

May 18, 1943.

J. L. BEERS
METHOD OF AND MACHINE FOR KNITTING HEEL FABRICS
IN SINGLE UNIT STOCKING BLANKS
Filed April 27, 1937

2,319,769

7 Sheets-Sheet 1

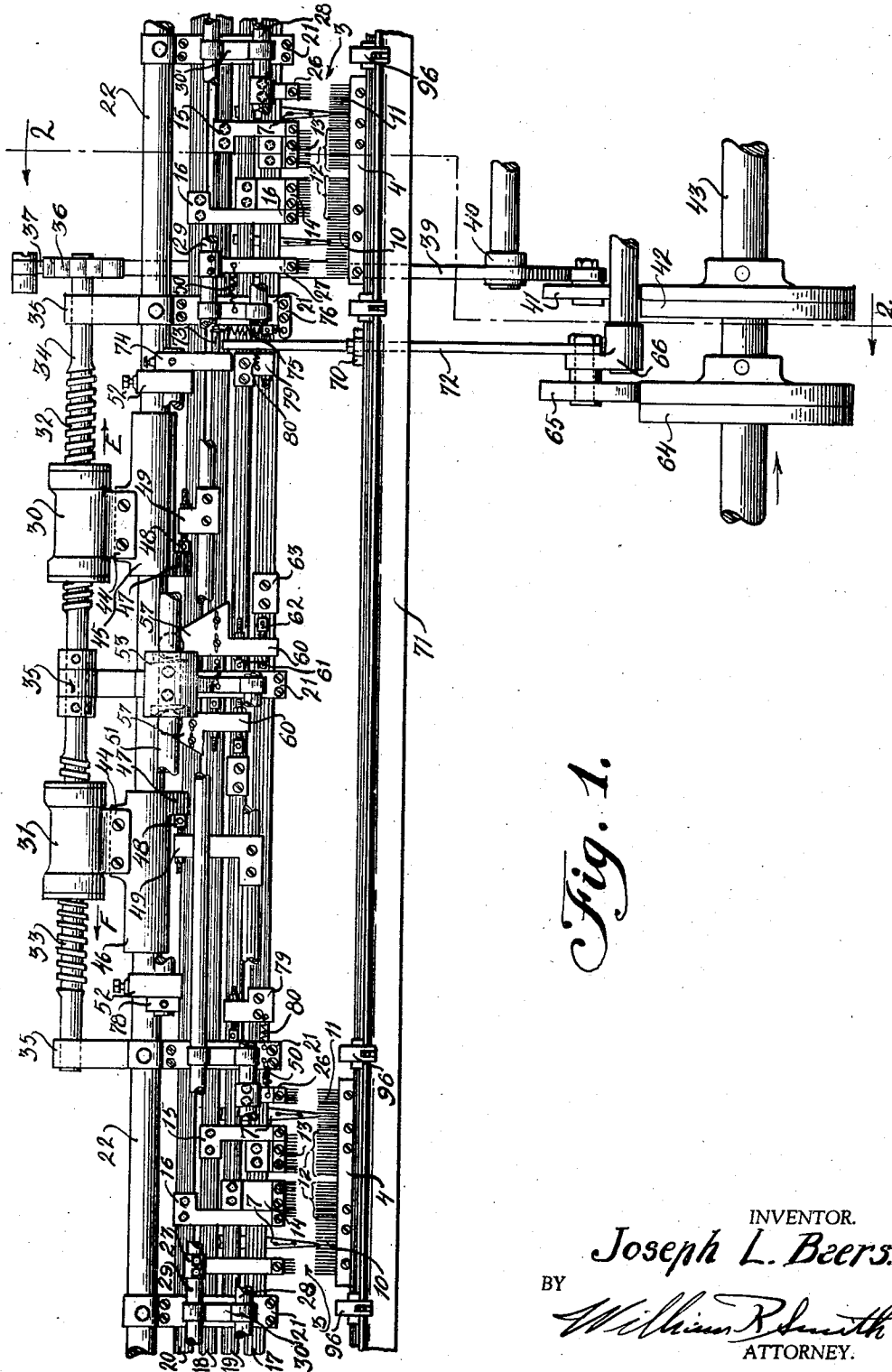


Fig. 1.

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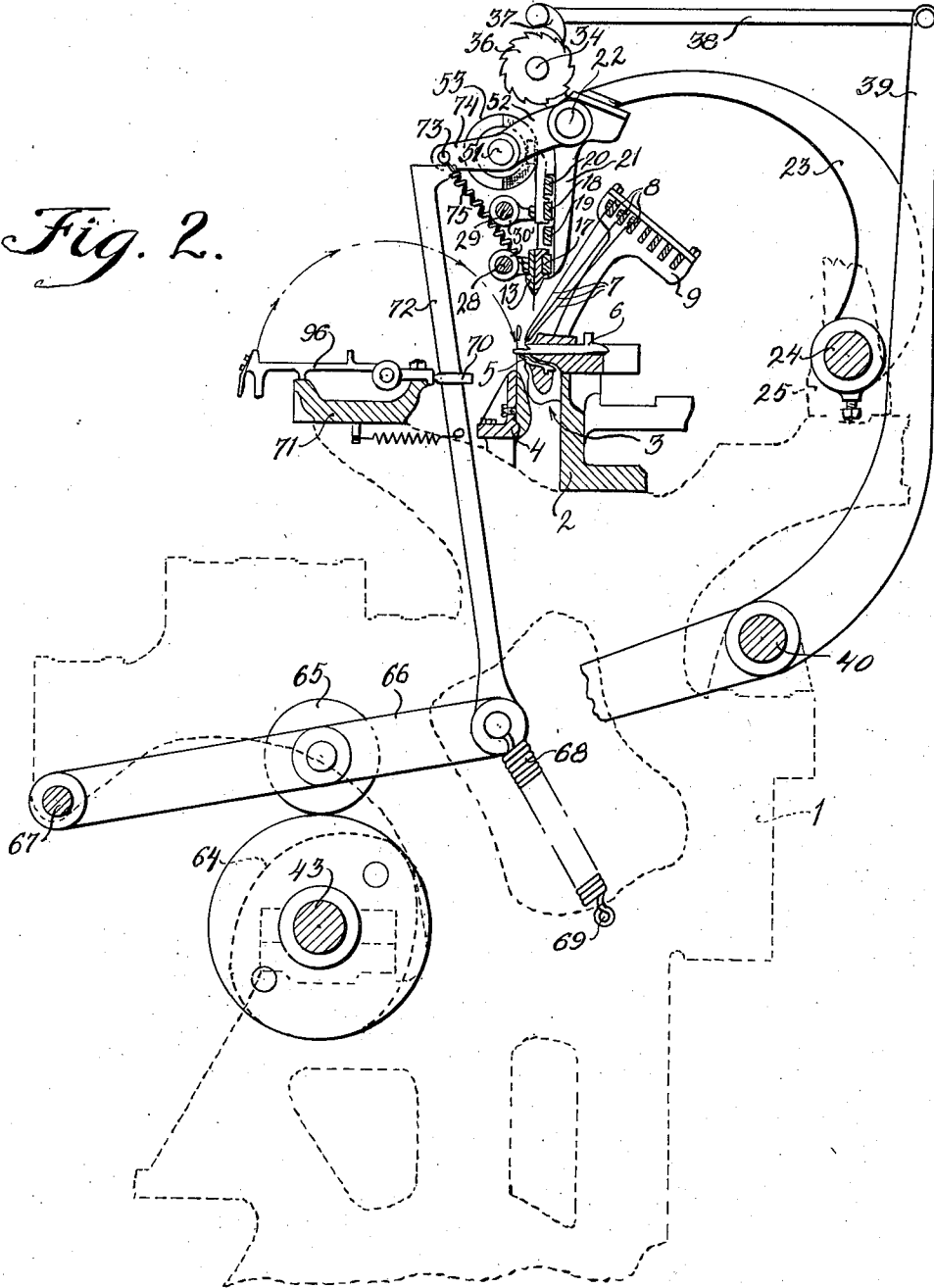
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7 Sheets-Sheet 2

Fig. 2.



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7 Sheets-Sheet 3

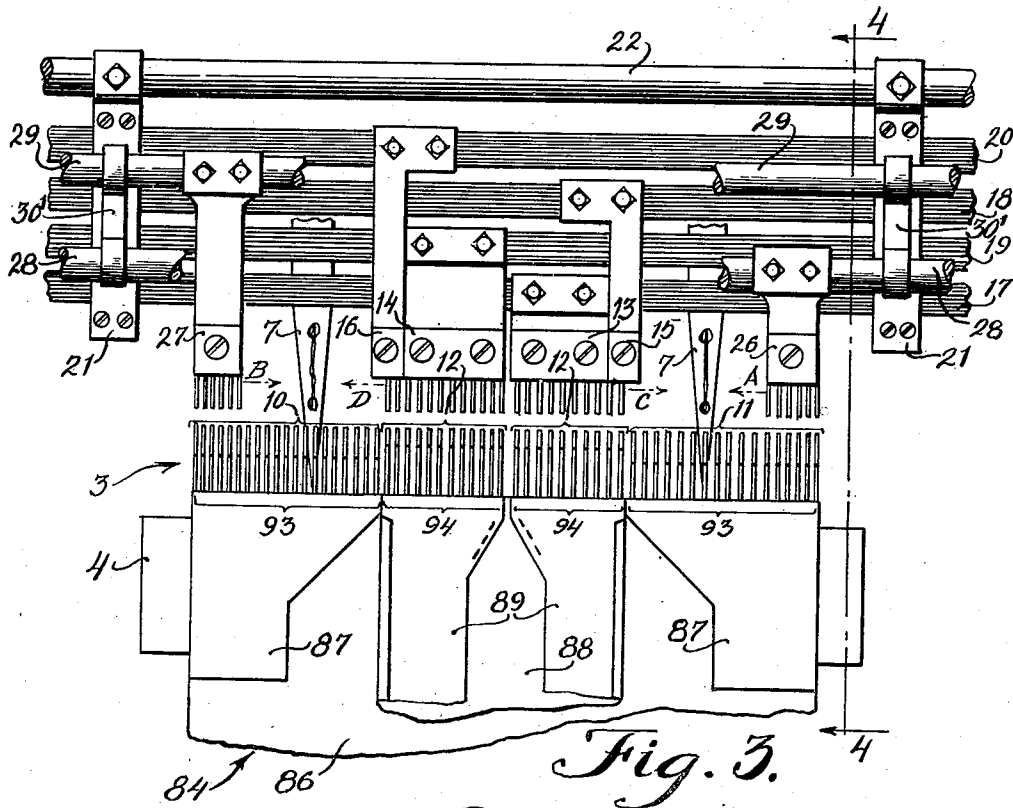


Fig. 3.

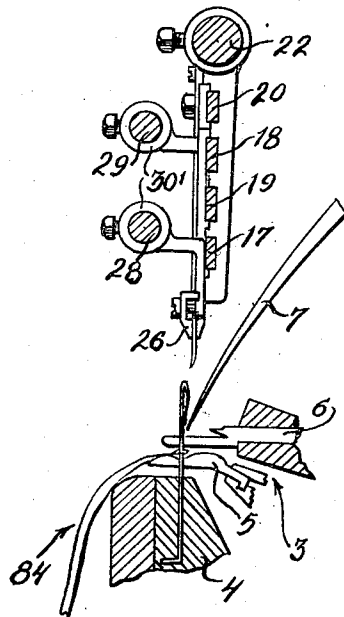


Fig. 4.

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7 Sheets-Sheet 4

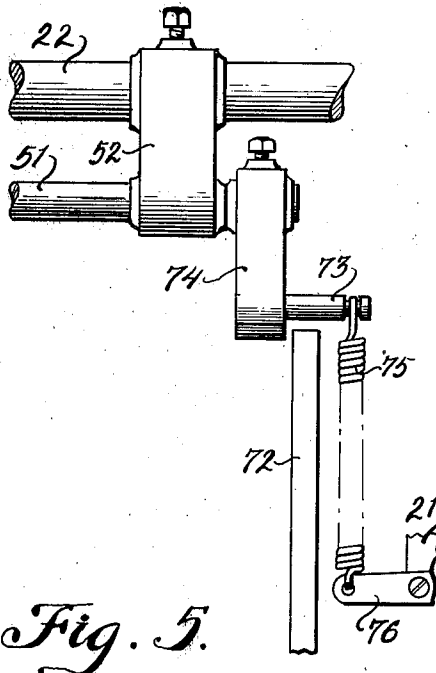


Fig. 5.

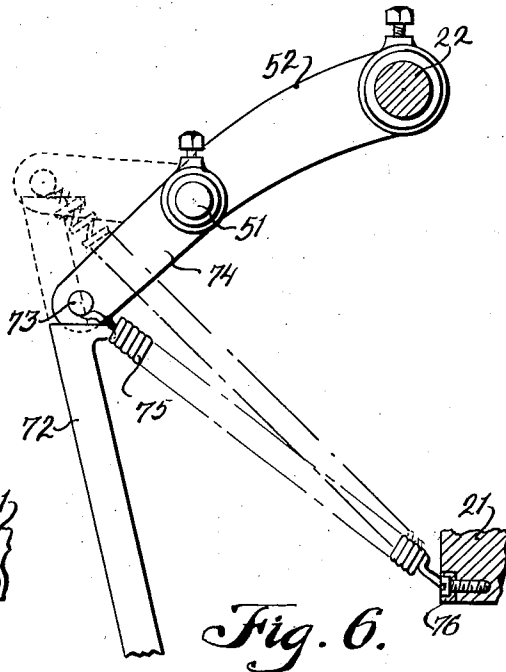


Fig. 6.

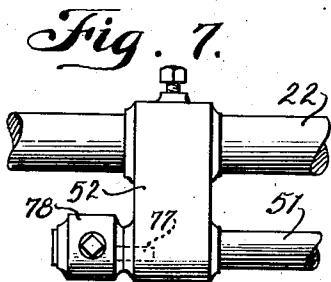


Fig. 7.

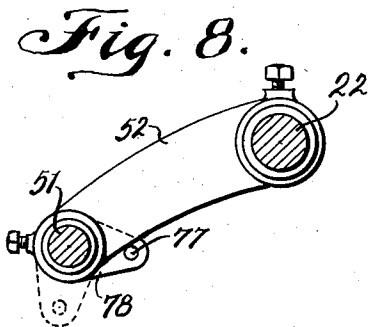


Fig. 8.

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7 Sheets-Sheet 5

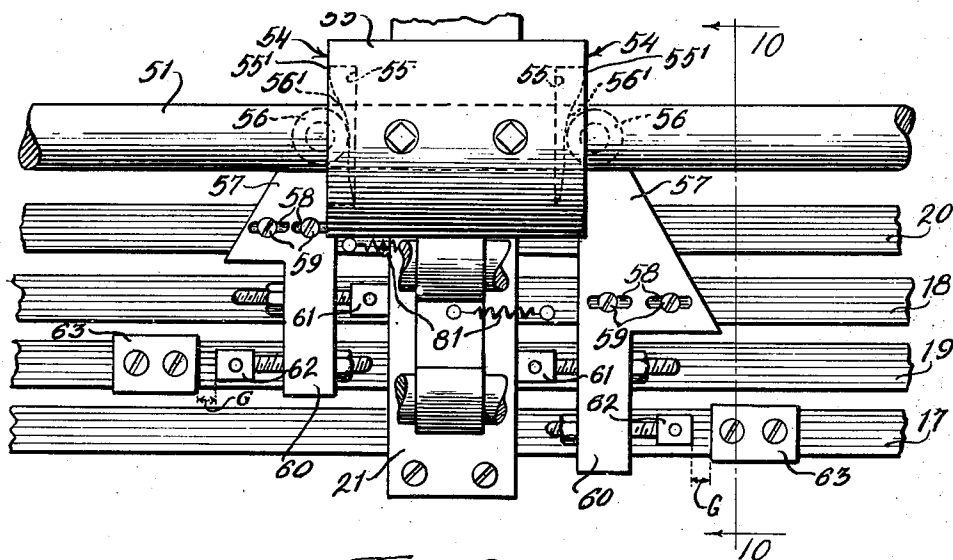


Fig. 9

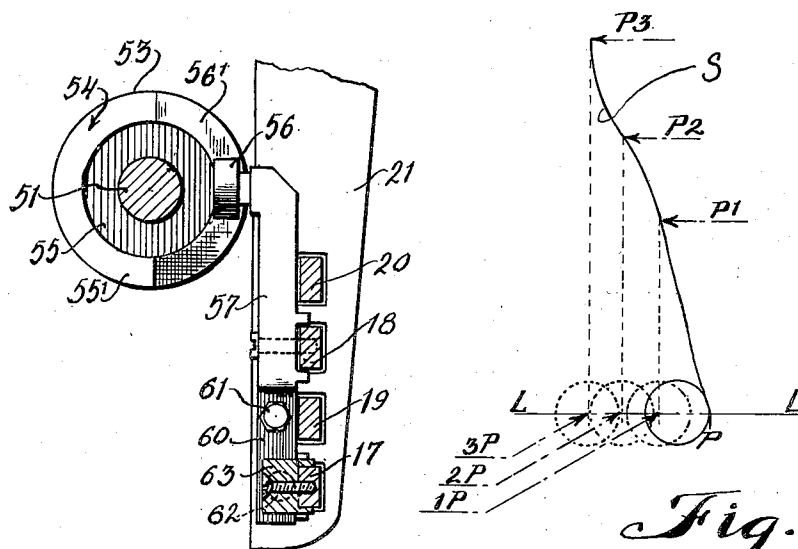


Fig. 10.

Fig. 11.

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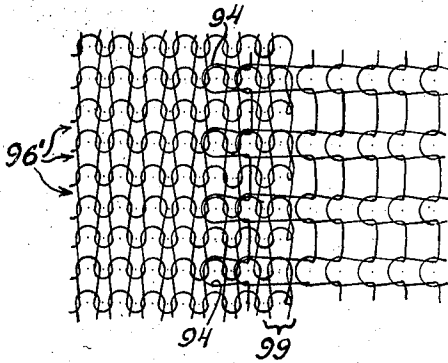
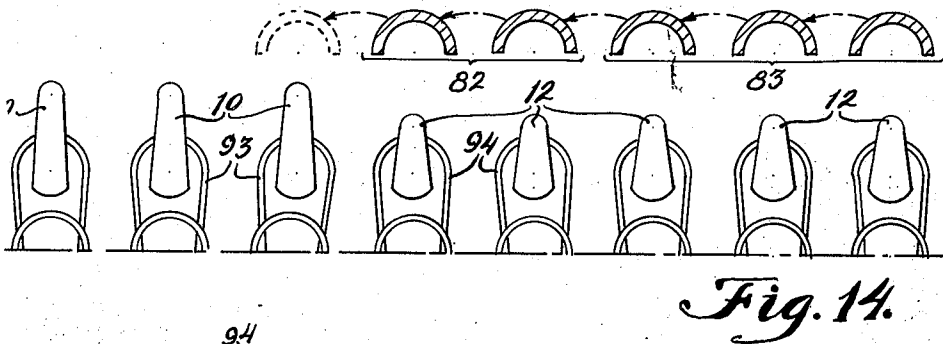
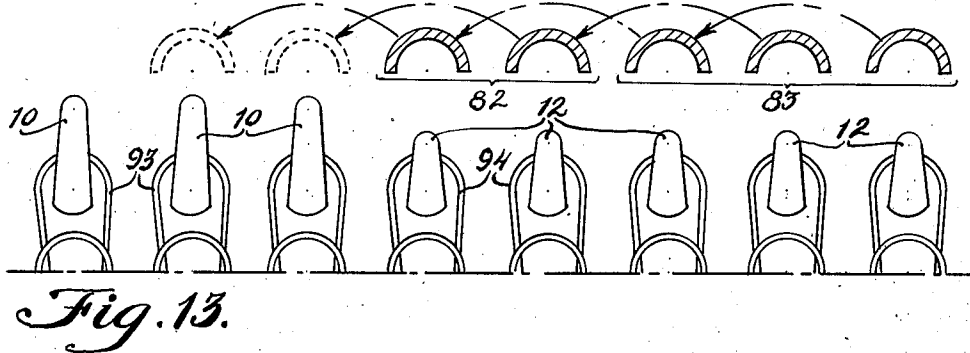
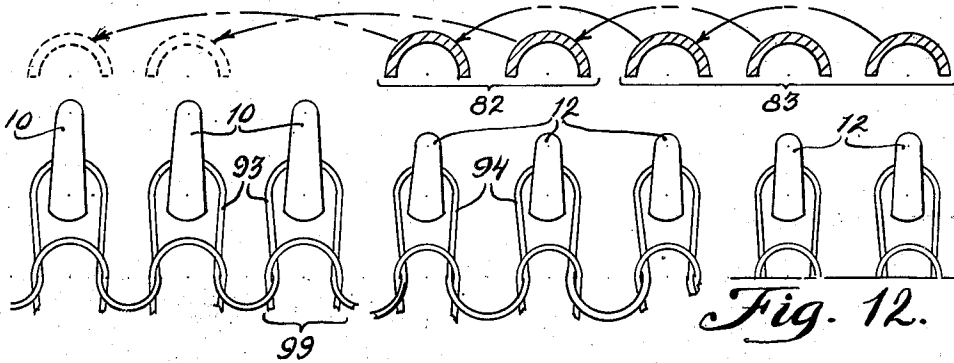


Fig. 15.

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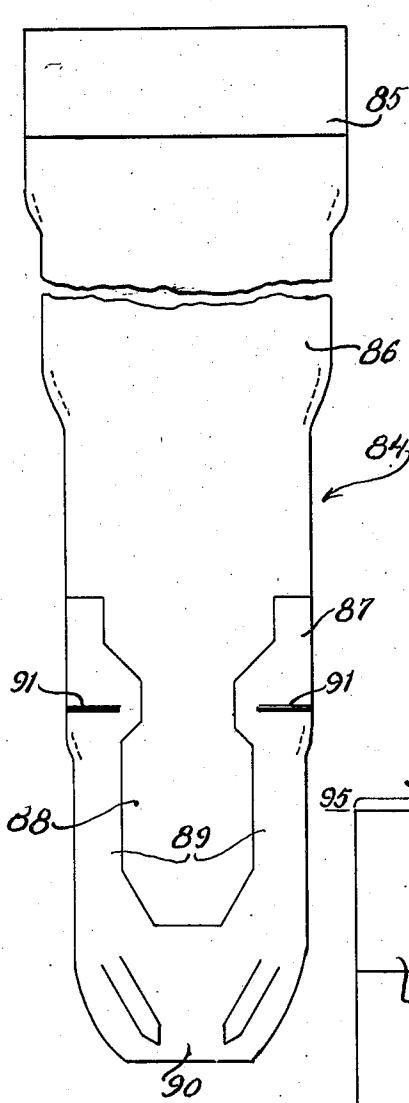


Fig. 16

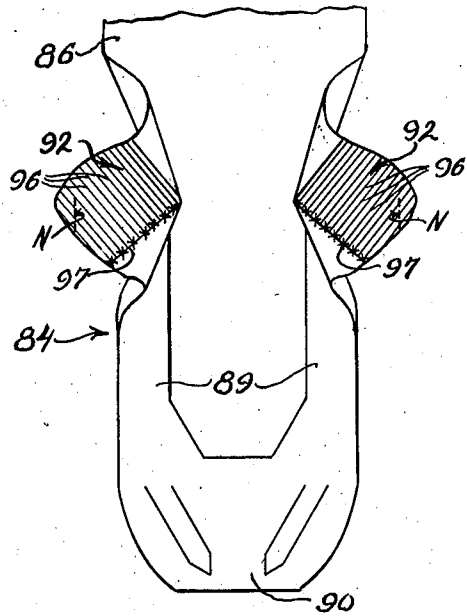


Fig. 17.

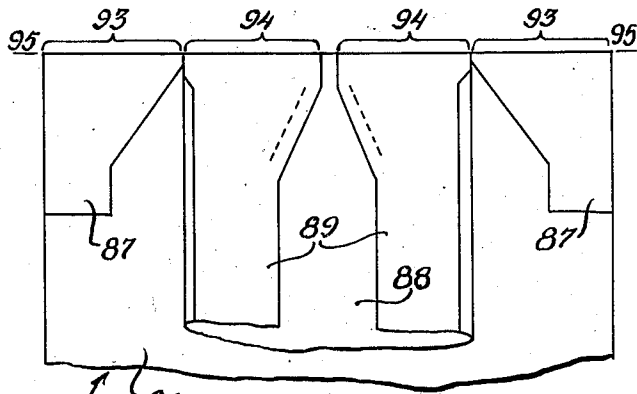


Fig. 18.

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UNITED STATES PATENT OFFICE

2,319,769

METHOD OF AND MACHINE FOR KNITTING HEEL FABRICS IN SINGLE UNIT STOCKING BLANKS

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Application April 27, 1937, Serial No. 139,129

51 Claims. (Cl. 66—82)

The present invention generally relates to full fashioned or flat knitting machines, and particularly to that type of machine intended to knit the heel portions into so-called single unit stocking blanks. More specifically, the invention contemplates a mechanism devised to produce the stockings constructed in accordance with the method disclosed in my co-pending application, Serial Number 106,828, filed October 21, 1936.

It is a well recognized fact that full fashioned stockings, wherein the leg and foot are knitted on a single machine, inherently possess certain advantages sought for, but seldom found, by the purchasing trade in the ordinary type of full fashioned stocking, wherein the leg is knitted on one machine known as the legger, and the foot is knitted on another machine known as the footer. Among such advantages are perfection and uniformity of matching and texture throughout the entire sheer portion of the stocking, which is present in the foot as well as the leg; yet the purchasing public has heretofore been denied these advantages because the manufacture of single unit type of stockings has been limited, and practically prohibited, due to the fact that the heretofore known methods devised for their production are rather involved and require expensive outlay, obviously placing the cost of manufacture on an exceedingly high scale and consequently necessitating a comparatively high selling price.

As generally known in the art, the leg portion and the foot portion of a single unit full fashioned stocking blank are knitted contiguously on one and the same machine. Heel tabs are subsequently knitted as a continuation of the leg portion, and after the blanks, with the completed heel tabs, are removed from the knitting machine, the heel tabs are looped to the adjacent section of the foot portion to form the stocking. This mode of procedure necessitates the utilization of complicated machinery which, coupled with the required additional looping operation, places the cost of the single unit stocking production far above that of the ordinary full fashioned stocking and thus prohibits the sale of single unit goods at prices reasonably competing with those of full fashioned stockings knitted in accordance with the old standard method, which employs two distinct and separate machines respectively known as the legger and the footer.

The present invention, therefore, seeks to provide a mechanism having an utmost simplified construction and capable of doing away with the heretofore needed additional looping operation for the completion of the stocking which makes

it possible to manufacture full fashioned stockings of the single unit type at a cost substantially at par with the manufacture of ordinary two unit type of full fashioned stockings, so that the public may be given the benefits of the advantages existing in single unit stockings.

It is the primary purpose of the invention to provide a mechanism capable of knitting a heel fabric onto the leg and foot portions of a single unit stocking blank while simultaneously interknitting the foot portion with the heel fabric as the knitting thereof progresses.

The invention is particularly characterized in that my improved mechanism may be embodied in an ordinary footer, which may be converted in order to accomplish the results of the invention, thus eliminating one of the greatest obstacles to the manufacture of single unit stockings, which obstacle arose from the apparent necessity of requiring completely revised and rebuilt machines of complicated and expensive construction.

The invention is further characterized by the fact that my improved mechanism is adapted to operate for automatically transferring the foot fabric of a single unit stocking blank for direct interlooping connection with the heel fabric during the knitting of the latter, whereby the leg, heel, and foot become contiguous and integral parts.

Other important objects and advantages of the invention will be in part obvious and in part pointed out hereinafter.

In order that the invention and its mode of operation may be readily understood by those persons skilled in the art, I have, in the accompanying drawings and in the detailed description based thereupon, set out a possible embodiment of the invention.

In these drawings—

Figure 1 is a front elevation of a section of a full fashioned footer knitting machine embodying my invention.

Figure 2 is a cross section taken on line 2—2 of Figure 1.

Figure 3 is an enlarged detail in front elevation of one knitting section of the machine, showing the loop transfer elements and a portion of the stocking blank in position for the introductory knitting of the heel fabric.

Figure 4 is a section taken on line 4—4 of Figure 3.

Figure 5 is a detail in front elevation of certain elements of the transfer comb control operating means.

Figure 6 is a side elevation of the same.

Figure 7 is a detail in front elevation of certain other elements of the transfer comb control operating means.

Figure 8 is a side elevation of the same.

Figure 9 is a detail of the transfer comb control.

Figure 10 is a cross section taken on line 10—10 of Figure 9.

Figure 11 is a diagram illustrating the adjustable positioning and resulting action of the transfer comb control.

Figure 12 diagrammatically shows the preferred method of transferring the loops of the foot fabric for interknitting connection with the heel fabric.

Figure 13 diagrammatically illustrates a modification in the method of transferring the loops of the foot fabric.

Figure 14 diagrammatically illustrates a further modification in the method of transferring the loops of the foot fabric.

Figure 15 is a diagrammatic representation of the interknitted foot and heel fabrics.

Figure 16 is an elevation of a full fashioned stocking blank of the single unit type.

Figure 17 is a similar view of the lower portion of the blank, with the heel tabs inserted therein.

Figure 18 is a diagrammatic representation illustrating the manner of folding the blank for the topping-on operation.

With more particular reference to the drawings, wherein like characters of reference will designate corresponding parts throughout, it is to be understood that I have shown only those parts of a full fashioned hosiery knitting machine which are essential to the clear understanding of the present invention, the basic structure of the knitting machine itself being that of the commonly used footer with which anyone skilled in the art is well acquainted.

In the drawings illustrating the preferred embodiment of my invention, the usual machine frame is indicated at 1 and carries the center bed 2 about which are mounted a plurality of spaced knitting sections, designated in their entirety by the reference character 3. Each knitting section 3 essentially comprises the needle bar 4, the knock-over bits 5, and the dividers 6. The thread or yarn is fed to the knitting sections 3 by means of the carriers 7 depending from the carrier rods 8 mounted for reciprocation in the carrier rod bracket 9. The relative position, essential operation, and function of the needle bar, knock-over bits, dividers, and carriers are well known by those skilled in the art and, therefore, need not be described in detail herein.

In accordance with the present invention, the needle bar 4 differs from the usual construction in that it is provided with two sets of knitting needles 10 and 11, respectively, each disposed on the opposite end portions of the needle bar 4, and an intermediate set of non-knitting needles 12 arranged on the needle bar 4 between the two sets of knitting needles.

The sets of knitting needles 10 and 11, of course, are adapted to knit in the usual way and, in accordance with the invention, each set is associated with one or more thread feeding carriers which, through the normal operation of the knitting machine, feed the yarn or yarns back and forth over said knitting needles.

As shown, the non-knitting needles 12 preferably consist of needles having short beards which prevent the loops in engagement therewith from being pressed off, in the manner and for the purpose to be later specified. It is also possible

to use ordinary knitting needles, instead of shortened beard needles, and in this event the usual presser edge, which is disposed opposite said needles, may be removed so that the needles will not press off, or the needles may be so mounted as to be moved away from their associated presser edge which will likewise prevent pressing off.

Associated with the non-knitting needles 12 are a pair of adjacent large transfer combs 13 and 14 respectively, and a pair of small transfer combs 15 and 16, one of the small transfer combs being disposed on the outer side of one of the large combs 13, and the other small comb 16 being disposed on the outer side of the remaining large comb 14. The combs 13, 14, 15, and 16 are each individually connected to a separate transfer bar, as shown at 17, 18, 19, and 20 respectively, said transfer bars being slidable in spaced brackets 21 supported upon a shaft 22 rigidly connected to an arm 23 secured to a rocking shaft 24 mounted in bearing 25 upon the rear portion of the knitting machine 1.

Arranged over certain of the knitting needles 10, 11 of each knitting section 3 are narrowing combs 26, 27 respectively, mounted upon rods 28, 29 slidably received in bearings 30, provided upon the transfer bar brackets 21.

As more clearly represented in Figure 3 of the drawings, the narrowing comb 26 mounted on the rod 28, and the narrowing comb 27 mounted on the rod 29, are intended to move inwardly of the knitting section or in the directions indicated by the arrows A, B, whereas the sets of transfer combs 13, 15 mounted on bars 17, 18 and the sets of transfer combs 14, 16 mounted on bars 19, 20 are intended to move outwardly of the knitting section or in the directions represented by the arrows C, D.

The mechanism for imparting the relative movements of the various transfer combs in the manner above stated will now be described.

Arranged in the central portion of the knitting machine is a narrowing head consisting of a pair of narrowing nuts 30, 31 each in engagement with a screw threaded portion 32, 33 of a spindle 34 rotatably mounted in a plurality of spaced paralleling supports 35 rigidly secured to the fixed shaft 22. It is to be noted that the screw threaded portions 32, 33 of the spindle 34 are formed to extend in opposite directions so that, with the rotation of said spindle 34, the respective narrowing nuts will move in opposite directions, for the purpose to be hereinafter set forth.

The spindle 34 is rotated by means of a pawl and ratchet mechanism which consists of a ratchet wheel 36 acted upon by a dog 37 actuated by a rod 38 connected to one end of an oscillating lever 39 pivoted at its intermediate portion upon the machine frame 1, as shown at 40, and having at its other end a roller 41 adapted to coast with a cam 42 mounted on the main cam shaft 43, capable of shogging in the usual fashion during the normal operation of the knitting machine. Thus, with the rotation of the main cam shaft 43, the cam 42, when brought into operative relation with the roller 41 by the shogging of said main cam shaft, will act upon the roller and cause the lever 39 to oscillate about its pivot 40 for reciprocating the rod 38 and accordingly operate the dog 37 to actuate the ratchet wheel 36 imparting rotation to the narrowing spindle 34 which, by reason of its construction, will cause the narrowing nut 30 to move in the direction indicated by the arrow E

and the narrowing nut 31 to move in the direction indicated by the arrow F' in Figure 1.

Rigidly connected to the narrow nuts 30 and 31 by means of integral wings 44 are sleeves 45 and 46, respectively slidable on shaft 22 and each provided with an abutment 47 disposed to contact a stop 48 adjustably carried in a support 49, one such support being fixed to each of the narrowing comb carrying rods 28, 29. The stops 48 are constantly urged in close contact with their respective abutments 49 by means of springs suitably connected to the rods 28 and 29 or their associated elements and to some convenient stationary part of the machine frame, for instance, as is indicated at 50.

From the foregoing, it will be understood that the operation of the narrowing head through the pawl and ratchet mechanism in the manner hereinbefore stated will cause the abutment 47 of the sleeves 45 and 46 to advance step by step and thus displace the respective narrowing combs 26 and 27 to move in the various directions already mentioned over a predetermined number of needles, the predetermined number of needles over which the narrowing combs move being determined by the adjustment of the mechanism, a matter well understood by those versed in the art. The narrowing combs 26 and 27 are intended to narrow the heel fabric at the proper time for shaping the same in the usual manner by forming the narrowing lines N as represented in Figure 17.

Sliding movement is imparted to the transfer combs 13, 14, 15, and 16 by means of a specially devised control which may be stated to comprise a shaft 51 rotatably carried in spaced bearing arms 52 secured upon the fixed shaft 22.

Rigidly mounted upon the intermediate portion of the rotatable shaft 51 is a cylindrical member 53 having its end surfaces 54 recessed out to provide grooves 55 defining rims 55' having camming surfaces 56' over which wide rollers 56 are mounted on plates 57, one plate being connected to the transfer bar 18 carrying the small transfer comb 15, and the other plate being connected to the transfer bar 20 carrying the small transfer comb 16. The connection between the plates 57 and their respective transfer bars 18 and 20 is preferably adjustable and, accordingly, said plates may be provided with elongated slots 58 through which pass screws 59, or like fastening elements. The adjustability of the plates 57 is primarily intended to vary the position of the rollers 56 in relation to the surface of the cam rims 56' for the purpose to be hereinafter fully described.

The plates 57 are each formed with an extension 60 adapted to carry adjustable stops 61 disposed to abut a fixed member of the machine frame, for instance, one of the transfer rod brackets 21, as more clearly shown in Figures 1 and 9 of the drawings.

Also adjustably carried by the extensions 60 of the plates 57 are stops 62 arranged to come in contact with a stop blocks 63 fixed on each of the transfer bars 17 and 19, carrying the large transfer combs 13 and 14 respectively.

The control just described is intended to be operated automatically and in timed relation with the function of the knitting machine. For this purpose, the main cam shaft 43 is provided with a cam 64 adapted, when the shaft is moved to its shogged position, to engage a roller 65 rotatably supported upon a rocking lever 66 having one end pivoted to the machine frame, as shown at

67 in Figure 2. The roller 65 is held in positive riding engagement with the cam 64 by means of a spring 68 connected to the lever 66 and to a suitable portion of the machine frame, as shown at 69 in Figure 2.

Guided in a forked bracket 70 connected to the front table 71 of the machine frame 1, and attached to the free end of lever 66, is an upwardly projecting arm 72 disposed to engage an abutment 73 rigid with an arm 74 fixedly secured to the shaft 51. At this point, it is to be noted that the arm 74 is normally urged downwardly, for example, by means of a coil spring 75 having one of its ends connected to the abutment 73 and its other end connected to an extension 76 conveniently secured to one of the transfer bar brackets 21. Because of this feature, and due to the rigid connection between the arm 74 and the shaft 51, it will be understood that the latter is constantly urged to rotate in one direction. However, the rotating movement of the shaft 51 and, consequently, the downward movement of the arm 74 are limited, as more clearly shown in Figures 7 and 8, by means of a stop pin 77 adapted to engage one of the bearing arms 52 and carried by a collar 78 fixed on the shaft 51.

From the foregoing description of the control and its operating means, it will be appreciated that when the cam 64 is brought in operative relation with the roller 65 through the shogging of the main cam shaft 43, the lever 66 will rock causing a vertical reciprocation of the arm 66. Due to the cooperative association of said arm 66 with the arm 72, the shaft 51 is thereby oscillated, resulting in imparting an oscillating movement to the cylindrical member 53. This oscillating movement of the cylindrical member 53, of course, displaces the contact point of the surface of the cam rim 56' with the rollers 56, causing the same to move longitudinally of the knitting machine. Thus the oscillating movement of the cylindrical member 53 is translated into a reciprocating movement, which reciprocating movement is transmitted through the plates 57 to the transfer bars 18 and 20 respectively connected thereto, and to the transfer bars 17 and 19 by reason of the stop blocks 63 thereon, which blocks are disposed in the path of movement of the stop 62 carried by the plates 57.

As previously stated, the plates 57 may be adjusted to vary the position of the rollers 56 in relation to the camming surface of the cam rims 56'. This adjustment is for the purpose of determining the desired number of needles over which the transfer combs 13—15 and 14—16 will be moved by the control mechanism. Obviously by setting the rollers 56 nearer to, or further away from, the lowest point of the camming surface of the cam rims 56', the action of said surface on the roller will be advanced or retarded and, accordingly, cause the initial movement of the transfer action to occur sooner or later during the operative function of the transfer bar control mechanism.

Upon referring to the diagram shown in Figure 11, the adjustable positioning of the rollers 56 and resulting action of the control member 53 thereon will clearly appear.

Let it be assumed that the curve S represents the surface outline of the cam rims 56' and is so graduated between the point P and the point P3 that when the point P3 has moved to the level indicated by the dotted lines L—L the transfer combs will have moved the distance of three needles, inasmuch as the points P1, P2, and P3

will have successively displaced the roller 56 to the positions 1P, 2P, and 3P, each representing the distance between one needle to another. Therefore, if the roller 56 is initially set at the position 1P, said roller will start to move from the position 1P only when the point P1 has reached the level L—L. Likewise, if the roller is initially set at the position 2P, it will remain unaffected until the point P2 has reached the level L—L. It will be understood that the positioning of the roller 56 in relation to the camming surface of the rims 56' is attained by setting the connection between the plates 57 and their respective transfer bars and by regulating the stops 60 and 61 accordingly.

In practicing the invention, I find it preferable to displace the small transfer combs 15 and 16 for a greater number of needles than the large transfer combs 13 and 14. That this mode of operation may be obtained, the stops 62 are adjusted to rest at a predetermined distance from the associated stop blocks 63 on the transfer bars 17 and 19 respectively carrying said large transfer combs 13 and 14. The distance indicated by the arrow G between the stops 62 and the stop blocks 63 preferably correspond to the distance of one needle so that the transfer bars 18 and 20 to which the plates 57 are directly connected, will move for a distance corresponding to one needle with the initial movement of said plates, whereas the transfer bars 17 and 19 will remain stationary and begin their movement only when the stops 62, during the continued movement of the plates 57, have been brought in contact with the stop blocks 63.

With the plates 57 in inoperative position, the distance G between the stops 62 and the stop blocks 63 is maintained by means of an adjustable stop 79 mounted on each transfer bar 17 and 19 and disposed to abut adjacent portions of certain of the transfer rod brackets 21, the stop 79 being yieldably held thereagainst by springs 80. The distance G referred to is also assured by reason of the fact that the stops 61 carried on the plates 57 are normally urged against the abutting surface by springs 81.

The machine being adjusted in the manner above defined, it will be understood that the small transfer combs will first move by themselves for a distance of one needle and then the small and large transfer combs will move simultaneously. Thus, as shown in Figure 12, the transfer fingers 82 which represent the transfer fingers carried by the small transfer comb 16 (Figures 1 and 3) are displaced for a distance of three needles, whereas the transfer fingers 83, representing the transfer fingers carried by the large transfer comb 14, are displaced for a distance of two needles.

Of course, it is to be understood that by adjusting the stops 62 so that the same will constantly bear upon the stop blocks 63, both the small and large transfer combs will move in unison during the entire transfer operation, and by setting the position of the rollers 56 with respect to camming surface of the cam rims 56' in the manner hereinbefore stated, the transfer combs may be caused to move over a definite number of needles, for instance, over two needles or over one needle, as represented in Figures 13 and 14 respectively.

The method of knitting heel fabrics in single unit stocking blanks upon my improved machine is carried out in the following manner:

The full fashioned stocking blank 84, such

as shown in Figure 16, is of the usual construction, consisting of the welt 85, leg 86, high splice heel 87, instep 88, sole 89, and toe 90, all being knitted continuously on one machine. The blank is adapted to be severed at the points 91 for the insertion of the heel tabs 92 (Figure 17). Subsequent to the severing of the blank 84 at point 91, the foot portion is folded over the leg portion and the sole sections 89 are folded upon the instep section 88 in the manner more clearly represented in Figure 18 of the drawings. By folding the stocking blank in the manner specified, it will be appreciated that the marginal row of loops 93 of the high splice heel 87 and the marginal row of loops 94 of each of the sole fabrics 89 lay substantially on a straight line, as indicated at 95, so that said rows of loops 93 and 94 as more clearly shown in Figure 3, may be topped on or transferred to the needle bar 4 of the footer converted in accordance with the invention to knit the heel tabs.

It is to be noted that because of the folding of the blank, as above set forth, the loops of the foot and sole sections are reversed so that in the topping or transfer operation by the usual means shown at 96 in Figures 1 and 2, the sinker portion of the marginal row of loops 94 of each sole section 89 will engage the corresponding non-knitting needles 12 of the converted footer, whereas the needle portion of the marginal row of loops 93 of the high splice heel section 87 will engage the associated knitting needles 10 and 11 of said footer in the manner more clearly represented in Figure 3 of the drawings.

The loops 93 and 94 having been thus transferred on the needles of my improved machine, the same is now ready for operation. The carriers are actuated in the well known fashion to lay the yarn or yarns across the knitting needles 10 and 11 so as to knit the courses 96' of the heel fabric 87. During the knitting of the heel fabric, the loops 94 are gradually transferred for interknitting engagement with said fabric by operation of the transfer mechanism already described.

As stated, the loops 94 on the non-knitting needles 12 may be transferred the distance of one or more wales, as necessity or preference may dictate. As also stated, in Figure 14 I have illustrated the single wale transfer. According to this mode of operation of knitting the heel tabs and simultaneously joining the sole portions thereto, the transfer fingers 82 and 83 descend through the usual dipping motion of the knitting machine, pick all the loops 94 off the non-knitting needles 12 and simultaneously transfer said loops one needle distance, which places each end loop successively in engagement with the end knitting needle of the row of needles 10. An intermediate course may be knitted on the needles 10 between each transfer operation to provide the necessary fabric for the formation of the heel and to insure sufficient elasticity to the foot. This operation is repeated until all the loops 94 on the non-knitting needles 12 have been transferred the distance of one needle at a time and interknitted to form a seam 97 uniting the sole portions 89 to the heel-tabs 92.

In Figure 13, I have illustrated the two wale distance transfer. As shown, the transfer fingers 82 and 83 move the distance of two needles after having picked off the loops 94. It will be appreciated that since the two needle transfer, as compared with the single needle transfer, cuts in half

the number of "dips" required to transfer the number of loops on the non-knitting needles 12, the two needle transfer operation will speed production in interknitting the loops in the manner heretofore described. However, at least three extra courses are found preferable after each interknitted course to give the proper length to the heel, resulting in producing small openings at the line of juncture between the sole and the heel.

Although such openings are not seriously detrimental to the quality of the fabric, the defect may be overcome by following the method of operation shown in Figure 12, which represents my preferred mode of operation. In practicing this mode of operation, the transfer fingers 82 and 83 are adapted, because of the described adjustment of the mechanism, to simultaneously pick off the loops 94 and while the points 83 are moved the distance of two needles, the points 82 are moved the distance of three needles. It will be understood that by proceeding in this manner, the first wale 99 is left without transfer loops. While it is also found preferable to knit three extra courses between each transfer course, the holes which might result thereby are not visible because the connections or joinings are all on the second and third wale of the heel tabs, said second and third wales usually being tighter than the first wale, which is then free to act as a covering for whatever small holes may appear at the point of juncture between the sole fabrics and the heel fabrics.

The transfer operation causes the marginal loops of the foot fabric to become interlooped with the adjacent marginal loops of the heel tab fabric and, accordingly, no seaming operation is necessary to unite the same. Further, due to the transfer of the loops in the manner specified, the foot fabric is turned automatically at substantially right angles to the leg fabric, as shown in Figure 15.

It will be appreciated that while the narrowing combs 26 and 27, and the transfer combs 13-14, and 15-16 are intended to operate in unison when the narrowings N in the heel fabrics are to be made, the operation of said narrowing combs 26 and 27 may be disrupted without interfering with the proper function of the transfer combs 13-14 and 15-16. This may be accomplished by simply disengaging the dog 37 from its associated ratchet wheel 36 which, of course, will stop the rotation of the spindle 34 and, accordingly, prevent the narrowing function of the nuts 30 and 31 upon said narrowing combs.

Obviously, the invention is capable of several modifications and those modifications which come within the scope of the subjoined claims are to be considered within the spirit of the invention.

What I claim is:

1. In a knitting machine of the character described, a set of knitting needles and a set of non-knitting needles adapted to have knitted fabric topped thereon, means for knitting courses as a continuation of the fabric topped on the knitting needles, and means for interknitting the loops of the fabric topped on the non-knitting needles with certain loops of said courses during the knitting thereof.

2. In a knitting machine of the character described, a set of knitting needles and a set of non-knitting needles adapted to have knitted fabric topped thereon, means for knitting courses as a continuation of the fabric topped on the

knitting needles, and means for interknitting at predetermined intervals the loops of the fabric topped on the non-knitting needles with certain loops of certain of said courses during the knitting thereof.

3. In a knitting machine of the character described, a set of knitting needles and a set of non-knitting needles adapted to have knitted fabric topped thereon, means for knitting courses as a continuation of the fabric topped on the knitting needles, and means for transferring the loops from the non-knitting needles onto certain of the knitting needles for interknitting said loops with certain loops of said courses during the knitting thereof.

4. In a knitting machine of the character described, a set of knitting needles and a set of non-knitting needles adapted to have knitted fabric topped thereon, means for knitting courses as a continuation of the fabric topped on the knitting needles, and means for transferring at predetermined intervals the loops from the non-knitting needles onto certain of the knitting needles for interknitting said loops with certain loops of certain of said courses during the knitting thereof.

5. In a knitting machine of the character described, a set of knitting needles and a set of non-knitting needles adapted to have knitted fabric topped thereon, sets of slidable transfer combs associated with the non-knitting needles and operable to pick up the loops from said non-knitting needles and transfer said loops onto certain of the knitting needles, and means for controlling the transfer movement of said sets of combs.

6. In a knitting machine of the character described, a set of knitting needles and a set of non-knitting needles adapted to have knitted fabric topped thereon, pairs of transfer combs associated with the non-knitting needles and operable to pick up the loops from said non-knitting needles and transfer said loops onto certain of the knitting needles, means for imparting movement to one comb of each of the pair independently of the other comb of each pair, and a mechanism for controlling and regulating the distance traveled by the mentioned independently moving combs.

7. In a knitting machine of the character described, a set of knitting needles and a set of non-knitting needles adapted to have knitted fabric topped thereon, sets of slidable transfer combs associated with the non-knitting needles and operable to pick up the loops from said non-knitting needles and transfer said loops onto certain of the knitting needles, a mechanism for controlling the transfer movement of said sets of combs, and means for varying the action of said mechanism to determine the movement of the combs.

8. In a knitting machine of the character described, a set of knitting needles and a set of non-knitting needles adapted to have knitted fabric topped thereon, sets of slidable transfer combs associated with the non-knitting needles and operable to pick up the loops from said non-knitting needles and transfer said loops onto certain of the knitting needles, a mechanism for controlling the transfer movement of said sets of combs, and means for varying the action of said mechanism to determine the movement of the combs, said means including a movement transmitting member and an element associated with certain of said combs and with said member and

adapted to transmit the movement of the latter to the former, said element being adjustable in relation to said member to modify its movement transmitting action.

9. In a knitting machine for producing an insert element in a fabric blank by knitting said element to a course portion of the blank, and successively transferring loops of another course portion of the blank to loops of said element as the element is knitted, the combination of loop forming and positioning mechanism comprising transfer point means and a loop-manipulating implement structure including a plurality of implement groups, the loops of said first course portion to be topped onto the implements of one of said groups and the loops of said other course portion to be topped onto the implements of another of said groups, and means for actuating and controlling said loop forming and positioning mechanism providing for knitting on said first group, and transferring loops from said other group to loops formed on said first group.

10. In a knitting machine for producing an insert element in a fabric blank by knitting said element to a course portion of the blank, and successively transferring loops of another course portion of the blank to loops of said element as the element is knitted, the combination of loop-manipulating and fashioning mechanism comprising transfer point means, narrowing point means and a loop-manipulating implement structure including a plurality of implement groups, the loops of said first course portion to be topped onto the implements of one of said groups and the loops of said other course portion to be topped onto the implements of another of said groups, and means for actuating and controlling said loop-manipulating and fashioning mechanism providing for knitting and narrowing on said first group, and transferring loops from said other group to loops formed on said first group.

11. In a knitting machine for knitting a heel portion onto a leg and foot portion of a combination stocking blank, a mechanism operable to knit heel courses onto the leg portion of the blank and a mechanism operable during the knitting of said courses to interknit the inner edge of said heel portion into the adjoining portion of the foot fabric.

12. In a knitting machine for knitting heel portions into a combination foot and leg stocking blank having the foot portion knitted onto the leg, means adapted to support separately those portions of the last course of the leg fabric and those portions of the first course of the foot fabric to which heel portions are to be knitted, and mechanisms operable to knit heel courses into said course of the leg and during the knitting of the following heel courses, to knit successively adjoining wale loops of said supported foot fabric course into the inner selvedge edges of the heel portions.

13. In a knitting machine for knitting heel tabs onto a leg and foot portion of a combination leg and foot stocking blank, means adapted to support separately loops of the leg fabric and loops of the foot fabric to which the heel tabs are to be knitted, knitting means operable to knit heel tab loops onto said loops of the leg fabric, and transfer point means operable to position in overlapping relationship loops of the leg fabric and loops of the heel tabs during the knitting of the latter to form an interknit connection therebetween.

14. In a knitting machine of the character de-

scribed, a set of knitting needles adapted for knitting courses of loops, a set of non-knitting needles adapted to have knitted fabric topped thereon; and means for transferring the loops from the non-knitting needles onto certain of the knitting needles for interknitting in overlapping relation said loops with certain loops of the courses during the knitting thereof by the knitting needles.

15. In a knitting machine for producing an insert element in a fabric blank by knitting said element to a course portion of the blank and successively transferring loops of another course portion of the blank to loops of said element as the element is knitted, the combination of a plurality of implement groups, the loops of the first course portion to be topped onto the implements of one of said groups, and the loops of the other course portion to be topped onto the implements of another of said groups; one of said groups adapted for knitting courses as a continuation of the fabric topped thereon; and a loop positioning mechanism operable for transferring loops from said other group to loops formed on the knitting group to interknit in overlapping relation with said loops with certain loops of the other group.

16. In a knitting machine for producing an insert element in a fabric blank by knitting said element to a course portion of the blank, and successively transferring loops of another course portion of the blank to loops of said element as the element is knitted, the combination of a plurality of implement groups, the loops of the first course portion to be topped onto the implements of one of said groups, and the loops of the other course portion to be topped onto the implements of another of said groups, one of said groups adapted to knit courses as a continuation of the fabric topped thereon; a loop positioning mechanism operable for transferring loops from said other group to loops formed on said first group for interknitting in overlapping relation said loops with certain loops of the other group; and a fashioning mechanism operable for providing the narrowing of the courses knitted on said first group.

17. In a knitting machine for producing an insert element in a fabric blank by knitting said element to a course portion of the blank, and successively transferring loops of another course portion of the blank to loops of said element as the element is knitted, the combination of a loop positioning mechanism including transfer point means; a loop forming and manipulating implement structure including a plurality of implement groups, the loops of said first course portion to be topped onto the implements of one of said groups, and the loops of said other course portion to be topped onto the implements of another of said groups; means for manipulating said implement structure for knitting on said first group; and means for manipulating said positioning mechanism for transferring loops from said other group to loops formed on said first group.

18. In a knitting machine for producing an insert element in a fabric blank by knitting said element to a course portion of the blank, and successively transferring loops of another course portion of the blank to loops of said element as the element is knitted, the combination of loop-manipulating mechanism comprising transfer point means; and a loop-manipulating implement structure including a plurality of implement groups, the loops of said first course portion to be topped onto the implements of one of said

groups, and the loops of said other course portion to be topped onto the implements of another of said groups; fashioning mechanism comprising narrowing point means; means for manipulating said loop-manipulating mechanism to knit on said first group; and means for manipulating said fashioning mechanism and said transfer point means for narrowing on said first group and transferring loops from said other group to loops formed on the first group.

19. In a knitting machine of the character described, a set of knitting implements adapted to have loops of one course in a fabric topped thereon and to knit courses of loops as continuations thereof; a set of non-knitting implements adapted to have loops of another course in said fabric topped thereon; a wide transfer comb associated with the non-knitting implements, and of a width great enough to remove from the non-knitting implements all of the fabric course loops topped thereon; and means for manipulating said comb whereby the loops on the non-knitting implements are transferred successively onto certain of the knitting implements so that the transferred loops may be interknitted successively in overlapping relation with certain loops of the courses as knitted by the knitting implements.

20. In a knitting machine of the character described, a set of knitting needles adapted to have loops of one course in a fabric topped thereon and to knit courses of loops as continuations thereof; a set of non-knitting needles adapted to have loops of another course in said fabric topped thereon; a wide transfer comb associated with the non-knitting-needles and of a width great enough to remove from the knitting needles all of the fabric course loops topped thereon; a narrow transfer comb of a width less than a course of loops knitted by said knitting needles for removing from certain knitting needles the associated loops of the knitted course for narrowing the same; and means for manipulating said comb whereby the loops on the non-knitting needles are lifted successively from the non-knitting needles and successively transferred in overlapping interknit engagement with the loops of the successive courses as knitted and narrowed by said knitting needles and said narrow comb.

21. In a knitting machine of the character described, a set of knitting needles and a set of non-knitting needles adapted to have knitted fabric topped thereon, means for knitting courses as a continuation of the fabric topped on the knitting needles, means for transferring the loops from the non-knitting needles onto certain of the knitting needles for interknitting said loops with certain loops of said courses during the knitting thereof, and means associated with a number of knitting needles for transferring the loops thereon to narrow certain of said courses.

22. In a knitting machine for producing an insert element in a fabric blank by knitting said element to a course portion of the blank, fashioning said element and successively transferring loops of another course portion of the blank to loops of said element as the element is knitted and fashioned, the combination of loop-manipulating and fashioning mechanism comprising a loop-manipulating implement structure including bearded implements embodying a plurality of groups, the loops of said first course portion to be topped onto the implements of one of said groups and the loops of said other course portion to be topped onto the implements of another of said groups, narrowing point means associated

with said first group, and transfer point means associated with said other group, and means for actuating and controlling said loop-manipulating and fashioning mechanism providing for knitting and narrowing on said first group, transferring loops from said other group to loops formed on said first group and preventing the closing of the beards of said other group at times when the implements of said other group would cast off loops.

23. In a knitting machine for producing an insert element in a fabric blank by knitting said element to a course portion of the blank, fashioning said element and successively transferring loops of another course portion of the blank to loops of said element as the element is knitted and fashioned, the combination of loop-manipulating and fashioning mechanism comprising a loop-manipulating implement structure including bearded implements embodying groups having long and short beards, respectively, the loops of said first course portion to be topped onto the implements of the long-beard group and the loops of said other course portion to be topped onto the implements of the short-beard group, narrowing point means associated with the long-beard group, and transfer point means associated with the short beard group, and means for actuating and controlling said loop-manipulating and fashioning mechanism providing for knitting and narrowing on said long-beard group, transferring loops from said short-beard group to loops formed on said long-beard group and preventing the closing of the short beards at times when the implements of the short-beard group would cast off loops.

24. In a full-fashioned stocking blank knitting machine for producing half heel pocket elements on a combined leg and foot blank by knitting said elements to course portions at opposite sides of the blank, fashioning said elements and successively transferring loops of other course portions of the blank at opposite sides of the blank to loops of said elements as the elements are knitted and fashioned, the combination of loop-manipulating and fashioning mechanism comprising a loop-manipulating implement structure including bearded implements embodying an outer and an inner group at each side of the center of the blank, the loops of each of said first course portions at opposite sides of the blank to be topped onto the implements of the adjacent outer group and the loops of each of said other course portions to be topped onto the implements of the adjacent inner group, narrowing point means associated with said outer groups, and transfer point means associated with said inner groups, and means for actuating and controlling said loop-manipulating and fashioning mechanism providing for knitting and narrowing on said outer groups, transferring loops from the inner groups to loops formed on the outer groups and preventing the closing of the beards of the inner groups at times when the implements of the inner groups would cast off loops.

25. In a full-fashioned stocking blank knitting machine for producing half heel pocket elements on a combined leg and foot blank by knitting said elements to course portions at opposite sides of the blank, fashioning said elements and successively transferring loops of other course portions of the blank at opposite sides of the blank to loops of said elements as the elements are knitted and fashioned, the combination of loop-manipulating and fashioning mechanism com-

prising a loop-manipulating implement structure including bearded implements embodying at each side of the center of the blank a group having long beards and a group having short beards, the loops of each of said first course portions at opposite sides of the blank to be topped onto the implements of the adjacent long beard group and the loops of each of said other course portions to be topped onto the implements of the adjacent short beard group, narrowing point means associated with said long beard groups, and transfer point means associated with said short beard groups, and means for actuating and controlling said loop-manipulating and fashioning mechanism providing for knitting and narrowing on said long beard groups, transferring loops from the short beard groups to loops formed on the long beard groups and preventing the closing of the beards of the short beard groups at times when the implements of the short beard group would cast off loops.

26. In a knitting machine for producing a fabric blank insert element of a given number of courses by knitting the element to a course portion of the blank, fashioning the element and successively transferring loops of another course portion of the blank to a number of loops of the element less than said given number of courses as the element is knitted and fashioned, the combination of loop-manipulating and fashioning mechanism comprising a loop-manipulating implement structure including a plurality of groups, the loops of said first course portion to be topped onto the implements of one of said groups and the loops of said other course portion to be topped onto the implements of another of said groups, narrowing point means associated with said first group, and transfer point means associated with said other group, and means for actuating and controlling said loop-manipulating and fashioning mechanism providing for knitting and narrowing on said first group, and transferring loops from said other group to selected courses of loops formed on said first group.

27. In a knitting machine for producing a fabric blank insert element of a given number of courses by knitting the element to a course portion of the blank, fashioning the element and successively transferring loops of another course portion of the blank to a number of loops of the element less than said given number of courses as the element is knitted and fashioned, the combination of loop-manipulating and fashioning mechanism comprising a loop-manipulating implement structure including bearded implements embodying a plurality of groups, the loops of said first course portion to be topped onto the implements of one of said groups, and the loops of said other course portion to be topped onto the implements of another of said groups, and transfer point means associated with said other group, and means for actuating and controlling said loop-manipulating and fashioning mechanism providing for knitting and narrowing on said first group, transferring loops from said other group to selected courses of loops formed on said first group, and preventing the closing of the beards of said other group at times when the implements of said other group would cast off loops.

28. In a knitting machine for producing a fabric blank insert element of a given number of courses by knitting the element to a course portion of the blank, fashioning the element and successively transferring loops of another course

portion of the blank to a number of loops of the element less than said given number of courses as the element is knitted and fashioned, the combination of loop-manipulating and fashioning mechanism comprising a loop-manipulating implement structure including groups having long and short beards, respectively, the loops of said first course portion to be topped onto the implements of the long beard group and the loops of said other course portion to be topped onto the implements of the short beard group, narrowing point means associated with said long beard group, and transfer point means associated with said short beard group, and means for actuating and controlling said loop-manipulating and fashioning mechanism providing for knitting and narrowing on the long beard group, transferring loops from the short beard group to selected courses of loops formed on said first group, and preventing the closing of the short beards at times when the implements of the short beard group would cast off loops.

29. In a full-fashioned stocking blank knitting machine for producing half heel pocket elements each of a given number of courses on a combined leg and foot blank by knitting said elements to course portions at opposite sides of the blank, fashioning said elements and successively transferring loops of other course portions of the blank at opposite sides of the blank to a number of loops of the elements less than said given number of courses as the elements are knitted and fashioned, the combination of loop-manipulating and fashioning mechanism comprising a loop-manipulating implement structure including an outer and inner group at each side of the center of the blank, the loops of each of said first course portions at opposite sides of the blank to be topped onto the implements of the adjacent outer group and the loops of each of said other course portions to be topped onto the implements of the adjacent inner group, narrowing point means associated with said outer groups, and transfer point means associated with said inner groups, and means for actuating and controlling said loop-manipulating and fashioning mechanism providing for knitting and narrowing on said outer groups, and transferring loops from the inner groups to selected courses of loops formed on said outer groups.

30. In a full-fashioned stocking blank knitting machine for producing half heel pocket elements each of a given number of courses on a combined leg and foot blank by knitting said elements to course portions at opposite sides of the blank, fashioning said elements and successively transferring loops of other course portions of the blank at opposite sides of the blank to a number of loops of the elements less than said given number of courses as the elements are knitted and fashioned, the combination of loop-manipulating and fashioning mechanism comprising a loop-manipulating implement structure including bearded implements embodying an outer and an inner group at each side of the center of the blank, the loops of each of said first course portions at opposite sides of the blank to be topped onto the implements of the adjacent outer group and the loops of each of said other course portions to be topped onto the implements of the adjacent inner groups, narrowing point means associated with said outer groups, and transfer point means associated with said inner groups, and means for actuating and controlling said loop-manipulating and fashioning mechanism providing for

knitting and narrowing on said outer groups, transferring loops from the inner groups to selected courses of loops formed on said outer groups, and preventing the closing of the beards of the inner groups at times when the implements of the inner groups would cast off loops.

31. In a full-fashioned stocking blank knitting machine for producing half heel pocket elements each of a given number of courses on a combined leg and foot blank by knitting said elements to course portions at opposite sides of the blank, fashioning said elements and successively transferring loops of other course portions of the blank at opposite sides of the blank to a number of loops of the elements less than said given number of courses as the elements are knitted and fashioned, the combination of loop-manipulating and fashioning mechanism comprising a loop-manipulating implement structure including bearded implements embodying at each side of the center of the blank a group having long beards and a group having short beards, the loops of each of said first course portions at opposite sides of the blank to be topped onto the implements of the adjacent long beard group and the loops of each of said other course portions to be topped onto the implements of the adjacent short beard group, narrowing point means associated with said long beard groups, and transfer point means associated with said short beard groups, and means for actuating and controlling said loop-manipulating and fashioning mechanism providing for knitting and narrowing on said long beard groups, transferring loops from the short beard groups to selected courses of loops formed on said long beard groups and preventing the closing of the beards of the short beard groups at times when the implements of the short beard groups would cast off loops.

32. In combination in a straight knitting machine, a needle bar, a bank of needles on the bar to receive a course of yarn loops to which further loops are to be knitted, a bank of needle-like implements also on said bar to receive another course of yarn loops, mechanism including means for actuating the needle bar to knit further courses to said first course and preventing the forming of loops on said needle-like implements, and means for transferring loops from said implements to selvage loops knitted by the needles and causing the transferred loops to be interknitted with the selvage loops.

33. In combination in a full-fashioned stocking blank knitting machine, a needle bar, groups of needles on the bar to receive a course of loose loops at each side of the blank to which heel tabs are to be knitted, groups of needle-like implements also on said bar to receive other courses of loose loops adjacent to said first loose loop courses at each side of the blank, mechanism including means for actuating the needle bar to knit the heel tabs and preventing the forming of loops on said implements, and means for transferring loops from said implements to selvage loops of the heel tabs and causing the transferred loops to be interknitted with the selvage loops.

34. Selvage loop forming and connecting means comprising mechanism including needle means for forming the selvage loops and transferring other loops and knitting them to the selvage loops, said connecting means including transfer bar means, and means including a cam adapted to operate transversely to the transfer bar means for imparting bar shifting movement thereto.

comprising mechanism including needle means for forming the selvage loops and transferring other loops and knitting them to the selvage loops, said connecting means including transfer bar means, and means including a double-sided cam adapted to operate transversely to the transfer bar means for shifting different transfer bars by its opposite sides, respectively.

36. Selvage loop forming and connecting means comprising mechanism including needle means for forming the selvage loops and transferring other loops and knitting them to the selvage loops, said connecting means including transfer bar means, and means including a double-sided cam adapted to operate transversely to the transfer bar means for simultaneously shifting transfer bars in opposite directions.

37. In combination in a straight knitting machine, a needle bar, a bank of needles on the bar to receive a course of yarn loops to which further loops are to be knitted, a bank of needle-like implements also on said bar to receive another course of yarn loops, mechanism including means for actuating the needle bar to knit further courses to said first course and preventing the forming of loops on said needle-like implements, and means for transferring loops from said implements to selvage loops knitted by the needles and causing the transferred loops to be interknitted with the selvage loops, including transfer bar means and a cam for operation transversely to the transfer bar means to impart transfer movement thereto.

38. In combination in a full-fashioned stocking blank knitting machine, a needle bar, groups of needles on the bar to receive a course of loose loops at each side of the blank to which heel tabs are to be knitted, groups of needle-like implements also on said bar to receive other courses of loose loops adjacent to said first loose loop courses at each side of the blank, mechanism including means for actuating the needle bar to knit the heel tabs and preventing the forming of loops on said implements, and means for transferring loops from said implements to selvage loops of the heel tabs and causing the transferred loops to be interknitted with the selvage loops including transfer bar means and a cam for operation transversely to the transfer bar means to simultaneously impart transfer movement to transfer bars in opposite directions.

39. In combination in a full-fashioned stocking blank knitting machine, a cam shaft, a needle bar, groups of needles on the bar to receive a course of loops at each side of the blank to which heel tabs are to be knitted, groups of needle-like implements also on said bar to receive other courses of loose loops adjacent to said first loop courses at each side of the blank, mechanism including means for actuating the needle bar to knit the heel tabs and preventing the forming of loops on said implements, and means for transferring loops from said implements to selvage loops of the heel tabs and causing the transferred loops to be interknitted with the selvage loops including transfer bar means and a cam operated by the cam shaft transversely to the transfer bar means to simultaneously impart transfer movement to transfer bars in opposite directions.

40. In combination in a full-fashioned knitting machine, a cam shaft, a needle bar, groups of standard needles of the beard type on the needle bar to receive a course of loops at each side of the blank to which heel tabs are to be knitted, groups of needle-like implements of the same

bearded type having shorter beards also on said bar to receive other courses of loose loops adjacent to said first loop courses at each side of the blank, a presser edge, mechanism including means for actuating the needle bar to engage the standard needle beards to the presser edge to knit the heel tabs and preventing the forming of loops on said implements and the closing of said short beards at the time the needles cast off loops, a front narrowing shaft, brackets on said front narrowing shaft, means for narrowing in the heel tabs including narrowing rods supported by said brackets and a follower for cooperating with a cam on the cam shaft, means for transferring loops from said implements to the inside selvage edges of the heel tabs and causing the transferred loops to be interknitted with the selvage edge loops including transfer bar means supported by said brackets and a cam carried by the front narrowing shaft operated by the cam shaft transversely to the transfer bar means to simultaneously impart transfer movement to transfer bars in opposite directions, and means whereby the transferring means may be operated simultaneously with, and independently of, the narrowing means.

41. A knitting machine of the character described having, in combination with a set of knitting needles and a set of non-knitting needles, a cam shaft for the machine, a loop transfer mechanism, a supporting frame for said transfer mechanism arranged to swing about a fixed pivot to impart substantially vertical movements to said transfer mechanism to cooperate with the sets of needles, and a mechanism for shifting the loop transfer mechanism from the set of non-knitting needles over certain of the knitting needles, comprising: a shifting cam supported on said frame for oscillation to effect lengthwise movement of said transfer mechanism, a cam on the cam shaft, a cam follower, and an operating connection between said shifting cam and said cam follower rendered operative by the action of said cam on the main cam shaft.

42. In a flat knitting machine, in combination: at least two sets of needles; means cooperating with one set of needles to knit successive courses thereby; and means for successively transferring loops from the other set of needles onto the first set of needles as the courses of loops are knitted by the latter.

43. In a flat knitting machine, in combination: a set of non-knitting needles adapted to have topped thereon a course of loops of a fabric; a set of knitting needles; means cooperating with said set of knitting needles to knit successive courses thereby; and means for successively transferring loops from the set of non-knitting needles onto the set of knitting needles as the courses are knitted by said set of knitting needles.

44. The method of producing a fabric, which comprises: knitting a blank to have adjacent loose loop course portions in walewise register; folding the blank near adjacent ends of said course portions to remove said portions from said register and to have them substantially in coursewise alignment; topping the aligned course portions onto loop manipulating implements of a knitting machine; knitting from one of said course portions a fabric insert while preventing the knitting of loops on said other course portion; transferring loops of the latter portion to loops knitted to said one course portion during the knitting of the insert; and transferring loops within the insert to shape the same.

45. The method of knitting a heel portion onto a leg and foot portion of a combination stocking

blank, comprising: placing a course of said foot portion upon a row of non-knitting needles and a course of said leg portion upon a row of knitting needles; knitting courses upon said row of knitting needles and, during the knitting thereof, interknitting the outer edge of the courses with the adjoining portion of the foot fabric; and narrowing said courses on the knitting needles.

46. The method of knitting full-fashioned stockings, consisting in: knitting the leg fabric, the high heel fabrics, the sole fabrics, the instep fabric, and the toe fabric as a unitary; folding the high heel fabrics towards each other to align the terminal courses thereof with each other and with the first courses of the sole fabrics; topping said courses upon the needles of a knitting machine; knitting courses to the high heel fabrics while transferring successively loops of the first courses of the sole fabrics into knitting position with the courses being knitted to the high heel fabrics and, simultaneously therewith, narrowing the knitted courses.

47. The method of knitting the heel portions into a combination foot and leg stocking blank having the foot portion knitted into the leg, comprising: separately supporting those portions of the last course of the leg fabric and those portions of the first course of the foot fabric to which the heel portions are to be knitted; knitting heel courses into said course of the leg and, during the knitting of the following courses, knitting loops of said supported foot fabric course into the inner selvedge edges of the heel portion and, simultaneously therewith, narrowing the heel courses.

48. In a method of knitting a heel fabric into a knitted combination leg and foot hosiery blank having separated leg and foot portions: supporting a course of each of the separated leg and foot portions in alignment upon needles of a knitting machine with the supported leg portions adjacent one another; knitting heel fabric courses as continuations of the supported courses of the leg portions; interknitting the supported courses of the separated foot portions with the heel fabric courses as the knitting thereof progresses; and narrowing certain of the heel fabric courses to shape the fabric.

49. In a method of knitting a heel fabric into a knitted combination leg and foot hosiery blank having separated high heel and sole portions: supporting a course of each of the separated high heel and sole portions in alignment upon needles of a knitting machine; knitting heel fabric courses as continuations of the supported courses of the high heel portions; interknitting the supported courses of the separated sole portions with the heel fabric courses as the knitting thereof progresses; and narrowing certain of the heel fabric courses to shape the fabric.

50. In a method of knitting a heel fabric into a knitted combination leg and foot hosiery blank having separated high heel and sole portions: supporting the last course of each of the high heel portions and the first course of each of the sole portions in alignment upon needles of a knitting machine; knitting heel fabric courses as continuations of the last course of each of the high heel portions; interknitting the supported first courses of the sole portions with high heel fabric courses as the knitting thereof progresses; and narrowing certain of the heel fabric courses to shape the fabric.

51. The herein described method to be performed on a flat knitting machine with two end sets of knitting needles, an intermediate set of

non-knitting needles, a yarn carrier for feeding yarn to each set of knitting needles, a pair of transfer point combs associated with the set of non-knitting needles, and a pair of narrowing point combs, one associated with each set of knitting needles, the method comprising the steps of: placing rows of loops of knitted fabric onto the three sets of needles; operating the yarn carriers to feed yarn to the knitting needles for the formation of courses of loops thereon; actuating the

5 pair of transfer point combs to simultaneously transfer loops in opposite directions from the intermediate set of non-knitting needles onto the end sets of knitting needles for the interknitting of loops placed on the non-knitting needles with the loops formed on the knitting needles; and actuating the pair of narrowing point combs to narrow courses of loops knitted on the sets of knitting needles.

JOSEPH L. BEERS.