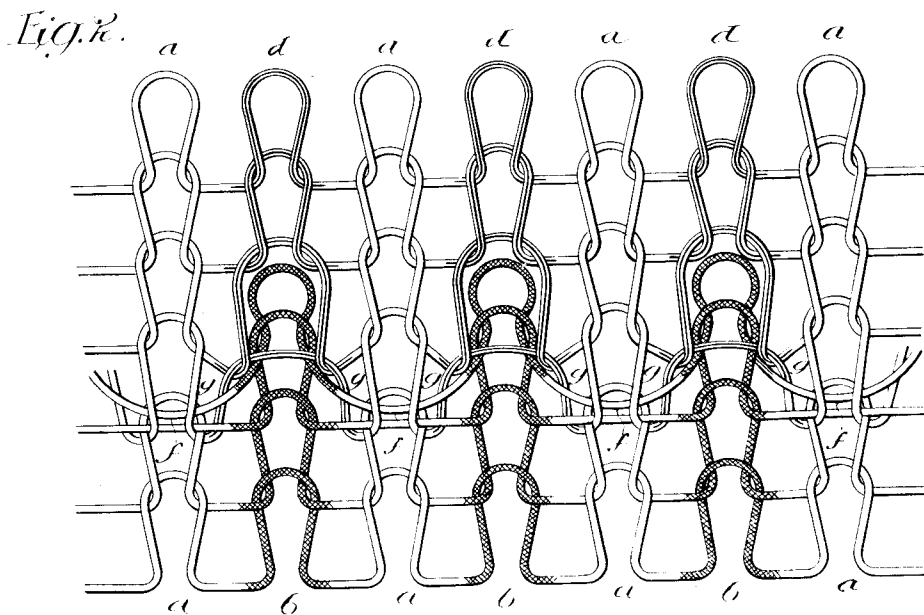
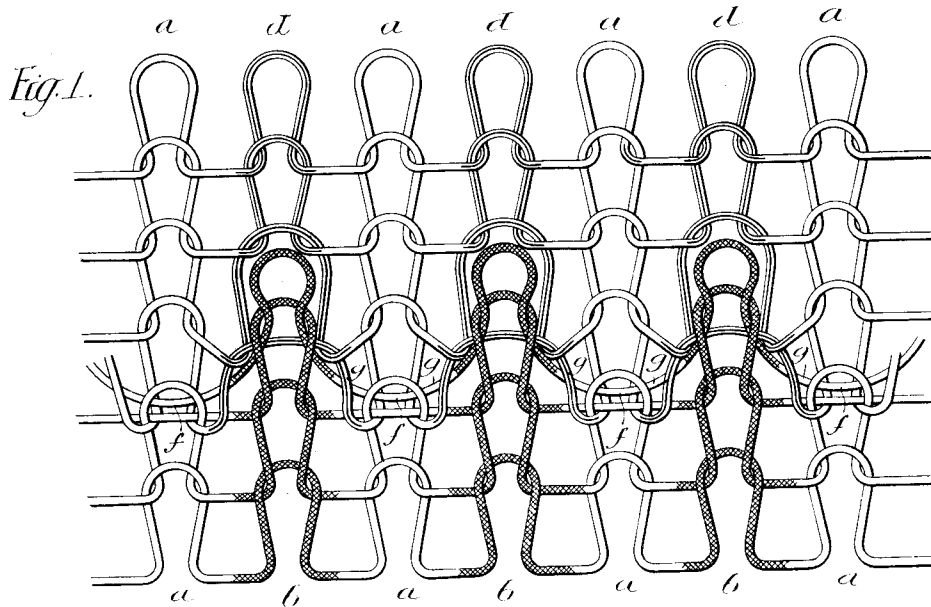


H. SWINGLEHURST.
 KNITTED FABRIC, HOSIERY MADE THEREFROM, AND MODE OF MAKING SAME.
 APPLICATION FILED SEPT. 11, 1905.

Patented Apr. 8, 1913

4 SHEETS—SHEET 1.



Witnesses:
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 Titus V. Jones.

Inventor,
 Harry Swinglehurst.
 by his Attorneys,
 Howson & Power

KNITTED FABRIC, HOSIERY MADE THEREFROM, AND MODE OF MAKING SAME.

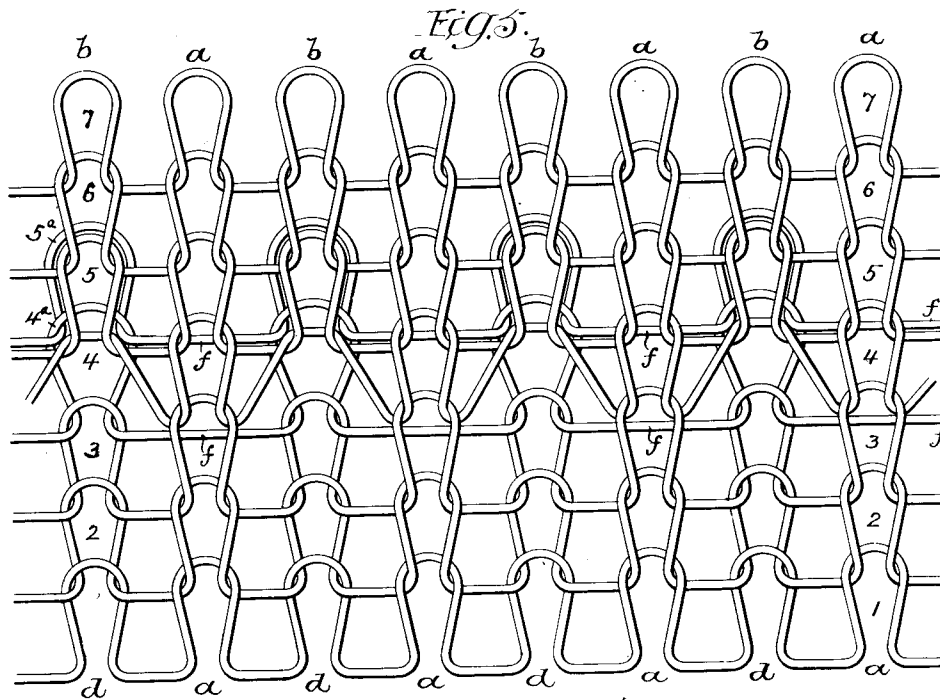
Patented Apr. 8, 1913.

4 SHEETS—SHEET 2.



Invention of Harry Swinglehurst,
by his Attorneys,
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 APPLICATION FILED SEPT. 11, 1905. Patented Apr. 8, 1913.
 1,058,492. 4 SHEETS—SHEET 3.



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KNITTED FABRIC, HOSIERY MADE THEREFROM, AND MODE OF MAKING SAME.

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4 SHEETS—SHEET 4.

1,058,492.

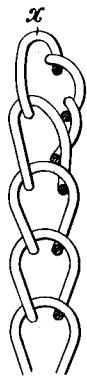
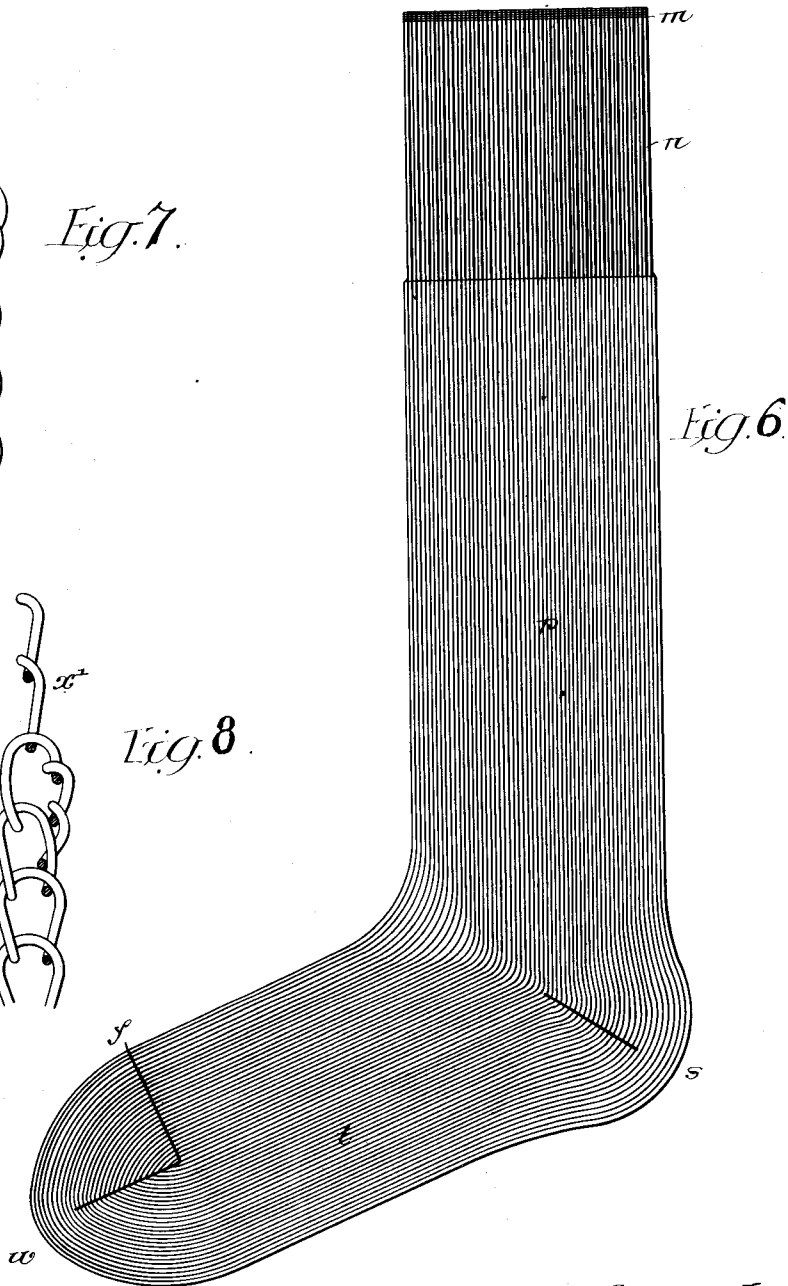


Fig. 7.



Fig. 8.



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UNITED STATES PATENT OFFICE.

HARRY SWINGLEHURST, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO SCOTT & WILLIAMS, INCORPORATED, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

KNITTED FABRIC, HOSIERY MADE THEREFROM, AND MODE OF MAKING SAME.

1,058,492.

Specification of Letters Patent.

Patented Apr. 8, 1913.

Application filed September 11, 1905. Serial No. 277,898.

To all whom it may concern:

Be it known that I, HARRY SWINGLEHURST, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Knitted Fabrics, in Hosiery Made Therefrom, and in the Mode of Making Same, of which the following is a specification.

One object of my invention is to prevent the "running back" of the discontinued rib wales in a knitted fabric in which change is effected from rib web to plain web by casting off the stitches from the ribbing needles and especially in a fabric in which plain web needles are introduced in place of the ribbing needles upon which knitting has been discontinued, a further object being to prevent the formation of eyelet holes at the point where the change is effected, and another object being to provide a sock or stocking which embodies said change of web, is capable of production upon a fast-running circular machine, and, after delivery from said machine requires nothing more than the looping of the mouth of the toe pocket to the end of the foot tube to constitute it a complete sock or stocking ready for boarding, pressing, or other finishing to which such articles of hosiery are ordinarily subjected in preparing them for market.

In the accompanying drawings, Figure 1, represents an exaggerated view of a piece of knitted web embodying my invention; Fig. 2, is a similar view looking at the opposite side of the web; Figs. 3, 4, and 5, are views similar to Fig. 1, but illustrating other ways of carrying out my invention; Fig. 6 is a side view of a sock made in accordance with my invention, and Figs. 7 and 8 are exaggerated sections of welts which may be formed at the top of the same.

Supposing that the knitting machine upon which the web is being produced has cylinder and dial needles and that one-and-one ribbed web is being produced upon the dial needles and upon alternate cylinder needles, the stitches cannot simply be cast from the dial needles prior to the introduction of the hitherto idle cylinder needles in their stead, because the stitches thus cast off have nothing to retain them and will "run back" under pressure, and even under the strain to which the fabric is subjected during the knitting operation, and the use of such a

web for the production of an article of apparel, such as a sock or stocking, is manifestly impracticable. By "running back" is meant the pulling out of the free terminal stitches of the discontinued rib wales, which results in the transformation of the ribbed fabric into plain fabric of very open mesh, the pulled-out stitches simply forming elongated sinker wales between the remaining standing wales, and such running back of the stitches being liable to extend into the ribbed web to an indefinite extent. Besides this objection there is the further objection of the formation of eyelet holes in the web by the initial loops of the plain web wales which supplant the discontinued rib wales.

In order to overcome the objections noted, I provide the machine with three sets of needles, namely standing wale needles in the cylinder, dial needles for producing the rib-wales which are to be discontinued, and cylinder needles for producing the plain web wales which are to replace said discontinued rib wales, and in accordance with one method of carrying out my invention, I discontinue the formation of stitches upon the standing wale needles of the cylinder while still permitting said needles to retain the stitches already upon them, and to receive the yarn in its passage from one dial needle to another, and continue the formation of stitches upon the dial needles for one or more, and preferably for a plurality of courses. When I have accomplished the formation of the desired number of courses in this way upon the dial needles only, I cast the stitches from said dial needles and retire the same, but immediately bring into action the previously inactive cylinder needles which are now to supplant said retired dial needles, and at the same time restore to action the lately retired standing wale needles of the cylinder, the result being that in the formation of the next course the knitting yarn will be looped on said freshly introduced cylinder needles and stitches will be drawn by the standing wale needles through the stitches and loops of yarn held thereby and which will now be jointly cast therefrom, and, in the following course, stitches will be drawn by all of the cylinder needles. As a consequence of this method of production the strain upon the fabric is borne by the standing wales which constitute part of

both the plain web and of the ribbed web, the discontinued wales of the ribbed web being relieved from such strain, and the running back of said rib wales being thereby prevented, and, in addition to this, the yarn forming the first course of the plain web is wrapped around the sinker wales extending from one discontinued rib wale to the next, so that it is difficult to ravel back the ribbed fabric even by designedly subjecting to strain individual stitches at the ends of the discontinued wales.

In Figs. 1 and 2, of the accompanying drawing, *a* represent standing wales of ribbed fabric which are continued into the plain fabric and correspondingly lettered therein, *b* represent the discontinued wales of the ribbed fabric, *d* the wales of plain fabric which take the place of the same, *f* the sinker wales extending from one discontinued rib wale to the next, and *g* the points at which the yarn constituting the first course of plain web is wrapped around said sinker wales.

In the fabric shown in Figs. 1 and 2, the knitting operation is arrested simultaneously upon all of the standing wale needles of the cylinder and the terminal stitches of all of the discontinued rib wales are in the same course, but this is not a necessary feature of my invention, for instance, in the fabric shown in Fig. 3, knitting is temporarily discontinued after the formation of course 2 upon the needles which produce standing wales *a'* and *a''*, and after the formation of course 5 on the needles which produce standing wales *a'* and *a''*, the terminal stitches of the discontinued rib wales *d'* and *d''* being in course 4 and the terminal stitches of discontinued rib wales *d'* and *d''* being in course 7. In the fabric shown in Fig. 4, knitting is discontinued upon the standing wale needles after the production of course 3 in wales *a'* and *a''*, and after the production of course 4 in wales *a'* and *a''*, but is discontinued for but one course on each needle, the yarn which forms the stitches in course 4 in the rib wales *d'* and *d''* failing to form stitches in the standing wales *a'* and *a''*, the yarn which forms the terminal stitches in course 5 in the said rib wales *d'* and *d''* also forming stitches in the standing wales *a'* and *a''*, and the yarn which forms the terminal stitches in course 5 in the rib wales *d'*, *d''* and *d'''* failing to form stitches in the standing wales *a'* and *a''*. In all of the fabrics thus far illustrated there are a plurality of yarns in some of the courses of the standing wales corresponding to courses in the terminal portions of the discontinued rib wales, because of the arrest of the knitting operation for one or more courses upon the standing wale needles while the knitting yarn is still being fed thereto, as well as to the ribbing needles, but the object of my invention may

be attained without recourse to this method of knitting or to the production of a fabric of this character. In Fig. 5, for instance, I have shown a fabric in the production of which all of the standing wale needles have been temporarily put out of action but permitted to retain their stitches, while two courses of stitches 4^a and 5^a have been knitted upon the dial needles, without feeding the knitting yarn to the standing wale needles, the stitches being then cast from the dial needles, the latter retired, and the previously inactive cylinder needles brought into action, together with the temporarily retired standing wale needles for the production of plain web. In a fabric of this character, the sinker wales of the discontinued rib wales are not engaged by the yarn which forms the first course of the plain web, as in the fabrics shown in Figs. 1 to 4. In this fabric, however, as in all of the preceding fabrics, the number of courses of stitches in the terminal portions of the rib wales and in the initial portions of the plain wales which supplant the same, together exceed the number of courses of stitches in the corresponding portions of the standing wales. In all of the fabrics shown there is an elongation of the discontinued rib wales which carries the same beyond the last stitches in the standing wales of the ribbed portion of the fabric.

Although I have shown my invention as applied to a one-and-one rib web that is to say, a web in which single cylinder needle wales alternate with single dial needle wales, it can be applied to other forms of ribbed web, and it is not necessarily limited to a fabric having the same number of wales in the plain web as in the ribbed web, for instance the rib wales might be discontinued without being replaced by wales in the plain web, or a pair of rib wales located side by side might, when discontinued be replaced by but a single plain-web-wale, and although I have described the machine for producing my improved fabric, as having plain-web needles in the cylinder and ribbing needles in the dial, the reverse of this may be true without any change in the fabric.

It should be understood that in the various views of the drawing, some of the stitches have as compared with their relation in the actual fabric, been distorted or displaced, for the clearer illustration of the manner in which they are interknitted.

One of the principal uses for my invention is in the manufacture of hosiery, where change is to be effected from a ribbed top web to a plain leg web, or from a ribbed leg web to a plain foot web. In knitting such hosiery, I use a machine having apertures of such character that heel and toe pockets as well as plain tubular web can be produced upon the cylinder needles, and

I start the knitting at the top of the leg, by first forming a "welt". In order to effect this result, the yarn is fed to the standing wale needles of the cylinder and to the dial needles for one course and the dial needles are then retired but caused to retain the loops upon them. Two or more courses of stitches are then formed upon the cylinder needles only, and the dial needles are then rendered operative and the production of ribbed web for the top or leg of the sock or stocking is proceeded with. When the desired length of ribbed web for the top or leg of the sock or stocking has been completed, the change from ribbed web to plain web is effected in the manner before set forth, and the production of plain tubular web with seamless heel and toe pockets thereon proceeds. When the toe pocket has been completed, a few courses of plain circular web are knitted to form a band to be afterward cut to separate the blanks, and when this has been done, the dial needles are again brought into action to receive the setting-up course for another welt, and so on.

In Fig. 6, *m* represents the welt at the top of the sock; *n* the ribbed top; *p* the seamless leg; *s* the seamless heel; *t* the seamless foot and *w* the seamless toe-pocket looped to the front end of the foot web, so as to form a substantially seamless union at the line *y*.

Fig. 7 shows a welt started with a setting-up course *x*, and Fig. 8 shows a welt having severed courses of plain web *x'* adjacent to said setting-up course *x*. A welt formed in either of these ways will not ravel back and hence, requires no further finishing to complete the top of the sock or stocking.

While my improved fabric can, and in most cases will be knitted with a single continuous yarn, I have, in Figs. 1 and 2, of the drawing, shaded this yarn, so as to indicate more clearly the three different wales, the unshaded stitches being those of the standing wales, the cross hatched stitches those of the discontinued rib wales and the lined stitches those of the plain web wales which supplant said discontinued rib wales.

By the words "terminal portion" as applied herein to a discontinued rib wale, I mean the actual terminal stitch and a stitch or stitches preceding the same, in each wale, and thus distinguish it from the terminal stitch alone. Besides serving to prevent running back of the discontinued rib wales, the extra courses of stitches constituting the terminal portions of said wales serve to close the eyelet holes, which would otherwise result from the drawing of the new initial loop in the plain web wale which supplants said discontinued rib wale.

I do not here claim means for preventing the running back of discontinued wales of a knitted fabric, my present invention being restricted to means for preventing the run-

ning back of discontinued rib wales in a combined plain and ribbed web, but while I have shown a number of different ways of accomplishing this result, I wish it to be understood that my main claims are not to be construed as limited thereto, but are intended to cover broadly means for attaining the desired end.

Having thus described my invention, I claim and desire to secure by Letters Patent:—

1. A machine knit fabric, partly ribbed and partly plain, having loose-ended and discontinued rib wales, and standing wales contained in both the ribbed and plain webs, and having a plurality of yarns in courses corresponding to courses in the terminal portions of the discontinued rib wales.

2. A machine knit fabric partly ribbed and partly plain, having standing wales contained in both the ribbed and plain webs, loose-ended and discontinued wales of ribbed web replaced by wales of plain web, and means for preventing running back of the loose ends of the discontinued rib wales.

3. A machine knit fabric partly ribbed and partly plain, having standing wales contained in both the ribbed and plain webs, and discontinued wales of ribbed web replaced by wales of plain web, the number of courses of stitches in the terminal portions of the rib wales and in the initial portions of the plain wales which supplant the same being together in excess of the number of courses of stitches in the corresponding portions of the standing wales.

4. A machine knit fabric, partly ribbed and partly plain, having discontinued rib wales replaced by plain web wales and standing wales contained in both the ribbed and plain webs and having a plurality of yarns in courses corresponding to courses in the terminal portions of the discontinued rib wales.

5. A machine knit fabric, partly ribbed and partly plain, having standing wales contained in both the ribbed and plain webs, and discontinued wales of the ribbed web replaced by wales of the plain web and connected by sinker wales.

6. A machine knit fabric, partly ribbed and partly plain, having standing wales contained in both the ribbed and plain webs, and discontinued wales of ribbed web replaced by wales of plain web, a plurality of courses of the terminal portions of the discontinued rib wales being connected by sinker wales.

7. A machine knit fabric, partly ribbed and partly plain, having standing wales contained in both the ribbed web and the plain web, and discontinued rib wales having sinker wales engaged by the yarn in the first course of plain web.

8. A machine knit fabric, partly plain and

- partly ribbed, having standing wales contained in both the ribbed web and the plain web, and discontinued rib wales connected by sinker wales which are engaged by the yarn in the first course of plain web.
- 5 9. A machine knit fabric, partly ribbed and partly plain, having standing wales contained in both the ribbed web and the plain web, and discontinued rib wales replaced by wales of plain web, said discontinued wales having sinker wales which are engaged by the yarn in the first course of plain web.
- 10 10. A machine knit fabric, partly ribbed and partly plain, having standing wales contained in both the ribbed web and in the plain web, and discontinued rib wales replaced by wales of plain web, said discontinued wales being connected by sinker wales which are engaged by the yarn in the first course of plain web.
- 15 11. A machine knit fabric, partly ribbed and partly plain, having standing wales contained in both the ribbed web and the plain web, and discontinued rib wales whose terminal portions have a plurality of sinker wales engaged by the yarn of the first course of plain web.
- 20 12. A machine knit fabric, partly ribbed and partly plain, having standing wales contained in both the ribbed web and the plain web, and discontinued rib wales whose terminal portions contain a plurality of courses of stitches connected by sinker wales which are engaged by the yarn of the first course of plain web.
- 30 13. A machine knit fabric, partly ribbed and partly plain, having standing wales contained both in the ribbed web and in the plain web, and discontinued rib wales replaced by wales of plain fabric, the terminal portions of said rib wales having a plurality of courses of stitches with sinker wales which are engaged by the yarn of the first course of plain web.
- 40 14. A machine knit fabric, partly ribbed and partly plain, having standing wales contained both in the ribbed web and in the plain web, and discontinued rib wales replaced by wales of plain fabric, the terminal portions of said rib wales having a plurality of courses of stitches connected by sinker wales which are engaged by the yarn of the first course of plain web.
- 50 15. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained in both the ribbed and plain webs, loose-ended and discontinued rib wales, and means for preventing the running back of the loose ends of the latter.
- 60 16. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, loose-ended and discontinued rib wales, and standing wales contained in both the ribbed and plain webs, and having a plurality of yarns in courses corresponding to courses in the terminal portions of the loose ended and discontinued rib wales.
- 70 17. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained in both the ribbed and plain webs, and discontinued rib wales connected by sinker wales.
- 80 18. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained in both the ribbed and plain webs, and discontinued rib wales having in their terminal portions a plurality of courses of stitches connected by sinker wales.
- 90 19. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained in both the ribbed and plain webs, loose-ended and discontinued wales of ribbed web replaced by wales of plain web, and means for preventing running back of the loose-ended and discontinued rib wales.
- 100 20. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained in both the ribbed and plain webs, and discontinued wales of ribbed web replaced by wales of plain web, the number of courses of stitches in the terminal portions of the rib wales and in the initial portions of the plain wales which supplant the same being together in excess of the number of courses of stitches in the corresponding portions of the standing wales.
- 110 21. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, discontinued rib wales replaced by plain web wales, and standing wales contained in both the ribbed and plain webs, and having a plurality of yarns in courses corresponding to courses in the terminal portions of the discontinued rib wales.
- 120 22. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, loose-ended and discontinued rib wales, and standing wales contained in both the ribbed and plain webs, and having a plurality of yarns in courses corresponding to courses in the terminal portions of the discontinued rib wales.
- 130

and toe pockets thereon, standing wales contained in both the ribbed and plain webs, and discontinued wales of the ribbed web replaced by wales of the plain web and connected by sinker wales.

23. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained in both the ribbed and plain webs, and discontinued wales of ribbed web replaced by wales of plain web, a plurality of courses of the terminal portions of the discontinued rib wales being connected by sinker wales.

24. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained in both the ribbed web and the plain web, and discontinued rib wales having sinker wales engaged by the yarn in the first course of plain web.

25. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained in both the ribbed web and the plain web, and discontinued rib wales connected by sinker wales which are engaged by the yarn in the first course of plain web.

26. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained in both the ribbed web and the plain web, and discontinued rib wales replaced by wales of plain web, said discontinued wales having sinker wales which are engaged by the yarn in the first course of plain web.

27. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained in both the ribbed web and in the plain web, and discontinued rib wales replaced by wales of plain web, said discontinued wales being connected by sinker wales which are engaged by the yarn in the first course of plain web.

28. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained in both the ribbed web and the plain web, and discontinued rib wales whose terminal portions have a plurality of sinker wales engaged by the yarn of the first course of plain web.

29. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained in both the ribbed web and the plain web, and discontinued rib wales whose terminal portions contain a plurality of courses of stitches connected by sinker wales which are engaged by the yarn of the first course of plain web.

30. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained both in the ribbed web and in the plain web, and discontinued rib wales replaced by wales of plain fabric, the terminal portions of said rib wales having a plurality of courses of stitches with sinker wales which are engaged by the yarn of the first course of plain web.

31. A machine knit sock or stocking having a non-raveling welt at the top, a seamless ribbed-web upper portion, a seamless plain-web lower portion, with seamless heel and toe pockets thereon, standing wales contained both in the ribbed web and in the plain web, and discontinued rib wales replaced by wales of plain fabric, the terminal portions of said rib wales having a plurality of courses of stitches connected by sinker wales which are engaged by the yarn of the first course of plain web.

32. The mode herein described of producing a knitted fabric partly ribbed and partly plain, said mode consisting in first knitting a ribbed web containing face wales and rib wales, then discontinuing the formation of the rib wales but elongating said wales before such discontinuance of the same, releasing said discontinued rib wales and continuing the formation of the face wales to produce plain web.

33. The mode herein described of producing a knitted fabric partly ribbed and partly plain, said mode consisting in first knitting a ribbed web containing face wales and rib wales, then discontinuing the formation of the rib wales but elongating the said wales before such discontinuance of the same, and then proceeding with the formation of plain wales alternating with the standing wales of the web, and forming continuations of said discontinued rib wales.

34. The mode herein described of producing a knitted fabric partly ribbed and partly plain, said mode consisting in first knitting a ribbed web containing face wales and rib wales, temporarily arresting for one or more courses the formation of wales on one face of said web but continuing the formation of the rib wales, and then discontinuing the formation of said rib wales

and proceeding with the formation of the wales of the other face.

35. The mode herein described of producing a knitted fabric partly ribbed and partly plain, said mode consisting in first knitting a ribbed web containing face wales and rib wales, temporarily arresting for one or more courses the formation of wales of one face of said web but continuing the formation of the rib wales, and then discontinuing the formation of said rib wales and proceeding with the formation of wales of the other face and with intervening wales of the same face which serve as continuations of the discontinued rib wales.

36. The mode herein described of producing a knitted fabric partly ribbed and partly plain, said mode consisting in first knitting a ribbed web containing face wales and rib wales, temporarily arresting for one or more courses the formation of wales of one face of said web but continuing the formation of the rib wales, then discontinuing the formation of said rib wales and proceeding with the formation of the wales of the other face, and engaging the stitches of the first of such continuing courses with the sinker wales intervening between the discontinued rib wales.

37. The mode herein described of producing a knitted fabric partly ribbed and partly plain, said mode consisting in first knitting a ribbed web containing face wales and rib wales, temporarily arresting for one or more courses the formation of wales of one face of said web but continuing the

formation of the rib wales, then discontinuing the formation of said rib wales and proceeding with the formation of the wales of the other face, producing intermediate wales of the same face which serve as continuations of the discontinued rib wales, and engaging the stitches of the first of the continuing courses of the temporarily arrested face wales with the sinker wale courses extending from adjoining discontinued rib wales.

38. The mode herein described of producing a knitted fabric partly ribbed and partly plain, said mode consisting in first knitting a ribbed web containing face wales and rib wales, temporarily arresting for one or more courses the formation of wales of one face of said web but continuing the formation of said rib wales, then discontinuing the formation of said rib wales and proceeding with the formation of the wales of the other face, producing intermediate wales of the same face which serve as continuations of the discontinued rib wales, and engaging the stitches of the first of the continuing courses of the temporarily arrested face wales with the sinker wale courses intervening between the discontinued rib wales.

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

HARRY SWINGLEHURST.

Witnesses:

WM. E. SHUPE,
JOS. H. KLEIN.