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COATING METHOD

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The present invention relates to a method of coating paper, textile fabrics and the like and is an improvement over the process described and claimed in my copending application Ser. No. 193,077 filed February 28, 1938 entitled "Coating Method and Product."

As described in said copending application, I have found that superior coated products can be formed in an easy and inexpensive manner by first applying to the base member to be coated, as by rolling or pressing, a soft, adhesive mass comprising artificial materials such as vinyl polymerizates or other polymerization products of unsaturated organic compounds or cellulose derivatives and the like and large quantities of non-volatile softeners, which mass is free from volatile solvents and which has the property of completely penetrating or intimately uniting with the base member. Thereupon a harder, less adhesive mass of similar materials but which contains considerably smaller amounts of non-volatile softeners is rolled or pressed onto the first coating. While the second or harder coating is incapable of firmly uniting directly to the base member, the interposition of the soft, adhesive coating layer not only impregnates the base member but also unites the hard, exterior coating to the base member. In this way it is possible to obtain products with hard, non-sticky coatings firmly attached to base materials. Since no volatile solvents are necessary there is no need for drying of the coatings applied, no fire or health hazard and no need for elaborate solvent recovery equipment.

It is an object of this invention to provide a coating process which permits of the application of smooth, strongly adherent coatings of cellulose derivatives, hard polymerizates and other synthetic substances upon textile fabrics, paper and the like.

It is also an object of my invention to provide a process of applying flexible coatings of cellulose derivatives, hard polymerizates and other synthetic substances upon textile fabrics and paper which are stable to heat and cold, non-tacky and impermeable to water and gas which process completely avoids the use of volatile solvents.

I have now found that the process of my aforesaid application can be simplified and the foregoing objects realized in the following manner. The coating materials to be utilized in my process, i. e. the soft initial coating material containing large quantities of non-volatile softeners and the harder material used for forming the outer coating and which contains considerably less non-volatile softener are first formed into suitable foils. The said foils can be easily made as by casting or rolling the composition into a plate, film or band of the desired thickness. Then such foils as are desired are superposed upon the base member and then the several layers are simultaneously united as by continuous rolling or pressing, preferably with the application of heat. If so desired, the surface of the article may be given any desired ornamentation as for example graining by applying pressure to the surface of the article by means of a roller having suitable engraving on its surface.

The materials that may be formed into foils and used according to the present process are as follows. As the relatively soft material which may be directly applied to the base member but which is generally too soft to constitute the external coating of the product one can use the soft resinous mass such as is obtained by mixing vinyl polymerizates or cellulose derivatives with a relatively large proportion of a non-volatile softening agent. Alternatively such resinous materials as polymers or cellulose derivatives may be used as the initial coating material which are per se soft, such as moderately polymerized isobutylene or mixed polymerizates of vinyl chloride and considerable quantities of vinyl acetate or polymerizates of acrylic acid esters, polyacrylic acid esters or polyvinyl acetate alone in a soft polymerization stage or especially soft cellulose derivatives such as cellulose laurate. In all the latter instances it is not necessary to add any softening agents in order to maintain the softness of the mass. Because of their low viscosity, all these soft masses penetrate deeply into the interstices of the fabric or paper to such an extent that the fibers on the reverse side of the sheet are saturated upon calendering under the pressure of the rollers and at a moderate temperature, i. e. a temperature ranging from 70° to 110° C. A harder, thermoplastic mass which melts or softens only at a relatively high temperature, i. e. a temperature ranging from 120° to 170° C. is used as outer coating material and as such there can be used cellulose derivatives, polyvinyl compounds, polyacrylic acid esters, polymerized isobutylene and other polymerizates either alone or in combination with relatively small amounts of non-volatile plasticizers or softening agents. The following examples are given in order to show some specific applications of my process. It is to be understood that these examples are merely illustrative and that the present invention is not to be limited thereto:

Example 1.—In a vulcanization machine for rubber material, simultaneously a base material or fabric, a soft and viscous foil of approximately 0.3–0.5 mm. thickness which has previously been rolled or cast without a solvent, prepared from 40 parts of polyvinyl chloride and 60 parts of softener (for example, phthalic acid butyl ester), and a harder, non-viscous foil which has also been previously prepared by calendering or any suitable method from 75 parts of polyvinyl chloride and 25 parts of tricresyl phosphate are superposed one upon the other and run between the pressure band and the drum of the vulcanization machine which has been partly or entirely heated to 120–150°. The required pressing pressure is achieved by a hydraulic tension device. An intimate union of the 3 layers is thus obtained and there is produced in one operation a continuous, finished, laminated product which can be used for various purposes such as artificial leather, folding boat skin, etc.

The drum of the vulcanization machine can be supplied, as necessary, with a smooth, polished or dull surface or with any desired engraving for imparting the desired surface ornamentation to the final product. It is quite advantageous to arrange the pressing drum so that it may be heated in one sector and simultaneously cooled in an adjacent sector so that any surface ornamentation on the finished product can be set and thereby protected from damage.

By inserting several layers of material and a corresponding number of soft foils and also two harder exterior foils, a multi-layered homogeneously welded material of greater thickness can be produced, which can be used for example for belts and the like.

Example 2.—In place of the two polyvinyl chloride foils of Example 1, which differ in hardness through their softening agents, foils made from mixed polymerizates of vinyl chloride and acrylic acid methyl ester are used which distinguish substantially by the percentage content of both components so that the one intended for the inner layer is very soft and viscous, consisting for example, of 50% polyvinyl chloride and 50% polyacrylic acid ethyl ester while the other intended for the outer layer, though flexible is harder and non-viscous, consisting for instance of 70% polyvinyl chloride and 30% polyacrylic acid ethyl ester. The process is otherwise the same as in Example 1.

Example 3.—Two completely different polymerizates are used as upper and lower layer, for example an upper foil of non-viscous highly polymerized isobutylene and a lower foil of soft, viscous polyacrylic acid ethyl ester. The process is otherwise the same as in Example 1.

Example 4.—For the upper layer a foil of 80% ethyl cellulose and 20% benzyl naphthalene is used and for the lower layer a foil of 50% ethyl cellulose and 50% benzyl naphthalene.

Example 5.—For the upper layer a foil of 80 parts of benzyl cellulose and 20 parts tricresyl phosphate is used, and for the lower layer a foil of cellulose laurate, which is soft and viscous per se (without softener).

Example 6.—For the upper layer, a foil of 70 parts polyvinyl chloride and 30 parts tricresyl phosphate can be used, and for the lower layer a foil of 50 parts of after-chlorinated polyvinyl chloride and 50 parts of tricresyl phosphate.

While I have described my invention in some detail it is to be understood that numerous variations are possible without departing from the spirit of my invention.

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