

March 23, 1965

H. MAUERSBERGER

3,174,308

PLUSH FABRIC

Filed March 28, 1957

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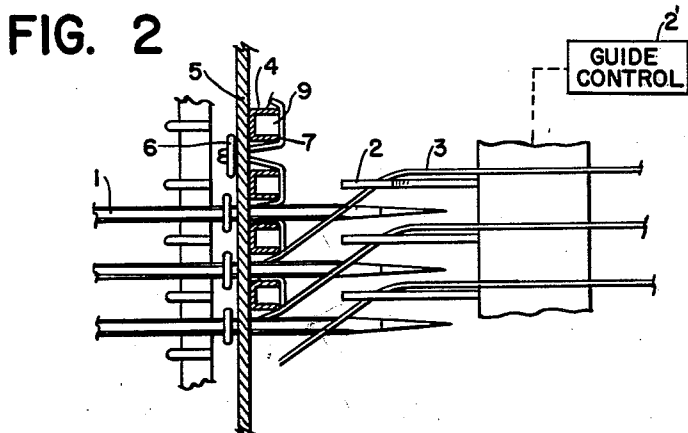
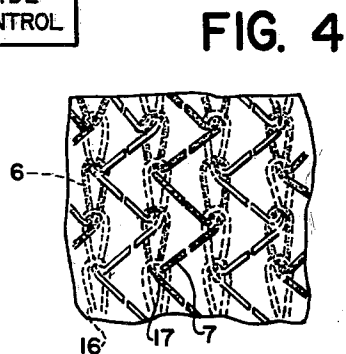
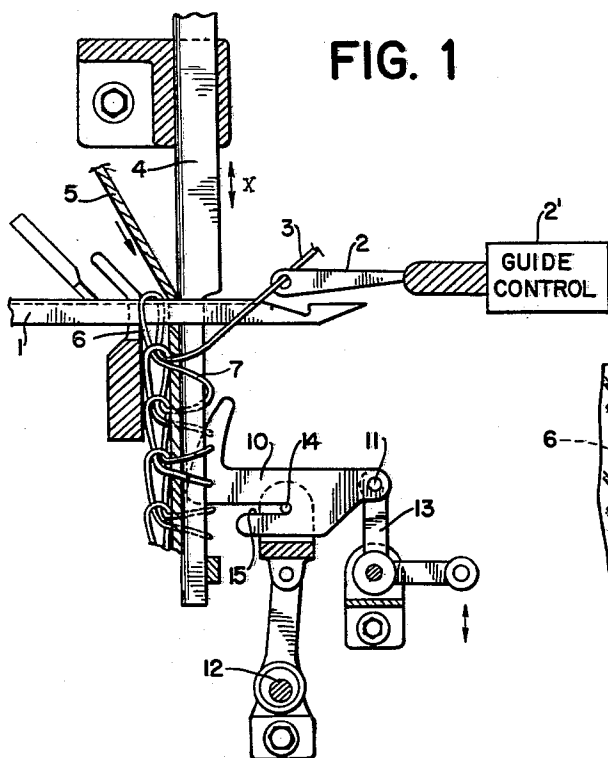


FIG. 3



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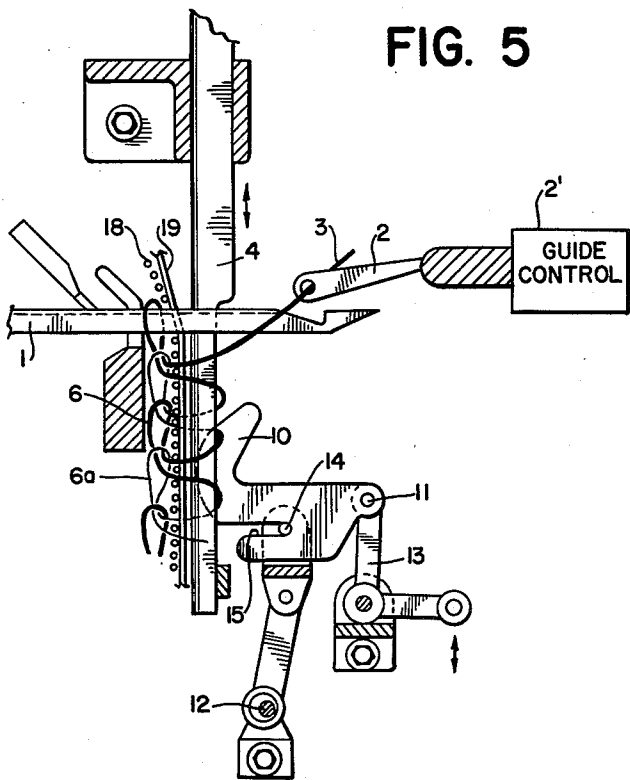
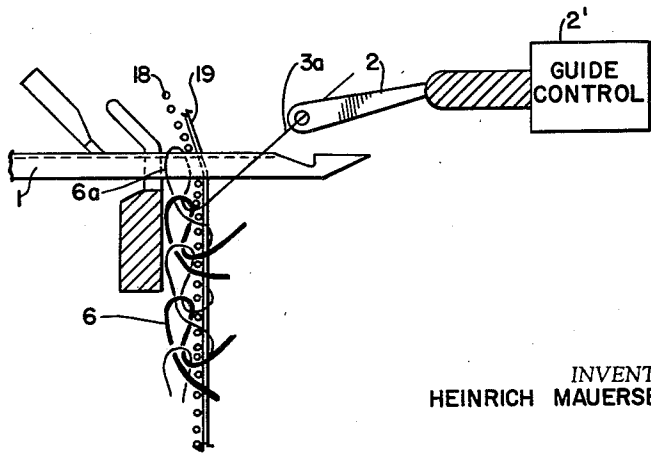


FIG. 6



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FIG. 7

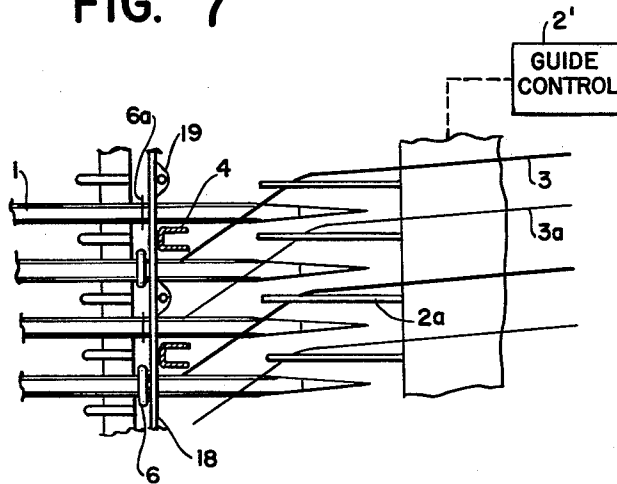


FIG. 8

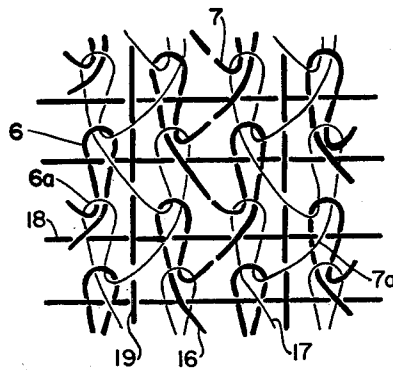
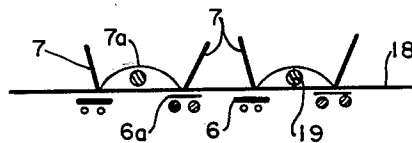


FIG. 9



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PLUSH FABRIC

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This invention relates to plush or pile fabrics.

An object of the invention is to provide an improved pile fabric, the pile threads of which are integrated into the foundation in such a manner as not to influence the design of the fabric.

A further object of the invention is to provide an improved pile fabric wherein pile threads or loops are incorporated into the fabric without materially increasing the thickness of the fabric.

Another object of the invention is to provide a pile fabric wherein the pile is provided with an economical consumption of pile thread material.

To achieve its various objectives, the invention contemplates the incorporation of pile threads and loops into the foundation by interlacing the pile elements in the manner of chain stitching. In known fabrics of this type, two loops are normally utilized at each pile position with one of the loops constituting the pile loop itself and being interlaced through the other loop. Both of these loops are at least in part on the pile side of the fabric and not only influence the design of the fabric but further substantially increase its thickness. Moreover, the consumption of pile material in forming the pile is inordinately high.

In accordance with the invention, a pile fabric is provided in which the pile thread is drawn in loops through the foundation from the pile or front side of the foundation to the back or reverse side. Each loop is extended from its position in the foundation along the reverse side thereof to a position whereat it engages another pile loop and, thus, the pile loops themselves are mutually engaged on the reverse side of the fabric so as not to be able to influence the design of the fabric. Moreover, in using the pile loops themselves as anchoring loops, the need is avoided of using separate anchoring loops and a more efficient use can be made of the pile material. Additionally, by avoiding the requirement for two separate loops at each position, the thickness of the fabric is not substantially altered.

A further object of the invention is to provide for the fabrication of a pile fabric foundation simultaneously with the formation of the pile itself. This avoids the need for preparing pile fabrics in two separate operations. Moreover, it avoids the possible deformation of foundation materials which are prepared in advance and then subjected to pile forming operations.

In forming the foundation simultaneously with the pile, the foundation is formed by separate rows of foundation yarn or thread which are integrated into the fabric while the pile loops are being mutually engaged as has been briefly described above. The resultant product is much more economically produced than heretofore achieved.

Other objects and advantages of the invention will be apparent from the following description and accompanying drawing in which:

FIGURE 1 illustrates, in side view, a device which in accordance with the invention inserts pile loops into a fabric foundation and causes the loops to be mutually engaged along the reverse side of the foundation;

FIGURE 2 is a top view of the apparatus shown in FIG. 1;

FIGURE 3 is a view of an element of the apparatus of FIGS. 1 and 2 with which the extension of the pile loops along the reverse side of the fabric is enabled;

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FIGURE 4 is a top view of a portion of the completed inventive fabric in which view the hidden mutually engaged loops are shown in dotted lines;

FIGURE 5 is a view similar to that of FIG. 1 in which, however, provision is made for the simultaneous formation of the foundation while the pile is being formed;

FIGURE 6 illustrates the apparatus of FIG. 5 at a subsequent phase of the process;

FIGURE 7 is a top view of the apparatus shown in FIG. 5; and

FIGURES 8 and 9 are, respectively, top and cross-sectional views of an alternative embodiment of the inventive pile fabric, produced by the mechanism illustrated in FIGS. 5-7.

As shown in the drawing, a machine for producing a pile fabric or similar article in accordance with the invention includes a row of sliders or longitudinally oscillating needles 1 with which are associated eye guides 2 which are ordinary arms having openings to guide pile threads 3. Between the slider needles 1 and perpendicularly thereto are lifters 4. Needle actuators, not shown, provide simultaneous oscillatory motion to all the needles. Such actuators are well known and are described in my Patent No. 2,890,579 of June 16, 1959, entitled "Textile Material and Manufacture."

Needles 1 pass through the foundation 5 and the eye guides 2 are positioned substantially opposite the needles 1 to engage the pile threads 3 thereupon on the pile or front side of the foundation. With the pile threads engaged in the hooked portions of needles 1, the latter are withdrawn through the foundation 5 so that the pile threads are drawn in loops to the back side of the foundation 5.

Loops or stitches 6 of the preceding stitch are suspended on needles 1, and pile threads 3 are drawn there-through and thus interlaced therewith. The eye guides 2 are moved laterally up and down in FIG. 2, that is, they reciprocally move the threads so they can be alternately hooked and drawn by different adjacent needles 1. They perform, for example, a simple knitting or tricot-type operation with the result that the pile threads 3 span the lifters 4. This operation extends the threads so that they form pile loops.

Guide actuators or control 2' are connected to guides 2 for movement thereof. The operation of such guide actuator for purposes of performing a simple knitting or tricot-type operation is well known and more particularly described in my Patent No. 2,890,579.

Whereas, heretofore, the individual threads 3 were stitched into the foundation 5 independently of each other, the invention contemplates that different adjacent pile threads 3 be alternately and mutually interlaced. The resulting back stitches or loops 6 are, therefore, portions of the pile loops.

The guide actuators 2' are also effective to alternate the guides between alternate adjacent rows of needles between each knitting cycle. Such alternate or reciprocating motion is accomplished in known manner by a suitable cam which superposes the alternating motion upon the knitting motion.

The base fabric 5 is advanced between stitches in the usual manner which is more particularly described in my Patent No. 2,890,579. The combination of the alternating guide motion and the advancing motion of the base fabric provides the required diagonal motion for interlacing the alternate adjacent pile loop. The advancing motion of the base fabric further serves to extend the pile loops behind the base fabric.

Lifters 4 are designed to include several steps and are adjustable longitudinally, individually or in groups, so that pile loops having different lengths can be produced. This arrangement may be controlled by known devices.

The thus produced fabric has closed pile loops which, however, may be cut open. For this purpose, knives 8 (see FIG. 3) are provided at the fabric take-off end of lifters 4. For this purpose, the lifters 4 are provided on the side facing the eye needles with a projection defining a groove 9 (FIGS. 2 and 3). The meshes or floats 7 are thus kept open for the operation of knives 8. If, on the other hand, a rug or similar article is to be produced with uncut pile loops, lifters 4 may have solid cross sections.

As more particularly seen with reference to FIG. 1, each lifter 4 is provided with a swingably mounted blade 10 supported at a pivot or bearing support 11. These blades 10 extend into channels 9 of lifters 4 and are moved in the manner of a pendulum in the direction of arrow x (up and down in FIG. 1) by means of a reciprocating arm moved by an eccentric or crankshaft drive 12 which in turn moves blades 10 by means of member 14 which slides in slot 15. For a change from cut to uncut pile loops, the blades 10 can be withdrawn to an inoperative position. For this purpose, bearings 11 are mounted on a pivoted lever 13 through the manipulation of which blades 10 are brought out of range of their respective lifters 4 by movement to the right of supports 11 in FIG. 1. The engagement member 14 of the crankshaft or eccentric drive 12 is accommodated in this case by a slot 15 on blade 10. The blades 10 may be withdrawn to their inoperative positions individually or in groups.

In FIG. 4 is shown a portion of the first embodiment of a pile fabric produced in accordance with the invention. The loops or stitches 6 of individual warp chains extend along the reverse or back side of the foundation in parallel wales or rows aligned with the needles 1. On the pile or front side of the foundation, however, the pile threads 7 extend diagonally between subsequent courses at pile positions 16 and 17, these threads being severed if cut loop piles are desired. The loops (whole or cut) constitute on the pile side of the foundation the pile of the fabric whereas, on the reverse side of the foundation, the loops are mutually engaged in chain stitch fashion to lock in the pile threads.

The machine embodiment illustrated in FIGS. 5-7 is also provided with slider needles 1 and associated eye guides 2 and, further, with eye guides 2a identical with guides 2, for seam threads 3a. Eye guides 2 and 2a perform the previously described movements. Hence, each eye guide 2 and 2a alternately sets the thread on two adjoining slider needles 1 so that alternately a pile thread mesh 6 and, thereafter, a seam thread mesh or stitch 6a is formed in each row from the adjacent threads 3 and 3a. The machine also includes lifters 4. The seam threads are intended to lie flat on the surface of the foundation on its pile side and not be cut. In accordance with the disclosure of the aforementioned earlier Patent 2,890,579, and applicant's other Patent 3,030,786, based on a divisional application of the former, the respective pile and seam threads may be made from different materials. As shown in FIGS. 5-9 of the present application, the seam thread, forming stitches 6a, is thinner than the pile thread, forming stitches 6, resulting in further economy in production.

As described above, the function of the lifters 4 is to form pile loops 7 by providing spacing between the foundation 5 and the apex of loops 7. Consequently, no lifters are disposed between the slider needles 1 on which the seam threads 3a are set as the seam threads are intended to lie flat on the pile side of the foundation. Therefore, lifter meshes or floats 7a of the seam thread lie flat.

In review, lifters 4 are provided with a channel 9 (FIG. 7). The latter serves to accommodate the cutting edge of a blade 10 pivoted at pivot 11 and driven by means of an eccentric or crankshaft drive 12. Pivot 11 of blade 10 is mounted on a knee lever 13 which is pivotally secured to the frame.

As distinguished from the structure of FIGS. 1-3, in this case, the foundation of the second fabric embodiment is not a finished foundation into which pile threads 3 are drawn. The foundation, rather, consists of more or less randomly crossing, loose, independent threads or fibers 18 and 19 respectively running transversely and longitudinally with respect to the worked piece. The warp-wise oriented threads 19 are floatingly adjacent, in front, to the weft-wise oriented threads 18 and both are fed to the operating stations by means of any known device such as shown, for example, in applicant's aforementioned Patents 2,890,579 and 3,030,786. Threads 19, running parallel to the longitudinal direction of the article, are fed between every two slider needles 1 with which seam threads 3a are engaged (see FIG. 7).

With the described means the foundation of the worked piece is formed at the same time as pile threads 3 are drawn into it. Seam threads 3a, which lie flat on and across the foundation threads 18 and 19, have the function of integrating the foundation (consisting of threads 18 and 19) into a uniform product. The threads 3a and the loops on the back serve to hold threads 18 and 19. In the finished article, each pile thread 3 extends (see FIGS. 8 and 9) over threads 16 and 17. This, of course, also applies to the seam threads 3a. As a consequence, both in the transverse (weft-wise) and longitudinal (warp-wise) directions of the worked piece, on the back side of the foundation thereof is alternately located a pile thread mesh 6 and a seam thread mesh or stitch 6a. On the other hand, on the pile side of the article, lifter meshes or floats 7a of seam threads 3a alternate with the lifter meshes of pile threads 3 forming the pile loops 7 (see FIG. 8). Further, lifter meshes 7a of seam threads 3a couple threads 19 with threads 18.

By way of variation, threads 19, running parallel to the longitudinal direction of the article, may be omitted. It is furthermore possible to feed to the stitch-forming positions a plurality of groups of threads 18.

In fact, there will now be obvious to those skilled in the art many modifications and variations of the inventive plush fabric set forth which do not depart essentially from the spirit of the invention as defined by the following claims:

What is claimed is:

1. A single plush fabric comprising a foundation having front and back sides and including a plurality of randomly crossing, mainly weft-wise oriented loose threads as well as some warp-wise oriented loose threads floatingly adjacent to said weft-wise threads, and a tricot layer interlaced with said foundation, said layer including in each wale a single warp chain consisting of first and adjacent second warp threads forming a plurality of interlocked stitches on said back side, said second warp thread being from a thinner material than that of said first warp thread, and a plurality of floats running on said front side diagonally with respect to said stitches, first stitches formed by said first warp thread alternating on said back side, in both wale and course directions, with second stitches formed by said second warp thread, first floats formed by said first warp thread alternating on said front side, in said course direction, and between consecutive pairs of wales, with second floats formed by said second warp thread, the consecutive floats having, in said wale direction, two substantially perpendicular, alternating directions, said first floats constituting pile loops which form an uncut pile, said second floats of said thinner warp thread being adjacent said front side of the foundation, said warp-wise oriented threads being solely intermediate said weft-wise oriented threads and said second floats.

2. A single plush fabric according to claim 1, wherein the number of said warp-wise oriented threads is substantially the same as that of said second warp threads.

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