July 7, 1942. E. J. BERGER 2,288,673

METHOD OF PRODUCING FASHIONED FLAT STOCKING BLANKS

Original Filed Oct. 12, 1940 3 Sheets-Sheet 1

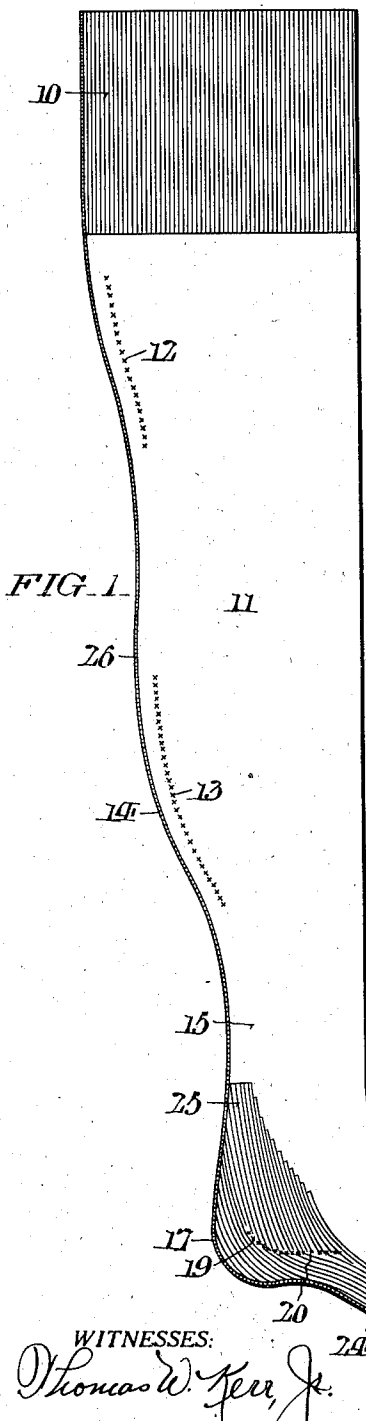


FIG. 1.

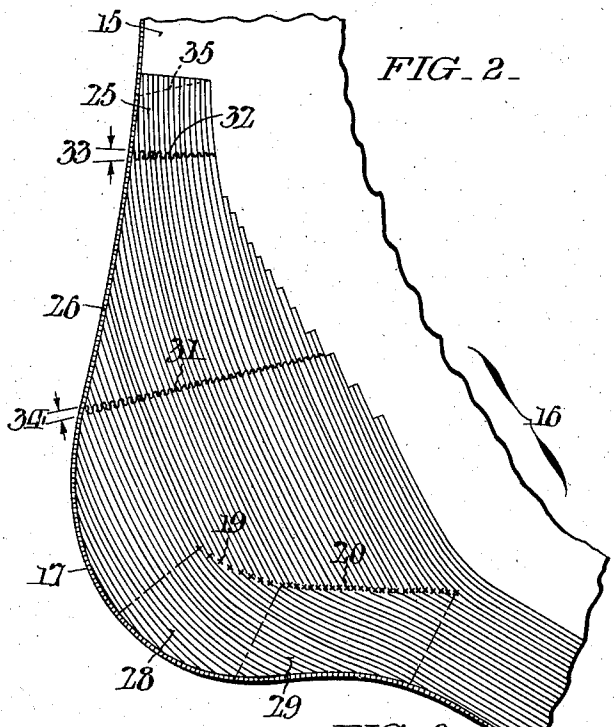


FIG. 2.

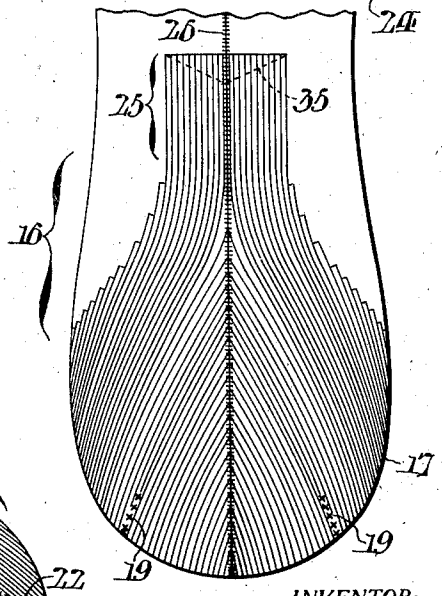


FIG. 3.

WITNESSES:
Thomas W. Kerr, Jr.
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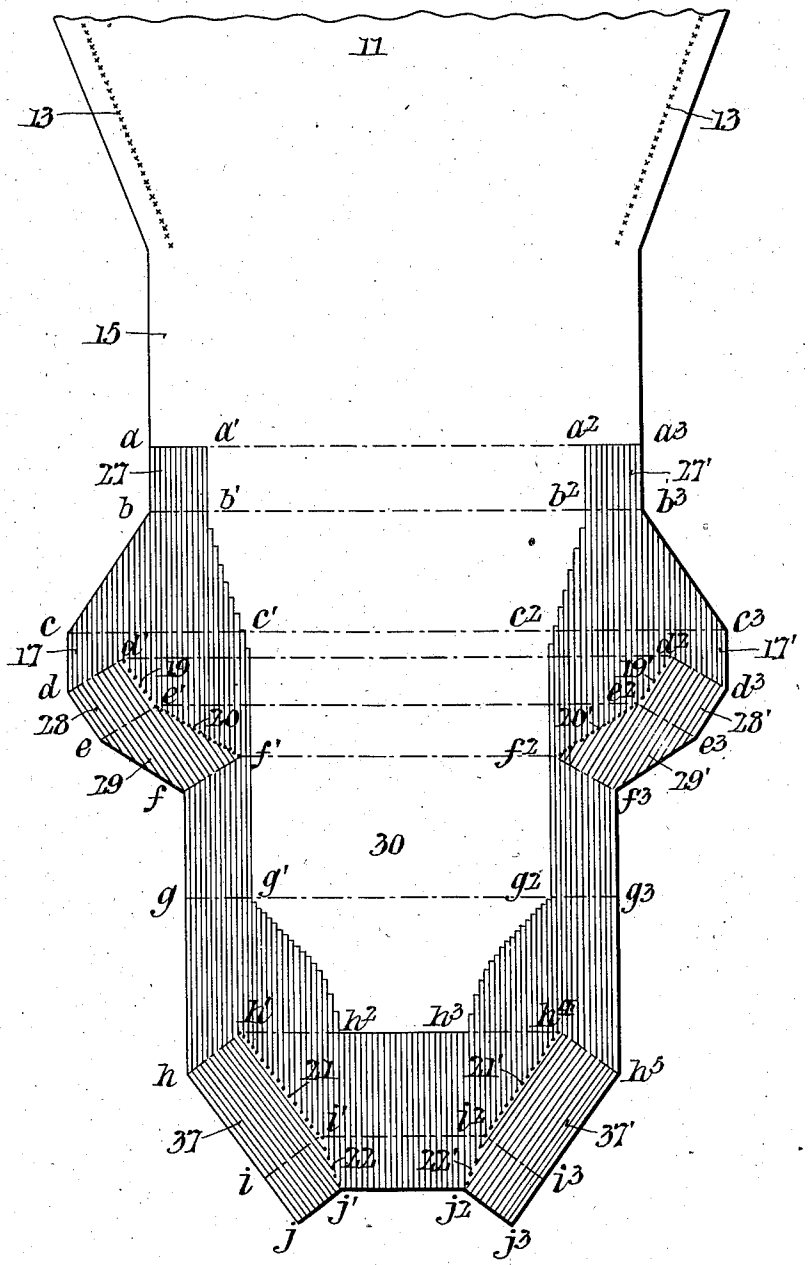
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July 7, 1942. E. J. BERGER 2,288,673

METHOD OF PRODUCING FASHIONED FLAT STOCKING BLANKS

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FIG. 4.



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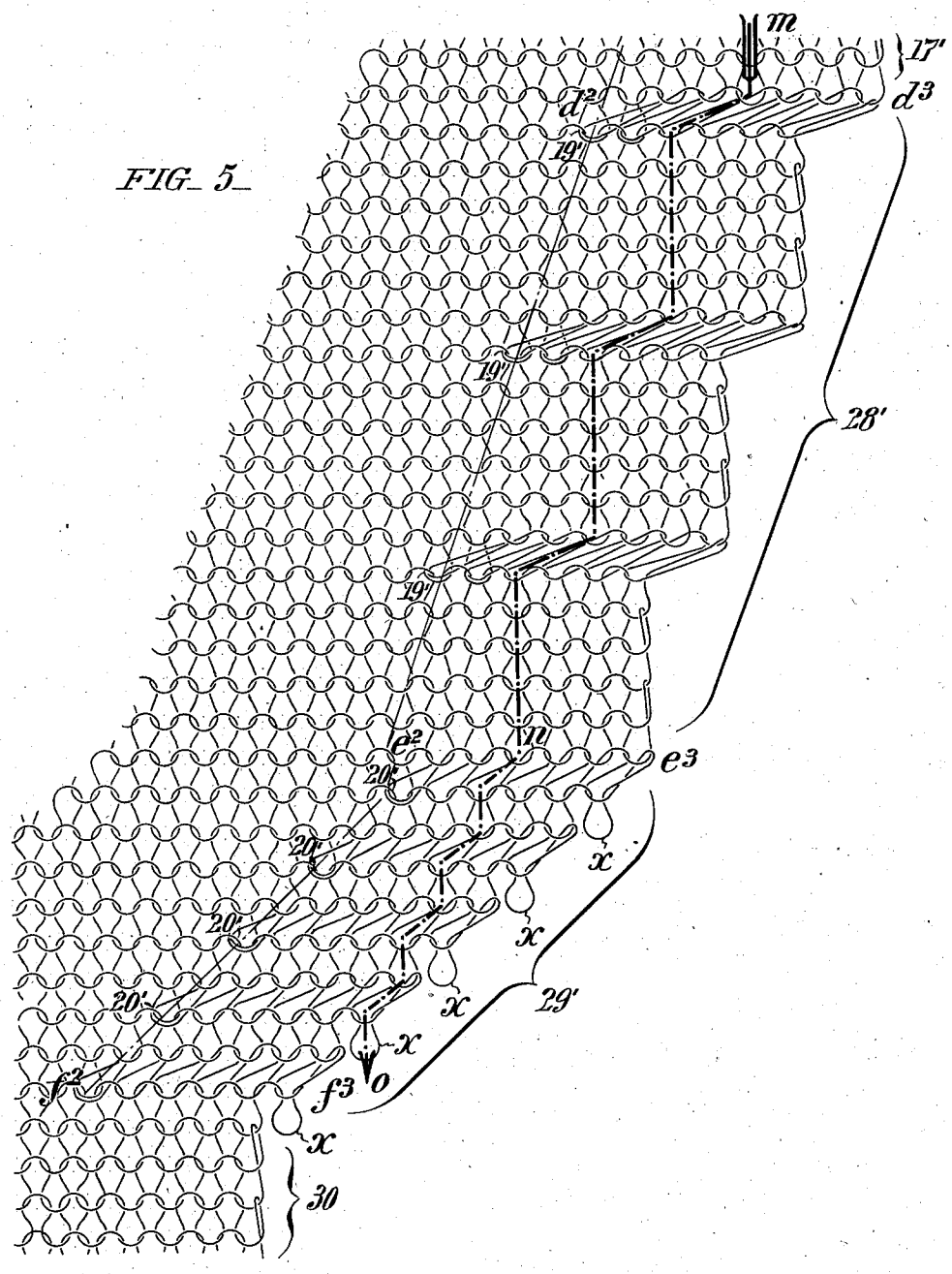
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METHOD OF PRODUCING FASHIONED FLAT STOCKING BLANKS

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FIG. 5.



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2,288,673

UNITED STATES PATENT OFFICE

2,288,673

METHOD OF PRODUCING FASHIONED FLAT STOCKING BLANKS

Emil J. Berger, Hatfield, Pa., assignor to Dexdale Hosiery Mills, Lansdale, Pa., a corporation of Pennsylvania

Original application October 12, 1940, Serial No. 360,883. Divided and this application March 3, 1941, Serial No. 381,497

6 Claims. (Cl. 66—184)

This invention relates to the production of fashioned flat stocking blanks, the present application being a division of an earlier patent application Ser. No. 360,883 filed by me on October 12, 1940.

The object of my present invention is to predetermine, through carrying out of novel steps incident to straightaway and uninterrupted knitting of a flat blank, an improved shape of configuration, which, when the selvages of the blank are finally seamed, will result in a stocking whereof the foot portion not only accurately conforms to the contours of the human foot, but which is pitched at the correct angle to the leg, to the avoidance of any excess fullness either at the front of the instep or at the back of the ankle immediately above the heel.

Other objects and attendant advantages will appear from the following description of the attached drawings, wherein

Fig. 1 shows, in side elevation, a completed stocking formed from a fashioned flat blank produced in accordance with my improved method of knitting.

Fig. 2 is a fragmentary view, in side elevation, of the heel portion of the stocking drawn to a larger scale.

Fig. 3 is a fragmentary view showing the rear elevation of the stocking heel.

Fig. 4 is a diagrammatic showing of the lower portion of the flat blank with the production of which the present invention is concerned; and

Fig. 5 is a fragmentary diagrammatic view showing the texture of the fabric in the lower portion of one of the heel projections of the stocking blank.

For convenience, I will first briefly describe the finished stocking shown in Figs. 1–3, and incidently point out some of the characteristics and advantages which result from my improved method of knitting the basic blank illustrated in Fig. 4 from which the stocking is formed. As shown, the stocking has a welt top 10; a shaped downwardly-tapered leg 11 with usual lines 12 and 13 of narrowing marks respectively immediately below the welt and at the calf 14; an ankle portion 15; and an integrally formed foot 16 with a widened and narrowed heel 17; and a narrowed toe 18. The heel 17 is characterized at opposite sides by connecting segments 19 and 20 of narrowing marks which lie at an obtuse angle to each other which in part define, at the heel bottom, gussets 28 and 29. It is to be particularly noted that the fabric wales extend on a bias in the gussets 29. The toe 18 is likewise characterized at opposite sides by connecting segments 21, 22 of narrowing lines which also lie at an obtuse angle to each other. The heel 17, toe 18 and sole 24 of the stocking are splice reinforced as indicated by the wale line shading, the reinforcement being prolonged up into the ankle, as at 25, to provide what is ordinarily termed as a "French" high heel. It will also be noted that the reinforcement is extended inwardly to a more or less irregular line, with creation of a "cradle foot" effect. The stocking is seamed crosswise of its toe at 23, and also continuously of the rear of its leg 11 and along the bottom of its foot as conventionally indicated at 26.

In accordance with my invention, the blank of Fig. 4 is continuously produced, preferably on a suitable flat knitting machine of the "Cotton" type in the following manner: the leg and ankle portions 11 and 15 of the blank are knitted from a single body yarn down to the line *a—a'—a2—a3*, whereupon two splicing yarn carriers are brought into action and their traverse controlled to produce, with the body yarn carrier (whereof the traverse is maintained uniform for the time being) and square areas 27, 27' which together constitute the high heel reinforcement 25 of the finished stocking, such knitting being continued down to the line *b—b'—b2—b3*. At this stage, the traverse of the main yarn carrier is progressively increased outward at a suitable rate with addition of extra fabric loops at or near the selvage edges of the blank down to the line *c—c'—c2—c3*, while the inward throw of the splicing yarn carriers is simultaneously increased progressively to bring the reinforced areas further toward the center of the blank. In the last described step, lateral transfers may be made adjacent the web edges after the manner disclosed in my U. S. Patent #2,211,315 dated August 13, 1940. Continuing from the line *c—c'—c2—c3*, the traverse of the main yarn carrier is kept uniform, but that of the splicing yarn carriers is still progressively increased inward until the line *d—d'—d2—d3* is reached, whereafter the traverse of the splicing yarn carriers is maintained uniform for a time. The throw of the main yarn carrier is, however, decreased progressively concurrently with inward transfer of constant numbers of edge margin loops each time by two needles, say every six or eight courses as exemplified in Fig. 5, until the line *e—e'—e2—e3* is reached, the transferring occasioning formation of the line seg-

ments *d'*—*e'* and *d2*—*e2* of narrowing marks **19**, **19'** well inward of the opposite edges of the blank and defining the gussets **28**, **28'** in which the fabric wales extend parallel with the edge segments *d*—*e* and *d3*—*e3* as instanced by the portion *m*—*n* of the heavy broken line *m*—*n*—*o* in Fig. 5. After the line *e*—*e'*—*e2*—*e3* is reached, the narrowing is contined for a time but in a different way and at a different rate down to the line *f*—*f'*—*f2*—*f3* to form gussets **29**, **29'** in which the wales extend in the same direction as in the gussets **28**, **28'** with the defining selvages *e*—*f*, *e3*—*f3* and lines of fashioning marks *e'*—*f'*, *e2*—*f2* parallel to each other but angularly disposed relative to said wales. For example, in the gusset **29'** it will be noted from Fig. 5 that the end loop in each plain course is dropped, and that in the succeeding narrowed course, the loop in the wale next to the wale of the dropped loop is transferred inwardly—in the illustrated instance—by the distance of one wale. At the same time a loop is added to the inner end of the series of transferred loops in the line *e2*—*f2* to compensate for the loop dropped in the previous course. As a consequence of such edge loop dropping and compensative inner loop addition, the wales in the gussets **29**, **29'** will continue in the same direction as the wales in the gussets **28**, **28'**, with the selvages *e*—*f*, *e3*—*f3* and the lines *e'*—*f'*, *e2*—*f2* extending parallel respectively to each other but forming at an angle to the wales in said gussets **29**, **29'** as shown. In this connection it is important to note that the fashioning lines *d'*—*f'* and *d2*—*f2* are considerably further inward from the selvage edges than is the case with the corresponding lines in the stocking of Patent #2,154,602. During the last described phase of the knitting the traverse of the main carrier is maintained uniform for a time to determine formation of the medial or instep portion **30** of the stocking foot down to the line *h*—*h'*—*h2*—*h3*—*h4*—*h5*. However, in the interval between the lines *g*—*g'*—*g2*—*g3* and *h*—*h'*—*h2*—*h3*—*h4*—*h5*, the inward movement of the two splicing yarn carriers is progressively increased at a varying rate to extend the reinforced areas still further toward the center of the blank in order to strengthen those portions of the fabric, which, when the stocking is in use, contact the sides of the large toe joints of the wearer. About the time the line *h*—*h'*—*h2*—*h3*—*h4*—*h5* is reached, a single splicing yarn carrier only is used in conjunction with the main yarn carrier for the completion of the blank, to reinforce the toe all the way across. During the knitting from the line *h*—*h'*—*h2*—*h3*—*h4*—*h5* to the line *i*—*i'*—*i2*—*i3*, the traverse of both the main and the splicing yarn carriers is progressively decreased, with attendant transferring of constant equal numbers of edge margin loops inward and with incidental formation of the segmental *h'*—*i'* and *h4*—*i2* of fashioning marks **21**, **21'** well inward of the edge segments *h*, *i* and *h5*, *i3*. Finally, during the knitting of the fabric from the line *i*—*i'*—*i2*—*i3* to the terminal line *j*—*j'*—*j2*—*j3*, progressively decreasing numbers of heel loops are transferred inward, with attendant formation of the segmental *i'*—*j'* and *i2*—*j2* of fashioning marks **22**, **22'** of narrowing in continuation of the lines *h'*—*i'* and *h4*—*i2* to taper the toe tip substantially after the manner disclosed in Patent #2,142,489 granted to me on January 3, 1939. Furthermore, in accordance with my present invention, the fabric loops in the heel cheek portions **17**, **17'** of the blank are graduated, i. e., progressively increased in size in the interval between the lines *b*—*b'*—*b2*—*b3*, and *f*—*f'*—*f2*—*f3*, from the normal at the inner selvage lines of the reinforcement toward the blank edges as conventionally indicated at **31** in Fig. 2. The same procedure is resorted to during the knitting of the high heel reinforcement squares **27**, **27'**, as at **32** in Fig. 2, the increase in the size of the loops being here, however, at a more rapid rate, so that the edge loops at **33** of said squares will be substantially equal in size to those at **34** at the edges of the heel cheeks **17**, **17'**. In this way, the heel boundary edges are increased in length with resultant attainment of the desired fullness and the formation of a more perfectly fitting heel, and with preclusion of objectionable "dove tail" limit lines such as shown in broken lines **35** in Figs. 2 and 3 at the top of the high heel reinforcement. Through interposition of the gussets **28**, **28'** and **29**, **29'**, and through change in the rate of narrowing in the segmental fashioning lines *e'*—*f'*, *e2*—*f2* from that followed in the segmental fashioning lines *d'*—*e'*, *d2*—*e2*, I not only obtain a more correct rounding at the regions of mergence of the heel bottoms with the sole, and disposal of the foot more nearly at right angles to the leg, but determine a relatively sharp bias as between the fabric wales in said region and the connecting wales of the heel cheeks in the regions directly thereabove. The latter feature has the advantage of rendering the heel bottom of the finished stocking elastic in the direction of the length of the foot, while still allowing ample elasticity in the fabric crosswise of the instep to counteract the strain induced when the wearer's foot is thrust into the stocking. Referring again to Fig. 4, it is to be particularly observed that by reason of the fashioning at *d'*—*f'* and *d2*—*f2*, the portions of each fabric course in the areas **28**—**29** and **28'**—**29'** instanced by the lines *e*—*e'* and *e2*—*e3* are in the relation of a flat obtuse angle to the connecting portion of each such course extending across the instep and represented by the line *e'*—*e2*. As a consequence of the last described procedure, objectionable puckering is avoided along the sutures *d'*—*f'* and *d2*—*f2*. It is moreover to be observed from Fig. 4 that, due to the liberal width of the heel bottom gussets **28**—**29** and **28'**—**29'** and of the toe bottom sections at **37**—**37'**, the fashioning lines *d'*—*f'*, *d2*—*f2* and *h'*—*j'*, *h4*—*j2* are caused to predetermine a sole contour which coincides exactly with the sole area of the wearer's foot when the stocking is in use.

The characterizing features which have been explained mutually contribute toward the provision of a stocking which is not only attractive in appearance by reason of being devoid of any heel fashioning sutures or seams above the shoe top when the stocking is in use, and which, as a consequence of being an integral structure throughout, can be much more economically manufactured than the usual types of full fashioned hosiery where the leg is knit on one machine and the foot on another, and where an exacting and time-consuming operation is necessary in transferring the leg blank from the "legger" to the "footer."

It must be particularly emphasized that while the fashionings which I employ are in general similar to some which have been used in the prior art, yet their previous employment has not produced a thoroughly satisfactory stocking be-

cause the means resorted to for the accomplishment of certain desirable ends have heretofore tended to neutralize each other, advantage gained in one place being counterbalanced by a disadvantage in another place or in another respect. By following the manufacturing directions which I have given in this specification a result is secured in which the desired ends are attained without sacrificing any one to another.

Having thus described my invention, I claim:

1. The method of producing an integral flat-knit selvage-edged blank for a fashioned stocking which comprises shaping the leg portion down to the ankle by progressively reducing the width of the fabric; thereafter resorting to widening for a time by progressive addition of end loops along opposite side edges of the blank to form the upper portions of the heel cheeks; then narrowing for a time by occasional transfer of constant numbers of fabric loops inward from the side edges by a plurality of wales to form the bottom portions of the heel cheeks; then narrowing for a time by more frequent transfer of a constant number of fabric loops inward from the blank edges, with incidental dropping of end loops to form gussets for mergence of the heel bottoms with the foot; and then continuing with the knitting to form the foot portion of the blank.

2. The method of producing an integral flat-knit selvage-edged blank for a fashioned stocking which comprises shaping the leg portion down to the ankle by gradually reducing the width of the fabric; thereafter resorting to widening for a time by progressive addition of end loops along opposite side edges of the blank to form the upper portions of the heel cheeks; then maintaining the width of the blank uniform for a time to form the medial portions of the heel cheeks; then narrowing for a time by occasional transfer of a constant number of fabric loops inward from the side edges by a plurality of wales to form the heel cheek bottoms; then narrowing for a time by more frequent transfer of a constant number of fabric loops inward from the blank edges with incidental dropping each time of end loops to form gussets for mergence of the heel cheek bottoms into the foot; and then continuing with the knitting to form the foot portion of the blank.

3. The method of producing an integral flat-knit selvage-edged blank for a fashioned stocking which comprises shaping the leg portion down to the ankle by gradually reducing the width of the fabric; thereafter resorting to widening for a time by progressive addition of end loops along opposite side edges of the blank to form the upper portions of heel cheeks; then maintaining the width of the blank uniform for a time to form the medial portions of the heel cheeks; then narrowing for a time by occasional transfer of a constant number of fabric loops inward from side edge by a plurality of wales to form the bottoms of the heel cheeks; then narrowing for a time by more frequent transfer of a constant number of fabric loops inward from the blank edges with incidental dropping of end loops to form gussets for mergence of the heel cheek bottoms into the foot; then maintaining the width of the blank uniform for a time to produce the instep of the foot; then again resorting to narrowing by transfer of uniform numbers of loops inward from the opposite edges of the blank to shape the advance toe; and finally continuing the narrowing for a time with incidental inward transfer of gradually decreasing numbers of end loops to shape the toe tip.

4. The method of producing a stocking according to claim 1, wherein, during the formation of the ankle portion, the loops of the fabric wales are graduated from the infield area of the blank toward the selvages; and wherein, during the knitting of the heel cheek portions, the individual fabric courses are similarly graduated from a region within the area of the blank toward the selvages at a different rate than in the ankle portion.

5. The method of producing a stocking according to claim 1, wherein, during the formation of the ankle portion, the loops of the individual courses are graduated in size from the normal at the infield area of the blank, outwardly toward the selvages; and wherein, during the formation of the ankle portion, the loops of the individual fabric courses are similarly increased in size from a region within the area of the blank, outwardly toward the selvages but at a different rate than in the ankle portion.

6. The method of producing an integral flat-knit selvage-edged blank for a fashioned stocking, which comprises shaping the leg portion down to the ankle by progressively reducing the width of the fabric; thereafter resorting to widening for a time by progressive addition of end loops along opposite side edges of the blank to form the upper portions of the heel cheeks; then narrowing for a time by addition of constant numbers of fabric loops inward from the side edges by a plurality of wales to form the bottom portions of the heel cheeks; then narrowing for a time by more frequent transfer of a constant number of fabric loops inward from the blank edges but by a lesser distance in each instance than before, with incidental dropping of end loops, to form gussets for mergence of the heel bottoms with the foot and then continuing with the knitting to form the foot portion of the blank.

EMIL J. BERGER.