may contain solid or liquid hygroscopic substances, e. g., magnesium chloride, calcium chloride, ethylene glycol and glycerine. Moreover, fugitive dyestuffs may be added to the compositions in order to tint the textile materials for identification purposes.

Where it is desired to treat textile yarns the treatment may be carried out by the application of the tetra-substituted ammonium soap, or the mixture of such soap or other soap of an organic base with pine oil, to the yarns while they are travelling, e. g., in the course of a winding operation. Where the treatment is applied to yarns having a basis of artificial textile materials, e. g., having a basis of filaments of organic derivatives of cellulose, the treating composition may be applied to the yarns as they leave the spinning cell in which they are formed. The compositions may be applied to the yarns by running the yarns in contact with rollers, wicks or other supply devices fed with the composition or by spraying the travelling yarns with the composition.

However, the treating compositions may be applied to the textile materials by other processes. Thus, for example, in treating short textile fibres, e. g., cellulose acetate staple fibres, or in treating yarns in hank form or while wound on bobbins or other packages, the treating composition may be applied by soaking the short textile fibres or hanks or packages of yarn in a bath of the composition. The treatment of short textile fibres or hanks of yarn may also be effected by spraying such fibres or hanks with the treating composition. In these processes it is desirable that the fibres or yarns be allowed to drain until they contain the desired amount of composition.

The whole of the amount of treating composition which it is desired that the textile materials should carry may be applied in a single operation or the treating composition may be applied in several stages. Thus, for example, textile materials in the form of yarns of continuous filaments may be treated with a proportion of the treating composition, and the materials may then be subjected to a process of conversion into staple fibres and the remainder of the treating composition applied to the staple fibres before their conversion into staple fibre yarn.

The compositions applied to the materials in accordance with this invention may, if desired, be removed from the materials immediately after the mechanical processing to facilitate which they have been applied. However, the compositions may, in general, be left on the materials until removed by the scouring operations usually applied to the materials when in fabric form.

As indicated above, the new processes are applicable to the treatment of textile yarns, fibres

and like materials of all types and are of especial value in connection with the treatment of textile materials having a basis of cellulose acetate or other organic derivative of cellulose, e. g. cellulose formate, cellulose propionate, cellulose butyrate or other esters of cellulose, methyl cellulose, ethyl cellulose, butyl cellulose, benzyl cellulose and other ethers of cellulose, mixed ethers of cellulose, mixed esters of cellulose and ether-esters of cellulose. However, the process is also applicable to the treatment of yarns or fibres consisting of or comprising wool, cotton, silk or reconstituted cellulose.

The invention finds extensive application in the treatment of textile yarns during the course of their conversion into fabrics and is also of particular value in the treatment of textile yarns having a basis of continuous artificial filaments in processes in which such artificial filaments are converted into staple fibre, and such staple fibre subsequently converted into spun yarn.

Having described our invention what we desire to secure by Letters Patent is:

1. Process for the treatment of filaments, yarns, fibres and like textile materials, which comprises depositing on such materials a composition which contains pine oil and a soap of an alkylolamine.

2. Process for the treatment of filaments, yarns, fibres and like textile materials having a basis of organic derivatives of cellulose, which comprises depositing on such materials a composition which contains pine oil and a soap of an alkylolamine.

3. Process for the treatment of filaments, yarns, fibres and like textile materials, which comprises depositing on such materials an aqueous composition which contains pine oil and a soap of an alkylolamine.

4. Process for the treatment of filaments, yarns, fibres and like textile materials, which comprises depositing on such materials a solution of pine oil and a soap of an alkylolamine in an organic solvent.

5. Process for the treatment of filaments, yarns, fibres and like textile materials, which comprises depositing on such materials a solution of pine oil and a soap of an alkylolamine in cyclohexanone.

6. Process for the treatment of filaments, yarns, fibres and like textile materials having a basis of organic derivatives of cellulose, which comprises depositing on such materials an aqueous composition which contains pine oil and from 5-10% of a soap of an alkylolamine, in such proportions that the materials carry 1-5% of their weight of the mixture of pine oil and alkylolamine soap.

7. Process for the treatment of filaments, yarns, fibres and like textile materials having a basis of cellulose acetate, which comprises depositing on such materials an aqueous composition which contains 5-20% of a soap of trimethyl benzyl ammonium hydroxide.

8. An antistatic composition for the treatment of filaments, yarns, fibers and like textile materials which comprises pine oil and a soap of an alkylolamine.

9. An antistatic composition for the treatment of filaments, yarns, fibers and like textile materials which comprises an aqueous solution containing 5-10% of a mixture of pine oil and a soap of an alkylolamine.

10. An antistatic composition for the treatment of filaments, yarns, fibers and like textile materials which comprises pine oil and a soap

of an alkylolamine, the pine oil being present in a proportion of 10-30% of the weight of the said soap.

5 11. An antistatic composition for the treatment of filaments, yarns, fibers and like textile materials which comprises a solution of pine oil and a soap of an alkylolamine in an organic solvent.

10 12. An antistatic composition for the treatment of filaments, yarns, fibres and like textile materials which comprises a solution of pine oil and a soap of an alkylolamine in cyclohexanone.

15 13. Filaments, yarns, fibres and like textile materials carrying a soap of an alkylolamine and pine oil.

14. Filaments, yarns, fibres and like textile materials carrying a soap of a tetra-substituted ammonium base.

20 15. Filaments, yarns, fibres and like textile materials carrying a soap of trimethyl benzyl ammonium hydroxide.

25 16. Process for the treatment of filaments, yarns, fibres and like textile materials, which comprises depositing on such materials a composition which contains pine oil and a soap of an organic base, the pine oil being the sole oil present in the composition.

17. Process for the treatment of filaments,

yarns, fibres and like textile materials having a basic of organic derivatives of cellulose, which comprises depositing on such materials a composition which contains pine oil and a soap of an alkylolamine, the pine oil being the sole oil 5 present in the composition.

18. Process for the treatment of filaments, yarns, fibres and like textile materials, which comprises depositing on such materials an aqueous composition which contains pine oil and a 10 soap of an alkylolamine, the pine oil being the sole oil present in the composition.

19. Process for the treatment of filaments, yarns, fibres and like textile materials, which comprises depositing on such materials a solution 15 of pine oil and a soap of an alkylolamine in an organic solvent, the pine oil being the sole oil present in such solution.

20. An antistatic composition for the treatment of filaments, yarns, fibres and like textile 20 materials, which comprises pine oil and a soap of an organic base, the pine oil being the sole oil containing the composition.

21. Filaments, yarns, fibres and like textile materials carrying a soap of an alkylolamine and 25 pine oil, the pine oil being the sole oil present.

DONALD FINLAYSON.

RICHARD GILBERT PERRY.