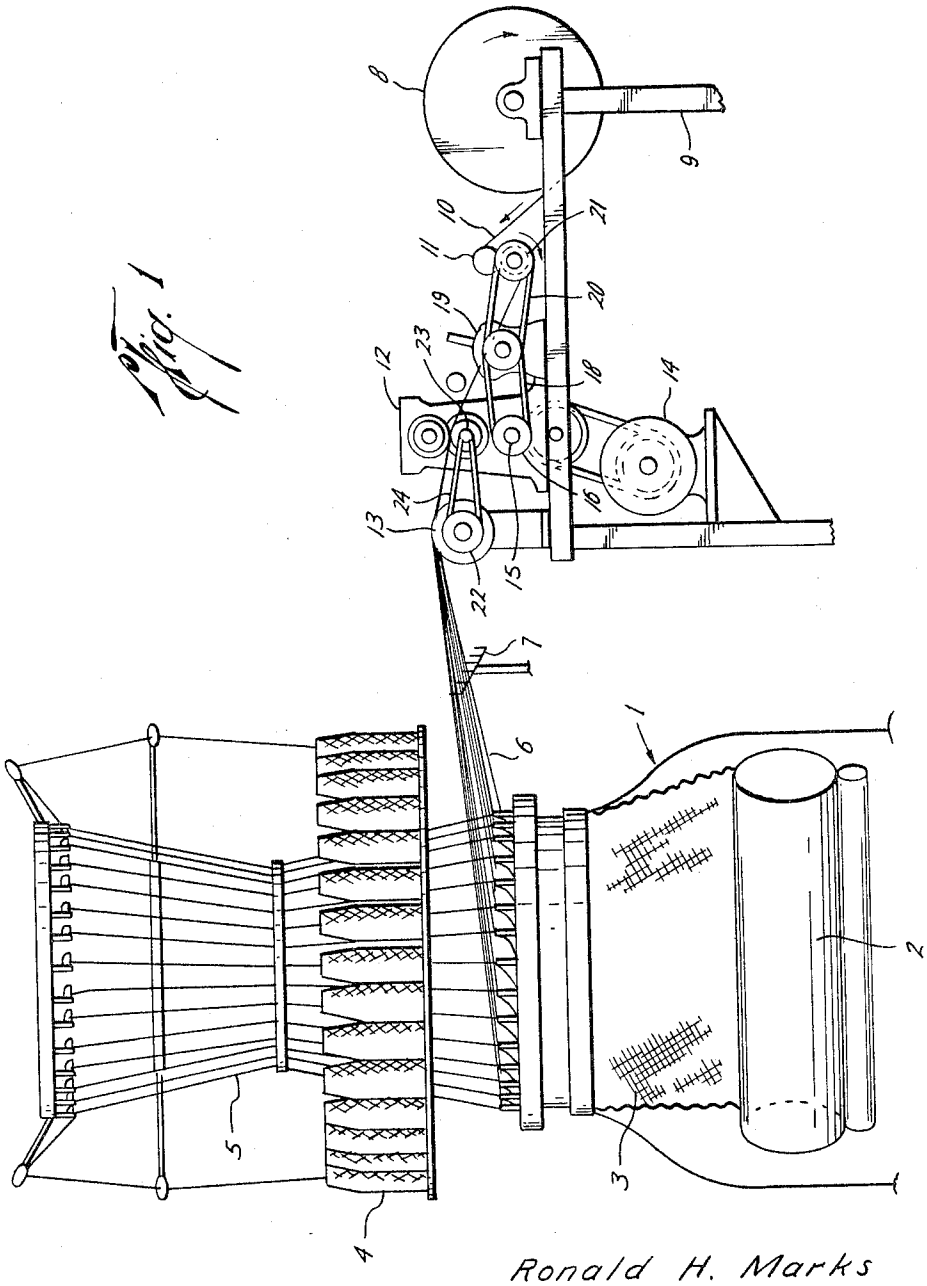
Nov. 1, 1966 R. H. MARKS ET AL 3,282,071

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Original Filed March 23, 1964 3 Sheets-Sheet 1

Fig. 1



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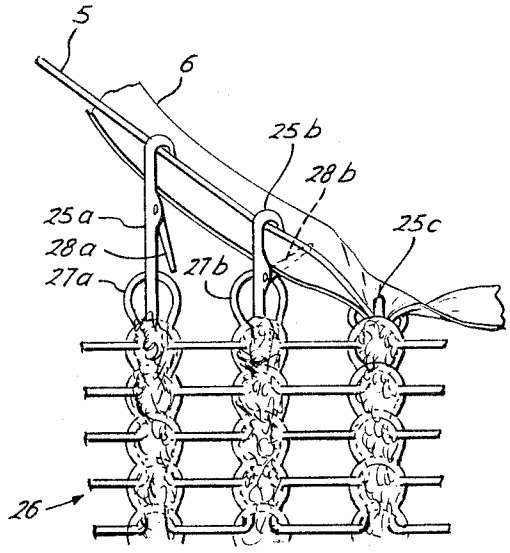
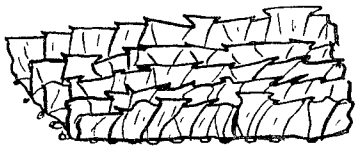


Fig. 2

Fig. 3



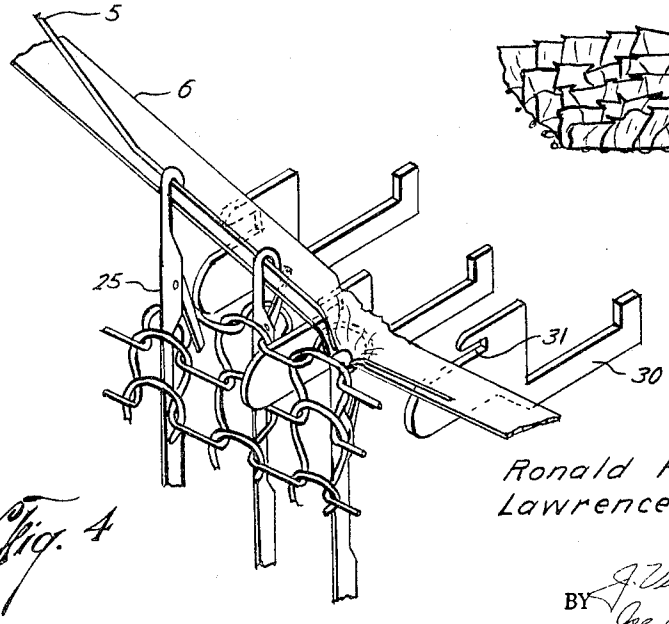


Fig. 4

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Fig. 5

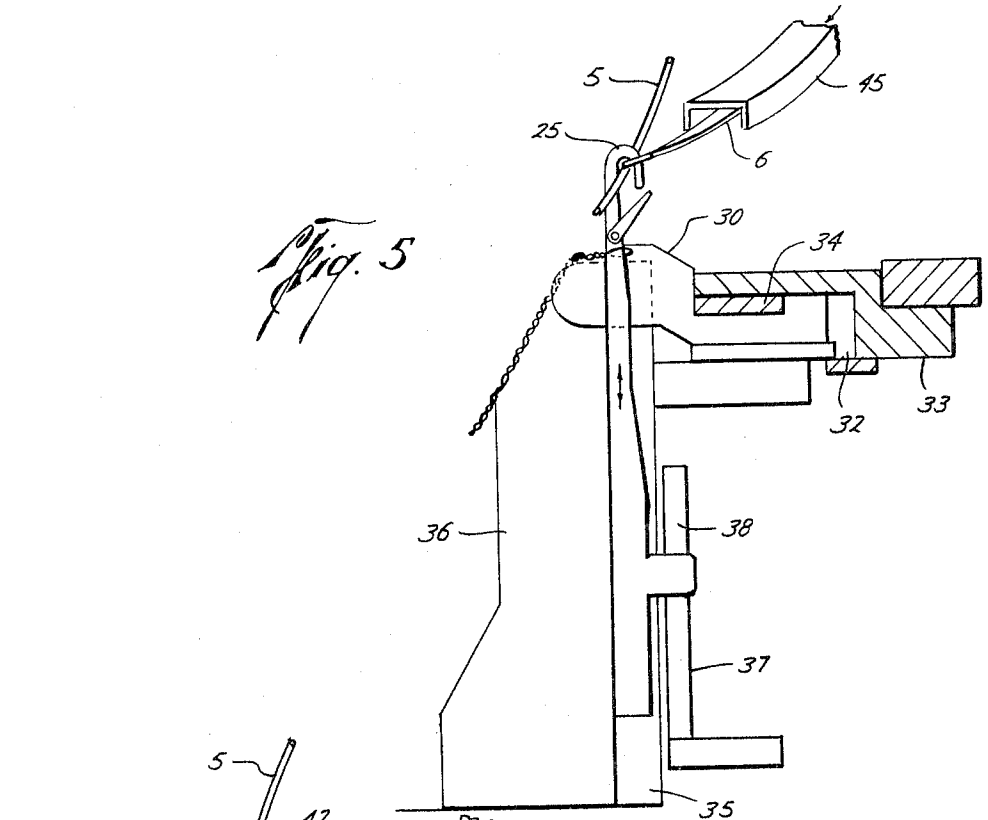
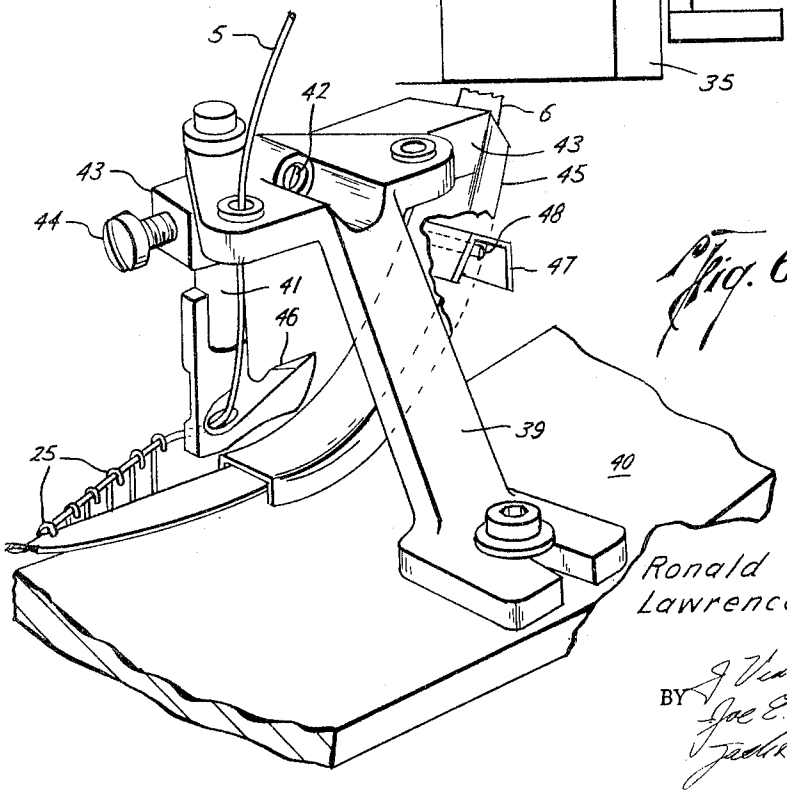


Fig. 6



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FABRIC

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Original application Mar. 23, 1964, Ser. No. 354,023. Divided and this application Jan. 20, 1966, Ser. No. 521,935

6 Claims. (Cl. 66—169)

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

This application is a division of our co-pending application Serial No. 354,023, filed March 23, 1964.

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 strip 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** is provided with sheave **16** which is connected 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 **25***a* has just engaged yarn strand **5** in its open hook end and is extending through needle loop **27***a*. It should be noted that latch **28***a* on needle **25***a* is fully open and has moved above loop **27***a*. Needle **25***b* has previously engaged yarn strand **5** and has commenced its downward movement. Latch **28***b* of needle **25***b* has been partially closed by engaging loop **27***b*. The hook end of needle **25***b* is poised immediately above the edge of strip **6**. Needle **25***c* has moved down further than needle **25***b* and has caught the edge of strip **6** and pulled it and yarn strand **5** through loop **27***c* and its latch **28***c* has been closed to prevent the dropping of a stitch. When needle **25***c* has completed its downward motion, it will again move up, it 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 stry **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 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. A new fabric comprising:
a backing of knit material, and
a plurality of strips of material, each of said strips having small portions of one edge gathered into the needle loops of one course of said backing and the other edge free.

2. A new fabric according to claim **1** wherein:
said strips are parallel and have sufficient width to overlap the next adjacent strip to provide an overlay structure.

3. A new fabric comprising:
a structure of knit material, and
a plurality of strips of material, said plurality of strips forming an overlay structure by gathering small portions of one edge of each of said plurality of strips into needle loops of said knitted structure whereby said strips are integrated into said knitted structure as an overlay of gathered ruffles.

4. A new fabric according to claim **3** wherein:
one of said strips is integrated into each course of said knitted structure.

5. A new fabric according to claim **3** wherein:
said strips are integrated into parallel courses of said knitted structure.

6. A new fabric having an appearance of overlying ruffles on one side and a knit with small tufts in the needle loops on the other side comprising:
a knitted structure formed by knitting a plurality of elements, and
an overlay structure formed by gathering small portions of one edge of each of a plurality of strips into needle loops whereby said strips are integrated into said knitted structure and form an overlay on such knitted structure of gathered ruffles.

References Cited by the Examiner

UNITED STATES PATENTS

1,501,857	7/1924	List	66—85
1,671,835	5/1928	Muller	66—193

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