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Keller

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[54] **COVERING**

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[63] Continuation of Ser. No. 803,433, Feb. 28, 1969, abandoned.

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[58] **Field of Search** 117/17, 33

[56] **References Cited**

UNITED STATES PATENTS

3,496,911	2/1972	Chmelar	118/621
2,776,223	11/1957	Brown et al.	117/33
2,777,977	1/1957	Everand	317/262
2,784,630	3/1957	Koprow et al.	117/33
2,829,124	4/1958	Napravnik	117/33
3,098,755	7/1963	Barth et al.	117/33
3,336,149	8/1967	Fox et al.	117/33
3,690,914	9/1972	Andreski	117/21

FOREIGN PATENTS OR APPLICATIONS

948,988	2/1964	Great Britain	117/33

OTHER PUBLICATIONS

Skeist, "Handbook of Adhesives" Rheinhold Publishing Corp., N.Y., 1962, pages V, VI, 286, 287, 333,334.

Kirk and Othmar, "Encyclopedia of Chemical Technology," Vol. 8, pp. 306–309, (1965).

"Product Engineering" Magazine June 19, 1967, pg. 123.

"Encyclopedia of Polymer Science & Technology," Vol. 6, page 241 (1967) & Vol. 7, pages 91 & 92 (1968).

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[57] **ABSTRACT**

A method of preparing a seamless carpetlike floor covering comprising applying a layer of a solvent-free liquid two component plastic system of resin and hardener to an inside floor or wall of a building, electrostatically spraying fiber flocking material onto the plastic system before it hardens, and hardening the plastic system with the flock material imbedded therein.

1 Claim, No Drawings

COVERING

The present application is a continuation of Application Ser. No. 803,433, filed Feb. 28, 1969, and now abandoned.

THE FIELD OF THE INVENTION

The field of the invention is structurally defined webs having a flocked type surface.

The object of this invention is to provide coverings with carpet-like surface structures, especially for covering floors. It is known that jute fabrics, after being coated with adhesive, can be flocked electrostatically with textile fibers. In this manner a tufted carpet is obtained which is suitable for covering floors. By dispensing with the supporting fabrics, it has also been possible to deposit textile fibers directly upon a polyvinyl chloride paste in such a manner that after gelling of the flock-covered paste, carpet-like lengths or sheets will be obtained which can be placed upon or adhered to floors. In order to obtain a closed surface by welding together the adjacent pieces at their edges, the method disclosed in the German Pat. No. 949,261 may be used where the adjoining edges are coated with self-hardening synthetic resins such as polyester resins, preferably mixed with fillers, casting resin or styrene resin, and are then smoothed and polished. The polyester resins can also be used in combination with diisocyanates.

These methods all have the disadvantage of first requiring the carpet covering to be produced, which then, in a separate operation, has to be placed on the floor. If textile fabrics are used as carriers for the applied flock, then such coverings cannot be cleaned with soft soap and alkaline cleansing agents because such textile materials are sensitive to water. Tufted carpets of this kind are also not compatible with fat-dissolving agents which would loosen the resins.

The use of polyvinyl chloride pastes requires expensive heat treatment and elaborate drying installations. Tufted carpets produced with polyvinyl chloride as a carrier have the disadvantage of only limited resistance to heat, chemicals and mechanical abuse.

Another serious difficulty with the production of flocked carpet coverings is that only those adhesives can be used which have good electrical conductivity.

Since the carrier substances are usually good electrical insulators, the adhesive film has to be grounded during flocculation. If the electricity is not conducted away quickly enough, then there will be formed over the flocculated surface an opposing electric field which will disturb further flocculation and will lead to undesired difficulties. Another difficulty with the usual process is that after the flock has been deposited, the excess has to be removed. This is usually done by brushing it away after the drying operation. If synthetic resins are used, and especially with polystyrene sheets, such removal is rendered difficult by the tendency of the synthetic resin to acquire a strong electrostatic charge resulting from friction, which will tend to retain the excess flock that is to be removed.

Still another disadvantage is the usual necessity of leveling the floor, as by troweling, in preparation for laying the carpet.

It is indeed already known to deposit seamless synthetic resin floor covering in a single layer and of sufficient thickness upon a floor, without requiring the floor

to be leveled, when a solid thermoplastic synthetic resin is mixed with fillers and heated until the mixture becomes flowable or sufficiently soft to be roller troweled. A subsequent flocking of fibers upon such a surface is not, however, possible after the surface has hardened.

Floor coverings are also disclosed in Swiss Pat. No. 361,114 which consist of a coating of duroplastic under polyadditions of hardened synthetic resins, one component of which is an unsaturated polyester resin. To increase its tearaway resistance, the freshly applied coating has dispersed in it some silicon carbide, marble, basalt or polyester in the form of thin broken pieces. Any of such particles which remain partly on the surface of such a floor covering are imbedded by polishing.

The state of the prior art raw materials of the present invention is disclosed in Kirk-Othmer "Encyclopedia of Chemical Technology," 2nd Ed., Vol. 1 (1963), pages 285–313, under the section "Acrylic Acid and Derivatives," pages 851–882 under the section "Alkyd Resins," particularly pages 865–868, wherein driers, modifiers and blending agents are disclosed; Vol. 5 (1964), pages 679–690, under the section "Coated Fabrics," particularly page 680, wherein flocked coatings are disclosed, and pages 690–716, under the section "Coatings, Industrial," particularly page 691, wherein the resume of synthetic resins used in the formulation of coatings is given; Vol. 8 (1966), pages 294–312 under the section "Epoxy Resins," particularly pages 306–311, wherein solventless systems, amine cured coatings, ester-type coatings and structural plastics are disclosed; Vol. 12 (1967), pages 188–197, under the section "Laminated and Reinforced Plastics", particularly page 189, wherein fibers are disclosed, and pages 190–191, wherein the plastics, catalysts and fillers are disclosed; and Vol. 16 (1968), pages 159–189, under the section "Polyesters."

SUMMARY OF THE INVENTION

Having in mind the limitations of the prior art, it has now been surprisingly found that the difficulties which have been encountered in the production of flocked carpets and in their use as floor coverings are avoided if the flocking with textile fibers is carried out together with a coating operation, for example of the floor.

According to the present invention, a seamless tightly adhering duroplastic coating on a plaster, concrete, artificial stone, ornamental or wooden base and having a carpet-like surface effect, is obtained by the hardening of coatings of possibly colored, pigmented or filler-containing synthetic resins on a bottom layer of two-component materials. The hardened surface layer is produced by mixing a two-component system comprising liquid solvent-free synthetic resins with hardeners and before the hardening, imbedding flocked-in shortly cut fibers therein. This process represents an advance over the prior art because of its reduction is the number of process steps.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The process is advantageously performed by first applying upon a base of plaster, concrete, artificial stone or wood, a mixture of liquid solvent-free two-component synthetic resin of a viscosity between 500 and 20,000 centipoises and a hardener by painting, rolling, spraying pouring or troweling, and then, before

the commencement of any hardening by the hardener, electrostatically depositing shortly cut fibers upon the coated surface and allowing the latter to harden.

It is also surprising that the electric conductivity of the coating material no longer requires any special attention because the coated layer of this invention remains adequately grounded throughout the base on which it is deposited.

It was also not to be foreseen and was therefore surprising that in the process of this invention no excess of textile fibers is deposited so that it is not necessary to remove any excess.

As base or bottom coatings, industrial or domestic plaster coatings and cementitious coatings are used, but also those containing other hydraulic binders such as lime or gypsum, as well as bituminous or asphaltic paving materials. Other suitable materials are concrete, terrazzo, ornamental material and especially wooden floors.

By the designation "solvent-free liquid two-component synthetic resin materials" are to be understood all two-component materials which after being mixed with the hardener will harden. They do not contain any volatile organic solvents which do not participate in the hardening process. There can, however, be present certain solvents which do take part in the hardening process and which will become permanent components of the hardened layer, as for example styrene, vinyl toluene, acrylic acid ester, methacrylic acid ester and other monomers.

Especially suitable solvent-free liquid duroplastics belong to the following groups:

a. hydroxyl group containing compounds which are hardened by polyisocyanates, such as polyethers, polyesters, alkyd resins, acrylate resins and epoxide resins;

b. epoxide resins which are hardenable with the help of polyamines, amidoamines or ketimines;

c. acrylic polymers and unsaturated polylesters which are hardened by peroxides in mixtures with copolymerizable monomers, such as styrene, vinyl toluene, acrylic acid ester, methacrylic acid ester and the like; and

d. those resulting from the hardening of polysulfides by the use of heavy metal peroxides such as lead peroxide or oxides of manganese such as manganese dioxide.

The hardener can be mixed with the two-component materials before the processing. It is also possible, however, for the hardener of the two-component material to be deposited separately upon a base by means of a two-component spraying gun, whereupon a reaction occurs. Finally, the hardener can also be first applied to the base and then a layer of the two-component material deposited thereon. In each case, the hardening of the two-component material commences as soon as the hardener and the two-component material come into intimate contact with each other.

The two-component materials are applied as clear lacquers to the base. They can, however, also be pigmented with the usual inorganic and organic pigments, and/or mixed with fillers such as talcum, barium sulfate, mica, asbestos, quartz, sand, etc. They can also contain the usual hardening accelerators.

The viscosity of the two-component material is between about 500 and 20,000 centipoises, and it is applied to the base by the usual methods such as painting, roller application, spraying, casting or troweling.

The textile fibers are shortly cut fibers of different lengths and thicknesses which are applied as flocks. Suitable for this purpose are natural fibers such as cotton, wool, preferably goat wool, but also synthetic fibers such as viscose flocks, triacetate flocks and polyamide flocks. The fibers are cut into lengths ranging from about 0.3 to 12 mm.

The textile fibers are flocked upon the coated surface of the base by electrostatic methods with the help of screen radiators (ball screens) in a high voltage field or by means of electrostatic spraying devices or installations.

The use of the suggested two-component materials has the advantage of permitting a layer of sufficient thickness to be applied by a single coating operation, the layer being then ready to imbed the flocked textile fibers deposited thereon and firmly hold them so that a floor covering of this kind can be subjected to the roughest use after the resin has hardened, without loss of its carpet-like appearance. It also eliminates the usual troweling and smoothing of the floor which must usually be done whenever a carpet is to be laid.

The coating of this invention is to a large extent resistant to thermal, chemical and mechanical treatment. It is surprising that such a coating with its fibrous surface can be cleaned with alkaline cleaning agents. In a similar manner fat-dissolving solvents such as gasoline are used for cleaning the coating without damage to either the textile fibers or the resin. A more important advantage is, however, that a seamless coating is obtained in contrast to the polyvinyl chloride coverings which must be welded and the other carpet coverings which must be fastened by adhesives.

It is surprising that for the coatings of this invention, only two-component materials are suitable, but not single component lacquers which produce layers of only insufficient thickness so as to necessitate repeated applications, each additional layer being applied only after the last preceding layer has dried. The solvent that must be present in the single component coatings causes the delay.

In the process of this invention, the solvent-free liquid duroplast is coated upon the base in layers of at least 0.5 to several mm thick. The preferred thickness is between about 0.5 and 5 mm. To effect its hardening, the solvent-free liquid duroplast is mixed with a hardener, or the latter is sprayed separately upon the base by means of a two-component spraying nozzle, but simultaneously with the application of the liquid duroplast. The mixing of the hardener with the duroplast then occurs during the spraying.

Within a certain time which is characteristic for each material, gelling of the solvent-free liquid duroplast coating commences. During the preferably short time before commencement of the hardening, the flock is applied. Upon a square meter of coated surface, not more than about 600 g, preferably 150 to 400 g of flock are applied, the exact amount depending on the length and thickness of the fibers.

Different kinds of surface effects are produced by flocking upon the adhesive surface either cut fibers of uniform length or of different lengths. It is also possible to deposit upon the same surface fibers of different lengths in successive operations. By the use of differently colored fibers, a variety of color effects is produced.

The flock covered surface hardens under the influence of hardeners with the possible help of accelerators, even at room temperature, to produce a carpet-like surface structure which is useful for covering not only floors but also walls and ceilings. As a floor covering, it is extremely durable and wear-resistant and differs from the usual floor coverings in that it can be applied in a single combined operation.

Without further elaboration, it is believed that one skilled in the art can, using the preceding description, utilize the present invention to its fullest extent. The following preferred specific embodiments are, therefore, to be construed as merely illustrative, and not limitative of the remainder of the specification and claims in any way whatsoever.

EXAMPLE 1.

Upon a smoothed cement floor surface, by use of a trowel, a mixture is spread containing a liquid epoxide resin, a colored pigment such as yellow iron oxide, powdered quartz of particle size smaller than 150 microns, and a cyclo-aliphatic polyamine as a hardener. The liquid epoxide resin is a known article of commerce which is produced by reacting bisphenol-A with epichlorhydrin.

Resins of this type are sold by the Shell group under the name Epikote. The ratio of the epoxide resin to the powdered quartz is 1:1.3. The ratio of the epoxide resin to the amine is 5:1.

A coating 1 mm thick is produced by spreading 2 kg of the mixture over each square meter of floor surface. At a room temperature of 18°C, the coating will have a gelling time of two hours. Before gelling of the layer commences, polyamide fibers cut to 2 mm lengths and of 20 denier thickness are flocked upon the epoxide resin surface through an electrostatic ball screen. For this purpose 196 g fibers/m^2 are used. The resulting coating has a carpet-like surface. After 6 hours it will be hard throughout and can then be walked upon, and after one week the fiber covered surface can be brushed with water and soft soap without damage thereto.

EXAMPLE 2.

Upon a smoothly troweled cementitious floor a two-component material of the following composition in parts by weight is applied by means of a roller:

7.0 parts of a commerical hydroxyl group containing linear solvent-face highly viscous liquid polyester (sold by the Bayer AG Company, Leverkusen, under the name Desmophen), with a hydroxyl content of about 8.5%, an acid number of less than 2 and a viscosity at 75°C of 330 ± 30 centipoises;

34.5 parts castor oil;

8.5 parts of a 50% paste of sodium aluminum silicate in castor oil;

22.1 parts rutile (TiO_2);

1.5 parts yellow iron oxide;

0.4 part green chromic oxide;

25.0 parts technical homologue containing diphenyl methane-4,4'-diisocyanate.

By the use of 1.5 kg of this material per m^2 of floor surface, a layer 0.8 to 1 mm thick is produced. The diisocyanate was not added until just before the coating step. The storage time of the mixture at 18°C is 45 minutes. Within this time, as described in Example 1, 205 g triacetate fibers are flocked per m^2 of floor surface upon the still liquid coating, the fibers being of 15 denier thickness and having been cut to a length of 2.5 mm. After 3 hours the carpet-like coating which now firmly adheres to the floor will be in condition to be walked upon.

EXAMPLE 3.

Upon a smoothed anhydrous floor a layer of hardener is coated which besides an acrylic styrene polymer, also contains benzoyl peroxide in dibutyl phthalate. Upon this coating, by means of a spray gun, a material is sprayed, two-thirds of which consists of monomeric acrylic compounds and one-third of which consists of powdered quartz of 10,000 mesh size. A layer 500 microns thick is formed. For that purpose 200 g hardener and 1.5 kg coating material are used per m^2 of floor surface. The coating gels after 30 minutes at 18°C. Within 15 minutes 200 g polyamide fibers of 20 denier thickness and 2 mm length are flocked upon the coating per m^2 of floor surface. After 2 hours the carpet-like surface can be walked upon and clings tenaciously to the floor.

EXAMPLE 4.

An inlaid floor is coated by means of a two-component spray gun with a material of the following composition in parts by weight:

490.0 parts of a commercial hydroxyl group containing solvent-free low viscosity liquid branched polyether (Handbook product of the Bayer AG Company under the trademark Desmophen), with a hydroxyl content of about 11.5, an acid number of less than 0.5 and a viscosity at 25°C of 650 ± 100 centipoises;

110.0 parts of a 50% paste of sodium aluminum silicate in castor oil;

310.0 parts heavy spar (barite);

80.0 parts titanium dioxide;

10.0 parts black iron oxide; and a hardener of

250 parts diphenyl methane-4,4'-diisocyanate (technical, homologue containing).

With a layer thickness of 1.2 mm, 2 kg per m^2 of floor surface were used. The coating gels after one hour. Upon the still liquid layer, 200 g cotton flock of 2–3 mm length are deposited per m^2 as in Example 1. After 3 hours, the coating has hardened and can be walked upon. A carpet-like coating has been produced.

EXAMPLE 5.

Upon a smoothed cement floor a two-component material is painted which contains liquid polysulfides with which a paste of lead peroxide in dibutyl phthalate has been mixed. For a layer thickness of 0.8 mm, 1 kg of the material was used per m^2 of floor surface. The coating gels at room temperature in 30 minutes. Within this time 196 g polyamide fibers of 1.5 to 2 mm length and 15 to 20 denier thickness are flocked electrostatically upon the still wet coating per m^2 of floor surface. After 2 hours, the coating which then firmly adheres to the floor and has the appearance of a carpet, can be walked upon.

I claim:

1. In a method of providing a substrate of a synthetic resin material with a flocked fabric surface by applying a layer of curable synthetic resin composition comprising duroplastic cold curing synthetic resin material, curing agents and accelerators directly on a concrete supporting surface, depositing fibers electrostatically

on said synthetic resin composition when said layer is in an immediate pre-gelling state and curing said layer of said synthetic resin composition, the improvement wherein the synthetic resin composition is a liquid free from volatile organic solvents not participating in the curing process, and having a layer thickness between 0.5 and 5 mm.

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