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RUBBER CONTAINING TEXTILE PRINTING PASTE

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This invention relates to textile printing, and has particular reference to new and novel compositions for printing colored designs on textiles, and to the improved textiles obtained thereby. More particularly, it contemplates the printing of textiles with printing pastes containing rubber of reduced viscosity, specially treated to render it useful for textile printing.

The conventional method of coloring textiles is to dye them in the piece, or to print dyes in various designs on the textiles. The dye printing of textiles is an expensive operation, and often open to serious objections due to the failure of many dyes to resist light, washing, dry cleaning and other incidents of normal use. Furthermore, fine designs reproduce poorly, due to the tendency of the dye pastes to spread.

It has been proposed to print textiles by the use of pigmented compositions, formed by dispersing pigment in a variety of binders, applying the compositions in a manner similar to the printing of paper, directly to the untreated fabric. This method of textile decorating has obvious advantages over the dye printing method, since it eliminates the treatment of the fabric before and after printing, necessary in dye printing, permits the use of the cheaper, more light-resistant covering pigments, and give finer prints. It also permits the use of fabrics which have slight defects, since the pigment tends to hide the defects.

Although the use of pigmented marking compositions possesses very great advantages over the conventional dye printing methods, the method has had but little application, due primarily to other objectionable qualities of the pigmented coating compositions.

A principal objection to these pigmented compositions is the development of what is known in the trade jargon as "hand"— a certain objectionable stiff feel of the cloth in handling, as compared with the smooth feel of the unprinted cloth. This is due only slightly to the thickness of the coating on the individual yarn; it is probably due primarily to the bridging of the film from one yarn of the fabric to the next, whereby agglomerates of yarns are formed which give the impression on handling that the fabric is woven from coarse thread. It is therefore essential that the composition yield a discontinuous film which does not bridge the yarns of the fabric unduly.

A second principal objection is the phenomenon known as "crocking," which is the tendency of the printed fabric to yield color to another fabric, or to the hand, when rubbed against it. While this phenomenon is observable with many dyestuff prints, it is far more serious with pigmented prints, and is one of the principal objections of the trade to pigment-printed fabrics.

A pigmented marking composition must not only meet the requirements of not crocking appreciably, and not giving a noticeable hand to the fabric, but must also meet other requirements. Adhesion to fabric, sufficient strength, flexibility and extensibility to withstand crushing, crumpling and stretching of the fabric, good resistance to washing and dry cleaning agents, and the ability to withstand ironing, are all essential characteristics of a desirable print.

The combination of all of these properties in a single vehicle is obviously difficult of attainment. Extensibility and flexibility are limited by thermoplasticity and a tendency to stick while ironing; a great many desirable film-forming ingredients may not be used because they do not withstand soap or dry cleaning solvents; and most flexible films, which are also strong enough to wear well, have their usefulness impaired by the "hand" they impart to the fabrics. The problem is further complicated by the fact that film-forming binders often act entirely differently in the discontinuous films desirable in textile printing, as compared to the continuous films obtained in the ordinary printing, marking and coating of paper, textiles, wood and non-porous materials.

Rubber and rubber substitutes have been considered in the past as binders for textile marking compositions, but have never come into extensive use because of certain inherent disadvantages. Ordinary rubber is far too viscous to give printing pastes of desirable printing properties; when it is depolymerized by milling or by heat, the resultant product produces films which tend to remain tacky, even after vulcanization. Unvulcanized rubber is too soluble in dry cleaning solvents to be of great usefulness.

I have discovered that natural rubber, depolymerized as by heat or milling, may be used advantageously in the printing of textiles, by incorporating therewith a minor portion of a rubber derivative such as chlorinated rubber or "Pliolite" (described in the Hauptli Patent No. 2,069,829, issued February 9, 1937, and comprising a reaction product derived from rubber by the action therewith of an amphoteric metal halide).

The depolymerized rubber compositions may be compounded with vulcanizing agents containing no free sulfur, and printed onto fabrics by conventional intaglio process; without causing conversion of the surfaces of the copper cylinders into copper sulfide, which has a tendency to be removed from the cylinder, to cause blemished prints. After vulcanization of the prints, they are resistant to washing and dry cleaning, possess excellent hand and resistance to crocking. They tend, however, to have a tacky feel which is objectionable in most fabrics.

I remove this feel by incorporating into the compositions a rubber derivative exemplified by chlorinated rubber and "Pliolite." Even very small amounts of rubber derivative improve the tack, and in many instances 10% of the rubber derivative, base on the rubber present, will completely remove the tack. In general I prefer to use from 20 to 30%. Amounts in excess of 50% of the rubber tend to affect the composition adversely by dulling the resulting film and causing a harsher feel.

Typical examples of my invention are the following:

EXAMPLE 1

	Parts
Pale crepe rubber	8.0
Pliolite	3.0
Iron oxide brown	8.0
Zinc oxide	0.4
Sulfur	0.16
Mercaptobenzothiazole	0.08
Tetramethylthiuramdisulfide	0.02
Antioxidant	0.08
Stearic acid	0.08
Petroleum hydrocarbon solvent, B. P. 135°–185° F	80.18

Mill the rubber, rubber substitute and pigment on the rubbermill for 15 minutes, or in a Banbury mill for an equivalent period. Add in small pieces to the solvent under agitation. Add the other ingredients either by master-batching in part of the rubber saved out for this purpose or add where safe to the pigmented batch. The fabric should be treated after printing to vulcanize the print.

EXAMPLE 2

	Parts
Pale crepe rubber	10.0
Chlorinated rubber	3.0
Indanthrene blue	3.0
Zinc oxide	0.3
Stearic acid	0.2
Dipentamethylene-thiuramtetrasulfide	0.1
Piperidinium pentamethylenedithiocarbamate	0.025
Xylene	53.375
Water	30.00

Mill and dissolve as in Example 1. Add the water to the xylene solution while agitating and pass through a colloid mill. The resulting composition has a body excellently adapted to intaglio application. Vulcanize the print as in Example 1.

EXAMPLE 3

Heat depolymerized rubber

	Parts
Pale crepe rubber—heat depolymerized	10.0
Chlorinated rubber	3.0
20% Monastral Green pulp (Copper Phthalocyanine Green)	15.0
Zinc oxide	0.3
Stearic acid	0.2
Dipentamethylene-thiuramtetrasulfide	0.15
Tetramethylthiuram mono-sulfide	0.1
Xylene	53.25
Water	18.00

Depolymerize the rubber in an oven by heating it in thin layers at 150° C. for four hours. Disperse the zinc oxide and vulcanizing agents in part of this rubber, as for a few minutes in the two-roll mill.

Add the depolymerized rubber, the chlorinated rubber, the dispersed zinc oxide and vulcanizing agents to the xylene, and stir until a solution is obtained. To this add, with agitation, the pigment pulp cut with the additional water. Pass the emulsion through a homogenizer or colloid mill. Vulcanize the print.

While I have shown but a few examples of my invention, changes can obviously be made without departing from the scope of my invention, which is defined in the claims.

I claim:

1. A textile printing paste comprising a dispersion of color in a vehicle, comprising a solvent having dispersed therein a color binding agent consisting essentially of depolymerized rubber and a rubber derivative, of the class consisting of chlorinated rubber and the reaction products of rubber and amphoteric metal halides in amount sufficient to materially reduce the tack of the rubber, but not exceeding 50% of the weight of the rubber.

2. The composition of claim 1, in which the rubber is depolymerized by milling.

3. The composition of claim 1, in which the rubber is depolymerized by heat.

4. The composition of claim 1, in which a vulcanizing agent and an antioxidant are incorporated into the composition.

5. In the combination of a textile fabric with a colored mark resembling a dyed mark but comprising pigment bound to the fabric by means of a binder, the improvement which consists in the use as a binder of depolymerized rubber and a rubber derivative of the class consisting of chlorinated rubber and the reaction product of rubber and amphoteric metal halides, in amount sufficient to materially reduce the tack of the rubber, but not exceeding 50% of the weight of the rubber.

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