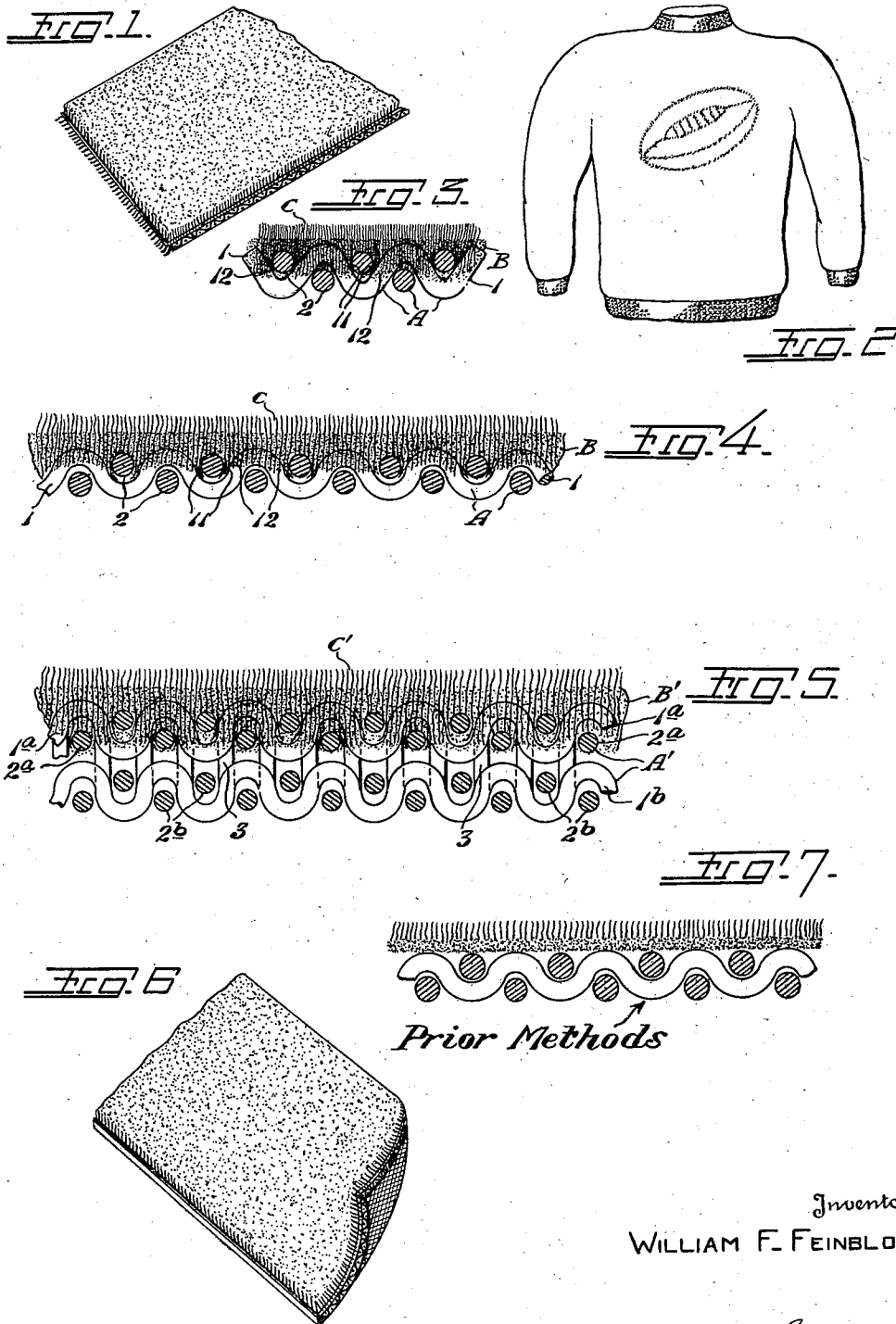


Jan. 18, 1938.

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METHOD FOR APPLYING FLOCK

2,106,132

Filed Aug. 27, 1937



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UNITED STATES PATENT OFFICE

2,106,132

METHOD FOR APPLYING FLOCK

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Application August 27, 1937, Serial No. 161,340

3 Claims. (Cl. 91-68)

This invention relates to an improved method for applying flock to the finish face only of knitted or woven materials to give an appearance resembling a pile or nap fabric, and the like.

5 More particularly, this invention pertains to a method of applying flock to knitted or woven fabric or similar base material to form raised surfaces presenting unusual design and ornamental effects and embodying an improved application of relatively short fibres or comminuted material in such manner that the same become positively embedded and anchored in the base material and positively retained therein under normal, ordinary conditions of wear, washing and use, regardless of how small or fine the details of the design may be.

Heretofore, practically without exception, methods of applying flock to one side only, or the upper, finish face of a knitted or woven base material comprise merely the well known steps of depositing a suitable film of adhesive to the base material, applying the flock or comminuted material to the adhesively coated surface so provided, and then subjecting the fabric to a beating, agitating or vibrating operation to embed the flock into the film of adhesive. Other methods eliminate the latter step and subject the fabric to a compressing action as by pressure rollers, or the like, by which the comminuted material is caused to adhere to the adhesive with greater tenacity, after which the fabric is subjected to a napping, combing or similar finishing operation. In any event, the fabric so produced is usually unsatisfactory and poor in quality in that the flock or comminuted material thereon easily pulls free from the adhesive leaving unsightly bare spots visible on the base material and otherwise affecting the appearance of the finished surface or the design thereon. For this reason there has been limited activity in the art dealing with the production of designs embodying applications of flock due to the fact that designs necessarily require very fine and minute raised outlines subject to a greater degree of wear and therefore the strands thereof more readily tend to pull free from the base material. Accordingly, it has heretofore been necessary in order to obtain a flocked surface, especially such as comprises a design and in which the flock is rigidly retained onto the base material, to apply the flock from the reverse side to show on the finish surface or to apply superfluous amounts of adhesive to the base material until it is impregnated throughout and the particles of flock are practically completely embedded in the adhesive in a substantially solid

mass. However, in many instances, especially in articles of clothing, any such application of the adhesive or flock to mar the smooth, even appearance of the reverse side of the base material is objectionable. Also in the application of several coats of adhesive, the base material necessarily is impregnated to such extent that it becomes stiff on drying of the adhesive, and accordingly loses its pliability such that its field of use is quite limited.

From the foregoing, it may be understood that the method of the instant invention marks a decided advance in the art in that flock is inexpensively, easily and effectively applied from the outer exposed finish face only of the knitted, woven or other base material in such manner that the flock is firmly, rigidly and permanently united therewith yet does not penetrate the base material to project through onto the reverse side, or require such amount of adhesive as will cause the base material to lose its flexibility or pliability in the area in which the flock is applied.

The invention further contemplates the provision of a method of applying flock to the finish face only of a knitted or woven fabric in a simple, most economical process involving a minimum of time and operations and without loss or waste of material.

Another object of the invention resides in a process of providing a fabric with a coating of flock or comminuted material which is evenly distributed throughout and which can be applied in various colors to produce an artistic appearance and unusual ornamental effects.

A still further object aims to provide a method of applying flock to a knitted or woven fabric which when so processed is capable of a wide range and variety of uses and in which the flock is so united and embedded in the base material as to withstand extraordinary wear, use, washing, drying, etc. and resist any reasonable attempt or tendency to pull free or become loose from the base material.

A more specific object is to provide a method of applying flock on a base material in the manner of raised designs, which though exceedingly fine and minute in detail, consist of fibres of flock embedded in the base material in interlocked engagement therewith to resist extraordinary wear, heavy usage, washing and drying and any reasonable tendency against pulling free either at the edges or an intermediate area of the design.

A still further object of the invention is to provide a fabric having the appearance and char-

acteristics of a pile fabric and being, at the same time waterproof, washable and smooth on its underface to be admirably suited for use in the manufacture of articles of clothing which may be worn close to the body without annoying or ill effects from either the flock, adhesive or dye, when colored flock is employed, and in which the flock fibres are deeply embedded and rooted in the base material such that it may be subjected to a napping, combing, brushing, or similar finishing operation.

A still further object of the invention is to provide a fabric coated with flock to present a surface similar to pile or nap fabric, or the like, but in which the pile or flock fibres are permanently secured to the base material without being woven therein.

Further objects and advantages of the invention will be apparent to those skilled in the art as a description thereof proceeds with reference to the accompanying drawing in which like reference characters designate like parts throughout the same, and in which:

Fig. 1 shows, in perspective, a section of material embodying the invention in which the flock or comminuted material is applied in a coating covering the base material throughout;

Fig. 2 shows the method of the invention as embodied in a process for applying flock in the manner of an open work design on a base material such as, for example, knitted fabric made into an athletic shirt, or the like;

Fig. 3 is a close-up view on a greatly enlarged scale of a cross-section of either Figs. 1 or 2 of an area of the base material with flock applied thereto by the method embodying the invention;

Fig. 4 is a cross sectional view on an exaggerated scale, of a woven or knitted fabric base material and showing the application of flock or comminuted material to the finish face together with an adhesive such as to be disposed in intermingled engagement with the fibres thereof;

Fig. 5 is a cross sectional view on an exaggerated scale, of a knitted or woven fabric comprising the base material having more than one layer and showing the application of flock or comminuted material to the upper layer and exposed, finish face thereof;

Fig. 6 is a representation in perspective of a section of material and flock applied thereto showing the undersurface of the base material as smooth, even and unaffected by the application of flock by the method of the invention; and,

Fig. 7 shows on an exaggerated scale, a cross section of fabric with flock applied thereto in accordance with prior methods.

Generally speaking, in methods heretofore known for applying flock or comminuted material to one face only of a knitted or woven fabric or base material, the processes comprise only the conventional steps of applying to the base material an adhesive coating, then applying thereto the flock or comminuted material by a sifting or air-blast operation, or the like, after which the whole is subjected to beating, agitating, or vibrating action to embed the flock or comminuted material into the adhesive. No such prior method contemplated a permanent bond of the flock and base material over and above what could be obtained by the elementary operation of beating of the base material to embed the flock into the adhesive. More specifically, no such method heretofore followed had the aim or teaching of causing the flock, when applied from one

face only, to become embedded and commingled with the fibres of the woven or knitted fabric in permanent engagement therewith without extensive gigning and napping operations requiring special apparatus and an inordinate amount of time and expense in manufacture. Also little attention was given to the action of the adhesive when once applied by such methods other than the aforesaid beating or vibrating operation, and since such methods relied mainly on the adhesive employed, quite naturally the adhesive was as thick as possible for ensuring maximum strength and it was this thickness of the adhesive which defeated the possibility of high grade inexpensive flock application. Thus, as illustrated in Fig. 7, in prior methods the adhesive film could not penetrate the surface of the woven or knitted fabric and necessarily dried into a distinct layer disposed on the finish face of the fabric, whereupon the flock or comminuted material was embedded in such layer of adhesive by the vibrating operation but could not enter into intermingled engagement with the fibres of the porous, woven fabric or base material. And accordingly, the article produced naturally was quite limited in its field of use since the binding effect of the adhesive alone was hardly effective and permitted the flock or comminuted material to easily pull loose and work free from the distinct layer of adhesive necessarily formed thereby leaving bare spots resulting in an unsightly appearance.

In the novel method of the instant invention an adhesive coating is applied to the finish face of a knitted or woven base material in such manner that a distinct layer of adhesive on the upper exposed surface thereof will not be formed, the object being to cause the adhesive coating to penetrate and become embedded in the interstices of the weave of the base material, impregnated in the fibres, and commingled with the flock or comminuted material to serve as a permanent bonding medium therefor. Broadly speaking, such advantageous result is obtained by stretching the base material to increase its porosity and the use of an adhesive of such viscosity that it is readily absorbed and penetrates and flows below the surface of the porous, woven or base material to form interstitial deposits of adhesive therein and at the same time serve as a carrier for the strands of flock such as to effect an intermingling of such strands with the stretched fibres of the woven material; this action is facilitated by a relatively slow, uniform beating action to the underface of the base material thereby hastening the capillary action thereof and causing the adhesive to serve as a carrier for the filaments of flock to embed the same in intermingled engagement, together with the interstitial deposits of adhesive, with the fibres of the knitted or woven base material. This intermingling is completed quite readily in the beating operation during which the adhesive dries somewhat causing a binding action which is pronounced and positive, such that when the base material is relieved from its stretched condition, the fibres thereof necessarily tend to close up and assume their normal untensioned relation and the flock or comminuted material previously carried below the finish surface into intermingled engagement with the fibres of the base material, not only is retained by the interstitial deposits of adhesive but is also clamped and compressed in rigid engagement between adjacent closed up fibres of the knitted or woven base material. Then, upon complete drying of the adhesive, the flock is per-

manently united to the base material and cannot pull free regardless of how finely applied or how minute the design.

Referring now more particularly to Figs. 1-6 inclusive of the accompanying drawing, it will be seen that the method of the invention contemplates the application of flock to knitted or woven base material to coat the same throughout as in Fig. 1, or in the manner of a design, Fig. 2, in which the flock may be embedded in the base material in distinct outlines or open-work comprising relatively fine lines and minute details to the extent that extremely small lettering and unusual artistic and ornamental effects may be created.

As shown in Fig. 3, a cross-section on a magnified scale of either Fig. 1 or 2 of an area of the fabric with flock applied thereto in accordance with the method of the invention would consist of the base material A, comprising regular arrayed cross fibres 1, intermeshed with longitudinal fibres 2, shown in section. The finish or exposed face of the base material together with a substantial upper portion of the fibres adjacent thereto is impregnated with the adhesive B, represented by stippling, and forms interstitial deposits of adhesive through out the interstices in the base material presented by the weave or knit of the said fibres 1, 2. The irregular arrayed flock or comminuted material is embedded in such interstitial deposits of adhesive and caused to closely adhere to the impregnated fibres 1, 2 of the base material, being compressed in and around the interstices between adjacent meshed fibres as at 11, and in and around adjacent cross fibres substantially as shown at 12. The adhesive B, in addition to forming interstitial deposits and becoming impregnated in the fibres of the base material, is dispersed into commingled engagement with a substantial portion of the flock C such that the same is firmly rooted throughout in the adhesive which, in turn, is suitably worked to become anchored to the base material as hereinafter more fully set forth. The flock is therefore permanently anchored to the base material with the outer strands thereof forming the desired raised finish and extending free in close relation as in Fig. 3, and may be subjected to combing, brushing, shaking or other well known finishing operation without danger of pulling free or working loose.

As the filaments or individual strands comprising the flock C, 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 materials and fine, closely woven fabrics such as broad cloth or poplin may be used for this purpose, particularly where inexpensive designs, lettering, and the like are desired. The flock is made of any suitable, comminuted material such as cotton, wool, silk, rayon, flax, jute, or hair, or a mixture of any such, and preferably comprises filaments or fibres of a substantial, definite uniform length and which may be applied by sifting through a screen or otherwise uniformly dispersed onto the base material.

In carrying out the method of the invention in one embodiment, a woven or knit fabric base material is disposed upon a suitable foundation and preferably stretched in an expedient manner to spread the meshed fibres thereof from what may be termed, the normal, closed, untensioned position substantially as shown in Fig. 3, to the open or spread arrangement shown in Fig. 4. This step not only increases the effective area of the exposed surfaces of the fibres of the base

material to which the adhesive is applied, but also definitely increases the porosity of the fabric itself by providing enlarged interstices in the fabric into which the adhesive may more readily flow on being applied to form interstitial deposits, while the stretched, exposed surfaces of increased area of the fibres themselves, permit the same to become impregnated throughout with adhesive in and around such interstitial deposits and uniformly to the desired depth in the base material but not to such extent as to penetrate through to the opposite or reverse side. With the fibres of the base material stretched as aforesaid, the adhesive is applied thereto as by spreading in an even, uniform film or coating. In the case of a design, the adhesive is applied in the manner of the desired character using for this purpose a proper die, silk screen, pattern, stencil, or the like. The adhesive may be of any suitable character and preferably of a waterproof nature such as water proof casein, waterproof glue, rubber cement, rubber latex, rubber dispersion, or any other suitable, relatively slow drying binding material of sufficiently fine body as to readily flow into the enlarged interstices presented by the stretched, meshed fibres of the base material and to become absorbed and impregnated in and around such fibres to the depth desired substantially as represented in Fig. 4. The flock is then applied immediately to the adhesive while in its plastic state and preferably by sifting through a screen such that, as the adhesive sets in flowing into the interstices of the stretched base material, it also acts as a carrier for the strands of the flock in carrying the same therewith to become embedded in the interstitial deposits of adhesive and in and around the adjacent cross fibres and the spaces therebetween to intimate interlocking therewith. The flock may be applied in one, two, or more colors in any desired design, but when more than one color is used, the first is allowed to dry prior to applying the second color to eliminate any possibility of flock of different colors commingling undesirably to possibly mar the desired color scheme.

In another embodiment of the method, the adhesive coating, and in the case of a design, the desired printed adhesive character, is applied to the base fabric while in its normal, untensioned relation and the fabric thereafter stretched to enlarge the interstices presented by the woven or knitted fibres thereby permitting the adhesive to flow below the finish surface, form interstitial deposits and impregnate the fibres throughout the increased areas of their exposed surfaces, whereupon the flock is applied to have intimate intermingled engagement therewith and worked to anchored relation during the beating operation as hereinafter set forth.

In still another embodiment it has been found most practical to apply the adhesive to the base material while in its normal, untensioned relation, immediately follow with the flock or comminuted material and then stretch the base material to enlarge the interstices presented by the woven or knitted fibres such that the adhesive may flow thereinto and form interstitial deposits, impregnate the exposed surfaces of the stretched fibres, and, at the same time, carry the strands of flock into intimate intermingled engagement therewith.

In any embodiment, with the adhesive still in its plastic state, more or less, the base material bearing the flock as shown in Fig. 4, is applied to a rotating beater or similar agitating instru-

mentality and undergoes a uniform, relatively slow beating operation, the number of revolutions of the rotating beater for best results being determined by experiment and considering the specific fabric of the base material and the selected flock applied thereto. Inasmuch as the beating operation in the instant method is relatively slow in comparison with other methods, a new action, which together with the previously discussed steps in the method, particularly the stretching operation, provides a result which hitherto has been unattainable. This beating operation, being relatively slow, is not such as to strike the base material with sufficient force as to knock the flock free from the adhesive or to dispose the same unevenly, but rather acts to effect, what may be termed, a reciprocatory, rocking action to the area of the base material actuated, whereby the meshed, undulated fibres, Fig. 4, are caused to alternately open and close thereby not only positively working the adhesive below the finish surface of the fabric into the enlarged interstices presented by the stretched fibres of the base material, but also gradually working and drawing the filaments of the flock into intermingled engagement into the interstitial deposits of adhesive and in close anchored engagement, intermediate the adjacent adhesively impregnated fibres. Thus the flock necessarily is disposed in most effective intimate locked relation with the base material but not to such extent that the adhesive is caused to work through or particles of flock become discernible on the reverse side.

After a suitable period of beating, the adhesive naturally tends to dry somewhat whereupon the intermingling of the flock with the base material becomes more pronounced and positive. The base material may then be relieved from its stretched condition such that the meshed fibres thereof are free to close up substantially to normal, untensioned relation substantially as shown in Fig. 3 whereupon the embedded strands of flock are squeezed and compressed to close relation, some anchored in the interstitial deposits of adhesive and others in cemented relation with the adhesively impregnated meshed fibres of the base material. It will thus be understood that when the adhesive is fully dry, the flock is necessarily permanently anchored to the base material and cannot work loose or pull free, regardless of how fine or minute an application may be, except, of course, under extraordinary, unusual wear or usage. In this relation it is to be noted that an important feature of the instant method resides in the fact that flock may be applied to unusually fine base fabrics such as knitted undershirts worn next to the body without the adhesive or flock penetrating onto the reverse side such that the underface of the base material is smooth and even as represented in Fig. 6, the fabric retains its flexibility, and the knit or weave assumes its normal, closed relation after the stretching operation.

In Fig. 5 the method is shown embodied in a process of applying flock to a base material A' comprising a plurality of layers. Thus the upper or finish layer comprising meshed cross and longitudinal fibres 1a, 2a is united to the next adjacent layer or layers, comprising fibres 1b, 2b, by cross fibres 3 passing through each of such layers. Generally the method followed in applying the flock C', to this type fabric is substantially similar to that described above with reference to a single layer of fabric such as

shown in Fig. 4. However, inasmuch as the adhesive B' is confined more particularly to the upper or finish layer, the fabric may be subjected to a greater stretching operation increasing its porosity to such extent that during the beating operation the flock fibres are more deeply embedded substantially as shown.

While the method of this invention has been described in detail with specific examples such examples are illustrative only, since it will be apparent to those skilled in the art that other embodiments within the spirit and scope of the invention may be practiced without departing from the teachings or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by the United States Letters Patent is:

1. The method of applying flock to the finish face only of a knitted or woven fabric, which comprises, applying a relatively fine liquid adhesive coating to one face of the fabric such that it penetrates partially through the fabric, dispersing the flock on the coated surface, stretching the fabric to spread the fibres thereby increasing the exposed areas thereof and permitting the adhesive to form interstitial deposits and become impregnated in the fibres to the desired depth in the fabric, beating the fabric to work the flock into intimate anchored relation in the interstitial deposits and into cemented relation with the said adhesively impregnated fibres of the fabric at such a depth that the flock is clamped and compressed in rigid engagement between adjacent closed up fibres of the fabric, and relieving the fabric from its stretched condition whereby such anchored and cemented relation of the flock becomes pronounced and positive on drying of the adhesive.

2. The method of applying flock to a knitted or woven fabric for ornamenting the finish face only thereof in the manner of a design, which comprises, applying a relatively fine liquid adhesive coating to one face of the fabric in the character of the design and such that the adhesive penetrates partially through the fabric, dispersing the flock on the coated surface, stretching the fabric to spread the fibres thereby increasing the exposed areas thereof and permitting the adhesive to form interstitial deposits and become impregnated in the fibres to the desired depth in the fabric, beating the fabric to work the flock into intimate anchored relation in the interstitial deposits and into cemented relation with the said adhesively impregnated fibres of the fabric at such a depth that the flock is clamped and compressed in rigid engagement between adjacent closed up fibres of the fabric, and relieving the fabric from its stretched condition whereby such anchored and cemented relation of the flock becomes pronounced and positive on drying of the adhesive.

3. The method of applying flock to the finish face only of a knitted or woven fabric, which comprises, applying a relatively fine liquid adhesive coating to one face of the fabric such that it penetrates partially through the fabric, dispersing the flock on the coated surface, stretching the fabric to spread the fibres thereby in-

creasing the exposed areas thereof and permitting the adhesive to form interstitial deposits and become impregnated in the fibres to the desired depth in the fabric, beating the fabric with the adhesive in its plastic state such that the flock is carried below the surface of the fabric and worked into intimate anchored relation in the interstitial deposits and into cemented relation with the said adhesively impregnated fibres of the fabric at such a depth that the flock is clamped

and compressed in rigid engagement between adjacent closed up fibres of the fabric, and relieving the fabric from its stretched condition after the flock has been worked below the surface thereof with the adhesive in its plastic state whereby such anchored and cemented relation of the flock becomes pronounced and positive on drying of the adhesive.

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