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2,820,277

METHOD AND APPARATUS FOR MAKING A HOOKED PILE FABRIC

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Fig. 1

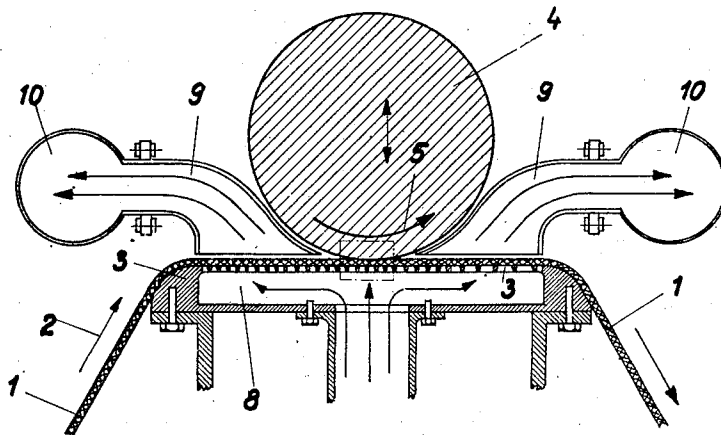


Fig. 2

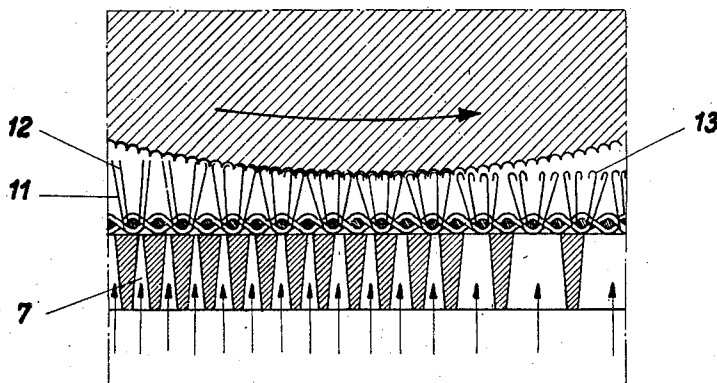
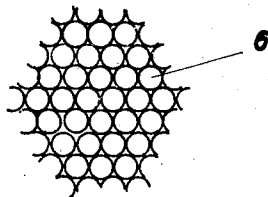


Fig. 3



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METHOD AND APPARATUS FOR MAKING A HOOKED PILE FABRIC

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6 Claims. (Cl. 26—2)

The invention relates to a method and apparatus for producing fabrics which can adhere to each other by interengaging very small fiber hooks.

Fabrics provided with hook-shaped upright threads are known. Such fabrics are velvet type or pile fabrics containing in closely spaced relationship raised pile threads projecting from the foundation structure. Said raised pile threads consist of synthetic thermoplastic resin material, and the terminal portions of said threads have been bent to hooks by application of heat.

The hook shape of said raised pile threads was produced by passing the same around heated transverse bars and cutting the obtained loops, so that the thermoplastic threads subjected to the heat assumed and retained the desired shape. After the loops had been cut, they formed the raised pile threads with hook-shaped ends, which were arranged substantially parallel to each other over the whole surface of the fabric.

A drawback of these known fabrics is due to the fact that the strength of the adhesion between two superposed pieces of fabric depends essentially on the angle which the weft or warp threads of the superposed fabrics form with each other. The maximum adhesion is obtained when the weft or warp, respectively, of the superposed fabrics form a right angle with each other; in said position, the largest number of the hooks will grip each other. If, however, the fabrics are superposed in a position where the planes of the hooks are parallel to each other, only sporadic interengagement takes place, and the adhesion is correspondingly smaller. In addition, the manufacture of such fabrics requires specific arrangements at the loom.

It is a principal object of the invention to provide a method for producing fabrics of the character described, which do not show the recited drawbacks and can be obtained from any starting material, irrespective of the kind of loom on which the material had been made.

Another object of the invention is to provide an apparatus for bending the ends of thermoplastic pile threads at random directions.

Other objects and advantages will be apparent from a consideration of the specification and claims.

In accordance with the invention, the ends of thermoplastic raised pile threads are heated, so as to become plastic and deformable, and are simultaneously subjected to axial pressure by means of a faceted pressure roller, whereby they are bent to hooks. The facets are preferably semi-spherical and concave and have a radius corresponding to the desired radius of the hooks formed by bending of the pile threads. The bending to the hooks takes place in all possible directions. With respect to said directions, the distribution of the hooks is such that irrespective of the position taken up by two superposed fabrics, always optimum adhesion is obtained because in view of the statistic distribution a substantially equal number of hooks can interengage in whatever position.

Any type of pile fabric may be used as starting material. It is not necessary to use fabrics in which the pile has been formed by cutting the loops; it is, for instance,

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also possible to interweave the warp threads of two parallel foundation fabrics and to produce the pile by cutting the two foundation fabrics in the symmetry plane.

In order to prevent pulling out of the hooked pile threads from the foundation fabric, the latter should be woven as tightly as possible. It is of advantage to cement the bases of the individual thermoplastic pile threads together and/or to the foundation fabric, either by a suitable thermal or chemical treatment applied to the foundation fabric. Such treatment may be applied prior to, or after formation of the hooks.

The novel features of the invention will be better understood from the following description taken in connection with the accompanying drawings, in which a suitable apparatus for preparing the fabric has been shown for purpose of illustration.

In the drawing:

Fig. 1 represents a vertical section of the entire apparatus;

Fig. 2 is a partial sectional view, on an enlarged scale, of the roll rolling on the web of the pile fabric, and

Fig. 3 is a partial view of the surface of the roll.

As shown in Fig. 1, a pile fabric 1, in which the pile threads are already cut, is pulled by a suitable mechanism (not shown) at a constant speed in direction of arrow 2 over a slideway 3, whereby the pile is on that face of the fabric which is not gliding on the slide-way. Above the slide-way 3, a roll 4 is rotatably arranged in such a way that the distance of the roller surface from the support 3 is adjustable.

The roll 4 is driven in direction of the arrow 5 at a speed corresponding to the speed at which the fabric is passed over the slide-way 3. The surface of the roll 4 is honeycombed by semispherical concave facets 6, which have a diameter corresponding to the diameter of the hooks to be formed, for instance about 0.25 mm. The roll 4 is heated and maintained at a predetermined temperature by means of a thermostat. When perlon pile threads are used, the temperature of the roll surface should be about 180–190° C.

The slide-way 3 is provided with cooling means for the foundation fabric and the lower portion of the upright pile threads. If air cooling is used, the slide-way 3 may contain slots 7, through which cooling air passes from the cooling space 8 against the lower face of the fabric 1 traveling over the slide-way 3. Said cooled air, which is admitted under pressure, passes through the porous foundation of the fabric 1 and is sucked off by means of aspirators 10 through the funnels 9.

The production of the hooks by means of the described apparatus is as follows:

The fabric, with projecting upright pile threads 11, is drawn below the roll 4 on the slide-way 3. Hereby, the tips 12 of the threads 11 strike against the facets 6 and are plasticized by the contact with the hot surface of the roll. The lower ends of the threads 11 retain their rigidity and elasticity because they are cooled by the air forced through the slots 7 of the slide-way 3.

On the further passage between roll and slide-way, the threads 11 are subjected to axial pressure, whereby the tips 12 are bent conforming to the shape of the facets 6, and from hooks. The direction in which the hooks are formed depends on the deflection of the pile tips by the impact with the facets, and is produced according to the laws of statistics in every possible way.

As soon as the web 1 has passed below the lowest longitudinal surface line of the roll 4, that is, after the tips 12 have been bent to hooks 13 and are beneath the axis of the roll 4, the deforming procedure is terminated. As the tips have been plasticized by the heat, the shape of the hooks is retained (Fig. 2).

Towards the exit side of the apparatus, the cooling

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slots 7 are enlarged, so that the cooling effect extends now to the bent hooks 13 and sets the same in their hooked shape. The bending angle of the obtained hooks is a function of the distance between the roll 4 and the slide-way 3 and can be adjusted by suitable adjustment of said distance.

The method of the invention is preferably applied to bands, which subsequently may be sewn or bonded to the materials to be united. Such adhesive fastening bands can be used in many ways, for instance attached to garments, pockets, and the like. They are flexible and do not scratch, are washable and can be produced in any shade or also in variegated designs. According to the intended application, the strength of the pile threads, the height of the pile, the radius and bending angle of the hooks, as well as their number per unit of surface can be varied.

For roughened wool fabrics, it is sufficient to press such an adhesive band against the surface of the wool fabric to obtain a fastening effect.

If two bands are pressed against each other, the individual hooks glide first smoothly upon each other and then grip each other, due to their elasticity, as soon as they have traveled the required length. Separation does not produce any injury of the adhesive fabric, because the hooks, again due to their elasticity, resume their original position and because the pile threads are firmly retained in the foundation structure as a result of the thermal or chemical treatment set forth hereinabove.

It will be understood that various changes may be made with respect to details of the apparatus, in the materials employed, and in the steps followed, without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A method of making a hooked pile fabric suitable

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as fastening means, comprising providing a foundation fabric having a plurality of upright thermoplastic pile threads of substantially equal length, passing said fabric under a roll bending the tips of said pile threads in random directions to hooks, heating said tips during said passage to a plastic deformable state and simultaneously cooling the lower ends of said pile threads, and subsequently setting the bent tips of the pile threads in said hook shape.

2. A method as defined in claim 1, including the step of bonding the lower ends of said pile threads to the foundation fabric.

3. A method as defined in claim 1, wherein said pile threads are superpolyamides, and wherein the said roll is heated to a surface temperature of about 180-190° C.

4. A device for making a hooked pile fabric comprising a stationary support for a traveling fabric having a plurality of upright thermoplastic pile threads, and a heated roll provided with a surface honeycombed with semi-spherical concave facets, said roll when in operative engagement with said pile threads bending the tips of said threads to hooks forming random angles with the plane normal to the surface of said fabric.

5. A device as defined in claim 4, comprising slots in said support for admission of a cooling agent to said traveling fabric.

6. A device as defined in claim 5 wherein the width of said slots located in said support in the path of the fabric, where the pile threads of said fabric have been bent to hooks by the action of said roll, is larger than the width of the slots located in the area below said roll.

References Cited in the file of this patent

UNITED STATES PATENTS

35	2,062,884	Holland	Dec. 1, 1936
	2,717,437	Mestral	Sept. 13, 1955