

June 27, 1939.

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2,163,674

TREATMENT OF PILE FABRICS

Filed Jan. 29, 1938

3 Sheets-Sheet 1

FIG. 1

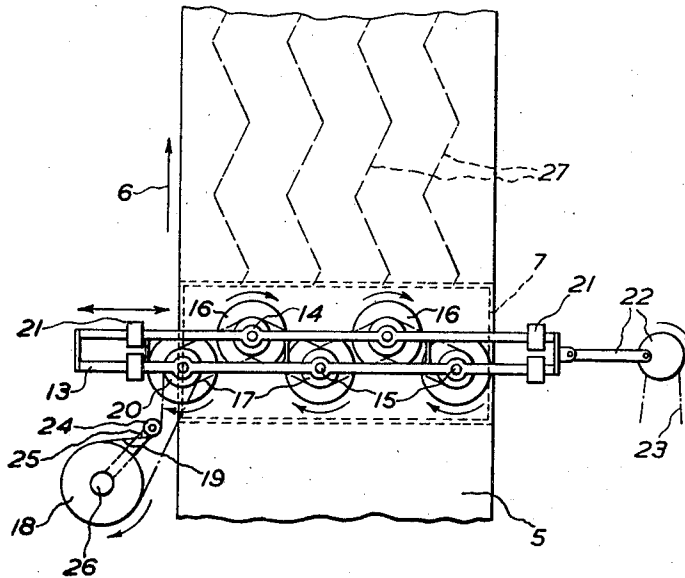
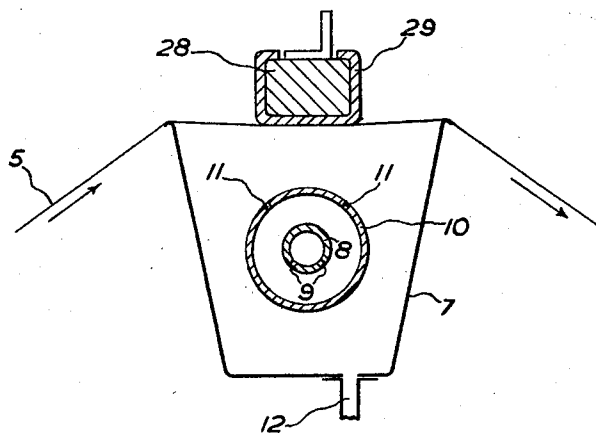


FIG. 2



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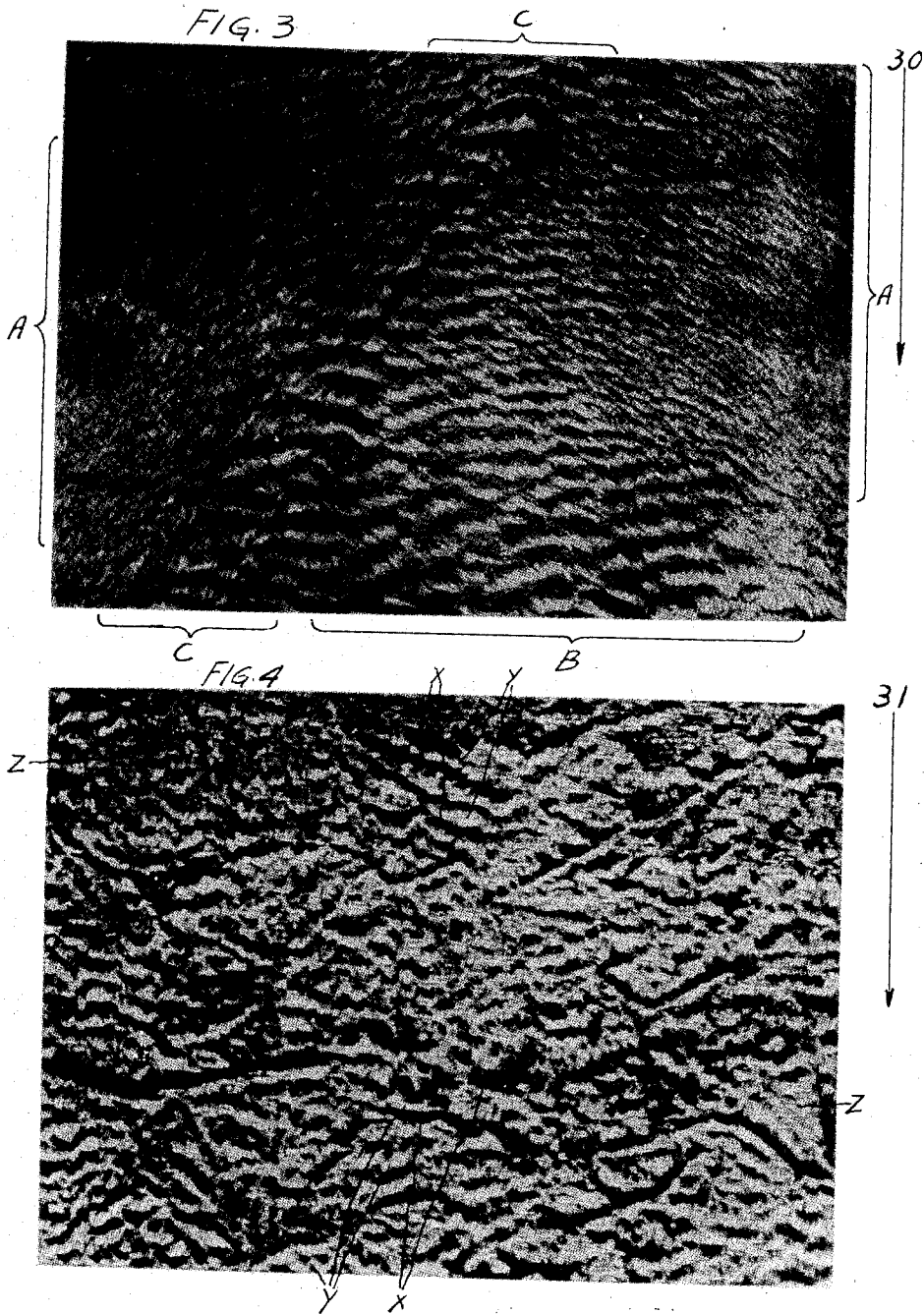
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3 Sheets—Sheet 2



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TREATMENT OF PILE FABRICS

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3 Sheets-Sheet 3

FIG. 5

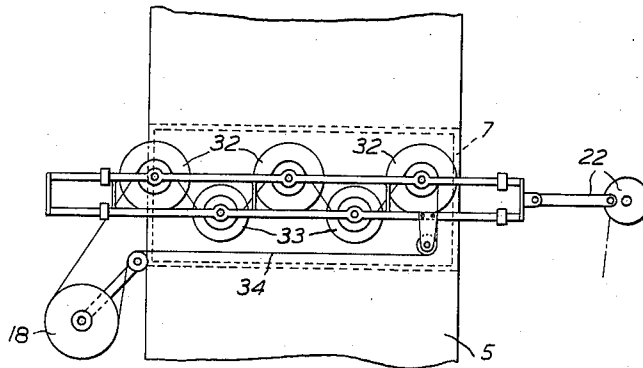


FIG. 6

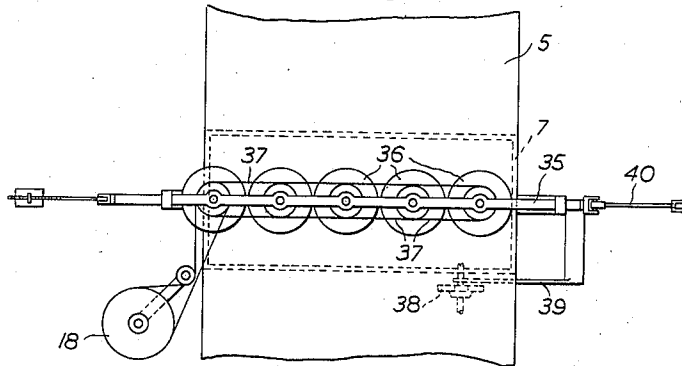
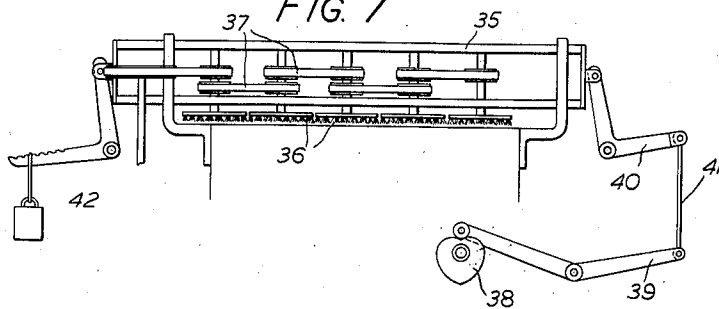


FIG. 7



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TREATMENT OF PILE FABRICS

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In Great Britain February 10, 1937

5 Claims. (Cl. 26—2)

The present invention relates to the production of improved fabric and is concerned more particularly with the treatment of pile fabric of the type which has been creased or brushed or otherwise manipulated or worked to form a design in the pile by causing tufts of filaments or fibres of the pile to point in different directions.

It is an object of the invention to produce novel and desirable pattern effects in pile fabric of the type referred to and thereby to increase the applicability of such fabric for a variety of purposes.

According to the invention the pile of a pile fabric which has been creased or brushed or otherwise manipulated or worked to cause filaments or fibres of the pile to point in different directions is subjected to a padding operation so as to drag parts of the upstanding pile tufts into different directions, the operation being carried out while the pile is under the influence of a setting medium, e. g., a hot aqueous medium. The padding of the pile modifies the creased or brushed design by dragging and disturbing those pile tufts which do not point substantially in the direction of motion of the pad over the fabric, the more transverse tufts being strongly curled and the others more lightly displaced.

Thus in the case of a pile fabric which has been brushed with revolving brushes to cause portions of the pile to point in different directions in a substantially ordered manner, the padding treatment according to the invention smooths or glosses tufts of filaments of the pile which are erect or inclined substantially in the direction of padding and drags and roughens tufts which point in other directions, the tufts which are inclined in the direction opposite to the direction of padding and the more transverse tufts being strongly curled generally in the direction of padding while other tufts are curled to a lesser degree. The substantially ordered character of the initial brushed design is generally maintained and the smooth portions of the pile merge gradually into the rougher curly tufted portions with the result that realistic animal skin effects are produced.

On padding a pile fabric which has been creased or crushed in a random manner to cause adjacent portions of the pile to point in different directions the pile is manipulated in a manner similar to that described above in that tufts of filaments which are initially inclined in the direction of padding are smoothed or glossed while tufts which point in other directions are dragged in the general direction of padding and a slight

curl is imparted to the tufts. Since in the case of a random creased fabric the original design has no semblance of order the padded tufts follow no pre-determined general design but run in random fashion in different directions across the face of the fabric.

By way of example methods of carrying out the invention by which animal skin and other desirable effects are produced on pile fabric will now be described in greater detail with reference to the accompanying diagrammatic drawings and photographs of which:

Fig. 1 is a plan view of a machine for brushing pile fabric;

Fig. 2 is a cross-sectional front elevation of a padding machine described in United States Patent No. 2,035,640;

Figs. 3 and 4 are photographs of pile fabrics exhibiting effects produced according to the invention;

Fig. 5 shows a slight modification of the machine shown in Fig. 1; and

Figs. 6 and 7 are a plan and cross-sectional front elevation, respectively, of a further modification.

Referring to Fig. 1 pile fabric 5 having a pile of cellulose acetate filaments of about 9 mm. in length is drawn with the pile uppermost in the direction indicated by the arrow 6 over the open end of a steam box 7 (one shown in elevation in Fig. 2) from which steam is directed at and through the fabric. The steam is introduced into the box by a conduit 8 which is perforated at 9 and surrounded by a baffle-tube 10 perforated at 11. The baffle-tube 10 prevents any drops of moisture suspended in the steam from being blown at the fabric, and, being open at its ends, allows trapped moisture to escape to the drain 12.

Disposed over the fabric, above the open end of the box 7, is a frame 13 formed with bearings 14 which rotatably support two rows of spindles 15, (5, in all, shown). Each spindle 15 has secured to its lower end a flat circular brush 16 which contacts with the pile of the fabric, the spindles being interconnected by chain and sprocket gearing 17 and driven from a sprocket 18 through a chain 19 which engages a sprocket 20 formed on one of the spindles. The chain and sprocket gearing 17 is arranged in a manner such that the brushes 16 of the two rows are rotated in opposite directions, as indicated by the arrows.

The frame 13 is slidably mounted in bearings 21 and is reciprocated by crank and eccentric mechanism 22 which is driven by a chain 23. In

order to permit the reciprocation of the frame 13 while still maintaining the drive to the spindles 15 and brushes 16, the effective length of the chain 19 is varied in accordance with the position of the frame, by a compensating pulley 24 mounted on an arm 25 which is pivoted at 26 and spring urged to rotate in the clockwise direction so as to take up and pay out the chain at the appropriate intervals, in the manner apparent from Fig. 1.

As the pile fabric 5 passes over the steam box 7 the steam is forced upwardly through the pile which is engaged by the revolving brushes 16 and thereby caused to assume an ordered displacement, the steam setting the pile tufts in their displaced positions.

Thus, the pile tufts situated in the area of the fabric treated by each brush are caused to assume different positions, the tufts near the edge of a brush being more disturbed than the tufts near the middle of the brush by reason of the increased angular velocity of the edge of the brush. The rotary movement of each brush, moreover, causes tufts lying to one side of a warpwise line drawn through the axis of the brush to incline in one general direction, and tufts lying to the other side of the line to incline in the opposite direction, there being a gradual merging of the inclination of the tufts into the same direction between the two extremes.

The reciprocation across the fabric of the brushes 16 by the eccentric mechanism 22, combined with the forward movement of the fabric in the direction 6, causes the areas treated by the several brushes to follow zigzag paths, the bounds of which are indicated by the dotted lines 27. The tuft-patterns of the separate areas (i. e., between the lines 27) have a generally similar appearance. By reason of the opposite directions of rotation of adjacent brushes 16 the pile tufts lying near to and on opposite sides of the lines 27 incline towards each other, and at the point at which they meet (i. e., on or near the lines 27) a series of rough tuft-ridges are formed.

After brushing, the fabric 5 is subjected to a steam padding operation in the apparatus illustrated in Fig. 2, the fabric being drawn over the open end of a steam box 7 functioning in the manner described above. Instead of being brushed, however, as in Fig. 1, the portion of the fabric to which the steam is applied is glossed or padded by a padding bar 28, covered with fabric 29 and arranged so as to bear down on the fabric, as indicated in Figure 2.

The padding of the brushed fabric smooths or glosses the pile tufts which are erect or inclined substantially in the direction of padding and drags and roughens tufts which point in other directions, the tufts which are inclined in the direction opposite to the direction of padding, and the more transverse tufts, being strongly curled in the direction of padding, while other tufts are curled to a less degree, depending on the distance between their tips and the face of the fabric. The substantially ordered character of the initial brushed design is generally maintained, and the smooth portions of the pile merge gradually into the rougher curly tufted portions with the result that a realistic animal skin effect is produced.

This effect is illustrated in Fig. 3. In the figure the pile tufts comprising the portions of the fabric near the brackets A were inclined substantially in the direction of padding (indicated by the arrow 30) on leaving the brushing apparatus of Fig. 1, and on being passed under the padding

bar 28 have been smoothed or glossed into the flattened position apparent from the figure.

The pile tufts comprising the portion of the fabric near the bracket B, on the other hand, were inclined somewhat transversely on leaving the brushing apparatus, and on being padded have been caused to assume a characteristic animal curl which becomes gradually more pronounced towards the area which extends obliquely across the fabric between the brackets C, the latter area comprising pile tufts which were inclined in the direction opposite to the direction of padding after the fabric had been brushed, and consequently the attempt of the padding bar 28 to reverse the inclination of these tufts of pile has given the fabric a rougher appearance and a stronger curl than the remaining tufts.

The steam passing through the fabric from the box 7 sets the tufts in their glossed or curled positions and renders them very resistant to subsequent displacement when the fabric is in use. After the padding operation the fabric 5 is dried, preferably naturally, e. g., by being hung in loops or festoons in a warm room. The fabric may be stretched to width to complete the finishing operation.

Different effects may be obtained by varying the brushing and/or the padding operation. Thus the rate of rotation of one or more of the brushes 16 may be varied in order to produce more or less distinct effects on the fabric, or the direction of rotation of one or more of the brushes may be changed by suitably adapting the chain and sprocket gearing 17. For example, all the brushes may be caused to rotate in the same direction, or one pair of brushes may be caused to rotate in the direction opposite to that of an adjacent pair. The size of the brushes may be varied, e. g., brushes of large diameter may alternate across the width of the fabric with brushes of smaller diameter. Simpler effects may be obtained by employing one row of brushes only, the brushes being of the same or different diameter.

Fig. 5 shows larger brushes 32 alternating with smaller brushes 33 driven by a single belt 34 so as to rotate in opposite directions, as indicated by the arrows.

Figs. 6 and 7 show a frame 35 carrying a single row of brushes 36, driven by belts 37, so as to rotate in the same direction as indicated by the arrows, but instead of the reciprocation of the frame being effected by crank mechanism as in Figs. 1 and 5, a cam 38 is used, operating on the frame through levers 39, 40 and link 41, together with a counter-weighted lever 42 to provide the return motion. The manner in which the frame 35 reciprocates depends, of course, on the profile of the cam 38. If the crank mechanism 22 or the cam 38 is not rotated, the brush-carrying frame does not reciprocate, and straight warpwise stripe effects are produced on the fabric.

The pressure of the brushes 16 on the fabric 5 may also be varied in order to create more or less distinct effects on the fabric. Thus the frame 13 may be mounted for adjustment towards and away from the fabric in order to cause the brushes to contact with the fabric with a greater or less degree of pressure. The movement of the frame 13 towards or away from the fabric may be effected by manual or automatic means, and may take place during the brushing operation to obtain effects of varying depth at regular or irregular intervals along the fabric.

Where it may be desired to obtain a pile fabric having the effects according to the invention

alternating with plain untreated pile the frame 13 may be lifted so as to bring the brushes 16 out of contact with the pile at intervals. The brushes may then be caused to re-engage the pile in the same positions across the width of the fabric or may be caused to move across the fabric before re-engagement with the pile takes place.

The various effects referred to above are enhanced and brought into greater prominence by the padding treatment according to the invention. The padding bar 28 may be caused to contact with the fabric with a greater or less degree of pressure in accordance with the effects desired, greater pressure of the bar creating more pronounced effects and vice versa.

An improved and unique crushed pile effect may be produced in crushed pile fabrics treated according to the invention. Thus on padding a pile fabric which has been creased or crushed in a random manner to cause adjacent portions of the pile to point in different directions the pile is manipulated in a manner similar to that described above in that tufts of filaments which are initially inclined in the direction of padding are smoothed or glossed while tufts which point in other directions are dragged in the general direction of padding, and a slight curl is imparted to the tufts. Since in this case the original crushed design has no semblance of order, the padded tufts follow no predetermined general design but run in random fashion in different directions across the face of the fabric.

The degree of inclination of the padded pile tufts may be such that parts of the foundation fabric are exposed through the pile, this exposure being emphasized by the dragging effected by the padding bar 28, and when the foundation fabric and the pile filaments are dyed in different colours pleasing contrasting effects may be obtained by such exposure.

After padding by the bar 28 the fabric is dried, preferably naturally, as described above. If it is found that the padding and subsequent drying of the pile has left the pile in a somewhat hard condition the pile may be softened by being passed in contact with a quickly rotating card cylinder, in the presence of steam, in such a manner that the card clothing whips or brushes the pile. The fabric may then be stretched to width to complete the operation.

A crushed pile fabric treated in the manner described above is illustrated in Fig. 4, the photograph illustrating the random crease marks in the pile and showing the curling over and flattening X of the pile effected by the padding bar 28 in the vicinity of the creases. In the vicinity of the flattened portions X, the base fabric is exposed at Y. In parts Z where the fabric was less prominently creased, the pile is laid substantially in the direction 31, giving a smoother appearance and largely covering the base fabric.

The invention is applicable to the treatment of pile fabrics generally which have been creased, brushed or worked to induce designs in the pile. Examples of such fabrics are plush, warp pile velvet, ring velvet or weft pile velvet, whether the pile consists of cotton, wool, mohair, alpaca, silk, artificial silk or of any other material and whatever the nature of the ground by which such pile is backed. The invention is, however, particularly applicable to fabrics having a pile of artificial silk. The invention is especially productive of very good results when applied to fabrics having a pile containing organic derivatives of cellulose, such as cellulose esters,

e. g. cellulose acetate, formate, propionate or butyrate, or cellulose ethers, e. g., ethyl, methyl or benzyl cellulose, either alone or mixed with filaments or fibres of other materials.

The patterns and effects according to the invention may appear on the fabric either alone or in combination with other patterns which may be impressed or otherwise formed on the fabric prior to or subsequent to any of the treatments described above. Additional raised pattern effects may be superimposed on the effects described above by carding localised areas of the pile, preferably in the presence of steam. Thus the patterned fabrics may be passed through the machine described in United States Patent No. 2,035,641, in which a rotating card cylinder bears against the pile while steam is passed through the portion of the fabric being treated, and a stencil of predetermined pattern is interposed between the cylinder and the pile in order to localise the carded portions of the pile.

The pile fabric treated according to the invention is preferably dyed before being subjected to creasing, brushing, or other manipulation. With a fabric comprising a foundation fabric of one material, e. g. cotton or silk, and a pile of a material having a different dyeing property, e. g., cellulose acetate, attractive cross-dyed effects may be obtained by dyeing the two materials in different colours. Such dyeing is especially advantageous when parts of the foundation fabric are exposed to view through the pile as may be the case in the random crushed fabrics described above. Again, the pile may be dyed in one colour and the foundation in a contrasting colour to give a shot or shadow effect in the fabric.

Patterns may be printed on the pile of the fabric to produce any desired effect and if the pile is printed before the fabric is treated in the manners described above, the treatment may be effected in accordance with the pattern printed on the pile. Thus, where animal skin effects are to be obtained in the pile of a fabric the pile may be printed with stripes or other distinctive animal markings and the subsequent treatment of the fabric may be effected in such a manner as to co-operate with the markings to produce the desired animal skin effect.

Having described my invention what I desire to secure by Letters Patent is:

1. Process for the production of improved pile fabric, comprising subjecting to the action of a setting medium the pile of a pile fabric, manipulating the filaments or fibers of the pile while under the action of said setting medium so as to cause them to point in different directions, allowing said pile to set in said different directions, and subsequently again subjecting said pile to the action of a setting medium and, while the pile is under the influence of said setting medium, subjecting the fabric to a padding operation so as to impart a curl to the filaments or fibers of the pile lying in a direction other than that of the motion of the padding operation.

2. Process for the production of improved pile fabric, comprising subjecting to the setting action of a hot aqueous medium the pile of a pile fabric, manipulating the filaments or fibers of the pile while under the action of said setting medium so as to cause them to point in different directions, allowing said pile to set in said different directions, and subsequently again subjecting said pile to the setting action of a hot aqueous medium and, while the pile is under the

influence of said setting medium, subjecting the fabric to a padding operation so as to impart a curl to the filaments or fibers of the pile lying in a direction other than that of the motion of the padding operation.

5 3. Process for the production of improved pile fabric, comprising subjecting to the setting action of steam the pile of a pile fabric, manipulating the filaments or fibers of the pile while
10 under the action of said steam so as to cause them to point in different directions, allowing said pile to set in said different directions, and subsequently again subjecting said pile to the setting action of steam and, while the pile is
15 under the influence of said steam, subjecting the fabric to a padding operation so as to impart a curl to the filaments or fibers of the pile lying in a direction other than that of the motion of the padding operation.

20 4. Process for the production of improved pile fabric, comprising filaments or fibers of an organic derivative of cellulose, comprising subjecting to the action of a setting medium the pile of a pile fabric, manipulating the filaments or
25 fibers of the pile while under the action of said setting medium so as to cause them to point in

different directions, allowing said pile to set in said different directions, and subsequently again subjecting said pile to the action of a setting medium and, while the pile is under the influence of said setting medium, subjecting the fabric to a padding operation so as to impart a curl to the
5 filaments or fibers of the pile lying in a direction other than that of the motion of the padding operation.

10 5. Process for the production of improved pile fabric, comprising cellulose acetate, comprising subjecting to the action of a setting medium the pile of a pile fabric, manipulating the filaments or fibers of the pile while under the action of
15 said setting medium so as to cause them to point in different directions, allowing said pile to set in said different directions, and subsequently again subjecting said pile to the action of a setting medium and, while the pile is under the influence of said setting medium, subjecting the
20 fabric to a padding operation so as to impart a curl to the filaments or fibers of the pile lying in a direction other than that of the motion of the padding operation.

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