

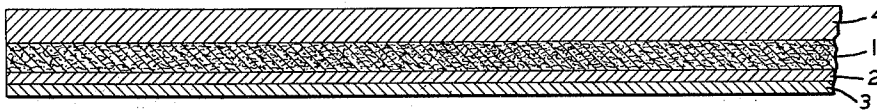
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RESILIENT HARD SURFACE COVERING

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RESILIENT HARD SURFACE COVERING

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This invention relates to coating for saturated felt backings. More particularly, the invention relates to a coating system to be applied to backing material used in the production of resilient hard surface floor coverings of the type in which a wearing surface of a layer of linoleum composition or plastic material, such as a vinyl resin plastic material, is calendered or otherwise impressed upon saturated felt backings.

Resilient floor coverings of the type widely used today are those which contain a relatively thick wearing surface of linoleum or plastic material which has been deposited onto a suitable backing material. Although asphalt impregnated felt has been used for a number of years as a backing for such resilient floor coverings, due to the many disadvantages inherent in asphalt impregnated felt, such as staining during stoving and the exhibition of undesirable characteristics due to wide changes in temperatures, there has been developed in more recent years a number of various types of resinous saturants for use in the impregnation of these felt backings onto which are calendered the decorative wearing surfaces. Although these backing materials possess many advantages over the asphalt saturated type, there is a problem presented in the application of the materials to the subfloor. Generally speaking, the most widely employed adhesives for the installation of resilient floor coverings are water base materials. Typical of such adhesives is one containing sulfite liquor, clay, plasticizer, and a deodorant. Sufficient water is added to such a mixture to obtain a suitable viscosity for spreading. In a resilient floor covering having a resinous saturated felt backing, such as one obtained by saturation of the felt with an oleoresinous material, for example, one produced by heating a mixture containing tall oil, linseed oil, and soya bean oil in the presence of a material such as rosin, moisture from the water base adhesive enters the back of the sheet and expands the felt. Since there is no substantial amount of expansion possible in the surface mix which has been subjected to curing or other treatment to render it resilient and flexible, the materials have a tendency to curl upward and a peaked seam results.

One problem presented in the application of various coating systems to saturated felt floor covering backings to overcome moisture penetration is that many coats cannot be employed because of the nature of normal installation practices in the hard surface floor covering industry. Any coating used to prevent the entry of moisture into the sheet must not interfere with adhesion of the sheet to pastes normally used to install flooring products. Many coatings which will satisfactorily prevent

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moisture penetration will not adhere to such pastes. In addition to being possessed of the characteristic of adhering to the normally employed pastes or cements, the material should be of such a nature as to adhere to the resin-impregnated backing. There are many materials which can be so readily stripped from such backing materials that they cannot be employed for the purpose desired.

I have found that resilient hard surface floor covering may be manufactured with a moisture barrier comprised of a two-coat system—the first coat, the prime seal coat, being of such a nature as to readily adhere to the felt backing; and the second coat functioning as a barrier and one which permits conventional cements or pastes to bond the finished floor covering to subfloors.

The drawing is a fragmentary sectional view of a floor covering carrying the two-coat back coating system of my invention. For purposes of clarity, the drawing is more or less schematic in showing the relative thickness of the various layers of material. In preparing a floor covering made in accordance with my invention, the backing 1 is obtained by saturating gray felt at about 150° F. to about 250° F. with an oleoresinous saturant to a level of about 30% to about 45% saturant by weight based on the original dry felt weight. The saturated felt is cured at a temperature of about 180° F. to about 270° F. to a tensile strength of about 1500 pounds per square inch. While any of a number of oleoresinous saturants may be used, such as one obtained by bending a vegetable drying oil, tall oil and a resin, and heating the resulting blend, a typical saturant contains the following ingredients in the following proportions:

	Parts
Blown soya bean oil	105
Raw linseed oil	105
Crude tall oil	60
FF wood rosin	30
Lead and manganese drier	5

Particularly advantageous results have been obtained by saturating gray felt at about 180° F. with an oleoresinous saturant to a level of about 37% to about 39% by weight of dry felt, and curing the resulting material. After curing, the wearing surface material 4 is deposited upon the backing. This may be accomplished by forming a sheet of a linoleum or plastic mix into the desired pattern and thereafter impressing the sheet upon a backing material. If the wearing surface requires cure, the sheet is then stoved in conventional linoleum-making stoves; and after stoving, the product is back coated with coatings 2 and 3 in accordance with my invention.

Generally speaking, I find it advantageous in the practice of my invention to apply a first coat 2 by means of a roller or any other conventional applicator device. The first coat is a latex of a mixture of polyvinyl chloride and butadiene-acrylonitrile synthetic rubber containing about 50% to about 60% by weight polyvinyl chloride and about 40% to about 50% by weight synthetic rubber. I prefer a composition containing about 55% polyvinyl chloride and about 45% by weight butadiene-acrylonitrile copolymer containing about 25% acrylonitrile. I have obtained advantageous results when the latex of the material described contains about 25% to about 50% solids. Generally speaking, a sufficient coat is obtained when the coating rate is 2.5 to 3.5 pounds

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solids per 100 square yards of material. After application and drying of the first coat, a second coating 3, which may be a 25% to 40% solids suspension, is applied by roller at a rate of 2.5 to 3.5 pounds solids per 100 square yards of material. The second coating is advantageously obtained by mixing 41 parts of filled plasticized polystyrene latex (Example I, below), 40 parts casein solution (Example II, below), and 8 parts water. The mixing can be carried out in any conventional mixing apparatus. The filler to plasticized polystyrene resin ratio may vary from 3 to 1 to 6 to 1.

A typical polystyrene latex contains the following ingredients in the following proportions:

Example I

	Lbs.
Peerless clay-----	494.0
Fibrene talc-----	61.0
Water-----	368.0
Styrene-maleic anhydride polymer-----	14.0
Glyceryl monoricinoleate-----	4.5
26° Bé. ammonia-----	4.2
Butyl benzyl phthalate-----	40.0
Polystyrene resin (40% dispersion)-----	202.0

In the coating of the above example, the clay and talc are fillers; the styrene-maleic anhydride polymer is a dispersing agent for the fillers; the glyceryl monoricinoleate is a defoaming agent; ammonia is a stabilizer; butyl benzyl phthalate is a plasticizer; and the polystyrene is the binder, the last two ingredients forming a plasticized binder system.

The styrene-maleic anhydride polymer is alkali soluble and may be prepared by heating styrene in the presence of maleic anhydride and the methyl half ester of maleic acid. The methyl acid ester in part reverts to anhydride and free alcohol during the polymerization and in part persists in the copolymer. Generally speaking, 1 mol of dicarboxylic components including the acid anhydride and half ester is reacted with 1 to 1.2 mols of styrene. 1 mol of acid anhydride is used with 0.2 to 1.5 mols of half ester.

A typical casein solution contains the following ingredients in the following proportions:

Example II

	Lbs.
Argentine casein-----	100
26° Bé. ammonia-----	23
Water-----	541
Sodium fluoride-----	3

In the above coating, the casein functions as an aid in developing adhesion in the last down coat; the ammonia solubilizes the casein in the casein solution; and the sodium fluoride is a preservative for the casein.

While the particular composition of the last down coat may be varied, it can be described as a dispersion, preferably aqueous, containing 1 part by weight casein solids to 3 to 5 parts by weight filler and plasticized polystyrene solids.

In order to realize the advantages of my invention, I find it is essential to employ the two-coat system. A single coat of either of the coatings described above will not give the desired results. I have also found that two coats of the same coating will not give the desired results. For example, the polystyrene-casein coating will not adhere satisfactorily to the felt if the vinyl resin-rubber coating has not been applied. On the other hand, the vinyl resin-rubber coating, while it adheres well to the felt, is inadequate in preventing moisture from passing into the felt, resulting in the peaked seams described hereinabove. In addition, the combination of the two coatings affords a superb water barrier. On an equivalent weight basis, the coating system of my invention is considerably more effective than two vinyl resin-rubber coats alone or two coats of polystyrene-casein in preventing

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moisture passage into the sheet. Water-insoluble proteins other than casein may be used in the last down coat. Examples of such materials are zein, soya alpha protein, and the like.

While the coating system has advantageous results on backings other than those containing an oleoresinous saturant, it is unnecessary in instances where the saturant is a highly waterproof material, such as asphalt. However, for reasons given above there are many disadvantages resulting from the use of asphalt and similar saturants; thus one may realize the great advantages of oleoresinous saturants, coupled with water resistance, by the practice of my invention.

The coating system of my invention results in a material which may be readily cemented to a subfloor utilizing conventional water base cements as described hereinabove. In addition, if desired, it can be used with an alcohol base cement, such as one containing extracted rosin, denatured alcohol, phenol-formaldehyde resin, and clay. Such pastes may be defined as those containing felt penetrating vehicles.

By means of my invention, I have provided a floor covering which is characterized by the property of being readily adhered to subfloors with a wide variety of adhesive materials. In addition, because of the two-coat system applied to the backing, it is resistant to moisture penetration and, therefore, not subject to peaked seams. In addition to being suitable for use in the production of the inlaid type of floor covering, wherein a relatively thick layer of linoleum or plastic material such as vinyl resin is calendered or otherwise impressed upon a backing, the two-coat system may be applied to printed felt base materials wherein a relatively thin film of paint is printed upon a saturated felt backing. Of course, the products of my invention may be used as floor coverings, wall coverings, counter tops, sink tops, and the like.

I claim:

1. A resilient floor or wall covering comprising a decorative wearing surface affixed to a fibrous foundation sheet saturated with an oleoresinous saturant and carrying a back coating system comprising a first coat which includes a film deposited from a dispersion of finely divided particles of a blend of polyvinyl chloride resin and butadiene-acrylonitrile synthetic rubber and a top coat deposited from a dispersion containing plasticized polystyrene resin and water-insoluble protein.

2. In an article of manufacture, a flexible floor or wall covering material, the back of which is adapted to be adhesively united to a subsurface and which is resistant to moisture penetration, a fibrous foundation sheet impregnated with an oleoresinous material, a top ornamental wear layer, and a back coating including a film deposited directly onto the back of said fibrous sheet and comprising a blend containing about 50% to about 60% by weight polyvinyl chloride resin and about 40% to about 50% by weight butadiene acrylonitrile rubber, and a second film deposited onto said first film comprising about 3 to about 5 parts by weight filler and plasticized polystyrene resin and about 1 part by weight casein.

3. In an article of manufacture, a flexible floor or wall covering, the back of which is adapted to be adhesively united to a subsurface and which is resistant to moisture penetration, a top ornamental wear layer secured to a felt backing saturated with the oleoresinous product of heating a drying oil, tall oil, and a resin, the back of said saturated felt carrying a film deposited from a dispersion of a blend containing about 55 parts by weight polyvinyl chloride and about 45 parts by weight butadiene-acrylonitrile rubbery copolymer, and a second film deposited over said first film from a dispersion containing about 3 to about 5 parts filler and plasticized polystyrene resin and about 1 part casein.

4. A floor or wall covering comprising a decorative wearing surface affixed to an oleoresinous saturated felt

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backing and a two-coat moisture barrier system applied to the back of said saturated felt, each of said coats being deposited in amounts of about 2.5 to about 3.5 pounds solids per 100 square yards of said covering, the first down coat comprising a blend of polyvinylchloride resin and butadiene-acrylonitrile synthetic rubber and the last down coat comprising plasticized polystyrene resin and casein.

5. In an article of manufacture, the combination of

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claim 2 in which said butadiene-acrylonitrile rubber contains about 25% acrylonitrile.

References Cited in the file of this patent

UNITED STATES PATENTS

2,153,723	Pohl	Apr. 11, 1939
2,434,974	Woerner	Jan. 27, 1948
2,529,799	Crockett	Nov. 14, 1950