May 18, 1943 J. E. GARRETT 2,319,224

FULL FASHIONED HEEL CONSTRUCTION

Filed Oct. 5, 1940 2 Sheets-Sheet 1

Fig. 1.

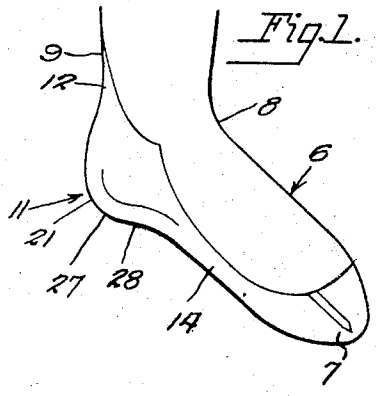
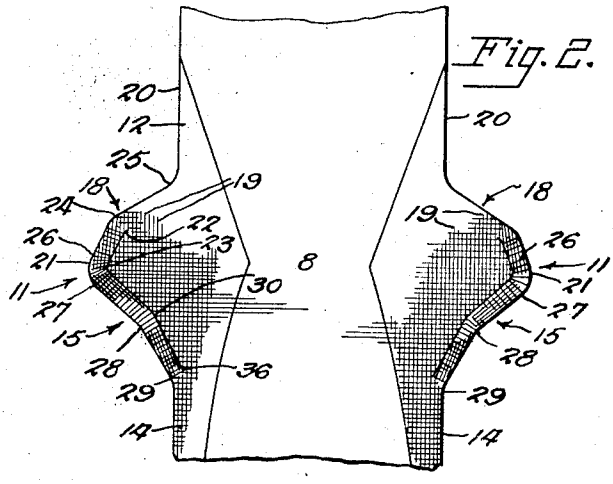


Fig. 2.



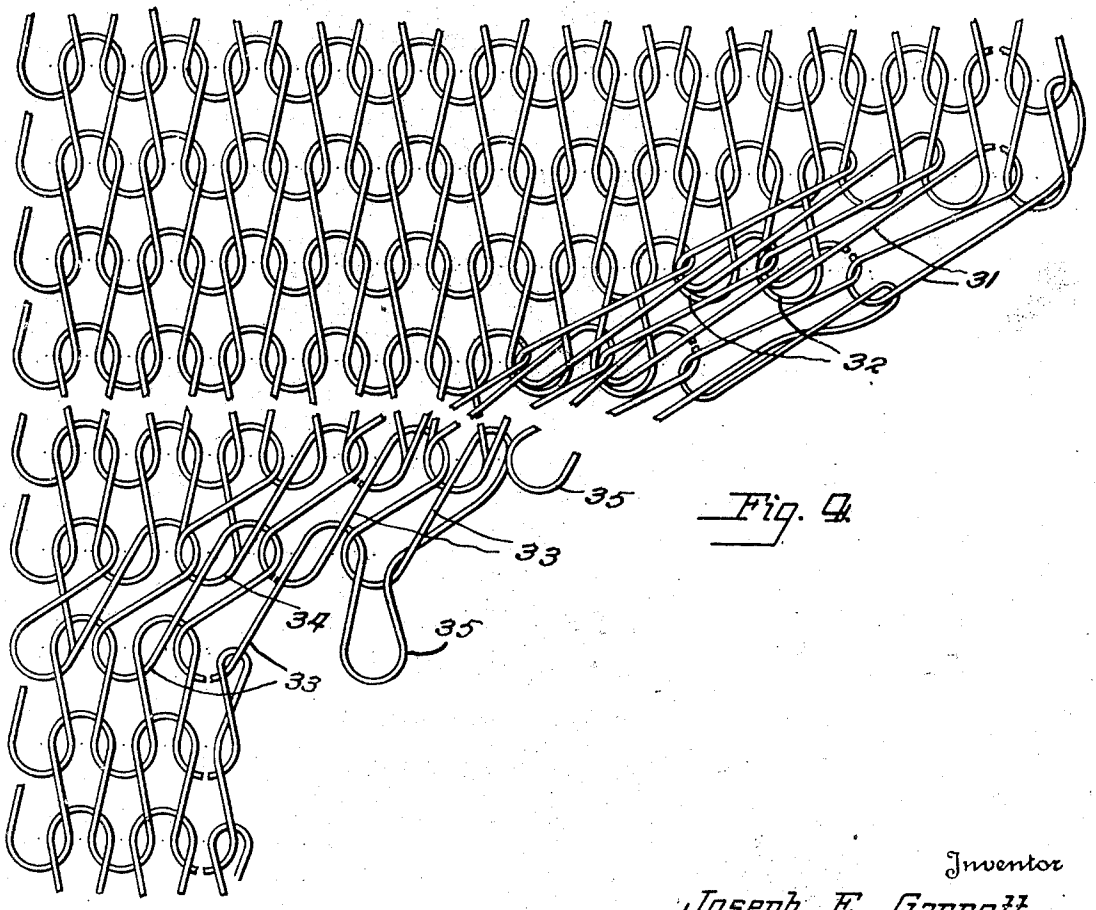


Fig. 4.

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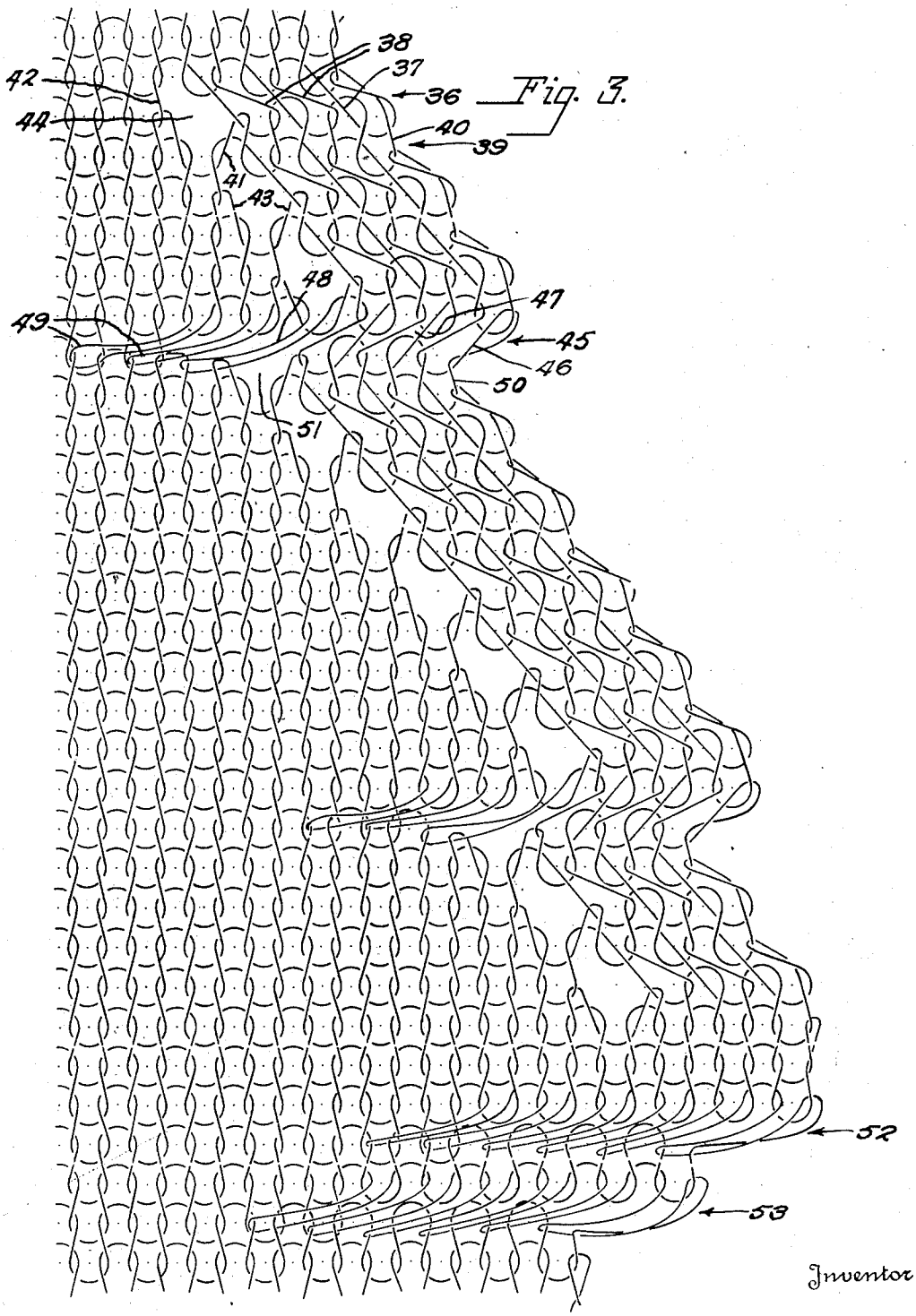

Fig. 3.

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UNITED STATES PATENT OFFICE

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FULL-FASHIONED HEEL CONSTRUCTION

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Application October 5, 1940, Serial No. 359,956

2 Claims. (Cl. 66—187)

This invention pertains to full fashioned hose, such as are knitted on the, so-called, Cotton machine, and is especially directed to the heel structure of full fashioned hose, and the art of producing the same.

In accordance with the practice of the present invention, the heel fabric is fashioned to fit the heel of the wearer, the fashioning producing a heel area of such shape that the fabric lies smoothly on the heel, and over the rounded part thereof. The fabric of the present invention is devoid of the dog ears, so-called, present in full fashioned heel fabric of the conventional prior art practice.

The heel fashioning in the fabric of the present invention may comprise widening, or narrowing, or a combination of the both to provide both convex and concave roundness along the edge thereof, in places to produce the desired shape to fit the heel. The fashioning provides the desired shape to portions of the fabric inwardly of the edge thereof which contributes to a smooth fitting heel. Thus, the fashioning comprises more than shaping the fabric to produce a blank with desirable edge contour, but provides a fabric shaping inwardly from the edge of the blank which causes the hose to lie smoothly on the foot of the wearer.

The heel fabricated in accordance with the practice of the present invention is devoid of terminal courses such as are conventionally present at the ends of the heel tabs of prior art stockings. This enables the elimination of heel looping, and facilitates the hose being closed by a single seaming operation producing a seam extending continuous into the leg and foot through the heel area. The stocking can be knitted continuous, on a single machine. This is a departure from the conventional prior art practice of knitting the leg on a legger, and thereafter knitting the foot on a footer, which requires the additional intermediate operation of topping.

Under the practice of the present invention the entire stocking is knitted on a legger, beginning with the welt and continuing through the leg, heel, and foot to the completion of the toe, the entire stocking being completed as a continuous operation of the machine.

The heel fashioning of the present invention comprises a novel form of fabric widening, and a novel method of producing the same. The invention also contemplates a novel form of narrowing, as well as the method of producing the same.

Reference is made to the accompanying drawings for a disclosure of one practical embodiment of the invention, the detailed description of which follows hereinafter.

In the drawings:

Figure 1 shows the foot portion of a full fashioned hose embodying a heel of the invention;

Figure 2 shows a fabric blank of the heel of Figure 1, with parts broken away;

Figure 3 shows one form of fashioning employed in the practice of the invention; and

Figure 4 shows a detail of narrowing stitches which can be used in the practice of the invention.

Viewing the drawings, the hose of Figure 1 comprises the foot portion **6**, terminating with a toe portion **7** which may be of any suitable structure. The fabric of the foot **6** extends through the instep **8** and the ankle **9** towards the leg, broken away in Figure 1. Below the ankle **9**, and opposite the instep **8**, is located the heel fabric **11**, to which the present invention is primarily directed. Splicing, or other reinforcement, may be provided, for example as shown, in the high heel, the sole **14**, and the toe **7**, as well as elsewhere in the hose wherever desired.

In accordance with the disclosed practice of the invention, the stocking is knitted downwardly from the leg through the ankle **9**, through the foot **6** and toe **7**. The heel fabric **11** includes the narrowed area, indicated generally at **15**, preferably in addition to the widened area **18** which adds fabric width to accommodate the portion of the foot extending through the instep **8** and heel **11**. Widening may be produced in any suitable manner to provide added wales such as are indicated diagrammatically by the vertical lines **19** in Figure 2. These wales are added beyond the edge line **20** of the ankle fabric as knitting continues into the heel. Widening is preferably continued to the point **21**, which corresponds to a point slightly above the tip of the heel, as indicated in Figure 1.

One form of widening is illustrated in detail in Figure 3. In accordance with the practice illustrated, a predetermined number of edge loops in predetermined courses are transferred outwardly to a predetermined extent. Thus, as illustrated, in courses **36**, the loop **37** at the extreme edge of the fabric, together with adjacent loops **38** inwardly from the edge of the fabric, are transferred outwardly the extent of a predetermined number of loops. In the embodiment shown, loops **37** and **38** are transferred the distance of one loop, i. e., each loop **37** and **38** is re-

moved from the needles which formed it and is transferred to the next adjacent needle outwardly. The transfer of the several loops **37** and **38** is made in a single operation by transfer mechanism well understood in the art.

Preferably, and as in the practice of the invention shown, yarn is fed in the next succeeding course **39** to the extent of the new fabric width, i. e., from and to the needles holding the opposite edge loops **37**. In this manner, edge loop **40** in course **39** is drawn through edge loop **37** of the next preceding course **36**. Loops are knitted in course **39** on each needle inwardly from the needle knitting the edge loop **40** to continue the fabric to its new width after widening.

In the manner of widening described, and as will be noted in Figure 3, the edge loops **37** and **40**, and other edge loops along the length of fabric, will be knitted in, and the fabric blank will present a selvage-like, non-ravelling edge. However, in the course **39** following the transfer course **36**, one or more needles inwardly from those to which loops were transferred will lack previously knit loops. Such needles will draw loops of the yarn fed to them and, in the case of single needle widening shown, such loops **41** will be locked in with the next adjacent loops **38** and **42** of the next previous course **36**. Accordingly, loops **41** will not ravel. Nor will the sinker loops **43** on opposite sides of loops **41** ravel.

As will be clear from Figure 3, the transfer of loops **37** and **38** to widen the fabric will produce fashioning marks which, in the case of widening, will appear as open spots or holes **44** in the fabric, each transfer operation producing such a hole. Such holes preferably do not appear in the finished hose. For this purpose, in the practice of the present invention, it is preferred that only a few loops **37** and **38** be transferred for widening. In the embodiment shown in Figure 3, three loops are transferred at each edge of the fabric in each widening step. The edge fabric between the fashioning marks **44** and edge loops **37**, **40**, etc., is encompassed within the seam employed to close the blank, and, as will appear from Figure 1, the fashioning marks **44** are hidden in the seam.

To produce a better shaped heel, narrowing may begin, as shown, before widening is discontinued. Narrowing is produced by transferring a plurality of loops at each edge of the fabric in successive fashioning courses which may follow each other one after the other, or which may be separated by intermediate courses which are not transferred. The preferred practice is to make transfers less frequent in this area, transfers above the point **21** made each fourth course, or each eighth course, being found satisfactory.

In the practice of the invention shown in detail in Figure 3, narrowing transfers are made in courses **45**, and are produced by transferring a plurality of edge loops inwardly to the extent of a predetermined number of loops. In courses **45**, in the instant embodiment shown, the three outermost loops **46** and **47** are transferred inwardly to the extent of one needle and the three innermost loops **48** are transferred inwardly to the extent of two needles. This produces fashioning marks **49**, comprising two adjacent loops knitted in each with another loop.

The narrowing fashioning in the widening fashioned area may be produced in the same course or in courses intermediate of those containing widening fashioning. In the instant embodiment shown, the loops **46** and **47** of course **45** were transferred outwardly to the extent of one needle and were transferred inwardly with loops **48** to the extent of two needles. This, as shown, provides a net narrowing of the fabric blank to the extent of one loop at each edge of the fabric, and when yarn is fed in the next succeeding course the feed is adjusted to whichever needle carries edge loops **46**, to produce loop **50** drawn through loop **46**.

Widening and narrowing fashioning produced in the manner shown and described will produce the widening fashioning marks **51** similar to widening fashioning marks **44**, which will be encompassed in the seam together with fashioning marks **44**. In the preferred practice of the invention the narrowing transferred loops **48** will extend inwardly from the edge of the fabric to a greater extent than the widening transferred loops, and to a sufficient extent for the narrowing marks **49** to appear in the stocking. The fashioning so produced will tend to lay the fabric around the rear and bottom of the heel.

As illustrated in Figure 3, widening transfers are made at more frequent course intervals than narrowing transfers in the widened area. For example, widening transfers are made in alternate courses. Thus, as illustrated in Figure 2, widening without narrowing is produced upon completion of the ankle fabric to produce the deflected edge of fabric blank from **25** to **24**. Narrowing transfers during widening produces a downwardly deflected fabric edge from **24** to **21**, and the course interval of narrowing transfers is preferably such that the blank continues to widen in this area. The angle will not be sharp, however, but will be rounded as indicated at **24**. This is due to the deflection of courses as indicated diagrammatically by the deflection of the horizontal lines **26** between the line of narrowing marks along **22—23** and the edge line **24—21**.

Following the point **21** widening is discontinued, but narrowing by loop transfer inwardly is continued, preferably more rapidly, for example in each course, to produce the rounded edge between the points **21** and **27** in Figure 2. Following the point **27** narrowing is continued preferably by transferring at less frequent course intervals, for example, in each alternate course, to produce the edge **27—28** which is less rounded. The narrowing illustrated in Figure 3 is to show the result of varying the course interval. Thus, the narrowing in course **52** appears the same as the narrowing in course **53**, the only difference being that course intervals of two needle narrowing is varied to produce rounding as at **27** and **28**.

According to one embodiment shown in Figure 4, narrowing between **28** and **29** is produced by transferring loops to a less extent. As illustrated in Figure 4, a plurality of edge loops, i. e. a plurality of loops **31** extending inwardly from the edge of the fabric, are transferred as shown to the extent of two loops. Accordingly, the two innermost loops of the transferred group are joined and knitted in each, being knitted with an additional loop, as indicated at **32** to produce narrowing marks similar to **49** in Figure 3. Such two needle narrowing may be continued for a predetermined number of courses, as from the point **27** to the point **28**, Figure 2, and at predetermined course intervals. Thereafter, the narrowing is preferably single needle, i. e., to the extent of a single loop. Accordingly, and as illustrated in Figure 4, a plurality of edge loops **33** are transferred the distance of one needle, the single innermost loop of the transferred group

being joined with the adjacent loop in the course, as illustrated at **34**.

Any suitable variation of yarn feed may be produced during both two needle and single needle narrowing. Preferably, as shown, the variation of yarn feed is the same in two needle and single needle narrowing to produce uniform diminution of fabric width in both areas of the fabric. For example, and as shown in Figure 4, variation of yarn feed is to the extent of two needles in each transfer course. Thus, in two needle narrowing the variation in yarn feed is to the same extent as the transfer, and each feed is to the edge loop in the previous knitted course. In single needle narrowing, after each narrowing course, the feed is diminished to the extent of two needles, extending to one loop inwardly from the edge loop in the previous course. The edge loop **35** is, accordingly, knitted off by the knitting of the next course. This knit off loop is locked into the hose by the seam, and is thus unable to ravel out.

The single needle narrowing described will cause the wales in the fashioned area to describe an angle with the edge of the fabric, as indicated by the wale indicating lines in the area **28**, **29**, **36** and **30** in Figure 2. This differs from the wale disposition parallel to the edge of the fabric in two needle narrowing, as indicated in the area **21**, **28**, **30**, **23**, in Figure 2. There is a corresponding course deflection, courses tending to a right angle disposition relative to wales. Thus, the change from two needle to single needle narrowing produces a variation in course disposition indicated in Figure 2, which produces the concave rounding of the fabric edge at **28** and which produces an ideal heel fit. It is this variation in a course distribution resulting from the change of fashioning which produces the edge rounding at **24**, **21**, **27** and **29**, rather than a sharp change in direction of the edge. Figure 2 undertakes to show the disposition of courses and wales in different areas.

The disclosed embodiment is one form of the invention. It may be modified without departing from the spirit of the invention, the scope of which is not to be determined by the specific embodiment shown, but by the accompanying claims.

What is claimed is:

1. In a full fashioned hose, heel fashioning comprising a widened area, the widened area comprising a predetermined number of loops at the edge of the fabric transferred outwardly the distance of one loop in predetermined fashioning courses, a predetermined number of loops at the edge of the fabric of predetermined fashioning courses being transferred inwardly the distance of two loops, the number of loops transferred inwardly being greater than those transferred outwardly, the fabric being formed in each course to the width determined by the loop transfer of the next previous fashioning course.

2. The method of fashioning the heel fabric of a full fashioned stocking to widen it comprising transferring a predetermined number of loops at the edge of the fabric outwardly to the extent of one needle to form predetermined fashioning courses, transferring a predetermined greater number of loops at the edge of the fabric inwardly to the extent of two needles in predetermined spaced apart fashioning courses, and forming the fabric in each course to the width determined by the next previous fashioning course.

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