

(No Model.)

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B. F. SHAW, Dec'd.

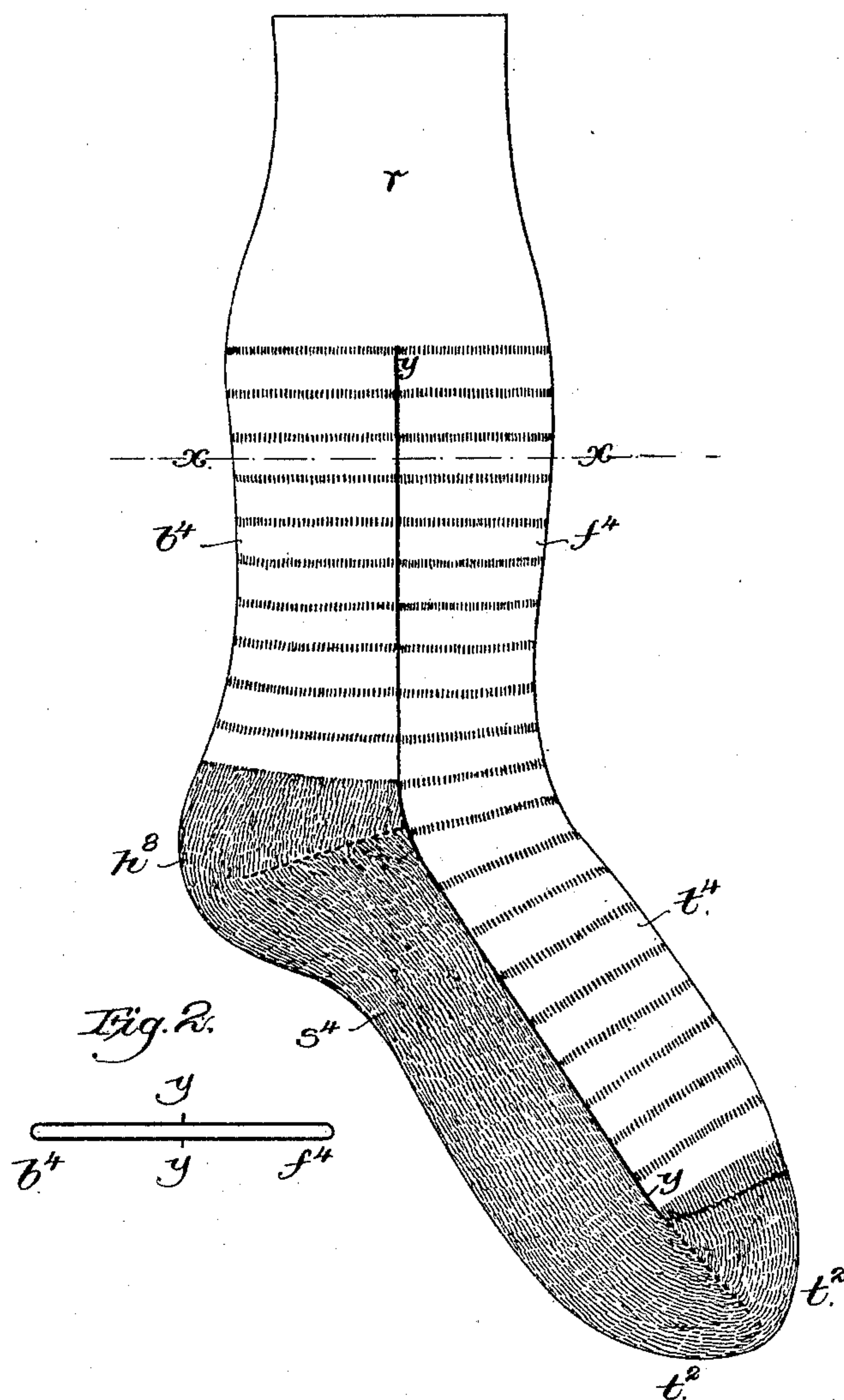
J. BUTLER, Executor.

STOCKING AND METHOD OF MAKING THE SAME.

No. 460,037.

Patented Sept. 22, 1891.

Fig. 1.



Witnesses.

John F. B. Printz

Frederick L. Emery

Inventor:

Benjamin E. Shaw,

by Crosby & Gregory

Attys.

(No Model.)

5 Sheets—Sheet 2.

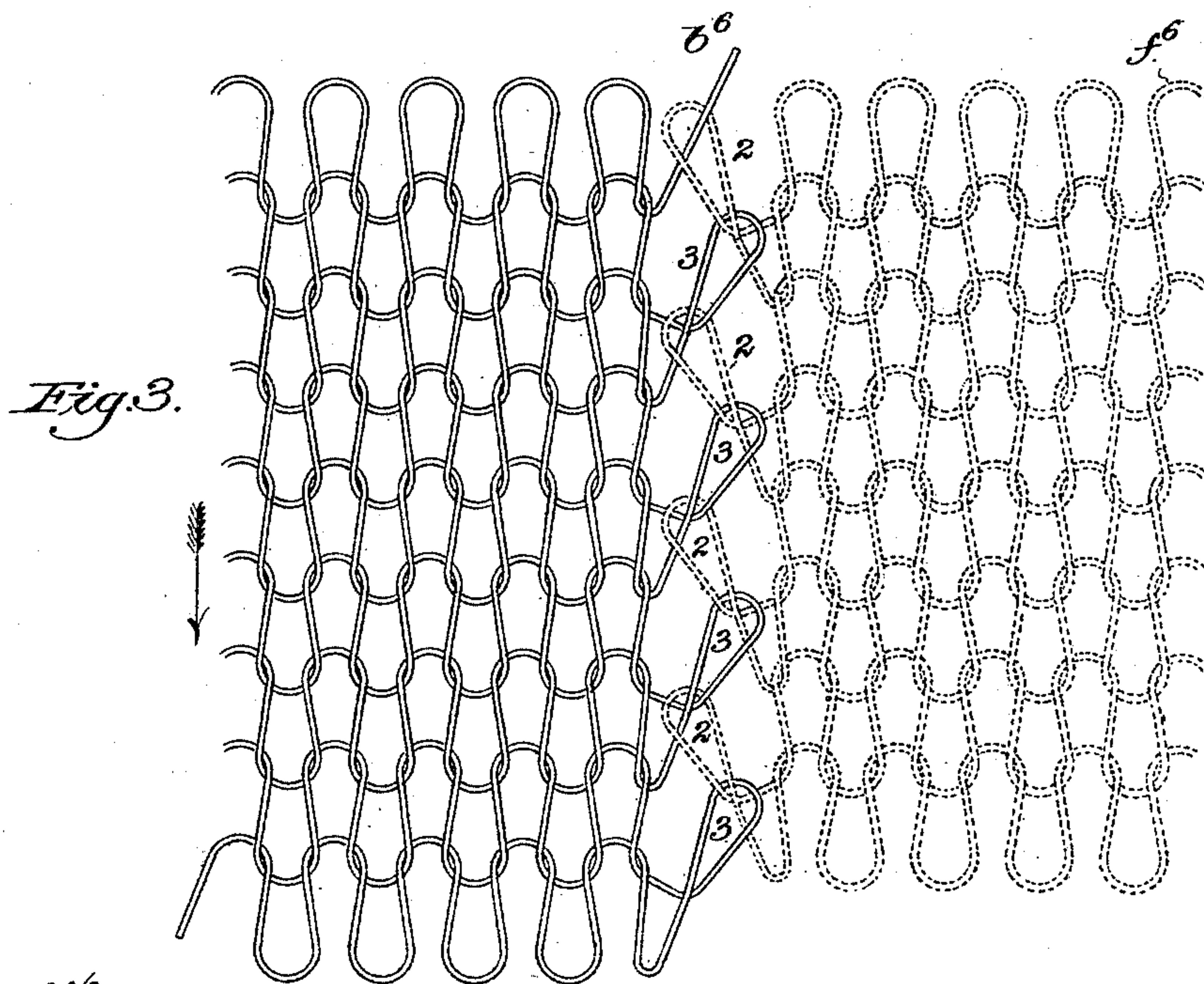
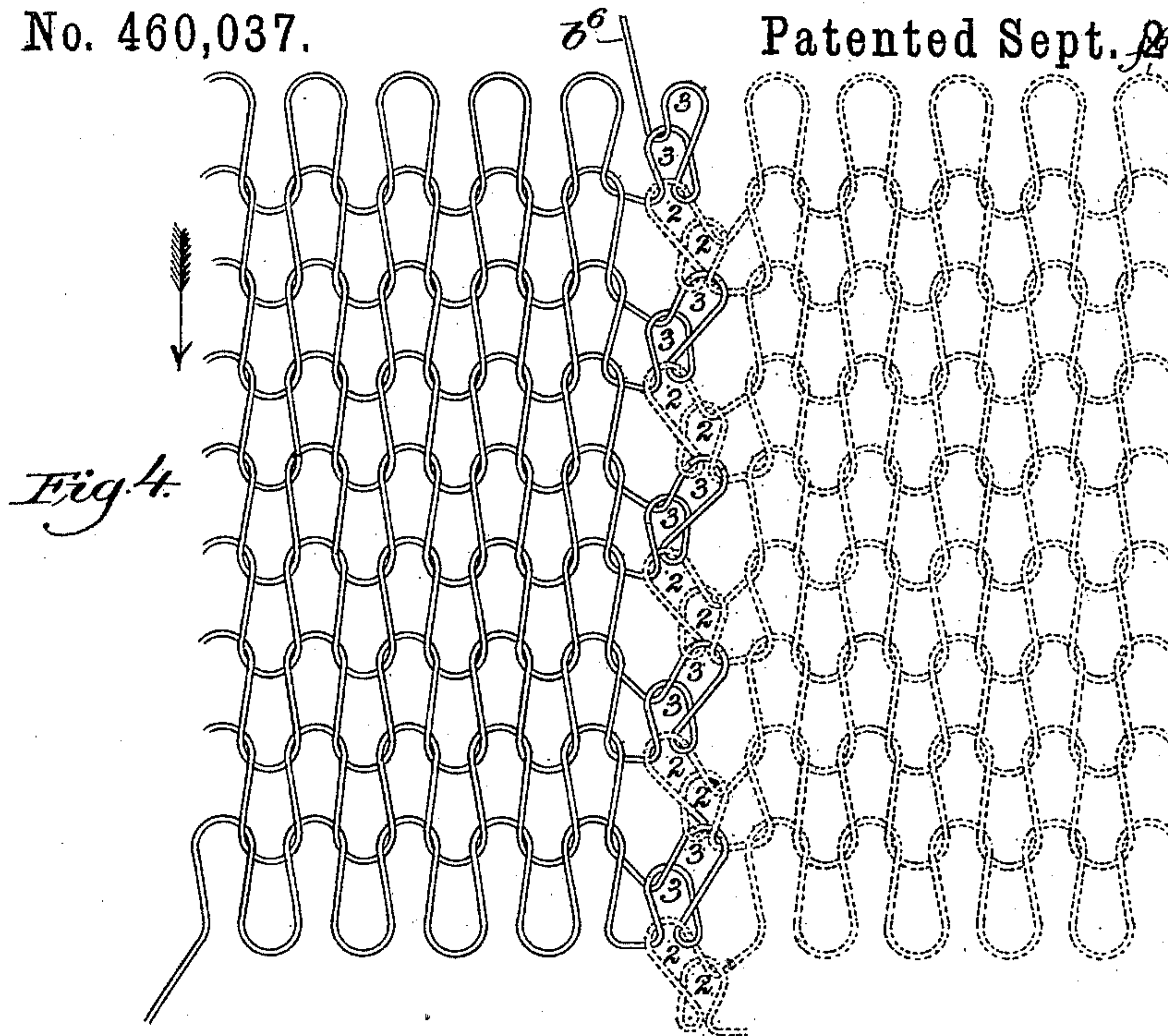
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STOCKING AND METHOD OF MAKING THE SAME.

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(No Model.)

5 Sheets—Sheet 3.

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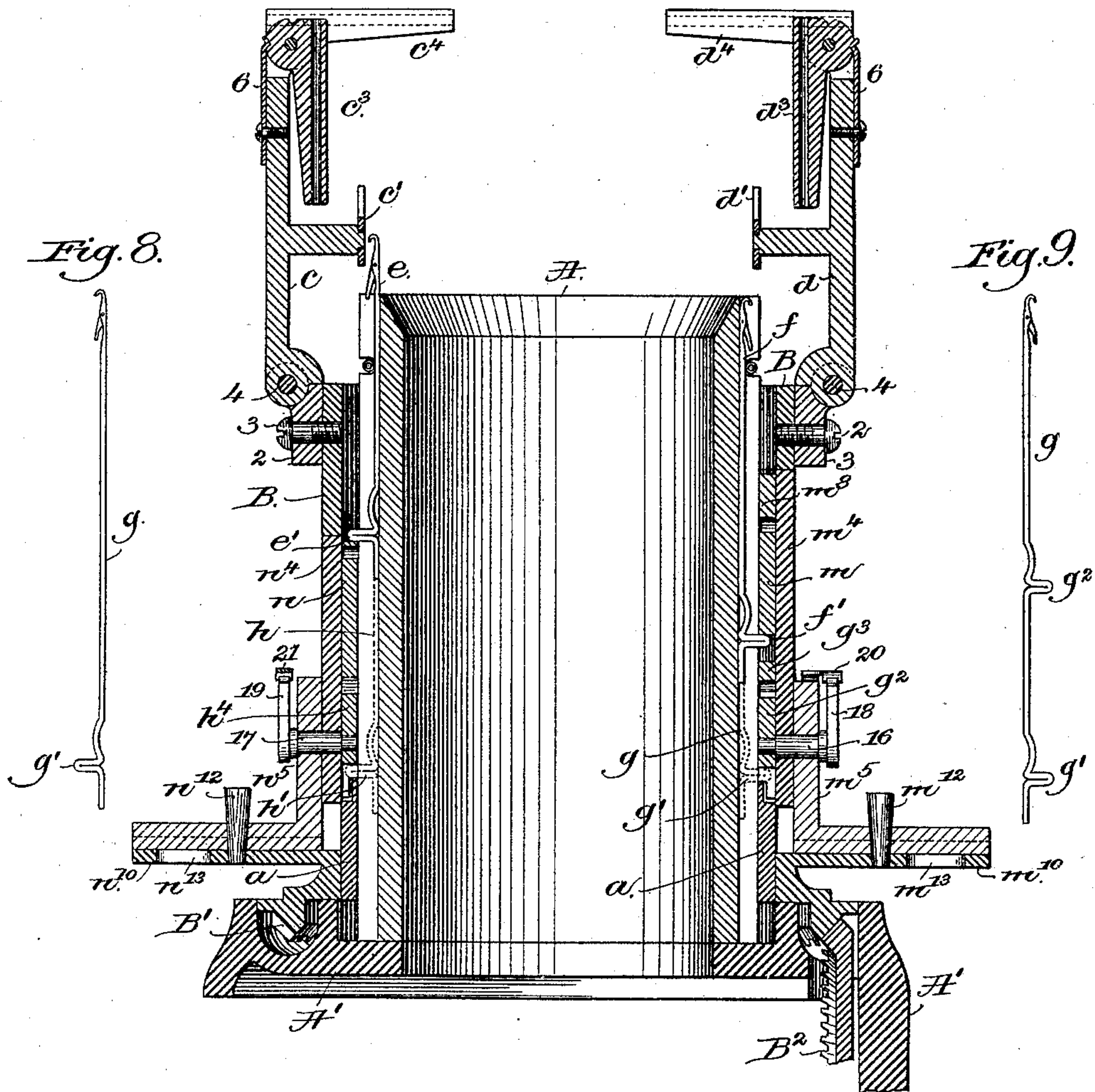
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No. 460,037.

Patented Sept. 22, 1891.

Fig. 5.



Witnesses.
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(No Model.)

5 Sheets—Sheet 4.

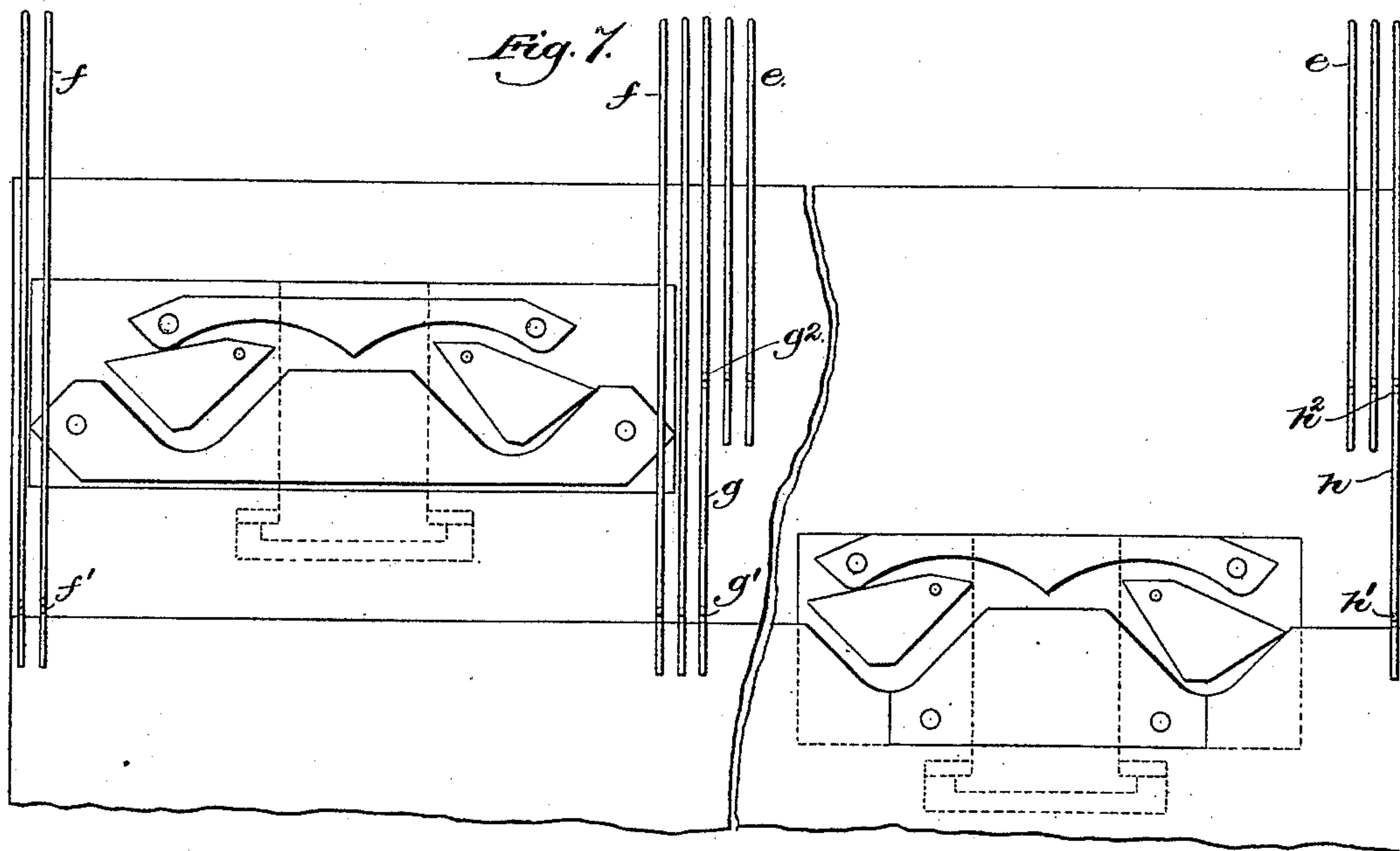
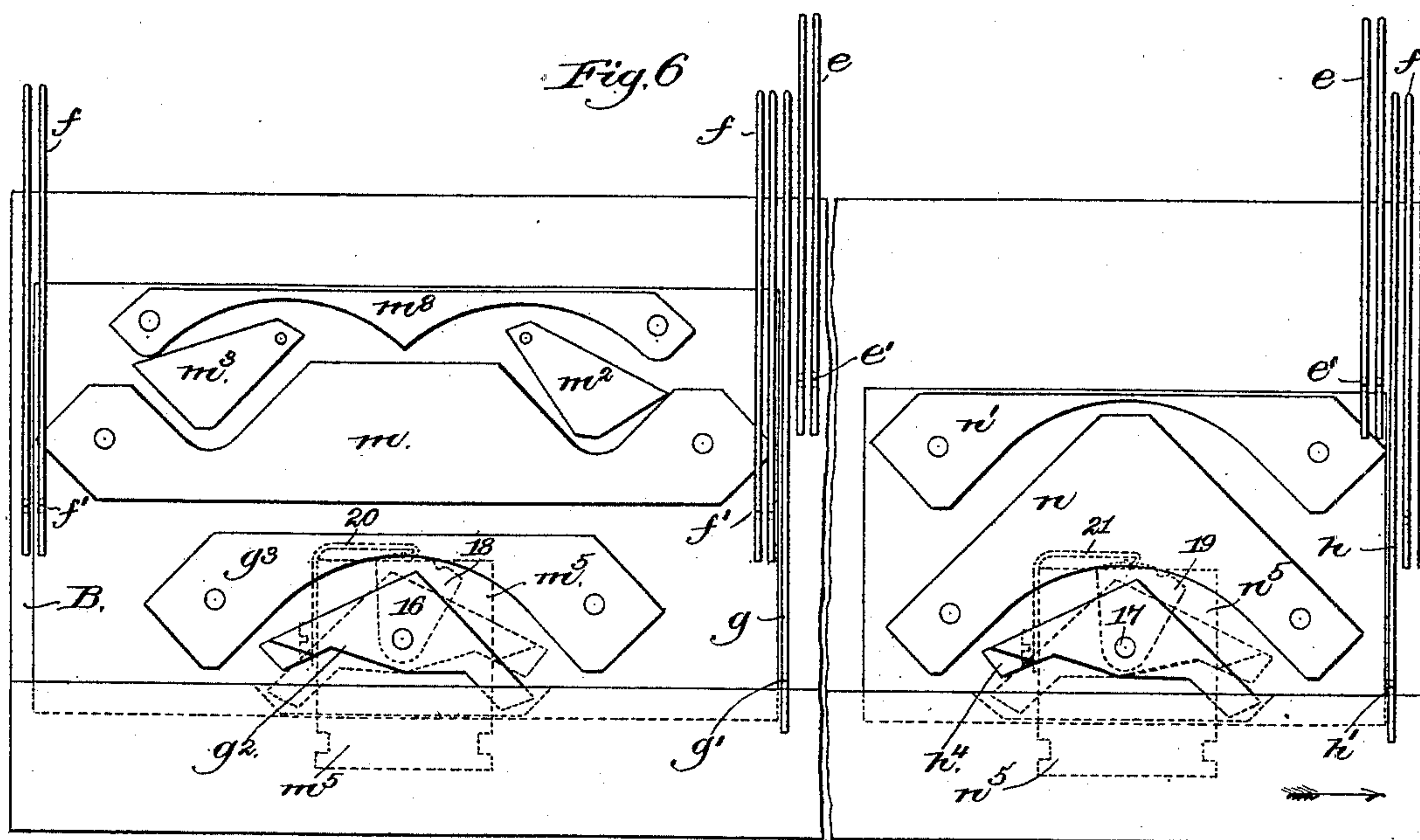
B. F. SHAW, Dec'd.

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STOCKING AND METHOD OF MAKING THE SAME.

No. 460,037.

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Witnesses:

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(No Model.)

5 Sheets—Sheet 5.

B. F. SHAW, Dec'd.
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STOCKING AND METHOD OF MAKING THE SAME.

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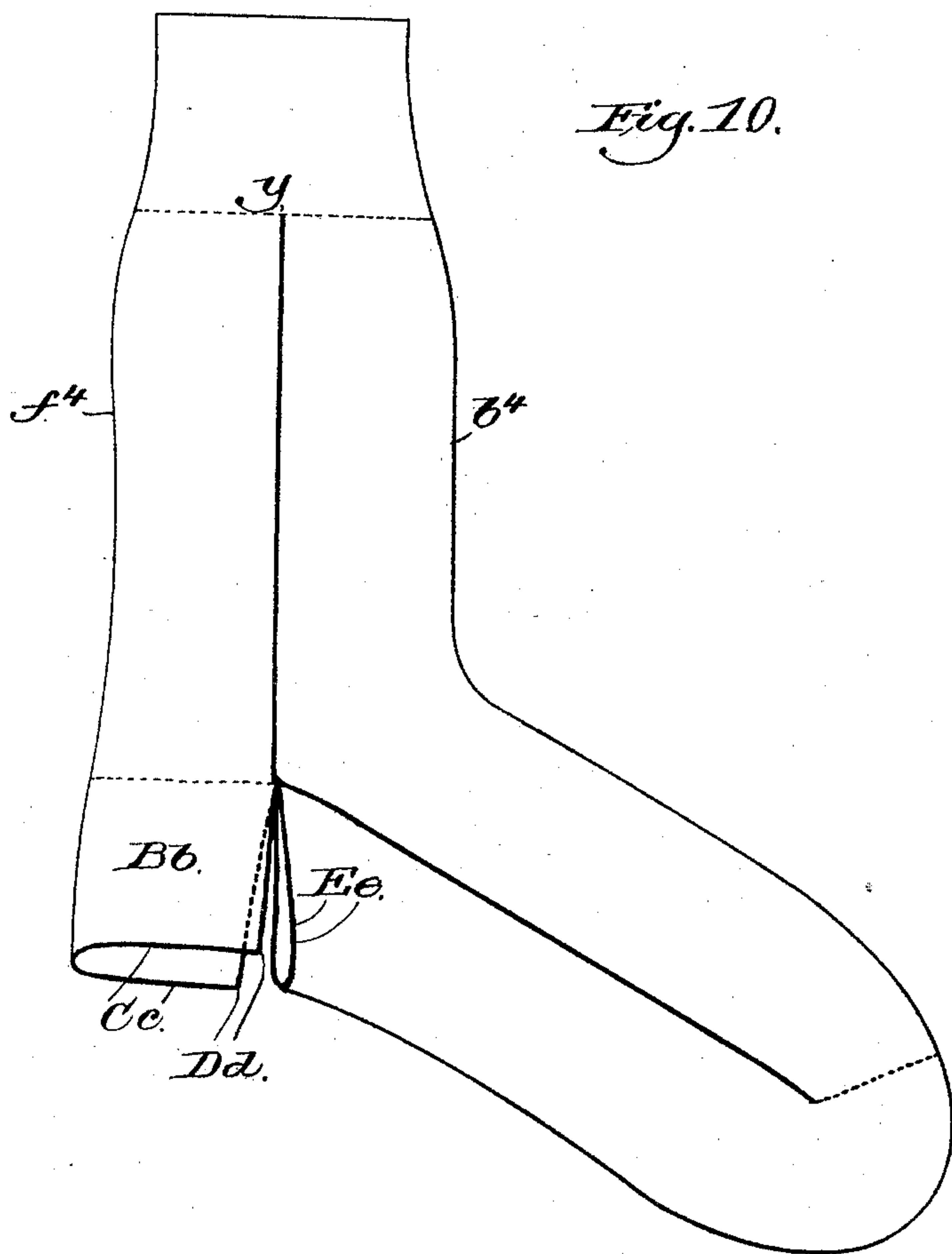


Fig. 10.

Witnesses.
Edgar A. Goddin
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UNITED STATES PATENT OFFICE.

BENJAMIN F. SHAW, OF LOWELL, MASSACHUSETTS; JOSIAH BUTLER, EXECUTOR OF SAID BENJAMIN F. SHAW, DECEASED, ASSIGNOR TO THE SHAW STOCKING COMPANY, OF SAME PLACE.

STOCKING AND METHOD OF MAKING THE SAME.

SPECIFICATION forming part of Letters Patent No. 460,037, dated September 22, 1891.

Application filed December 3, 1889. Serial No. 332,426. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. SHAW, of Lowell, county of Middlesex, State of Massachusetts, have invented an Improvement in
5 Stockings and Methods of Making the Same, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

10 This invention has for its object the production of a novel stocking by a novel method of knitting.

The stocking to be herein described is more nearly of that class known as "seamless," I
15 meaning thereby a stocking wherein the leg and the main part of the foot are without a sewed seam.

United States Patent No. 228,480, heretofore granted to me, shows and describes a
20 machine by which to knit a seamless stocking. Referring to the said patent, it will be seen that the needles are arranged in a circle, that a single yarn-guide attached to a cam-cylinder presents yarn to all the needles during the continuous rotation of the machine,
25 the fabric at such time being tubular, one and the same yarn appearing in like manner at the front and at the back of the leg, and a tubular web having been made of sufficient
30 length for the leg of the stocking, the needles not to be used in knitting the heel are rendered inoperative, and the said yarn (the cam-cylinder being now reciprocated) is presented to the remainder of the needles, while
35 the fabric is narrowed and widened to form a heel, and the heel having been made in usual manner, all the needles are again made operative and the cam-cylinder is again rotated to form a tube for the entire foot, and the foot
40 having been completed some of the needles are again rendered inoperative and the toe is formed on the remaining operative needles, the machine being at such time reciprocated.

A stocking made as above described is composed of one yarn, which appears in each full
45 round of loops or courses from end to end of the stocking. At the toe and heel, however, it is customary to introduce an additional or thickening thread.

50 Desiring to improve seamless stockings, I

have devised a method of knitting whereby the front and back of the leg and, if desired, the top of the foot may be made to differ from the sole of the foot, or from the sole and heel and toe, and by my method any part of the
55 stocking may be striped to the exclusion of any other part.

The novel seamless stocking produced in different colors in accordance with my improved method of knitting is more desirable
60 and salable than the plainer stocking, because of the more pleasing effects of design and material.

My invention consists in a stocking having the front part of its leg composed of one yarn
65 or set of yarns and the rear part of its leg composed of another and distinct yarn or set of yarns, the said two parts being united in the form of a tube by the reciprocal interloopment of the loops of the opposed edges of
70 said parts at the sides of the leg, substantially as will be described; also, in a stocking having the top or upper part of its foot composed of one yarn or set of yarns, and the bottom or sole part of its foot composed of another and
75 distinct yarn or set of yarns, the said upper and sole parts being united in the form of a tube by the reciprocal interloopment of the loops of the opposed edges of said upper and sole
80 at the sides of the foot, substantially as will be described; also, in a so-called "seamless stocking" having the front and back of the leg formed of half-circular courses of independent yarns, as will be described, with the
85 end loops or stitches of the said half-circular courses mutually interlooped, as will be described, having the top and sole of the foot similarly formed and having narrowed and widened heel and toe pouches, substantially
90 as will be set forth.

My invention also consists in the herein-described method of knitting stockings having a tubular-knitted leg, which consists in
95 simultaneously knitting half-circular courses for the back and for the front of the leg from different yarns, respectively, and reciprocally interlooping the said yarns at the opposed ends of said half-circular courses as fast as
100 these are laid, substantially as will be described; also, in the method herein to be de-

scribed of knitting a stocking, which consists in forming the leg portion thereof by simultaneously knitting half-circular courses of loops or stitches of different or independent yarns, one series of such half-circular courses to constitute the front of the leg and the other to constitute the back thereof, reciprocally interlooping the yarns at the opposed ends of the half-circular courses as these last are knit, then knitting with one of the yarns in continuation of the back of the leg to form a heel portion, then forming the foot portion by similarly knitting half-circular courses of loops or stitches of different or independent yarns, one series of such half-circular courses to constitute the top of the foot and the other to constitute the sole thereof, reciprocally interlooping the yarns at the opposed ends of the half-circular courses as these last are knit, then forming the toe in the usual manner, and finally finishing by seaming in usual manner, all substantially as will be described; also, in the described method of knitting seamless stockings, which comprises simultaneously knitting from separate independent yarns half-circular courses of loops to enter into the formation of the front and back of the stocking and interlooping along the opposite sides of the stocking the said half-circular courses as fast as they are knitted, thus making a tubular seamless portion, substantially as will be described.

In the manufacture of a stocking in accordance with my improved method of knitting the front part of the stocking (it comprising the front of the leg and the top of the foot) is composed of a distinct yarn or set of yarns, if the fabric is to be striped, while the back part of the stocking (including the rear part of the leg and the bottom or sole of the foot) is knitted from another distinct yarn or set of yarns when the fabric is to be striped, these two parts being preferably begun at what is to be the top of the leg and being knitted at the same time by a to-and-fro movement of the yarn-delivery guides with relation to the series of needles which they are to supply with yarn, the half-circular courses of loops so formed being interlooped at their ends as the said courses are laid. I denominate such interloopment as "reciprocal." It differs in method and kind and makes a different stocking from one produced by knitting two flat webs having selvage edges, the loops of which are subsequently united by a separate yarn, or by drawing the said loops one through the other by means of a crochet-needle.

In my improved stocking the yarn or yarns entering into the composition of the body of the front of the leg do not enter into the composition of the body of the rear of the leg, and vice versa, and this is also true as to the top and sole of the foot.

In my method of knitting, knitting on the needles employed to knit the front of the stocking is suspended at the instep, and while

the heel is being knitted on the needles used to knit the back of the leg, the yarn or yarns used in the front of the stocking not being used in knitting the heel, and the heel having been finished, knitting is resumed on all the needles and the foot is knitted, and then knitting on the needles employed to knit the front of the leg is again discontinued, as before, while the toe is knitted in substantially the same manner as the heel by a succession of narrowing and widening operations now well known. I, however, desire it to be understood that when the foot is of sufficient length the action of the needles used in knitting the bottom or sole of the foot may be discontinued and the toe be knitted on the needles used to form the front of the stocking; or I may knit the top of the toe on one set of the said needles and the bottom of the toe on the other set of needles, all of which will be understood by persons conversant with the use of circular-knitting machines adapted to be reciprocated at times for heel and toe narrowing and widening.

Other applications for United States Patents, Serial No. 333,113 and Serial No. 342,960, to which reference may be had, show two forms of knitting-machines whereby my improved stocking may be rapidly knitted, each of the said machines containing two series of needles called, respectively, "longer needles" and "shorter needles" and "suture-needles," the latter located between the outermost needles of the said two series of needles, the suture-needles performing the interloopment at the sides of the stocking in the line *y y* (see Figure 1) of the front and back of the stocking, each knitted from distinct yarns, as before stated, it being understood that should the suture-needles be omitted the front and back of the stocking would not be connected, but would present separate distinct fabrics.

The machines referred to are provided with yarn-feeders—preferably three, but there may be more—for each yarn-delivery guide, and by providing these yarn-feeders with yarns of different color or material any desired color or kind of yarn may be taken to each yarn-delivery guide, according to the color or kind desired for the part of the stocking being knitted, and these yarns may be changed one for another as the knitting proceeds, if striped work is desired at any part or parts of the stocking, and so, also, it will be understood that by the employment of these extra yarn-feeders an extra or thickening yarn may be introduced at any desired part of the stocking, whether at heel or toe or sole or other part, or the sole may be knitted of one thickness while the top of the foot is being knitted of another thickness or thinner.

Fig. 1 in side elevation represents a stocking embodying my invention, the full line *y y* representing the wale or line of interloopment of the front and back of the stocking along the sides of the leg and foot, the drawing showing the stocking as stretched flat, as

when on a board. Fig. 2 is section of the same in the line x of Fig. 1. Fig. 3, on an enlarged scale, shows some of the loops entering into the composition of the front and rear of the leg, or it may be the top and sole of the foot in the line $y y$, the figure showing the interloopment by the suture-needles of the different yarns knitted on the separate series of needles, to be described. Fig. 4 represents a modified form of interloopment. Fig. 5 shows in vertical section part of a knitting-machine by which to make my improved stocking, the said figure by dotted lines showing the length of the suture-needles ninety degrees distant from the section-line for the said figure; Fig. 6, a detail of the inner side of the cam-carrier, needle-actuators, and some of the series of longer and shorter needles, and suture-needles used in the machine partially shown in Fig. 5; Fig. 7, a modification to be described. Figs. 8 and 9 show one of each of the different suture-needles to be referred to; and Fig. 10 shows a stocking with a modified shape of heel, the striped effect being omitted.

Referring to Fig. 1, r represents an ordinary rib top or cuff, to which the remainder of the stocking is knitted. The front part of the stocking comprises the front f^4 of the leg and the front t^4 of the foot, while the back part of the stocking comprises the rear part b^4 of the leg and the sole s^4 of the foot, the heel h^8 and toe t^2 being represented as knitted on the needles employed to knit the rear of the leg and sole of the foot. The yarn used in the front of the leg is entirely distinct from that used in the rear of the leg, and so also the yarn used in the top of the foot is entirely distinct from that used in the sole of the foot, the half-circular courses of loops produced in knitting the front part of the leg and the top of the foot being interlooped at their ends, respectively, as fast as laid with the endmost loops of the half-circular courses of loops entering into the rear of the leg and sole of the foot, which are laid in succession simultaneously with the production of the front of the leg and the top of the foot, the line of interloopment of these separate distinct yarns being in the line $y y$.

Figs. 3 and 4, enlarged, show the interloopment of the yarn or yarns used in the front and back parts of the stocking.

In Fig. 1 the stocking is shown as striped in the leg and top of the foot, and to do this the yarn used in the front and rear of the leg and in the top of the foot will be changed after the knitting of a defined number of half-circular courses of loops and a yarn of another and the desired color substituted for a certain number of half-circular courses. If the stocking-leg is to be all of one color, then the yarn used in the front will be of the same color as that used in the rear of the leg; but if striped in two colors then yarns of two colors will be used one after the other on each the front and the rear side.

Referring now to Figs. 5 and 6, copied from my application, Serial No. 333,113, filed December 9, 1889, and to which reference may be had for a more extended description of one form of machine by which to knit my improved stocking, A represents a needle-bed, and B a cam-carrier having at its inner side (see Fig. 6) two series of cams or actuators, one to reciprocate the series of needles e , denominated "shorter needles," and the other to reciprocate the series of needles f , denominated "longer needles," the said cam-carrier being also provided below the cams or actuators just referred to with suture cams or actuators g^2 and h^4 , by which to reciprocate at the proper times the intermediary suture-needles g and h , one each between the opposing series of longer and shorter needles.

In Fig. 5 the cam-carrier is shown as provided with two yarn-delivery guides $c' d'$, the guide c' delivering its yarn or yarns to the longer needles f and not to the shorter needles, and the yarn-guide d' to the shorter needles e and not to the longer needles, and each yarn-delivery guide in practice has two or more yarn-feeders, as $c^3 c^4 d^3 d^4$, from which may be taken from time to time yarns of the desired color to supply the said delivery-guides for making striped stockings or for thickening any desired part of the stocking. It will also be understood that the cam-carrier B has only a motion of reciprocation, and that it is reciprocated only far enough to cause the respective yarn-delivery guides to present their yarns each to its own proper series of needles and to the suture-needles, the latter in their reciprocation effecting the interloopment at their ends, one with the other of the respective half-circular courses of loops knitted on the said longer and shorter needles, as the said half-circular courses of loops are laid.

In Fig. 5 and 6, where the suture-needles are represented as having each but one butt, and as reciprocated by separate independent suture-cams, the said suture-needles are elevated to take yarn and knit only as the cams or actuators co-operating with the said longer and shorter needles move off from the series of needles which they actuate, each suture-needle thus constituting the last needle to take yarn and knit at the end of each half-circular course of loops laid, the interloopment of the independent distinct yarns presented, one or more only in the front part and one or more only in the back part of the stocking, being as represented in Fig. 3, where the central wale supposed to be in the line $y y$ is shown as composed of loops 3 and 2, taken alternately from the yarns $b^6 f^6$.

In Figs. 3 and 4 the yarn shown by dotted lines as entering into the front part of the stocking is marked f^6 , while the yarn b^6 shown by full lines enters only into the back of the stocking, the parts of the stocking shown in the said Figs. 3 and 4, viewing the particular stocking represented in Fig. 1, be-

ing supposed to lie between the dark stripes; but to stripe the work as shown in Fig. 1, the yarns f^6 and b^6 will be exchanged at the proper times in the knitting for yarns of other desired color, so by the terms "distinct yarns" and "sets of yarns" I intend to signify the employment of one yarn in the front part and another in the back part of the stocking, or two or more such yarns in each the back and front for the production of color effects or for thickening the fabric.

Referring now to Fig. 7, which is copied from my application, Serial No. 342,960, filed March 7, 1890, to which reference may be had, the suture-needles g h have each two butts g' g^2 , h' h^2 , and they are actuated each by one and then by the other of the cams or actuators employed to reciprocate the series of longer needles and the series of shorter needles, and as a result thereof the suture-needles instead of being actuated to serve only as the last needles in the completion of each half-circular course of loops, as described in Figs. 5 and 6, are made to take the distinct yarns f^6 b^6 at the commencement as well as at the ending of each half-circular course, the interloopment of the said distinct yarns at the ends of the said half-circular courses as laid being as represented in Fig. 4, where the wale of loops supposed to be in the line y y , Fig. 1, shows two loops 3 from the yarn b^6 , knitted on the shorter needles and appearing only in the back part of the stocking, interlooping with two loops 2 of the yarn f^6 , knitted on the longer needles and appearing only in the front part of the stocking, such wale of loops being more closely knitted or more prominent than the adjacent wales, whereas the wale of loops 2 3 (shown in Fig. 3) is less prominent or thinner than the wales of loops adjacent to it on either side. Should the suture-needles be omitted, it will be understood that the yarns f^6 b^6 , fed, respectively, to the longer and to the shorter needles, as described, would be knitted into two distinct fabrics; but the suture-needles, actuated as described, automatically effect the interloopment of semi-course with semi-course as fast as laid, thus making a tubular fabric. This is a very different operation from that which will be practiced by crocheting the edges of the said fabrics together by means of a crochet-hook and a separate thread.

While the stocking is much more cheaply produced than by crocheting, it possesses advantages over the crocheted stocking.

Should my improved stocking be knitted on a straight machine having two ranks of needles, as it may be, the heel may be produced on either rank of needles, and the toe may be produced wholly on either or partly on each rank of needles. By the alternation of yarns, as described, of different colors the leg may be striped, or the top of the foot may be striped and the sole of the foot be of a plain color, and, in fact, the color of the front part of the stocking as compared with the back

part of the stocking may be varied at any part of the length of the stocking, and as may be desired.

Prior to my invention stockings showing color effects at the back different from the front have been made by first knitting the different parts in flat pieces having selvages and subsequently sewing the said pieces together. I am also aware that stockings have been made by first making the leg and the top of the foot, and by thereafter knitting the sole and joining the courses of loops made therein as laid to loops of the top of the foot, which loops are picked in succession onto the end needles of the series of needles on which the sole is being knitted; but this plan of knitting is slow and requires manual dexterity, whereas in my method the front and back parts are knitted simultaneously and joined automatically half-circular course after half-circular course as laid.

It will be seen that in following my above-described method of knitting a stocking the heel may be knitted in any usual way or form—i. e., it may be knitted in a square or rectangular piece, as Bb, Fig. 10, which, when folded, requires that its lower edges Cc be bound together and its sides Dd joined to the sole part Ee, or it may be knitted by the narrowing and widening process of the ordinary seamless stocking, or as described in United States Patent No. 64,154 or No. 200,225, heretofore granted to me. In the formation of the toe, while I prefer the process described in United States Patent No. 64,154, any other usual process or method may be followed.

By my method, as herein explained, the wale formed by the suture-needle is composed of a loop from "one yarn" drawn through a loop of the "other yarn," and of a loop from the other yarn drawn through a loop of the one yarn, so that there is a reciprocal interlooping of the different yarns one with the other.

In the stocking fabric it will be understood that the stripes shown in Fig. 1 are parallel; but this cannot be accurately shown on a drawing showing the stocking stretched flat and supposed to be on a board, as in Fig. 1.

A species of stocking of which the stocking herein described is the genus is made the subject-matter of application Serial No. 395,946, filed June 11, 1891.

I claim—

1. A so-called "seamless stocking" having the front part of its leg composed of one yarn or set of yarns and the rear part of its leg composed of another and distinct yarn or set of yarns, the said two parts being united in the form of a tube by the reciprocal interloopment of the loops of the opposed edges of said parts at the sides of the leg, substantially as described.

2. A stocking having the top or upper part of its foot composed of one yarn or set of yarns and the bottom or sole part of the foot composed of another and distinct yarn or set

of yarns, the said upper and sole parts being united in the form of a tube by the reciprocal interloopment of the loops of the opposed edges of said upper and sole at the sides of the foot, substantially as described.

3. A so-called "seamless stocking" having the front and back of the leg formed of half-circular courses of independent yarns, as described, with the end loops or stitches of the said half-circular courses mutually interlooped, as described, having the top and sole of the foot similarly formed and having narrowed and widened heel and toe pouches, substantially as set forth.

4. The herein-described method of knitting stockings having a tubularly-knitted leg, which consists in simultaneously knitting half-circular courses for the back and the front of the leg from different yarns, respectively, and reciprocally interlooping the said yarns at the opposed ends of said half-circular courses as fast as these are laid, substantially as described.

5. The herein-described method of knitting a stocking, which consists in forming the leg portion thereof by simultaneously knitting half-circular courses of loops or stitches of different or independent yarns, one series of such half-circular courses to constitute the front of the leg and the other to constitute the back thereof, reciprocally interlooping the yarns at the opposed ends of the half-circular

courses as these last are knit, then knitting with one of the yarns in continuation of the back of the leg to form a heel portion, then forming the foot portion by similarly knitting half-circular courses of loops or stitches of different or independent yarns, one series of such half-circular courses to constitute the top of the foot and the other to constitute the sole thereof, reciprocally interlooping the yarns at the opposed ends of the half-circular courses as these last are knit, then forming the toe in the usual manner, and finally finishing by seaming in usual manner, all substantially as described.

6. The described method of knitting seamless stockings, which comprises simultaneously knitting from separate independent yarns half-circular courses of loops to enter into the formation of the front and back of the stocking and interlooping along the opposite sides of the stocking the said half-circular courses as fast as they are knit, thus making a tubular seamless portion, substantially as described.

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

BENJAMIN F. SHAW.

Witnesses:

JAMES F. GORDON,
RALPH H. SHAW.