

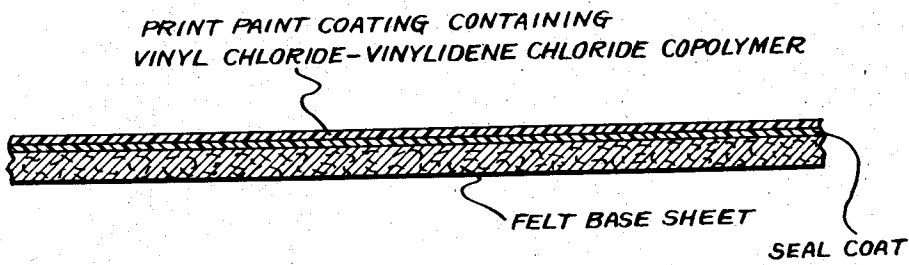
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2,860,071

FELT BASE FLOOR COVERING AND METHOD OF MAKING THE SAME

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FELT BASE FLOOR COVERING AND METHOD OF MAKING THE SAME

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11 Claims. (Cl. 117—72)

This invention relates to a felt base floor covering and more particularly to an improved felt base floor covering having a decorative wearing surface and to the method of making the same.

Felt base floor coverings are well known to the art and generally speaking, they comprise a saturated felt backing, a seal coat, and a paint film which serves as both a decorative and wearing surface. One widely used method of producing such floor coverings involves the steps of face-coating a saturated felt sheet with a coating paint by means of a knife or other suitable apparatus to provide what is known in the art as a "seal coat." Following the application of the seal coat to the saturated felt backing, the resulting material is then passed under a series of print blocks through a blockprinting apparatus. The blocks are passed across rolls in containers of paint of their respective colors, and various designs are applied by means of the multiple blocks to the coated felt base. Following the application of the decorative coating, the material is suspended in stoves to dry the paint film. The paints employed, because of the manner in which they are applied, are called "print paints"; and in the art the goods are known as "printed felt base floor coverings."

Various coatings have been used for decorating the surface of a seal-coated saturated felt. Generally speaking, these coatings are conventional print paints containing the desired color pigment and a drying oil-resin type vehicle. These drying oil-resin type vehicles have found wide use in the production of printed felt base goods.

It has heretofore been recognized that vinyl resins impart desirable properties to the decorative wearing surface layer of printed felt base goods, and various attempts to utilize vinyl resins in such coatings have heretofore met with little success primarily because of the fact that difficulty has been experienced in securing the necessary strong bond to the underlying seal coat, particularly of the types which have heretofore been generally used, and which have comprised oleoresinous base coatings.

One attempt to solve the problem is illustrated in the patent to Hazeltine, No. 2,624,682, wherein it is proposed to embody from 20 to 50% of a rubberlike component in the seal coat together with a vinyl resinous reinforcing agent. The print paint comprises an organosol consisting of a vinyl resin or copolymers thereof suspended as finely divided particles in a plasticizer and non-solvent hydrocarbon. The process required to produce the Hazeltine product involves the heating of the product to 300–350° F. in order to effect fusion of the individual particles into a film.

The present invention seeks to provide a superior printed felt base goods in which any usual or preferred form of seal-coated felt base may be utilized and to which an improved vinyl resin print paint may be successfully bonded without requiring the employment of fusion of the components.

The invention will further be understood by reference to the accompanying drawing wherein the sole figure is illustrative of a preferred embodiment.

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We have discovered that the required bond between a vinyl print coating and the underlying seal coat, and particularly an underlying seal coat of an oleoresinous base, may be secured by embodying in the print paint a solution of a vinyl chloride-vinylidene chloride copolymer containing at least 20% and preferably substantially 40% of vinylidene chloride. Such a product is obtainable under the trade name, "Geon Resin 200 x 20," manufactured by Goodrich Chemical Co. In practice other vinyl polymers may be used with the Geon 200 x 20 including vinyl chloride-vinyl acetate copolymer, polyvinyl chloride, vinyl chloride-vinyl acetate copolymer interpolymerized with a dibasic acid, such as maleic anhydride, vinyl chloride-vinyl chloride copolymer containing a hydroxy group. Other vinyl resins, such as polyvinyl butyral, vinyl acetate, copolymers of vinyl chloride and acrylonitrile as well as certain other vinyl chloride-vinylidene copolymers formulas may be used with Geon 200 x 20. Although a polyester type of plasticizer is shown above, other plasticizers may also be used alone or in combination, such as dioctyl phthalate, dibutyl phthalate, butyl benzyl phthalate, tricresyl phosphate, triphenyl phosphate, alkyl aryl phosphate and the like.

The solvents shown in the preferred example may also be varied. Xylol, toluol or aromatic petroleum solvents may also be used for part of the ketones. Other ketones, such as methyl ethyl ketone and acetone and the like may be used.

In producing a print paint in accordance with the present invention embodying an oleoresinous vehicle to which vinyl polymers are added in such a manner as to be compatible therewith, we may prefer to produce a body vehicle which when pigmented comprises the base for the production of the present print paint. The body vehicle may have the following formulation:

BODY VEHICLE

Example I

- 850# rosin
- 62.5 gals. soya fatty acids
- 563 gals. linseed oil
- Raise heat to 400° F. turn heat off and add
- 250# of phenol formaldehyde resin (tertiary butyl phenol type)
- Wait 20 minutes, begin to reheat and add
- 200# pentaerythritol
- Heat to 575° F. and hold to at least a Z to Z-2 viscosity to an acid number below 10. Cool and add
- 75 gallons of heavy bodied leaded linseed oil (appr. Z-3) containing appr. 1/2 to 1% litharge
- 198 gallons mineral spirits
- 69# liquid lead drier (24% Pb as metal)
- 15# manganese drier (6% Mn as metal)

Example II

- 170 lbs. linseed fatty acids
- 233 lbs. Acintol FA (refined tall oil)
- Heat to 350° F., and add
- 31 lbs. pentaerythritol
- Hold 1/2 hour @ 400° F., then add
- 100 lbs. Epon Resin 1001
- Heat to 500° F., hold 1/2 hr.
- Heat to 550° F., hold 2 hrs.
- Cool and add
- 90 lbs. mineral spirits
- 2 lbs. liq. Pb 24%
- 0.65 lb. liq. Mn 6%

As alternative compositions of the body vehicle we may use tall oil as a substitute for the fatty acids in the foregoing formulation, and in addition hempseed, perilla,

fish oil, safflower, walnut and the like may be used, either individually or in various combinations as may be found desirable and in varying proportions. In place of linseed oil other siccative drying oils may be used, such as soya, hempseed, perilla, fish oil, walnut, dehydrated castor, oiticica, China-wood, etc. The siccative drying oils may be used alone or in various combinations. Siccative drying oils may also be replaced by fatty acids or the fatty acids may be used in place of the drying oils adjusting the polyhydric alcohol to obtain the proper acid number.

Resins other than those shown in the body vehicle may be used in the place of the resin section, such as coumarone-indene resins, run copals or other fossil resins, copal type synthetic resins, rosin modified maleic resins, petroleum resins, terpene resins, ester gums and other rosin esters, alkyd resins including the drying oil modified type and the natural resin modified type, phenol formaldehyde resins of either the oil reactive or oil and heat reactive type, modified phenolic resins of the phenol modified type and oil extended type.

Other resins, such as petrex resins, may be used. Petrex acid is a synthetic resinous polybasic acid of terpene origin, and is used in the manufacture of heat setting alkyd resins. Another resin which may replace the phenolic resin partially or entirely is the synthetic resin whose fundamental ingredient is carbic anhydride. The carbic anhydride is produced by the reaction of cyclopentadiene and maleic anhydride. This adduct in turn is reacted with a polyhydric alcohol and a fatty acid to form a carbic resin. Resins of these types are heat reactive or oil reactive and oil soluble.

Other epoxy type resins may also be used which are reaction products resulting from the reaction of a mixture of a dihydric phenol with epichlorhydrin or glycerol dichlorhydrin. Melamine or urea resins which are compatible with the oleoresinous body vehicle may also be used.

In producing the present print paint, we may prefer to produce a base grind of pigment, heavy bodied linseed oil and the body vehicle, as above described, ground through a 3-roll mill or similar equipment, and one formulation for producing a base grind for a white-base print paint is as follows:

112 Titanox RCHTX (titanium calcium pigment)
64 calcium carbonate
12 heavy bodied linseed oil
160 above body vehicle

It is understood that the white base may be modified with other hiding power pigments, such as lithopone, titanated lithopone, zinc sulphide, titanium dioxide, let down titanium pigments, such as calcium titanium pigment, barium titanium pigment, high strength lithopone, zinc oxide and the like.

Modified formulas for the base grind are as follows:

800# Titanox RCHTX (30% TiO_2 and 70% CaSO_4)
450# calcium carbonate
125# zinc oxide
80# melamine resin (60% solids in xylol)
672# body vehicle (as described above)

800 lbs. Titanox RCHTX
450 lbs. calcium carbonate
125 lbs. zinc oxide
120 lbs. melamine resin
650 lbs. body vehicle

800 lbs. Titanox RCHTX
450 lbs. calcium carbonate
125 lbs. zinc oxide
120 lbs. melamine resin
25 lbs. long oil alkyd resin
625 lbs. body vehicle

250 lbs. titanium dioxide
1000 lbs. calcium sulphate
125 lbs. zinc oxide
120 lbs. melamine resin
650 lbs. body vehicle

Formulas for the vinyl solutions are of the following character:

VINYL CHLORIDE-VINYLDENE CHLORIDE COPOLYMER SOLUTION

I

100# vinyl chloride-vinylidene chloride copolymer (Geon Resin 200 x 20, Goodrich Chemical Co.)
186# diisobutyl ketone

VINYL POLYMER SOLUTION

II

100# vinyl polymer (Geon Resin 400 x 74) (Goodrich Chemical Co.)
300# methyl isobutyl ketone

III

100# Geon 205 (vinyl chloride-vinylidene chloride copolymer)
400# methyl isobutyl ketone

IV

100# Vinylite VYHH (vinyl chloride-vinyl acetate copolymer)
400# methyl isobutyl ketone

V

100# Vinylite VAGH (hydrolyzed vinyl chloride-vinyl acetate copolymer)
400# methyl isobutyl ketone

For best results we have utilized a mixed vinyl solution according to the following formulations:

MIXED VINYL SOLUTION (PREFERRED)

95# Geon 200 x 20 solution—#I
46# vinyl polymer solution 400 x 74—#II
4# Paraplex G62 (polymeric type plasticizer)
1# stabilizer

The amount of vinyl polymer solution 400 x 74—#II shown in the preferred mixed vinyl solution may be replaced with a similar quantity of III, IV, and V respectively. Little or no stabilizer may be used. If stabilizer is to be used barium cadmium laurate, barium cadmium ricinoleate, strontium zinc laurate, barium ricinoleate, cadmium 2 ethyl hexoate or other barium or calcium compounds; dibasic lead stearate, dibasic lead phosphite, normal lead salicylate or other lead compounds may be used. Organic tin compounds may also be used. These stabilizers may be used with epoxide type resins if desired.

PRINT PAINTS

100# base grind
8# body oil
35# mixed vinyl solution (any of the foregoing)

100 lbs. base grind
6 lbs. body vehicle
40 lbs. mixed vinyl solution

100 lbs. base grind
55 lbs. mixed vinyl solution

100 lbs. base grind
8 lbs. long oil alkyd resin
35 lbs. mixed vinyl solution

¹ Lower percentage of vinylidene chloride content than Geon 200 x 20.

The above are preferred formulations. The extender pigments can be varied as well as the hiding power pigments. The melamine resin may be omitted, but we find that the introduction of melamine resin permits a faster cure as well as imparting additional alkali resistance and wear. The percentage may also be varied in the formulas.

The percentage of vinyl resin to the oleoresinous binder may be varied. The above formula shows 25% vinyl resin and 75% oleoresinous binder. Formulas have been successfully produced using higher or lower percentages ranging from 5% vinyl resin to 50% vinyl resin.

Although a conventional oleoresinous seal coat may be used to obtain satisfactory bond with the print paint we have also found that a seal coat using a polyvinyl acetate emulsion as a binder in place of the oleoresinous binder is not only excellent for bond but offers better sealing flexibility and toughness.

TYPICAL EXAMPLE OF POLYVINYL ACETATE PAINT

Clay	50
Red slate	310
Polyvinyl alcohol (8% sol'n)	50
Darvan #1 (20% sol'n)	18
Water	99
Polyvinyl acetate (55% solids)	146
Plasticizer	20

¹ Sodium salt of polymerized alkyl-aryl sulfonic acid.

Process.—Add clay and red slate to polyvinyl alcohol solution, Darvan solution, and water to produce slurry. Mix plasticizer with polyvinyl acetate, add to slurry and grind. The polyvinyl acetate paint may be produced in a conventional paint three-roll mill, pebble mill, or other type of grinding equipment.

This seal coat is preferred not only for the oleoresinous-vinyl binder but also for the 100% vinyl binder shown below. This seal coat differs from Hazeltine as we do not use a rubberlike component admixed with a vinyl reinforcing agent for tackifying.

The polyvinyl acetate may be plasticized with a conventional chemical plasticizer, and the normal type of extender, such as red slate flour, calcium carbonate, clay, magnesium silicate, aluminum silicate, mica, may be used.

The vinyl print paint thus far described preferably has an oleoresinous vehicle, and we have discovered that for some purposes by utilizing a vinyl resinous composition embodying a vinylidene chloride content of from 20 to 40% vinylidene chloride it is possible to produce a satisfactory vinyl print paint which will bond satisfactorily to the conventional seal coats, and after the solvents have been evaporated and the composition cured in the usual manner the flooring is ready for use without requiring fusion of the resins to form the vinyl paint film.

The preferred formula containing no oleoresinous vehicle is as follows:

VINYL PRINT PAINT

(VINYL POLYMER SOLUTION)

Example I

916.0 Geon 400 X 74 dissolved in	A
48.0 methyl isobutyl ketone	
40.0 Neolyn 35 (alkyd resin) dissolved in	B
40.0 methyl isobutyl ketone	
12.0 Paraplex G-62 (polyester-epoxy type)	C
3.0 Mark M (barium cadmium stabilizer plasticizer)	
60.0 Atomite CaCO ₃	
20.0 Titanox RCHTX (titanium-calcium pigment)	
20.0 color pigment	

(VINYL CHLORIDE-VINYL VINYLIDENE COPOLYMER SOLUTION)

44.0 Geon 200 X 20 dissolved in	D
82.0 diisobutyl ketone	

Blend solutions A and B, then add C in order. After homogeneous mixture is obtained, grind over a 3-roller mill twice and then thin with solution D.

Example II

21.0 Geon 400 X 74 dissolved in	A
62.0 methyl isobutyl ketone	

20.0 Neolyn 35 dissolved in	B
20.0 methyl isobutyl ketone	

12.0 Paraplex G-62 (polyester epoxy type)	C
3.0 Mark M (barium-cadmium stabilizer)	
70.0 atomite	
20.0 titanium dioxide	
10.0 color pigment	

59.0 Geon 200 X 20 dissolved in	D
110.0 diisobutyl ketone	

Blend solution A and solution B, then add C in order. After homogeneous mixture is obtained, grind over a 3-roller mill twice and then thin with solution D.

From the description of the compositions of the present vinyl print paint and the methods of making the same, it will be observed that the vinyl resins in our print paint are completely dissolved and are, therefore, solutions not organosols. No fusion is necessary. The solvents are evaporated, and the flooring is ready for use. We prefer, however, to use a hot air system which is at approximately 150–170° F. to remove the solvents in contrast to the usual fusion temperatures of 300–350° F. which are necessary to fuse the individual particles into a film. Prolonged bakes at lower temperatures are ineffective in developing cohesion in the film.

Stabilizers other than the type above may be used. The types containing lead, strontium and tin alone or in combination may be used for both heat and light stabilization.

Other solvents, plasticizers, pigments and extenders as shown in the vinyl-oleoresinous section may be used.

Neolyn 35 is a rosin derived alkyd material and is preferred because it is the most polymeric and has the highest melting point. However, other grades of Neolyn may be used.

Neolyn may be replaced with polymerized rosin, maleate esters, modified rosin esters, modified maleic resins, rosin modified maleic glycerides, or nitrile rubbers.

In order to substantiate our claims for a floor covering with better performance, abrasion tests, scrubbing tests and alkali tests were made on the floor coverings containing vinyl resins as against the regular printed felt base floor covering.

DRY ABRASION RESISTANCE

This test is run with the Tabor Abraser Model E-4010 with the vacuum pickup. A four inch by four inch specimen is cut from the floor covering to be tested. This specimen is mounted on the turntable in the conventional manner without the use of the rim. For this test abrasive wheels are used, each loaded with a 1000 gram weight. The instrument is turned on in the standard fashion and allowed to run until the coated asphalt felt shows through the coating over an 80% area in the path cut by the abrasive wheels. The number of cycles indicated on the counter of the machine is recorded as the wear cycles of the specimen tested.

ALKALI RESISTANCE

There are two solutions required for this test. 1% and 5% solutions of sodium hydroxide in water are applied to the floor coating in test as follows: 5 drops of each solution are applied with a medicine dropper to the surface of the floor covering and immediately covered over with a lab watch glass. These solutions are allowed to remain in contact with the surface of the floor covering for a period of 2 hours. At the end of the test period the watch glasses are removed and the solutions wiped off with a piece of soft flannel. Immediately after this the test specimen is rinsed with clear, cold water. The condition of the area contacted by the solutions is noted.

SCRUBBING RESISTANCE

This test is run with a nylon bristled brush, weighted

7 with approximately 2 pounds of lead. The brush is driven by the arm of a vacuum type windshield wiper. The surface of the floor covering in test is smeared with a scrubbing compound and the brush allowed to work this compound back and forth across the test specimen. The scrubbing compound is manufactured as follows: 20 grams of Fels Naphtha Soap is dissolved in 180 grams of hot water. To this is added 20 grams of Oakite and 300 grams of Old Dutch Cleanser. This mixture is thoroughly agitated to produce a smooth, creamy consistency. During the period of the test frequent additions of this scrubbing compound should be added to the surface of the material in test. The end point is reached when sufficient coating has been removed to allow the coated felt to show through the surface. Very small breaks, such as would be accounted for by high spots can be disregarded. Failure is that point where very definite break-through is indicated by progressive lengthening of the abrasion lines.

AVERAGE TEST RESULTS

	Taber	Scrub	Alkali	
			1%	5%
Conventional Printed Felt Base Floor Covering.	1,400 (1,100-1,700)	2,300	Good.....	Fair-Poor.
Oleoresinous Vinyl Printed Floor Covering.	2,100 (1,800-2,400)	5,000	Excellent..	Good.
High Vinyl Printed Floor Covering..	2,500 (2,400-2,600)	10,000	Excellent..	Excellent.

While the present invention is particularly useful as a printed felt base sheet for use as a floor covering it will be understood that the sheet may be used for other purposes, such as a wall covering and for application to other surfaces.

Having thus described the invention, what is claimed is:

1. The method of making a printed felt base sheet comprising the steps of applying to a felt sheet at least one seal coat, then applying to the seal coat a print paint coating composition containing from 5% to 50% by weight of a vinyl resin solution including a vinyl chloride-vinylidene chloride copolymer having a vinylidene chloride content of at least 20%, and then subjecting the product to moderate heat substantially below 300° F. without fusing the vinyl resin.

2. The method as defined in claim 1 wherein said print paint coating composition includes a solution of an oleoresinous binder.

3. The method as defined in claim 1 wherein said print paint coating composition includes a solution of resinous binder materials in addition to said vinyl chloride-vinylidene chloride copolymer.

4. A printed felt base sheet produced by the method defined in claim 1.

5. The method of making a printed felt base sheet comprising the steps of applying to a felt sheet at least one seal coat, then applying to the seal coat a print paint coating composition comprising a mixture of a base material containing a pigment and a solution of oleoresinous binder in a solvent with from 5% to 50% of a solution of a vinyl resinous material in a solvent, said vinyl resinous material including a vinyl chloride-vinylidene chloride copolymer having a vinylidene chloride content of at least 20%, and then subjecting the product to moderate heat substantially below 300° F. without fusing the vinyl resin.

6. The method of making a printed felt base sheet comprising the steps of applying to a felt sheet at least one seal coat and then applying to the seal coat a coating composition comprising a mixture of a solution of an

oleoresinous binder in a solvent with from 5% to 50% by weight of a solution of a vinyl resin in a solvent, and then subjecting the product to moderate heat substantially below 300° F. to evaporate the solvent and effect curing of the non-vinyl components without fusing the vinyl resin.

7. The method as defined in claim 6 in which the evaporation of the solvent and the curing occurs at a temperature of from 70°-200° F.

8. The method of making a printed felt base sheet comprising the steps of applying to a felt sheet at least one seal coat and then applying to the seal coat a coating composition comprising a mixture of a solution of an oleoresinous binder in a solvent with from 5% to 50% by weight of a solution of a vinyl chloride-vinylidene chloride copolymer in a solvent, and then evaporating the solvents at temperatures substantially below 300° F. and below the usual fusion points of vinyl copolymers.

9. The method of making a printed felt base sheet comprising the steps of applying to a felt sheet at least one

seal coat and then applying to the seal coat a coating composition comprising a mixture of a solution of an oleoresinous binder in a solvent with from 5% to 50% by weight of a solution containing a vinyl chloride-vinylidene chloride copolymer and at least one other vinyl resin, and then evaporating the solvents at temperatures substantially below 300° F. and below the usual fusion points of vinyl copolymers.

10. The method as defined in claim 6 wherein said at least one other vinyl resin is selected from the group consisting of vinyl chloride-vinyl acetate copolymer, polyvinyl chloride, vinyl chloride-vinyl acetate copolymer interpolymerized with a dibasic acid, a vinyl chloride-vinyl chloride copolymer containing a hydroxy group, polyvinyl butyral, and mixtures of polyvinyl butyral, vinyl acetate, copolymers of vinyl chloride and acrylonitrile, and vinyl chloride-vinylidene chloride copolymers having a different vinylidene chloride content.

11. The method of making a printed felt base sheet comprising the steps of applying to a felt sheet at least one seal coat and then applying to the seal coat a coating composition comprising a mixture of a solution of an oleoresinous material in a solvent with from 5% to 50% by weight of a solution containing a vinyl chloride-vinylidene chloride copolymer and at least one other resin in a solvent, and then evaporating the solvents at temperatures substantially below 300° F. and below the usual fusion temperatures of vinyl copolymers.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 5, line 62, Example I, for "916.0 Geon 400" read -- 16.0 Geon 400 --; column 6, line 47, for "Tabor" read -- Taber --; column 8, line 41, for the claim reference numeral "6" read -- 9 --.

Signed and sealed this 9th day of June 1959.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents

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