

April 13, 1954

E. E. WALKER ET AL

2,675,337

METHOD OF PRODUCING AN IMPROVED PILE FABRIC

Filed Nov. 2, 1949

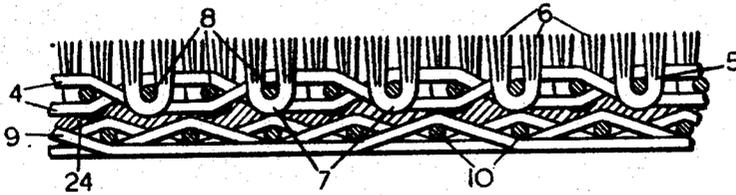


FIG. 1.

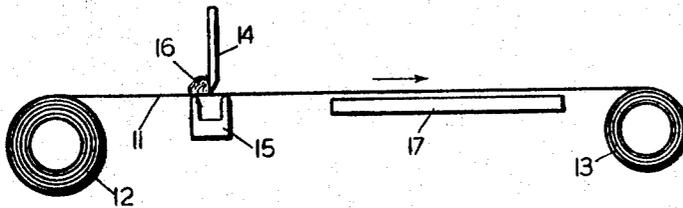


FIG. 2.

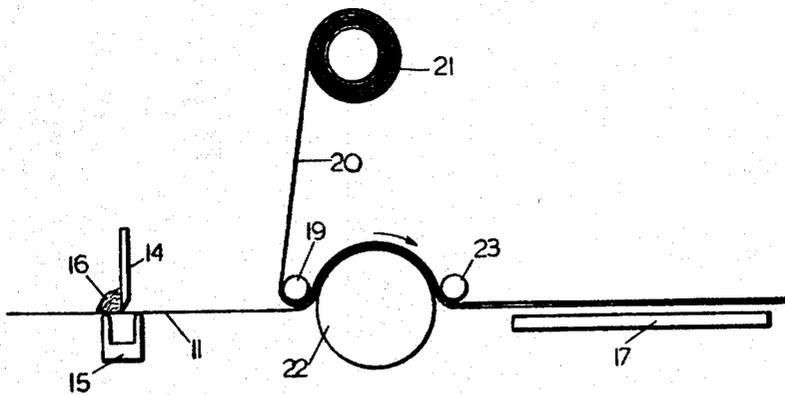


FIG. 3.

E. E. WALKER
R. J. MANN
J. F. LEVARS

Inventors

by
R. Seltzer & C. W. Levinson
Attorneys

UNITED STATES PATENT OFFICE

2,675,337

METHOD OF PRODUCING AN IMPROVED PILE FABRIC

Eric Eaton Walker, Ralph James Mann, and James Frederick Levers, Spondon, near Derby, England, assignors to British Celanese Limited, a company of Great Britain

Application November 2, 1949, Serial No. 124,992

Claims priority, application Great Britain November 16, 1948

6 Claims. (Cl. 154—76)

1

This invention relates to woven fabrics and the like, and particularly to woven pile fabrics.

In pile fabrics the tufts of pile yarn are apt to become loose and be detached from the ground of the fabric, i. e. the woven structure in which the pile tufts are secured and which gives coherence to the pile fabric as a whole. This is especially the case when the pile is a short dense pile of stiff or springy yarn, such as may be forced out of the back of the fabric by pressure arising from the normal handling and use of the fabric and acting on the pile face thereof. It has been found that this fault can sometimes be prevented by spreading, on the back of the pile fabric, a gum or other adhesive material which locks the bights or middle parts of the pile tufts (the two end parts of which form the pile) into the ground of the fabric. This procedure, however, gives an undesirable appearance and texture to the back of the fabric and is unacceptable for many purposes.

According to the present invention an improved pile fabric in which the pile tufts are firmly secured in the fabric and which has other desirable properties is produced by fixing to the back of a woven pile fabric, by means of an adhesive, a layer of a further fabric which secures the bights of the pile tufts in the ground of the woven pile fabric. The pile in the resulting improved pile fabric is not only firmly secured in the fabric and prevented from being forced out of the back of the fabric but is also very resistant to distortion, such as a local flattening or crushing.

The additional fabric secured to the back of the woven pile fabric is preferably a thin woven fabric having a smooth and lustrous or otherwise decorative surface, which is exposed on the back of the composite fabric; thus a light satin fabric is suitable for the purpose. A heavier woven fabric, however, or even a second pile fabric similar to the first, can be employed. Valuable novelty effects can be obtained by the use of an additional fabric contrasting in colour with the pile.

The invention is particularly useful when a fabric having a short and very dense pile is desired, in which case it is necessary to weave the pile fabric by the "peg pile" method of weaving in which the pile tufts form simple V loops each held by a single thread of the ground and not, as in less dense fabrics, W-loops each held by three threads of the ground. In the former case, the pile tufts are particularly liable to be forced out of the back of the fabric. The invention is

2

also of particular advantage when the pile tufts consist of filaments of cellulose acetate or other organic derivative of cellulose, filaments of these materials having a certain liveliness, i. e. a tendency to stiffness and springiness, which also makes it easier for them to be forced out of the back of the fabric.

As the adhesive employed for securing the additional fabric to the back of the pile fabric, it is desirable, in order to avoid undue stiffness in the resulting product, to employ a substance which, when set, is fairly soft and flexible. While such adhesives as dopes containing cellulose acetate or other organic derivatives of cellulose dissolved in volatile solvent can be employed (due regard being had to the nature of the textile materials contained in the fabrics to be united) a softer and more rubbery material is preferred. Thus, there may be employed emulsions of polyvinyl compounds, such as polyvinyl chloride, polyvinyl acetate or a co-polymer thereof, containing a suitable plasticiser. Use may even be made of part of the substance of one or more of the fabrics employed, this part being softened by the application of a suitable solvent liquid before bringing the fabrics together so as to cause them to unite. The solvent liquid may already contain in solution a content of adhesive material, either the same substance as the part of the fabric to be softened or another substance compatible therewith.

By way of example one particular improved pile fabric in accordance with the invention, and the method of making it, will now be described in greater detail with reference to the accompanying drawings in which,

Figure 1 is the diagrammatic warp-wise section of the fabric, showing the construction of its component parts,

Figure 2 is a diagram showing a method of pre-coating the component fabrics, and

Figure 3 is a diagram showing how the component fabrics are united.

The woven pile fabric employed, shown on the upper face in Figure 1, is woven from a ground warp 4 of 2/120s cotton yarns spaced at 27 ends per inch and a pile warp 5 of continuous filament cellulose acetate yarn of 140 denier and 40 filaments, also spaced at 27 ends per inch. The pile is formed by the ends 6 of V-shaped loops the bights 7 of which are secured in the ground warp 4 by means of the ground weft 8, which is a continuous filament cellulose acetate yarn of 140 denier and 26 filaments, woven at 120 picks per inch. The woven pile fabric is secured to a

thin satin fabric, shown with its lustrous face downwards on the underside of Figure 1. This is formed from continuous filament cellulose acetate yarns in both warp and weft, the warp 9 being of 75 denier yarns spaced at 210 ends per inch and the weft 10 of 140 denier yarns spaced at 72 picks per inch. The warp 9 and weft 10 are woven as a 5-shaft satin.

While the usual method of combining two fabrics is to coat them separately with a thermoplastic adhesive, to dry the adhesive, and then to cause the fabric to unite under the action of heat and pressure applied by calendering, this method is not convenient when applied to a pile fabric owing to the possibility of the pile being unduly flattened by the pressure applied. For this reason it is preferred to bring the fabrics together while one or both of them still carries a film of wet adhesive, and to unite the fabrics under a pressure that is applied by drawing them both together under tension round a curved surface. The fabrics may, however, be given a preliminary coating of adhesive which is caused to dry before they are united, in order to prevent penetration through the fabrics of the film of wet adhesive subsequently used in uniting them.

The application of the preliminary coating can be effected in the manner shown in Figure 2, in which a fabric, say the satin fabric 11, is taken from a roll 12 and wound up on a roll 13, being drawn under a doctor blade 14 disposed over a spreading bed 15 which allows the fabric to yield under the doctor blade 14. The adhesive, shown at 16, is thereby spread on the back of the fabric which passes over a drying plate 17, by means of which it is dried before being wound up on the roll 13. The adhesive employed in this instance is an emulsion containing 15 parts by weight of polyvinyl chloride, 18 parts of tricresyl phosphate and 67 parts of methyl ethyl ketone, the doctor blade 14 being adjusted to apply about 30 grammes of adhesive per square yard of fabric, leaving a coating of about 10 grammes per square yard after drying. A like treatment is applied also to the woven pile fabric 20 subsequently to be employed as in Figure 3. Figure 2 is therefore equally illustrative of the method of applying the preliminary coating to the pile fabric 20, the fabric 20 being substituted for the satin fabric 11 shown in Figure 2.

The fabrics are then united in the manner shown in Figure 3. The satin fabric 11 is passed a second time over the spreading bed 15 and under the doctor blade 14 and a coat of approximately 150 grammes per square yard of wet adhesive is applied. The fabric 11 then passes under a small roller 19 where it is brought in contact with the pre-coated pile fabric 20 drawn from a roll 21. The two fabrics pass together under the roller 19, over a large drum 22 and under a second small roller 23 before passing over the drying plate 17. The pre-coated surface of the pile fabric 20 is thus brought into contact with the freshly re-coated surface of the satin fabric 11. Both the fabrics are drawn over the drum 22 under a substantial tension so as to ensure close contact under pressure between the fabrics. During the major part of the time during which the pressure is applied between the fabrics, i. e. while they are both passing round the drum 22, the pile of the fabric 20 is exposed and is not under pressure. The pressure is sufficient to cause the fabrics 11, 20 to adhere to one another and to remain firmly united after the emulsion has been dried by the passage of the fabrics over the dry-

ing plate 17. The drying of the emulsion leaves the adhesive as a layer 24 (Figure 1) between the two component fabrics. The united fabrics are rolled and are ready for use as a composite fabric.

The pile fabrics produced in accordance with the present invention are particularly suitable for use in millinery, for which purpose a certain degree of stiffness is often of considerable advantage. The stiffness of the product can, however, be modified by controlling the thickness of the additional fabric, the amount of adhesive material incorporated, and the proportion of plasticiser in the adhesive. In the use of pile fabrics in millinery, it is often necessary to cut the fabric into ribbons or other suitable shapes and it is desirable that such cutting should be effected without undue fraying at the cut edges. It is a particular advantage of the present invention that the improved pile fabric of the invention, when cut, has very little tendency to fray at the edges. In consequence, the use of hot knives, applied adhesives and like expedients to prevent fraying is unnecessary.

Having described our invention, what we desire to secure by Letters Patent is:

1. A method of producing an improved pile fabric comprising fixing to the back of a woven pile fabric a layer of a further fabric by applying to at least one of said fabrics a layer of wet adhesive and drawing the two fabrics together, with the adhesive layer between them, under tension round a curved surface while said layer is still wet, so as to embed the bights of the pile tufts in said adhesive and to secure said pile tufts in the ground of the woven fabric.

2. A method of producing an improved pile fabric comprising fixing to the back of a woven pile fabric a layer of a further fabric by applying to at least one of said fabrics a layer of wet adhesive comprising cellulose acetate dissolved in a volatile solvent therefor and drawing the two fabrics together, with the adhesive layer between them, under tension round a curved surface while said layer is still wet, so as to embed the bights of the pile tufts in said adhesive and to secure said pile tufts in the ground of the woven fabric.

3. A method of producing an improved pile fabric comprising fixing to the back of a woven pile fabric a layer of a further fabric by applying to at least one of said fabrics a layer of wet adhesive comprising an emulsion of a polyvinyl compound containing a plasticizer, said polyvinyl compound being selected from the group consisting of polyvinyl chloride, polyvinyl acetate and copolymers thereof, and drawing the two fabrics together, with the adhesive layer between them, under tension round a curved surface while said layer is still wet, so as to embed the bights of the pile tufts in said adhesive and to secure said pile tufts in the ground of the woven fabric.

4. A method of producing an improved pile fabric comprising applying a layer of adhesive to the back of a woven pile fabric, applying a further layer of adhesive to a further fabric, drying said layers of adhesive, applying a layer of wet adhesive over the dry layer of adhesive on at least one of said fabrics, and drawing the two fabrics together, with the adhesive layers between them, under tension round a curved surface while said layer of wet adhesive is still wet so as to unite said fabrics by means of the adhesive.

5. A method of producing an improved pile fabric comprising applying a layer of adhesive to the back of a woven pile fabric, applying a further layer of adhesive to a further fabric, drying said layers of adhesive, applying a layer of wet adhe-

5

sive over the dry layer of adhesive on at least one of said fabrics, said wet adhesive comprising cellulose acetate dissolved in a volatile solvent therefor, and drawing the two fabrics together, with the adhesive layers between them, under tension round a curved surface while said layer of wet adhesive is still wet so as to unite said fabrics by means of the adhesive. 5

6. A method of producing an improved pile fabric comprising applying a layer of adhesive to the back of a woven pile fabric, applying a further layer of adhesive to a further fabric, drying said layers of adhesive, applying a layer of wet adhesive over the dry layer of adhesive on at least one of said fabrics, said wet adhesive comprising an emulsion of a polyvinyl compound containing a plasticizer, said polyvinyl compound being selected from the group consisting of polyvinyl chloride, polyvinyl acetate and copolymers thereof, and drawing the two fabrics together, with 10 15 20

6

the adhesive layers between them, under tension round a curved surface while said layer of wet adhesive is still wet so as to unite said fabrics by means of the adhesive.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
810,935	Goldman -----	Jan. 30, 1906
1,918,849	Larson -----	July 18, 1933
2,001,381	Davison -----	May 14, 1935
2,001,527	Davison -----	May 14, 1935
2,055,464	Bowes -----	Sept. 29, 1936
2,317,595	Faris -----	Apr. 27, 1943
2,358,204	Bird -----	Sept. 12, 1944
2,510,563	Dow -----	June 6, 1950
2,512,727	Rice -----	June 27, 1950
2,528,152	Landgraf -----	Oct. 31, 1950