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SINGLE TEXTURE FABRIC AND PROCESS OF MAKING THE SAME

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Fig. 1.

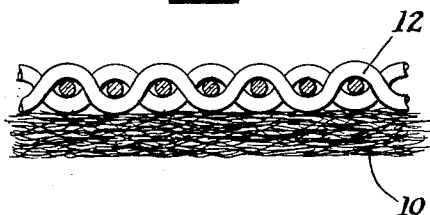


Fig. 2.

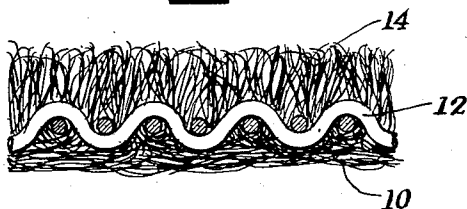


Fig. 3.

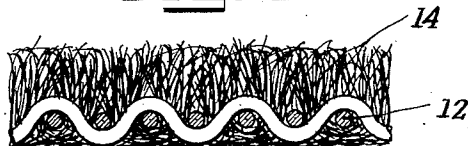


Fig. 4.

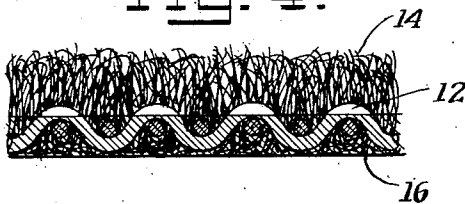


Fig. 5.

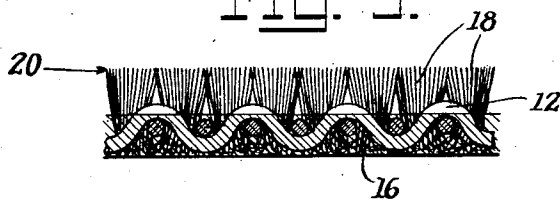
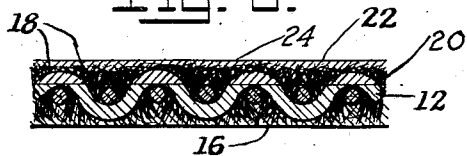


Fig. 6.



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SINGLE TEXTURE FABRIC AND PROCESS OF MAKING THE SAME

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This invention relates to improvements in fabrics and methods of making fabrics and more particularly to a fabric having one face finished with a surface of short fibres, to give a surface similar to that of a pile or nap fabric or of other fabric finishes or serving to anchor to the base, an artificial leather or other coating.

Fabrics of the type outlined above have heretofore required a heavy base from which a nap may be raised without unduly weakening the fabric or has necessitated the weaving into the fabric of loops of thread which may then be cut to form a pile fabric. The production of a surface of this type has therefore been limited to fabrics in which the surface fibres have been secured to the base of the fabric as a part of the threads woven into or forming the fabric base. This has necessitated an expensive type of weaving and has limited the formation of surfaces of this type to expensive fabrics.

An object of my present invention is to provide a fabric having a surface similar to pile or nap fabrics or to similar finishes but in which the pile or surface fibres are secured to the base fabric without being woven therein.

Another object of the invention is to provide a fabric having a fibrous surface of the character indicated which may be mounted and secured on a fabric base independently of the character or type of the fabric base and for which a coarse, loosely woven, fabric base may be used.

Another object of the invention is to provide a method by which a surface of fibres suitable for pile or other finish may be formed and secured in a fabric.

A further object of the invention is to form or secure to a fabric base a surface of fibres secured in said fabric as a base and by means of said surface fibres to anchor to said base a continuous coating of the character used in making artificial leather or a water proofed surface.

Still further objects of the invention are to provide a fabric having the appearance and characteristics of a pile fabric and being, at the same time, water proof, and suitable for

use as a lining for automobile tops and closed vehicles, to provide a cheap and inexpensive method for making pile fabrics, and to provide a method for anchoring loose fibres so firmly to a fabric base that they may be subjected to napping, combing, shearing or, indeed, any similar finishing operation.

With these and other objects in view, which will be apparent from the following detailed description, the invention comprises the methods and products described and set forth in the following specification and claims.

The various features of the invention are illustrated in connection with the accompanying drawings, in which:

Fig. 1 is a cross sectional view on a greatly enlarged scale, of a woven fabric to serve as the base of a fabric embodying my invention, and a section of a "bat" or layer of suitable fibrous material so placed on a surface of the fabric as to be in position to be subjected to the initial step in the formation of a nap or pile on the fabric;

Fig. 2 is a similar cross sectional view of the fabric and bat after they have been subjected to a needling operation whereby a large number of loose fibres are caused to project through the meshes of the woven fabric serving as a base;

Fig. 3 is a similar cross sectional view of the fabric after the excess of fibres has been removed, by singeing or otherwise, from the "bat" side of the fabric;

Fig. 4 is a similar cross sectional view of the fabric after a coating and impregnating layer of cement has been applied to the "bat" side to anchor the "bat" to the fabric;

Fig. 5 is a similar cross sectional view of the finished fabric after the fibres projecting through the fabric base from the "bat" side to the opposite or finished side have been napped to raise, disentangle, and straighten them and have been sheared to render them of substantially uniform length, and thus give a pile finish; and

Fig. 6 is a similar cross sectional view of a fabric finished similar to that of Fig. 5 to which a coating of suitable material, such as the cellulose ester compositions or rubber compositions commonly used for making ar-

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fificial leather or water proofed surfaces, has been applied to the pile or nap surface of the fabric.

In the drawings, the same reference numerals refer to the same parts throughout the several views.

In my present invention, a mass of loose fibres is attached to a woven fabric base, by placing a layer or bat of loose fibres on the side of the fabric opposite that on which the pile, or nap, or other finished surface is to be formed, pushing portions of the fibres of this bat through the interstices of the fabric while leaving the remaining portions enmeshed in the bat, and then anchoring the portions of the fibres on the bat side so that they cannot be pulled through the fabric or otherwise dislodged. In anchoring the fibres on the bat side of the fabric I preferably impregnate these enmeshed portions on the bat side by means of a suitable cementing composition to attach them to each other and secure them to the fabric base. The portions projecting through the fabric to the opposite or finish side are thus securely anchored and may then be subjected to combing, shearing, or other finishing operations without danger of loosening the fibres, or may serve as a secure anchorage for a coating applied to the finished surface to form an artificial leather or water proof coating.

As the fibres are thus anchored independently of the weave of the fabric base, a pile or other desired finish may be formed on a wide variety of fabrics, and coarse, loosely woven fabrics, such as burlap, may be used for this purpose, particularly where cheapness and strength are desired. The bat may be made of a variety of fibres depending on the type and quality of finish desired, but preferably consists of wool or hair or a mixture of wool and hair, the fibres of which are loosely intermeshed with each other. This bat is laid on the under or bat side of the fabric and blunt or barbed needles are repeatedly forced through the bat and the fabric, catching portions of the fibres and forcing them through interstices in the fabric base while the remaining portions of the fibres are left intermeshed in the bat. There is thus left on the bat side of the fabric the main portion of the fibres in a loosely intermeshed condition while from this bat there extend through the pores or meshes of the fabric, short end portions, or loops, of fibres held loosely in position on the base by the length which is enmeshed in the bat on the opposite side of the fabric. Although each fibre projecting through the meshes of the fabric has a length enmeshed in the bat on the opposite side, the mere needling operation does not of itself secure the fibres to the base with sufficient strength to enable the projecting ends to be subjected to combing or napping or other desired finishing

treatments without danger of pulling the fibres completely, or very largely, through the fabric.

The portions of the fibres remaining in the bat are, therefore, then anchored or secured to each other and to the fabric base by impregnating them and the adjacent surface of the base with a suitable cementing composition, first removing, if necessary or desirable, the excess of fibres from the bat side from which the needling was done. This cementing composition may be either a pyroxylin composition or rubber cement and may not only serve to anchor the fibres to each other but may render the finished product water proof. A slow curing rubber cement is preferably used which impregnates each of the individual fibres, and after the solvent has evaporated from the cement, leaving each fibre in the bat enclosed in a layer of rubber, the mass of fibres and rubber is formed into a unitary mass by pressure. A backing of a clothlike or fibrous appearance may then be formed or any desired finish given to the bat side of the completed fabric.

The anchorage thus given to the fibres is so firm and secure that the fibres on the side of the fabric opposite the bat may be subjected to combing, napping, shearing or other treatment to produce any desired finish. In forming a pile or nap finish, the fibres are combed to straighten them and cause them to lie in the same direction substantially parallel to each other and at right angles to the base fabric, and are usually subjected to a shearing operation by which they are rendered of a substantially uniform height. The fibres may be sheared close to the fabric base and serve as an anchorage for a continuous coating of a pyroxylin or rubber composition, the ends of the fibres being embedded in and covered by the coating and securely anchoring the coating to the fabric base. Or the projecting fibres may be pressed and left with a finish resembling that of a woolen cloth. In each case a bat of fibres suited to the finish desired, is selected.

Referring more particularly to the accompanying drawings to illustrate the product and method, a bat 10 of loose fibres is placed on the surface of a woven fabric 12 opposite that which is to serve as the finished side, the position of the bat being that indicated in Fig. 1. The fabric 12 may be burlap, heavy cotton goods of open mesh or even thin sheeting. The bat 10 is then acted on by a large number of needles which repeatedly penetrate the mass of loose fibres and the meshes of the fabric 12 and carry the ends 14 of many of the fibres through to the opposite side of the fabric as indicated in Fig. 2. The thickness of the bat may now be reduced to a desired uniform thickness by removing unnecessary fibres by singeing or other means,

leaving the fabric and bat as indicated in Fig. 3. In this condition each of the fibres 14 extending through the meshes of the fabric has a length extending into and lying in the bat but which is not secured therein with sufficient firmness to hold the fibres in place against the pulling effect of napping or combing.

A layer of rubber cement 16 is therefore applied to the bat 10, impregnating the fibres of the bat and under surface of the fabric base but preferably not penetrating through the fabric 12 to the opposite or finish side. After the solvent has evaporated from the cement, the remaining rubber, which is preferably a slow curing rubber, is pressed to unite the fibrous mass into a unitary body as indicated in Fig. 4. This rubber cement has the effect of uniting each fibre in the bat to the other fibres so that the projecting ends on the finish side of the fabric cannot be pulled out unless sufficient force is used to destroy the fabric.

To form a pile or nap fabric, the fibres 14 are then combed, brushed or tigered and sheared leaving the fibres straightened and extending from the meshes of the fabric 12 in tufts or bunches 18, which join and extend to a uniform level 20 above the fabric 12, in the manner of a pile fabric as indicated in Fig. 5. The fibres may be sheared very close to the base and embedded in a coating 22 of suitable composition such as pyroxylin or rubber composition which completely covers the fibres and which may be finished in any desired manner. The cementing or coating layers 16 and 22 may penetrate to each other in the base fabric or merely coat opposite sides of the base in accordance with the specific mode of treatment.

In some cases, it may be desirable to provide this fabric with a cloth finish on the back or bat side and, where such is the case, a layer of sheeting or other suitable fabric may be doubled to the back side of the fabric produced in accordance with my method.

It will be observed that my improved fabric may resemble, in many characteristics, pile fabrics such as plush, velvet, or velour, in that it is provided with a large number of fibres projecting vertically from the base of the fabric. Such pile fabrics as have been made heretofore are comparatively expensive due to the complicated and intricate methods needed for this manufacture, but my improved fabric, while it has all of the desirable qualities of a pile fabric, may be produced at a materially lower cost. Furthermore, the impregnating layer which anchors the loose fibres to the fabric base may render the finished fabric waterproof and this is a very desirable characteristic not possessed by pile fabric as heretofore made. In the automobile industry, it is the practice, in many cases, particularly in connection with closed

bodies, to use a plush, velour, or other pile fabric, as a lining for the inside of the body or for a lining for the decks or tops of automobiles, and my improved fabric is a material which is particularly well suited for this use and which answers all the purposes of this trade, notwithstanding the fact that it can be manufactured at a materially lower cost than the fabrics heretofore used for that purpose.

Moreover, my invention may be applied advantageously in the manufacture of the ordinary pile fabrics as above mentioned, these fabrics generally being formed by looping or hooking the pile into the base fabric and shearing the same, instead of utilizing a single unlooped straight fibre as in applicant's material. In the regulation pile fabric, the application to the base surface of the fabric of an impregnating coat of rubber cement, pyroxylin, or oxidized oil, serves the double purpose of providing a water-proofing material while, at the same time, increasing the hold of the base on the loop fibres. In fabrics so constructed, the pile is firmly anchored and cannot be readily pulled out of the base, as is the case ordinarily in pile fabrics.

While the method is particularly adapted to the production of fabrics with a pile surface, it is capable of producing other surface effects. When a pile effect is desired, it is desirable to use fibres which are comparatively straight, such as calf or goat hair. If on the other hand a surface finish resembling cloth is desired, other types of fibres, such as wool are used which may be felted to a cloth-like surface.

In this class of goods, the needled fibres are compressed and matted with the cementitious material which may be rubber cement or a composition including pyroxylin or any other substance forming a holding layer for the projecting fibres. Various fibres will be forced down to a flat configuration such as indicated in Figure 6 of the drawings, and may receive subsequently an additional finishing coating to smooth the surface. In a subsequent operation it may be also calendered under pressure and the application of heat, this serving further to lay the fibres and to give the fabric a cloth-like appearance.

In the modified fabric above referred to, and in fact in any type of fabric utilizing the needled fibre, there is no necessary limitation of the binding or cementing substance to a rubber cement, since other materials will give satisfactory service, such, for example, as pyroxylin, oxidized oils, and the like. Moreover, in the cloth finish modification, I may employ a rubber composition on both sides or pyroxylin or oxidized oils on both sides, or I may utilize rubber on one side and oil or pyroxylin on the other, the specific coating material used depending upon the

finished effect desired and somewhat upon the base material employed and other considerations which may arise in the manufacture of the product.

5 Note should be made further, of the advantageous use of impregnating material on the base fabric and on the needled fibres of this fabric. I have found it in some instances, exceedingly advantageous to water-
10 proof the needled fibres by utilizing a solution of aluminum acetate or similar water repellent, non-absorbent and non-capillary fluid impregnating in the fibre, so that in the completed fabric, there is no tendency there-
15 in to absorb moisture. This water-proofing treatment of the fibres of the fabric is advantageous in either the pile construction or the cloth finish construction. It is under-
20 stood, of course, that in addition to the water-proofing of the fibres of the fabric, one or both sides thereof may be coated with an additional water-proofing coat of rubber, pyroxylin, oxidized oils or other substance having similar properties.

25 As changes of construction may be made within the scope of my invention, it is desired that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

30 Having thus described my invention, what I claim as new and useful and desire to secure by Letters Patent is:

1. A fabric comprising a base fabric, fi-
35 brous elements extending transversely there-through, those portions which are on one side of the fabric being free, and those portions of said fibrous elements which are on the other side being largely reduced in bulk
40 by shearing, the remainder of said sheared elements being attached to the fabric base by a cementitious material.

2. A fabric comprising a base fabric, fi-
45 brous elements extending transversely there-through, those portions of the fibrous elements which are on one side of the base being free, and those portions which are on the other side being removed to expose the base surface, and cementitious material adhesively
50 anchoring the fibrous elements to the base on that side of the base from which portions of the fibrous elements have been removed.

3. A method of making fabrics comprising applying a layer of fibres to a fabric base,
55 projecting portions of said fibres through said base, diminishing the thickness of said fibrous layer by removing a portion thereof, and finally applying an anchoring material to the fibrous layer and the adjacent side of the base.

60 4. A method of making fabrics comprising applying a layer of loose fibres to a fabric base, projecting portions of said loose fibres through said base, shearing off a portion of the fibrous layer, and finally adhesively an-
65 choring said fibrous layer to said base.

5. A fabric comprising a base fabric; a thin layer of fibres on one face of the base fabric, some of which fibres extend through the base fabric to the other side of the base layer with
70 free portions, and an anchoring material applied to the fibre layer and the adjacent face of the base fabric.

6. A step in the process for making fabrics which consists in applying a layer of fibres to one face of a fabric base; projecting sufficient
75 portions of said fibres through the base to the other face thereof so as to form a pile surface thereon; and uniting the base and fibrous layer on the face from which said fibres are projected with an adhesive substance.

7. A step in the process for making fabrics which consists in applying a layer of fibres to a fabric base; projecting a sufficient portion
80 of said fibres through the base so as to form a fibrous surface on the side of the base opposite to that to which the fibrous layer is applied; and applying a cementitious material between said fabric base and fibrous layer and between the fibres of the base and
85 layer whereby the fibres are securely bound to each other and the layer to the base.

8. A step in the process for making fabrics which consists in applying a layer of fibres to one side of a fabric base; projecting sufficient
90 portions of said fibres through the base to the other side thereof so as to form a pile surface thereon; and uniting the base and fibrous layer by means of an adhesive material and the application of pressure, whereby the fibres
95 of the layer are securely bound to the base.

9. A pile fabric comprising a base fabric, pile strands projected from one face of the fabric through the fabric and beyond the
100 other face of the fabric and cementing material on the first named face of the fabric serving to anchor the said strands in place.

10. A pile fabric comprising a base fabric, a mass of fibres projecting from one face of the fabric through the fabric and beyond the
105 other face of the fabric, and cementing material applied to the side of the base from which the fibres have been projected, serving to anchor the fibres firmly to the base.

11. A pile fabric comprising a fabric base, a mass of fibres projected from one face of the fabric through the fabric and beyond the
110 other face of the fabric, and a rubber cement applied to said mass of fibres and the adjacent portion of the base on the side of the base from which the fibres have been projected, firmly anchoring the said mass of
115 fibres to the said base fabric.

12. A pile fabric comprising a base fabric, fibrous elements projected and extending
120 transversely therethrough from one face of the fabric and extending from the opposite face thereof, a cementing material on the face of the fabric from which the said fibrous elements are projected, and having the free por-
125 tions of the said fibrous elements extending to the other face of the fabric.

tions of said fibres projecting from said base finished.

13. A method of making a pile fabric, which comprises applying a layer of fibres to a base fabric, projecting portions of said fibres through said base, diminishing the thickness of said fibrous layer by removing a portion thereof, and applying a cementing material to the face of the base fabric from which portions of said fibres have been projected, thus anchoring the fibres to the said base fabric.

In testimony whereof, I affix my signature.
PAUL S. SMITH.

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