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METHOD OF KNITTING A TWO FACED PILE FABRIC

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2 Sheets-Sheet 1

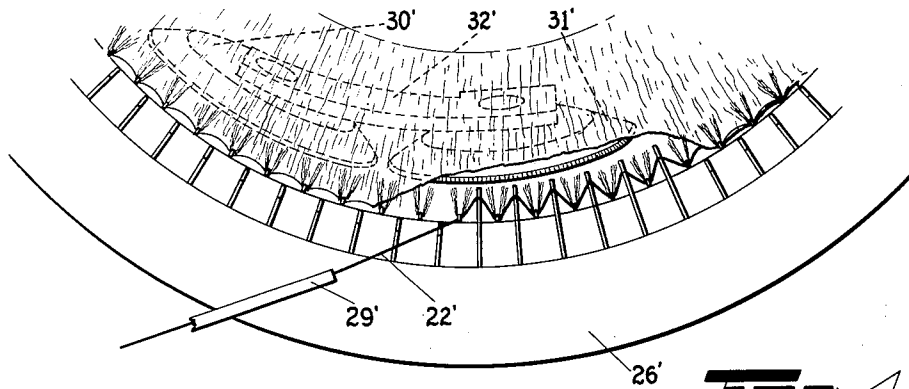


Fig. 4

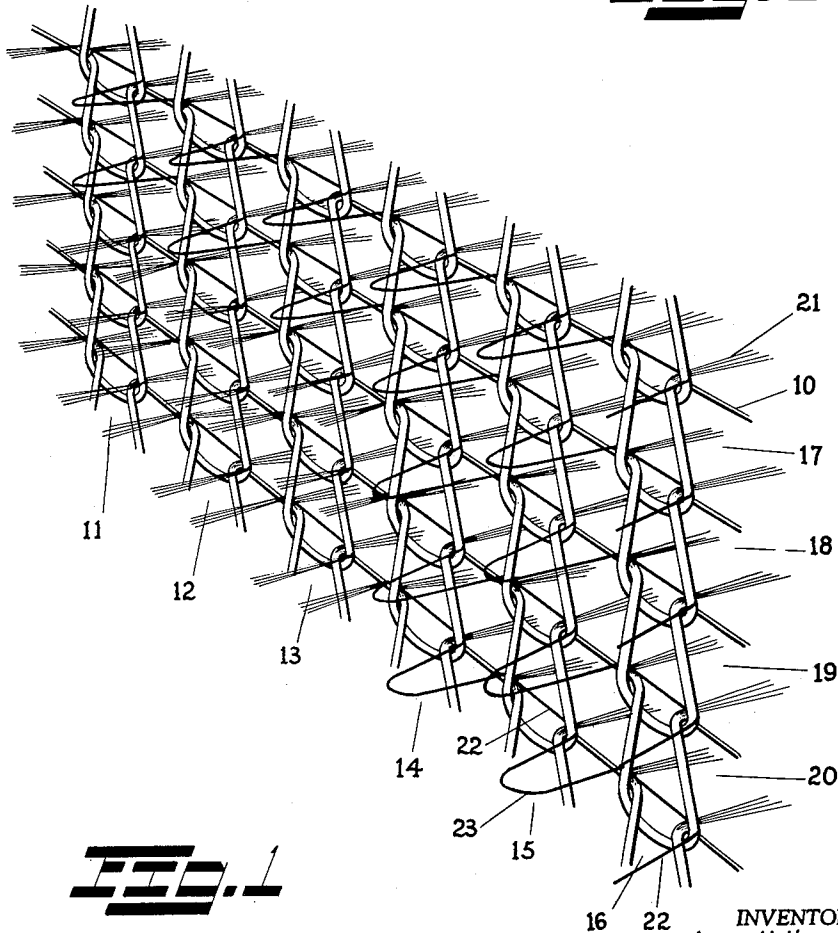


Fig. 1

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METHOD OF KNITTING A TWO FACED PILE FABRIC

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This invention relates to a novel knitted fabric having pile at both faces and to a method of forming such fabrics.

It is a general object of the invention to knit a fabric of the type having pile in such manner that the pile shall appear at the face of a jersey fabric and preferably, at both sides thereof.

A further object is that of knitting such fabrics with very dense pile of considerable length if desired, and of controlling these characteristics so that any reasonable "cover" may be effected.

A further object is that of forming these fabrics in such a way that the length of pile and density may be independently controlled at each face of the fabric.

It is another object of the invention to produce a two face pile fabric in which the pile at one side may be comprised as independent tufts of fibers held at the stitches of the base fabric and the pile at the opposite side appears as terry loops.

A further object is that of forming such fabrics in more or less conventional, open top, independent needle knitting machines by the addition of a silver feeding means and of other simple but novel means hereinafter described.

Other objects will become apparent from the following detailed disclosure.

Knitted pile fabrics having pile at one side are very commonly produced and by modern techniques these may be knitted in several ways. However, it has long been desired to form pile at both sides of these fabrics and while several attempts have been made to accomplish that, virtually no success at all has been forthcoming so that such fabrics are still not commercially available.

According to the instant invention, a fabric may be produced which will have pile at one face formed by that system now utilized in machines manufactured and sold by the Wildman Jacquard Co., of Norristown, Pennsylvania, and frequently referred to as "Hi-Pile" fabric machines. An example of such a machine is to be found in French Patent 527,671. Pile so knitted will naturally come to the inside of the fabric tube as knitted, that is, the back of the jersey fabric which constitutes the base for such pile. To obtain pile at the other face, the front, an entirely novel and most effective means is employed which first involves raising the fabric from its normal level and, of course, the needles along with it, then sinking loops of a continuously fed pile yarn from the outside and below the needle latches, assuming latch needles to be employed. This latter step is then followed by drawing down the needles which at the same time pulls the fabric down trapping the sunk pile yarn with the outwardly directed loops about the needle shanks being cast off over the needle latches and hooks while the bights of yarn or terry loops sunk inwardly and beneath the fabric remain there to be locked in place at a next following feed at which a base yarn is knitted preferably having individual tufts of fibers drawn along with it. These terry loops may be left in their looped form or may be cut or sheared and both faces of the fabric finished by napping, brushing, liquid treatment or in other ways which may be relied upon for producing the surface texture and appearance required.

The invention will be described in greater detail by reference to a preferred form and modifications thereof

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as illustrated in the accompanying figures of drawing, wherein:

FIG. 1 is a perspective view showing the fabric structure with loops more open than would normally be the case and to a greatly enlarged scale.

FIG. 2 is a perspective view of part of a knitting machine showing one method and mechanism by which the fabric may be produced.

FIG. 3 is a plan view of the mechanism of FIG. 2.

FIG. 4 is a plan view of a modified form the mechanism may take.

Referring to FIG. 1, a section of fabric is shown in which a maximum of pile is incorporated, at least, insofar as the possibilities of number of tufts and loops is concerned. A base yarn 10 is knitted in wales 11, 12, 13, 14, 15, 16, etc., of courses 17, 18, 19, 20, etc., and preferably constitutes a fairly tightly knitted jersey fabric. The needles which form stitches of this base fabric take tufts of fibers from a doffer brush or from any other source and draw these tufts 21 as described in the French patent, and in a manner well known to those skilled in the art. These tufts may be of any convenient length and may comprise more or less material according to the cover desired and the length of pile wanted.

The base fabric and the tufts may be considered as drawn at a single feed and a machine may have one or more such feeding stations according to its size and requirements. At a point following such a station or between stations, a yarn which will be termed a "pile yarn" in that its purpose is that of providing for pile only, is introduced. This yarn denoted by numeral 22 is incorporated in a manner to be set forth in detail and by means of which a pile loop 23 projects outwardly between adjacent needle loops. These loops 23 extend to the face of the fabric while tufts 21 project to the back. The face pile is tied in since it passes to the back of the needle loops as at 24. It must be borne in mind that this illustration shows the fabric to an enlarged scale but also with its loop structure very much more open or loosely knitted than would actually be the case in a practical fabric. Also, the pile yarn 22, while shown here by a rather heavy single line, would preferably have a sufficient weight and bulk to serve as an effective cover for the base fabric, that, of course, depending greatly upon the ultimate use to which the material is to be put.

While this pile may be left in the form of loops (terry loop cloth) it is in most instances desired that both sides of the fabric be the same or at least similar. The loops may be cut by shearing or in any other manner and may be napped, brushed or finished by any of the accepted processes. At the left, lower corner of FIG. 1, several loops are shown having been cut as treated in that way so they correspond very closely to the tufts at the back of the fabric.

Materials may be any of the suitable fibers and yarns and many of the synthetics are distinctly advantageous for the purpose especially when finished by shearing, electrostatic treatment and by chemically setting the material in place.

It is a characteristic of the pile as herein formed that it will project perpendicularly from the fabric face when finished.

Now referring to FIGS. 2 and 3, mechanism to carry out the method and to produce the fabric comprises an open top, independent needle knitting machine having needles 25 herein of latch type, but it should be understood that the invention may be practiced on spring beard needles as well. These needles are raised by cams (not shown) in a cam ring 26 and take tufts of fibers 21 from a doffer 27 after which they engage the base or body yarn 10 fed from a tube 28 and draw that yarn into knitted stitches at the same time that the stitches of the

base fabric are formed. As is now well understood, this much alone will produce fabric with pile at the inside of the knitted tube, that is, at the back of the fabric.

To incorporate pile at the fabric face, a primary step is that of raising the fabric with the needles so that the pile yarn 22 fed from a feeder tube 29 may be sunk between needle shanks. To raise the fabric inclined disks 30 and 31 freely rotatable on axes held in a bracket or support 32 are so positioned as to engage beneath the fabric adjacent the inner side of the needle circle. These elevate the fabric to about the height indicated in FIG. 2. Of course, the fabric lifts the needles with it.

A sinker wheel 33 or the like is freely pivotable on a stud 34 at the upper end of a post 35 and carries a number of bits 36 which have notches 37 to sustain the yarn 22 and to kink it into loops as the bits enter between needle shanks as in FIG. 3. The pitch of the bits corresponds to the cut or spacing of the needles in the cylinder and wheel 33 is driven by the meshing of the bits with the needles.

The bits may project between needles to any extent permitted by the needles, but must be able to enter and exit in a known manner. If very long loops are to be sunk, the bits may be cam operated thereby permitting them to enter to a considerable extent while they avoid interference. In some cases these wheels should be inclined to the axis of the needle cylinder.

These loops are preferably sunk below needle latches as shown, but, however, if above the latches it makes little difference since when needles rise subsequently, they will be cleared and will not knit in in either case.

The needles and necessarily the fabric are drawn down after insertion of loops. At both the stations air jets are employed to maintain the pile in position and directed as intended. Nozzle 38 emits a jet which blows tufts 21 to the inside of the cylinder and to the fabric back. Nozzle 39 serves to direct an air stream against the loops 23 after they have been sunk to keep them directed inwardly and taut until they have been locked in place as the fabric is drawn down into contact with them. These nozzles 38 and 39 are supplied from any convenient source of air under pressure fed to them through a tube 40 which runs about the machine adjacent the cam ring 26. Other nozzles may be provided as required.

When needles are again raised to take another base yarn and tufts for a subsequent course, that course locks these pile loops permanently in place. Since they are beneath the fabric at the face thereof, they appear at that side and are opposed to the tufts at the back.

In FIG. 4 a modification is shown with parts which are similar to those of FIGS. 2 and 3 bearing the same numerals with primes.

In the form of the invention first described web holders would, of course, be used, but they have only their usual function. Here they are to be of such form as to have an extra notch similar, for example, to that of United

Patent No. 2,183,050 and in addition to serving their usual function, they measure or sink the pile yarn 22'. At that time the fabric and needles are raised and the loops thus sunk between needles may be held in place by an air stream or streams. It is not thought necessary to describe these sinkers or cams which cause them to function to greater extent since it is only necessary to push them in far enough and in properly timed relation to other parts so that they will measure loops of a desired size. At the usual feeding stations they must be retracted farther than usual while the base yarn is being drawn, but they serve in holding down the fabric and casting off old loops as usual.

While not shown, nozzles for directing air to assist in placing and maintaining the position of the loops are to be provided here as in the form of the invention previously described.

While the disclosure to this point has been directed toward obtaining pile at both faces, it is contemplated that part only of the process may be used to produce a fabric with pile at the face but not at the back. In such cases it is necessary to lift the fabric and to sink the pile yarn as described so that the loops may be locked in, but underneath the material and at its face.

The shearing and other treatment to which the material is to be subjected need not be described in detail here since they are well known to those skilled in this art.

While one embodiment and a modification of the invention have been disclosed it is to be understood that the inventive concept may be carried out in a number of ways. This invention is, therefore, not to be limited to the precise details described, but is intended to embrace all variations and modifications thereof falling within the spirit of the invention and the scope of the claims.

I claim:

1. A method of knitting a two faced pile fabric which comprises the steps of forming a jersey knitted base fabric, incorporating individual loose tufts of fibers to be held at certain of the stitches of said base fabric and to project to the back of the fabric, raising the needles and fabric and inserting between some at least of the needles while the fabric thereon is raised, bights of a yarn and then drawing the needles and fabric down to trap said bights of yarn so that it will be held in the fabric upon drawing a subsequent course of the base fabric and will appear as pile loops projecting to the fabric face.

2. The method of claim 1 further characterized by the step of shearing the ends of the pile loops.

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