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N. LEVIN

2,995,020

METHOD OF KNITTING

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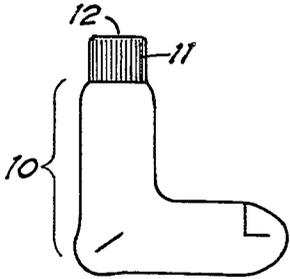


Fig. 1.

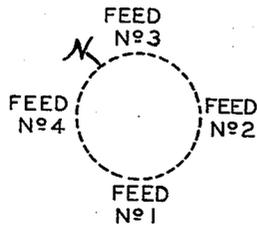


Fig. 2.

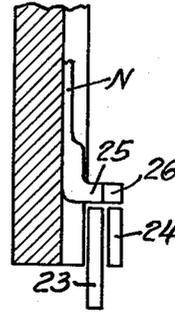


Fig. 7.

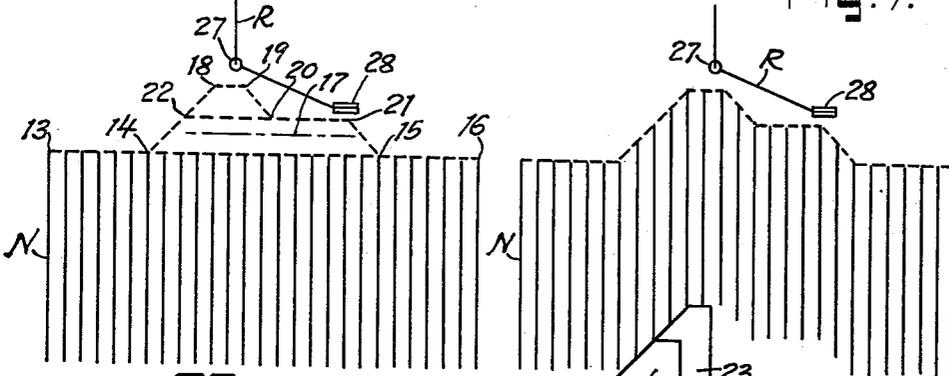


Fig. 3.

Fig. 4.

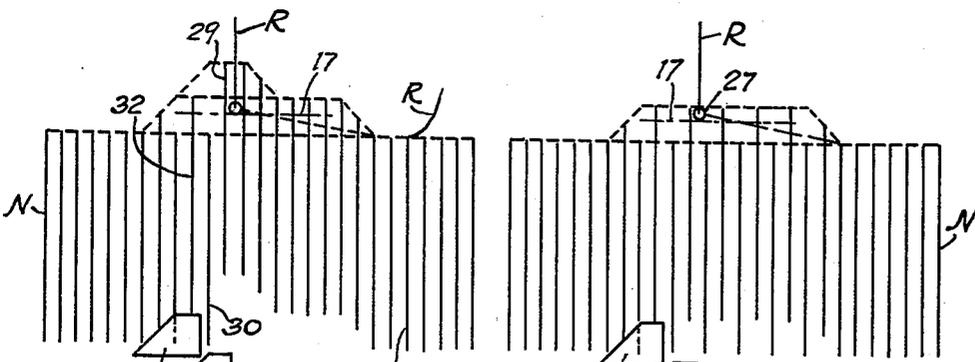


Fig. 5.

Fig. 6.

INVENTOR

Nathan Levin

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METHOD OF KNITTING

Nathan Levin, 722 Edge Wood Ave., Trenton, N.J.
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The present invention relates generally to the art of knitting and more particularly to a method of initiating the feeding of yarn to bare needles of a circular knitting machine.

In the formation of a mock rib top for circular knit hosiery, as made upon a circular knitting machine, an elastic yarn is fed to spaced needles (initially bare) at tuck level for one or more revolutions of the machine, after which one or more body yarns start to knit upon all of the needles and continue to knit for the required number of revolutions of the machine to form the top. During the formation of the top the elastic yarn continues to be fed to the spaced tuck level needles. The knitting of the body yarn upon all the needles causes the inlaid elastic yarn to be cast off unknit to provide the rib appearance. Difficulty is often experienced in commencing the initial feeding of the elastic yarn to the tuck level needles over the feeding level of a fixed throat plate inasmuch as the hooks of the needles taking the yarn are close to the feeding level of the throat plate.

It is the object of the present invention to provide a method of initiating the feeding of a yarn at a throat plate to needles passing the throat plate at tuck level, with particular reference to the feeding of an elastic yarn under tension to spaced bare tuck level needles at the start of the selvage (or make-up course) of a mock rib elastic top for hosiery.

The objects of the invention will become apparent from the following detailed description of the preferred form thereof shown in the accompanying drawings, and from the appended claims.

In the drawings,

FIG. 1 is a side elevational view of a circular knit hose having a mock rib top.

FIG. 2 is a diagrammatic view of the circle of latch needles of a four feed circular knitting machine.

FIGS. 3 through 6 are diagrammatic views showing steps in the manipulation of the needles.

FIG. 7 is a view showing a means for selectively raising the needles.

In FIG. 1, a circular knit hose, indicated generally at 10, has a mock rib top 11, and a selvage 12, which is begun in the manner hereinafter set forth.

A circle of latch needles N is shown in FIG. 2 wherein the four feeds of a circular knitting machine, upon which the hose 10 may be made, are also shown. Each of the feeds including the feed at which the elastic yarn is to be fed, is provided with the usual throat plate over which yarns are normally fed to the needles.

In FIGS. 3 through 6, groups of the needles are shown and their several paths of travel (in the direction of the arrows) are indicated in relation to one of the feeds of the machine. In FIG. 3 the needles N are shown moving at the low or idle level, along the path 13, 14, 15, and 16, wherein their hooks are well below the feeding level of the throat plate, indicated by the dot dash line 17. The normal knitting wave or path of these needles, in FIG. 3, would deviate between the points 14 and 15 to follow the path 14, 18, 19, 20, 21, and 15, for regular knitting during which the needles would be raised to latch clearing level 18, 19, with their needle hooks well above throat plate level 17 to take a yarn being fed without any difficulty. The tuck path of these needles, in FIG. 3, would deviate between the points 14 and 15 to follow the path 14, 22, 20, 21, and 15, for tuck knitting during which the needles would be

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raised to tuck level (latches not cleared of stitches or of yarn thereon) 22, 20, 21, with their needle hooks at or just above throat plate level 17. While the tuck level may be determined by the mechanism of each machine, care must be taken not to raise the needles to a level where the stitches or yarn drop off their opened latches. A high tuck level position, relative to the throat plate level, will make it easier for the needle hooks to take a yarn while a low tuck level will make it more difficult, however, in the high tuck position there is danger of losing the tucks, particularly in the case of elastic yarn which is under tension and which forms a plurality of tucks on the latches prior to the first course of body yarn. In the present instance, a low tuck level may be maintained for the needles to insure that the tucks are retained on the latches, while other means is used to start the yarn feeding to the needles. Once the yarn is taken by the tuck needles, in high or in low position, feeding will continue thereto without difficulty.

The means causing the needles to follow the above described paths is not shown, with the exception of a pair of thin cams 23, 24, in inactive positions in FIG. 3. In FIG. 7 these cams are shown in relation to needles N having short butts 25 and to needles N having long butts 26. The cam 23 will raise all of the needles while cam 24 will raise only the long butt needles, the needles being preferably arranged so that alternate ones thereof have the long butts while the intervening ones have the short butts. In FIG. 3, a yarn R, preferably of elastic nature for the mock rib top, is shown extending through the yarn feeding aperture 27 of a yarn guide (not shown) to a clamp and cutter indicated at 28, the yarn being in non-feeding position relative to the throat plate and to the needles.

At the start of each hose the needles are bare, the final course of stitches of the previously formed hose having been cast off the needles at a feed by taking the yarn out of feeding position with the needles passing through a normal knitting wave, or by causing the needles to pass through a normal knitting wave at a feed (from an idle level path) with no yarn in feeding position.

Assuming that bare needles N are passing the feed shown in FIG. 3 at low idle level, the path of the needles is changed so that they pass through the normal knitting wave as shown in FIG. 4 with the yarn R in non-feeding position. This may be accomplished in any known manner, as by raising cam 23 to the position shown. At the same time, or at a later time, but in any case prior to the lowering of cam 23 to its position of FIG. 5, the cam 24 is also raised as shown in FIG. 4, to a position wherein it will become effective on the long butt needles once the cam 23 is lowered. Thereafter cam 23 is lowered, as in FIG. 5, so that the needles cease to follow the normal knitting path and so that alternate ones thereof (having long butts) follow the tuck level path under the influence of cam 24. Needle 29 is the final one of the normal knitting path while needle 32 is the first of the tuck level path. At the same time that cam 23 is being lowered, the yarn R is placed in feeding position at the throat plate level 17, FIGS. 5, 6, to be taken by a group of needles of which needle 29 is the tail needle and needle 31 is the leading needle. The number of needles in this group may vary and in fact may consist of a single bare needle, however, in practice a plurality of needles take the yarn R while so passing through the normal knitting path. As the needles of this group continue their movement they are lowered to idle level thus causing the yarn R to extend in a feeding position across the throat plate, so that the first tuck needle 32, and alternate ones thereafter, will continue to have the yarn R fed to them without difficulty, as in FIG. 6. Knitting of the mock rib top and the hose continues thereafter in normal manner.

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The cam 23 may be in the position of FIG. 4 only long enough to raise a group of bare needles to pass through the normal knitting wave, or it may be in this position for one or more revolutions of the machine in which case its action may be utilized to cast off the final course of stitches of each hose, so that the cast off course of one hose and the feeding of the elastic yarn for the next hose may take place at the same feed, thus providing for economy of machine operation since the cast off action of the needles during this knitting wave (with no yarn in feeding position) may be utilized in connection with the present invention.

The group of bare needles 29 to 31 take the elastic yarn during movement in a normal knitting path and on the next one or more revolutions of the machine (prior to the first knitting course of the body yarn) alternate ones of this group of needles also take the elastic yarn in tuck position. When the first body yarn course is knitted, during which the elastic yarn on the alternate needles is cast off unknit, that portion of the elastic yarn first taken by all of the needles of the group 29 to 31 is also cast off unknit from said group of needles without causing any change in the basic set up or construction of the selvage course of the hose top.

The yarn R, prior to the feeding thereof, may extend from yarn guide eye 27 to the clamp and cutter 28, or if no clamp and cutter is being used, it may extend from the guide eye 27 to a cord of twisted yarns extending between adjacent ones of the hose being formed. Obviously the level of the free end of yarn R, relative to the throat plate level 17, will have a bearing on the difficulty of feeding the yarn to tuck level needles, however, in both of the above instances the level of the free end of the yarn R is such that the feeding of the yarn to the tuck level needles by the method of the present invention is so positive that it eliminates the formation of defective hose tops, insofar as the start of the elastic yarn is concerned.

I claim:

1. In the operation of a circular knitting machine having a knitting feed equipped with a throat plate over which yarn is adapted to be fed to and taken by a circle of latch needles passing said throat plate, the method of initiating the feeding of said yarn to bare

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needles passing said throat plate at tuck level including the step of causing a group of bare needles to pass said throat plate at latch clearing level in advance of the passage of said tuck level needles thereby, and the step of feeding said yarn to said group of needles as they pass said throat plate whereby said group of needles take said yarn and draw the same over said throat plate in such manner that said yarn is in position to be fed to and be taken by said tuck level needles.

2. In the operation of a circular knitting machine having a knitting feed equipped with a throat plate over which yarn is adapted to be fed to and taken by a circle of latch needles passing said throat plate, the method of casting off the final course of knitting of a hose made upon said machine and of initiating the feeding of an elastic yarn for the top of the next hose to be made including the step of causing said circle of needles to pass said throat plate at said feed at latch clearing level with no yarn in feeding position until said final course is cast off from said circle of needles to thus leave them bare, the step of changing the path of travel of said circle of needles so that spaced bare ones thereof pass said throat plate at tuck level, and the step of feeding said elastic yarn to a group of the needles at latch clearing level whereby said group of needles take said elastic yarn and draw the same over said throat plate in such manner that said yarn is in position to be fed to and be taken by said tuck needles when the path of travel of said circle of needles is so changed.

3. In the method as set forth in claim 1, the step of causing said yarn to be cast off unknit from said group of needles.

4. In the method as set forth in claim 2, the step of causing said elastic yarn to be cast off unknit from said group of needles at the start of said top of said next hose.

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