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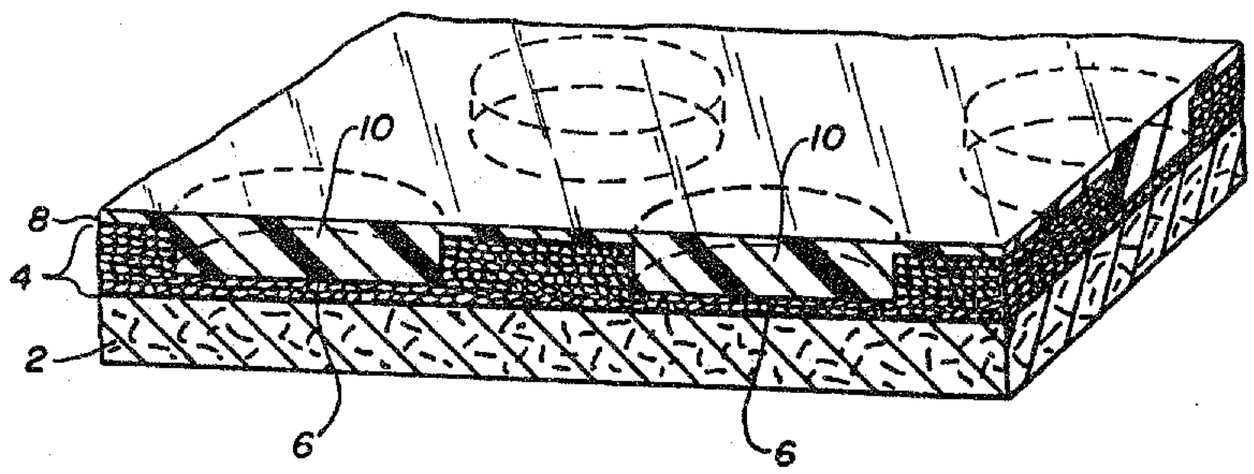
(54) **REVETEMENT DECORATIF, ET METHODE DE FABRICATION CONNEXE**

(54) **DECORATIVE SURFACE COVERING AND METHOD OF MANUFACTURE**



(57) A surface covering product is disclosed which includes a layer of fused embossed PVC material on a substrate and a layer of transparent or translucent plastic material substantially covering the fused PVC layer and filling the embossed area of depression in the PVC layer. The surface covering product is made by applying a plastic, preferably thixotropic, material to the embossed surface of the PVC material and wiping off at least a portion of the material. In one embodiment, a film of plastic material of substantial or minimal thickness remains on the fused PVC material, preferably substantially covering it. In another embodiment, the material is completely wiped off the undepressed area of the fused granular material. The PVC material is preferably a granular material such as a stencil vinyl fine material.

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ABSTRACT OF THE DISCLOSURE

DECORATIVE SURFACE COVERING AND METHOD OF MANUFACTURE

A surface covering product is disclosed which includes a layer of fused embossed PVC material on a substrate and a layer of transparent or translucent plastic material substantially covering the fused PVC layer and filling the embossed area of depression in the PVC layer. The surface covering product is made by applying a plastic, preferably thixotropic, material to the embossed surface of the PVC material and wiping off at least a portion of the material. In one embodiment, a film of plastic material of substantial or minimal thickness remains on the fused PVC material, preferably substantially covering it. In another embodiment, the material is completely wiped off the undepressed area of the fused granular material. The PVC material is preferably a granular material such as a stencil vinyl fine material.

The present invention relates to a surface covering product and a method of making such a surface covering product.

Chavannes et al., U.S. Patent No. 2,587,594, discloses a process for making decorative plastic sheet-like articles. The resulting articles have a contrasting colored portion embedded in lower regions of a film.

Chavannes et al. also teaches a method of forming discrete contrasting colored portions on the higher regions of a film by applying the contrasting colored substance to an embossed carrier, doctoring off the high points of the carrier, forming at least one layer of film over the doctored carrier, fusing the film and contrasting colored material, and stripping the carrier. However, such a method results in contrasting discrete elements on the high portions of the film.

Young, U.S. Patent No. 1,873,098, teaches a method of painting the grooves between the ribs of an automobile mat material. The grooves are filled with a paint containing a large percentage of volatile solvent, the mat material is doctored with a rubber blade and the paint permitted to dry. Since the paint contains a large percentage of volatile solvent, when it evaporates a film of desired thinness lays over the bottom and sides of the ribs.

Balmer et al., U.S. Patent No. 4797315, and Dorsey et al., U.S. Patent No. 4816318, disclose surface

covering products comprising a substrate material having a layer of impervious vinyl chloride polymer material (hereinafter referred to for brevity as PVC material) thereon with spaced apart, preferably dot-shaped, colored elements embedded in or protruding from the free surface of the PVC material layer; if they protrude a further, differently colored, material may surround the elements to form a contrasting colored background. The elements are applied in the form of discrete, spaced apart, elements of a thixotropic material either directly to the impervious layer or to a release sheet which is subsequently contacted with the impervious layer.

The present invention provides a decorative surface covering product comprising:

(a) a first layer of fused vinyl chloride polymer material, hereinafter PVC material, and

(b) a second layer of cured transparent or translucent plastic material substantially covering said first layer, said second layer having at least one element extending into said first layer.

More especially, the present invention provides a surface covering product comprising a substrate; a first fused PVC material layer substantially covering the substrate; and a second layer of plastics material either embedded in and partially covering the first layer, or substantially covering the first layer and having a portion embedded in the first layer. Preferably, the

portion of the second layer embedded in the first layer is a plurality of discrete protruding elements.

Further, the invention also provides a decorative surface covering product comprising:

(a) a first layer of granular, PVC material, and

(b) a second layer of cured plastic material substantially covering said first layer, a portion of said second layer material filling the interstices between the granular material of the first layer, said PVC material and said second layer material in the interstices being fused.

The invention is also directed to a method of forming a surface covering product having a layer of fused PVC material and a layer of cured transparent or translucent plastic material. The layer of plastic material has either at least one discrete element which extends into the layer of fused PVC material or a layer of material substantially covering the layer of fused PVC material and having at least one discrete element extending into the layer of fused PVC material. Preferably, the second layer has a plurality of discrete geometric elements having substantially constant cross-section. More preferably, the elements are circular or cylindrical which form a dot pattern design, rectangular or regular polygonal-shaped in cross-section or cross-bar shaped which form a grid pattern. When the second layer substantially covers the first layer, the discrete

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elements are visible through the layer of plastics material. The plastic material may contain solid particles, such as quartz or pearlescent pigment, to give the surface covering a different decorative effect and improve wear characteristics.

The method more especially comprises: (1) forming a layer of PVC material, preferably granular material, on the surface of a substrate material, (2) fusing the PVC material, (3) embossing the PVC material to form a depressed area in the surface of the PVC material opposite the substrate, (4) applying a transparent or translucent plastic material to the surface of the PVC material whereby the depressed area is filled with the plastic material and the undepressed surface of the granular material is substantially covered with a film of the plastic material, (5) if desired, wiping off at least a portion of the film of plastic material, and (6) curing the plastic material.

Preferably, the PVC material is mechanically embossed to form a number of discrete depressions. The depth of the depressions is preferably about 80 to 90% of the thickness of the fused granular material and the depressions cover about 10 to 50% of the surface area of the PVC material. In one embodiment, it is preferred that the embossing mold does not bottom out. In another embodiment, it is preferred that the embossing mold does bottom out. The PVC material may be simultaneously fused

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and embossed and the substrate may be removed. The plastic material on the surface of the PVC material between the depressed areas may be completely wiped off, or a film of minimal or substantial thickness may be left on the areas between the depressed areas.

One form of surface covering and apparatus and a method for making it will now be described in greater detail by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows a perspective view with a cross-sectional view of an embodiment of the present invention ; and

Figure 2 shows a schematic drawing of equipment for practising the method of the present invention.

Figure 1 shows one embodiment of the present invention which results from the method of the present invention. A substrate 2 is covered with a layer of fused PVC material 4. The PVC material may be a dryblend formed by known methods of blending vinyl chloride resin particles,for example polyvinyl chloride or vinyl chloride-vinyl acetate copolymers, in admixture with suitable quantities of plasticizers, stabilizers and blowing agents if desired, a stencil vinyl fine material, a liquid plastisol, or chips of fused plastisol. The layer of fused PVC material substantially covers the substrate and is bonded to the substrate. However, if a smear layer of plastisol is applied to the substrate

before the PVC material is applied, the substrate may be a releasable backing which may be removed after the PVC material has been fused. Areas of depression 6 are embossed, preferably by mechanical embossing, in the surface of the PVC material opposite the substrate.

A layer of transparent or translucent plastic material 8 substantially covers the layer of PVC material. The layer of plastic material has a substantial thickness between the areas of depression in the PVC material. Discrete elements 10 of plastic material fill the areas of depression in the PVC material.

Although discrete elements are shown, the layer of plastic material may be a single element such as would be formed if the embossed pattern were a single continuous depression creating discrete areas of raised PVC.

The term "element" is intended to include an area of increased thickness of the layer of plastic material which extends into the layer of fused PVC material. The cross-sectional area of the element or elements at their interface with the surface of the plastic material adjacent to the layer of PVC material may be greater than the cross-sectional area of the element or elements at a location spaced from the interface so that the element or elements are inverted dome-shaped. Preferably, however, when the plastic material is substantially wiped off the areas between the depressions, the discrete elements have a substantially constant cross-sectional area so that the

design pattern remains constant despite wearing away of the upper surface of the surface covering product.

Equipment for practising the method of making the embodiment of Figure 1 is shown in schematic form in Figure 2. The substrate 2 is unwound from a roll 12. A roll coater 14 applies a three mil (0.075 mm) wet smear coat of plastisol. The screed roll 16 levels out the PVC material coating 4 which is deposited on the substrate by a means 18. The substrate and PVC material layer pass through the oven 20 to fuse the PVC material. The PVC layer is embossed at 22 to form areas of depression 6. The plastic material is applied with a squeegee 24. The excess material is wiped off at 26 and leaves a thin film 28. Thereafter, the plastic material is cured and bonded to the fused PVC material and the substrate may be removed.

Depending on the type of materials used, different types of equipment may be preferred. For example, a screed roll 16 has been used to level a dryblend to form the PVC material coating 4. However, a peg roller would be preferred if the PVC material is a stencil vinyl composition.

The step of fusing and embossing the PVC material may be combined into one step. Preferably, the dryblend PVC material is fused and then mechanically embossed to form discrete areas of depression.

When the PVC material is a stencil vinyl composition, it is preferred to sinter the granular PVC material prior to embossing it and fusing the granular material coating after the plastic material has been applied and wiped. By this procedure, the plastic material, particularly if it is a liquid plastisol which is advantageously thixotropic, can not only fill the depressed areas but also fill the interstices between the stencil vinyl fine material. When the PVC material is a stencil vinyl composition, it is important to deaerate the liquid plastisol.

In one preferred embodiment, only a portion of the plastic material on the areas of the PVC material between the depressed areas is wiped off so that a film of about 0.0001 inches to 0.020 inches (0.025 to 0.5 mm) covers the areas between the depressed areas. Preferably, the thickness of the plastic material is about 0.0001 (0.0025 mm) or 0.005 inches (0.13 mm).

Typically, the fused PVC layer has a maximum thickness of about 0.075 inches (1.9 mm) and preferably about 0.055 inches (1.4 mm). Typical felt backing has a thickness of about 0.030 inches (0.75 mm) resulting in a surface covering having a thickness of about 0.085 inches to 0.090 inches (2.2 to 2.3 mm).

In another preferred embodiment, the plastic material on the areas of the PVC material between the depressed areas is completely wiped off to form a product

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similar to that described in U.S. Patent No. 4816318. This embodiment results if the PVC material is a dryblend or plastisol which has been fused prior to applying the plastic material.

In a further preferred embodiment, the plastic material is substantially completely wiped off the areas between the depressed areas of a stencil vinyl fine material. However, since the surface of the stencil vinyl fine material is somewhat irregular, not all of the film of plastic material between the areas of depression may be wiped off, and a layer of plastic material of minimal thickness substantially covers the stencil vinyl composition. Further, the material, especially if it is thixotropic, is caused by the wiping process to penetrate the interstices in the stencil vinyl material.

The present invention is not believed to be dependent on the substrate employed. Rather, it is believed that any of the substrates normally employed in the surface covering field can be employed in the practice of the present invention.

The substrate or backing sheet should, however, normally be composed of strong, durable and flexible material. The backing can be woven, felted or a solid sheet of synthetic or natural flexible material. The conventional flexible flooring backing is a web of felted fibers. The felt generally is produced using a Fourdrinier or cylinder paper machine with the thickness

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of the resulting sheet being that usually used in floor and wall covering, that is, from 0.02 to 0.08 inch (0.5 to 2.0 mm). The fibrous material used is normally cellulosic, although other fibers can be used including those of mineral and animal origin. The sources of cellulosic material can include cotton or other rag material, wood pulp including both ground wood and chemical wood pulp, paper, boxes, or mixtures thereof in any proportion. The web can also contain fillers, such as wood flour.

The felt can be strengthened and improved in water resistance by impregnation with a bituminous material. Numerous bituminous materials are well-known as impregnants in the production of printed surface coverings and include asphalts of petroleum or tars and pitch residues of animal or vegetable origin. These materials can be treated to attain the desired physical properties of softening point or viscosity for satisfactory use by such treatment as, for example, air blowing and steam distillation.

The impregnant should desirably be uniformly dispersed throughout the felt sheet. This can be controlled to some extent by the saturating technique through use of pressure rolls in the saturating bath. Where the impregnant is not uniformly dispersed throughout, blistering can frequently occur due to high

concentrations of material adjacent to one surface of the felt.

If an impregnated backing sheet is used, it usually is provided with one or more seal coats, such as lacquer, prior to printing a decorative design. The seal coats perform the desirable function of masking the color of the felt and preventing the impregnant from bleeding through and staining the wear layer and, in addition, create a smooth uniform surface suitable as a base for printing.

Felt sheets of the type commonly used as backings for printed surface coverings tend to have minor surface irregularities due to non-uniformities in the felt-making equipment. The sheet also frequently shows a number of small protruding lengths of fibers. The seal coats are designed to hide all these irregularities. The total thickness of seal coats required is normally from about 1 to about 12 mils (0.025 to 0.3 mm). This thickness can be created through use of a single thick coating or several superimposed thinner coatings. Using the conventional techniques of coating, such as flexible doctor roller application, the desired thickness is created by use of more than one coating. The use of multiple coatings is also desirable in promoting optimum adhesion of the wear surface layer to the backing, since the seal coat applied directly to the fibrous backing can be designed for optimum sealing against migration of

bituminous impregnant and the uppermost seal coat can be designed for optimum adhesion to the polyvinyl chloride surface wear layer.

The present invention is not limited in any way by the choice of substrate. In fact, although a substrate of some kind is normally required to provide necessary mechanical strength in processing, surface coverings are well known in which a strippable release carrier is employed. Such a release carrier can then be removed from the surface covering product subsequent to the final fusion procedure. Such a strippable substrate is within the scope of the present invention.

Choices among available substrates, therefore, should be made on some basis such as manufacturing convenience or physical properties of the end product.

The PVC layer may be formed of any small particle resin material that is flowable in the manner of dry sand or a water/sand mix, or liquid such as plastisol. One type of granular material is a plastisol slurry wherein the granular material is a plastisol PVC resin material containing a high level of plasticizer. Another type of granular material is the classic dryblend as used in Example 1 wherein the granular material is formed of vinyl resin particles with plasticizer absorbed into the resin. Another type of granular material is a stencil mix of Example 2 wherein the granular material is formed of partially plasticized PVC filled particles. A

granular material can be formed of a mixture of dryblend, stencil mix, quartz, and/or other fillers. The composition of the PVC material is not the important feature of its use herein. It is preferred that the PVC material be a granular material formed of small particles and that the particles be colored a number of different colors. A granular material could even be gelled/fused, ground plastisol chips. The PVC layer may be fused plastisol.

The plastic material, in one embodiment of the invention, makes use of the rheological characteristics of a thixotropic plastic material. With an application method such, for example, as using a double-blade squeegee, a pseudoplastic thixotropic material can be deposited on the fused PVC material, typically in thicknesses exceeding that of normal printing inks. Because of the properties of the material, lateral flow after application can be controlled or substantially eliminated.

A thixotropic material is a material which exhibits dual rheological behaviour, that is, it exhibits high viscosity under low shear and low viscosity under high shear.

Fumed and precipitated silicas are the preferred thixotropic agents, or thixotropes, although various inorganic and organic materials are known to be operative, including such inorganic materials as very fine particle organophilic clays and such organic materials

as highly substituted sorbitols or calcium/organic complexes. Fumed silica, available commercially from the Degussa Company, under the trade designation"Aerosil 200,"* may be employed. PVC plastisols composition with relatively high proportions of blending resin and relatively low proportions of plasticizer also exhibit thixotropic behaviour.

The quantity of such material added to the resin paste system will determine the thixotropic nature of the resulting system, and its viscosities under various rates of shear. Such properties will govern the lateral flow of the plastisol.

Various resinous materials may be employed as the thixotropic material in the present invention and these include virtually any useful resinous plastisols, while polyvinyl chloride resins have been employed with advantage.

It is, however, also within the scope of the invention to employ plastic materials that are Newtonian in behaviour or nearly so, or materials whose viscosity increases with increasing shear.

In order to be useful as an abrasion resistive material in the present invention, the plastic material should include solid particles having abrasion resistance properties. Such particles may be an inorganic material, for example, such as silica quartz. These particles may be clear or slightly translucent.

* Trademark

The particle should be of suitable dimension to pass through a No. 10 U.S. Standard sieve series mesh, a screen with openings of about two millimeters (2.0 mm) and yet be retained on a No. 200 mesh screen with openings of about seventy microns. Preferred results, however, have been obtained with particles which would pass through a No. 25 mesh screen with openings of about six hundred microns and be retained on a No. 50 mesh screen, with openings of about two hundred and fifty microns. The particles of solid material are advantageously of a MOHS hardness of 7 to 9, and preferably about 7.

The elements may be in any shape or pattern. However, geometrics such, for example, as repeated patterns of circles, squares, diamonds, have been demonstrated to be effective visually.

The discrete elements may be from about 0.015 (0.38 mm) inches to about 0.045 inches (1.14 mm) in depth, preferably from about 80% to about 90% of the thickness of the fused PVC material. Further, it is preferred that such elements cover from about 10% to 50% of the total surface area in the final product in order to provide an effective colored visual effect. The exact percentage is a function of the decorative material, the visual effect, and the wear resistance desired.

Depending on the type of visual effect desired, the embossing mold may or may not bottom out on the surface

of the PVC material layer opposite the substrate. If it is desired to have the stencil vinyl fines appear as discrete particles, the travel of the embossing mold should be set up so that the depressions in the mold do not bottom out. If it is desired to obtain a visual effect in which granular particles are compressed and blended together, the embossing mold should bottom out. When the PVC material is fused before being embossed, the surface of the PVC layer between the depressed areas can be smoothed by bottoming out the embossing roll or left with a matted finish by controlling the travel of the embossing mold so that the depressions in the mold do not bottom out.

The free surface of the portion of the second layer overlying the elements may lie in the same plane as that of the portion between the elements, or it may be above or below that plane.

When the plastic material is transparent, and the elements are arranged in a dot pattern design, the surface of the product may have a lenticular appearance.

The following Examples illustrate the invention:

Example 1

A dryblend having the following formulation was prepared:

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		Weight Percent
PVC Resin	Coarse," Vygen "*310 Resin (Vygen Corp.)	68.2
Plasticizer	S-160* Phthalate Plasticizer (Monsanto)	30.0
Stabilizer	M-275* (Argus Chem. Corp.)	1.8
Pigment		As Needed

Four differently colored dryblends were prepared and then mottled in the following proportions:

Tan	33.3%
Light Blue	33.3%
Brown	16.2%
Red	16.2%

The differently colored dryblends were weighed out individually and put into a drum tumbler to inter-disperse and blend the mottled colors.

"Pevikon"*S-658 dryblend (Manufactured by Norsk Hydro) has been substituted weight for weight for the coarse "Vygen"*310 Resin with good results. Also, a mottled stencil vinyl mix may be used as the PVC resin.

A plastisol to form a thixotropic plastic material was prepared using the following formulation:

Plasticizers	Weight Percent
"Nuoplaz"*6000 (Hüls)	13.44
TXIB*(Texanol"*Isobutyrate) (Eastman Chemical)	13.44

* Trademark (each instance)

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	Weight Percent
ESO (Epoxidized Soya Oil) (Argus Chemical Corporation)	1.57
Stabilizer	
"Synpron"* 1522 (Synthetic Products Co.)	2.35
Air Release Additive	
"Perenol"* E-2 (Blue Bell Chemical Corporation)	2.02
PVC Resin, Dispersion	
"Oxy 1734 "* (Occidental Chemical Corporation)	19.48
"Geon 179 "* (B.F. Goodrich Chemical Group)	34.26
PVC Resin, Blending	
"Geon 213 "* (B.F. Goodrich Chemical Group)	13.44

To a 30 mils (0.75 mm) thick backing felt, 3 mils (0.075 mm) of wet plastisol was applied to a smear coat to tack the dryblend. The dryblend was applied with a screed roll having the nip set to 155 mils (4 mm) steel-to-steel, with the line running at 23 feet (7 m) per minute. The oven zones were set at 335, 375, 410, and 450°F (168, 191, 210 and 232°C) with an air setting of .05/.08, .04/.04, .13/.13 and .20/.09 inches (1.27/2.03; 1.0/1.0; 3.3/3.3; and 5.1/2.3 mm) of water. At the exit of the oven and the entrance to the embossing machine,

* Trademark (each instance).

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the temperature of the fused granular sheet was 320°F (160°C). The embossing roll was run at 50 PSI (344 kPa) with the nip set at 65 mils (1.65 mm) against the stops. The thixotropic material was applied with a double-blade squeegee coater at 3 mils (0.75 mm) and 1.5 mils (0.04 mm) thickness of the surface was wiped clean. The thixotropic material was cured and bonded to the layer of fused granular material in a four zone oven set as follows:

		Zone 1	Zone 2	Zone 3	Zone 4
Temp, Setting	(°F)	350	400	400	370
	(°C)	177	204	204	188
Air Setting					
(inches of water)		0.05/0.15	0.15/0.15	0.15/0.15	0.15/0.15
(mm of water)		1.27/3.8	3.8/3.8	3.8/3.8	3.8/3.8

Example 2

A stencil vinyl fine composition having the following formulation was prepared:

	Weight Percent
PVC Homopolymer - "Vygen"* 65 (Vygen Corp.)	21.26
Plasticizer - Diisononyl Phthalate	8.21
Plasticizer/Stabilizer - Epoxidized Soya "(Paraplex"* G-61 Rohm and Haas Co.)	0.33
Stabilizer - Zinc Stearate	0.15
Lubricant - Stearic Acid	0.05
Filler - Limestone 50 Mesh (297 micron)	70.00

* Trademark

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The stencil vinyl fine composition was laid-up on a lacquer key coated backing felt having a thickness of 32 mils (0.81 mm) using a peg roller. The stencil vinyl fine composition was levelled with a series of vibrators. The lay-up was heated for about one minute to approximately 325°F (167°C) to soften the fines for embossing using 50% on/off (2 secs on/2 secs off) top radiant electric heaters (manufactured by Radiant Heat Enterprises) and bottom platens at 400°F (204°C). The softened fines were embossed with an embossing roll over a plain steel bottom roll with the nip set at 50 mils (1.27 mm). The feeder was adjusted so that the overall gauge of the felt plus fines was 55 mils (2.2 mm) immediately after the embossing laminator. The plastisol of Example 1 was applied and cured as in Example 1.

Example 3

Good visual results were also obtained when using the following shear thickening plastisol composition in place of the thixotropic plastisol used in Examples 1 and 2.

	Weight Percent
" Borden"* 260-SS, blending resin (Borden Chemical Co.)	3.4
" Geon"* 173, dispersion resin (B.F. Goodrich Chemical Group)	24.1
" Borden"* 440X2, dispersion resin (Borden Chemical Co.)	11.5

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	Weight Percent
"Oxy-6472,"* dispersion resin (Occidental Chemical Corporation)	20.6
ESO, plasticizer (Argus Chemical Corporation)	1.8
TXIB*, plasticizer (Eastman Chemical)	3.6
" Nuoplaz"* 6000, plasticizer (Hüls)	22.1
" Benzoflex,"* plasticizer (Velsicol Chemical Corporation)	6.0
"Surfynol 104A,"* surfactant (Air Products & Chemicals, Inc.)	2.4
"Perenol E-2",* air release additive (Blue Bell Chemical Corporation)	1.8
"Synpron 1522",* stabilizer (Synthetic Products Co.)	2.7

Example 4

Similar results to those of Example 3 were obtained using the following plastisol formulation:

	Weight Percent
" Borden"* 260-SS, blending resin (Borden Chemical Co.)	2.9
" Geon"* 173, dispersion resin (B.F. Goodrich)	19.7
" Borden,"* 440X2, dispersion resin (Borden Chemical Co.)	24.6
" Oxy-6472,"* dispersion resin (Occidental Chemical Corporation)	19.7
ESO, plasticizer, plasticizer	0.7

* Trademark (each instance)

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(Argus Chemical Corporation)

	Weight Percent
"Nuoplaz"* 6000 (Hüls)	25.7
"Synpron"* 1363 stabilizer (Synthetic Products Co.)	2.7
BYK 4015,* surfactant (Chemie U.S.A.)	4.0

* Trademark

Claims:

1. A decorative surface covering product comprising:

(a) a first layer of fused vinyl chloride polymer material, hereinafter PVC material, and

(b) a second layer of cured transparent or translucent non-thixotropic plastic material substantially covering said first layer, said second layer having at least one element extending into said first layer.

2. The decorative surface covering product of claim 1, wherein the PVC material is a granular material prior to being fused.

3. The decorative surface covering product of claim 2, wherein the granular material is selected from dryblend, stencil vinyl fines, and chips of fused PVC material.

4. The decorative surface covering product of any one of claims 1 to 3, wherein the granular material appears through the second layer as particles of differing colors.

5. The decorative surface covering product of any one of claims 1 to 4, wherein the second layer includes a plurality of discrete elements extending into the first layer.

6. The decorative surface covering product of claim 5, wherein the portion of the surface of the second layer overlying the discrete elements projects above the plane of the surface of the portion of the second layer between the discrete elements.

7. The decorative surface covering product of claim 5, wherein the portion of the surface of the second layer between the discrete elements projects above the plane of the portion of the surface of the second layer overlying the discrete elements.

8. The decorative surface covering product of claim 5, wherein the thickness of the second layer in the areas between the discrete elements is substantially less than the depth of the elements.

9. The decorative surface covering product of any one of claims 5 to 8, wherein the plastic material is transparent and the discrete elements are arranged in a dot pattern design providing the decorative surface of the covering product with a lenticular effect.

10. The decorative surface covering product of any one of claims 5 to 8, wherein the portion of the second layer between the elements has minimal thickness.

11. The decorative surface covering product of any one of claims 1 to 10, wherein the second layer includes a plurality of circular, rectangular, regular polygonal or cross-bar cross-section.

12. The decorative surface covering product of any one of claims 1 to 10, wherein the cross-sectional area of the elements is substantially constant throughout their depth.

13. The decorative surface covering product of claim 1, wherein the plastic material is translucent.

14. The decorative surface covering product of any one of claims 1 to 13, wherein the depth of the element is from 80% to 90% of the thickness of the first layer.

15. The decorative surface covering product of any one of claims 1 to 14, wherein the element is from 0.015 to 0.045 inches in depth.

16. The decorative surface covering product of any one of claims 1 to 15, wherein the plastic material includes a plurality of discrete elements extending completely into the first layer, the discrete elements being arranged in a dot pattern design providing the decorative surface of the covering product with a discrete colored dot pattern of a contrasting shade of color to the color of the decorative surface of the covering product not above a discrete element.

17. The decorative surface covering product of any one of claims 1 to 16, wherein the cross-sectional area of the element at its interface with the surface of the second layer adjacent the first layer is about 10 to 50% of the surface area of the decorative surface covering product.

18. The decorative surface covering product of any one of claims 1 to 17, wherein the plastic material contains solid particles.

19. the decorative surface covering product of claim 18, wherein the second layer contains solid particles of a MOHS hardness of at least 7 and a diameter size of 600 microns or less.

20. The decorative surface covering product of claim 1, wherein the plastic material is a plastisol.

21. The decorative surface covering product of any one of claims 1 to 20, wherein the surface of the second layer overlying the element or elements extending into the first layer is an exposed wear surface.

22. The decorative surface covering product of any one of claims 1 to 21, wherein the PVC material of the first layer is opaque.

23. The decorative surface covering product of any one of claims 1 to 22, wherein at least one element of the second layer extends into a depression in the first layer formed in the first prior to the application of the second layer thereto.

24. A method for the preparation of a surface covering product, which method comprises:

(a) providing a PVC material on a substrate material,

(b) fusing the PVC material,

(c) embossing the PVC material to form an area of depression in the surface of the PVC material opposite the substrate,

(d) applying a transparent or translucent non-thixotropic plastic material to the surface of the fused PVC material whereby the depressed area is filled with the plastic material and the undepressed surface of the PVC material is substantially covered with the film of the plastic material,

(e) wiping off at least a portion of the film of plastic material, and

(f) curing the plastic material.

25. The method of claim 24 wherein the PVC material is simultaneously fused and embossed.

26. The method of claim 24 wherein the PVC material is mechanically embossed.

27. The method of claim 24 wherein the PVC material is embossed to form discrete areas of depression.

28. the method of any one of claims 24 to 27 wherein the depth of areas of depression is from 80 to 90% of the thickness of the PVC material.

29. The method of any one of claims 24 to 27 wherein the areas of depression cover from 10 to 50% of the surface area of the PVC material opposite the substrate.

30. The method of any one of claims 24 to 29, wherein the plastic material is a colored translucent ink.

31. The method of any one of claims 28 to 35, wherein the plastic material on the undepressed area of the PVC material is substantially completely wiped off.

32. The method of any one of claims 24 to 31 wherein only a portion of the plastic on the undepressed area of the PVC material is wiped off whereby a film of the plastic material of substantial thickness covers substantially all of the surface of the PVC material opposite the substrate.

33. The method of any one of claims 24 to 32 wherein the substrate is removed from the PVC material.

34. The method of any one of claims 24 to 33 wherein the plastic material contains solid particles.

35. The method of any one of claims 24 to 34 wherein the plastic material is a plastisol.

36. The method of any one of claims 24 to 34 wherein the plastic material is a powder which is fused after it is applied to the fused granular material.

37. The method of any one of claims 24 to 36 wherein the PVC material is a granular material.

38. The method of claim 37 wherein the granular material is sintered, the sintered material is embossed to form areas of depression, the plastic material is applied to the embossed and sintered granular material, and the plastic material is substantially completely wiped off the undepressed area of the granular material to form a layer of plastic material of minimal thickness.

39. The method of claim 37 or claim 38 wherein the granular material is a stencil vinyl fine material.

Fig. 1

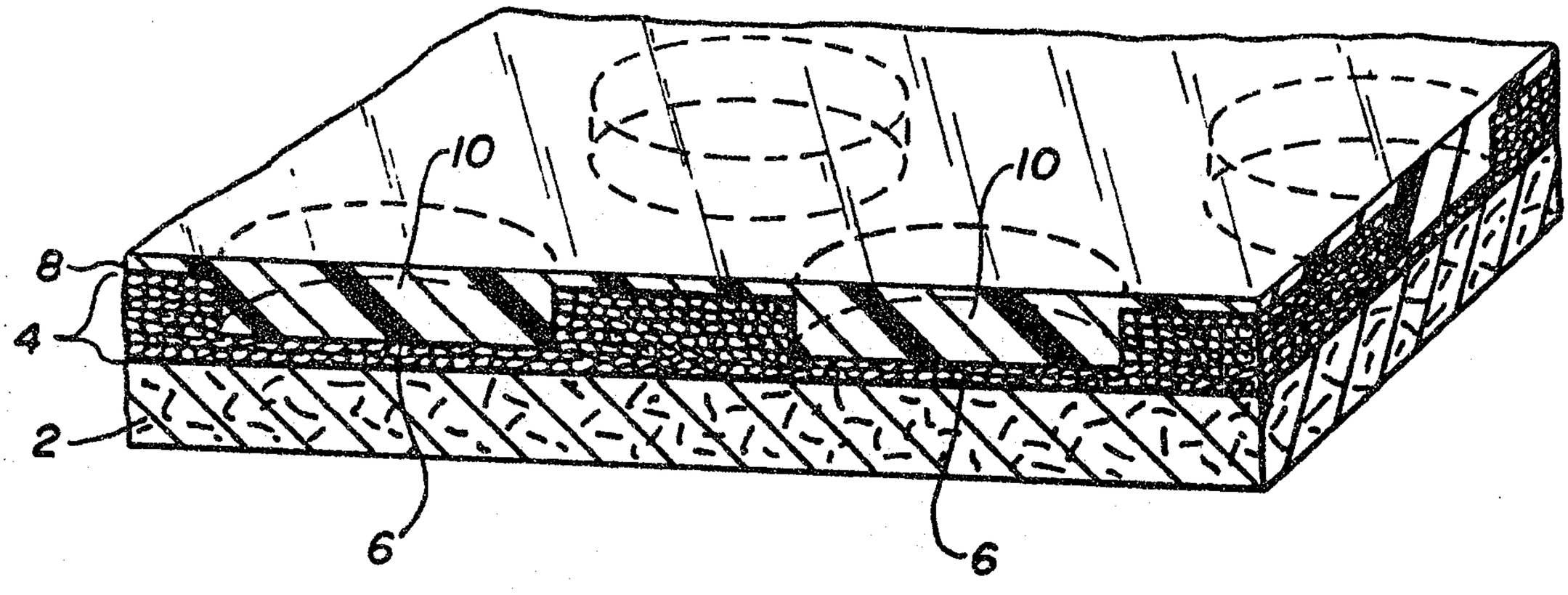

Fig. 2

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