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TEXTILE PRINTING COMPOSITION AND FABRIC

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2 Claims. (Cl. 260—32)

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 synthetic rubbers of the type obtained by copolymerization of butadiene and acrylonitrile.

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 gives 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.

The fabrics produced by this method of textile printing differ markedly from fabrics coated with the same compositions. The coated fabrics are waterproof; these fabrics are completely porous and readily launderable, like dye-printed textiles, since the pigment is bound to the fabric by completely discontinuous films of binder, which permits the passage of water through the entire fabric. It is this complete absence of a continuous film which repels water, which makes the problem so difficult.

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 synthetic rubbers obtained by copolymerizing butadiene and acrylonitrile may be used advantageously as a vehicle

in the printing of fabrics, giving soft wash-resistant prints which stand up well on the fabric. The synthetic rubber is preferably compounded with vulcanizing agents.

A typical example of my invention is the following:

Example 1

	Parts
Perbunan (rubber copolymer of butadiene and acrylonitrile)	8.00
Zinc oxide	.40
Sulfur	.16
Captax (mercaptobenzothiazole)	.08
Tuads (tetramethyl thiuram disulfide)	.02
Solvesso #2 (hydrogenated petroleum naphtha)	64.34
Yellow toner pulp (16.7% pigment)	11.98
Water	15.02

The zinc oxide and sulfur are milled with half of the Perbunan; the Captax and Tuads are milled with the rest of the Perbunan. Both milled dispersions are dissolved in Solvesso #2. Water is stirred into pigment pulp and the mixture passed through colloid mill. The color paste is then stirred into Solvesso solution, and passed through colloid mill.

It should be noted that water is used in the composition in the form of a water-in-lacquer emulsion. This is done to get improved sharpness of printing and color strength; at least about 20% of water is necessary to get this effect, while 50 to 60% is preferred, and higher amounts may be used, consonant with the production of emulsions of satisfactory printing body. This paste when printed on a fabric and dried at 220° F. to 280° F. for 2 to 6 hours to vulcanize the composition, gives an unusually resistant washable film.

Examples can of course be multiplied indefinitely without departing from the scope of my invention, which is defined in the claims. In particular, the vulcanizing agents, antioxidants, pigments and solvents can be varied in manner well known to the art—it is only essential that the pigment binder consist essentially of the copolymer.

I claim:

1. A textile printing composition comprising an emulsion having an inner aqueous phase comprising at least 20% of the emulsion, and an outer organic phase comprising pigment dispersed in a vehicle consisting essentially of a solution of synthetic rubber obtained by copolymerizing butadiene and acrylonitrile in a volatile organic solvent, in combination with vulcanizing agents, said composition yielding soft, wash-fast prints on fabric after vulcanization.

2. In the combination of a textile fabric with a pigmented decoration bonded to the fabric by means of a binder in such a discontinuous fashion that the fabric is readily launderable, the improvement which comprises the use of vulcanized synthetic rubber obtained by copolymerizing butadiene and acrylonitrile as the essential binder for the pigment whereby soft wash-fast prints are obtained.

DAVID M. GANS.

Certificate of Correction

Patent No. 2,394,542. February 12, 1946.

DAVID M. GANS

It is hereby certified that the name of the assignee in the above numbered patent was erroneously described and specified as "International Chemical Corporation" whereas said name should have been described and specified as *Interchemical Corporation*, as shown by the record of assignments in this office; 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 30th day of April, A. D. 1946.

[SEAL]

LESLIE FRAZER,
First Assistant Commissioner of Patents.

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