

April 21, 1942.

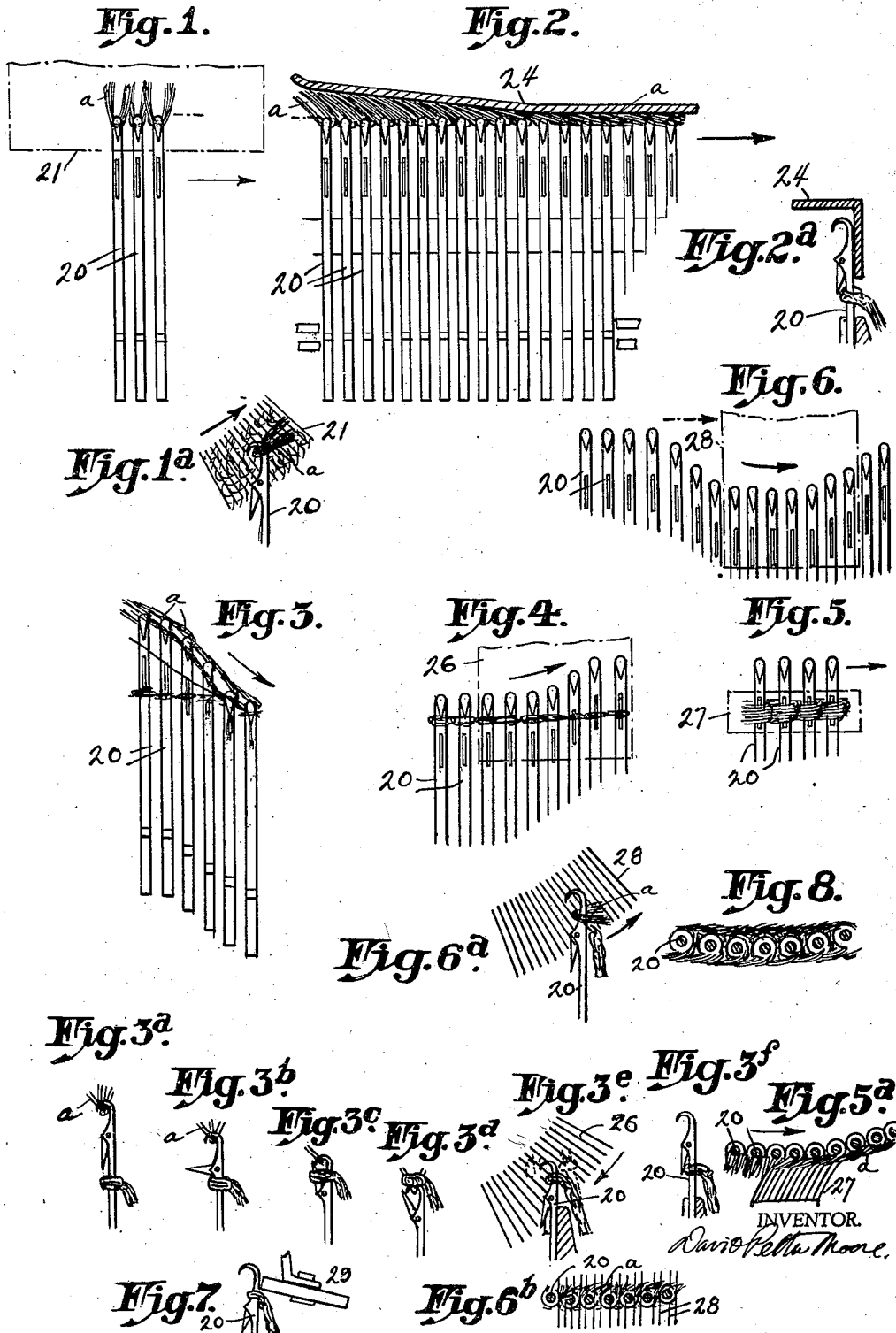
D. P. MOORE

2,280,536

KNITTED FABRIC

Filed Nov. 12, 1940

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

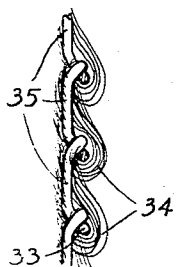


Fig. 10.

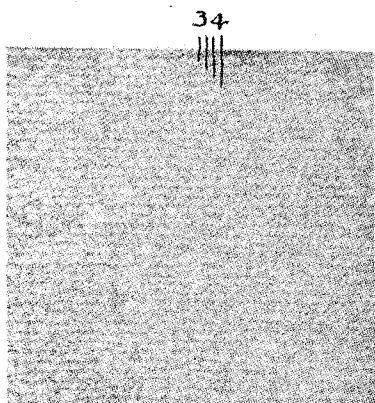


Fig. 9.

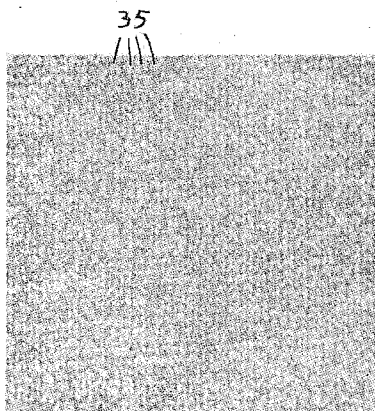


Fig. 11.

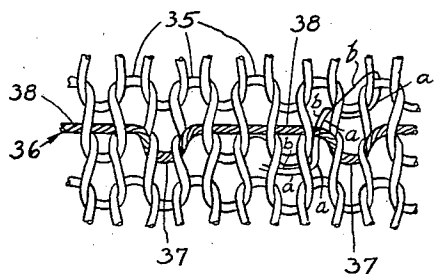


Fig. 12.

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KNITTED FABRIC

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Application November 12, 1940, Serial No. 365,388

7 Claims. (Cl. 66—191)

The present invention relates to improvements in knitted fabrics, one object of the invention being the provision of a fabric in which both faces are clothed or covered with fibers in such a manner that the knitted supporting web is hidden and protected thereby.

Another object of the invention is the provision of a fabric in which yarn of any character, such as wool, worsted, cotton, rayon, linen and any combination thereof may be used as the base and during the knitting thereof to form the basic knitted, such as a jersey, web, short loose fibers are incorporated therewith during the knitting operation, so that the web is completely hidden, and so that when a cross-section of the fabric is taken, the knitted yarn forms a layer adjacent the middle of the fabric, as a streak of lean in bacon, thus providing a protecting means for the same.

Still another object of the present invention is the provision of a knitted fabric which may be used as taken from the machine, finished thereafter in a pile, a ribbed, a loose matted double-faced fabric, or a felted surfaced fabric, as well as fabrics of extreme light and heavy weights.

Still another object of the present invention is the provision of a knitted fabric, which can be so knitted on the machine and have short loose fibers so commingled with the basic yarn during the knitting operation as to provide when finished, a substantially non-stretchable fabric.

In order that the construction of this fabric may be fully understood and its advantages appreciated, the method of making the same will be set forth in the sequence of the various steps of the manufacture, that is from the approach of the needles after the loops have been disposed upon the shanks thereof with the latches open, when latch needles are employed, although it is to be understood that this fabric to a certain degree may be made on spring needle machines, and although a rotary circular latch needle machine is here employed, it is to be understood that a flat bed latch needle machine may also be used.

The present fabric is an improvement upon the fabrics as set forth in applicant's U. S. Patents Nos. 1,791,741 and 1,994,482, in that it produces a fabric in which the free ends of the short loose fibers instead of assuming a pile effect as in the said mentioned patents, have their free ends disposed about the base of the adjacent wale or loop, so as to substantially encircle that portion and cover the rear face of the fabric. In this manner, the interstices of the

fabric are filled and to a desired thickness upon both faces of the fabric. It is also an inherent quality of this fabric that the free ends of the short loose fibers held by the loop upon its initial needle will during the knitting operation, be positioned so as to be intermeshed with the next succeeding needle in the next row, and where the fibers are sufficiently long, the final free ends thereof will extend to and be knitted in with the third needle of the third row of wales, so that the direction of trend of the tuft of short loose fibers is upwardly in a zig-zag direction, so as to in effect provide a substantially inherent non-stretch means, without the introduction of an extra non-stretch yarn, which, however, in some fabrics is desirable. Thus also the knitted in and intertwined short loose fibers provide, when the fabric is finished and napped, a double-faced fabric in which the knitted web with its wales are completely covered and hidden, and the appearance of a knitted fabric disappears.

In the accompanying drawings—

Figures 1 and 1^a are diagrammatic views showing several latch needles accepting the short loose fibers from a fiber feeding brush.

Figures 2 and 2^a are views showing the second step in the manufacture of this fabric.

Figure 3 shows the third step, when the needle approaches and is at the knitting point.

Figures 3^a, 3^b, 3^c, 4^a, 3^e and 3^f show various positions of the needles at various stages of the process.

Figure 4 illustrates a step just at and after the knitting point has produced a stitch or loop.

Figures 5 and 5^a show the next step after the outwardly rotating brush has acted upon the needle held fibers.

Figures 6 and 6^a show the step of wiping the external lap or untwisted yarn formed from the outwardly brushed fibers.

Figure 6^b is a top plan view showing the position the fibers assume as wrapped about the shanks of the needles by the inwardly rotating wiping brush.

Figure 7 is a side view showing a means of pressing the loops down upon the shanks of the needles to insure the proper seating thereof and insuring the holding of the latches.

Figure 8 is a section through a series of needles to illustrate how the fibers present themselves on the shanks of the needles after the final brush action of Figs. 6, 6^a and 6^b.

Figure 9 is a plan view of a piece of the fabric showing the main face.

Figure 10 is an enlarged vertical section of a portion of the fabric as shown in Fig. 9, illustrating schematically the loops, short loose fibers and the rolls made from the latter.

Figure 11 is a view similar to Fig. 9 of the opposite face of the fabric.

Figure 12 is a diagrammatic view on an enlarged scale showing the basic web minus the short loose fibers, illustrating the positioning of the non-stretch yarn in conjunction with the loops or stitches.

Referring to the drawings, the numeral 20 designates latch needles, which as shown in Figs. 1 and 1^a, are passing through and being filled with short loose fibers *a*, delivered to them by the brush 21, which is a member of a fiber feeding attachment operated in synchrony with the needle carrying cylinder, not shown. Thus a tuft or small brush *a* is set in the hook of each needle. During the movement of the needles, in the direction of the arrow, they pass below a fiber setting bridge 24, which causes the tufts to be bent or laid rearwardly and downwardly, thus forming a mat or untwisted yarn and causing the free ends of the needle-held fibers of the previous needle to overlap the following and sometimes the several following needles. In this position, the needles approach the point to receive the yarn 30 to form the next stitch, the yarn just taken within the hook of the needle entering below the bent portion of the tuft, then in the hook, and to a great extent embeds itself therein, Figs. 3, 3^a and 4.

As the needle now approaches and is acted upon by the knitting cam (Figs. 3^b, 3^c and 3^d), the loop *l* held down upon the shank of the needle, due to the take-up of the knitting machine as usual, and the needle per se being pulled downwardly, appears to ride upwardly, closing the latch and sliding up and about the yarn and tuft held in the hook to form the next loop. As the needle is moved upwardly at this point, the loop and fibers upon the needle are positioned below the latch which has been opened as is usual during the movement of the needle. Also while this action is taking place, the outwardly rotating wiper or brush 26, wipes the fibers held by the needles, so that the free ends thereof are wiped outwardly between the needles (Figs. 3^c and 4), to be engaged later on by the fixed wiper or soft brush 27, which causes the free ends of the fibers to extend rearwardly on the outside of the shanks of the needles (Figs. 5 and 5^a), so that a mat or substantially untwisted yarn is formed above the upper outer rim of the cylinder and on the hook side of the needles. The completed fabric is then taken from the machine, in the usual manner and form, is fulled, before or after splitting the tube, and is then carried through the desired and necessary steps to produce the required finish, viz: blanket, ski or snow cloth, pile on one face and nap on the other, felted on one or both faces, but in each and every case, the knitted web formed by the yarn will be entirely covered so that the knitted structure is concealed.

If the fabric is merely fulled, the fibers present on the face, that is the face toward the center of the cylinder in a latch needle machine as here described, a series of transverse ribs, which run therefore, at right-angles to the needle formed wales, so that a fabric particularly desirable for mats, rugs, carpets, upholstery results.

To produce a heavy pile face, the brush or fingered device 28, Figs. 6, 6^a and 6^b, is added;

and as the brush is rotated inwardly, the loose or free ends of the fibers overlaying the shanks of the needles are wiped inwardly and project upon the inner face of the fabric, and so that the rear or outer face, is more firmly clothed, the edge of the fabric appearing somewhat similar to that shown in Fig. 8, except that more free ends are upon the inside than upon the outside of the cylinder.

The fabric as illustrated in Figs. 9, 10 and 11, is just as it comes from the machine, and it will be noted that the short loose fibers (a single fiber being shown in Fig. 12 with the bowed portion locked in the loop and its terminals *a* and *b* following the courses there shown) where anchored in one row of stitches or loops 33, form the base for the rolls 34, formed by the free ends of such held fibers, the free ends being brushed so that they commingle with the next row of stitches, and generally to the needle next succeeding. In this manner, the free ends of the loose fibers are thus anchored in the next stitches, and where the free ends are sufficiently long they may be carried even into the next succeeding row or rows of stitches. Thus the rolls 34, though formed individually by and at each needle are contiguous with the next succeeding rolls to produce in appearance a solid roll transversely of the fabric when the fabric is split, but spirally when in the knitting machine. Thus these rolls appear to be in parallel rows, which rows are at right angles to the rows 35 of stitches or loops, as shown in Fig. 11.

In Fig. 12, the non-stretch yarn, or rather the stretch lessening or preventing yarn 36, is anchored at every fourth needle to produce the anchored portions 37 and the straight portions 38. These here shown are placed at each fourth row of stitches, but this is merely by way of illustration, as some fabrics will require different positioning of the said stretch preventing yarn. It will also be apparent, that the short loose fibers will entirely cover this yarn, as the yarn is placed in a row of stitches carrying the knitted-in and held short fibers, previous to the selection of the anchoring points of the stretch preventing yarn.

This particular fabric when taken from the machine, can be fulled either in tube or split form, and the more it is fulled, that is more closely shrunk, the less stretch the fabric will have and then the faces may be finished in any desired manner.

Various weights of fabrics can be made by this method, the finer the needles and the more to the inch, and the size of yarn, with the proportionate amount of the short loose fibers, will determine the weight of the fabric. It has been found in practice with a 10 cut 24 gauge needle having an 18 gauge hook, that the fabric will comprise 25 to 27% yarn and the remainder the short loose fibers, namely 75 to 73% short loose fibers.

In many cases, the take-up generally carried by knitting machines is too light and too narrow for properly taking up this fabric, and it has been found that the rolls thereof should be say in a 26 inch cylinder not less than 34 inches wide. This is due to the fact that the short loose fibers add to the knitted web sufficient body to increase the width of the fabric during the knitting operation.

To assist in the take-up and insure that the loops or wales are as far down upon the needles as the take-up should hold them, it may be desirable to employ the rotating disk 29, which

acts upon the fabric just before the action shown in Figs. 5 and 5^a, and sometimes after the action shown in Figs. 6 and 6^a.

The rotating member 28 may be a brush, or it may be in the form of a series of spirally arranged wire fingers, so spaced and timed that as the needles approach it, one wire finger at a time will pass between the two needles and thus insure the movement of the fibers, spanning the space between such needles, being carried to the inner side of the cylinder.

It will thus be evident that with this particular method that a fabric of special characteristics results, that is a fabric in which the yarn forming the loops or stitches is substantially covered during the knitting operation; and which when shrunk by fulling, can be given any desirable finish, customary with woven fabrics, and further that the knitted characteristics so apparent in knitted fabrics do not appear to the user of this present fabric.

The surfaces of this fabric may be given many types of finish, with the result that this fabric lends itself to uses for outer garments, blankets, underwear, furs, and floor coverings. Also that where desirable cotton yarn can displace wool, while the short loose fibers may be of wool, linen, cotton, silk and/or rayon.

This application is a continuation in part of the abandoned application filed August 12, 1937, Serial No. 158,667, and the claims are based on the application filed April 10, 1939, Serial No. 267,107.

What is claimed is:

1. A knitted fabric composed of yarn and short loose fibers and in which the yarn forms the basic web while the short loose fibers com-

mingle with the yarn so that at each loop a U-shaped portion is formed with the short loose fibers while the terminals of the U lay co-extensive with each other and span the next course of loops to be engaged and held in place by the next succeeding needle formed loop in the next succeeding course of loops.

2. A knitted fabric as claimed in claim 1, in which the portions of the loose fibers between their anchoring points form courses of rows of rolls upon one face of the fabric.

3. A knitted fabric as claimed in claim 1, in which an additional strand of yarn is so knitted in with certain courses of loops and with certain of the loops in such course as to present short straight lengths of yarn extending a greater distance than the distance between two or more adjacent loops.

4. A knitted fabric composed of yarn and short loose fibers, so knitted together that the short loose fibers substantially cover the yarn and provide externally projecting parallel rows of rolled short loose fibers upon one face of the fabric.

5. A knitted fabric as claimed in claim 4, wherein the projecting rows are at right angles to the normal loop lines of the fabric.

6. A knitted fabric as claimed in claim 4, wherein the projecting rows of fibers are parallel but between the courses of loops.

7. A knitted fabric as claimed in claim 4, wherein the projecting rows of fibers are parallel but between the courses of loops and are anchored in the connecting portions of adjacent courses of loops.

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