Sept. 27, 1955 E. FISCHER 2,718,769

STOCKING AND METHOD OF MANUFACTURING THE SAME

Filed Aug. 16, 1950

Fig. 1.

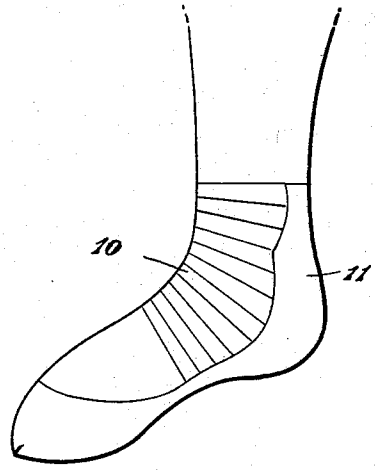


Fig. 2.

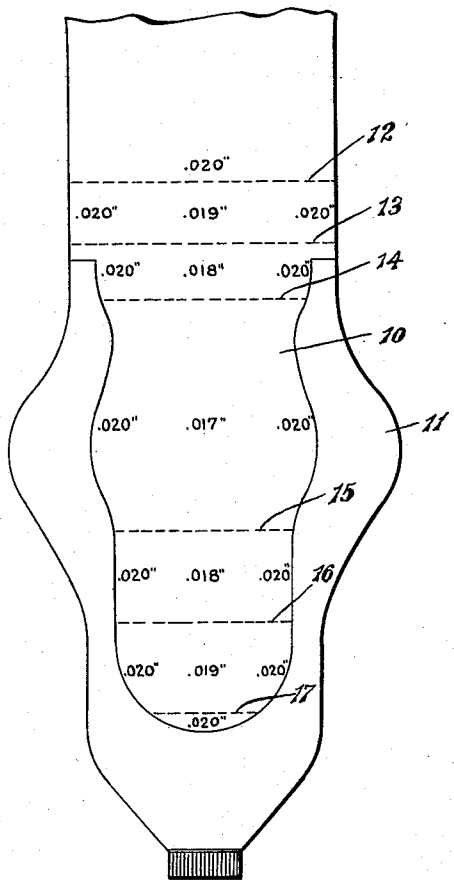


Fig. 3.

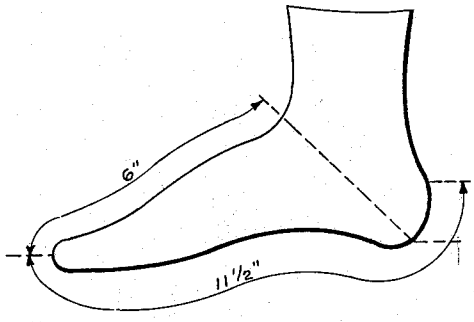
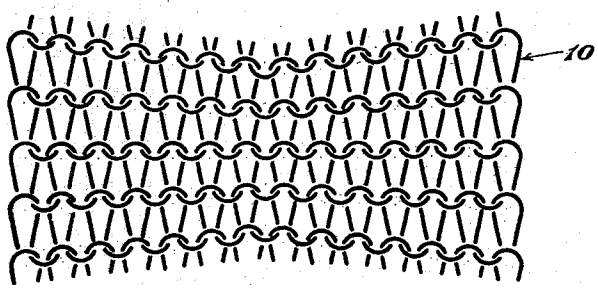


Fig. 4.



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STOCKING AND METHOD OF MANUFACTURING THE SAME

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9 Claims. (Cl. 66—185)

This invention relates to stockings and method of manufacturing the same, and is directed more particularly to knit stockings manufactured by knitting machines constructed for the purpose. While the invention is applicable to either full-fashioned stockings or to circular-knit stockings, the description is simplified by arbitrarily selecting a full-fashioned stocking as exemplary of the invention. Even more specifically, the invention contemplates improvement in manufacture of stockings in the particular part thereof which in use is at the front and top of the foot from the toe portion of the stocking, across the instep and up to the leg portion of the stocking. For brevity, this selected portion of the stocking will be designated herein as the middle portion as it lies between toe, sole and heel reenforcing edge portions of the stocking blank as knit on a flat-knitting machine.

This middle portion of the foot, almost always, consists of the same yarn, which may be silk, nylon, rayon, cotton or other material, as the leg of the stocking, and extends from the toe to the ankle portions of the stocking. The ankle portion of a stocking is commonly one to two inches above the start of the high heel portion, and the middle portion consequently is not only exposed to view in use, but is the most conspicuous part of the stocking. Stockings as heretofore manufactured inherently wrinkle at this middle portion and are noticeably unsightly as well as uncomfortable.

The present invention has for its primary object, improvement of stockings and method of manufacture thereof to accomplish elimination or correction of the prevalent wrinkling of prior art stockings.

A further object of the invention is to knit the stocking substantially to proper shape to fit the wearer's foot.

Another object of the invention is to avoid extensive distortion of the knit yarn by shrinking or other process for shaping after knitting is completed.

Still another object is to knit a form-fitting stocking on present-day machines and with equal rapidity to present-day manufacture of stockings.

Again, an object of the invention is to save yarn and yet provide a better stocking.

Other objects of the invention will appear to those skilled in the art to which it appertains, as the description proceeds, both by direct reference thereto and by implication from the context.

Referring to the accompanying drawing in which like numerals of reference indicate similar parts throughout the several views;

Figure 1 is a completed stocking in side elevation viewed in flattened condition, and indicating some of the cross-courses of the knit yarn across the foot portion;

Figure 2 is a portion of a stocking blank from toe to ankle, in its distended condition as knit and before looping and seaming;

Figure 3 is a classical side elevation of a foot and its dimensions; and

Figure 4 is a magnified plan of a portion of the knit material showing graduation of the loop lengths in a plurality of courses.

For purpose of better understanding of the present invention, attention is first directed to Figure 3 wherein it will be observed that the distance from the toe to the instep is much shorter than the distance from the toe to the top of the heel, and for a characteristic foot where the first mentioned distance is six inches, the other will be eleven and a half inches. Yet in knitting a stocking, the same number of cross-rows of stitches or loops of the yarn exist for both of these distances. The result is, that with the usual prior-art knitting there is too much material at the front-center of the foot portion of the stocking when knit to provide adequate number of courses or rows to fulfill the requirements for material from toe to top of the heel next the bottom and rear of the stocking. Consequently the usual stocking when coming off the knitting machine has no bend at the instep and has to be put on a form and the stocking material shrunk by heat or other means to enforce a shape upon the material corresponding to the form used and to thereby obtain a degree of forward projection of the foot portion of the stocking from the leg portion thereof. Actually, by employment of this prior-art method, the yarn is given a permanent stretch toward and at the heel and a contraction in approach to and at the instep. The yarn is thereby thinned where the wear is most severe and becomes more bulky and promotes wrinkles at the instep where form fitting is most desirable.

According to the present invention, the lengths of the knitted loops **10** are graduated successively across the foot portion of the stocking so that those next the reenforced portions **11** of sole and heel have substantially the length of the standard loops employed in knitting the leg portion, but progressively are shortened toward and at the center of each course as clearly shown in Fig. 4. Assuming, as a specific example, that the leg portion of the stocking is knit with fifty courses to the inch, then normally, each such course will occupy substantially .020" lengthwise of the stocking. Immediately adjacent the reenforced heel and sole portions, the loops of the unreenforced middle portion of the stocking foot also have their loops .020" in length, but as the course approaches the front center of the stocking the successive loops are shortened more and more so that at the center their length will be less than .020". This graduation or shortening of the loops is less pronounced in courses approaching the leg and also, if so desired, in approaching the toe. Thus there is a graduation of loop length viewed transversely of the foot and viewed longitudinally of the foot. The arbitrary designations of loop lengths applied at intervals on the knitted material of Fig. 2 are illustrative of this double graduation.

Explanatory of Fig. 2, it may be said that the top cross line **12** indicates presence thereabove in the leg portion, of loops all of which are of equal length and there designated as all having the dimension of .020". Between said line **12** and a next lower line **13** at about the top of the heel reenforcement, the indication is given by the drawing of the presence of a series of courses wherein the outside loops still have a length of .020" but the graduation of loops has decreased the lengths toward the center thereby decreasing the center loops to .019", and below that, between lines **13** and **14**, down to .018" and then below that, a long stretch at .017" between lines **14** and **15** representing the instep portion of the stocking, below which the center loops are there indicated as beginning to lengthen, as between lines **15** and **16**, to .018", then between lines **16** and **17** up to .019" and finally to .020" at the toe between line **17** and the toe reenforcement. Throughout these rows or courses having designated shortened center loops there is a graduation from end

loops all of which are substantially .020" next the reenforcement. The change within each row or course and the change in knitting the several series of courses is a gradual transition. The result of all of these graduated decreasing loop lengths accomplishes a shortening of the over-all length of the material at the front center of the foot of several inches so that, when the stocking blank is folded and seamed, the foot portion bends at the instep and projects forwardly as indicated in Fig. 1, and has a shape corresponding to that of a human foot and will be form fitting when in use without any bulging or wrinkling of the material at the instep.

It will be understood, that with the knitting performed on a flat knitting machine, a special regulating stitch-motion cam will be used in connection with an automatic regulating stitch motion, to obtain the loop-length graduation above described, I do not, however, limit myself to any particular machine or device for effecting the described graduations, nor do I limit myself to the precise amounts of graduation herein given as an example, as the machine and the graduations accomplished are subject to variation to meet manufacturing requirements and desire of the manufacturer.

Furthermore, while I have shown graduation of loop lengths at the front center portion of the foot portion in Figure 2 as existing from the leg portion to the instep portion and then in reverse order to the toe, it is within the scope of the invention to provide the graduation from the leg portion to reduce the loop lengths at the instep portion as shown, and to then continue knitting to the toe with the same reduction of loop length as at the instep. Thus there would not be, in the specific showing of Fig. 3, an increase from the .017" loop length to the .018", .019" and .020" loop lengths in approach to the toe, but the same loop length of .017" would be continued from the instep portion to the toe. In fact, the invention contemplates knitting from the instep to the toe with the reverse order of graduation as shown; or with no further graduation toward the toe from the instep; or with a less graduation than shown in the drawing, thereby not returning the loop lengths in approach to the toe to the same loop length as used in knitting the leg of the stocking. For instance it may be returned to loop length of .018 inch at the toe or to .019 at the toe instead of fully to .020 inch at the toe.

Practice of the described invention obtains a more perfect fit of the stocking without distortion of the yarn, and in attainment of this beneficial result provides a stocking which does not wrinkle at the instep, and one which does not pull at the heel, and one wherein both the looping line of the toe and the reenforced heel will remain in their proper positions on the foot of the wearer. A marked saving of yarn is obtained in making stockings in accordance with my invention and manufacturing cost is further reduced by the better form-fit of the knitted stocking in its finishing operations.

I claim:

1. A stocking having leg, heel, sole and toe portions, and having a middle portion between said leg and toe portions and across the stocking between the sides of the heel and sole portions, said middle portion being comprised of courses of knitted loops, said courses being in successive series with the courses of any one series substantially alike and graduating to shorter loop length medially of the several courses, and the graduated loop lengths of courses of one series differing from the graduated loop lengths of courses of a successive series but all of said courses of all series having loops at the ends thereof substantially of equal length.

2. A stocking having leg, heel, sole and toe portions, and having a middle portion between said leg and toe portions and across the stocking between the sides of the heel and sole portions, an intermediate part of the length of said middle portion between said leg and toe portions comprising an instep portion, said middle portion and its instep portion being comprised of courses of knitted loops, said courses being in successive series with the courses of any one series substantially alike and graduating to shorter loop length medially of the several courses and with the loops of the successive series of courses in approach from the instep portion to the toe portion graduating toward equality of loop lengths within the courses.

3. A stocking having leg, heel, sole and toe portions, and having a middle portion between said leg and toe portions and across the stocking between the sides of the heel and sole portions, an intermediate part of the length of said middle portion between said leg and toe portions comprising an instep portion, said middle portion and its instep portion being comprised of courses of knitted loops, said courses being in successive series with the courses of any one series substantially alike and graduating to shorter loop length medially of the several courses and with the loops of the series of courses next said leg portion having less graduation of loops than the next following series of courses toward the instep.

4. A stocking having leg, heel, sole and toe portions, and having a middle portion between said leg and toe portions and across the stocking between the side of the heel and sole portions, an intermediate part of the length of said middle portion between said leg and toe portions comprising an instep portion, said middle portion and its instep portion being comprised of courses of knitted loops, said courses being in successive series with the courses of any one series substantially alike and graduating to shorter loop length medially of the several courses and with the loops of the series of courses next said leg portion having less graduation of loops than the next following series of courses toward the instep, and graduation of loops in successive series of courses from the leg portion to the mid-length of the instep portion each being more pronounced than the preceding series of courses.

5. A stocking having leg, heel, sole and toe portions, and having a middle portion between said leg and toe portions and across the stocking between the sides of the heel and sole portions, said middle portion being comprised of courses of knitted loops said courses being in successive series with the courses of any one series substantially alike and graduating to shorter loop length medially of the several courses and the courses of one series differing from the graduated loop lengths of courses of a successive series but all of said courses of all series having loops at the ends thereof substantially of equal length.

6. A stocking having leg, heel, sole and toe portions, and having a middle portion between said leg and toe portions and across the stocking between the sides of the heel and sole portions providing an instep portion, said middle portion and its instep portion being comprised of knitted loops, said knitted loops being graduated to a shorter length in series of courses from the leg portion to the center of said middle portion, said loops being graduated coursewise to a shorter loop length medially of said middle portion.

7. A stocking having leg, heel, sole and toe portions, and having a middle portion between said leg and toe portions and across the stocking between the sides of the heel and sole portions providing an instep portion, said middle portion and its instep portion being comprised of knitted loops, said knitted loops being graduated to a shorter length in series of courses from the toe portion to the center of said middle portion, said loops being graduated coursewise to a shorter loop length medially of said middle portion.

8. A stocking having leg, heel, sole and toe portions, and having a middle portion between said leg and toe portions and across the stocking between the sides of the heel and sole portions providing an instep portion, said middle portion and its instep portion being comprised of knitted loops, said knitted loops being graduated to a shorter

length in series of courses from the leg portion to said middle of the middle portion said loops being graduated coursewise to a shorter loop length medially in each series of courses, and said knitted loops between the toe portion and the middle of said middle portion also being graduated to a shorter length in series of courses from the toe portion to said middle of said middle portion, said loops being graduated coursewise to a shorter loop length medially in each series of courses.

9. A method of manufacturing a knitted stocking, comprising knitting the middle portion thereof between leg and toe portions, and across the stocking between the sides of the heel and sole portions with a succession of courses of loops in which the loops at the ends of the courses are all of substantially the same length, and graduating the lengths of the loops across the middle portion from one

heel and sole portion to the other within each of a plurality of said courses during the knitting thereof such that the loops toward the middle of each of said plurality of courses are knit shorter than the loops at the ends of each of said courses next to the heel and sole portions.

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