

Feb. 4, 1941.

N. SCHWARTZ

2,230,388

METHOD FOR LAYING IN YARN ON COTTON TYPE OF KNITTING MACHINE

Filed March 25, 1940

3 Sheets-Sheet 1

Fig. 1

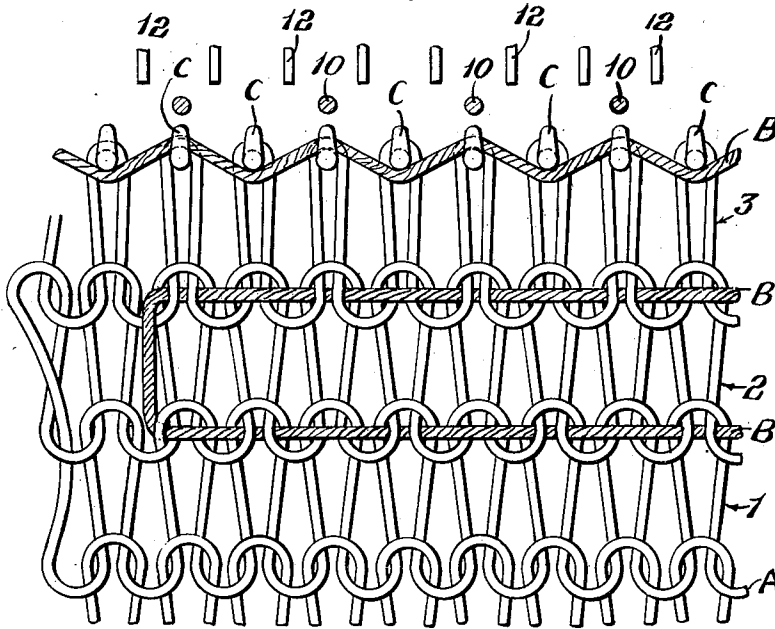


Fig. 2

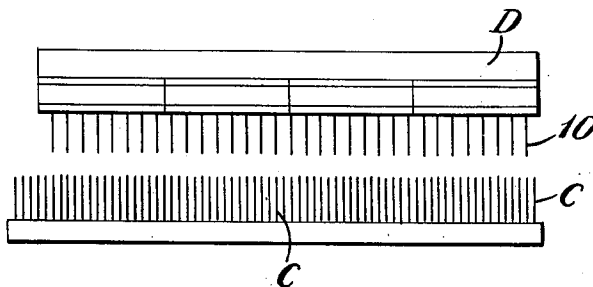
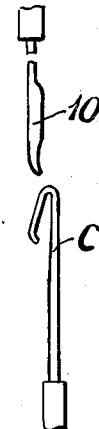


Fig. 3



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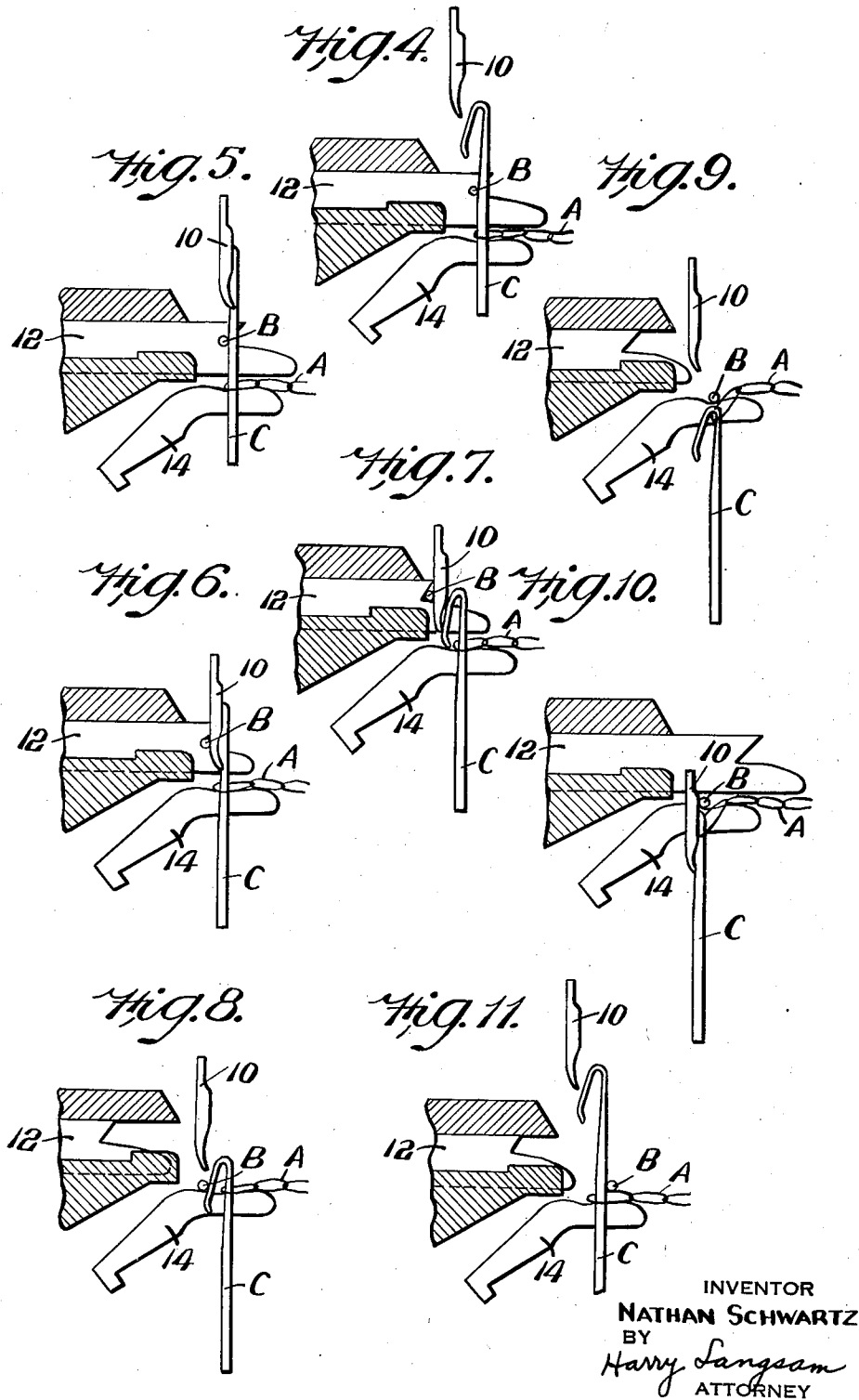
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Fig. 12.

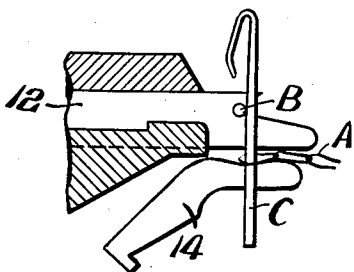


Fig. 13.

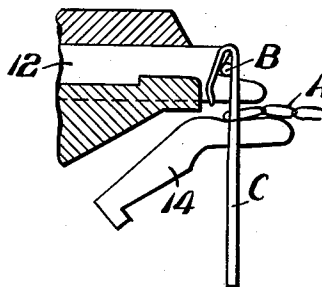


Fig. 14.

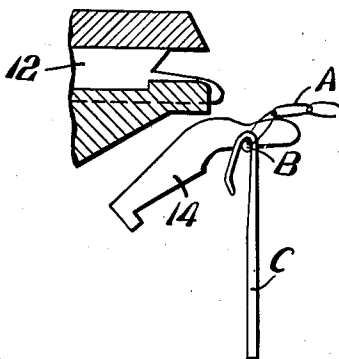
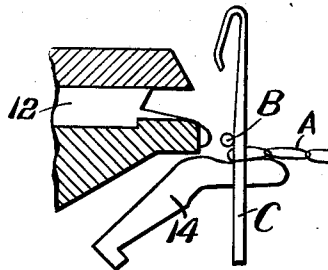


Fig. 15.



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METHOD FOR LAYING IN YARN ON COTTON
TYPE OF KNITTING MACHINE

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Application March 25, 1940, Serial No. 325,829

5 Claims. (Cl. 66—83)

My invention relates to knitted fabrics and relates particularly to laying into a knitted fabric a transverse thread without altering the normal loop formation of a flat knitting machine of the Cotton type.

My invention is utilized to lay transverse threads of elastic or other material into the welt or other portions of women's hosiery wherever desired.

10 The advantage of utilizing an elastic welt thread in women's knitted hosiery is to provide elasticity and eliminate runs in the hosiery generally caused by the tension of garters on the hosiery.

15 Difficulty has been experienced in not being able to knit the exact or required amount of elastic yarn for each transverse course into the welt portion of women's stockings. If too much elastic yarn is used, the welt will look loose and shabby; and if too small an amount of elastic yarn is used, the stocking welt will pucker.

It is, therefore, an object of my invention to lay in the exact length of elastic yarn required in the welt of hosiery.

Another object of my invention is to have absolute control over the amount of elastic yarn laid into any one transverse course of a knitted fabric.

Another object of my invention is to provide a knitted ladies' full fashioned stocking having an elastic yarn or yarns laid coursewise in the welt so that a coursewise pull on the knitted welt will stretch the elastic, thereby the elastic welt serves as a garter.

35 Another object of my invention is to utilize the customary combination of elements present in a flat knitting machine of the "Cotton" type for laying a yarn into a plain knitted fabric.

40 Another object of my invention is to provide a novel method of laying an elastic yarn and of introducing it into knitted courses in straight lengths.

45 Another object of my invention is to provide a method for inserting a section of straight elastic yarn between loops of a knitted fabric without puckering the fabric.

50 Another object of my invention is to provide a method of knitting yarn and laying in yarn whereby the yarn for knitting and the yarn for laying in are laid at different times, but the engagement of the laid in yarn between the loops occurs at the time of knitting the subsequent course.

With the above and related objects in view, my invention consists in the following details

of construction and combination of parts, as will be more fully understood from the following description, when read in conjunction with the accompanying drawings, in which—

Fig. 1 is a fragmentary plan view of a portion 5 of a plain fabric showing the elastic as it is laid in between the needle loops and the sinker loops. The sinkers are withdrawn and the knitting needles are ready to make a regular knitting course.

Fig. 2 is a diagrammatic view showing the relative position of the needle bar and the picot bar 10 carrying the transfer needles.

Fig. 3 is a side elevational view of the needle bar and picot bar illustrated in Fig. 2.

Fig. 4 is a detailed view illustrating the position of one knitting needle, sinker, picot point 15 and knockover bit at the beginning of the laying in operation after the laid in yarn has been laid upon the shank of the needle by the forward motion of the sinker; a portion of the fabric is 20 upon the knockover bit.

Fig. 5 is a view analogous to Fig. 4 wherein the picot point presses the beard of the needle to close the beard so that the laid in yarn is not 25 taken within the beard; the sinker has not moved.

Fig. 6 is a view similar to Fig. 5 showing the elements after the closed beard of the knitting 30 needle has passed the laid in yarn.

Fig. 7 is a view similar to Fig. 6 illustrating the knitting needle being drawn through the fabric loop but wherein the laid in yarn remains 35 above the needle and outside the beard of the needle.

Fig. 8 is a view analogous to Fig. 7 wherein the sinker has been withdrawn, the transfer point remains stationary, and the knitting needle 40 is still in the process of being lowered; the laid in yarn is located on the outside of the beard of the needle.

Fig. 9 is a view similar to Fig. 8 wherein the 45 needle has been drawn to its lowest position.

Fig. 10 is a view similar to Fig. 9 wherein the knitting needle has its beard closed by its complementary picot point and the knitting needle 50 is in the process of being raised.

Fig. 11 is a view similar to Fig. 10 wherein the 55 knitting needle has been raised, the picot point has been moved from its engagement with the beard of the knitting needle, and the sinker has been retracted, and the elastic yarn is in the back of the knitting needle. The elements illustrated are in a position for the regular knitting course so that the laid in yarn will be engaged at the time of knitting the next course.

Fig. 12 is a detailed view illustrating the po- 55

sition of one knitting needle, which is adjacent the knitting needle illustrated in various positions in Figs. 4 to 11, inclusive. In Fig. 12 the elements are the same as in Fig. 4 with the exception that the picot point is omitted. In Fig. 12 the elastic is laid in and the needle is raised.

Fig. 13 is a view similar to Fig. 12 wherein the spring beard needle has been lowered, and the elastic is within the beard of the needle; the sinker is out.

In Fig. 14 the sinker has been withdrawn, the needle is in its lowermost stroke with the elastic B and portion of the fabric loop A in engagement.

In Fig. 15 the needle has been raised, the sinker is retracted, and the needles are in position for the regular knitting course.

My invention is applicable to be utilized in a flat knitting machine of the Cotton type without any change in the customary structure of the machine.

Referring now in detail to the drawings, I show in Fig. 1 the top face of a piece of plain flat knitted fabric having a yarn, generally designated as A, of inelastic structure, which is formed to make a plurality of courses 1, 2 and 3. Into each of some of the knitted loops is a weft elastic or inelastic yarn or thread, generally designated as B. The weft elastic yarn B has been laid over the top portion of each needle loop of one course 1 and through each sinker loop of the adjoining course 2. In the next course, the weft elastic yarn B has been laid upon each needle loop of one course 2 and through the sinker loop of the adjoining course 3, see Fig. 1.

Above the regular knitting needles, each of which is generally designated as C, is positioned a picot bar, generally designated as D, which picot bar has points 10 spaced one for each two knitting needles, that is, above every other spring beard knitting needle C is located a picot point in the bar. The purpose of the picot points 10 is to close the beard on every other needle C at predetermined times so that in the process of laying in the yarn B, every other beard of the knitting needles is closed, and the yarn B which is laid across the front of the needles by a separate carrier will not be taken under the beards. The spring beard needles, alternately located to those whose beards are closed, carry the elastic yarn B within their beards together with loops of the knitted fabric. Therefore, the elastic yarn B during the non-knitting process is positioned to lie alternately in front of and in back of the shanks of the spring beard needles. In the knitting operation which follows the elastic yarn positioning operation, the elastic yarn will be engaged with the knitted loop every other wale, although the elastic yarn will be in every course or in spaced courses depending upon the position that is desired to place the elastic yarn.

It will be apparent that with the beards of alternate needles closed, the elastic yarn B, which is in front of all of the needles, will not come under the beards closed by the picot points during the downward motion of the needles and points of the laying in step, but the elastic yarn will be thrust in back of the shanks of the knitting needles whose beards were closed.

Referring more specifically to the non-knitting action or elastic yarn laying-in step wherein the elastic yarn is located in the back of the knitting needle, as illustrated in Figs. 4 to 11, inclusive, I shall describe the action of the picot point 10, the sinker 12, the knitting needle C, and the

knockover bit 14. The elements (not shown) which actuate the picot point, the sinker 12 and the knitting needle are not shown nor described in detail, because these elements are the customary parts of the regular cotton or flat machine. The elements of the Cotton or flat machine are altered in their operation to execute the process constituting my invention.

In Fig. 1 I show that the courses 1 and 2 have have been knitted and the elastic B has been laid between courses 1 and 2, and the elastic yarn B has been laid over the top portion of each needle loop of course 1 and through each sinker loop of the adjoining course 2. In courses 2 and 3 the elastic yarn has been laid over each needle loop of one course 2 and through the sinker loop of the adjoining course 3. In courses 1—2 and 2—3 the elastic yarn B goes through each of the sinker loops, thereby varying the position of the elastic yarn. The laid in elastic yarn B is shown in front of and in back of the shanks of adjacent needles, and this laying in of the elastic B has been accomplished during a non-knitting operation, hereinafter further explained.

The sinkers 12, the picot points 10, and the knitting needles C in Fig. 1 are in the position to commence the regular knitting operation. Referring to Figs. 4 to 11, inclusive, which show the laying in course, the elastic B is laid upon the sinker 12, and then the sinker is pushed forward as in Fig. 4. The picot point 10 is then moved to close the beard of the needle B with the sinker in identical positions in Figs. 4 and 5. With the beard of the needle closed, the picot point and the spring beard needle are moved in unison downwardly so that the picot point prevents the elastic yarn B from going under the beard of the needle (Fig. 6). The sinker 12 now commences to move backwardly, and the picot point is also moved backwardly to open the beard and permit the fabric loop to go under the beard, as shown in Fig. 7, and the picot point 10 remains substantially stationary as the sinker 12 moves to its rearward position, and the needle 12 continues its downward course until the elastic yarn B reaches the knocking-over bit 14 (see Fig. 8). The sinker 12 and the picot point 10 now remain stationary as the knitting needle continues its downward motion until the loop of the fabric A is caught into the beard of the needle, and the elastic assumes the position substantially over the knitting needle. The picot point 10 covers the beard of the needle to prevent the elastic yarn from slipping over the front of the beard, as shown in Fig. 10, and the picot point 10 and the needle C commence the upward motion. However, it may be desirable at times to omit the closing of the beard, as shown in Fig. 10. The sinker 12 has been moved out as the picot point and the knitting needle commence their upward journey, as in Fig. 10, the elastic B and the fabric will not rise or catch upon the beard of the knitting needle, and the fabric will be forced down upon the shank of the needle. The elastic yarn by this operation remains in the rear of the knitting needle C, as illustrated in Fig. 11, the sinker 12 is retracted, and the picot point 10 also is elevated. The elastic yarn is now in the back of the needle, and the regular knitting operation can now be performed.

In Figs. 12 to 15, I illustrate the essential steps in the knitting needle adjacent to the knitting needle which is engaged by the picot point. The elastic B is laid in Fig. 12 the same as it is in Fig. 4, and the sinker

12 holds the elastic B in position. The spring beard knitting needle is drawn outwardly, and as the spring beard is open, the beard of the needle will engage the elastic B, thereby drawing the elastic yarn downwardly after the sinker has been retracted as in Fig. 14.

Fig. 14 also shows that the elastic yarn B lies adjacent the knitted loop; and as the needle C is elevated, as in Fig. 15, the elastic yarn B lies adjacent the front shank of the needle, the sinker is retracted, and the loops of the fabric are upon the knitting needle.

At this point it may be worthwhile to note that Figs. 11 and 15 show knitting needles in a position for a regular knitting course.

The amount of elastic yarn laid into any one course is controlled by the distance the sinkers and dividers are moved forward between the needles and by the amount of tension placed upon the yarn. By a variation of these two factors, any desired amount may be laid into a given course.

My invention may be applied to various fabrics, such as plain fabric, a non-run type of fabric, a fabric having designs therein, or a lace type of fabric.

Although my invention has been described in considerable detail, such description is intended as illustrative rather than limiting, since the invention may be variously embodied, and the scope of the invention is to be determined as claimed.

I claim:

1. A method of laying in elastic yarn and knitting inelastic yarn in a flat knitting machine having horizontally positioned sinkers and vertically arranged spring beard needles, which method comprises the steps of knitting a body of inelastic yarn, laying in an elastic yarn upon the sinkers during a non-knitting cycle of the machine, closing the beards of alternate needles whereby the closed beard knitting needles will not carry the elastic yarn as they are lowered, retracting the sinkers whereby the elastic yarn may move over the beards of the closed beard knitting needles, keeping the beards of the alternate knitting needles closed during their elevation so that the elastic yarn is located at the back shanks of the closed beard knitting needles, and knitting the body inelastic yarn whereby the elastic yarn will be laid in the sinker loops of one course and over the needle loops of another immediately adjacent course.

2. A process of knitting a body yarn and weaving an elastic yarn in a plain knitted fabric upon a flat knitting machine having horizontally positioned sinkers, vertically arranged spring beard needles, a vertically positioned picot bar includ-

ing picot points alternately positioned over said spring beard needles comprising the steps of knitting a plain fabric of body yarn, laying the elastic yarn coursewise upon said sinkers during a non-knitting cycle, closing the beards of alternate knitting needles, lowering all of the knitting needles so that the elastic yarn and the fabric loops engage one another in the open beard needles, the elastic thread riding over the outside of the closed beard needles, closing the beards of alternate knitting needles, and elevating all of the knitting needles whereby the elastic yarn is moved in front of the shanks of alternate needles and in back of the shanks of the needles between the alternate needles.

3. My invention as set forth in claim 2 including laying in body yarn, and knitting the body yarn to the fabric loops on the knitting needles whereby the elastic yarn will be locked in position.

4. A process of laying an additional yarn into ground knitted fabric loops on a flat machine, said process comprising the laying of the exact length of additional yarn upon sinkers without applying any tension thereto, closing the beards of alternate knitting needles, lowering all of the knitting needles during a non-knitting cycle of the machine whereby the additional yarn may pass over the outside of the closed beard knitting needles, raising all of the needles and permitting all of the needles to have the beards open, and closing the beards of alternate needles during the upward movement of all of the needles whereby the additional yarn will lie alternately in front of and back of the shank of alternate knitting needles, and laying in a body yarn and knitting said body yarn whereby the additional yarn is laid into position.

5. A process of knitting a body yarn and weaving an additional yarn in a plain knitted fabric upon a flat knitting machine having horizontally positioned sinkers, vertically arranged spring beard needles, a vertically positioned picot bar including picot points alternately positioned over said spring beard needles comprising the steps of knitting a plain fabric of body yarn laying the additional yarn coursewise upon sinkers during a non-knitting cycle, closing the beards of alternate knitting needles, lowering all of the knitting needles so that the additional yarn and the fabric loops engage one another, elevating all of the knitting needles whereby the additional yarn is moved in front of the shanks of alternate needles and in back of the shanks of the needles between the alternate needles.

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