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SIZING TEXTILE FABRIC

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This invention relates to a method for sizing textile fabric and to the product thereof, and more particularly relates to a method for sizing textile fabric by means of a thermoplastic film-forming composition resistant to hydrolysis by alkaline washing solutions.

The object of this invention is to produce a permanently sized textile fabric suitable for articles of wearing apparel customarily starched, which after pressing with a hot iron, is transformed into a stiffer material having an apparently heavier body and, generally, a starched appearance.

A further object of this invention is to provide a sized textile fabric from which the sizing material is not removed by repeated laundering, which needs only to be pressed with a hot iron to produce a stiff, yet pliable, starch-like finish, and which is porous so as to allow the passage of water and moisture.

A further object of this invention is to provide a pliable, yet firmly-set textile fabric in which tears and rips proceed with greater difficulty than in the untreated material, and in which adjacent threads are not strained or loosened when the material is torn.

The product in accordance with this invention comprises a textile fabric which contains a solid, thermoplastic, film-forming material which is substantially inert to the action of aqueous alkaline solutions throughout the individual threads thereof, and bonding adjacent threads together, but not forming a continuous coating on the individual threads or filling the interstices between the individual threads. This product will be found to be permanently sized and of a starched appearance which is retained after many washing and ironing operations, even when the washing is carried out in strong alkaline solutions.

The method in accordance with this invention comprises impregnating a textile fabric with an aqueous emulsion of a solution of a solid, thermoplastic, film-forming material substantially inert to the action of aqueous alkaline washing solutions in a volatile substantially water-immiscible solvent, removing the excess emulsion from the cloth, evaporating the water and the volatile solvent from the impregnated fabric and pressing at an elevated temperature, as with a hot iron, preferably at a temperature within the range of about 320° F. to about 360° F.

In following my method the excess emulsion may be conveniently removed from the cloth by passing the cloth between padded rolls. The

amount of emulsion remaining in the cloth after the excess has been removed, will desirably be such that the amount of dry thermoplastic composition remaining in the fabric at the end of my procedure will be sufficient to impregnate the individual threads of the fabric and to substantially bond the threads together where directly adjacent, but insufficient to fill the interstices between the threads or to form a continuous coating over the surface of the textile. The amount of the dry thermoplastic composition remaining in the fabric will ordinarily be within the range of about 5% to about 40% by weight of the untreated cloth.

The aqueous emulsion used in accordance with my invention will comprise an emulsion of a solution of a solid thermoplastic, film-forming material substantially inert to the action of alkaline washing solutions in a suitable volatile solvent therefor which is substantially immiscible with water. Thermoplastic materials which are suitable for use in accordance with this invention are organic esters of cellulose, as, cellulose acetate, cellulose propionate, etc.; mixed esters of cellulose, as, cellulose nitro acetate, cellulose aceto-butyrate, cellulose aceto-laurate, etc.; cellulose ethers, as, ethyl cellulose, propyl cellulose, hydroxy ethyl cellulose, butyl cellulose, etc., poly vinyl acetate resins; mixed vinyl acetate-vinyl chloride resins; polyacrylic acid ester resins, as, poly ethyl acrylate, polymethyl acrylate, methyl methacrylate; mixtures of vinyl and acrylate esters, mixtures of glycol, glycerol and glycol esters of terpinene maleic anhydride resins, chlorinated rubber, rubber hydrochloride, chlorinated rubber hydrochloride, etc. Nitrocellulose is not suitable for this purpose, since it is not resistant to the action of aqueous alkaline solutions, and is not a true thermoplastic.

The solution of the thermoplastic material may, if desired, contain a suitable softening or plasticizing agent for lowering the softening temperature of the material. When using a material which softens at a temperature of 400° F. or above, a plasticizer will desirably be added. The plasticizer selected for this purpose will desirably be resistant to hydrolysis in alkaline solutions. The particular plasticizer used will also desirably be compatible with the thermoplastic material used. Suitable plasticizers for use with thermoplastic cellulose derivatives are, for example, hydrogenated methyl abietate, hydrogenated ethyl abietate, triphenyl phosphate, tricresyl phosphate, tributyl phosphate, methyl phthalyl

methyl glycolate, ethyl phthallyl ethyl glycolate, etc.

The aqueous emulsion which I use will contain an emulsifying agent or mixture of emulsifying agents and will desirably be finely dispersed. Suitable emulsifying agents are, for example, the alkali metal salts of the higher aliphatic half ester sulfates, as sodium lauryl sulfate, sodium stearyl sulfate, etc.; sulfonated oils, as sulfonated castor oil, sulfonated olive oil, etc.; soaps, as sodium stearate, sodium oleate, etc.; alkali metal salts of alkyl naphthalene sulfonic acids, as, sodium butyl naphthalene sulfonate, sodium isopropyl naphthalene sulfonate, etc.

The solids deposited in a textile fabric when impregnated with a thermoplastic film-forming material resistant to alkaline hydrolysis by the method in accordance with this invention, will generally be laid down in the threads of the fabric as an adherent mass. However, with certain impregnating materials, as for example, ethyl cellulose, an emulsion deposits the material as fluffy, poorly adhering masses. In the use of such a material, it is desirable, although not essential, to subject the textile fabric to a pretreatment with a dilute aqueous solution of an inorganic salt, and preferably a salt of a polyvalent metal, prior to impregnating the fabric with the emulsion. Salts used for this purpose may be, for example, aluminum chloride, aluminum sulfate, zinc chloride, zinc sulfate, calcium chloride, etc. An aqueous solution of an inorganic salt having a concentration within the range of about 0.5% to about 3.0% by weight will be found suitable for this purpose.

The following examples further illustrate emulsion compositions suitable for the treatment of a textile fabric, such as for example, organdy, broad cloth, the heavy cotton fabric used for nurses' uniforms, etc., in accordance with this invention.

Example I

A solution of the following composition was prepared:

	Per cent by weight
Ethyl cellulose	16.6
Hydrogenated methyl abietate	3.4
Toluol	56.0
Butanol	16.0
Naphtha (Hi-Flash)	8.0
	100.0

Five hundred grams of the above solution was emulsified in 300 cc. of water containing 1.5 grams of sodium lauryl sulfate and 3 grams of sulfonated castor oil, to form an oil-in-water type emulsion by admixing the two solutions and passing the mixture through a colloid mill. The emulsion was uniform and of fine particle size.

Example II

A solution of the following composition was prepared:

	Per cent by weight
Cellulose acetobutyrate	12
Methyl phthallyl ethyl glycolate	6
Triphenyl phosphate	6
Ethylene dichloride	46
Ethylene glycol monoethyl ether acetate (Cellosolve acetate)	20
B-B dichlorethyl ether	10
	100

One hundred parts of the above formula are emulsified in 40 parts of water containing ½% sodium lauryl sulfate and 1% sulfonated castor oil by admixture and then passage through a colloid mill.

Example III

Film phase:

	Parts by weight
Chlorinated rubber (Tornesit-30 cp. grade)	100
Hydrogenated methyl abietate	15
Oleic acid	4.9
Toluol	16
Xylol	110

Water phase:

Distilled water	98.5
NaOH	0.7

These two phases are run together through the colloid mill for emulsification.

Example IV

Fim phase:

	Parts by weight
Poly vinyl acetate resin (Gelva 15)	25
Toluol	55
Butyl acetate	20

Water phase:

Distilled water	39.4
Sodium lauryl sulfate	0.2
Sulfonated castor oil	0.4

The two phases may be shaken together for dispersion, or emulsified in a colloid mill.

The following examples further illustrate the method in accordance with this invention.

A sample of heavy, unsized cotton broadcloth was immersed in a 1% aqueous solution of aluminum chloride, passed between squeeze rolls and then immersed in an emulsion of the composition shown in Example I, containing ethyl cellulose. The broadcloth saturated with the ethyl cellulose emulsion was then passed between padded squeeze rolls to remove the excess, and then through a drying tunnel at approximately 100° F. At this stage of the treatment the cloth was no stiffer than the untreated broadcloth, and microscopic examination showed that the individual threads of the cloth were impregnated with minute pellets of ethyl cellulose plastic. The treated broadcloth was pressed with a hot iron at a temperature of about 340° F. After ironing, the weight of the broadcloth was found to have been increased about 30%. It was found to have a starched appearance, and to be much stiffer than the untreated cloth, yet still pliable. It was found to be more difficult to tear than the original cloth, and when torn gave a clean tear with unraveled edges. The interstices between the threads of the treated cloth were not closed, so that the treated cloth was not impervious to the passage of water and moisture, and can be used for the same purposes as the untreated broadcloth which has been starched. The broadcloth so treated has a decided advantage over broadcloth which has been starched, in that the sizing is not removed even after repeated laundering.

A sample of organdy was immersed in an emulsion of the composition shown in Example II, containing cellulose acetobutyrate. The organdy saturated with emulsion was then passed between padded squeeze rolls and through a drying tunnel. The cloth so treated was then pressed with a hot

iron at a temperature of about 340° F. The or-
gandy so treated was found to have been in-
creased in weight by about 25%, and to have a
starched appearance.

It will be understood that the details and ex-
amples hereinbefore set forth are illustrative
only, and that the invention as herein broadly
described and claimed is in no way limited there-
by.

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

1. A sized textile fabric characterized by stiff-
ness and a starchlike finish in the absence of
starch, by pliability and perviousness to both
moisture and air, and by having the individual
threads thereof discontinuously impregnated with
from about 5% to about 40% of a composition
comprising a solid thermoplastic material sub-
stantially resistant to the action of aqueous alka-
line solutions and where said threads are directly
adjacent, being bonded together by the thermo-
plastic material, without the interstices being
filled by said thermoplastic composition.

2. A sized textile fabric characterized by stiff-
ness and a starchlike finish in the absence of
starch, by pliability and perviousness to both
moisture and air, and by having the individual
threads thereof discontinuously impregnated
with from about 5% to about 40% of a thermo-
plastic composition comprising a thermoplastic
cellulose derivative substantially resistant to the
action of aqueous alkaline solutions and where
said threads are directly adjacent, being bonded
together by the thermoplastic composition, with-
out the interstices being filled by said thermo-
plastic composition.

3. A sized textile fabric characterized by stiff-
ness and a starchlike finish in the absence of
starch, by pliability and perviousness to both
moisture and air, and by having the individual
threads thereof discontinuously impregnated with
from about 5% to about 40% of a plasticized
thermoplastic composition comprising a thermo-
plastic cellulose derivative substantially resistant
to the action of aqueous alkaline solutions and
where said threads are directly adjacent, being
bonded together by the thermoplastic composi-
tion, without the interstices being filled by said
thermoplastic composition.

4. A sized textile fabric characterized by stiff-
ness and a starchlike finish in the absence of
starch, by pliability and perviousness to both
moisture and air, and by having the individual
threads thereof discontinuously impregnated with
from about 5% to about 40% of a composition
comprising cellulose acetobutyrate and where said
threads are directly adjacent, being bonded to-

gether by the cellulose acetobutyrate, without the
interstices being filled by the cellulose aceto-
butyrate.

5. A sized textile fabric characterized by stiff-
ness and a starchlike finish in the absence of
starch, by pliability and perviousness to both
moisture and air, and by having the individual
threads thereof discontinuously impregnated with
from about 5% to about 40% of a composition
comprising ethyl cellulose and where said threads
are directly adjacent, being bonded together by
the ethyl cellulose, without the interstices being
filled by the ethyl cellulose.

6. A sized textile fabric characterized by stiff-
ness and a starchlike finish in the absence of
starch, by pliability and perviousness to both
moisture and air, and by having the individual
threads thereof discontinuously impregnated with
from about 5% to about 40% of a composition
comprising chlorinated rubber and where said
threads are directly adjacent, being bonded to-
gether by the chlorinated rubber, without the
interstices being filled by the chlorinated rubber.

7. A sized textile fabric characterized by stiff-
ness and a starchlike finish in the absence of
starch, by pliability and perviousness to both
moisture and air, and by having the individual
threads thereof discontinuously impregnated with
from about 5% to about 40% of a composition
comprising plasticized cellulose acetobutyrate and
where said threads are directly adjacent, being
bonded together by the plasticized cellulose aceto-
butyrate, without the interstices being filled by
the plasticized cellulose acetobutyrate.

8. A sized textile fabric characterized by stiff-
ness and a starchlike finish in the absence of
starch, by pliability and perviousness to both
moisture and air, and by having the individual
threads thereof discontinuously impregnated with
from about 5% to about 40% of a composition
comprising plasticized ethyl cellulose and where
said threads are directly adjacent, being bonded
together by the plasticized ethyl cellulose, with-
out the interstices being filled by the plasticized
ethyl cellulose.

9. A sized textile fabric characterized by stiff-
ness and a starchlike finish in the absence of
starch, by pliability and perviousness to both
moisture and air, and by having the individual
threads thereof discontinuously impregnated
with from about 5% to about 40% of a composi-
tion comprising plasticized chlorinated rubber and
where said threads are directly adjacent, being
bonded together by the plasticized chlorinated
rubber, without the interstices being filled by the
plasticized chlorinated rubber.

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