Oct. 21, 1941. H. E. HAEHNEL 2,259,974

METHOD OF AND APPARATUS FOR NARROWING KNITTED FABRIC

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Fig. 1.

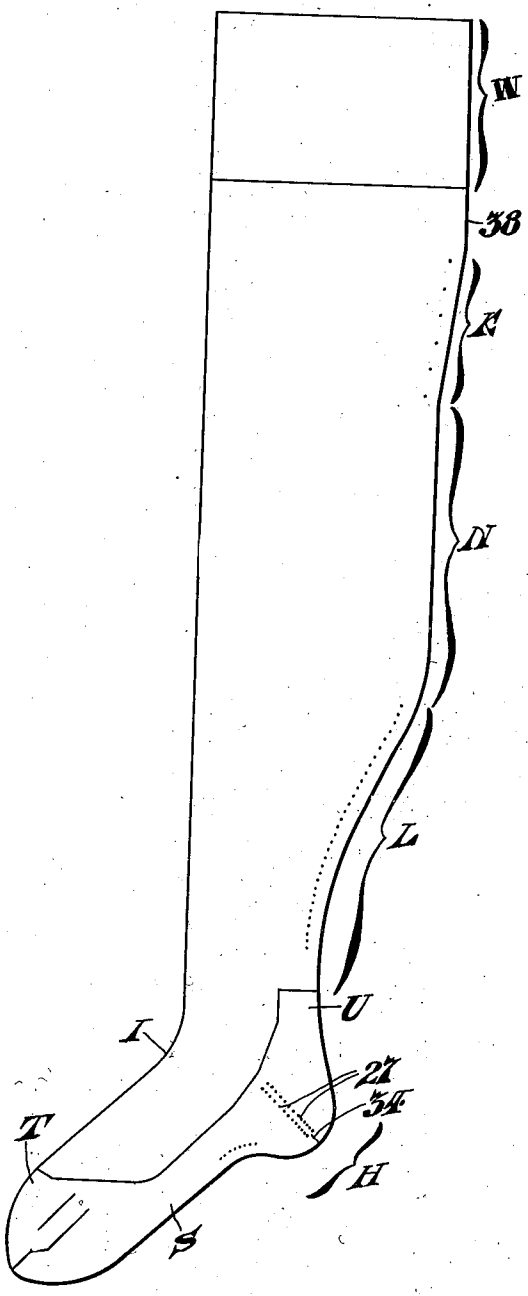


Fig. 2.

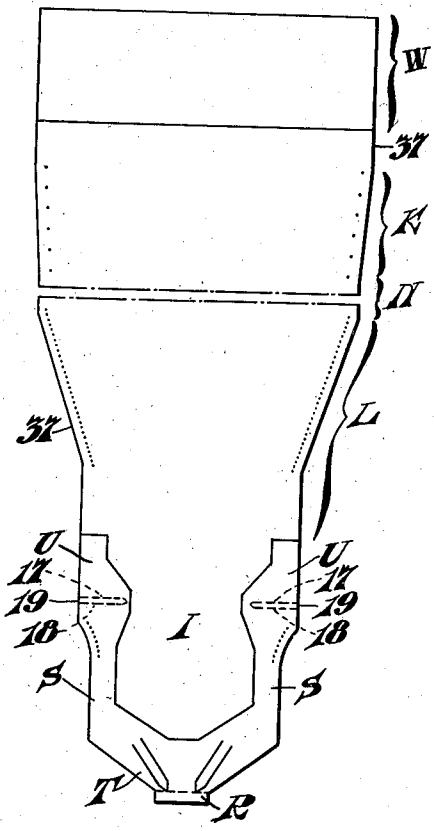
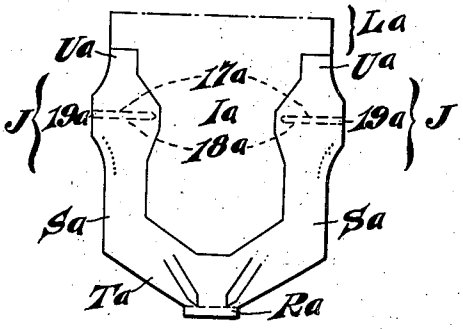


Fig. 3.



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Fig. 4.

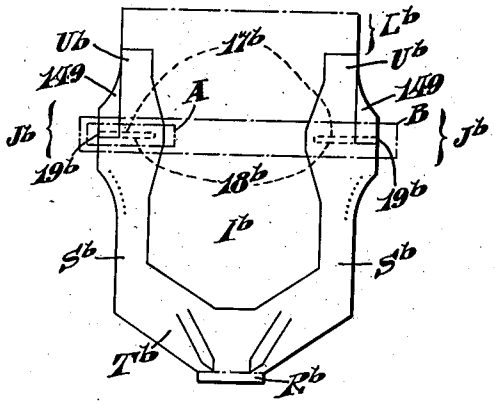


Fig. 5.

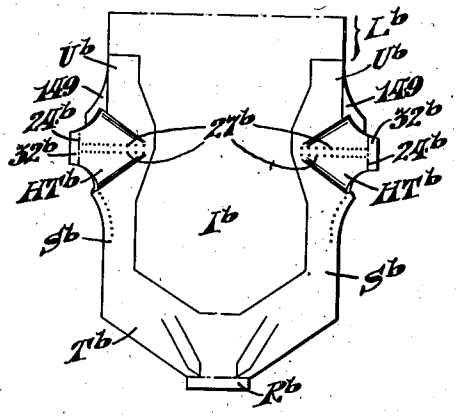


Fig. 6.

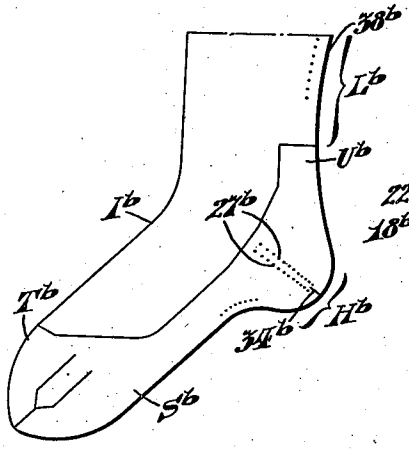


Fig. 7.

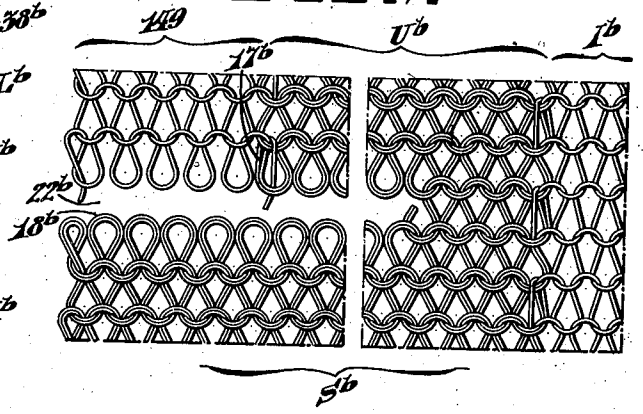
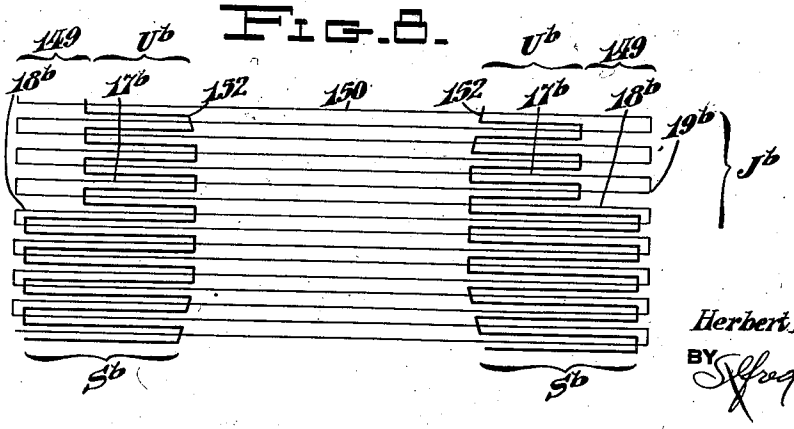


Fig. 8.



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FIG. 9.

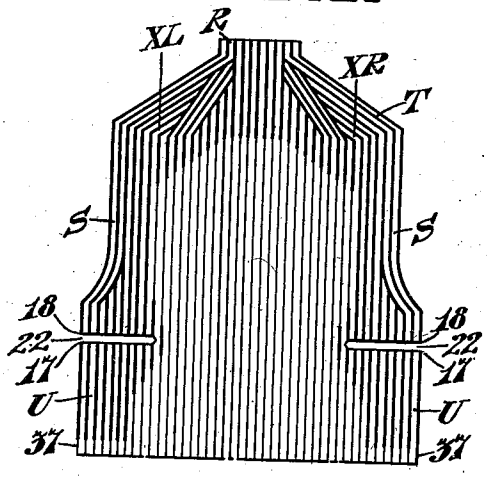


FIG. 10.

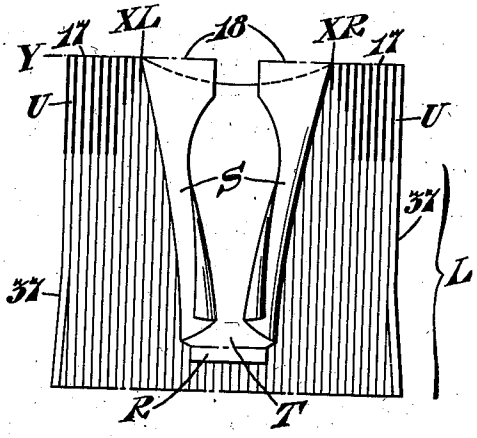


FIG. 11.

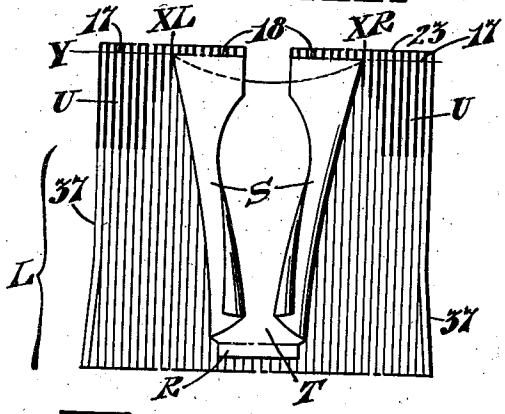


FIG. 12.

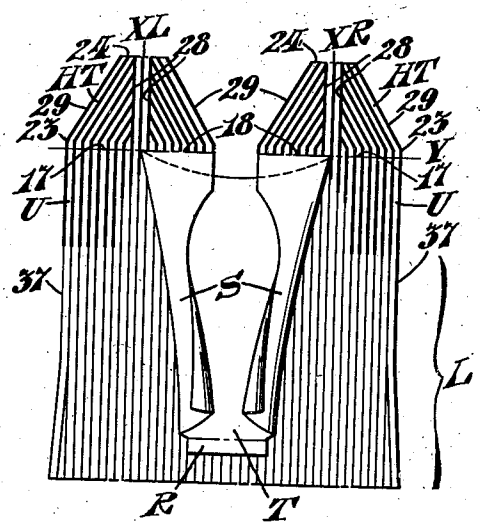
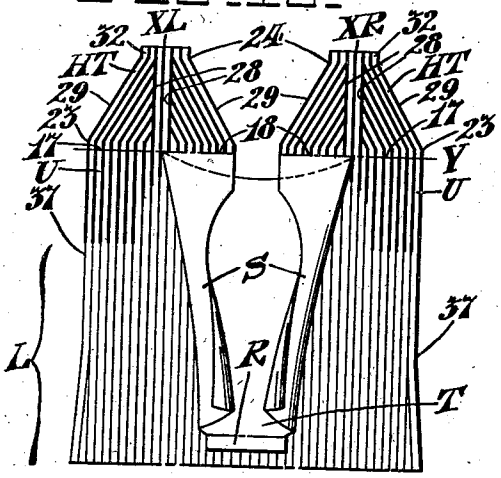


FIG. 13.



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Fig. 15.

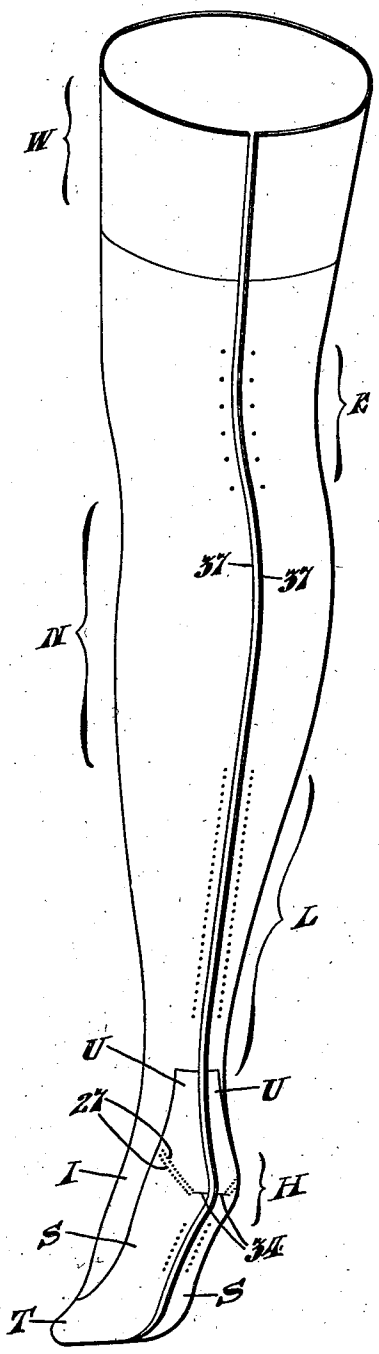
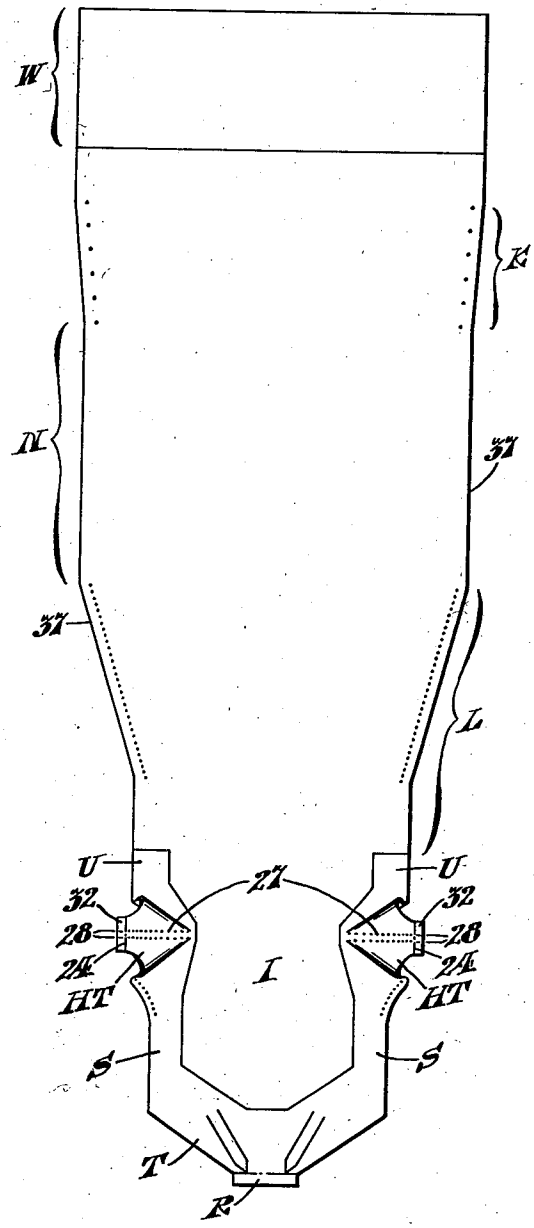


Fig. 14.



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Fig. 16.

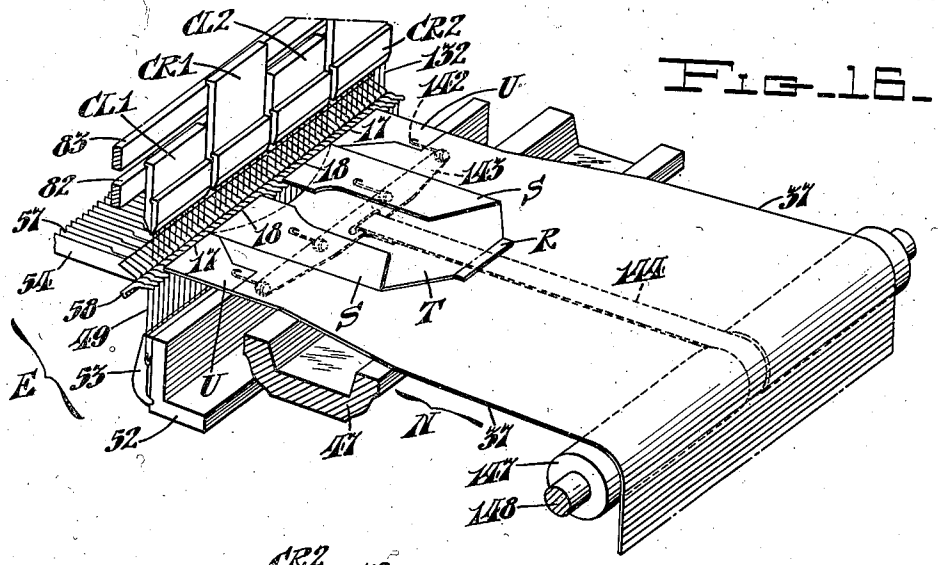


Fig. 17.

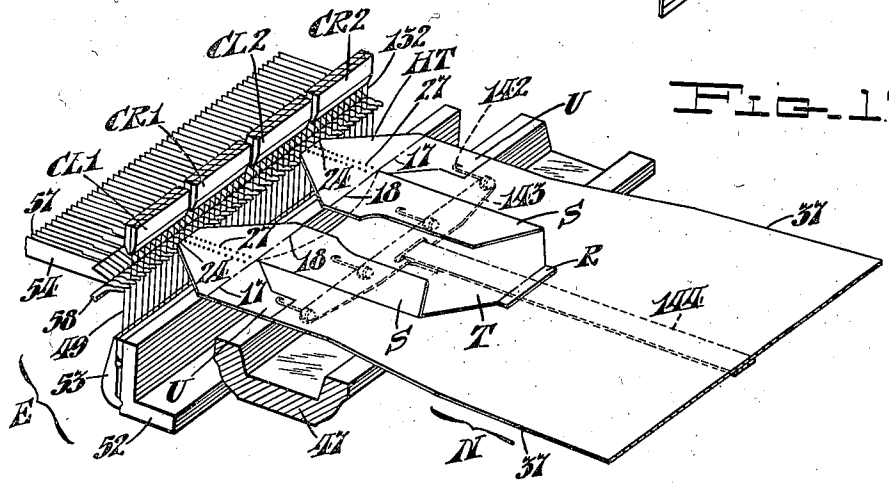
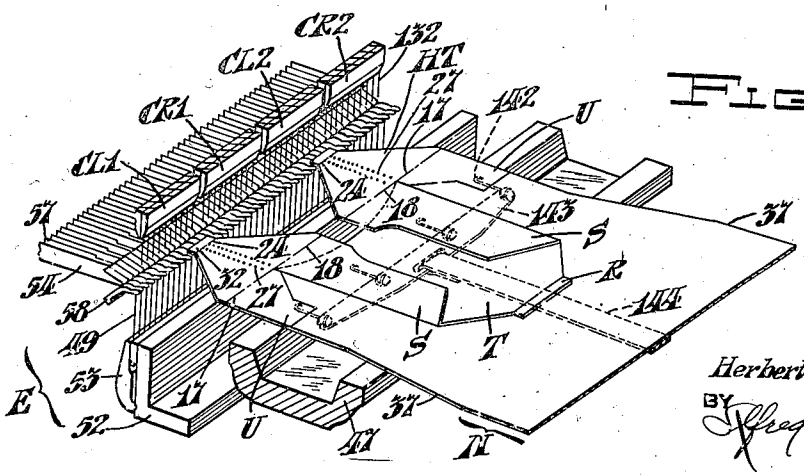


Fig. 18.



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Fig. 19.

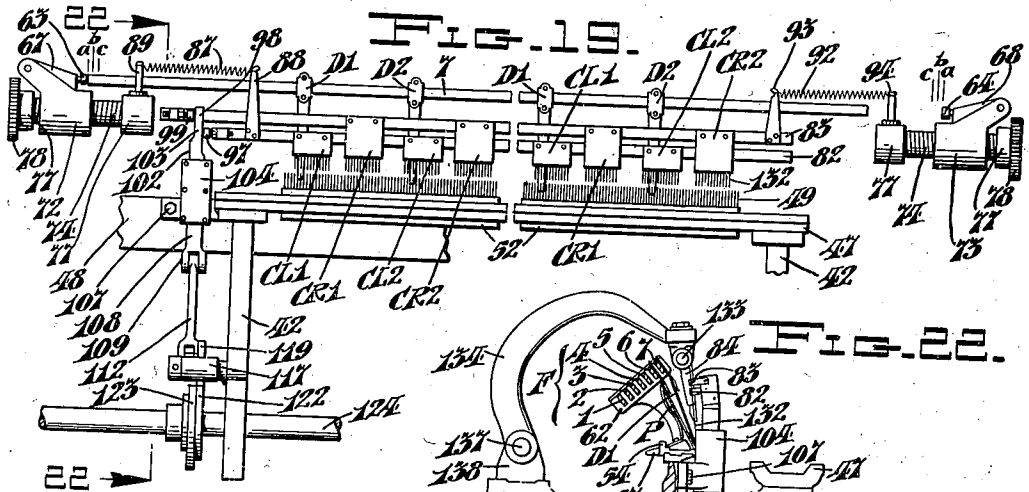


Fig. 22.

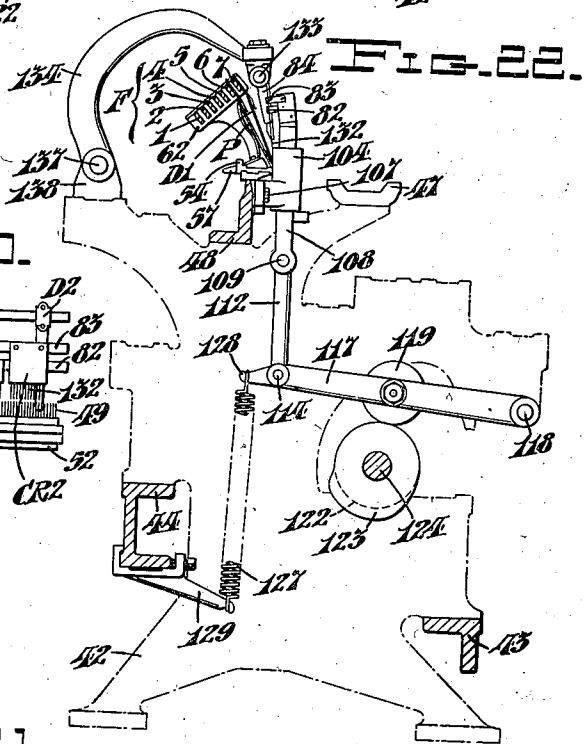
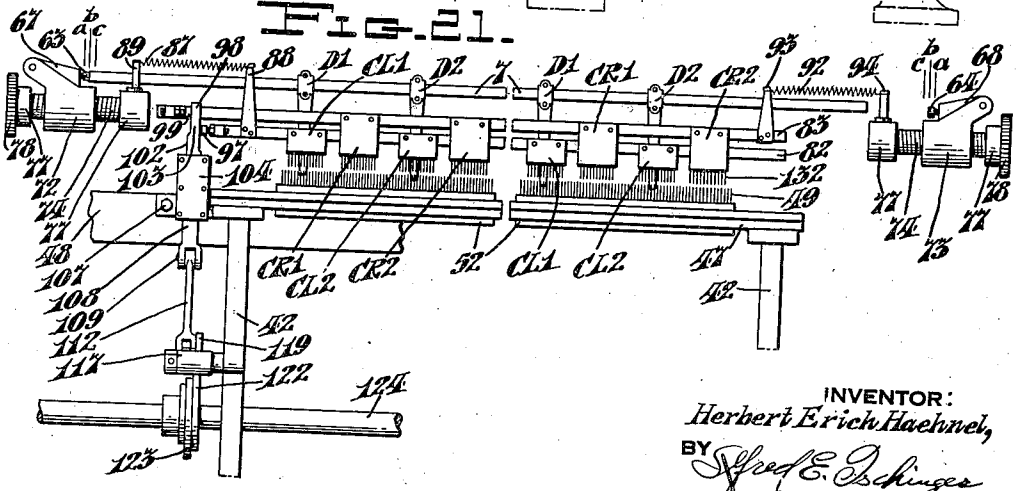


Fig. 20.

Fig. 21.



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Fig. 23.

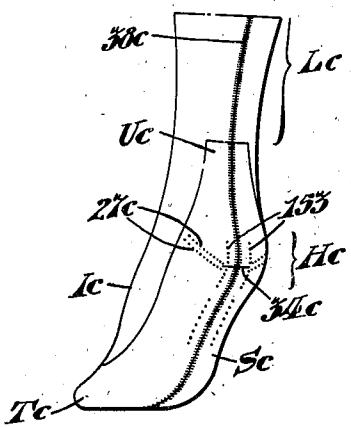


Fig. 24.

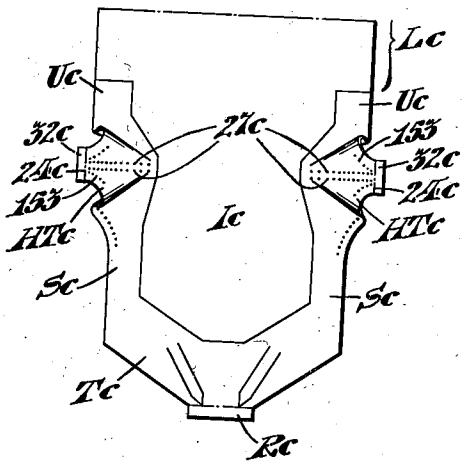


Fig. 25.

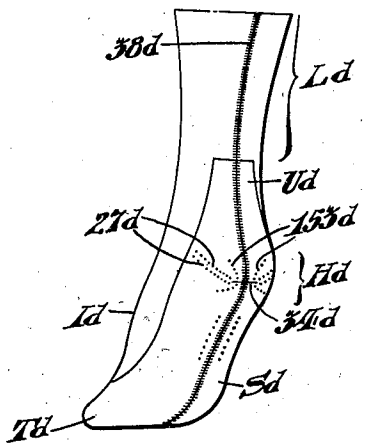
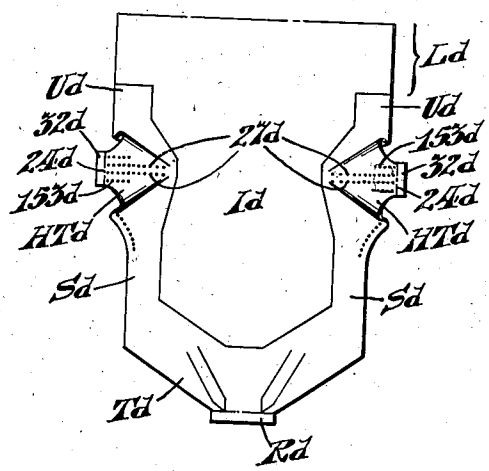


Fig. 26.



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FIG. 27.

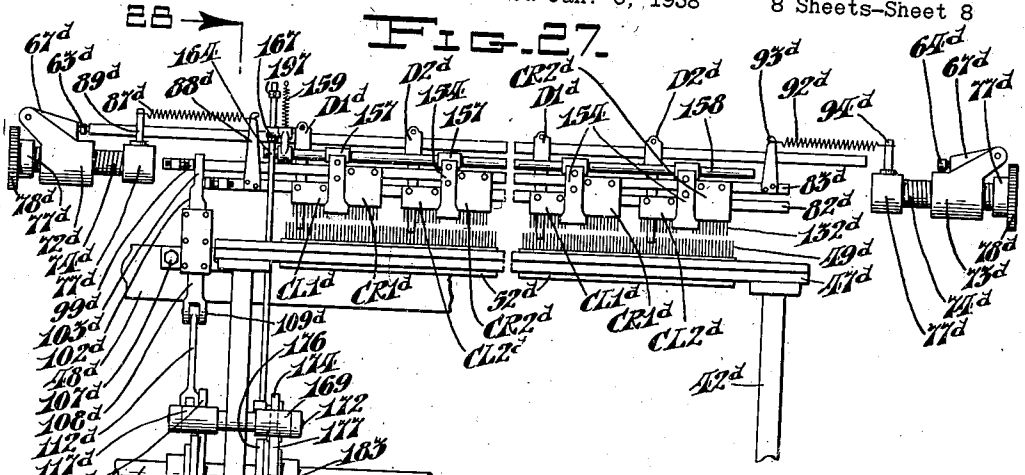
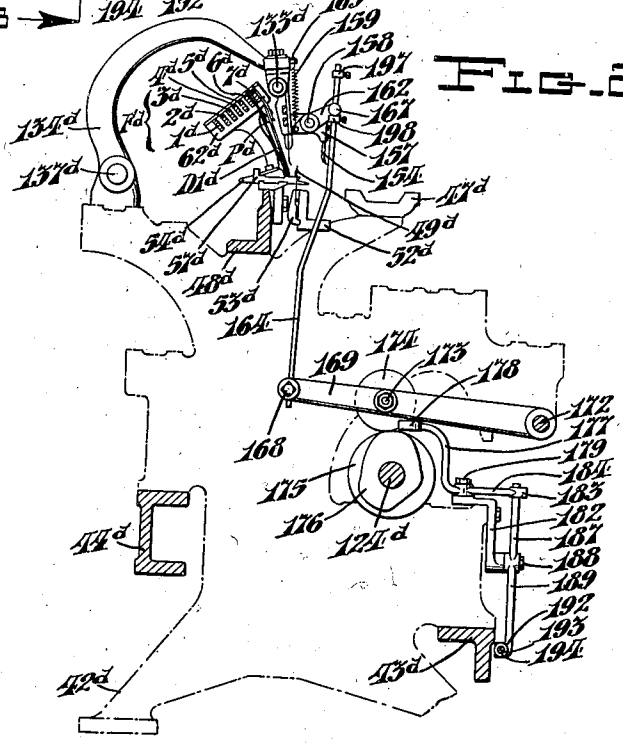


FIG. 28.



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Patented Oct. 21, 1941 2,259,974

UNITED STATES PATENT OFFICE

2,259,974

METHOD OF AND APPARATUS FOR NARROWING KNITTED FABRIC

Herbert Erich Haehnel, West Reading, Pa., assignor to Textile Machine Works, Wyomissing, Pa., a corporation of Pennsylvania

Original application January 6, 1938, Serial No. 183,656. Divided and this application September 9, 1940, Serial No. 355,888

11 Claims. (Cl. 66—89)

My invention relates to a novel method of, and means for, producing knitted fabric, particularly as related to full fashioned stockings each having leg and foot portions continuously knitted on a unit machine, and a heel element subsequently added. This application is a division of my prior application filed January 6, 1938, Serial No. 183,656, for knitted fabric and method of and means for producing the same, which has since eventuated into Patent No. 2,223,252. Said patent contains claims to articles within the invention and claims to the broad methods of making such articles.

Those phases of my invention comprising the means and the machine method, and the claims thereon, have been transferred to this application.

In the production of full fashioned stocking blanks, it has been usual to knit the welts, legs and heel tabs on one machine, known as a legger, and to complete the blanks by transferring them to a machine known as a footer, and knitting and fashioning the foot portions thereon. This procedure causes the well known differences of shade or tone forming a line between areas of the instep region knitted on the legger and the footer machines, respectively, caused by unavoidable discrepancies in the spacing of the needles of the two machines, by the fact that the areas are knitted of yarn from different cones, and by other factors.

Various suggestions have been made toward the elimination of the above-mentioned defect, probably the first of which was to knit an entire stocking blank, including the welt, the leg, the heel tabs and the foot on one machine, known as a unit machine. In one such machine, a course of loops across the instep area is lifted by a point comb off the needles, and the comb allowed to recede from the plane of the needles during the knitting of the heel tabs, after which the comb is brought back to the needle plane and the loops redeposited on the needles for completing the knitting of the foot portion. In another machine, instead of lifting the instep loops off the needles, the needle bar is so split and a portion thereof allowed to recede with the instep course loops, and brought back again, after the completion of the heel tabs, as to accomplish substantially the same result.

It was later suggested to knit all of a stocking, except the heel tabs, on one machine, and to subsequently add these tabs, or a unit heel pocket element, whereby the objectionable line, or differences of shade, between areas in the instep region was avoided.

However, with this suggestion also, there arose still further problems as to whether, and how, to knit the heel pocket elements, as separate entities to be topped or seamed in position in the main blank, or stocking, or to knit the heel pocket elements directly to the main blank.

Attempts along the first line, resulted, according to one suggestion, in the production of separate half heel pocket elements to be topped and seamed in place. This suggestion requires, not only the handling, but also the maintenance of separate stocks, of the many small heel elements.

Another prior suggestion, avoiding objections to the half heel pocket element suggestion above mentioned, is to produce an entire heel pocket element in one piece, and to assemble it in position by a combination of topping and seaming operations.

In the matter of knitting the heel elements in position from loops of the main blank, it has heretofore been suggested to top the main blank onto needles and implements of a "heeler" machine whereby, as the heel tabs are knitted on standard needles, the loops of the first course portions in the sole area, at opposite sides of the blank, are transferred from needle-like loop holding implements one at a time to inside selvage edge loops of the heel tabs as the latter are produced. Such method has the great advantage of reducing the operation of producing the stocking to somewhat its former simple commercial status by the two machine "legger" and "footer" mechanism. It requires no separate stocks of heel elements, but only of the yarn thereof as it is knitted in place, and, at the same time, eliminates the instep line above set forth.

It is among the objects of the invention hereof to provide a method and machine whereby full fashioned stockings may be produced without differences in shade between areas of the instep region and, in general, to avoid all the objections to former methods and machines intended to produce a similar stocking.

In particular it is an object hereof to improve the last above-mentioned method, wherein loops of the sole area are transferred, by eliminating the necessity for such transfer, and thereby producing an improved stocking of structurally different characteristics from any prior stocking of which I am aware.

It is an object to provide improved means for practicing the method of the invention, and producing the stocking, of the invention, whereby the product of the above-mentioned unit machine may be completed substantially as satisfactorily

as, if not better than, the long practiced standard two-machine legger and footer method.

It is another object to utilize the novel principles and features of this invention in the production of other fabrics similar to full fashioned stockings or portions thereof wherever they may be applied.

With these and other objects in view, which will become apparent from the following detailed description of the illustrative embodiment of the invention shown in the accompanying drawings, my invention resides in the novel steps and method and the novel elements, features of construction and arrangement of parts in cooperative relationship as hereinafter more particularly pointed out in the claims.

In the drawings:

Figure 1 is a view, in side elevation, of a full fashioned stocking made by the machine of and in accordance with the method of the invention, as arranged or folded in its flat form;

Fig. 2 is a view of a one-piece combined leg and foot blank, minus the heel pocket elements, from which the stocking of Fig. 1 is formed, a section of the leg area being omitted;

Fig. 3 is a view similar to the lower portion of Fig. 2 of a corresponding lower portion of a stocking blank made on a machine in accordance with the invention and according to the method of the invention;

Fig. 4 is a view, similar to Fig. 3 of another modified form of blank produced by the invention;

Fig. 5 is a view of the blank portion of Fig. 4, after the heel elements have been knitted to position therein;

Fig. 6 is a view similar to the bottom portion of Fig. 1, of the stocking produced from the blanks of Figs. 4 and 5;

Fig. 7 is a magnified loop diagram of an area A shown in dot-and-dash lines in Fig. 4, but with a severing course or area severed in Fig. 7, and not severed in Fig. 4;

Fig. 8 is a schematic diagrammatic layout of yarns as fed in the region of the area B shown in dot-and-dash lines of Fig. 4;

Figs. 9 to 13, inclusive are sequence diagrams similar to the lower portion of Fig. 2, but inverted from the position thereof corresponding to the service position of the stocking on the leg of the wearer to the position of the blank as the fabric comes from the machine, showing successive steps in the production of a finished blank;

Fig. 14 is a view similar to Fig. 2 of the blank thereof, plus the heel pocket elements added during the steps of Figs. 9 to 13, inclusive;

Fig. 15 is a perspective rear view of the stocking of Fig. 1, as extended or rounded out in service on the leg of a wearer, but having its selvage edges slightly spaced apart prior to seaming;

Figs. 16, 17 and 18 are perspective views of portions of the blank of Fig. 2, and of the machine for adding thereto heel pocket elements shown in the figures at successive stages of production, corresponding to Figs. 10, 12 and 13, respectively;

Fig. 19 is a diagrammatic front elevation of portions of a full fashioned knitting machine modified in accordance with the invention, showing the parts positioned as at one stage of operation;

Fig. 20 is a view similar to a portion of Fig. 19, the parts shown being positioned as at another stage of operation;

Fig. 21 is a view similar to Fig. 19, with the parts at still further positions different from the position of the parts of Figs. 19 and 20;

Fig. 22 is a front to back sectional view, taken substantially along the line **22—22** of Fig. 19 of the machine thereof, but showing further elements;

Fig. 23 is a view, similar to the bottom portion of Fig. 15, but with the back seam effected, of another modified form of stocking produced by the invention;

Fig. 24 is a view of the completed blank portion from which the structure of Fig. 23 is produced;

Fig. 25 is a view similar to Fig. 23 of another modified form of stocking produced by the invention;

Fig. 26 is a view similar to Fig. 24, of the completed blank portion for producing the structure of Fig. 25;

Fig. 27 is a view similar to Fig. 19 of another knitting machine modified in accordance with a further form of the invention; and

Fig. 28 is a view similar to Fig. 22 of the machine of Fig. 27.

In the drawings and description, only those parts necessary to a complete understanding of means constructed in accordance with the invention have been set forth; further information as to the construction and operation of other elements not herein specifically pointed out, but which are usual and well known, being available in the pamphlet entitled "Full Fashioned Knitting Machines," copyright 1920, and in the "Reading" Full Fashioned Knitting Machine Catalogues, copyright 1929 and 1935, published by the Textile Machine Works, Reading, Pennsylvania, and in a pamphlet entitled "Knitting Machine Lectures," published in 1935 by the Wyomissing Polytechnic Institute, Wyomissing, Pennsylvania.

As shown in Fig. 1, a full fashioned stocking produced by the invention is constructed as usual, except as to parts hereinafter to be more particularly pointed out, and comprises a welt W, a narrowed upper knee area K, an intermediate leg section N, a lower leg portion L having a narrowed portion, upper reinforced heel areas U, a heel element H, an instep area I, reinforced sole portions S, and a reinforced toe portion T.

The stocking, as thus constituted, but before the heel pocket element H is inserted, is produced from the blank of Fig. 2 which is not itself produced by a method or means of the invention, except in combination with the corresponding new elements herein set forth. It comprises, in one continuously knitted fabric, the welt W, the knee area K, the leg area N, the lower leg portion L, the instep portion I, the sole portion S, and the toe portion T having a ravel area R therein, but omits the heel pocket element H of Fig. 1.

To prepare the blank of Fig. 2 for the reception of the heel pocket element H of Fig. 1, it is provided, intermediate the reinforced upper heel areas U and the sole portions S, at each side of the walewise center of the blank, with parallel successive course portions **17** and **18**, in walewise register with each other, having a severing area **19**, as of one row of loops therebetween. The course portions **17** of needle loops thus constitute the last or lowermost course portions in the heel areas U, and the course portions **18** of sinker and divider loops constitute the first or uppermost course portions in the sole areas S, in the normal service position of the finished stocking on the leg of a wearer. As shown in Fig. 9, the

lower portion of the blank of Fig. 2 is inverted from its position of Fig. 2, viewed as it comes from the front of the machine.

As indicated in Fig. 9, the severing areas 19 have been severed, leaving slits 22 whereby the course portions 17 and 18 are rendered separable out of, or transversely to, the plane of the blank for folding the latter, as in Fig. 10. In the latter figure, the blank has been folded, at one side of the course portions 17 and 18, toward the toe end, at the left walewise side of the blank, about a walewise line XL, adjacent to the position of the inner end of the left hand or corresponding course portions 17 and 18, as viewed in Fig. 9, and, at the right walewise side of the blank, about a walewise line XR adjacent to the position of the inner end of the right hand course portions 17 and 18, the blank also being folded about a coursewise line Y between the course portions 17 and 18, thus placing the latter in substantial alignment with each other for topping onto adjacent needles, and rendering the course portions 18 inner course portions relative to the outer course portions 17. The blank, as shown in Fig. 10, is in its position of topping onto the needles of a "heeler" machine of the invention, hereinafter set forth.

Fig. 11 indicates the appearance of the blank when, upon continuing the knitting thereof to produce heel tab areas HT, a few courses have been formed to a first course portion 23 at each side of the blank in which narrowing is effected. From each course portion 23 to a shorter course portion 24, which may or may not be a loose course for purposes hereinafter described, as seen in Fig. 12, shaping or narrowing is intermittently effected along the walewise center lines XL, and XR simultaneously in opposite coursewise directions forming narrowing marks 27 (Fig. 1) along substantially parallel lines 28 (Fig. 12). This operation tapers the areas HT along sloping edges 29 from the course portion 23 to the course portion 24, from the latter of which, a ravel area 32 (Fig. 13) is formed. The blank is then complete, as shown in Fig. 14 after which, the half portions of each ravel area 32 are folded into flat face engagement with each other about a medium coursewise line of the blank, as viewed in Fig. 14, and the corresponding half portions of the short course 24 looped to each other along lines 34, as shown in Figs. 1 and 15, during which looping operation the ravel course portion 32 is removed. As shown in Fig. 15, selvage edges 37 which are later seamed together to form a usual back seam 38 (Fig. 1), are spaced a slight distance apart to better illustrate the construction of the stocking particularly in and about the pocket element H.

Referring to Figs. 16 to 22, inclusive (first see Figs. 19 to 22, inclusive), portions of a full fashioned knitting machine, for accomplishing the previously recited results, include center frames 42, a front beam 43, a back beam 44, a front bed 47, a center bed 48, and loop forming mechanism E including needles 49, a needle bar 52, a needle bar clamp 53, sinkers 54, dividers 57 and knockover bits 58. Two needle bar sections of a multi-section machine are indicated in Figs. 19 and 21. Yarn laying means F, includes brackets, such as a bracket 62 secured to the center bed 48, for supporting yarn carrier bars 1 to 7, inclusive.

The machine, in this instance, is a modified footer machine, or in other words, the invention may be considered as an attachment to a footer machine whereby, by slight alterations, it may be utilized either as a footer or as a heeler machine. In its capacity as a footer it may require the several yarn carrier rods illustrated, and, in its capacity as a heeler machine, it may require a smaller number, such as the three rods 5, 6 and 7. A machine constructed to operate only as a heeler machine therefore does not ordinarily require as many yarn carriers as are illustrated, or other parts of a heeler, and may consequently be initially constructed at a saving in size, weight and cost.

The yarn carrier bar 7 carries two yarn guide fingers D1 and D2 for each needle bar section disposed, and adapted to operate, at opposite sides of the vertical center line of the corresponding section in the production of the heel tab areas HT at opposite sides of the walewise center line of the blank.

The carrier bar 7 is reciprocated longitudinally in a usual manner, by the coulier motion mechanism of the machine, between adjustable contact screws 63 and 64 on left and right hand end stops 67 and 68, respectively. The stops 67 and 68 are carried by yarn carrier end stop nuts 72 and 73, respectively, on spindles 74 journaled in bearings 77, and having ratchet wheels 78 by which the spindles are operated to vary the distances of reciprocation of the yarn carrier bar 7. Narrowing rods 82 and 83 are longitudinally slidably journaled in bearing brackets, such as the bracket 84 (Fig. 22).

The rod 82 carries, at the left end of each needle bar section, a narrowing comb CL1, and the rod 83 carries, at the right of each comb CL1, also at the left of the center of each needle bar setcion, a narrowing comb CR1. The rod 82 also carries, at the right of the center of each needle bar section, a narrowing comb CL2, and the rod 83 carries at the right of each comb CL2 at the right end of each needle bar section, a narrowing comb CR2. The rod 82 is biased toward the left, as viewed in Figs. 19, 20 and 21, by a spring 87 connected between an arm 88 on the rod, and an arm 89 on the inner bearing 77 of the left end spindle 74. The rod 83 is biased toward the right, by a spring 92 connected between an arm 93 on the rod, and an arm 94 on the inner bearing 77 of the right end spindle 74.

The rod 82 carries an adjustable contact screw 97 at its left end for engagement with the right side of a longitudinally movable elongated cam or wedge-like element 98, and the rod 83 carries an adjustable contact screw 99 at its left end for engagement with the left side of the wedge 98. The latter has portions 102 and 103 constituting high and low cam portions, respectively, such that when the wedge is reciprocated longitudinally from its position of Fig. 19 to its position of Fig. 22, the rods 82 and 83 are moved longitudinally relative to each other by a distance equal to a two needle spacing along the needle banks of the respective needle bar sections.

The wedge 98 is vertically reciprocably journaled in a bearing bracket 104 secured, as by screws 107, to the center bed 48, and has a lower end portion 108 that is pivotally connected, by a pin 109, to a link 112. The latter is pivotally connected, by a pin 114, to a lever arm 117 that is pivotally supported by a pin 118 in one of the center frames 42, and carries a follower or roller 119 for engagement with either of cams 122 and 123 fixed to a usual cam shaft 124. The follower 119 is biased toward the cams by a spring 127 connected between a hook end 128 of the lever

arm 117 and a bracket 129 clamped to the back beam 44. The cam 122 is circular so that, when the follower 119 is on this cam, as shown in Figs. 19 and 21, the machine is in ordinary knitting condition, and no narrowing movement is imparted to the narrowing points 132 of the combs CL1, CR1, CL2 and CR2. When the cam shaft 124 is shogged to the right, the follower 119 rides on the contoured narrowing cam 123 such that the wedge 98 is reciprocated vertically to reciprocate the narrowing rods simultaneously in opposite directions.

Dipping movement of the narrowing points is effected in a usual manner, by a usual mechanism including a front narrowing shaft 133 on which the brackets 84 are mounted, and a curved lever arm 134 pivotally mounted by a back narrowing shaft 137 that is mounted in brackets, such as the bracket 138 on the machine frame.

As shown in Fig. 16, in which the position of the blank corresponds to its position of Fig. 10, the course portions 17 and 18 are mounted on the needles 49, and the blank maintained taut by welt hooks 142 on a welt bar 143 that is connected, by a strap 144, to a usual take off roller 147 on a shaft 148.

In Fig. 17, the parts are positioned corresponding to the stage of operation at which the blank is completed to its form of Fig. 12, after which the ravel courses are added, as shown in Figs. 13 and 18.

During the operation in which the above-mentioned steps are effected, plain and narrowed courses are at first effected in about the ratio of five or six courses to one narrowed course, after which, as the formation of the heel tabs HT approaches the ends of the latter, the narrowings are effected more frequently.

As shown in Fig. 19, the parts are in plain knitting position, and the end stops 67 and 68 positioned as shown. Each of the combs CL1 and CR1 merely operates back and forth a two needle distance, and this distance is in the same location at each operation. The combs CL2 and CR2 operate likewise, never changing the general location along the needle bank, but always working back and forth over the same two needle span. The combs may be operated back and forth a one needle distance, and the number of narrowings increased, or the arrangement of narrowing marks changed, as hereinafter set forth, to produce the heel tab areas to the desired size and shape.

After each narrowing, the first of which is indicated as being effected in Fig. 20, by the position of the wedge 98 causing the combs of each pair to move toward each other, the end stops 67 and 68 are each moved inwardly a two needle distance, indicated by the small vertical lines *a*, *b* and *c* above the stops. Plain courses are then formed to the length determined by the end stops, until the next narrowing, when the above procedure is repeated, and the end stops are again moved toward each other a further two needle distance. Thus, although, the narrowing combs never advance inwardly beyond the two needle span over which they work, the end stops advance by successive additional two needle distances upon successive narrowings. Fig. 21 illustrates the finish of the first narrowing in which the wedge 98 has dropped to lower posiiton, the follower 119 is on the circular cam 122, and the end stops have advanced inwardly two needles.

Yarn guide fingers, such as the finger P associated with the yarn guide finger D1 of Fig. 22, and mounted on the carrier bar 7, are provided one for similar association with each of the yarn guide fingers D1 and D2. As shown, the fingers P lay the body yarn of the fabric, and the fingers D1 and D2 are splicing carriers, thereby being actuated and controlled to travel simultaneously with, and through strokes of the same length as, the carriers P. Where plating is desired, the fingers P are given the usual lead relative to the carriers D1 and D2 by mechanism not of itself constituting part of this invention.

In the modified form of blank portion shown in Fig. 3, in which corresponding parts are designated by corresponding reference characters having the subscript *a*, the only difference in construction over that of the first form resides in the provision of widened reinforced portions J at each side of the blank.

The blank is otherwise folded and arranged relative to the heeler machine needles, as in Figs. 10 and 16, and completed in the manner of completing the blank of the first described form, the result in the finished stocking providing a heel pocket element of slightly modified shape and greater fullness.

In the modified form of blank portion shown in Fig. 4, in which parts corresponding to parts previously described are designated by corresponding reference characters having the subscript *b*, the construction is similar to that of Fig. 3, except that areas 149 of widened portions *Jb* are of single or reduced yarn thickness to which no heel pocket fabric is knitted, and which are severed from the blank by cutting along lines defined by the adjacent reinforced areas prior to forming a back seam 38*b*, Fig. 6, these areas being provided merely to facilitate the production of the individual blank portions therebelow. Thus, the course portions 17*b*, to which heel tab fabric is knitted, are shorter than the course portions 18*b* so that, when these course portions are aligned, as in Fig. 10, and centered relative to the narrowing combs, fashion marks 27*b* are in the center of the heel pocket elements HT*b* (Fig. 5), but, however, are lower on the stocking than the corresponding marks 27 of Figs. 1, 14 and 15. This feature is further desirable inasmuch as any contributing strain occasioned by the narrowings in the fabric is not directed to the turning point of the heel where the sole portion S*b*, the upper heel portion U*b* and the instep I*b* meet and which is considered to be one of the weaker points in stockings as heretofore constructed, but is instead spread to a lower area in the stockings where these additional strains will be more readily absorbed without damaging the fabric. Thus, another variety or selection of heel size and shape is provided. As shown in Fig. 7, the severing course 19*b* of Fig. 4 has been severed, thus providing a slit 22*b* between the course portions 17*b* and 18*b* for folding the blank, as above set forth. This figure also better illustrates the thickness and position of one of the areas 149 relative to the adjacent areas, and the particular configurations and loop relations of the yarns.

Fig. 8 further exemplifies how a body yarn 150 is laid through the areas 149, the areas U*b*, the reinforced sole areas, and the lower leg area approaching the instep I, in the relation of the body yarn to a reinforcing yarn 152 of the areas U*b* and S*b* in the widened portions J*b*. The course portions 17*b* and 18*b*, and the severing area 19*b*, at one side of the fabric, are offset walewise one course from the corresponding fea-

tures, respectively, at the other side of the fabric, as indicated in Fig. 8.

In the form of fabric shown in Figs. 23 and 24, in which parts corresponding to parts previously described, are designated by corresponding reference characters having the subscript *c*, the construction is similar to the first described forms thereof, except that additional narrowing is effected which produces narrowing marks **153** along lines sloping or curved relative to the lines of the marks **27***c* at each side of the walewise center line of each heel tab area HTc for causing, in the example given, a more sudden taper of the tabs toward the outer ends thereof.

In the form of fabric shown in Figs. 25 and 26, and in the modified form of machine, shown in Figs. 27 and 28 for producing portions of this fabric, parts corresponding to parts previously described, are designated by corresponding reference characters having the subscript *d*. In both the fabric and the machine, the construction is similar to the above-described forms thereof except that the additional narrowing represented by marks **153***d*, along lines parallel to the lines of the marks **27***d* at each side of the walewise center line of each heel tab area HT*d*, is provided by the use of covering knives **154** to cover the loops inwardly thereof, after the completion of the narrowing which produces the marks **27***c*.

Each covering knife **154** is carried at the free end of a lever **157** having its other end fixed to a covering shaft **158** journaled on the narrowing rod brackets **84***d*. A spring **159**, connected between the inner end of a lever **162** on the shaft **158** and a pin **163** associated with the front narrowing shaft **133***d*, operates to bias the lever **162** clockwise about the axis of the pin **158**, as viewed in Fig. 28. An upright rod **164** extends loosely through a swivel member **167** at the outer end of the lever **162**. The rod is pivotally connected at its lower end, by a pin **168**, to one end of a lever **169**. The latter is pivoted at its other end, by a pin **172**, to a portion of the machine frame, and carries intermediate its ends, on a pin **173**, a follower **174** for cooperation with circular and contoured cams **175** and **176**, respectively, on the cam shaft **124***d*.

A lever **177**, having on one of its arms a fork **178** embracing the follower **174**, is pivoted about the axis of a vertical pin **179** in a bracket **182** on the machine frame, and has a fork **183** on its other arm **184** embracing the upper arm of a lever **187** that is pivoted by a horizontal pin **188** in the bracket **182**. A lower arm **189** has a forked end portion **192** embracing a horizontal rod **193** between collars **194** on the latter. The rod **193** is supported along the front beam **43***d*, and leads to a usual pattern chain mechanism for longitudinal reciprocation thereby.

During plain knitting, and also during the formation of the narrowings represented by the marks **27***d*, the follower **174** rides on the circular cam **175**, the latter being of such thickness that the follower remains thereon during shogging of the cam shaft from its plain knitting position to its position of effecting the narrowings **27***d*.

After the narrowings **27***d* are effected in any one course, the narrowings **153***d* are effected in that course by shifting of the rod **193** from the pattern mechanism, this shifting acting through the collars **194**, the lever **187**, the fork **183**, the lever **177** and the fork **178**, to move the follower **174** off the circular cam **175** and onto the contoured cam **176**.

The rod **164** carries collars **197** and **198**, respectively, fixed thereto above and below the member **167** such that, when the follower **174** is on a high point of the cam **176**, or on the circular cam **175**, the lower collar **198** holds the knife **154** in an inactive position. When the follower **174** is on a low point of the cam **176**, the collar **198** is removed from beneath the member **167** so that the knife **154** is free to move downwardly about the axis of the shaft **158** to position for blocking out certain of the fashioning points.

Of course, the improvements specifically shown and described by which I obtain the above results, can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

I claim:

1. The method of forming a heel portion in a stocking fabric blank, which includes simultaneously narrowing said heel portion in opposite directions at one side of the walewise center line of said stocking fabric blank.

2. The method of forming heel portions in a fabric blank, which includes simultaneously narrowing said heel portions in opposite directions at each side of the walewise center line of the blank.

3. The method of forming a tapered knitted fabric heel portion which comprises successively simultaneously narrowing such as to form narrowing marks along parallel walewise lines.

4. The method of forming a tapered heel portion in a knitted fabric blank portion at one side of the walewise center line of the blank, which comprises successively simultaneously narrowing such as to form narrowing marks along parallel walewise lines at said side.

5. The method of forming a tapered heel portion in a knitted fabric blank portion at each side of the walewise center line of the blank, which comprises successively simultaneously narrowing such as to form narrowing marks along parallel walewise lines at each of said sides.

6. Means including loop forming mechanism for forming a fabric blank portion, said means comprising a plurality of narrowing points for operation at one side of the walewise center line of the blank, means for successively operating said points simultaneously in opposite directions in the same course, covering knife means, and means for actuating said covering knife means to be in active position during one of said point operations and to be in inactive position during another of said point operations.

7. Means including loop forming mechanism for forming a tapered blank portion, said means comprising a plurality of narrowing points, covering knife means, and means for operating said covering knife means and successively operating the points simultaneously such as to form narrowing marks along parallel walewise lines at each side of the walewise center of said tapered blank portion.

8. The method of forming a fabric blank, which includes simultaneously narrowing in opposite directions at one side of the walewise center line of the blank and performing said narrowing in such a way that all the fashion marks will lie in two lines parallel to the wales in the area in which said fashion marks are to be found.

9. The method of forming heel portions in a flat knitted stocking blank which includes simultaneously narrowing the heel portions in oppo-

site directions at one side of the walewise center line of the blank and performing said narrowing in such a way that all the fashion marks will be in two given lines parallel to the wales in the area in which said fashion marks are to be formed.

10. The method of forming tapered heel portions in a flat knitted stocking blank at each side of the walewise center line of the blank which comprises cutting the blank inwardly from the selvage at both sides along a given course in the region of the heel, arranging all the loops on both sides of each cut on spaced groups of alined needles on opposite sides of the center line of the blank, knitting heel portions on the loops of said cuts, and narrowing each of said heel portions simultaneously in opposite directions to form fashion marks all in given parallel lines.

11. The method of forming tapered heel portions in a knitted stocking blank as set forth in claim 10 and in which knitting and narrowing of the heel portions are so carried out that the parallel lines of fashion marks lie at right angles to the wales of the main portion of the stocking blank.

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