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TEXTILE MATERIALS

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This invention relates to the manufacture of textile fabrics and textile yarns suitable for incorporating therein, and is more particularly concerned with the production of fabrics exhibiting crêpe effects.

Textile materials exhibiting crêpe effects have long been obtained by employing in their construction highly twisted yarns (hereinafter referred to as crêpe yarns or crêpe threads) made of natural silk in the gummed state, the crêpe effects appearing when the fabrics are subsequently subjected to a suitable scouring or like treatment for the purpose of removing the gum. Crêpe effects are, however, only obtained with difficulty by the employment of highly twisted crêpe threads made of certain other materials, especially degummed silk and artificial fibres.

I have now found that, in the production of textile fabrics exhibiting crêpe effects, improved result are obtained by subjecting fabrics containing highly twisted crêpe threads coated, impregnated, or similarly treated with a material capable of being swelled, to a treatment adapted to swell the coating material without rendering it relatively soft or yielding. Threads to be used as crêpe threads may be coated, impregnated, or similarly treated, preferably prior to twisting, with a material which is capable of being caused to swell, and, after weaving the said threads into fabrics, the coating or impregnating materials may be swelled. The operation of coating, impregnating or similarly treating the thread is hereinafter referred to as a coating operation, the material deposited on the thread by the said operation being similarly described as a coating. Thus for example a textile yarn may be coated or impregnated with casein by any convenient process, twisted to the necessary high degree, woven into a fabric with or without other yarns, and the fabric subjected to treatment with water or other aqueous liquid so as to cause the casein coatings or deposits to swell. In this manner it has been found possible not only to obtain crêpe effects more easily when using for crêpe threads the textile yarns hitherto employed for this purpose, but also to obtain crêpe effects when using for crêpe threads textile yarns which could not be applied for this purpose hitherto.

It appears that when the coating or impregnating material of the highly twisted crêpe threads swells while remaining relatively firm, i. e. while not becoming unduly soft or yielding, the crêpe threads shrink in length and give rise to crêpe effects in the fabrics.

The coatings or deposits on or in the crêpe threads prepared and used in accordance with the invention may be composed of any materials which may be caused to swell after the said threads have been twisted and incorporated into fabrics. The coating or impregnating material should, however, be capable of swelling without becoming converted into a very soft or yielding form. Particularly satisfactory results may be obtained when coatings or deposits of casein are employed though other albuminous materials, for example egg albumen, and substances of other classes, for example rubber or rubber latex or algin may be used if desired. Coatings or deposits of these materials, especially of casein, may be caused to swell, by means of an aqueous treatment, without becoming undesirably yielding or soft.

Various means may be utilized for the coating or impregnation of the crêpe threads with casein or other albumen, rubber latex, algin, or the like. Very conveniently however the said coating or impregnating materials are applied to the threads, preferably while the latter are untwisted or only slightly twisted, in the form of aqueous or other solutions or dispersions, the solvent or other vehicle being subsequently removed by subjecting the threads to a drying or like operation.

After the threads have been given the necessary high degree of twist they may be incorporated in fabrics and the latter treated so that the coatings or deposits on the crêpe threads swell but do not become very soft or yielding. Where the coating or impregnating substance is adapted to be swollen by water or other aqueous liquid, the coatings or deposits may with advantage be subjected to a thorough dehydration either before or after twisting and/or weaving. Such dehydration may be accomplished for instance by drying in a current of warm or hot air or by treating the twisted or untwisted crêpe threads, or the fabrics, with liquids capable of abstracting water from the coatings or deposits, for example strong alcohol or a concentrated solution of calcium chloride.

The subsequent treatment of the materials for the purpose of swelling the coating or impregnating materials of the crêpe threads may be accomplished in any convenient manner. It is essential however that the method utilized be such that the coatings may be caused to swell without becoming unduly soft or yielding. Where the coating materials permit, as for example in the case of casein, swelling without undue softening may be effected by treatment in a simple aqueous

bath, for example a dilute solution of soap such as is commonly employed for the scouring of textile materials. Where the degree of swelling thus attained is insufficient the conditions of treatment may be modified; for example higher temperatures may be employed or substances facilitating the swelling may be added to the treating bath e. g. benzene or other aromatic hydrocarbons may be added in the case of coatings of rubber latex.

On the other hand, where a simple aqueous bath causes the coating or impregnating materials of the crêpe threads to become unduly soft or yielding, the bath may be modified so as to restrain the swelling action. For example, in the case of coatings of gelatine or like albumens an aqueous swelling bath may receive an addition of alcohol or of a salt or other material which diminishes the swelling action of the water.

Another method of effecting a regulated degree of swelling is to apply the swelling agent in restricted quantity e. g. in the form of vapour. For example the fabrics containing the coated or impregnated crêpe threads may be subjected to the action of moist air until the requisite degree of swelling of the coatings has taken place.

In like manner when, as in the case for example of coatings of rubber, organic swelling agents e. g. benzene are used the action thereof may be diminished if necessary by an admixture of inert diluent, e. g. lower paraffin hydrocarbons.

It is most convenient to be able to employ the same type of liquid, usually aqueous, both for the application of the coating materials and for the swelling of the same after fabric formation. To this end the coatings or deposits applied from solutions or dispersions in a liquid e. g. water, may be so treated by physical, chemical or other means that on treatment with the same liquid swelling and no immediate solution or substantial softening takes place.

Thus for example the crêpe threads may be coated or impregnated with a solution of casein in water containing an alkali and then treated with an acid, or with a salt of a heavy metal or of calcium or other alkaline earth metal, whereby the casein becomes converted into an insoluble or difficultly soluble form which, after drying, swells when treated with water but does not dissolve or become very soft or yielding. Again where casein is applied in the form of an aqueous ammoniacal solution simple drying is usually sufficient to effect removal of ammonia and leave a deposit or coating of casein capable of swelling in water in the desired manner. Coatings of casein or other albuminous materials may also be treated with formaldehyde or tannic acid in order to reduce their tendency to become unduly soft or yielding in water. The yarns may for instance be passed through an ammoniacal solution of casein and then through formaldehyde solution. In some cases the agents adapted to modify the coatings may be applied in admixture with the coating materials. Thus an ammoniacal solution of casein containing formaldehyde may be applied to the yarns or threads, a subsequent drying serving to fix a difficultly soluble casein compound thereon. Again some materials, for example rubber latex, may be applied as aqueous dispersions and the latter converted on the threads into the desired coatings or deposits, capable of being swollen by water, by drying or other treatment adapted to effect coagulation of the dispersion.

As stated above casein has been found particularly suitable for the coating or impregnation of crêpe threads in accordance with the invention. Casein may for instance, readily be dissolved or dispersed in water with the aid of an alkali such as borax, caustic soda, or ammonia. Such solutions or dispersions applied to textile yarns leave, on simple drying in the case of ammoniacal solutions, and drying and acidifying in the case of some other alkaline solutions, deposits or coatings which swell on treatment with suitable aqueous baths without becoming very soft or yielding. A yarn, of cellulose acetate or other fibres, prepared with casein in the aforesaid manner and then given a high degree of twist, e. g. 60–80 turns per inch, shrinks considerably when immersed in an aqueous bath, and the yarns are eminently suitable for the production of fabrics exhibiting crêpe effects. For example the "crêping" of fabrics incorporating the said yarns may be readily effected, that is to say the fabrics may be caused to exhibit crêpe effects, by treatment in a suitable aqueous bath.

It will be appreciated that any treatment applied, whether for the purpose of applying, modifying, or swelling the coatings or deposits of the crêpe threads should not be such as to affect prejudicially the properties of the filaments composing the crêpe threads.

The solutions or dispersions of casein, algin, rubber latex, or the like employed for coating or impregnating crêpe threads in accordance with the invention may contain, in addition to dissolving or dispersing agents where these are employed, other substances capable of modifying the character of the coatings. Thus, for example, in some cases it has been found advantageous to add to the solutions or dispersions softening agents, e. g. glycerine, or lubricating agents, e. g. oils or soaps for instance sodium stearate. Where crêpe threads are to be prepared from yarns made of or containing cellulose acetate or other cellulose esters, it has been found advantageous to apply the coating or impregnating material from solutions or dispersions which are alkaline but not strongly alkaline. For example the solutions or dispersions may be rendered alkaline with an aliphatic amine.

The following are examples of coating solutions which may be used for preparing the crêpe threads in accordance with the invention, the various quantities being expressed in parts by weight.

		Parts
(1)	Casein	8
	Ammonia 880	4
	Water	96
(2)	Casein	4
	Dextrin	4
	Ammonia	2
	Water	98
(3)	Egg albumen	2
	Water	4
	Glycerine	1
(4)	Gelatine	10
	Casein	20
	Water	400
	Caustic soda	1
	Sodium stearate	2

The application of solutions or dispersions of casein or the like to the crêpe threads may be effected in any desired or convenient manner, for example, by any of the known methods used in

the sizing of textile yarns. Thus, for instance, the threads in hank form may be immersed in the solutions or dispersions, or the threads may be passed continuously through the solutions or dispersions, then through a suitable drying device, and then to a winding and twisting apparatus where the high degree of twist necessary in crêpe threads may be applied. Again the yarn may be wound on suitable bobbins, the latter placed in closed containers, and the coating or impregnating solution introduced after evacuating the containers. The yarn may then be dried while winding off onto other bobbins or packages.

In the case of artificial threads the treatment with the solutions or dispersions may take place continuously with their production; for example a bundle of filaments of cellulose acetate issuing from a dry spinning apparatus may be passed directly through a bath or through or over another suitable application device supplied with one of the aforesaid solutions or dispersions.

The application of the casein, algin or like material to the yarns to be used as crêpe threads is preferably effected in such a manner that the individual filaments constituting the said yarns are effectively coated. The application is in consequence preferably effected while the yarns are in the untwisted or only slightly twisted state.

The after-treatment applied to the fabrics for the purpose of causing the coatings of the crêpe threads to swell and crêping of the fabrics to occur may, as indicated previously, vary according to the nature of the said coatings. Thus, for example, it may comprise a simple treatment with water with or without addition of substances adapted to vary the swelling action of the bath, for instance soap, alkali metal salts, e. g. sodium chloride, or acids, e. g. hydrochloric acid. If desired the swelling treatment may be combined with another subsequent treatment, for example the removal of the coating materials or dyeing.

After crêping has been effected the coatings or deposits on the crêpe threads may be removed in any convenient manner, for example, where the coating is of casein, by scouring in a bath containing alkali or soap.

If desired the removal of the coatings or deposits may be effected in the same bath as the swelling by a suitable adjustment of the composition, temperature, etc. of the bath. Thus, for example, woven material containing crêpe threads coated with casein may be entered into an alkali or soap bath of such concentration and temperature that the coatings become swollen but not immediately removed. As soon as the coatings have become swollen to the degree required to cause the desired crêping of the fabric to occur, the concentration and/or temperature of the bath may be increased for the purpose of removing the coating.

The degree of twist imparted to the yarns or threads serving to give the crêpe effect may be similar to that commonly employed in the production of crêpe threads from silk in the gummed state, but any other suitable degree of twist, whether higher or lower, may be employed according to the effects it is desired to produce.

The crêpe threads produced in accordance with the invention may be incorporated into fabrics in any desired manner, for example the weft alone may be wholly or partially composed of such threads, or the warp may also contain them. In general it is found convenient to employ threads of relatively low twist in the warp and to employ as the weft both crêpe threads having a left hand twist and crêpe threads having a right hand twist and prepared in accordance with my invention. The threads having right hand twist and those having left hand twist may be incorporated in any convenient manner, for example pairs of weft threads of right hand twist may alternate with pairs of threads of left hand twist.

The invention is applicable to the production of textile fabrics having crêpe threads of any desired textile materials and is particularly applicable to the production of fabrics from crêpe threads made of degummed silk or made of yarns consisting of or containing artificial filaments of for example, regenerated cellulose or cellulose esters or cellulose ethers. Examples of such cellulose esters are cellulose formate, acetate, propionate and butyrate, and among the ethers may be mentioned ethyl, methyl, and benzyl cellulose and the analogous condensation products of cellulose and glycols or polyhydric alcohols.

What I claim and desire to secure by Letters Patent is:—

1. The process of producing textile fabrics exhibiting crêpe effects which comprises coating threads with an albuminous material dispersible in water, modifying the coating so as to render it capable of being swelled by water without becoming relatively yielding, twisting the threads to a high degree, incorporating in fabrics the highly twisted crêpe threads so produced, and then subjecting the said fabrics to an aqueous treatment.

2. The process of producing textile fabrics exhibiting crêpe effects which comprises coating threads with an albuminous material dispersible in water, subjecting the coated threads to the action of formaldehyde, twisting the threads to a high degree, incorporating in fabrics the highly twisted crêpe threads so produced, and then subjecting the said fabrics to an aqueous treatment.

3. The process of producing textile fabrics exhibiting crêpe effects which comprises coating threads of cellulose acetate with an alkali casein compound, liberating casein therefrom on the threads, twisting the threads to a high degree, incorporating in fabrics the highly twisted crêpe threads so produced, and then subjecting the said fabrics to an aqueous treatment.

4. The process of producing textile fabrics exhibiting crêpe effects which comprises coating threads of cellulose acetate with an albuminous material dispersible in water, subjecting the coated threads to the action of formaldehyde, twisting the threads to a high degree, incorporating in fabrics the highly twisted crêpe threads so produced, and then subjecting the said fabrics to an aqueous treatment.

5. The process of producing textile fabrics exhibiting crêpe effects which comprises coating threads of cellulose acetate with gelatin, subjecting the threads to the action of formaldehyde, twisting the threads to a high degree, incorporating in fabrics the highly twisted crêpe threads so produced, and then subjecting the said fabrics to an aqueous treatment.

6. The process of producing textile fabrics exhibiting crêpe effects which comprises coating threads of cellulose acetate with an albuminous material disperisble in water, twisting the threads to a high degree, incorporating in fabrics the highly twisted crêpe threads so produced, and then subjecting the said fabrics to the action of an aqueous salt solution.

7. Highly twisted crêpe threads of cellulose

acetate impregnated with a compound of an albuminous material and formaldehyde adapted to swell in water without becoming relatively yielding.

8. The process of producing textile fabrics exhibiting crêpe effects, which comprises providing threads with a coating of a normally water-dispersible sizing agent modified to render it capable of being swelled by water without becoming relatively yielding, twisting the threads to a high degree, incorporating in fabrics the highly twisted crêpe threads so produced and then subjecting the said fabrics to an aqueous treatment.

9. The process of producing textile fabrics exhibiting crêpe effects, which comprises coating threads with a water-soluble compound of casein with a base, liberating casein therefrom on the threads, twisting the threads to a high degree, incorporating in fabrics the highly twisted crêpe threads so produced, and then subjecting the said fabrics to an aqueous treatment.

10. The process of producing textile fabrics exhibiting crêpe effects, which comprises coating threads of cellulose acetate with an alkali casein compound, liberating casein therefrom on the threads by acid treatment, twisting the threads to a high degree, incorporating in fabrics the highly twisted crêpe threads so produced, and then subjecting the said fabrics to an aqueous treatment.

11. Highly twisted crêpe threads of cellulose acetate of which the individual filaments are coated with a compound of gelatine and formaldehyde.

12. Highly twisted crêpe threads of which the individual filaments are coated with a compound of an albuminous material and formaldehyde.

13. Highly twisted cellulose acetate crêpe threads of which the individual filaments are coated with a compound of an albuminous material and formaldehyde.

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