

[54] **METHOD OF ADHERING FIBERS IN A TUFTED CARPET**

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[51] Int. Cl. ....B32b 5/02

[58] Field of Search .....156/305, 72; 161/62, 66, 67; 139/2

[56] **References Cited**

**UNITED STATES PATENTS**

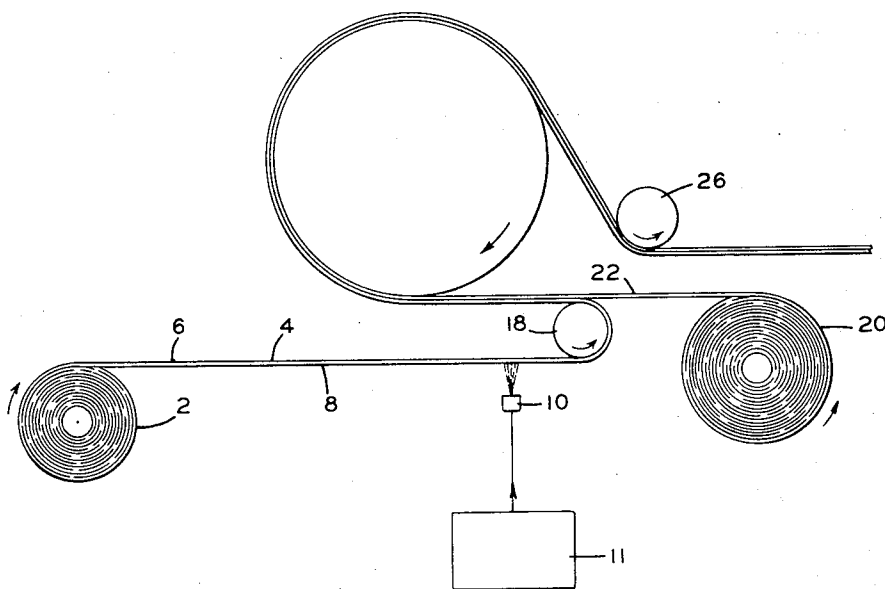
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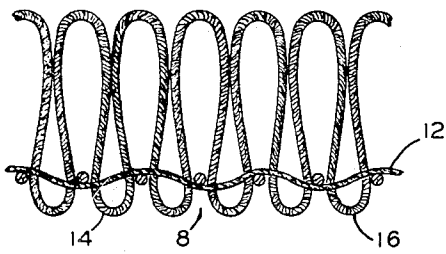
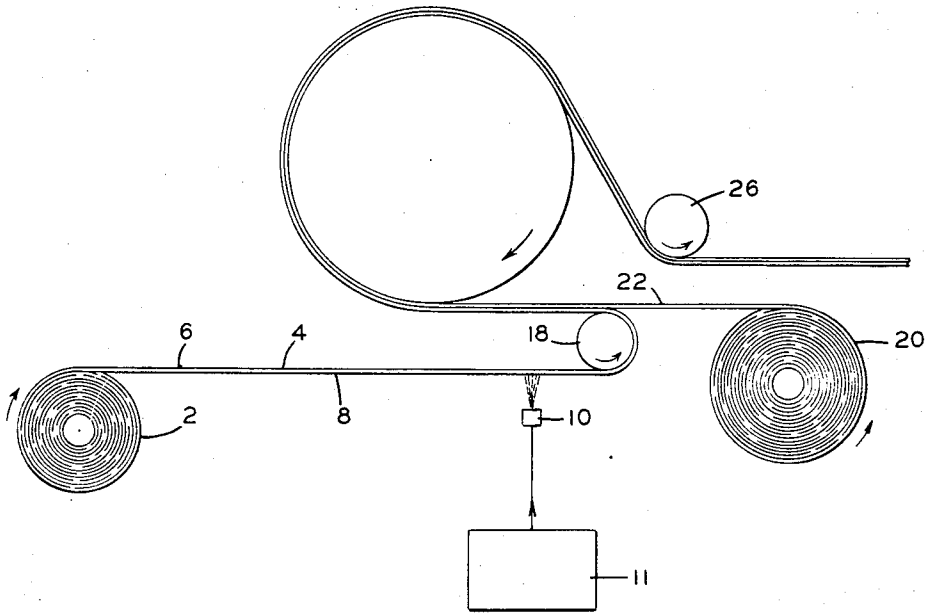
[57] **ABSTRACT**

A primary backing is needle punched with fiber strands to form a tufted carpet. The short loops of the strands which the tufting needle formed on the primary backing are treated with a solvent which softens the outer surface of the fibers. A secondary backing is then applied over the primary backing, and a sandwich-like structure is formed with the primary backing and secondary backing having therebetween the short fiber loops which have been softened by the solvent. After the solvent has been vaporized, the two backings are adhered to each other and the fiber loops. Adherence is due primarily to the fact that the fiber loops had been softened by the solvent and turned into an adhesive which, upon drying, serves to bond the elements together.

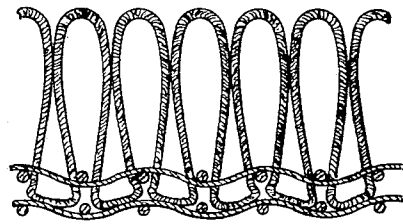
**1 Claim, 3 Drawing Figures**



*Fig. 1*



*Fig. 2*



*Fig. 3*

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## METHOD OF ADHERING FIBERS IN A TUFTED CARPET

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The invention relates to the manufacture of rugs of the type known as tufted, stitched and/or hooked rugs, wherein the pile or tufts are punched, stitched or hooked in a woven fabric backing and form a product which is hereinafter collectively referred to as a tufted rug.

#### 2. Description of the Prior Art

Normally, tufted-type rugs have the punched tufts adhered to the woven fabric backing by the use of a latex coating, such as that shown in U.S. Pat. No. 2,748,446. This latex coating bonds together the mass of loops on the reverse side of the backing and prevents the loops from being pulled away from the backing.

As indicated in the above-mentioned patent, a latex backing requires a relatively long period of drying. Furthermore, it has been found that the heat which is necessary to dry the latex is such that it causes the fibers which make the wear surface to shrink. Consequently, after the drying of the latex, the carpet must be put through a stretching operation to return the carpet to its original size. Finally, it should be noted that the latex becomes a part of the finished product and is thus a cost item in the finished product.

The advantages of the process described herein are that heating for drying can be carried out at a much more rapid rate, there is no shrinkage of the wear layer due to the fact that the wear layer is not heated substantially during the drying process, and finally, in most cases, the material of the fibers forms the adhesive requiring no additional material to be added to the carpet as an adherent to become a permanent part of the rug as a cost factor.

### SUMMARY OF THE INVENTION

In the process herein, the steps involve the placement of fibers, preferably nylon, on a primary backing in such a manner that the pile protrudes through the backing. The back of the carpet composition is treated with a solvent for the fibers and, thereafter, is subject to a heated roll to drive off the solvent and cause the incipient fusion of the loops of the fibers. The fibers are thus locked in place in the backing. The solvent may contain additional materials to act as an additional adhesive. For example, nylon could be added to the solvent, and this mixture used with the extra nylon could act as a further adhesive. A secondary backing is adhered to the primary backing to form the finished product, and the fused fibers function as the adhesive holding the two backings together.

### BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic view of the apparatus for carrying out the process;

FIG. 2 is an enlarged section through a tufted rug showing the backing and piles; and

FIG. 3 is an enlarged section through the tufted carpet showing the primary and secondary backings in position.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

The carpet is formed by taking a prepared roll of tufted carpet and primary backing, roll 2, FIG. 1, and feeding the tufted carpet and primary backing structure 4 off the roll with the carpet face 6 facing upwardly. This leaves the carpet back 8 facing downwardly so it may pass by a spray assembly 10 which deposits a solvent from reservoir 11 on the loops passing through the back surface of the carpet primary backing.

Referring to FIG. 2, there is shown the tufted carpet and primary backing structure wherein the primary backing 12 has placed therethrough fibers 14 which have loops 16 on the carpet back 8. The solvent is applied so that it covers the loops 16.

The solvent causes the outer surface of the individual strands of fiber, which form the fiber loop, to soften. The individual strands become tacky and stick to each other and the primary backing. This results in the loops being held fast to the backing so that the loops cannot be pulled out. Also the individual strands are locked together to prevent "pilling," i.e., individual strands pulling loose. The quantity of solvent placed on the carpet back is such as not to completely dissolve the individual strands of the fiber, but merely to soften the outer surface of the individual strands so that they become tacky and, in effect, an adhesive. The tufted carpet and primary backing, so treated with the solvent, is passed around idler roll 18. A secondary backing material is stored on a roll 20, and this backing material 22 is removed from the roll 20 and placed upon the carpet back in the vicinity of the idler roll. The combination structure of the tufted carpet primary backing and the secondary backing is then fed to a heated drum where the combination is passed around the rotating hot drum for a contact time of three minutes at 375° to 400° F. As was indicated earlier, the carpet face is not heated to a point that it will begin to shrink. The carpet face is relatively cool to the touch of a hand because the solvent being evaporated from the carpet back passes out through the carpet face, and this movement of the vaporized solvent out through the carpet face performs a cooling function to the carpet face.

The driving off of the solvent at the heated drum permits the tacky surfaces of the individual strands to set up and become a solid again. This conversion of the tacky surface to a solid surface functions in the same manner as would an adhesive present at this point, that is, it bonds together the primary backing and secondary backing and the individual strands of the fiber into a unitary structure holding the three parts together. The bonded carpet then comes off the heated drum to an idler roll 26 and then off to a conventional roll-up structure.

When using the above solvent binding technique, it is obvious that the solvent must attack and tackify only the fibers forming the tufted surface of the carpet and that the backings must be immuned from the solvents. While it is possible that both the backing and tufted fibers could be attacked by the solvent, control of the operation becomes critical. The method is simpler to carry out where the solvent attacks only the fibers of the tufted material. When the primary and secondary

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backings are jute and the tufted fabric is nylon, the solvent used is a resorcinol ethanol solution. This solution is a 25 to 50 percent by weight solution of resorcinol in ethanol. The ethanol acts as a solvent for the solid resorcinol, and the combination functions as a solvent for the nylon. The resorcinol ethanol solution is sprayed on a carpet backing, after which heat is applied to evaporate the ethanol. The resorcinol ethanol solvent causes a softening of the outside surface of the nylon fibers. The drying only drives off the ethanol leaving some resorcinol. However, it has been found with other fabrics that you can secure a true softening of the outside of the strands forming the fiber tufts with the solvent driven off. With acrylic-type fibers, the solvent is dimethylformamide; while with polypropylene fibers, the solvent is decahydronaphthalene; and with polyester-type fibers, the solvent is meta-cresol. In the last-mentioned group of fabrics and solvents, there is a true softening of the outside strands of the fibers, and these thus become the adhesive that binds the mass together.

What is claimed is:

1. A method of producing a tufted carpet so that the tufted material is securely adhered to the carpet primary backing, said tufted carpet being initially formed by

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a tufting operation which passes strands of the tufted material through the primary backing to form long loops on one side of the backing and short loops on the other side of the backing, comprising the steps of feeding the backing with the unprecoated tufted material to a coating means with the short loops in position to be coated, coating the short loops of the tufted material with a tufted material solvent means which softens to a tacky state the outer surface of the individual strands of the fiber forming the tufted material so that the softened outer surface acts as an adhesive for binding the strands and primary backing together, placing a secondary backing over the fiber loops after the coating is placed on the fiber loops so that a carpet backing is formed of a sandwich-like structure with the fiber loops bonded together between a primary and secondary backing, and then vaporizing the solvent means to cause the individual strands of the fiber to fixedly adhere to each other and the carpet backings, said vaporization being accomplished by passing the carpet over a heated surface with the backings adjacent the heater to drive the solvent out through the face of the carpet to cool the face of the carpet.

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