July 6, 1948. P. O. POWERS 2,444,468

LINOLEUM TYPE SURFACE COVERING

Filed Aug. 17, 1943

FIG. 1

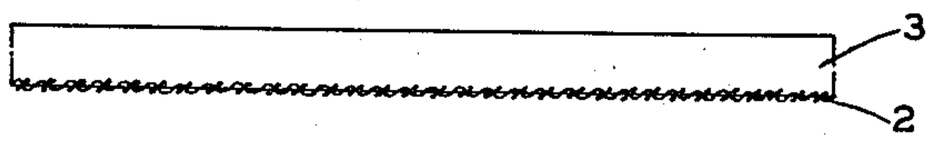
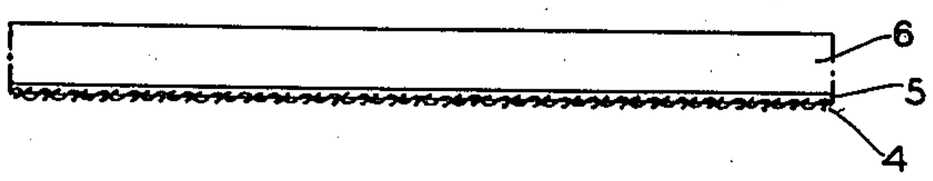


FIG. 2



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LINOLEUM TYPE SURFACE COVERING

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7 Claims. (Cl. 154—25)

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This invention relates to surface coverings of the linoleum type having a backing or foundation of treated cotton fabric.

The backing commonly used for linoleum is burlap. Burlap is sufficiently strong to avoid distortion by stretching during pressing in the process of manufacture and when the linoleum is hung in the curing stoves or ovens. Likewise, burlap is not materially affected dimensionally by the absorption of moisture and linoleum having a backing of burlap will lie flat in use, without buckling or distortion.

It is common practice to size the burlap before applying the linoleum mix. Jute fiber, from which burlap is woven, is soft and pliable, and the burlap itself being an open weave fabric is likewise limp and is susceptible to wrinkling. The sizing step increases the stiffness of the burlap, removes wrinkles, and straightens the fabric. Starch sizes, reinforced with proteins, have been used to a great extent. As an example, 25 parts by weight of cornstarch, 6 to 8 parts by weight of casein, 250 parts by weight of clay filler, and about 500 gallons of water constitute a commonly used sizing bath, producing a stiffened burlap substantially free of wrinkles upon drying by passing the treated fabric over the heated cans of a Butterworth drier.

With supplies of burlap reduced because of shipping difficulties and with the view in mind of utilizing natural agricultural products of the United States, considerable work has been undertaken in the development of cotton backed linoleum type floor and wall coverings. Cotton sheeting is not similar to burlap in its physical characteristics, for it is dimensionally affected by water and does not have sufficient strength to preserve the initial dimensions of the uncured covering during stoving or during installation or use. As a result, distortion of the pattern occurs in inlaid goods when the cotton backed material is hung in the stoves for curing. Another serious deficiency resulting from the susceptibility of woven cotton fabrics to dimensional change upon absorption of moisture is the opening of the seams in the installed material. This occurs through contraction of the backing upon installation of the covering, particularly with adhesives containing water. While the seam between adjacent pieces may be cut closely when fitted, open joints will result from the backing coming into contact with the adhesive, for the backing will contract and pull the linoleum wear coat with it. Even though there are no joints, the shrinkage is objectionable

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and for many uses; e. g., desk tops, renders the material wholly unsuitable. Sizing of the cotton fabric, although desirable and effective for stiffening the cotton sheeting, does not overcome these defects. Neither are they overcome by the decorative backing paint commonly applied to linoleum goods.

The principal object of this invention is to provide floor and wall coverings of the linoleum type having a backing of cotton fabric so treated that it will retain the original dimensions of the linoleum during manufacture and subsequently during installation and use. To this end I impregnate the fabric with a material or materials, described in detail below, which has the effect of inhibiting or limiting dimensional changes in the final product from the application of moisture to the backing.

The invention as applied to a floor covering is shown in the attached drawing, in which Figures 1 and 2 are sectional views of linoleum type floor coverings having woven cotton fabric backings.

In one example of the invention, I have treated the cotton fabric backing with a water-soluble urea-formaldehyde resin, known as "UF204," prepared generally in accordance with my Patent 2,320,301, issued May 25, 1943.

A treating solution was formed of the following, all parts being by weight:

	Parts
UF 204 water-soluble urea-formaldehyde resin (37% solids)	576
Lactic acid (85%)	18
Water	306

An 81''—56 by 56—1.90 cotton sheeting was immersed in the above solution and the excess was removed by squeeze rolls. The fabric was then passed over a Butterworth drier heated to about 230° F. to drive off the water and set or further condense the resin. An ironing effect is obtained on the cans of the Butterworth drier which results in a smooth, straight, wrinkle-free fabric. Fabric so treated is ready for use in the preparation of linoleum type floor and wall coverings. A decorative backing paint is generally applied to one face of the backing fabric and a layer of linoleum mix is applied to the other and calendered or pressed to obtain a good bond between the wearing layer and the backing. Thereafter, the linoleum is hung in heated curing stoves for maturing or curing the wearing layer.

In the example given above, the amount of solids in the urea-formaldehyde solution was

37% and this was diluted with a relatively large amount of water. The concentration of the treating solution will depend upon the quantity of resin desired in the finished fabric, the method of application, the equipment employed for removing excess solution, and other variable factors. In treating the fabric referred to above, where the fabric was immersed in a bath of the treating solution and subsequently passed through squeeze rolls for expressing excess solution, the dried resin incorporated in the fabric represented about 50%, based on the fabric weight.

The cost of the treated fabric may be reduced without material sacrifice in the handling properties of the sheet by using a lesser concentration of impregnating resin and treating the fabric, after impregnation and setting of the resin, with a sizing, similar to the common practice in stiffening burlap. For example, the cotton fabric may be first impregnated with a solution containing a relatively low percentage of water-soluble urea-formaldehyde, say 15%, and this will impart substantially less resin to the fabric than the 50% of resin referred to in the example above where the amount of solids in the urea-formaldehyde solution was 37%. The cloth is then dried and, after drying, it is passed through a bath of starch sizing material prepared as follows, all parts being given by weight:

Cornstarch	parts	25
Casein	do	8
Filler	do	250
Water	gallons	500

The fabric is fed from the sizing machine to a Butterworth can drier and as delivered therefrom is in satisfactory condition for immediate use in the preparation of linoleum type floor and wall coverings by the application of a wearing layer. With a backing treated in this manner, the amount of urea-formaldehyde incorporated into the backing is considerably reduced and the stiffness required in the backing is obtained primarily by the sizing treatment. The inhibition or limitation of dimensional change results primarily from the urea-formaldehyde treatment and incidentally from the casein in the starch sizing. Linoleum made in this fashion and containing only 21–22% of urea-formaldehyde resin on the weight of the cotton fabric has been used as desk-top material with satisfaction. This use is one of the most exacting in the trade, and lesser quantities of resin may safely be used for most purposes, or even for desk tops.

While I prefer to use urea-formaldehyde as the treating composition, other carbamide-formaldehyde resins may be used, some of which are disclosed in my said Patent 2,320,301. Such water-soluble, carbamide-formaldehyde condensates as the methylol carbamides prepared from urea, thiourea, melamine, urea derivatives, and mixtures of the same, and also water-soluble condensates prepared from such carbamides, formaldehyde, and water-soluble alcohols such as methanol, glycerine, ethylene glycol, diethylene glycol, sorbitol, and the like, all hereinafter referred to by the term "water-soluble carbamide-formaldehyde condensate" may be used.

If desired, the resin may be preserved by the use of water-soluble alcohols. In the first example given above, the UF204 resin was preserved by 1.89% of its weight of methanol.

A catalyst is preferably employed to accelerate the setting or condensation reaction. The lactic acid referred to in the first example is used for that purpose, but other well-known catalysts may be substituted for it.

The cotton fabric treated in accordance with this invention is materially strengthened and made proof against dimensional change. The distortion which heretofore occurred with cotton fabric backings, particularly noticeable in those areas which were adjacent to the top of the battens when the material was hung in the curing stoves and therefore subjected to the most weight in hanging during curing, causing the pattern to be distorted and the width of the covering to be reduced, is overcome by the strengthening effect or increase in elastic modulus resulting from the treatment applied to the fabric. Likewise, when the covering is installed and in use, it is held against dimensional change which would otherwise occur in the presence of moisture and result in buckling and distortion in coverings laid on the base without adhesive and open seams or objectionable overall shrinkage in coverings cemented in place.

While it is preferred to apply the treatment to the fabric prior to the application of the wearing layer, the fabric may be treated afterwards, preferably before stoving.

In Figure 1 of the drawing, the woven cotton fabric backing 2, treated with a carbamide-formaldehyde solution, carries a wearing layer 3. Figure 2 shows a modification of the invention in which the woven cotton fabric backing 4, treated with the carbamide-formaldehyde solution, carries a lacquer coating 5. A wearing layer 6 is applied over the lacquer coating.

The wearing layer of linoleum type floor coverings is generally formed of oxidized linseed oil and rosin together with fillers, such as cork, and color pigments. Other types of binders which produce a similar resilient and flexible material are sometimes used.

While I have illustrated and described a preferred embodiment of my invention, it will be understood that the same may be otherwise embodied and practiced within the scope of the following claims.

I claim:

1. The process of preparing linoleum type surface coverings having a woven cotton backing which comprises substantially inhibiting the backing against dimensional changes by impregnating it with an effective amount of a water-soluble carbamide-formaldehyde condensate, drying the cloth, applying a wearing layer of the linoleum type to one face of the cloth, and heating the coated cloth.

2. The process of claim 1 in which the carbamide-formaldehyde condensate is one obtained from urea and formaldehyde.

3. The process of preparing linoleum type surface coverings having a woven cotton backing which comprises substantially inhibiting the backing against dimensional changes by impregnating it with an effective amount of a water-soluble carbamide-formaldehyde condensate, drying the cloth, sizing the cloth, applying a wearing layer of the linoleum type to one face of the cloth, and heating the coated cloth.

4. The process of preparing linoleum type surface coverings having a woven cotton backing which comprises substantially inhibiting the backing against dimensional changes by impregnating it with an effective amount of a water-soluble carbamide-formaldehyde condensate and a catalyst for accelerating the condensation reaction,

drying the cloth, applying a wearing layer of the linoleum type to one face of the cloth, and heating the coated cloth.

5. A surface covering of the linoleum type comprising a woven cotton backing rendered substantially proof against dimensional changes by impregnation with an effective amount of a carbamide-formaldehyde resin, and a wearing layer of the linoleum type carried by the backing.

6. A surface covering of the linoleum type comprising a woven cotton backing rendered substantially proof against dimensional changes by impregnation with an effective amount of a urea-formaldehyde resin, and a wearing layer of the linoleum type carried by the backing.

7. A surface covering of the linoleum type comprising a woven cotton backing rendered substantially proof against dimensional changes by impregnation with an effective amount of a carbamide-formaldehyde resin and stiffened with a starch size, and a wearing layer of the linoleum type carried by the backing.

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