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FABRIC TAKE-OFF DEVICE

Joseph D. Marks, Wyomissing, Pa., assignor to Berkshire Knitting Mills, Wyomissing, Pa., a corporation of Pennsylvania

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My invention relates generally to fabric draw-off devices, and particularly to means of this character for use in connection with straight or full fashioned knitting machines.

5 The production of hosiery, by full fashioned footers, requires means for selectively holding certain of the narrowing points inoperative during the formation of the foot portion of the stocking, and when fashioning the toe part and producing therein the so-called "diamond points". In this connection there is commonly employed mechanism frequently referred to as the "covering motion"; such mechanism including a point covering knife which operates during the knitting in the foot portion of a stocking to prevent the fashioning points, especially those of the small combs used for fashioning the toe part, from coming into contact with the needles during the fashioning of the sole of the stocking when operation of the small narrowing combs is not required.

10 During the narrowing of the sole, when the covering knife of each knitting section moves into and out of engagement with the small narrowing combs to prevent coaction between the latter and the needles, the free end of each knife so closely approaches the usual fabric take-up bar that it has heretofore been impossible to utilize a fabric-engaging hook on that portion of the bar in line with the covering knife. In view of this feature, an even distribution of tension could not be affected across the width of the fabric. Also, the hook bar devices heretofore employed necessitated careful handling to prevent the formation on the intermediate hooks of burs and sharp edges which damage the knitted fabric.

15 One object of my invention is to overcome the above-mentioned and other objections incident to devices of this general character heretofore employed, and to provide a device by which the tension on the fabric is held more uniform, whereby the fabric is protected against injury by contact with burs and sharp edges on the tension bar or hooks, and by means of which a fabric engaging hook may be maintained in place in line with the covering knife and free from the swing thereof.

20 It is also an object of the invention to render such device simple and durable in construction, economical to manufacture and effective in its operation.

With these and other objects in view, which will become apparent from the following detailed description of the illustrative embodiment of the invention shown in the accompanying drawings, my invention resides in the novel elements, features of construction and arrangement of parts in cooperative relationship as hereinafter more particularly pointed out in the claims.

In the drawings:

25 Figure 1 is an enlarged perspective view of a novel hook device forming part of my invention;

Figure 2 is a fragmentary perspective view showing my improved fabric draw-off device in use;

Figure 3 is an enlarged plan view of the draw-off device shown in Fig. 2;

Figure 4 is a sectional view taken substantially on the line 4—4, of Fig. 2, and showing additional parts; and

Figure 5 is a view, similar to Fig. 3, but of a modified form of my invention.

Full fashioned stockings are usually knit on two machines, the welt, leg and heel tabs being produced on a "legger" knitting machine, and transferred to a "footer" machine, which knits the sole, instep and toe portions, thus producing a continuous length of flat knit stocking fabric in which the line of jointure between the leg and foot is not perceptible in the finished product.

After a leg blank 12 has been knitted on a "legger" machine, it is transferred to a "footer" in the usual manner, so that each of the needles 13 engages a loop of the topping-on course previously knotted on the legging machine. The needles 13 are held in spaced relation to each other in a bed 14 which is carried by a bar 15 by means of a clamp 16 adjustably secured thereto by a bolt 17 in usual manner, as shown in Fig. 4. Connected to the fabric 12, by means of a draw-off bar 18 and the strap 19, is the fabric take-up reel 20 carried by the rotatable shaft 22, which structure operates in a well known manner to exert a desired degree of tension on the fabric to maintain the latter taut. The fabric is supported by the reel 20, the strap 19, and the respective hook elements 10 and 33.

Figs. 2 and 4 disclose various parts of a Reading full fashioned stocking machine embodying the mechanism and elements of my invention, only those parts of the various mechanisms necessary to an understanding of the invention being illustrated. The various other parts and mechanisms and their operation being well known in the art, and shown and described in the "Reading" Pull Fashioned Knitting Machine Catalogue (copyright 1929), published by the Textile Machine Works, Reading, Pennsylvania.

In accordance with one form of my invention, single or one-piece elements, such as hooks, are positioned along a tension bar, as by placing
one at each end, one at the center, and one between each end hook and the center hook, of the bar, along the upper side thereof. The bar may be substantially straight, across the take-off edge of the fabric, or extended forwardly at its ends. Each end of the device is provided with the usual hook, whereas the intermediate fabric engaging devices or hooks comprise a mounting portion or base ring secured to the bar as by screws and an S-shaped fabric engaging portion, whereby the fabric of the fabric engaging devices are correctly faced to engage the fabric, but the end hooks are forward or toward the needles, and the other reverse hooks rearward or toward the take-up reel, from the tension bar, in the draw-off direction. By this arrangement, the fabric is tensioned uniformly, the center holding device being disposed beyond the path of movement of the covering knife; the S-shaped devices holding the fabric clear of the bar and of the screws.

The S-shaped hook device 10 of Fig. 1 includes a shank 10c, having a ring 10b formed at one end for receiving a holding member, such as a screw 24, Figs. 2, 3, 4, and 5, whereby the hook may be secured to the take-up bar 18. The hook further comprises a prong or point 10c for engagement of the fabric, and an intermediate part 10a for connecting the part 10a to the prong 10c. The prong 10c and the part 10d together form a hook for engaging the fabric, and the part 10a and the part 10d constitute a structure for spacing the fabric engaging hook part 10d from the base of the device. Altoho the shanks 23a, Figs. 2 and 3 of the usual end hooks 23 extend from the take-up bar 18 toward the needles 13 and the bases 10c of the intermediate hooks 10 extend from the take-up bar away from the needles in the draw-off direction, the prongs 23c of the hooks 23 and the prongs 10c of the hooks 10 are disposed at opposite sides of the hook holding screws 24, each extend away from the needles to so hook into the fabric in the same direction as to draw it from the needles.

Heretofore, when hooks like the hooks 23 were engaged at both the end and intermediate portions of the bar, since the prongs of all of the hooks were positioned at the one and same side of the holding bar toward the needles, the fabric 12 engaged the bar and the screws 24 which hold the intermediate hooks to the bar. By the invention, the fabric normally is held taut above the screws and spaced therefrom, free from contact with jagged and sharp edges on the bar and or the screws to avoid impairment of the fabric.

In operation, during the first dip, or loop-engaging motion of the narrowing mechanism N, which is effected simultaneously with each sole narrowing operation, performed with large outer combs, the small narrowing combs 25 which are centrally positioned at this time, are held inoperative, during the sole narrowing operations, by means of the covering knife 26. Following the movement of the narrowing points into the knock-over bit structure, the covering knife 26, carried by the bracket 27 on the shaft 28, breaks engagement with the narrowing points 29 of the center combs during an oscillating movement of the shaft 28 and the free ends thereof follow the arcuate path 32, indicated by dot-and-dash lines in Fig. 4. During the outward swing of the covering knife 26, away from the needles, the simultaneous downward movement of the narrowing mechanism M causes the knives 26 to engage the fabric 12. The path of outward swing of the lower end of the knife 26 so closely approaches the hook bar 18 that a hook of usual construction may not be employed at the center section of the bar, and the omission of a hook at this position permits an even distribution of tension across the width of the fabric, thus causing the fabric to be sleazy and loosely knit. Although the prong portions 10c and 23c, of the hooks 10 and 23, respectively, may be similar to each other, instead of forming the ring 10b directly on an extension of the hook shank to the prong 10c, as in the construction of the hook 23, the base 10a is spaced from the prong 10c by a strut portion 10d on which the fabric 12 normally rests in spaced relation to the bar 18 and to the screws 24. The diagonal strut portion 10d, in addition to positioning the fabric 12 spaced above the bar 18 and the screws 24, also renders the hook flexible, whereby the tension on the fabric is more uniformly distributed between the hooks.

In the fabric draw-off mechanism of a "footer" machine, it is essential that the hooks 29 engage the heel tabs 12c in order to transfer the tension to the selvages of the foot portion. It is also desirable to have a hook engage the center 25 of the fabric, and to include intermediate hooks to distribute the tension exerted by the take-off of the fabric 19 uniformly across the width of the fabric. The reverse hook device of the invention provides the above-mentioned features in a simple economical structure.

In contrast to the complicated structure of certain prior fabric draw-off appliances and the difficulty encountered when attaching them to, and disengaging them from, the fabric, my invention may be manipulated as readily as standard structures, such as that shown and described in the above-mentioned catalogue, permits the fabric tension to be uniformly distributed, elevates the fabric from the hook bar and adjacent parts, and facilitates the production of hosiery of a superior grade.

If it is desired to space the intermediate hooks 10 a greater distance in the fabric take-off direction from the end hooks, than as shown in Fig. 3, the offset end hook bar of Fig. 5, may be employed, on which the hooks 23 are carried. The prong portions 30 and the hooks 10 are secured to the intermediate portion 31.

Of course, the improvements specifically shown and described by which I obtain the above results, can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

What I claim is:

1. In a knitting machine, the combination with a covering knife, a tension bar, a draw-off mechanism, and means for connecting the bar to said draw-off mechanism, of means for engaging the fabric to the bar including means for connecting a portion of the fabric to the bar in line with the covering knife in the take-off direction and disposed clear of the path of travel of the knife adjacent to the fabric connecting-on position of said bar, said means also holding the fabric off the bar.

2. In a fabric-tensioning device, the combination with a knitting machine including needles and a covering knife, a tension bar, draw-off mechanism, and means for connecting the bar to said draw-off mechanism, of means for connecting the fabric to the bar including end and intermediate single wire-like elements spaced therealong and having mounting-base rings, and screws in the rings securing the elements to the bar, the rings of the end elements each having a shank extending to...
ward the needles and terminating at the lower end of a hook of substantially C-shape and the rings of the intermediate elements each having a shank extending away from the needles and terminating at the lower end of a hook of substantially 8-shape.

3. In a knitting machine, the combination with a bank of needles, a covering knife, and a tension bar, of means for connecting the fabric to the bar including elements on the bar at the ends, at the center and between the center and the ends, said end elements extending from the bar toward the needle bank, said center and intermediate elements comprising single members holding the fabric off adjacent parts of the bar and the center element being disposed clear of the path of travel of said covering knife adjacent to the fabric connecting-on position of the bar.

4. In a knitting machine, the combination with a bank of needles, a covering knife, and a tension bar along the take-off side of the needle bank having ends extending toward said bank, of means for connecting the fabric to the bar including elements on the bar at said ends, at the center and between the center and the ends, said end elements extending from the bar toward the needle bank, said center and intermediate elements comprising single members holding the fabric off adjacent parts of the bar and the center element being disposed clear of the path of travel of said covering knife adjacent to the fabric connecting-on position of the bar.

5. In a knitting machine, the combination with a bank of needles, loop engaging points cooperating with said needles, a tension bar along the draw-off side of the needle bank, a draw-off mechanism, means for connecting the bar to said mechanism, and a covering knife for rendering said points inoperative swingable into and out of engagement therewith, of means for connecting the fabric to the bar including a single hook member for connecting a portion of the fabric to the bar in line with the covering knife in the take-off direction and disposed clear of the path of travel of the knife adjacent to the connecting-on position of said bar.

6. In a knitting machine, the combination with a bank of needles, loop engaging points cooperating with said needles, a tension bar along the draw-off side of the needle bank, a draw-off mechanism, means for connecting the bar to said mechanism, and a covering knife for rendering said points inoperative swingable into and out of engagement therewith, of means secured to the exterior of the tension bar for connecting the fabric to the bar including a one-piece 8-shape hook member for connecting a portion of the fabric to the bar in line with the covering knife in the take-off direction and disposed clear of the path of travel of the knife adjacent the connecting-on position, said member holding the fabric in spaced position above the bar.

7. In a knitting machine, the combination with a bank of needles, loop engaging points cooperating with said needles to effect special loop formations, a fabric draw-off mechanism, a tension bar intermediate the needles, and the draw-off mechanism, means for connecting the bar to said mechanism, and a covering knife swingable into and out of engagement with said loop engaging points, of means secured upon the exterior of the tension bar for connecting the fabric to the bar including end members having hook and base portions extending in a common direction, and an intermediate member having hook and base portions extending in opposite directions for connecting the fabric to the bar in line with the covering knife and disposed clear of the path of travel of the knife adjacent to the fabric connecting-on position of said bar.

8. In a knitting machine, the combination with a covering knife, a tension bar, a draw-off mechanism, and means for connecting the bar to said mechanism, of means for connecting the fabric to the bar including a reverse hook member for connecting the fabric to the bar in line with the covering knife in the take-off direction and disposed clear of the path of travel of the knife adjacent to the fabric connecting-on position of said bar.

JOSEPH D. MARKS.