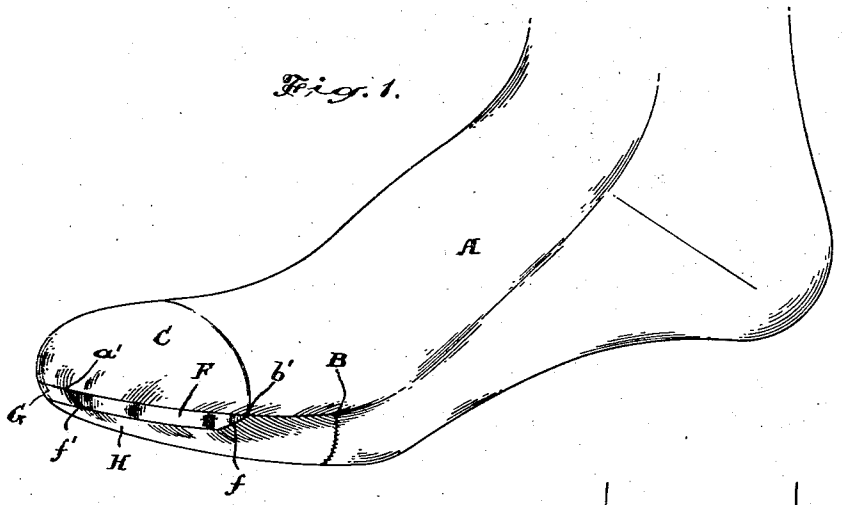
April 18, 1933. J. M. ALLEN 1,904,036

SEAMLESS HOSIERY AND PROCESS OF MAKING SAME

Filed April 28, 1931

Fig. 1.



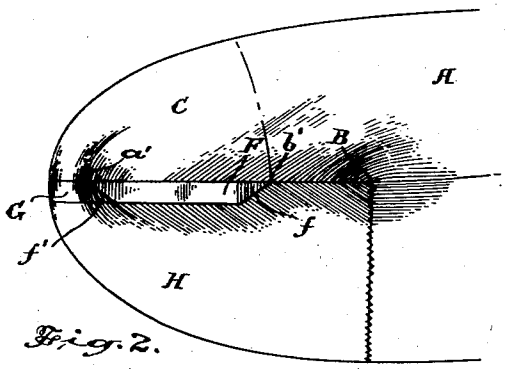


Fig. 2.

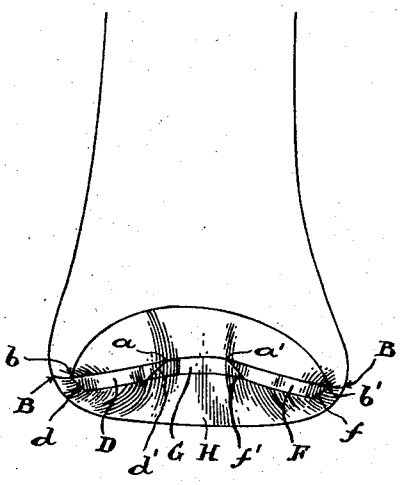


Fig. 4.

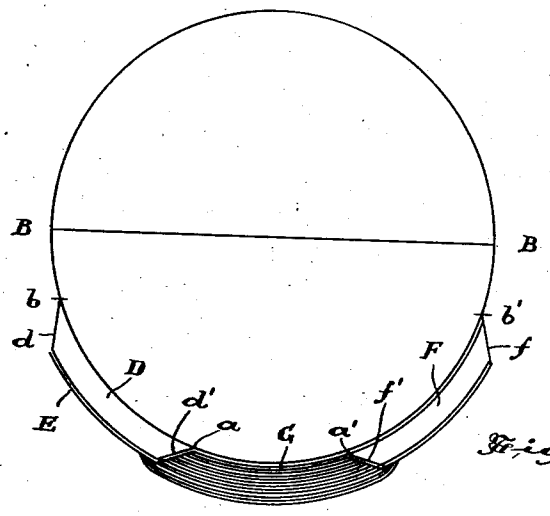


Fig. 3.

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UNITED STATES PATENT OFFICE

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SEAMLESS HOSIERY AND PROCESS OF MAKING SAME

Application filed April 28, 1931. Serial No. 533,557.

The principal object of the invention is to provide a seamless stocking foot having a formation which will enable it to accommodate the foot of the wearer without binding and without having any loose or puckered portions which will render the garment uncomfortable or unsightly.

This invention is an improvement to the invention disclosed in my Patent #1,754,185 of April 8, 1930, and in this improvement the gusset which extends around the end of the toe is made in three parts, each part constituting in itself a minor gusset and the respective parts are joined by tapered fashioning lines.

The principal features of the invention consist in the manner of knitting the toe of the stocking with minor gussets at each side and with an equalizing minor gusset between the ends of the aforementioned minor gussets joining them across the end of the toe. These minor gussets thus constitute portions of an insert which corresponds in size and contour to the unitary gusset of the patent referred to.

In the drawing, Figure 1 is a side elevational view of a stocking constructed in accordance with this invention as appearing on the foot.

Figure 2 is a side elevational view of the knitted foot shown flat.

Figure 3 is a diagrammatic view illustrating the arrangement of the needles on a circular knitting machine and the order in which these are put into and out of operation.

Figure 4 is an end elevation of the toe of the stocking.

The stocking herein shown is manufactured upon a circular knitting machine and the heel and body portion of the foot is formed in the usual manner.

When the body portion A has been knitted as far as the point B in the length thereof, which corresponds with the widest part of the foot of the wearer, the needles knitting the lower half of the foot are lifted out of action and the cylinder is reciprocated to knit the tapering toe portion C by picking the needles out of action, one at a time on each side, until the width of the toe is reduced to the desired minimum number of stitches between the points a, a'.

If desired the knitting of the top half of the foot may be continued from the point B with the finer instep yarn for a number of courses of the narrowing, as described more fully in my patent aforementioned. Thus the finer instep yarn may be continued to the points b, b' as indicated in Figures 1 and 2, or the change may be made at any other point in the narrowing that may be found desirable.

After the points a, a' have been reached in narrowing, the needles knitting between these points are simultaneously lifted out of action and the needles between points a, b Fig. 3 are returned into action in a group and a course is knitted at one side of the tapered toe.

Knitting is continued on the needles returned into action by reciprocating the cylinder to knit the minor gusset D of any desired number of courses, but preferably about eight or ten, and the needles are progressively lifted out of action at each end to form the tapered ends d, d' to the gusset.

In completing the last course E of the minor gusset D the yarn is knitted to the tapered edge d' of the minor gusset and also knitted between the points a, a'. This is accomplished by throwing into action those needles that were picked out of action to form the tapered edge d' and also the needles between the points a, b' in Fig. 3. One course is knitted and all needles except those between a' and b' are thrown out of action. Knitting is continued on the needles remaining in operation to form the minor gusset F, and these needles are withdrawn progressively from action at each end of the group to form the tapered ends f, f'. Any desired number of courses may be knitted in the minor gusset F, preferably eight or ten so that the minor gussets D and F will have the same number of courses.

When the last course of the minor gusset F has been knitted as far as the tapered end f' the needles lifted out of action to form the taper f' are returned into action in a group along with the needles from a' to a and one

course is knitted, such course ending at *a* and all the remaining needles which happen to be in operation are moved up out of operation in a group except the central or intermediate group between points *a*, *a'*, and knitting of the intermediate minor gusset G begins.

The needles are picked down at the ends of each of the courses to knit a minor gusset with flaring or tapered ends which match with the tapered ends *d'*, *f'*, of the minor gussets D and F respectively.

The picking down of needles during the formation of the intermediate minor gusset G will involve as many courses as were knitted in the respective minor gussets D and F so that the fabric in the three minor gussets D, G, F, will form an insert extending around the end of the toe virtually of the same size and shape as the fabric in the unitary gusset of the above referred to patent.

Throughout this insert there are rows of loops extending coursewise as do the loops of the courses of the gusset of the above patent, said rows of loops containing approximately the same number of loops as the corresponding courses of the patent, said rows of loops being interrupted however by the narrowed and widened sutures *d'* and *f'*. Thus all the advantages of the patented stocking are present in this improved stocking and in addition a stocking providing a slightly better fit and a greatly enhanced appearance is produced.

Upon the completion of the last course of the intermediate minor gusset G the knitting is continued and needles are picked down at each end of the courses to knit the widening bottom portion H of the toe and this operation continues progressively until the entire complement of the half circle of needles between the points B, B have been restored to action and the toe pocket is completed.

In practice there is no interruption between the completion of the minor gusset G and the rest of the bottom portion H. Widening begins with the needles between points *a*, *a'* in operation and continuous until the toe pocket is complete and all the needles from B to B are back in operation. The full complement of needles is then thrown into action to knit a desired number of courses to enable the looping of the toe pocket to the lower half of the previously knitted foot section.

It will be understood from this description that by the introduction of the minor side gussets D and F on either side of the toe, which otherwise because of its length has been narrowed down, and by knitting in the third or end minor gusset G at the point of the toe between the minor gussets D and F, there will be no puckering through the gathering of excess material around the forward ends of the minor side gussets. The total result being that the fabric is balanced by the insertion of a minor gusset across the point of the toe, the ends of which are tapered in the opposite direction to that of the minor side gussets.

What I claim as my invention is:

1. In a process for manufacturing seamless hosiery having a seamless toe pocket commenced on substantially half the needles and tapered progressively to the tip of the toe the step of knitting individual spaced gussets to the tapering sides forming same with opposed tapered ends, then after completion of the knitting of said gussets knitting an intermediate fabric between the adjacent tapered ends of said gussets forming the latter with opposite tapered ends to mate with the opposed tapered ends of said individual spaced gussets, then continuing the knitting of said intermediate fabric to complete the toe pocket increasing the number of needles progressively from the narrow toe end.

2. A process of knitting seamless hosiery consisting in first knitting the foot with a full complement of needles, then knitting the upper toe portion with a gradually diminishing complement of needles, then knitting a separate narrowing gusset to each of the sides of said toe section, completing the knitting of one gusset prior to commencing the knitting of the other, the ends thereof adjacent to the foot being spaced from the commencement of the tapering toe portion and the ends adjacent the toe tip being spaced apart and both ends being tapered, then knitting a widened intermediate gusset between the tapering gusset ends adjacent the toe tip producing tapered ends to match the tapering ends of the side gussets, then continuing the knitting from the last course of knitting of the intermediate gusset forming a progressively widening fabric from the toe end to the completed foot section.

3. A process of knitting seamless hosiery consisting in first knitting the foot with a full complement of needles, then knitting the upper toe portion with a gradually diminishing complement of needles leaving only a central group in action, then removing said central group from action and returning a group of needles into action at one side of the central group just removed from action and progressively lifting same out of action to knit a tapering gusset intermediate of the length of one side of the upper toe portion, then lifting the remainder of the group simultaneously from action and returning simultaneously another group of needles into action at the other side of the removed central group and progressively lifting the same out of action to knit a tapered gusset intermediate of the length of the other side of the tapering toe portion, then removing the remaining needles of said last returned group simultaneously out of action and returning said central group of needles simultaneous-

ly into action and progressively returning additional needles into action, and then returning needles into action to progressively widen the knitted fabric until the complement of needles is in operation to complete the knitting of the toe.

4. A process of manufacturing seamless hosiery consisting in knitting the body of the foot with the full complement of needles, then knitting the upper part of the toe pocket commencing with half the complement of needles and progressively picking the needles up out of action at the ends of each course until only a central group remain in action to form a tapering fabric, then removing said central group of needles simultaneously from action, then simultaneously returning a group of needles into action at one side of said central removed group of needles to knit to one side of the tapered fabric progressively lifting said returned needles out of action at the end of each course to form a tapered side gusset, then simultaneously lifting the remainder of such group of needles from action, then returning said central group of needles simultaneously into action along with a group of needles at the other side thereof and knitting a course around the tapered end of the toe, then simultaneously removing said central group of needles from action and continuing the knitting on the remaining returned needles to form a gusset at the other side of said tapered toe fabric progressively lifting needles out of action at the end of each course simultaneously removing the remaining active needles, then returning a group of needles into action including said central group and knitting a course to extend to the first course of the first mentioned side gusset, then progressively returning needles into action at the ends of each course to knit a tapered intermediate gusset between the tapering ends of the progressively knitted side gussets, then continuing the knitting by progressively returning needles into action to complete the toe pocket ultimately bringing half the full complement of needles into operation.

5. A stocking having a tapering top toe portion, a separate gusset knitted to each of the sides of said toe portion and each having spaced apart tapering ends, an intermediate gusset knitted to the end of the toe section and having opposite tapered ends knitted to the adjacent spaced tapering ends of the side gussets, and a widening toe bottom forming a continuation of said intermediate gusset knitted to the side gussets and to the top section to complete the toe.

JOHN M. ALLEN.