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TEXTILE PRINTING COMPOSITION

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This invention relates to methods and compositions for printing textile fabrics, particularly greige goods.

Fabrics as they come off the loom (prior to bleaching and finishing) are generally known in the trade as "greige goods." Greige goods have waxes, oils and other materials present, these materials being naturally-occurring materials, as for example the naturally-occurring oils and waxes found in cotton fiber, and/or size, which is added to the yarn prior to weaving to protect and lubricate the yarn during its passage through the loom.

Heretofore attempts to print greige goods have been unsuccessful because these waxes, oils and other materials prevented the printing composition from penetrating and becoming bonded with the fabric. The result was that the printing composition was only superficially applied to the fabric, and, consequently, was comparatively readily removed or obliterated so that the printing, especially under laundering operations to which the goods might be subjected, soon faded or became entirely removed or erased from the fabric.

With bleached goods the bleaching operation removes some or all of the oils, waxes, and other materials that are so resistant to penetration and the printing composition has an opportunity to become securely bonded to the fiber. I am not aware that anyone has heretofore successfully printed directly on greige goods or provided a printing composition which was generally applicable to greige goods as well as to bleached or finished fabrics.

By the terms "printing of fabrics directly as they come off the loom" or "printing of greige goods" it is to be understood that I mean the printing of any fabric that is not bleached or finished (greige goods) and has present the natural fats, waxes and oils of the fiber and/or the size added to the yarn to lubricate it during its passage through the loom.

An object of the present invention is the provision of a method and composition for printing fabrics directly as they come off the loom.

Another object of the present invention is the provision of a method and composition for the printing of greige goods, the method and composition also being generally useful in the printing of bleached or finished textile materials.

Other objects of the invention will hereinafter more fully appear.

I have found that textile printing compositions comprising a proportion of a terpene ether may be printed on greige goods with excellent results. Preferably these terpene ethers are those produced from an unsaturated terpene compound by the addition of an alcohol to a double bond of an unsaturated terpenic group contained in the said terpene compound. Such terpene ethers and methods of preparing the same are described in U. S. Patent No. 2,136,011 to Humphrey. The proportion of terpene ether employed is a small but effective amount, generally greater than 2% by weight of the printing composition and generally not more than 10%.

While I am aware that Humphrey suggests that these ethers are useful as solvents and softeners for coating compositions and printing inks, I believe that I am the first to successfully print greige goods and to propose a textile printing composition comprising a terpene ether for this purpose. Materials generally classified as plasticizers, as for example dibutyl phthalate, diethyl phthalate, tricresyl phosphate, blown castor oil, camphor and the like, are of no utility in imparting penetration to textile printing compositions. Also, the mere utilization of organic solvents, as for example hydrocarbons, alcohols, ketones, acetones, "Cellosolve", and the like in textile printing compositions fails to provide a composition suitable for printing greige goods. In the belief that this was due to lack of penetration, I have tried in combination with such solvents many of the well-known textile assistants such as pine oil, but use of these agents proved unsuccessful and is to be contrasted with the textile printing composition of the present invention which overcomes the resistance of greige goods to printing.

While I am not to be limited to my theory of the operation of the terpene ether, it appears that the ether softens or dissolves the waxes, lubricants and sizes, and oils present in the fiber of greige goods and permits the dispersion of the binding material of the printing composition with these oils, waxes, etc., into intimate contact with the fibers. In the absence of the terpene ether the binder would be repelled by the oils, waxes, etc. and would be prevented from adhering to the fibers.

The solid content of the printing composition of the present invention may comprise any suitable resinous binder and a coloring material. As a resinous binder, there may be employed any soluble phenol or urea-aldehyde resin, vinyl resin, ester gum, alkyd resin or oil-soluble natural resins such as copal. As an auxiliary binder there may be employed any of the cellulose esters or

ethers commonly utilized in coating compositions. Preferably, the printing composition is of the water-in-oil emulsion type having an unsaturated fatty acid modified alkyd and phenol aldehyde resin, fortified with halogenated rubber or ethyl cellulose, as a binder. It is to be understood, however, that the invention is not limited in this respect, that other resinous binders may be employed, and that the textile printing composition may be in the form of the oil-in-water type or the solution type.

The coloring material employed in the printing composition may be any suitable pigment or soluble dyestuff. By the term "pigment" I mean to include lakes and toners.

Any suitable vehicle may be employed, as, for example, one or more volatile substances such as toluol, xylol, alcohol, ethyl acetate, butyl acetate, acetone, "Cellosolve" (mono-ethyl ether of ethylene glycol), methyl isobutyl ketone, butyl alcohol, hydrogenated petroleum naphtha, one or more of the constituents of the vehicle being a solvent for the binder either alone or when admixed with one of the other constituents of the vehicle. Where the printing composition is of the emulsion type an emulsifying agent such as morpholine, ammonium stearate, ammonium linoleate, triethanolamine, soap or the like may be employed. It is understood that suitable dyers and plasticizers may be utilized.

Non-limiting examples of textile printing compositions of the present invention wherein percent represents percentage by weight are as follows:

Example 1

	Percent
Oil modified alkyd resin (Rezyl 869)	18.28
Chlorinated rubber (Parlon)	2.71
Morpholine	0.23
Hydrogenated petroleum naphtha (Solvesso #3)	8.59
Hydrogenated petroleum naphtha (Solvesso #2)	10.55
Terpene ether (Terposol #3)	6.96
Cobalt nuodex	0.84
Water	47.25
High flash naphtha	2.71
Pigment	1.88
	100.00

The textile printing composition of Example 1 was a water-in-oil emulsion having a solids content of 22.87% and a viscosity of 800–1000 ctps.

Example 2

	Percent
Oil modified alkyd resin (Rezyl 869)	3.42
Chlorinated rubber (Parlon)	4.85
Phenolated alkyd resin (ESL–627)	2.02
Morpholine	0.23
Hydrogenated petroleum naphtha (Solvesso #3)	3.09
Hydrogenated petroleum naphtha (Solvesso #2)	10.69
Terpene ether (Terposol #3)	4.31
Cobalt nuodex	0.83
High flash naphtha	4.85
Water	63.84
Pigment	1.87
	100.00

The textile printing composition of Example 2 was a water-in-oil emulsion having a solids content of 12.16% and a viscosity of 3300–3800 ctps.

Example 3

	Percent
Oil modified alkyd resin (Rezyl 869)	3.42
Chlorinated rubber (Parlon)	1.09
Phenolated alkyd resin (ESL–627)	2.04
Morpholine	0.23
Hydrogenated petroleum naphtha (Solvesso #3)	3.10
Hydrogenated petroleum naphtha (Solvesso #2)	10.81
Terpene ether (Terposol #3)	4.35
Cobalt nuodex	0.84
High flash naphtha	1.09
Water	71.16
Pigment	1.87
	100.00

The textile printing compositions of Example 3 was a water-in-oil emulsion having a solids content of 8.42% and a viscosity of from 10,000 to 12,000 ctps.

Example 4

	Percent
Urea formaldehyde resin	4.72
Paraplex RG2	2.72
"Duponol" ME fatty alcohol sulfate	1.13
Toluol	10.41
VM & P naphtha	10.81
Methanol	5.62
Capryl alcohol	4.73
Pigment	7.73
Terpene ether (Terposol #8)	4.76
Water	47.37
	100.00

The textile printing composition of Example 4 appeared to be a water-in-oil emulsion. The Paraplex is an alkyd resin of the straight chain dibasic acid type.

Example 5

	Percent
Oil modified alkyd resin (Rezyl 869)	3.25
Phenol modified drying oil extended alkyd resin (Beckosol #1)	6.83
Phenolated alkyd resin (ESL–627)	1.32
Chlorinated rubber (Parlon)	2.12
Cobalt nuodex	1.24
Hydrogenated petroleum naphtha (Solvesso #2)	2.67
Hydrogenated petroleum naphtha (Solvesso #3)	18.00
Mineral spirits	6.73
High flash naphtha	2.12
Terpene ether (Terposol #3)	4.76
Water	49.18
Pigment	1.78
	100.00

The textile printing composition of Example 5 was a water-in-oil emulsion having a viscosity in the neighborhood of 800 ctps.

Example 6

	Percent
Rezyl 869	3.25
Ethyl cellulose emulsion (Hercosett)	5.18
Phenolated alkyd resin (ESL–627)	1.96
Morpholine	0.22
Hydrogenated petroleum naphtha (Solvesso #3)	2.96
Hydrogenated petroleum naphtha (Solvesso #2)	14.50
Cobalt nuodex	0.80
Terpene ether (Terposol #3)	4.76
Water	64.59
Pigment	1.78
	100.00

The textile printing composition of Example 6 was a water-in-oil type emulsion having a solids content of 12.78% and a viscosity of about 12,000 ctps.

The compositions of each of the foregoing examples were prepared by first grinding the pigment with a proportion of the resin and mixing the pigmented resin with the remaining ingredients. However, it is to be understood that the compositions may be prepared by other methods. Thus, the pigment may be flushed on a portion of the resin by mixing the resin dissolved in a portion of the solvent, say Solvesso #2, with water pulp pigment as received from the pigment manufacturer, the mixing being conducted under vacuum to get preferential evaporation of the water. The solvent is returned to the mixer and the process continued until essentially all of the water has been removed, at which time complete dispersion of the pigment in the resin is obtained. The pigmented resin is thereafter mixed with the remaining ingredients of the printing composition.

Under some circumstances it may be advisable to prepare the non-pigmented emulsion and the pigment paste separately and to combine them just prior to printing. In this manner a base of the emulsion may be combined with various color pigment pastes as desired. As a further alternative, a resin solution containing the terpene ether, with or without emulsifier, and the pigment concentrate may be separately prepared and the two emulsified with water just prior to printing.

In application the printing composition is applied to the textile by offset, intaglio or other process. The printing compositions may be utilized for "over-all" printing as well as design printing. The composition may also be applied by immersing the textile therein and thereafter passing the textile through squeeze rolls, or by padding the composition onto the textile. These various methods of application serve to illustrate the versatility of the product.

After application of the ink, the drying may be accomplished by atmospheric drying over a period of time or by force drying over a can set or through a heated chamber at temperatures of from 150 to 300° F. for time intervals of from thirty seconds to several minutes. These are typical times and temperatures and are not critical.

It is to be understood that the foregoing exples are merely for purpose of illustration and are not to be taken as limiting. Various soluble resins and cellulose derivatives may be employed depending upon the properties desired in the particular print. While I consider the water-in-oil emulsion type to be preferred since the water in the internal phase permits viscosity control and at the same time aids in penetration, it is to be understood that the terpene ethers are highly effective in other types of textile printing compositions.

Broadly, the present invention contemplates a method and composition for printing textile fabrics, particularly greige goods, the composition comprising a resinous binder dissolved in volatile solvent, and terpene ether present in a small but effective proportion sufficient to assist the printing of greige goods. By "terpene ether present in a small but effective proportion sufficient to assist the printing of greige goods" I mean that when adjusted to suitable printing viscosity and printed on griege goods the composition containing the proportion of terpene ether provides a print that is comparable with prints on bleached or finished goods, whereas in the absence of the terpene ether, the composition when printed on greige goods is relatively easily removed or obliterated, especially under laundering operations. The ability of the compositions of the present invention to print greige goods greatly increases their usefulness, but it will be understood that these compositions are not limited to use on greige goods and that they may be utilized on other fabrics such as bleached or finished fabrics.

It will be obvious to those skilled in the art that the method and composition of the present invention are susceptible to wide variation.

Having described my invention, what I claim is as follows:

1. A textile printing composition which will successfully print on greige goods comprising a resinous binder dissolved in volatile solvent, and a terpene ether present in proportion greater than 2% and not more than 10%, the terpene compounds in said composition consisting essentially of said terpene ether.

2. A textile printing composition which will successfully print or greige goods comprising a resinous binder dissolved in volatile solvent, and a terpene ether present in proportion greater than 2% and not more than 10%, the terpene compounds in said composition consisting essentially of terpene ether of the type which is produced from an unsaturated terpene compound by the addition of an alcohol to the double bond of an unsaturated terpenic group contained in the said terpene compound.

3. The process of printing greige goods prior to bleaching and finishing which comprises printing the greige goods with coloring material and a resinous binder therefor in the presence of a small but effective proportion of terpene ether sufficient to assist the printing of the greige goods.

4. The process of printing greige goods which comprises printing the greige goods with composition comprising coloring material, resinous binder dissolved in volatile solvent and a terpene ether present in proportion greater than 2% and not more than 10%.

5. A process as set forth in claim 3 wherein the terpene ether is one of the type which is produced from an unsaturated terpene compound by the addition of an alcohol to the double bond of an unsaturated terpenic group contained in the said terpene compound.

6. A process as set forth in claim 4 wherein the terpene ether is one of the type which is produced from an unsaturated terpene compound by the addition of an alcohol to the double bond of an unsaturated terpenic group contained in the said terpene compound.

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