

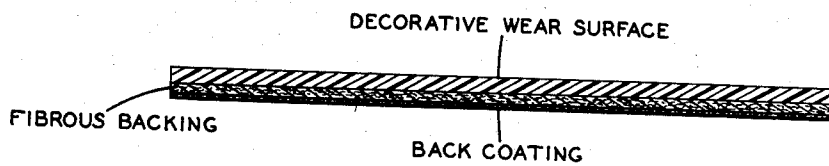
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RESILIENT FLOOR AND WALL COVERING HAVING A BACK COATING

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RESILIENT FLOOR AND WALL COVERING HAVING A BACK COATING

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This invention relates to a resilient floor and wall covering and more particularly to a resilient floor and wall covering having a decorative wear surface and a coating applied to the under surface thereof to cause the same to cup away from the decorative wear surface.

In the manufacture and installation of resilient floor and wall coverings of the linoleum and vinyl type, one of the problems encountered is upward curling of the material toward the decorative wear surface or face resulting in raised seams between adjacent pieces after installation. There are several known causes for this curling, among which are a dissimilarity in properties between the wear surface and the backing, stress in the decorative wear surface resulting from manufacturing processes, and distortion resulting from curing. In the case of backed materials, it is generally known that decorative wear surfaces of the thermoplastic type such as those made from vinyl chloride-vinyl acetate copolymers contract during cooling from manufacturing temperature to room temperature, contributing to this cupping problem. Also, some of the backings currently used in resilient type floor and wall coverings absorb moisture, causing them to expand, thereby accentuating this cupping or curling condition. This situation is particularly pronounced where the sheet material is cut into blocks of floor tile size, usually 9" x 9".

The invention set forth in this application satisfactorily overcomes this problem in all types of resilient floor and wall coverings in which this cupping or curling condition exists, regardless of whether the material comprises a decorative wear layer on a backing, or is of the so-called homogeneous type in which the composition is the same throughout, by the application of a coating to the back surface or surface opposite that to which the decorative wear layer is applied. This coating shrinks, causing the sheet material to cup away from the decorative wear surface side so that when the material is installed on a floor this coating will be constantly holding the edges down in contact with the floor, resisting upward curling.

It is an object of this invention to provide a floor and wall covering having applied to the back thereof a coating which will shrink, causing the material to cup toward the back to overcome the natural tendency to curl toward the surface.

The accompanying drawing is illustrative of the invention in which there is shown a floor covering having a decorative wear layer on a fibrous backing and a back coating on the side of the fibrous backing opposite that to which the wear layer is applied.

This invention may be used in the production of any of the well known resilient floor and wall coverings such as those made of linoleum or vinyl composition. The invention is particularly useful in those cases where the decorative wear surface of linoleum or vinyl is formed on or laminated to a backing such as saturated organic felt. This type of backing has a tendency to grow or expand when it absorbs moisture from the air or from the adhesives used to install the flooring. Also, the wear layer contracts to a greater extent than the backing when the flooring is exposed to low temperatures or laid under cold conditions. Both effects cause curling of the product. In the case of materials having backings of a water-resistant

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type such as asbestos with a rubber latex binder, thermal contraction of the wear layer is the only major factor contributing to this face cupping inasmuch as the backing is fairly stable dimensionally to changes in moisture content. Cupping in the homogeneous material such as unbacked linoleum usually is caused by edge curling of the material during curing. With the homogeneous vinyl compositions the most prevalent cause of curling is stress in the finished material due to manufacturing processes.

The shrinkage characteristics of cellulosic resins, particularly the higher viscosity grades, are well known in the industry. However, when these coatings are used as a back coating for floor coverings of the type here under consideration, a relatively large amount of cellulosic resin is required to overcome the pull of the decorative wear surface. It has been found that a pronounced improvement in the shrinkage characteristics of cellulosic resins results from the addition of relatively small quantities of fine particle size filler of the diatomaceous silica type. The shrinkage characteristics of the cellulosic resins are sufficiently enhanced to overcome the pull toward the decorative wear surface and cup the material toward the back of the floor and wall covering. The particular filler materials most suitable for carrying out this invention are the diatomaceous silicas having a particle size of 15 microns or less with the preferable size ranging from 2 to 5 microns. These particular filler particles are the fossilized remains of organic material and are formed with irregular surfaces which enhance the intertwining or intermeshing of adjacent particles with one another and with the resin vehicle, thereby greatly enhancing the strength of the back coating.

These fillers may be used with any of the cellulosic resins such as nitrocellulose, ethyl cellulose, and cellulose acetate butyrate. It is desirable to include a suitable solvent for the cellulosic resin, and it has been found that the ketones are well suited as primary solvents for the cellulosic resin while other solvents such as mixtures of toluene and alcohol may be used as secondary solvents in the system. In order to attain the desirable coating properties the nitrocellulose resin should be selected from those comprising a 10.7% to 12.2% nitrogen concentration with a preferable range between 11.8% to 12.2% nitrogen. The resin should have a viscosity ranging between 18 centipoises and 1000 seconds with the preferred range being from 1/4 seconds to 5-6 seconds.

This system of measuring viscosity is described in the publication entitled, "Cellulose Nitrate," by Henry Fleming Payne, published by John Wiley & Sons, Inc., 1954. The recitation in determining the viscosity of cellulose nitrate is contained on pages 407-441. That relating to ethyl cellulose appears on pages 456-496. The same material is contained in the publication of Hercules Powder Company, published in 1955, entitled, "Nitrocellulose—Properties and Uses." The pertinent material appears on pages 20-25 thereof.

When employing an ethyl cellulose resin it should be selected from those having an ethoxy concentration of 43% to 50% with the preferred range between 47.5% to 49%. The viscosity of the ethyl cellulose resin should range between 4 centipoises and 5000 centipoises with the preferred range between 7 centipoises and 100 centipoises. These viscosities are determined by making a solution of 5% of the ethyl cellulose resin in 80 parts toluol and 20 parts denatured 2-B ethyl alcohol of 95% purity.

Other cellulosic resins falling within these viscosity limits are suitable for carrying out the invention.

Example 1

This material comprises an oleo-resinous saturated felt backing and a wear surface of a suitably plasticized and

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filled vinyl chloride vinyl acetate copolymer. To the underside of the felt backing of this product there was applied a coating of the following formulation:

	Pounds
Nitrocellulose (70% in ethanol) ½ sec. R.S.-----	100
Methyl ethyl ketone-----	252
Syloid 244 (diatomaceous silica)-----	17.5

NOTE:—20% Syloid 244 based on total solids.

The coating was applied at the rate of 50 pounds per 100 square yards by means of a conventional roll coater.

Example 2

This material comprises a backing of asbestos with a rubber latex binder and a wear surface of a copolymer of vinyl chloride-vinyl acetate. To the underside of the asbestos and rubber backing of this product there was applied a coating of the following formulation:

	Pounds
Ethyl cellulose, 6-8±3 centipoises-----	140
Syloid 244 (diatomaceous silica)-----	35
Toluene -----	275
Acetone -----	150
Alcohol -----	75

NOTE:—20% Syloid 244 based on total solids.

The coating was applied at the rate of 50 pounds per 100 square yards by means of a conventional roll coater.

In both of the above cases the material cupped toward the back, after application and drying of the coating. In Example 1 the methyl ethyl ketone is used as a solvent for the nitrocellulose. In Example 2 the acetone is used as the primary solvent and the mixture of toluene and alcohol is used as a secondary solvent or extender.

The invention here involved has found considerable utility in application to the back of linoleum or vinyl resilient floor and wall coverings which are made with or without a backing. These coatings are of particular use when the floorings are to be cut into tile, for example 9" x 9" squares, since seam peaking is accentuated in tile. The coating may be applied by any suitable means such as roll coating, syringing, air knife, etc. The coating may be dried by any dry cycle, but one which will quickly remove the solvent from the wet film and thereby minimize penetration into the substrate is preferred.

I claim:

1. A resilient floor and wall covering comprising a decorative wear layer and a backing of fibrous material, a coating on said backing on the side opposite said wear layer, said coating comprising a cellulosic ester and a diatomaceous silica filler of small particle size.

2. A resilient floor and wall covering comprising a decorative wear layer of a copolymer of vinyl chloride and vinyl acetate and a backing of fibrous material, a coating on said backing on the side opposite said wear layer, said coating comprising a cellulosic ester and a diatomaceous silica filler of small particle size.

3. A resilient floor and wall covering comprising a decorative wear layer and a backing of fibrous material, a coating on said backing on the side opposite said wear layer, said coating comprising nitrocellulose and a diatomaceous silica filler of small particle size.

4. A resilient floor and wall covering comprising a decorative wear layer of linoleum and a backing of fibrous material, a coating on said backing on the side opposite said wear layer, said coating comprising a cellulosic ester and a diatomaceous silica filler of small particle size.

5. A resilient floor and wall covering comprising a decorative wear layer and a fibrous felt backing, a coating on said fibrous felt backing on the side opposite said wear layer, said coating comprising a cellulosic ester and a diatomaceous silica filler of small particle size.

6. A resilient floor and wall covering comprising a decorative wear layer and a backing of rubber and as-

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bestos, a coating on said backing on the side opposite said wear layer, said coating comprising a cellulosic ester and a diatomaceous silica filler of small particle size.

7. A resilient floor and wall covering comprising a decorative wear layer and a backing of fibrous material, a coating on said backing on the side opposite said wear layer, said coating comprising ethyl cellulose and a diatomaceous silica filler of small particle size.

8. A resilient floor and wall covering comprising a decorative wear layer of a copolymer of vinyl chloride and vinyl acetate, a coating on the back of said decorative wear layer comprising a cellulosic ester and a diatomaceous silica filler of small particle size.

9. A resilient floor and wall covering comprising a decorative wear layer of linoleum, a coating applied to the back of said linoleum comprising a cellulosic ester and a diatomaceous silica filler of small particle size.

10. A resilient floor and wall covering comprising a decorative wear layer and a backing of fibrous material, a coating on said backing on the side opposite said wear layer, said coating comprising the dried residue of nitrocellulose having a viscosity between 18 centipoises nitrocellulose and 1000 seconds nitrocellulose and a nitrogen content between 10.7% to 12.2% and diatomaceous silica having a particle size of 15 microns or less.

11. A resilient floor and wall covering comprising a decorative wear layer and a backing of fibrous material, a coating on said back on the side opposite said wear layer, said coating comprising the dried residue of nitrocellulose having a viscosity between ¼ second nitrocellulose to 5-6 seconds nitrocellulose and a nitrogen concentration between 11.8% to 12.2% and diatomaceous silica having a particle size of 15 microns or less.

12. A resilient floor and wall covering comprising a decorative wear layer and a backing of fibrous material, a coating on said backing on the side opposite said wear layer, said coating comprising ethyl cellulose having a viscosity between 4 centipoises nitrocellulose and 5000 centipoises nitrocellulose and an ethoxy concentration of 43% to 50% and diatomaceous silica having a particle size of 15 microns or less.

13. A resilient floor and wall covering comprising a decorative wear layer and a backing of fibrous material, a coating on said backing on the side opposite said wear layer, said coating comprising the dried residue of ethyl cellulose having a viscosity between 7 centipoises nitrocellulose and 100 centipoises nitrocellulose and an ethoxy concentration ranging between 47.5% to 49% and diatomaceous silica having a particle size of 15 microns or less.

14. A resilient floor and wall covering comprising a decorative wear layer and a backing of fibrous material, a coating on said backing on the side opposite said wear layer, said coating comprising a cellulosic ester and diatomaceous silica having a particle size ranging between 2 and 5 microns.

15. A resilient floor and wall covering comprising a decorative wear layer having applied to the back thereof a coating comprising the dried residue of nitrocellulose having a viscosity between 18 centipoises nitrocellulose and 1000 seconds nitrocellulose and a nitrogen concentration between 10.7% to 12.2% and diatomaceous silica having a particle size of 15 microns or less.

16. A resilient floor and wall covering comprising a decorative wear layer having applied to the back thereof a coating comprising the dried residue of ethyl cellulose having a viscosity between 4 centipoises nitrocellulose and 5000 centipoises nitrocellulose and an ethoxy concentration between 43% to 50% and diatomaceous silica having a particle size of 15 microns or less.

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