

June 19, 1923.

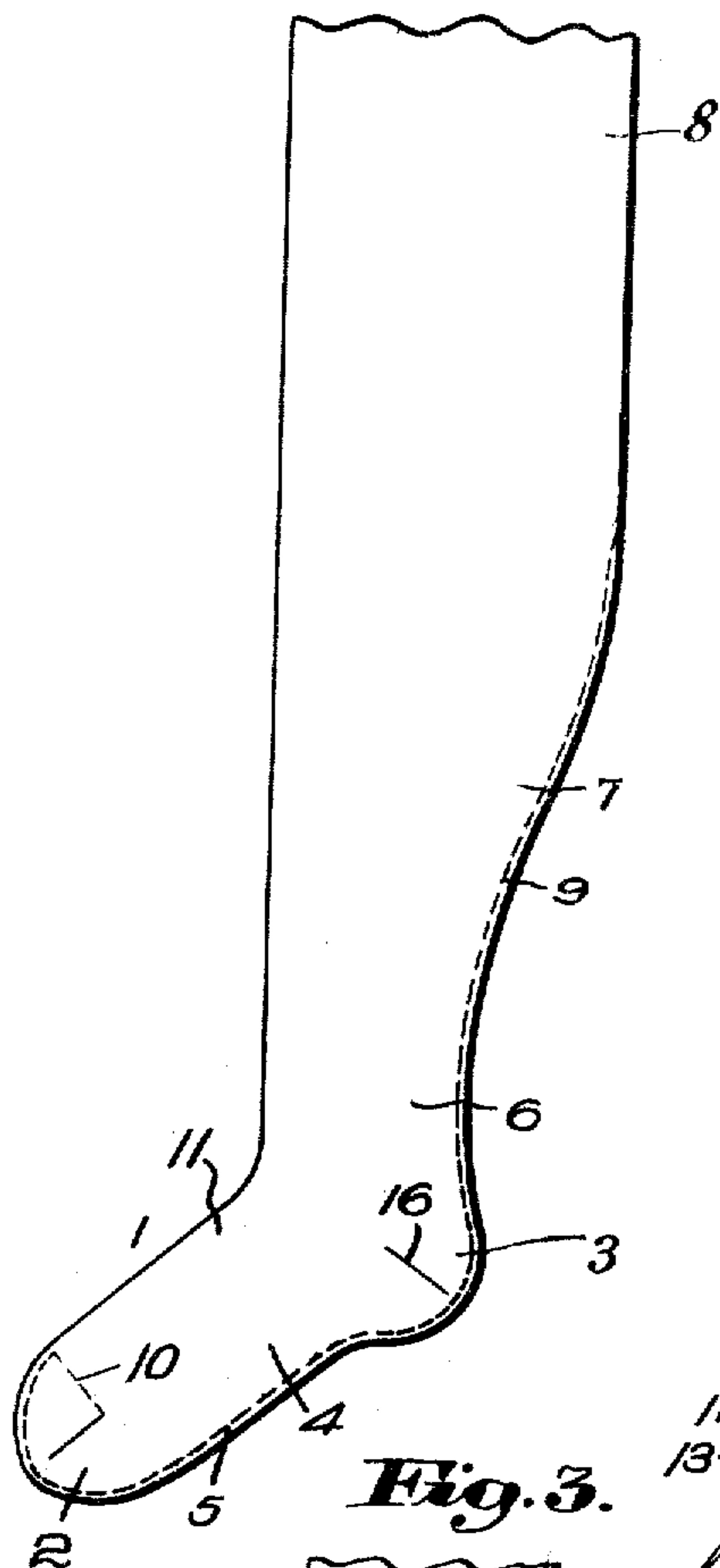
G. P. BOSWORTH

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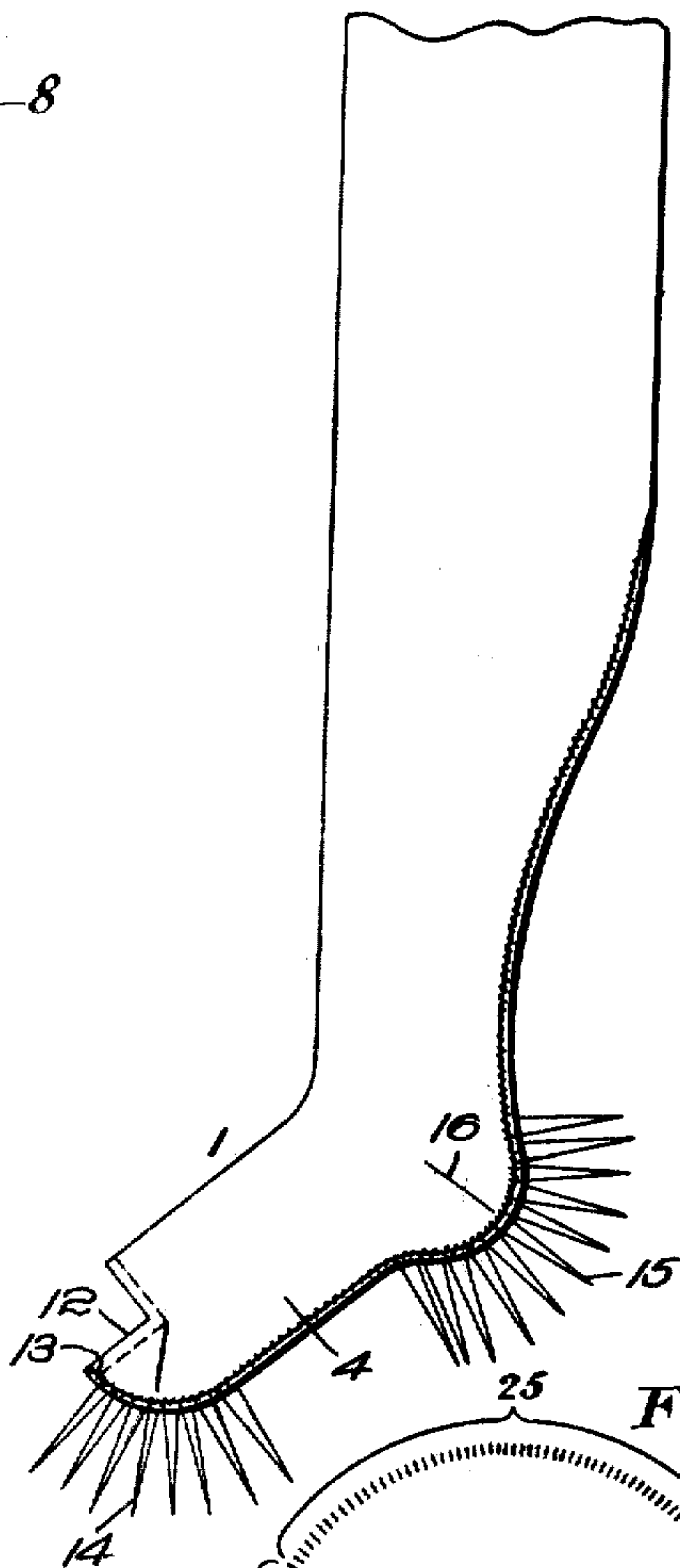
HOSIERY AND METHOD OF MAKING THE SAME

Filed June 26, 1920

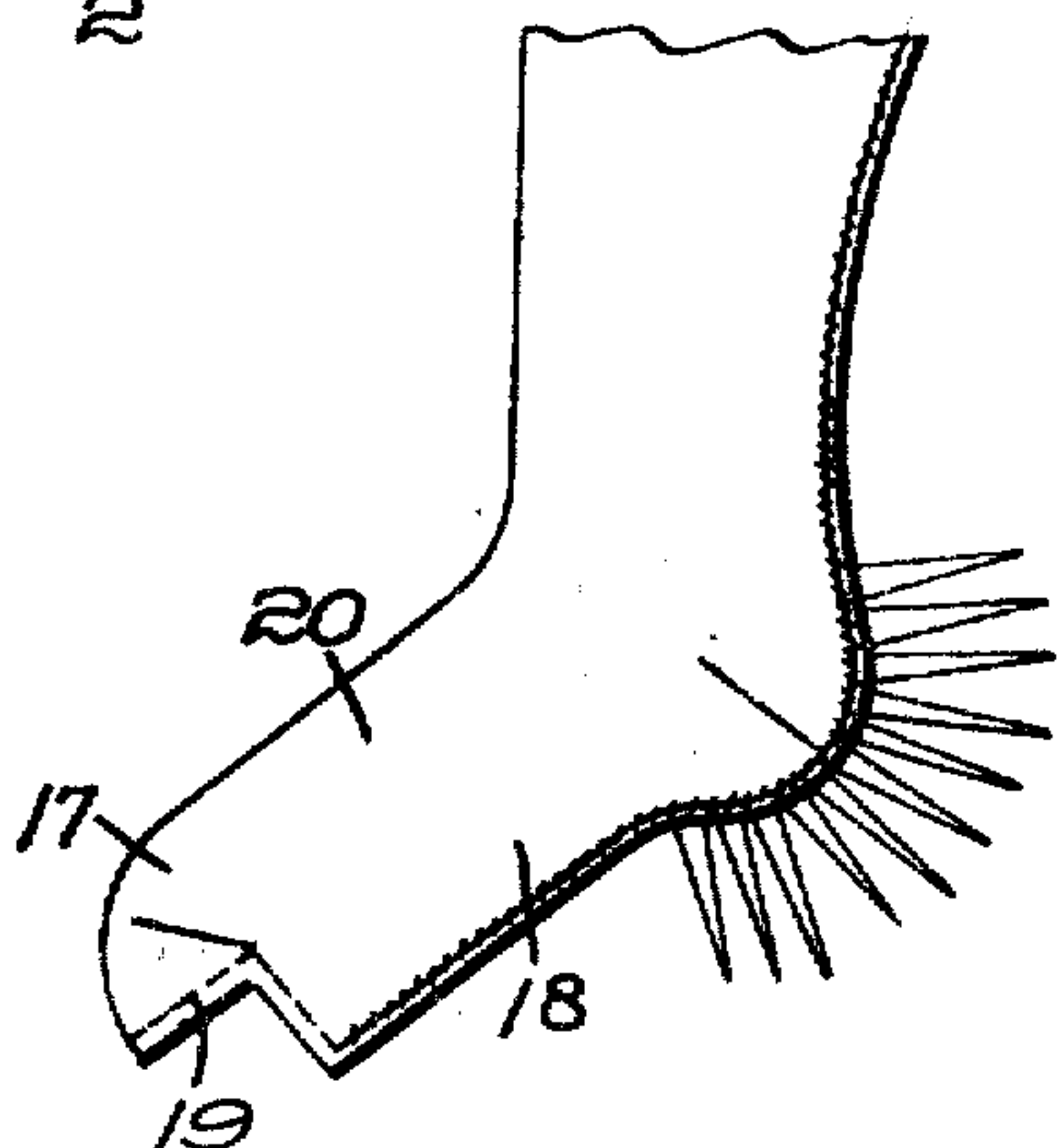
*Fig. 1.*



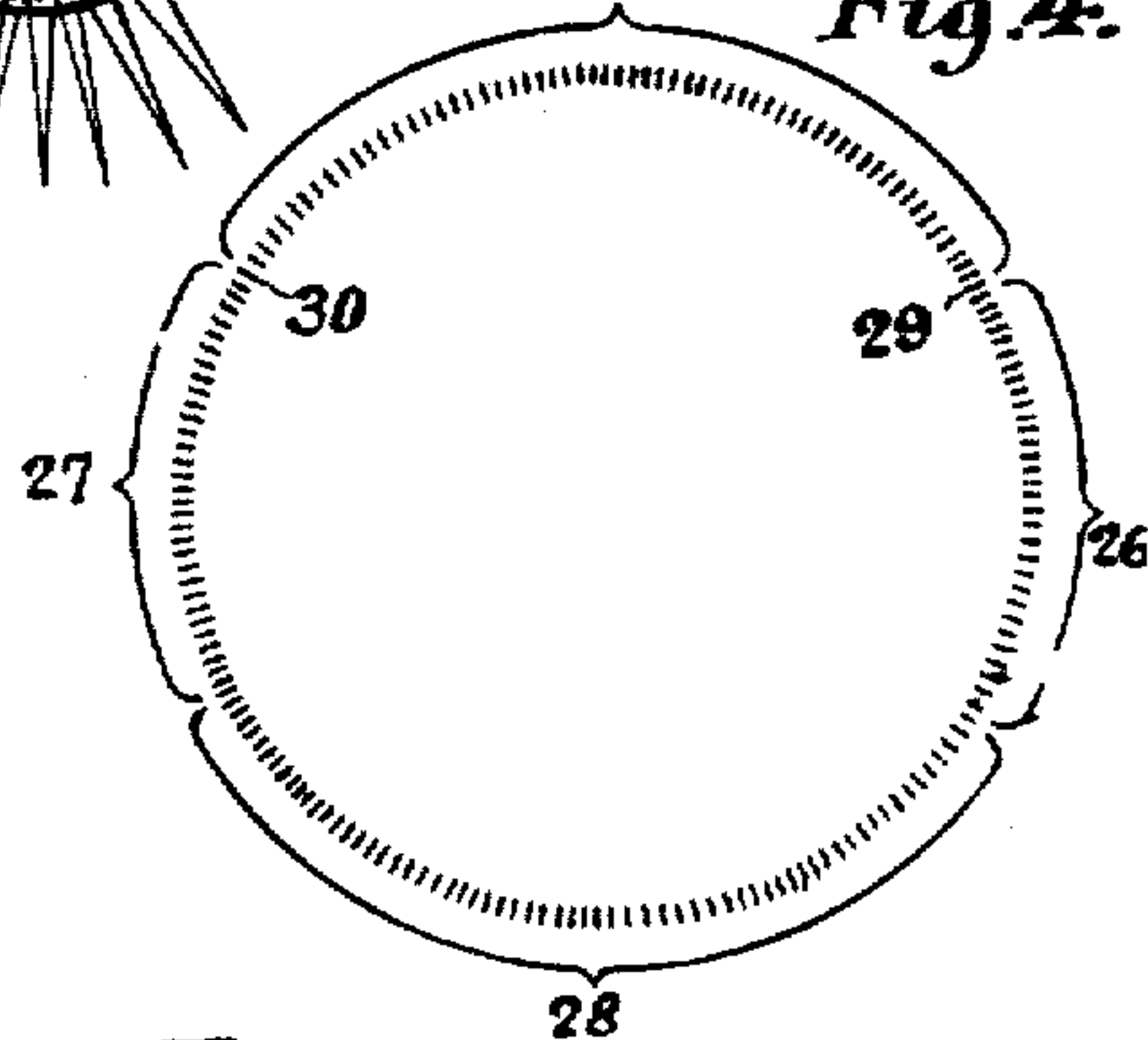
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



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**Inventor:**  
**George P. Bosworth**  
By *Emory Booth, James and Henry*  
**Attys**

## UNITED STATES PATENT OFFICE.

GEORGE P. BOSWORTH, OF CENTRAL FALLS, RHODE ISLAND, ASSIGNOR TO HEMPHILL COMPANY, OF PAWTUCKET, RHODE ISLAND, A CORPORATION OF MASSACHUSETTS.

## HOSIERY AND METHOD OF MAKING THE SAME.

Application filed June 26, 1920. Serial No. 392,050.

*To all whom it may concern:*

Be it known that I, GEORGE P. BOSWORTH, a citizen of the United States, and a resident of Central Falls, in the county of Providence and State of Rhode Island, have invented an Improvement in Hosiery and Methods of Making the Same, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to hosiery and to the method of making the same, and has particular reference to machine-knitted full-fashioned hosiery. The invention has for its object to economically and rapidly produce neatly fitting and stylish hosiery.

In the accompanying drawings, I have shown merely for the purposes of illustration one form of stocking embodying my invention, and in connection therewith I shall describe the best method known to me for making the same.

In the drawings:—

Fig. 1 is a side elevation of a stocking made in accordance with my invention;

Fig. 2 is a side elevation of a blank from which the complete stocking shown herein is produced; and

Fig. 3 is a side elevation of the foot of a modified form of stocking blank.

Fig. 4 is a diagrammatic plan of the needles of a circular knitting machine upon which the blanks illustrated in the preceding figures can be produced.

I shall refer to the stocking herein shown as a machine knitted stocking, and to its formation upon a machine of the general type known as a circular knitting machine wherein either the needle cylinder or the knitting cams may have relative rotary or reciprocatory movement. It is, however, distinctly to be understood that within the scope and purpose of the invention the stocking may be knitted otherwise, or upon other types of machine than those to which reference has been made. The blank from which the stocking embodying this invention is produced is knitted upon a circular knitting machine preferably substantially like that disclosed in the patent to Hemphill No. 933,443 dated September 7, 1909, and the production thereof involves both rotary and reciprocatory movements of the machine, and for convenience such movements will have

reference to the needle carrier or needle cylinder rather than to the knitting cams. Obviously, knitting of the stocking blank may be started either at the top of the leg or at the toe, but herein I shall refer to the operations as beginning at the toe and upon a circular series of needles having certain needles thereof withdrawn or thrown out of action temporarily to produce an interruption or gap in the circular continuity of wales of the fabric, this gap occurring in the present embodiment at the center of the bottom of the toe. The stocking embodying this invention has a foot 1 including a toe pocket 2 and a heel pocket 3, said toe and heel pockets being separated by the arch portion 4, which, together with said toe and heel pockets, are seamed as conventionally indicated at 5 along the center of the bottom of the foot and around the heel thereof. The stocking further embodies an ankle portion 6, fashioned calf 7 and a tubular leg 8. The ankle 6 and fashioned calf 7 are seamed along the center of the back thereof as conventionally indicated at 9, which seam is a continuation of the seam 5 at the bottom of the foot, said seam 9 terminating at the top of the calf 7, although it may if desired be continued to the top of the leg along the center of the back of the tubular portion 8, but when so extended it will constitute merely a mock or imitation seam. The toe pocket 2 of the stocking has a seam 10 extending over the top thereof from center to center of each side of said pocket, thus uniting the first course loops of said toe pocket with the terminal or first course loops of the instep portion 11. The preferred mode or sequence of operations employed in producing the stocking herein shown is as follows.

Upon the interrupted series of needles hereinbefore referred to, I proceed to knit a plurality of courses as shown at 12, and which are herein designated as protective courses that are later unravelled back to permit the looping of the first course of the web constituting said toe pocket with the terminal or first course loops of the instep section of the stocking, thus to form the seam 10 illustrated in Fig. 1. The protective courses 12 may be and preferably are formed during the reciprocating movements of the needle cylinder, or by to and fro knitting as it is sometimes called, and by reason of such movements, and also by reason of the with-



drawal of certain needles of the series, a strip of fabric will be formed having selvages 13 at opposite sides thereof (see Fig. 2), which facilitate the ravelling back of the

5 courses prior to the seaming operation.

Having knitted a sufficient number of these protective courses, the next step in the operation is to produce the toe pocket 2, the first course in the formation thereof being effected during to and fro or reciprocating knitting and following the withdrawal from action in the usual manner of the instep needles, that is, those needles upon which the portion 11 of the stocking is

10 formed, said withdrawn needles retaining their loops while inactive. Knitting next proceeds upon the remaining needles, these needles being arranged in two separate substantially equal groups separated by the

15 needles which were withdrawn at the beginning of the knitting operations to form the interruption or gap above referred to. In order that the arrangement of the needles which are in operation at this time may be

20 better understood, let it be assumed that the needle cylinder contains in all three hundred needles arranged as shown in Fig. 4, one hundred of which are included in the bracket 25 and constitute the instep needles,

25 a second hundred arranged in two groups included in the brackets 26 and 27 and constituting the needles upon which the toe pocket web is formed and the third hundred embraced by the bracket 28 and constituting the needles which are withdrawn to produce the interruption or gap. The needles

30 upon which the toe pocket web is to be formed are divided as stated into two groups 26 and 27 of substantially fifty needles each, which groups separate the remaining two

35 groups of needles; that is, the instep and the withdrawn groups 25 and 28 respectively. The operation to be described relates to knitting upon the two groups 26

40 and 27 of fifty needles constituting the needles upon which said toe pocket web is formed, all other needles being withdrawn from action at this time. The toe pocket is produced in the usual manner, that is, by

45 narrowing and widening, which consists in gradually withdrawing from action certain of the needles of the groups 26 and 27 beginning with needles 29 and 30 of the series, permitting said withdrawn needles to re-

50 tain their loops, and after a certain number of these needles have been withdrawn, then in restoring said needles in a reverse order to that in which they were withdrawn and in effecting the interlooping of the new

55 loops formed upon said gradually restored needles and those loops which were retained by said needles, thus uniting in diagonal courses at opposite sides of the toe pocket the corresponding narrowed and widened

60 courses of the web. These narrowing and

widening courses are produced by reciprocating knitting and by reason of the group 28 of needles which are withdrawn and which produce the gap at the center of the bottom of the toe, the edges of the two sections of the web constituting said toe pocket will be connected together by floating yarns 14, see Fig. 2, which may also be termed elongated

sinker wales.

Following the knitting of the last widening course of said toe pocket, the instep needles 25 are restored to action, and upon these needles and the needles 26 and 27 employed in knitting said toe pocket the section 4 and the section 11 of the stocking

75 which separates the toe and heel pockets 2 and 3 will be knitted by reciprocating knitting to form an oppositely selvaged strip of fabric, the selvaged edges thereof forming continuations of the edges of the toe

80 pocket which are connected together by the floating yarns 14, the needles 28 remaining out of action. Upon completion of the last course of the foot prior to the formation of the heel pocket 3, the instep needles 25 are

85 again withdrawn from action, retaining their loops, and knitting proceeds in the usual manner upon the remaining needles of the groups 26 and 27 to produce gores by narrowing and widening said heel pocket

90 3; but, by reason of the separation of the needles forming said heel pocket web, said web will be formed in two sections, the corresponding edges of these sections being

95 connected together by floating yarns 15, which span the gap produced by the group 28 of inactive needles hereinbefore referred to. The needles of the groups 26 and 27

100 operating at this time are first gradually reduced in number during the reciprocating movements of the cylinder beginning with the needles 29 and 30, and after a certain number of courses have been knitted in this manner, said needles are restored

105 in the reverse order and the new loops formed upon said needles immediately following their restoration are united with the old loops that were retained upon said

110 needles during their withdrawal, thus uniting the narrowing and widening courses in diagonal seams or gores 16. Following the knitting of the last widening course of said heel pocket, the instep needles 25 are again

115 restored to action and knitting proceeds upon the active needles to produce by reciprocating knitting an oppositely selvaged strip constituting the ankle 6 up to the bottom of the fashioned calf 7, at which point

120 in the operation one or more needles at opposite ends of the withdrawn series of needles 28 are restored and these restored needles cooperate to increase the width of the strip constituting said calf.

At certain intervals this operation of restoring certain of said withdrawn needles is

125 130



repeated until the top of the calf is reached and until all of said withdrawn needles have been restored to action and said calf has been properly shaped. Upon the restoration of the last needle or needles of said withdrawn group which had previously produced the interruption or gap in the knitted web, the machine is automatically shifted to knit rotatably or round and round instead of reciprocatingly, and upon all of the needles of the circular series the tubular leg portion 8 of the stocking is now knitted, thus completing the knitting operations of the blank. The blank thus formed will consist of the toe pocket 2 formed by reciprocating knitting in two sections united by the floating yarns 14, the heel pocket 3 likewise formed in two sections by reciprocating knitting, which two sections are united by floating yarns 15, and these two pockets will be connected together by the oppositely selvaged strip constituting the arch portion 4 and the instep portion 11. Above the heel pocket 3 and attached thereto will be the oppositely selvaged strip 6 constituting the ankle of the stocking, and integral with said ankle will be the oppositely selvaged full-fashioned calf 7, which is knitted integral with the tubular leg portion 8. Following the completion of the blank as just described, the same may be removed from the machine and the various edges thereof united by stitching in the order desired. Previous to said stitching operations, the courses 12 are ravelled back and the terminal or first course loops of the toe are united with the terminal or first course loops of the instep portion 11, the floating yarns 14 and 15 are removed and the edges thus freed are, together with opposite edges of the arch portion 4 and opposite edges of the ankle and calf portions 6 and 7, united by seams 5 and 9.

In Fig. 3 I have shown a form of stocking wherein the toe pocket is produced in such a manner as to entirely eliminate the center seam of the previous form. Here the toe pocket 17, instead of being knitted upon the same groups 26 and 27 of needles that the arch 18 is knitted upon as in the previous case, is knitted upon the instep needles 25 which are not separated into two groups as are said arch needles, therefore no gap or interruption is produced to separate the toe pocket web into two parts. The said toe pocket is shaped by narrowing and widening as in the previous case, and the knitting thereof may be and preferably is preceded by a plurality of protective courses 19 formed by reciprocating knitting upon the same needles that the arch 18 and instep 20 are formed, thus producing an oppositely selvaged web that may readily be ravelled out preparatory to the seaming operations, which may be done substantially as herein-

before described, with the exception that no stitching about the center of the toe will be necessary.

While I have herein shown and described merely for illustrative purposes one specific embodiment of my invention, and have disclosed and discussed in detail the construction and arrangement incidental to such disclosure, it is to be distinctly understood that the invention is limited neither to the mere details or relative arrangement of the parts of the stocking nor to the specific application herein shown, but that extensive variations from the illustrations may be made without departing from the principles thereof.

#### Claims:

1. In a stocking blank, a strip comprising foot, ankle and fashioned calf portions and an integral tubular web constituting the leg, said foot being characterized by a heel pocket composed of narrowed and widened courses formed in two spaced gored sections united by floating yarns, the portions of the foot and ankle adjoining said heel having oppositely selvaged edges.

2. In a stocking blank a strip comprising the foot, ankle and fashioned calf portions and an integral tubular web constituting the leg, said foot being characterized by toe and heel pockets each composed of narrowed and widened courses formed in two spaced gored sections, the edges whereof are united by floating yarns, the portion of the foot between said toe and heel pockets and the ankle and calf portions having opposite selvaged edges.

3. In a stocking a blank comprising integral seamless tubular leg, fashioned calf and ankle and foot portions, said foot being characterized by toe and heel pockets each composed of two spaced gored sections of narrowing and widening courses, the edges whereof are non-selvaged, the portion of the foot between said toe and heel pockets and the ankle and calf portions having oppositely selvaged edges to provide relatively greater support for their stitches than is provided for the separated gored sections whereby the stitches uniting said gored sections will be materially supported.

4. In a full fashioned stocking a blank comprising oppositely selvaged ankle and foot portions alternating with heel and toe pockets each composed of substantially symmetrically spaced gored sections of narrowing and widening courses having non-selvaged edges, the stitches uniting said selvaged edges cooperating to support the stitches of said non-selvaged edges.

5. That method of knitting a stocking which consists in knitting reciprocatingly to form oppositely selvaged foot, ankle and fashioned calf portions and reciprocatingly upon separated groups of needles to form



substantially similar separated gored sections having non-selvaged edges connected by floating yarns.

5 6. That method of making a stocking which consists in knitting upon an interrupted circular series of needles to form an oppositely selvaged strip, then in knitting integral with said strip upon two separated sets of needles reciprocatingly and by narrowing and widening to form a gored toe pocket in two sections united by floating yarns, then in knitting reciprocatingly to form an oppositely selvaged strip constituting the intermediate portion of the foot, then  
10 in knitting reciprocatingly upon two separated sets of needles to form a gored heel pocket consisting of two substantially co-extensive sections of fabric united by floating yarns, then in knitting integral with said ankle a fashioned calf and subsequently knitting the upper leg portion of the stocking.

7. That method of making a stocking which consists in knitting reciprocatingly  
25 upon a selected group of needles to form a gored toe pocket, then in knitting reciprocatingly upon an increased number of needles to form an oppositely selvaged strip constituting the intermediate portion of the foot, then in knitting reciprocatingly upon  
30 two separated groups of needles to form a heel pocket in two gored sections united by floating yarns, then in knitting reciprocatingly upon certain needles to form an oppositely selvaged strip constituting the ankle, then in knitting reciprocatingly upon grad-

ually increasing series of needles to form an oppositely selvaged fashioned strip constituting the calf, then in knitting upon all of the needles rotatably to form a tubular leg  
40 and subsequently uniting the edges of said several sections to form a seam extending along the bottom of the foot around the center of the heel and up the center of the back of the leg including the ankle and calf portions.

8. That method of knitting fashioned hosiery upon a circular knitting machine which consists in knitting rotatively upon a full circle of needles to knit a tubular leg, in  
50 knitting reciprocatingly upon gradually varying series of needles to form a tapered or fashioned calf, in knitting reciprocatingly upon a series of needles less than the full circle to form an oppositely selvaged ankle,  
55 in withdrawing the instep needles from the last mentioned series of needles and in knitting upon the remaining needles of that series in separated groups reciprocatingly to form and by narrowing and widening to  
60 produce a gored heel pocket in separated sections having non-selvaged edges connected by floating strands of yarn, in knitting upon all of the needles used in forming the ankle reciprocatingly to form an oppositely  
65 selvaged section constituting the arch and instep portions of the foot and in forming a toe pocket by narrowing and widening.

In testimony whereof, I have signed my name to this specification.

GEORGE P. BOSWORTH.