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COATED FABRIC AND THE PRODUCTION THEREOF

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18 Claims. (Cl. 91—68)

The present invention relates to improvements in the art of producing coated fabrics, for example leather-cloth, tarpaulin and the like, of the kind comprising a fibrous base material, such as cotton, hessian, pulp or paper, covered with a composition containing dissolved nitrocellulose and a softening agent therefor. The invention is particularly concerned with the manufacture of such coated materials having great resistance to fire.

Certain softening agents which have hitherto been used in such compositions, for example vegetable oils such as castor oil, blown castor oil, and blown cottonseed oil, belong to the class of softeners that have little or no solvent action on nitrocellulose. These softening agents, however, become rancid on storage, and coated fabrics embodying them may develop an offensive odour. Anti-oxidant materials are often introduced to avoid this defect, but the presence of an anti-oxidant often induces certain other disadvantages. Moreover, when coated fabrics containing substantial proportions of these softeners are heated to a temperature of about 70° C. they exude droplets of oil on the surface of the fabric.

Softeners such as tricresyl phosphate have been proposed for use instead of the above-mentioned vegetable oils. Softeners of this type are good solvents for nitrocellulose, and compare favourably with vegetable-oil softeners in that they do not become rancid on storage, nor exude when the coated fabrics are heated. However, they still suffer from the disadvantages that nitrocellulose compositions containing them in substantial proportions are thermoplastic even after removal of any volatile solvents and/or diluents, and that in consequence fabrics coated with such compositions may become tacky or sticky when warm. This defect is particularly troublesome if it appears during manufacturing processes, such as the production of coated material in continuous webs by hot-plate spreading machines which involves lapping the hot coated material in folds, and in the embossing of the coated material.

A method of manufacturing coated fabrics has also been suggested according to which the coating composition contains nitrocellulose and, as a softening agent therefor, a brominated tricresyl phosphate corresponding substantially in composition to a dibromotricresyl phosphate in which both the bromine atoms are substituted in the nucleus. The fabrics so coated are satisfactorily flexible at ordinary temperatures and do not become tacky or sticky while warm, and difficulties due to the thermoplasticity of the coating are not encountered in the usual manufacturing processes, even when temperatures of 100° C. are employed. These coated fabrics, moreover, have good fire-resistance. However, although the dibromotricresyl phosphate possesses only a faint odour, this odour is persistent and is intensified by warmth. In certain circumstances, e. g. the exposure of a large surface of coated fabric in an enclosed space, the odour may become objectionable.

This invention has as an object to devise a method of manufacturing coated fabrics comprising a fibrous base covered with a composition containing dissolved nitrocellulose and a softening agent therefor which will be fire-resistant, odourless, and will neither be tacky nor exude drops of oil when warm. A further object is to provide new coated fabrics having these properties. A still further object is to devise a new method of manufacturing coated fabrics. A still further object is to provide new coated fabrics. Further objects will appear hereinafter. These objects are accomplished by the following invention.

I have now found that coated fabrics having a particularly high exudation temperature, satisfactory freedom form thermoplasticity, good fire-resistance and other desirable properties, are obtained by the use in the coating composition, as softening agent for the nitrocellulose, of a condensation product of reaction between castor oil and a polycarboxylic acid or an anhydride thereof, if desired in presence of a polyhydric alcohol; said condensation product containing a halogen substituent.

According to the present invention, a coated fabric is produced by a process comprising the application to a base material of a coating composition comprising colloided nitrocellulose and, as a softening agent for the nitrocellulose, a condensation product of reaction between castor oil and a polycarboxylic acid, if desired in presence of a polyhydric alcohol; the said condensation product containing a halogen substituent.

Any nitrocellulose of the type usually employed for the manufacture of coated fabrics in which castor oil is used as softening agent may be employed. When the viscous or resinous halogenated castor-oil-polybasic-acid condensation product is employed as sole softening agent, the exudation temperature of the coated fabric may be as high as about 120° C.; but other softening agents, either of the solvent type for instance tricresyl phosphate, or of the type having little or no solvent action, such as castor oil, may be employed in partial replacement thereof to a limited extent. For example a coated fabric still having an exudation temperature as high as about 100° C. may be obtained by employing, as softener for the nitrocellulose, a brominated castor oil citrate containing 15% or less bromine in conjunction with half its weight of castor oil; whereas when castor

oil is used alone the exudation temperature is about 70° C.

The presence of a small proportion of a solvent plasticiser is advantageous in tending to increase the strength of the coating; provided that the proportion is insufficient to induce thermoplastic properties in the coated fabric.

The invention is further illustrated by the following examples in which the parts are parts by weight.

Example 1

In the manufacture of an artificial leather, a fireproofed cotton fabric is coated in a known manner with a composition consisting of the following ingredients in parts by weight.

	Parts
Nitrocellulose (11.4%–11.6% nitrogen)	16
White pigment (titanium oxide)	11
Resin consisting of brominated castor oil citrate with 5% bromine	33
Solvent mixture (ethyl acetate: industrial spirits 40:60 by volume)	80

The product may be embossed.

Example 2

	Parts
Nitrocellulose (10.8%–11.0% nitrogen)	30
Pigment	30
Magnesium ammonium phosphate	15
Resin consisting of brominated castor oil citrate containing 15% bromine	60
Tricresyl phosphate	16
Solvent mixture as in Example 1	120

The composition is spread on a fireproofed cotton fabric.

Example 3

A fireproofed cotton base fabric is coated in the usual way with the following composition:

	Parts
Nitrocellulose (10.8–11.0% nitrogen)	30
Pigment	30
Magnesium ammonium phosphate	15
Resin consisting of a castor-oil-modified glycerol phthalic acid condensation product containing 13% bromine	60
Tricresyl phosphate	16
Solvent mixture as in Example 1	120

The coated cloth may be stamped or embossed.

Example 4

A fireproofed cotton base fabric is coated with the following composition:

	Parts
Nitrocellulose (as in Example 2)	30
Pigment	30
Magnesium ammonium phosphate	15
Castor-oil-maleic-acid condensation products containing 13% bromine	60
Tricresyl phosphate	16
Solvent mixture as in Example 1	120

The coated cloth may be stamped or embossed.

Example 5

A fireproofed cotton base fabric is coated with the following composition:

	Parts
Nitrocellulose (as in Example 2)	16
White pigment (titanium oxide)	11
Castor-oil-citric-acid condensation product containing 5% chlorine	33
Solvent mixture as in Example 1	80

The coated cloth may be stamped or embossed.

Instead of the condensation products used in the examples I could have used any halogenated product prepared as described in application Serial No. 217,775, filed July 6, 1938, in the name of Arthur Hill, by treating a viscous or plastic polybasic carboxylic ester of castor oil in solution in a suitable solvent with bromine until between 5%–25%, and preferably between 10%–20% of bromine is introduced, reckoned on the weight of the untreated castor-oil-polybasic-carboxylic-acid reaction product. There may thus be employed for example the condensed castor oil citrates brominated to the extent of 15% of the final product.

Alternatively, the condensation product used may be one obtained by the halogenation of a castor-oil-modified polyhydric-alcohol-polybasic-acid condensation product; for instance one produced as described in British application No. 5792/38 filed February 23, 1938.

The chlorinated condensation products of castor oil and polybasic organic acids, whether or not also condensed with polyhydric alcohols, e. g. the chlorinated castor oil citrates containing 5–12.5% chlorine, are also suitable for use according to my invention. In the application of my invention, I may make use of the halogenated condensation products of castor oil and any one of the following polycarboxylic acids: maleic, fumaric, citric, aconitic, tartaric, phthalic, isophthalic, terephthalic, hexahydrophthalic, succinic, adipic, glutaric, azelaic, suberic and sebacic acids. These intermediate condensation products may if desired also contain a proportion of glycerol or ethylene glycol condensed therein. The halogenation should be carried out to the extent of between .06 and .3 grm. molecules of halogen for each 100 grms. of the unheated condensation product and preferably between .125 grm. mols and .25 grm. mols.

The softeners used according to the present invention, besides possessing improved flame-resistance, are characterised by low volatility and an almost complete lack of odour. Coated fabrics made according to the present invention are practically odourless and do not propagate their own combustion. In general, an increase in the bromine content of these softeners corresponds to a higher flame-resistance. Softeners of this type containing over 15% bromine may be strongly coloured, and may accordingly be used preferably in dark-coloured coating compositions. Highly brominated softeners are preferably used in presence of a proportion of solvent softener, e. g. tricresyl phosphate.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

I claim:

1. A process for the production of coated fabrics which comprises the application to a base material of a flame resistant coating composition comprising colloided nitrocellulose and, as a softening agent therefor, a substance of the class consisting of the condensation products of a reaction between castor oil, a halogen and a polycarboxylic acid, and the condensation products of a reaction between castor oil, a halogen and a polycarboxylic acid in the presence of a polyhydric alcohol, the halogen content of the condensation product being between .06 and .3 gram molecules of halogen for every 100 grams of the unheated condensation product.

2. A process as in claim 1, in which the soften-

ing agent also contains a minor proportion of a solvent softener for the nitrocellulose.

3. A process as in claim 1, in which the halogenated condensation product is a brominated castor-oil-citric-acid condensation product.

4. A process as claimed in claim 1 in which the halogenated condensation product contains from .125 to .25 grm. molecules of halogen for every hundred grammes of the unheated condensation product.

5. A process as in claim 1, in which the halogenated condensation product contains 5%–25% of bromine on the weight of the unheated condensation product.

6. A process as in claim 1, in which the halogenated condensation product contains 10–20% of bromine on the weight of the unheated condensation product.

7. A process as claimed in claim 1 in which the halogenated condensation product contains from 5% to 12.5% of chlorine calculated on the weight of the unheated condensation product.

8. A process as claimed in claim 1 in which the halogenated condensation product contains from 5% to 10% of chlorine calculated on the weight of the unheated condensation product.

9. Flame resistant coating compositions comprising colloided nitrocellulose and, as a softening agent therefor, a substance of the class consisting of the condensation products of a reaction between castor oil, a halogen and a polycarboxylic acid, and the condensation products of a reaction between castor oil, a halogen and a polycarboxylic acid in the presence of a polyhydric alcohol, the halogen content of the condensation product being between .06 and .3 gram molecules of halogen for every 100 grams of the unheated condensation product.

10. Coating compositions as claimed in claim 9, in which the softening agent also contains a minor proportion of a solvent softener for the nitrocellulose.

11. Coating compositions as claimed in claim 9, in which the halogenated condensation product is a brominated castor-oil-citric acid condensation product.

12. Coating compositions as claimed in claim 9 in which the halogenated condensation product contains from .125 to .25 grm. molecules of halogen for every hundred grammes of unheated condensation product.

13. Coating compositions as claimed in claim 9, in which the halogenated condensation product contains 5%–25% of bromine on the weight of the unheated condensation product.

14. Coating compositions as claimed in claim 9, in which the halogenated condensation product contains from 5 to 12.5% of chlorine calculated on the weight of the unheated condensation product.

15. Coating compositions as claimed in claim 9, on the weight of the unheated condensation contains from 10 to 20% of bromine calculated on the weight of the unheated condensation product.

16. Coating compositions as claimed in claim 9, in which the halogenated condensation product contains from 5 to 10% of chlorine calculated on the weight of the unheated condensation product.

17. Coated fabrics comprising a textile material and a composition as claimed in claim 9.

18. Coated fabrics comprising a textile material and a composition as claimed in claim 9 in which the softening agent also contains a minor proportion of a solvent softener for the nitrocellulose.

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CERTIFICATE OF CORRECTION.

Patent No. 2,208,640, July 23, 1940.

JOHN HERON McGILL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 23, for the word "form" read --from--; page 3, second column, line 23, claim 15, for "on the weight of the unheated condensation" read --in which the halogenated condensation product--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 10th day of September, A. D. 1940.

(Seal) Acting Commissioner of Patents.

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