

No. 626,864.

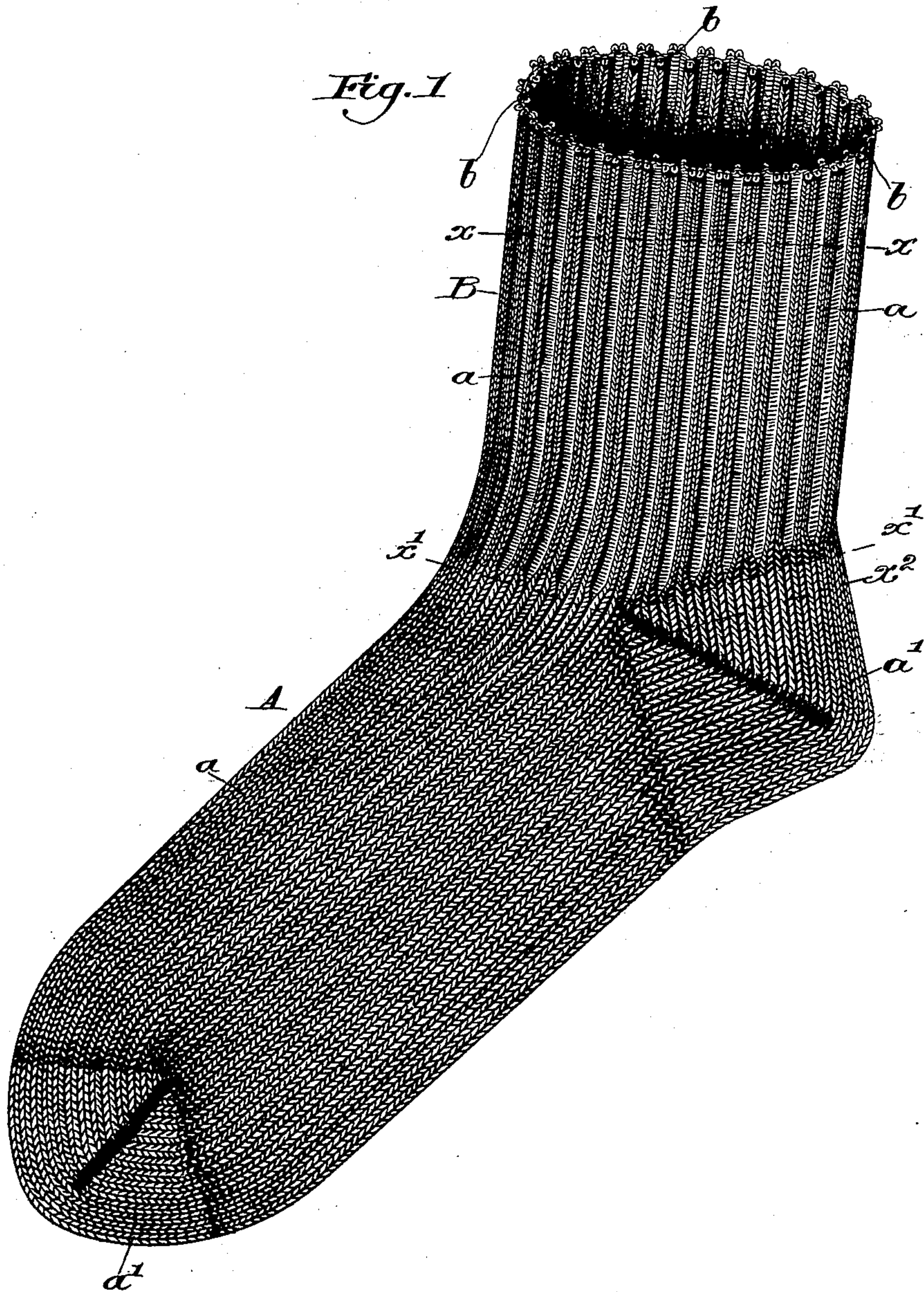
Patented June 13, 1899.

W. D. HUSE.  
STOCKING.

(Application filed Sept. 1, 1898.)

(Specimens.)

2 Sheets—Sheet 1.



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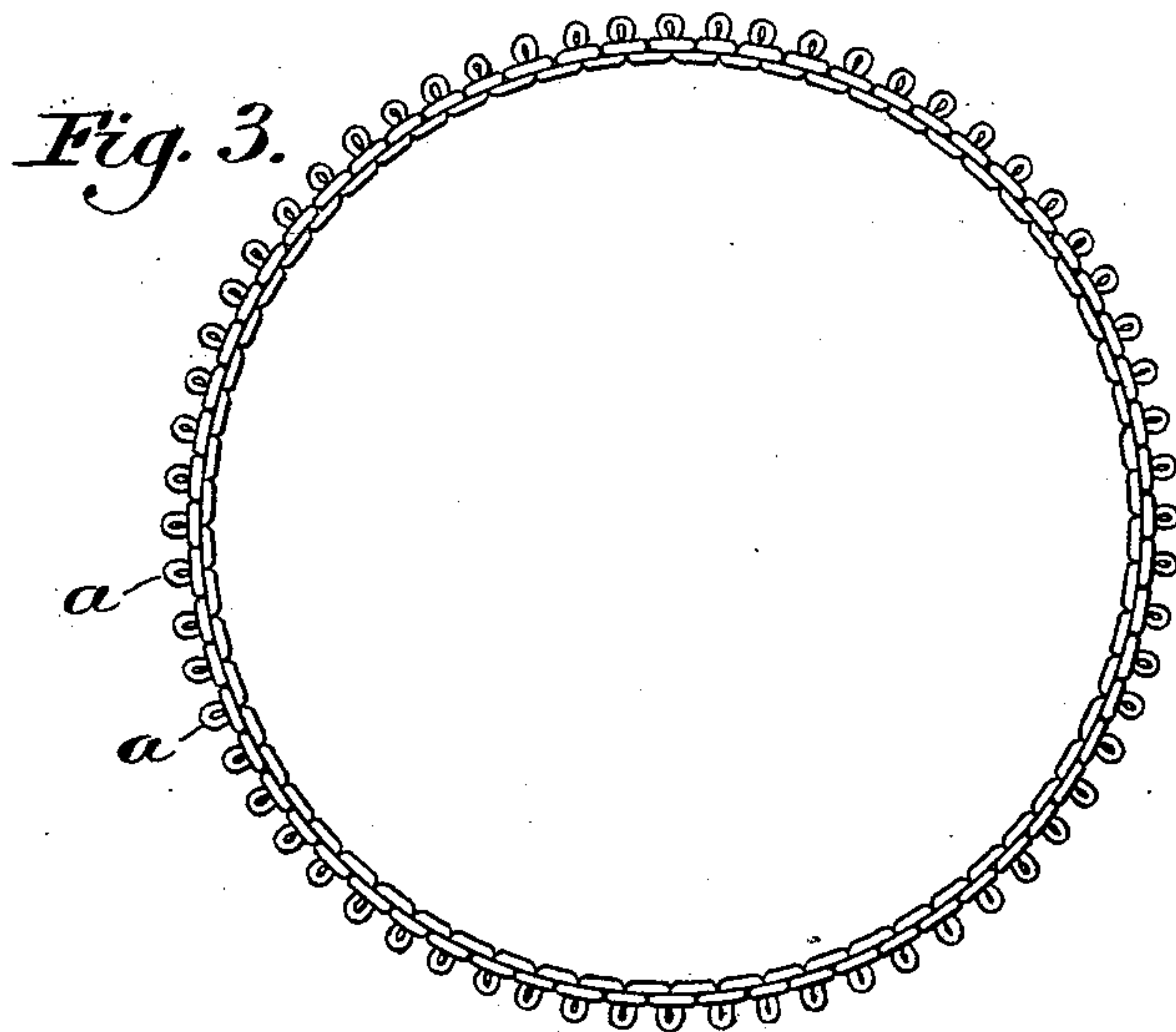
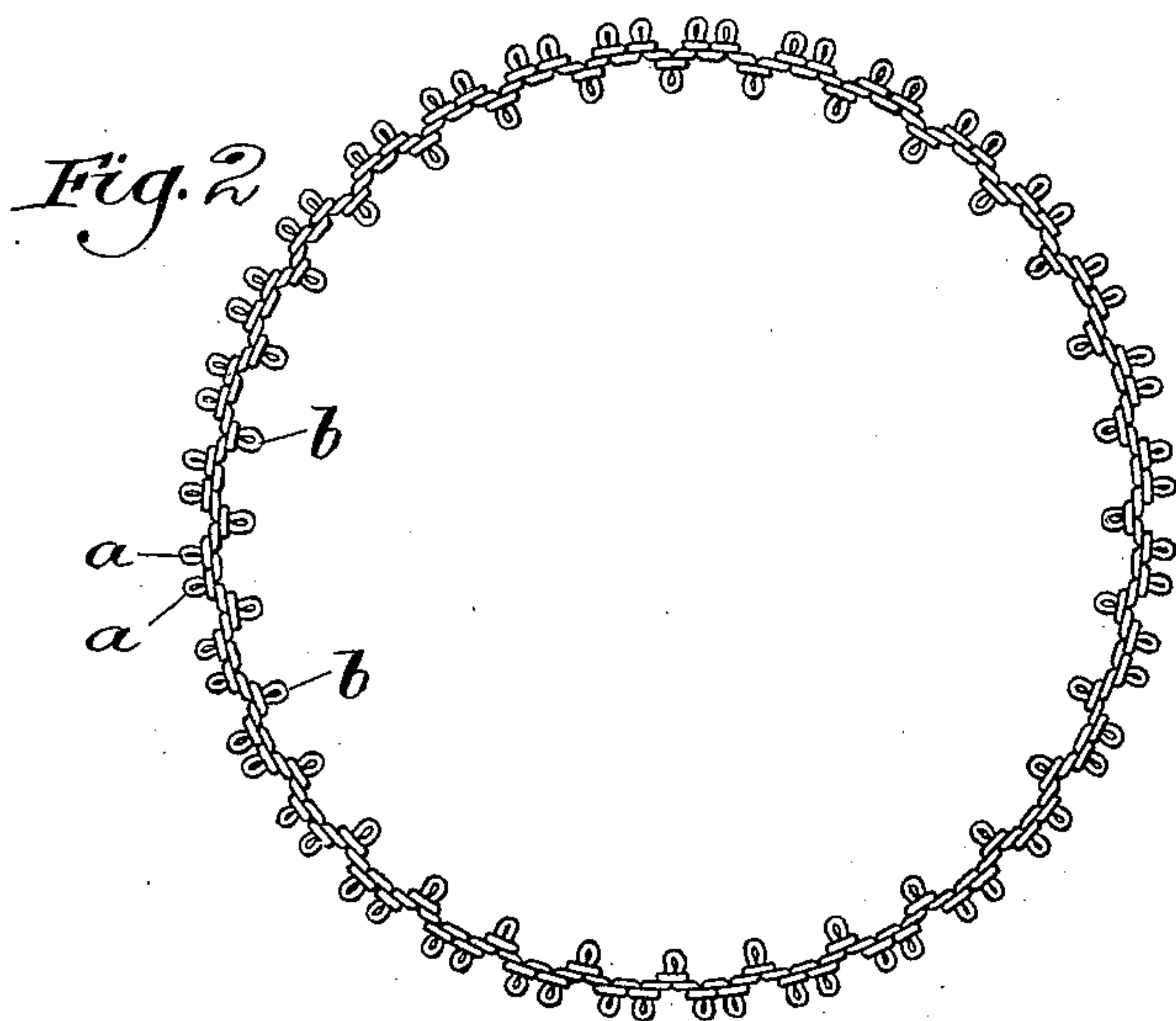
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2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

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## STOCKING.

SPECIFICATION forming part of Letters Patent No. 626,864, dated June 13, 1899.

Application filed September 1, 1898. Serial No. 689,984. (Specimens.)

*To all whom it may concern:*

Be it known that I, WARREN D. HUSE, of Laconia, county of Belknap, State of New Hampshire, have invented an Improvement in Stockings, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention has for its object to provide a novel and improved knit stocking, my principal aim being to provide a stocking that can be produced entirely upon one machine and be as commercial as the stockings of different constructions heretofore produced partly on one and partly on another machine.

Prior to my invention it has been common to knit the leg portion of a stocking in rib-stitch upon one machine, and then transfer such leg portion from the rib-machine upon which it was knit to a plain-stitch machine upon which the foot portion, including the toe and heel portions of the stocking, have been knit.

To enable the operator to make the transfer of the rib-leg to the plain-footing machine, it has been customary, so far as I am aware, to knit the last course of the rib-leg quite loose, much looser, in fact, than the body of the leg portion; otherwise the transfer to the needles of the plain-footing machine could not readily be made.

In knitting the leg portion a relatively light yarn has been employed, partly because the leg is subjected to less wear than the foot and partly because the rib-stitch of the leg contains more stitches to the inch in circumference than the plain stitch employed in the foot.

In knitting the plain foot a relatively heavy yarn is usually employed; but the weight or size of the yarn and number of stitches employed in the foot have been selected solely with reference to the knitting and wear of the foot and without any reference whatever to the size of yarn and number of stitches employed in the leg, which latter has also and arbitrarily been determined solely with reference to the knitting of the leg and the wear thereupon.

In making the transfer from the rib-leg machine to the plain-foot machine any variation in the number of stitches in the leg, as

compared with that provided for in the foot, has been compensated for by skipping or doubling on—that is, if the number of rib-stitches in the leg was less than the number of cylinder-needles in the foot-machine certain of the cylinder-needles would be skipped in making the transfer from one machine to the other—and if, as has usually been the case, the number of rib-stitches in the leg portion exceeded the number of cylinder-needles in the plain machine the difference would be compensated for by what is known as “doubling on”—that is, applying two or more stitches to one cylinder-needle—this doubling on being distributed around the cylinder of the machine, so as to make the work as uniform as possible. Thus while it has been common to knit a foot in plain stitch and with one weight of yarn and a leg in rib-stitch with a lighter yarn no attempt whatever has been made to proportion the number of stitches in the foot to the number of stitches in the leg and to proportion the weight of the respective yarns in either the leg or the foot to the number of stitches in the foot or the leg and there has been no necessity therefor. The weight of the yarn and the number of stitches employed in the foot and in the leg have been arbitrarily selected and without any reference whatever to the weight of yarn and number of stitches employed in the leg or the foot, and it has been a practical impossibility to dispense with skipping or doubling in making the transfer from one machine to the other.

To obviate the transfer of the work and the consequent increase in cost of output, attempts have been made to knit an entire stocking, including the foot and leg portions, on one and the same machine; but stockings thus knit, so far as I am aware, have been a commercial failure.

Stockings have been thus made upon a rib-machine employing cylinder and dial needles by first knitting the foot with the cylinder-needles and then throwing into action the dial-needles and knitting the rib-leg; but stockings so knit have been a commercial failure, because the size of the yarn necessary to produce a foot of the required diameter with stitches corresponding to the number of cylinder-needles has been found ex-



cessively heavy for the leg and to produce a leg of abnormal diameter when the extra number of stitches necessarily produced by the dial-needles are introduced in the formation of the leg. This added weight also has made it impossible to carry the expansible leg portion of a stocking so knit down to or below the small ankle portion of the leg, as is desirable in a thoroughly commercial stocking. In an effort to correct this a yarn proper for the leg has been employed, one which would produce a proper rib-leg; but when this same yarn was continued in the formation of the foot with the cylinder-needles alone the less number of stitches produced in the foot have been insufficient to produce the required diameter and formation of foot.

My invention contemplates a foot knit in plain stitch upon the cylinder-needles of a rib-machine and having the number of plain stitches corresponding to the number of such cylinder-needles, the yarn being by preference selected according to its weight with especial reference to the number of plain stitches thus employed in producing the foot, so as to produce the required diameter of foot with the specific number of stitches which are produced by the cylinder-needles. Having knit the foot, with its heel and toe, in usual manner on the cylinder-needles, the dial-needles are thrown into action to produce the rib-leg, and simultaneously with the throwing in of the dial-needles the yarn is changed to a lighter yarn, the difference between the yarn employed in the foot and leg portions having direct reference to the difference in the number of stitches employed in the foot and leg, the decrease in size or weight of yarn being just sufficient to compensate for the added number of stitches thrown into the work by the introduction of the dial-needles and their stitches, so that the final product is a stocking wherein the foot is knit in plain stitch and with as many rows of stitches as there are at one face of the leg portion—for example, the outer face—and with a yarn employed in the leg portion which, as compared with that in the foot portion, is exactly what is necessary to maintain the proper diameter with the added number of stitches employed in the leg. Thus my stocking differs from stocking heretofore produced, either by transfer or on one machine, in that my stocking always has in the foot the same number of rows of plain stitches as are employed at one face of the rib-leg without any opportunity for or necessity of doubling or skipping, and also in that the yarns employed in the foot and leg are each graded as to their weight or size with direct reference to the number of stitches in the leg and the foot, whereby the less and fixed number of stitches in the foot with the greater weight of yarn produces exactly the required diameter of foot for the leg, the latter, with its added number of stitches, having a yarn just enough lighter than the foot-yarn to compen-

sate for the added number of stitches and produce the required diameter of the leg.

My invention further comprehends knitting the toe and heel portions with a third yet heavier or reinforced yarn.

In the following specification, in connection with the accompanying drawings, I will describe my invention in the best form now known to me, it being understood, however, that my invention is not to be limited to the specific form herein shown and described.

In the drawings, Figure 1 in elevation, part perspective, shows a sufficient portion of stocking embodying my invention to enable the invention to be understood; Fig. 2, a horizontal section through the rib-leg at about the dotted line  $xx$ ; Fig. 3, a horizontal section through a part of the plain foot at about the dotted line  $x'x'$ ; Fig. 4, a partial section through the heel at about the dotted line  $x^2x^2$ .

Referring to the drawings, in the embodiment of my invention there shown the foot portion A is first knit in usual plain stitch upon the cylinder-needles of a rib-stitch machine. In knitting this foot the weight or size of yarn employed is directly proportioned to the number of cylinder-needles employed and to the gage of such needles, so as to produce the required diameter of foot. Having knit the foot with plain stitches in this manner, the dial-needles of the rib-stitch machine are thrown into action and the leg B thereafter knit upon and in continuation of the foot, but in rib-stitch.

Of course in changing from plain to rib stitch upon the same machine no skipping or doubling is possible. Hence the number of rows of plain stitches  $aa$  in the foot (see Fig. 3) exactly and necessarily equals the number of stitches at one of the faces or sides, usually the outside, of the rib-leg, as best shown by a comparison of Fig. 2 with Fig. 3. By reference to Fig. 2, however, it will be seen that in knitting the rib-leg the stitches  $b$  produced by the dial-needles at the opposite face of the fabric from the stitches  $a$  increase the total number of stitches in the circumference of the leg as compared with the circumference of the foot. To prevent any distortion of the article by suddenly throwing in this added number of stitches, my invention contemplates simultaneously with the change from plain to rib knitting a change of yarn or thread from the size or weight, Fig. 3, employed in the foot to a lighter or smaller yarn, Fig. 2, the size or weight of the yarn, Fig. 2, in the rib-leg being directly proportioned to the number of stitches and size of yarn employed in the foot, whereby the full or substantially the same diameter of the stocking is maintained without doubling or skipping. My invention therefore for the first time comprehends a stocking having a foot knit in plain stitch and a leg knit in rib-stitch, with the number of rows of plain stitches in the foot exactly corresponding with the number of rows of stitches at one face of the rib-leg and



with the relative sizes of yarn employed in the foot and leg inversely proportioned to the number of stitches employed in the leg and foot, whereby substantially the same or required diameter of foot and leg may be obtained, notwithstanding the increased number of stitches in the leg as compared with the foot, which increase remains the same on stockings knit on one machine.

10 In addition to the foregoing I also preferably employ a third yet heavier yarn in the heel and toe, as best shown at *a'*, Fig. 4, for the purpose of better resisting the wear at those points.

15 It is perfectly clear that without doubling or skipping if the change was made from plain to rib knitting by throwing in the dial-needles without simultaneously and proportionately changing the yarn the fewer number of stitches in the circle of the foot would naturally produce a more open fabric, which would tend to contract in diameter as compared with the leg, because the extra number of stitches in the latter tend to hold it  
25 distended. All this is avoided by my invention.

The saving in cost of knitting a stocking involving my invention as compared with prior methods of knitting stockings is very  
30 great and the stocking is quite as commercial as any heretofore produced. Furthermore, as a matter of convenience and economy in transferring, in fact in order to make this transfer with sufficient facility to enable  
35 the stockings to be made at a commercial price, the number of rows of rib-stitches employed in the leg of the stocking, knit as heretofore on two machines, has been kept as low as possible. Hence when expanded as necessary to fit the shape of the leg the stitches  
40 in the expanded portions of the leg are so opened as to produce a distinctly different effect from that produced by those portions of the stocking that are not so expanded, there  
45 not being sufficient rows of stitches to permit any considerable stretching without opening the interstices between the stitches. By my invention, however, the number of needles or rows of stitches enforced in the leg is so much  
50 greater than heretofore that the leg may be stretched sufficiently to nicely fit the leg at all points, yet without producing any perceptible difference in the effect produced or the apparent character of the knitting, because there are so many rows of stitches  
55 that the required expansion does not open the stitches of any row sufficiently to make them distinguishable from the stitches in the smaller portions of the leg that are not so stretched. Furthermore, I obtain this ca-

capacity for expansion by using this large number of rows of stitches without making the small ankle portion of the stocking bulky, because the reduced yarn employed in the leg is so proportioned to the number of  
65 stitches, as described, that the ankle is maintained of substantially the same diameter as the top of the plain knit foot. This definite reduction in size of the yarn simultaneously with the change from plain to rib knitting  
70 that maintains the ribbed ankle substantially of the same diameter and thickness as the top of the foot also enables me in my improved stocking to carry the highly-expandible ribbed knit portion quite to the top of the foot, as  
75 shown in the drawings, thus to provide the shapely fit and nice expansion there needed about the ankle without making such ankle portion so thick as to preclude its being worn, which would be and has been the case where,  
80 as heretofore, attempts have been made to carry such ribbed portion with so many needles down to or below the ankle portion.

The term "heavier yarn" as employed herein does not denote necessarily a yarn heavier  
85 in actual weight, but is employed to indicate a stiffer, larger, or bulkier and it may also be heavier yarn, that by reason of its increased size, bulk, or character will compensate for a less number of stitches and maintain the fabric at substantially the same size  
90 or diameter as would be the case were the original yarn with the greater number of stitches employed.

Having described my invention, what I  
95 claim, and desire to secure by Letters Patent, is—

As an article of manufacture, a seamless stocking knit on one machine, it having a foot portion knit in plain stitch and a leg portion  
100 knit in rib-stitch, with the same number of rows of stitches at one ribbed face as the number of rows of stitches in the plain foot portion, said plain foot and ribbed leg portions being knit respectively with relatively heavy  
105 and light yarns, the relative weights of which are in inverse ratio or proportion to the relative number of stitches in said foot and leg portions of the stocking, whereby an expandible leg portion is produced having the number  
110 of rows of stitches described, without increase of diameter of the same at its smallest part when contracted.

In testimony whereof I have signed my name to this specification in the presence of  
115 two subscribing witnesses.

WARREN D. HUSE.

Witnesses:

EDMUND LITTLE,  
GEO. P. MUNSEY.