July 7, 1942. E. J. BERGER 2,288,672

STOCKING

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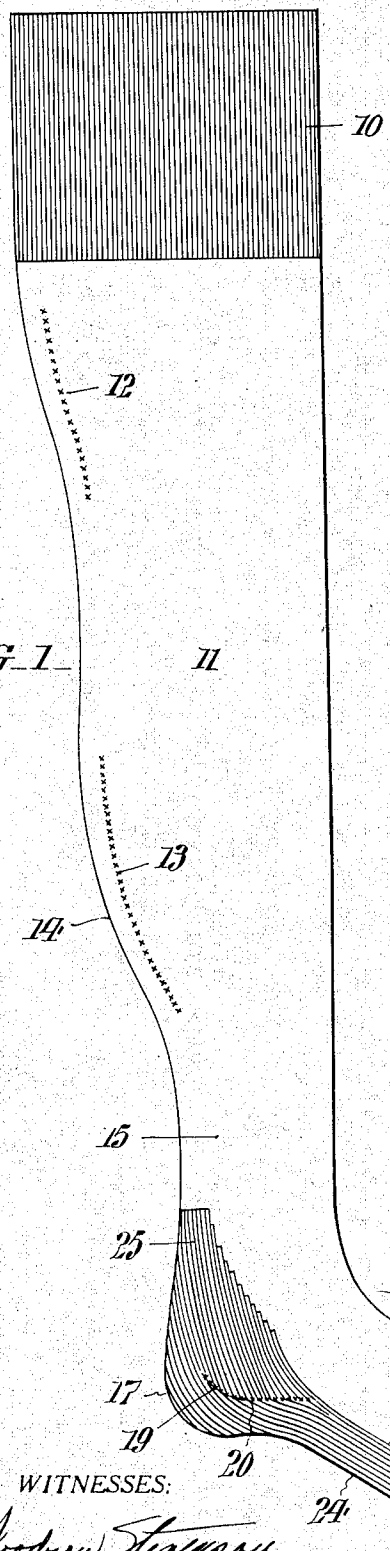


FIG. 1.

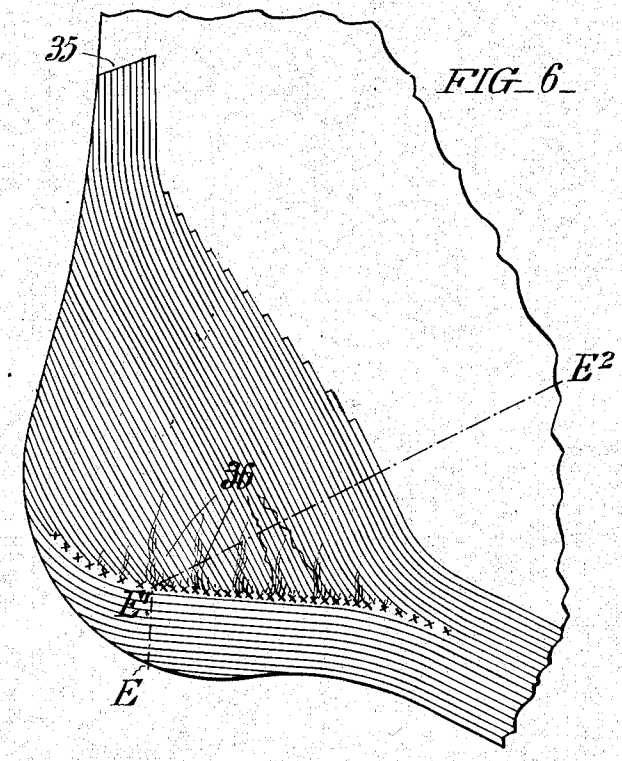


FIG. 6.

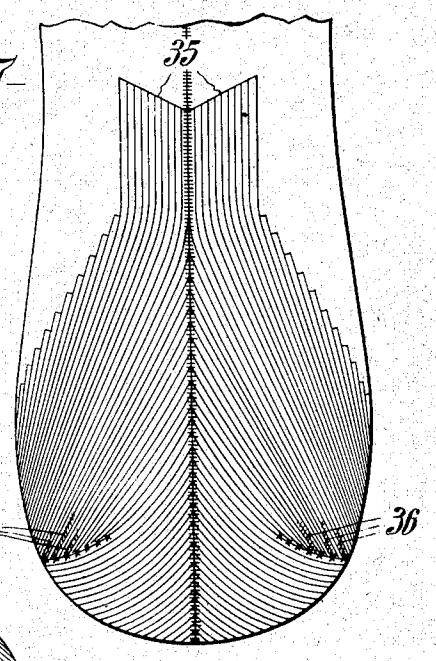


FIG. 7.

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FIG. 4.

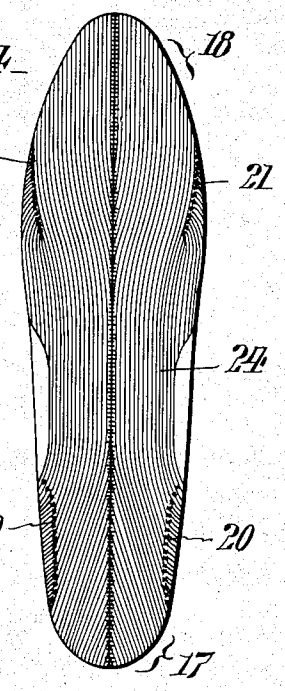
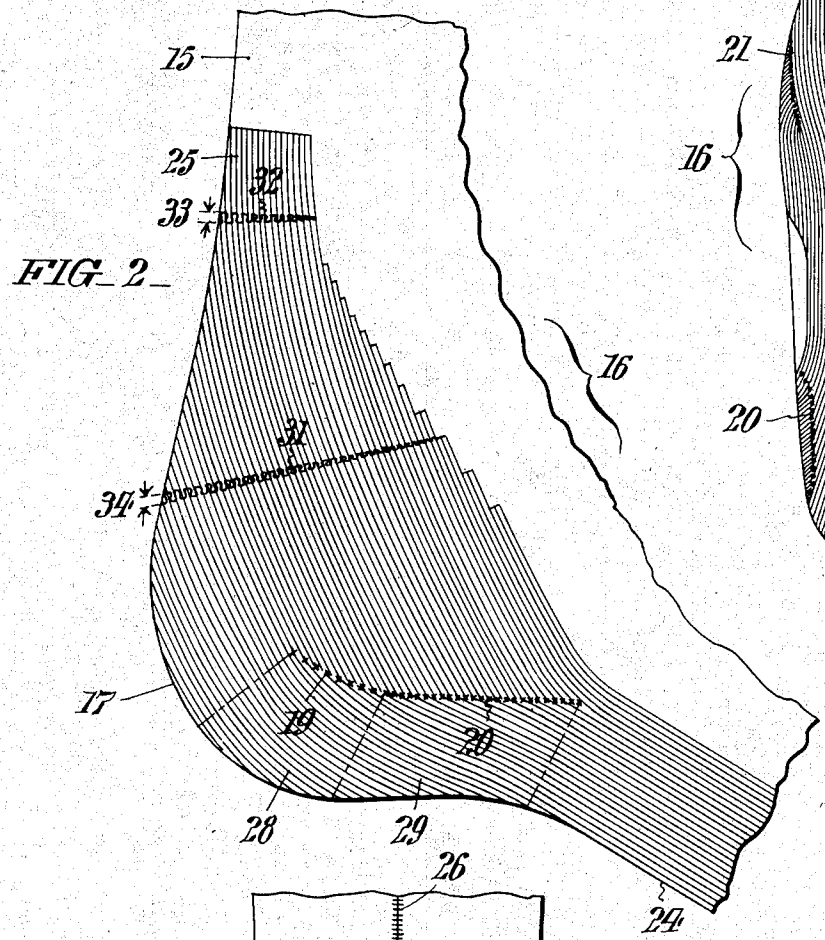


FIG. 2.



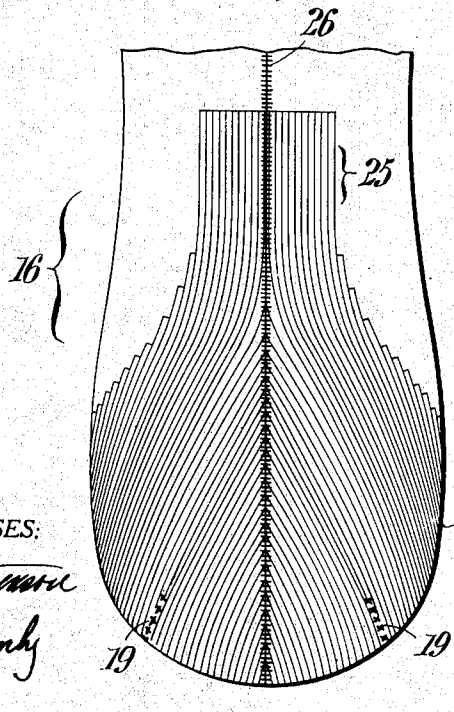


FIG. 3.

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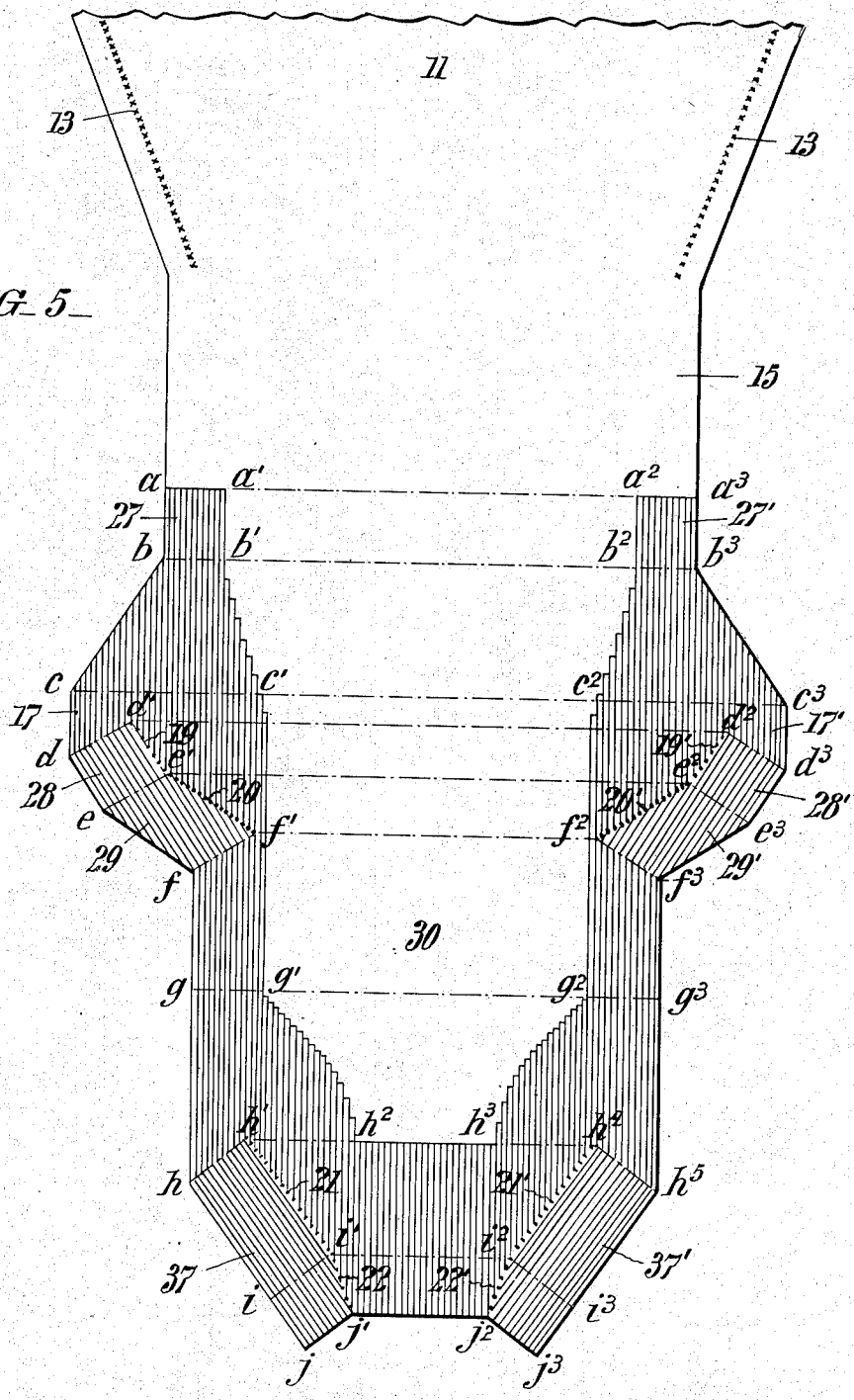
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July 7, 1942. E. J. BERGER 2,288,672

STOCKING

Filed Oct. 12, 1940 3 Sheets-Sheet 3

FIG. 5



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Patented July 7, 1942

2,288,672

UNITED STATES PATENT OFFICE

2,288,672

STOCKING

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

Application October 12, 1940, Serial No. 360,883

13 Claims. (Cl. 66—184)

This invention relates to hosiery and more especially to long fashioned hose formed from continuously knit flat profiled blanks with continuously knit integral legs and feet, such for example as the hosiery featured in U. S. Patent No. 2,154,602, granted to me on April 18, 1939.

My present invention has for its object to improve hosiery both as regards its general appearance and fit and adaptability to usage. I provide hosiery of the kind referred to in which the fabric is of solid texture throughout and devoid of puckering along or adjacent the lines of narrowings at the sides of the heel; in which the foot is disposed more nearly at right angles to the leg and shaped more accurately to the human foot with avoidance of excess fullness at the back of the ankle; and in which the foot is elastic in the direction of its length, particularly adjacent the heel bottom, as well as crosswise of the instep, for capacity to stretch to preclude toe-cramping and to easily yield as the wearer's foot is thrust into the stocking.

By the combination of means hereinafter described, I have produced hosiery which I believe to be more perfectly fitted to the human foot and more perfectly accommodated to human usage than has previously been the case.

One way in which the foregoing and other objects and attendant advantages can be readily attained in practice will appear from the following detailed description of the attached drawings, wherein

Fig. 1 is a view showing my improved stocking in side elevation after boarding and in the condition for marketing.

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 shows the sole bottom of the stocking as it appears on the foot of the wearer.

Fig. 5 is a diagrammatic showing of the lower portion of the flat blank from which the stocking is formed.

Figs. 6 and 7 are views corresponding to Figs. 2 and 3 showing a stocking such as featured in the patent, supra, with defects which are overcome or obviated through my invention.

As illustrated in Fig. 1, my improved stocking has a welt top **10**; a fashioned leg **11** with the customary lines **12** and **13** of narrowing marks respectively immediately below the welt and at the calf **14**; an ankle portion **15**; an integrally-formed foot **16** with shaped heel and toe portions **17** and **18** which are characterized by segmented lines **19—20** and **21—22** of narrowing marks, and a toe closure seam **23**. The stocking is further characterized by having its heel **17**, sole **24** and toe **18** splice reinforced as indicated by the wale-line shading in the drawings, the reinforcement being prolonged, as at **25**, up into the ankle to form what is ordinarily termed a square "French" high heel. The reinforcement is moreover extended inwardly to a more or less irregular line, to produce in the finished stocking a "cradle" foot effect. In accordance with my invention, the stocking is formed from a continuously-knit flat selvage-edged blank by folding the blank on its longitudinal median, and afterwards seaming its matched selvage edges together as at **26** in Fig. 3 after the mode ordinarily practiced in the production of fashioned hosiery.

The stocking blank which is partly shown in Fig. 5 can be commercially produced 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 may be knitted as ordinarily 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 carrier (whereof the traverse is maintained uniform for the time being) the 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 progessively concurrently with inward transfer of constant numbers of edge margin loops each time by two needles, say every six or eight courses, until the line *e—e'—e2—e3* is reached, the transferring

occasioning formation of the segments 19, 19' of narrowing lines 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 *d*3—*e*3. Thereupon, the inward transfer of edge margin loops is continued but in a different way and at a changed rate, that is to say, the transfers are made in alternate courses each time from one wale to the next with incidental dropping of one loop at each edge of the blank down to the line *f*—*f'*—*f*2—*f*3. As a consequence, segmental fashioning lines 20—20' are formed in continuation of the lines 19, 19' at an obtuse angle to the segmental lines 19, 19' defining gussets 29, 29' in which the fabric wales extend on a bias as clearly shown in Figs. 2 and 5. In this connection it is important to note that the fashioning lines 19, 20 and 19', 20' are considerably further inward from the selvage edges than is the case in the stocking of Patent #2,154,602 and in the prior art stocking illustrated in Fig. 6. 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'*—*h*2—*h*3—*h*4—*h*5. However, in the interval between the lines *g*—*g'*—*g*2—*g*3 and *h*—*h'*—*h*2—*h*3—*h*4—*h*5, the inward movement of the two splicing yarn carriers is pregressively 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'*—*h*2—*h*3—*h*4—*h*5 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'*—*h*2—*h*3—*h*4—*h*5 to the line *i*—*i'*—*i*2—*i*3, 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 fashioning lines 21, 21' well inward of the edge segments *h*, *i* and *h*5, *i*3. Finally, during the knitting of the fabric from the line *i*—*i'*—*i*2—*i*3 to the terminal line *j*—*j'*—*j*2—*j*3, progressively decreasing numbers of heel loops are transferred inward, with attendant formation of the segmental fashioning lines 22, 22' of narrowing in continuation of the lines 21, 21' 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 is size in the interval between the lines *b*—*b'*—*b*2—*b*3, and *f*—*f'*—*f*2—*f*3, 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 incrcased 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 at 35 in Figs. 6 and 7 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 20, 20' from that followed in the segmental fashioning lines 19, 19', I not only obtain a more correct rounding at the regions of mergence of the heel bottoms with the sole, 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. This 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. 5, it is to be particularly observed that by reason of the fashioning at 19—20 and 19'—20', the portions of each fabric course in the areas 28—29 and 28'—29' instanced by the lines *e*—*e'* and *e*2—*e*3 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'*—*e*2. As a consequence, objectionable puckering such as indicated at 36 in the prior art stocking illustrated in Fig. 6 where the portions E—E' and E'—E2 of each fabric course at the corresponding regions extend substantially at right angles, are avoided. It is moreover to be observed from Fig. 4 that, due to the liberal width of the heel bottom sections at 28—29 and 28'—29' and of the toe bottom sections at 37—37', the fashioning lines 19—20, 19'—20' and 21—22, 21'—22' are caused to predetermine a foot bottom 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 because 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. A stocking formed from a continuous fashioned flat knitted selvage-edged blank having a narrowed leg and ankle, and a foot with widened and narrowed heel cheeks, the loops comprising the individual fabric courses of the edge margins of the ankle and of the heel cheeks being graduated in size from a region within the area

of the blank toward the selvages at different rates.

2. A stocking according to claim 1, wherein the loops in the individual fabric courses respectively of the edge margins of the ankle and of the heel cheeks progressively increase in size toward the selvages.

3. A stocking formed from a continuous fashioned selvage-edged flat knitted blank having a narrowed leg and ankle, and a foot with widened and narrowed heel cheeks, the loops comprising the individual fabric courses of the edge margins of the ankle and of the heel cheeks being graduated in size from the normal at a region within the area of the blank toward the opposite blank edges at different rates.

4. A stocking according to claim 3, wherein the loops of the individual fabric courses of the edge margins of the angle and of the heel cheeks increase in size toward the blank edges.

5. A stocking according to claim 1, further characterized by having in its foot bottom an integrally knit gusset in which the fabric wales extend on a bias.

6. A stocking according to claim 1, further characterized by having at the juncture between the heel bottom and the foot sole, a gusset in which the fabric wales extend on a bias.

7. A stocking formed from a continuous fashioned flat-knitted selvage-edged blank having a narrowed leg and ankle, a foot with widened and narrowed heel cheek portions, and splice reinforcements extending throughout the heel cheek portions and up into the rear of the ankle region of the stocking, the loops composing the individual fabric courses of the reinforced heel and high heel portions being graduated in size from a region within the area of a blank toward the opposite blank edges at different rates.

8. A stocking according to claim 7, in which the loops composing the individual fabric courses in the reinforced heel and high heel portions progressively increase in size outwardly from a region within the area of the blank toward the opposite edges of the blank.

9. A stocking according to claim 7, further characterized by having in its foot bottom a gusset in which the fabric wales extend on a bias.

10. A stocking according to claim 7, further characterized by having at the juncture of its heel bottom with the instep a gusset in which the fabric wales are on a bias.

11. A stocking formed from a continuously knit fashioned selvaged blank having narrowed areas at opposite sides of its foot portion at the junctures of widened and narrowed heel cheeks and the instep portion, each of which areas lies between a segment of the corresponding selvage and a parallel line of fashioning marks, and in each of which the fabric wales are on a bias to said selvage segment and said line of fashioning marks.

12. A stocking formed from a continuously knit fashioned selvaged blank having narrowed areas at the bottoms of its heel portions in which the wales extend in the direction of the length of the foot, and other narrowed sections respectively adjacent the first mentioned sections through which the heel bottoms are merged with the instep, each of which latter sections lies between a segment of the corresponding selvage and a parallel line of fashioning marks, and in each of which latter sections the wales are on a bias to said selvage segment and said line of fashioning marks.

13. A stocking seamed longitudinally of its rear and formed from a continuously knit fashioned selvage blank with a narrowed leg and ankle, and a foot with widened upper heel portions and with narrowed lower heel portions each of which latter lies between a segment of the corresponding selvage edge of the blank and a parallel line of fashioning marks and in each of which lower heel portions the wales extend on a bias, said foot also having a toe with single line narrowings adjacent opposite edges of the toe tip, the lines of marks resulting from the fashioning of the heel and toe portions defining a sole outline in the finished stocking which corresponds to that of the wearer's foot.

EMIL J. BERGER.