

March 29, 1966

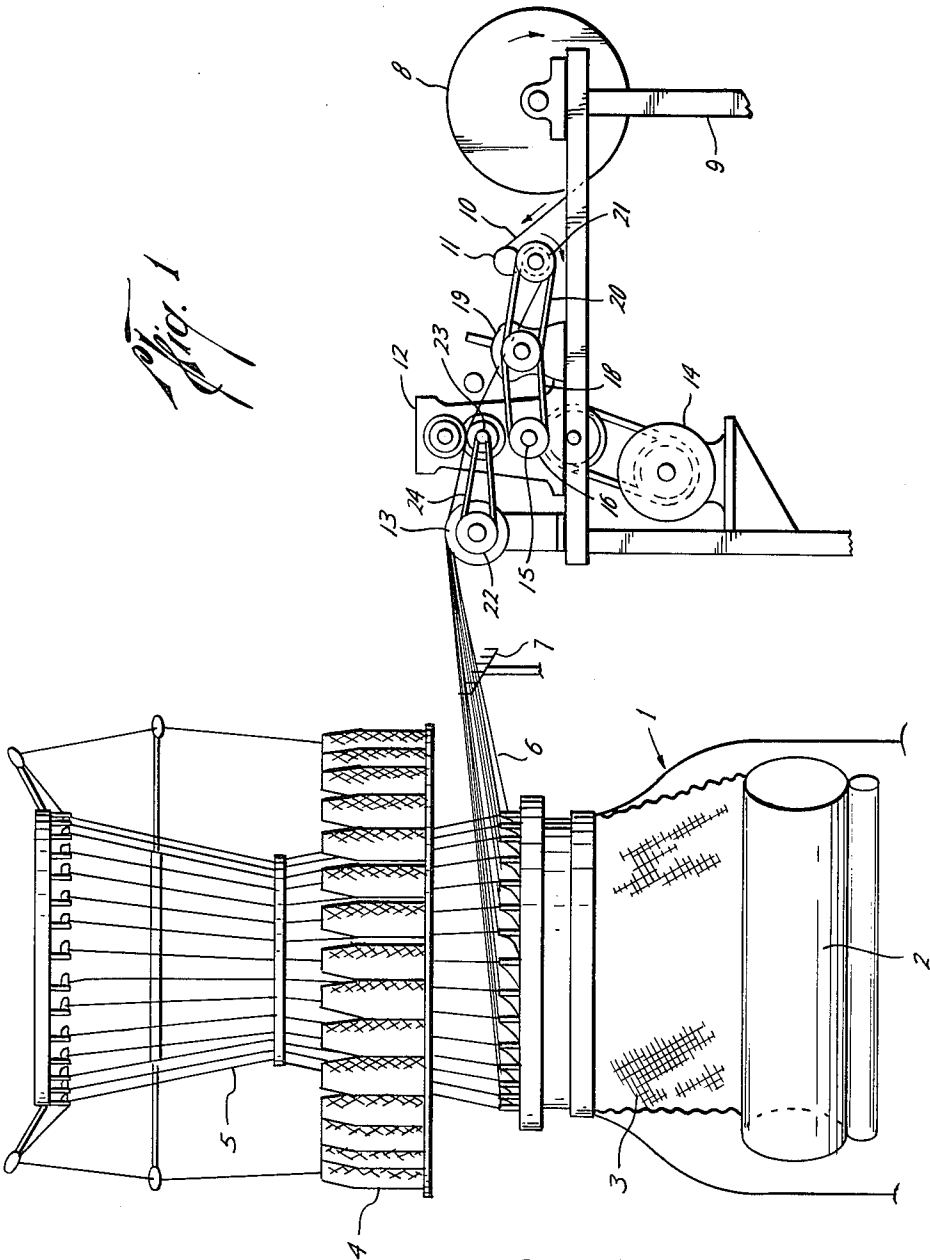
R. H. MARKS ETAL

3,242,698

METHOD AND APPARATUS FOR PRODUCING A KNITTED FABRIC

Filed March 23, 1964

3 Sheets-Sheet 1



Ronald H. Marks
Lawrence R. Goodman
INVENTORS

BY *Walter H. Martin*
Paul E. Edwards
John C. Springette
ATTORNEYS

March 29, 1966

R. H. MARKS ETAL

3,242,698

METHOD AND APPARATUS FOR PRODUCING A KNITTED FABRIC

Filed March 23, 1964

3 Sheets-Sheet 2

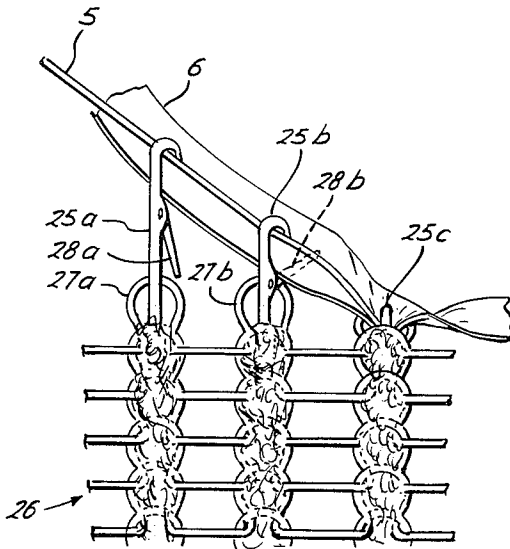
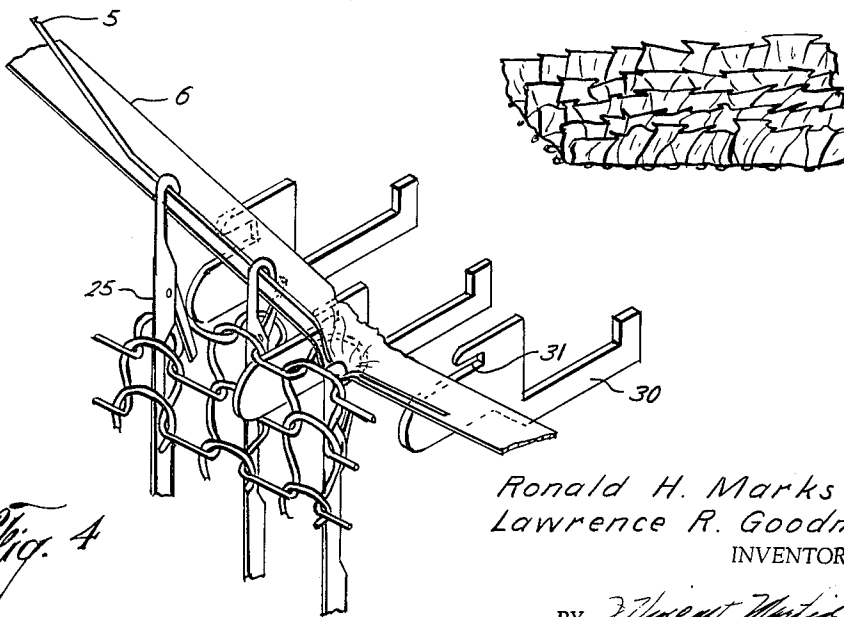


Fig. 3



Ronald H. Marks
Lawrence R. Goodman
INVENTORS

BY *J. Vincent Martin*
J. E. Edwards
James R. Springette
ATTORNEYS

March 29, 1966

R. H. MARKS ETAL

3,242,698

METHOD AND APPARATUS FOR PRODUCING A KNITTED FABRIC

Filed March 23, 1964

3 Sheets-Sheet 3

Fig. 5

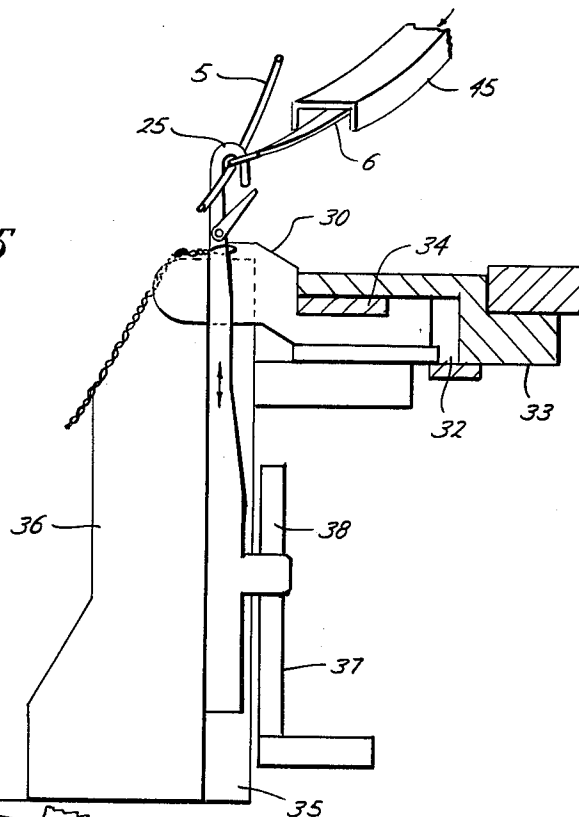
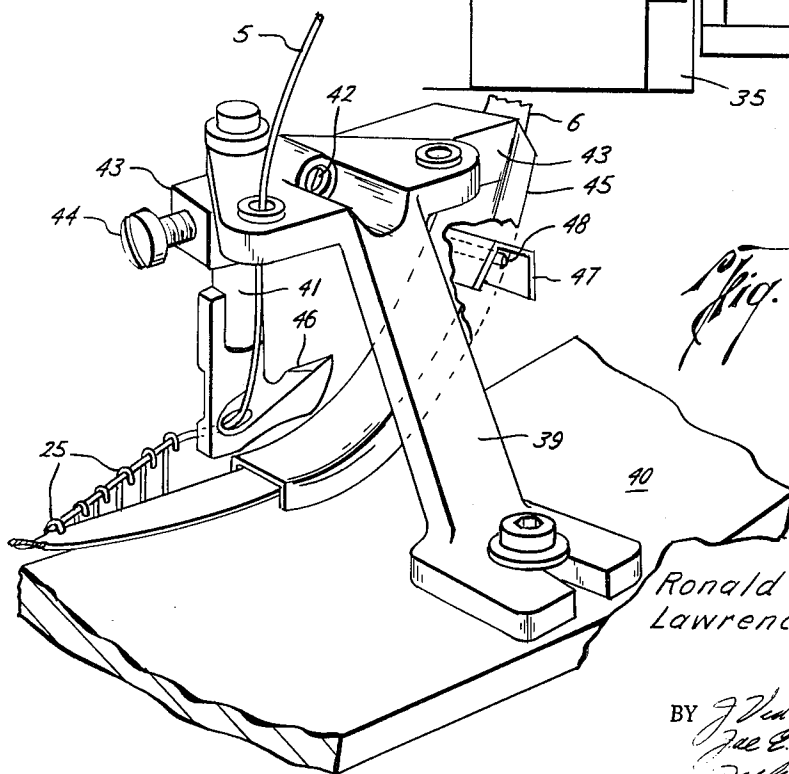


Fig. 6



Ronald H. Marks
Lawrence R. Goodman
INVENTORS

BY *J. Vincent Martin*
Joe E. Edwards
Robert J. Spriggs
ATTORNEYS

1

2

3,242,698

METHOD AND APPARATUS FOR PRODUCING A KNITTED FABRIC

Ronald H. Marks, 7800 Sovereign Row, Dallas 7, Tex., and Lawrence R. Goodman, Dallas, Tex.; said Goodman assignor to said Marks

Filed Mar. 23, 1964, Ser. No. 354,023

12 Claims. (Cl. 66—125)

The present invention relates to a new fabric and to the method and apparatus for producing such fabric.

Knitted fabrics have been quite common for many years. Generally such fabrics are produced on knitting machines in which a plurality of yarn strands are fed into the knitting machine and intermingled by needles which alternately engage and then release a strand of yarn by pulling the engaged strand through the loop of the previously engaged strand to release the previously engaged strand. Prior to the present invention a plurality of yarn strands have been knitted but no machine has been used for receiving a plurality of strips of material and a plurality of yarn strands to be knitted into a fabric having the strips integrated in the fabric in the form of a pile or continuous strip extending on one side of the fabric.

It is therefore an object of the present invention to produce such a fabric.

Another object is to provide a method and an apparatus for producing a fabric from a plurality of yarn strands and a plurality of material strips.

Another object of the present invention is to provide a method and an apparatus for producing a fabric from a plurality of yarn strands and a plurality of strips derived from a roll of material.

A further object of the present invention is to provide a method and an apparatus for producing a fabric in which a plurality of yarn strands and a plurality of strips are integrated by knitting.

A still further object of the present invention is to provide a method and an apparatus for producing a fabric by integrating a plurality of yarn strands and a plurality of strips while such strips remain connected to the roll of material from which they are derived.

Still another object of the present invention is to provide a method and an apparatus for producing a fabric having piling composed of strips of material, one edge of which has been combined with knitted yarn.

Another object is to provide a fabric having a plurality of twisted paper yarn interknit with a plurality of paper strips.

Still a further object is to provide a method and an apparatus to produce a fabric from a plurality of twisted paper yarn and a plurality of paper strips in with the paper strips to form a pile or continuous strip on one side of the fabric and have portions of one of their edges gathered in the needle loops formed by the knitting of the paper yarn.

These and other objects of the present invention are more fully explained and described in reference to the drawings wherein:

FIGURE 1 is a schematic elevation view of an apparatus constructed to perform the method of the present invention.

FIGURE 2 is a partial detail view of the action of knitting needles on a yarn strand and a strip.

FIGURE 3 is a view of a small piece of fabric made in accordance with the method of the present invention.

FIGURE 4 is a schematic perspective view of the interior of a knitting machine illustrating the fabric being formed in relation to the needles and sinkers of the machine.

FIGURE 5 is a typical sectional view of a knitting machine illustrating the relative position of the knitting

needles, their actuating mechanisms, the sinkers and the yarn and strips being fed into the knitting machine.

FIGURE 6 is a perspective view of the combination yarn and strip feeding mechanism and its relationship to needles of a knitting machine.

Knitting machine 1, as shown in FIGURE 1, is shown to be a rotating cylinder-type knitting machine. In this type of knitting machine cylinder 2 on which fabric 3 is wound rotates as do the knitting needles while spindles 4 which supply yarn strands 5 remain stationary. As fabric 3 is produced by knitting machine 1, it is wound on cylinder 2.

Strips 6 are delivered to knitting machine 1 by strip guide 7 of any suitable form. In FIGURE 1 strip guide 7 is shown in the form of a spreading comb but may be of any combination of guides or eyes to deliver the strips 6 to the proper position on knitting machine 1.

In one form of the invention strips 6 originate in paper roll 8 which is suitably mounted on frame 9. Web 10 or continuous sheet is withdrawn from roll 8 by tension adjuster 11 and is delivered to cutter 12 wherein web 10 is cut into strips 6 without severing the connection of strips 6 to web 10. Strips 6 from cutter 12 pass over drum 13 and are delivered through strips guides 7 to knitting machine 1. Drum 13 is generally used to maintain tension in web 10 and strips 6 on either side of cutter 12. Motor 14 by connection of suitable belt and sheaves provides the power for cutter 12. Shaft 15 of cutter 12 is provided with sheave 16 which is connected by belt 17 and sheave 18 to variable speed transmission means 19. The output rotation of variable speed transmission means 19 is transmitted by belt 20 to sheave 21 to rotate tension adjuster 11. Sheave 22 is connected to shaft 23 on cutter 12 by belt 24 to rotate drum 13.

In FIGURE 2 the engagement of strips 6 is illustrated in relation to the yarn strand 5 being engaged by needles 25 and showing a standard knitted fabric 26 which does not include strips 6 for the purpose of clarity. As shown in FIGURE 2 the movement of needles 25, strip 6, yarn strand 5 and fabric 26 will be from left to right. Needle 25a has just engaged yarn strand 5 in its open hook end and is extending through needle loop 27a. It should be noted that latch 28a on needle 25a is fully open and has moved above loop 27a. Needle 25b has previously engaged yarn strand 5 and has commenced its downward movement. Latch 28b of needle 25b has been partially closed by engaging loop 27b. The hook end of needle 25b is poised immediately above the edge of strip 6. Needle 25c has moved down further than needle 25b and has caught the edge of strip 6 and pulled it and yarn strand 5 through loop 27c and its latch 28c has been closed to prevent the dropping of a stitch. When needle 25c has completed its downward motion, it will again move up, its latch will open and it will be pushed up through the loop which it has just formed and extend upwardly behind strip 6 for engagement with the next yarn strand 5 and strip 6.

FIGURE 3 illustrates the piled fabric produced by the knitting of yarn strand 5 with strips 6, showing how that portion of one edge of strip 6 is gathered in the needle loops formed from yarn strands 5.

FIGURE 4 is a view similar to FIGURE 2 but illustrates the relationship of sinkers 30 to needles 25 and strip 6. Slots 31 in the upper portion of sinkers 30 engage the fabric to form the sinker loops as in other knitting machines.

As best seen in FIGURE 5, sinkers 30 move inward and outward in guide slots 32 in plate 33 and are actuated by horizontal cam 34. Needles 25 move up and down in slot 35 in rotating cylinder 36 of knitting machine 1 and are actuated by cam 37 and follower 38 which remain

stationary while cylinder 36, needles 25, plate 33, and sinkers 30 rotate.

Strip and yarn guide frame 39 is secured to a stationary portion 40 of knitting machine 1 as shown in FIGURE 6. Shaft 41 extends through the upper portion of frame 39 and is held in position by set screw 42. Bracket 43 is fastened on shaft 41 by set screw 44 and is secured to strip guide 45 to provide support and positioning of strip guide 45. Yarn guide 46 is secured to the lower end of shaft 41 to deliver yarn 5 to the needles as shown. Strip guide 45 is channel shaped and provided with U-shaped tensioner 47. Tensioner 47 has one of its legs positioned within strip guide 45 by cross member 48 and will have a slight drag on the movement of strip 6 through the space between the web of strip guide 45 and the leg of tensioner 47. This drag on strip 6 will cause a slight tension in the strip, and movement of strip 6 into the fabric 3 will be effected by the pull of the needles as they engage the edge of strip 6 pulling it into the needle loops.

In operation the apparatus of the present invention may be set up as shown in FIGURE 1 whereby yarn strands 5 are supplied to the knitting machine 1 from the spindles 4, and the strips 6 are supplied from the roll 8 through the cutter 12 to knitting machine 1. As hereinbefore mentioned, the yarn strands 5 may be of any suitable material depending upon the fabric which is to be produced, such as twisted paper, paper strips capable of being knitted, cotton or other suitable yarn. The strips 6 will also be selected on the basis of the fabric that is to be produced. In FIGURE 1 the strips 6 are illustrated to be cut from a roll 8 of material which is to be fed to knitting machine 1. A typical example of a suitable material is paper. Any other material may be used which can be engaged by the needle hooks and an edge portion pulled in gathered form into the needle loop and which allows the needle to release from the strip, either by tearing out of the edge of the strip or by passing downwardly through the hole in the strip made by the engagement thereof by the needle hook. If desired in the fabric being produced, a relatively thin plastic material may be used, provided it has such properties as will allow it to be engaged within the needle loops formed by the knitting of the yarn strands without interfering with the subsequent knitting by the needles.

As seen in FIGURE 2, as the edge of the strip 6 is gathered into the needle loops 27, the strip 6 will twist to the extent that the opposite edge will be lower than the gathered edge in the final product.

The feeding of the strips 6 to the knitting needles, as shown in FIGURE 6, utilizes the movement of the fabric already completed and the movement of the knitting needles to pull the strips 6 into position against the tension created by the tensioner 47. Strip guide 45 is positioned to receive strips 6 and deliver strips 6 in position below yarn strands 5 with one edge just under the hooks of the knitting needles 25.

From the foregoing it can be seen that a new fabric has been produced which may be described as having a knit backing with a plurality of strips each having small portions on each edge gathered into the needle loops along a course of the backing. As used in this description, the word "course" is used to mean one row of knitting formed by a single yarn strand.

Also, the method used in forming this fabric, wherein edge portions of strips are gathered into the needle loops by feeding the strips into position to have an edge under the needle hooks, and the apparatus used for such method, wherein the strips are provided and delivered under proper tension to the proper position, have been shown in the drawings and described in reference thereto.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made

within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. The method of producing a fabric including, feeding a plurality of elements to a knitting machine, and feeding a plurality of material strips to said knitting machine whereby the hooks of the knitting needles of such knitting machine will catch on one edge of such strips and gather a portion of the caught edge of such strips in the needle loops formed by the knitting of said elements by knitting needles.
2. The method of producing a fabric comprising, knitting a plurality of elements, and gathering a small portion of one edge of one of a plurality of material strips into each needle loop formed by said elements whereby one edge of one of said material strips is held by the knitted elements along each course thereof.
3. The method of producing a fabric comprising, knitting a plurality of elements, and gathering small portions of one edge of one of a plurality of material strips into the needle loops formed by the knitting of said elements whereby said strips are held by the knitted elements and wherein the number of elements is always at least the same as the number of strips.
4. The method of producing a fabric having a jersey knit backing and a plurality of ruffled strips on one side of the backing with small edge portions of the ruffled strips being gathered and held in the needle loops of the backing on a rotating cylinder knitting machine comprising, feeding a plurality of elements to be knit to the knitting needles of the knitting machine, dividing a substantially continuous sheet of material longitudinally into a plurality of strips, guiding each of said strips to a position with respect to the knitting machine whereby one edge of a strip is positioned below the hooks of the knitting needles whereby edge portions of the strip will be pulled into needle loops formed by knitting said elements.
5. The method according to claim 4 including, restraining the movement of said strips into position below the hooks of the needles whereby the pull resulting from the needles engaging the edges of the strips causes the strips to be pulled into position thereby.
6. The method according to claim 4 wherein said strips remain attached to said sheet of material.
7. The method according to claim 4 wherein said sheet of material comprises a roll of paper.
8. An apparatus for producing a fabric comprising a knitting machine, means feeding a plurality of elements to said knitting machine, whereby said elements are knitted, means supplying a plurality of strips to said knitting machine, and means guiding said strips into a position under needle hooks whereby each needle will catch a portion of one edge of said strips and pull such caught portion into a needle loop of said elements.
9. In an apparatus for producing a fabric on a rotating cylinder knitting machine which knits a plurality of elements into a knit backing the improvement comprising, means feeding a plurality of strips to said knitting machine, and means positioning each strip at different stations on said knitting machine below the hook of the knitting needles in elevated positions at such station.
10. In an apparatus for producing a fabric on a rotating cylinder knitting machine which knits a plurality of elements into a knit backing the improvement comprising,

5

means feeding a plurality of strips to said knitting machine,
 means positioning each strip at different stations on said knitting machine below the hook of the knitting needles in elevated positions at such station, and
 means tensioning said strips whereby said strips are pulled into position by the movement of needles previously engaging said strips.

11. In an apparatus for producing a fabric on a rotating cylinder knitting machine which knits a plurality of elements into a knit backing the improvement comprising,

a strip guide at each station on the knitting receiving a strip,

said strip guide comprising,

a curved channel member receiving a strip between channel legs, and

a tensioner engaging said strip and providing frictional drag thereon between said strip and the web of said channel member.

12. Invention according to claim 11 wherein said tensioner comprises,

a support member secured between legs of said channel member, and

6

a U-shaped member having one leg between the legs of said channel member, the other leg exterior of said channel member and the web supported by said support member.

References Cited by the Examiner

UNITED STATES PATENTS

1,501,857	7/1924	List	66—85
1,671,835	5/1928	Muller	66—193
1,841,159	1/1932	Silverman	66—202
2,014,026	9/1935	Nebel	66—169
2,144,667	1/1939	Stein	66—192
2,169,886	8/1939	Shaw	28—1
2,654,936	10/1953	Slovin	28—1
2,761,193	9/1956	EGGE et al.	28—1
2,959,949	11/1960	Crawford	66—125
3,012,393	12/1961	Shuttleworth et al.	57—165 X
3,018,645	1/1962	Fried	66—125
3,137,150	6/1964	Mishcon	66—169
3,162,004	12/1964	Hogg et al.	57—167 X

DONALD W. PARKER, *Primary Examiner*.

R. FELDBAUM, *Assistant Examiner*.