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MIXED TEXTILE MATERIAL AND METHOD
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Celanese Corporation of America, a corpora-
tion of DelawareNo Drawing. Application July 26, 1934,
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This invention relates to the conditioning of fibers comprising organic derivatives of cellulose such that the same may be readily employed alone or in admixture with other fibers, such as wool, in forming yarns and threads and fabrics from such yarns.

An object of the invention is the economic and expeditious production of yarns and threads and/or the fabric made from same wherein the yarns and threads contain fibers of organic derivatives of cellulose alone or in admixture with other fibers such as wool. Another object of the invention is the conditioning of the organic derivatives of cellulose fibers such that they more readily lend themselves to the processing treatment in admixture with wool fibers. Other objects of the invention will appear from the following detailed description. In processing wool to yarns or thread by any of the ordinary methods, it is necessary to apply to the same an oily material which may be an emulsion of an oil or oils in water or other suitable lubricant or softener. When employing mixtures of wool and organic derivatives of cellulose fibers, however, it is found that these oily materials cause a stringiness in the artificial fibers that prevent them from being properly mixed, opened up and carded. The artificial fibers, due to methods of forming same of continuous filaments and methods of shipping same, are more or less matted when received at the place of use. These matted artificial fibers must, therefore, like the wool fibers be "opened up" or separated into a more workable mass. To mix the two types of fibers and open them up by a woolen method is very difficult if a uniform product is desired. Moreover, the wool in the mixture must be treated with its particular type of lubricant and softener which causes the artificial fibers to become stringy and otherwise become less adapted to the future processing such as opening up, mixing, blending, carding, etc.

According to my invention, however, I overcome the objections and difficulties encountered in processing yarns or threads of mixtures of wool and artificial fibers by treating the artificial fibers alone with a lubricant in a low boiling nonaqueous carrier, said lubricant resulting by the time the two types of fibers are mixed, in a mixture that is compatible with and similar to the lubricant and softener later to be applied to the mixture of wool and artificial fibers for aiding in processing the mixture and satisfying the requirement of the wool fiber as a prerequisite to carding etc. Thus, in accordance with my invention the artificial fibers are treated with a nonaqueous oily material and opened up prior to their being mixed with the wool fibers which may or may not have been picked to small tufts.

The artificial fibers that lend themselves to

this invention are the staple length fibers containing organic derivatives of cellulose. These fibers may be formed in any suitable manner, preferably by extruding, through suitable orifices, into a solidifying medium a solution of an organic derivative of cellulose, such that continuous filaments are formed. The continuous filaments may then be formed into groups or bands and these groups or bands may then be cut or torn into short lengths by suitable knives or sets of nip rollers. All the artificial fibers may be of the same length or of a mixture of various lengths. The length of the fibers may vary between $\frac{1}{2}$ inch and 15 inches in length depending upon the product desired. By regulating the size of orifices and conditions at the time of extrusion, fibers of any suitable denier may be formed and for the purpose of this invention fibers having deniers between 0.5 and 25 may be employed.

The fibers may be relatively straight fibers, slightly curved or highly crimped. They may also be of any suitable cross section from flattened to bulbous fibers.

Although the derivative of cellulose preferred as the base material of the artificial fibers is cellulose acetate, other derivatives of cellulose may be employed such as the other organic esters of cellulose and cellulose ethers. Examples of other organic esters of cellulose are cellulose formate, cellulose propionate, and cellulose butyrate while examples of cellulose ethers are methyl cellulose, ethyl cellulose and benzyl cellulose. The mixed esters and ethers of cellulose may also be employed for example nitro cellulose acetate.

The artificial fibers may contain, besides the organic derivative of cellulose, effect materials such as pigments, filling materials, dyes or lakes, fire retardants, de-electrifiers, plasticizers, sizes and lubricants. Examples of pigments and filling materials are the metallic salts and oxides such as bismuth oxychloride, titanium oxide, antimony oxide, zinc oxide, tin phosphates and silicates, and the non metallic substances such as lamp black, logwood, nigrosine, starch and cellulose. Examples of fire retardants are beta chlornaphthalene, triphenyl phosphate and tricresyl phosphate. Examples of sizes are the waxes, resins and synthetic resinous materials. Examples of the lubricants or oily materials are the animal, vegetable and mineral oils such as castor oil, olive oil, neat's-foot oil and petroleum jelly, glycerines, glycols and the derivatives and substitution products of the polyhydric alcohols. These effect materials may be incorporated with the fibers by adding same to the spinning solution from which the filaments are formed that are divided into the fibers or by applying same to

the filaments as they are formed or during any winding operation with or without the presence of swelling agents.

The artificial fibers may contain plasticizers, 5 examples of which are the aryl sulphonamides as para ethyl toluol sulphonamide, the alkyl phthalates as dimethyl phthalates, the dialkyl tartrates as dibutyltartrate, the alkoxy esters of polybasic organic acids as diethoxy ethyl phthalate, the 10 polybasic acid esters of the mono-alkyl ethers of polyhydric alcohols as diethylene glycol ethyl ether ester of phthalic acid, the alkyl esters of phosphoric acid as triglycol phosphate, the aryl esters of phosphoric acid as tricresyl phosphate 15 and the mixed alkyl and aryl phosphates. The plasticizers may be used alone or in combination with others. The quantity of plasticizer that may be employed may vary within very great limits say from 1 to 50% of the weight of cellulosic 20 derivatives.

As stated above the artificial fibers of suitable length, preferably 4 to 7 inches, may be treated with a lubricant in a nonaqueous carrier and opened prior to being mixed with the wool fiber. 25 This may be accomplished in any suitable manner. However, the preferred method is to place a layer of the material of few inches thick upon a mixing floor and blow atomized or finely divided droplets of the lubricant upon this layer, cover 30 the first layer with a second layer and again subject the material to atomized lubricant and so on until the desired quantity has been treated. Any suitable atomizing device may be employed for this purpose. Other methods of applying the 35 lubricant may be employed as by sprinkling the layers with the lubricant or spraying the lubricant on to a layer of the fibers passing on a conveyor under the spraying device.

The artificial fibers if matted may be passed 40 through a wool picker device and separated into tufts prior to or subsequent to oiling or the artificial fibers may be given an oiling before and after such a separating action. It is preferred, however, that the oiling treatment be relatively 45 recent in respect to the complete opening up action. The complete opening up action is preferably accomplished by passing the material through the first breaker of a card device instead of the opener used in opening wool fibers.

50 The lubricant that may be used on the artificial fibers contains two parts, the lubricant proper and a carrier therefor. The lubricant proper may be formed by mixing together mineral oil, water, an alkaline hydroxide, vegetable and/or 55 animal oils or the fatty acids derived therefrom, and an alcohol. The lubricant proper is mixed with a carrier which is preferably kerosene or similar substance. The carrier should be such that it will aid in distributing the lubricant proper on the artificial fibers and remain there until 60 the opening up action has started at which time it should evaporate leaving only the lubricant proper on the opened up fibers. The artificial fibers may then be mixed with the wool fibers and 65 the whole lubricated with a lubricant of a type suitable for the treatment of wool fibers without effecting to a disadvantage the carding properties of the artificial fibers which if not pretreated 70 in accordance with this invention develop a stringiness difficult to remove by carding.

The lubricant proper to be applied to the artificial fibers may vary considerably in components and their percentages. However for the purpose 75 of further describing the invention and not as a

limitation the following formula is given of a preferred lubricant.

	Parts
White mineral oil-----	320
Water-----	4.4
Potassium hydroxide 47° Bé-----	6.7
Oleic acid-----	31.9
Ethyl alcohol-----	11.3

10 In place of white mineral oil any suitable mineral oil may be employed, where light color is immaterial, having the viscosity of light lubricating oil. The amount of mineral oil employed may vary between 275 and 400 parts by volume. 15 In place of potassium hydroxide any of the alkali metal hydroxides or ammonium hydroxide may be employed in amounts of from 5 to 10 parts by volume. In place of oleic acid any of the fatty acids may be employed, for example stearic acid and palmitic acid or mixtures of these. The fatty acids may be employed in amounts from 20 to 40 20 parts by volume. The fatty acids may be replaced in whole or in part by oils or fats, such as stearin, olein, castor oil, olive oil, coconut oil, etc. Between 5 and 20 parts of sulphonated oils may be 25 also added to the mixture. In place of or in conjunction with the ethyl alcohol other monohydric alcohols may be employed such as methyl alcohol and butyl alcohol. The monohydric alcohols may be employed in amounts from 5 to 20 parts by 30 volume. From 1 to 10 parts of a polyhydric alcohol may be added to the mixture. Examples of polyhydric alcohols are glycerine, glycol, and diethylene glycol.

Such lubricating material as described above 35 does not impart a stickiness to the fibers. The volatile carrier which remains on the fibers until they are at least partially opened up prevents any excessive accumulation of the lubricant in spots or in the tightly matted tufts of fibers.

The lubricant proper may be mixed with a suitable carrier of relatively low boiling point for example kerosene or benzene. The relative proportions of lubricant and carrier may vary between 40 parts of lubricant to 60 parts of carrier 40 or 60 parts of lubricant to 40 parts of carrier. The carrier employed and the concentration of the lubricant in the carrier will vary with the type and size of fiber used, as well as the working conditions such as temperature, etc. The carrier 45 is selected such that the major proportion is removed from the fibers during the opening up operation and such that the vapor of same is not injurious to employees or may be removed by suction devices and flues above the card device. 50

The artificial fibers after being opened up may 55 be mixed in any desired proportion with wool fibers by laying down on a mixing floor alternate layers of artificial fibers and wool fibers.

The percentage of artificial fibers employed in the mixture may vary from 20 to more than 60 90% of the mass. As the wool fiber layers are laid down in the mixing operation they may be subjected to an oiling treatment. The oily material employed is preferably an emulsion of a mixture, similar to that employed on the artificial fibers, in water in the ratio of about 50 65 parts of lubricant to 20 to 50 parts of water. Although this lubricant is aqueous in character it has no tendency to make the pre-oiled artificial fibers mat or become stringy. 70

The mixture of artificial fibers and wool fibers may be processed to yarn and threads by the woolen method, the worsted method or the French spinning method, in a manner similar to the processing of wool fibers alone. The yarns 75

or threads are strong and of a worsted appearance and may be woven, warp knitted, circular knitted, knotted or netted into fabrics of great strength and durability that are light in weight and nonabsorbent.

It is to be understood that the foregoing detailed description is merely given by way of illustration and many alterations may be made therein without departing from the spirit of my invention.

Having described my invention what I desire to secure by Letters Patent is:

1. In a method of producing spun yarn from wool fibers and artificial fibers containing organic derivatives of cellulose, the step of making the organic derivative of cellulose fibers more amenable to processing with the wool fibers to form a mixed spun yarn, which comprises subjecting said organic derivative of cellulose fibers to treatment with a lubricant comprising a mixture of mineral oil, a caustic material, a fatty acid and an alcohol, in kerosene as a carrier.

2. In a method of producing spun yarn from wool fibers and artificial fibers containing cellulose acetate, the step of making the cellulose acetate fibers more amenable to processing with the wool fibers to form a mixed spun yarn, which comprises subjecting said cellulose acetate fibers to treatment with a lubricant comprising a mixture of mineral oil, a caustic material, a fatty acid and an alcohol, in kerosene as a carrier.

3. Method of preparing artificial fibers containing organic derivatives of cellulose to make the same more amenable to processing with wool fibers to form a mixed spun yarn, which comprises subjecting the organic derivative of cellulose fibers to treatment with a lubricant comprising a mixture of mineral oil, a caustic material, a fatty acid and an alcohol, in kerosene as a carrier and opening the treated organic derivative of cellulose fibers under such conditions that the kerosene is substantially removed therefrom.

4. Method of preparing artificial fibers containing cellulose acetate to make the same more amenable to processing with wool fibers to form a mixed spun yarn, which comprises subjecting the cellulose acetate fibers to treatment with a lubricant comprising a mixture of mineral oil, a caustic material, a fatty acid and an alcohol, in kerosene as a carrier and opening the treated cellulose acetate fibers under such conditions that the kerosene is substantially removed therefrom.

5. Method of preparing artificial fibers containing organic derivatives of cellulose to make the same more amenable to processing with wool fibers to form a mixed spun yarn, which comprises subjecting the organic derivative of cellulose fibers to treatment with a lubricant comprising a mixture of mineral oil, potassium hydroxide, oleic acid and ethyl alcohol, in kerosene as a carrier and opening the treated organic derivative of cellulose fibers under such conditions that the kerosene is substantially removed therefrom.

6. Method of preparing artificial fibers containing cellulose acetate to make the same more amenable to processing with wool fibers to form a mixed spun yarn, which comprises subjecting the cellulose acetate fibers to treatment with a lubricant comprising a mixture of mineral oil, potassium hydroxide, oleic acid and ethyl alcohol, in kerosene as a carrier and opening the treated cellulose acetate fibers under such con-

ditions that the kerosene is substantially removed therefrom.

7. Method of producing spun yarn from wool fibers and artificial fibers containing organic derivatives of cellulose, which comprises subjecting the organic derivative of cellulose fibers to treatment with a lubricant in a volatile non-aqueous carrier, opening the treated organic derivative of cellulose fibers under such conditions that the volatile carrier is substantially removed therefrom, mixing said organic derivative of cellulose fibers with wool fibers treated with an aqueous emulsion of a lubricant which is compatible with the lubricant on the organic derivative of cellulose fibers and converting the mixed fibers into a mixed spun yarn.

8. Method of producing spun yarn from wool fibers and artificial fibers containing cellulose acetate, which comprises subjecting the cellulose acetate fibers to treatment with a lubricant in a volatile non-aqueous carrier, opening the treated cellulose acetate fibers under such conditions that the volatile carrier is substantially removed therefrom mixing said cellulose acetate fibers with wool fibers treated with an aqueous emulsion of a lubricant which is compatible with the lubricant on the cellulose acetate fibers and converting the mixed fibers into a mixed spun yarn.

9. Method of producing spun yarn from wool fibers and artificial fibers containing organic derivatives of cellulose, which comprises subjecting the organic derivative of cellulose fibers to treatment with a lubricant comprising a mixture of mineral oil, a caustic material, a fatty acid and an alcohol, in kerosene as a carrier, opening the treated organic derivative of cellulose fibers under such conditions that the kerosene is substantially removed therefrom, mixing said organic derivative of cellulose fibers with wool fibers and converting the mixed fibers into a mixed spun yarn.

10. Method of producing spun yarn from wool fibers and artificial fibers containing cellulose acetate, which comprises subjecting the cellulose acetate fibers to treatment with a lubricant comprising a mixture of mineral oil, a caustic material, a fatty acid and an alcohol, in kerosene as a carrier, opening the treated cellulose acetate fibers under such conditions that the kerosene is substantially removed therefrom, mixing said cellulose acetate fibers with wool fibers and converting the mixed fibers into a mixed spun yarn.

11. Spun yarn containing wool fibers and artificial fibers of organic derivatives of cellulose, said artificial fibers being treated with a lubricant comprising a mixture of mineral oil, a caustic material, a fatty acid and an alcohol.

12. Spun yarn containing wool fibers and artificial fibers of cellulose acetate, said artificial fibers being treated with a lubricant comprising a mixture of mineral oil, a caustic material, a fatty acid and an alcohol.

13. Spun yarn containing wool fibers and artificial fibers of organic derivatives of cellulose, said artificial fibers being treated with a lubricant comprising a mixture of mineral oil, potassium hydroxide, oleic acid and ethyl alcohol.

14. Spun yarn containing wool fibers and artificial fibers of cellulose acetate, said artificial fibers being treated with a lubricant comprising a mixture of mineral oil, potassium hydroxide, oleic acid and ethyl alcohol.