May 27, 1941. A. F. VERBEEK 2,243,612

MANUFACTURE OF FULL-FASHIONED HOSIERY

Filed Dec. 30, 1938 2 Sheets-Sheet 1

Fig. 1

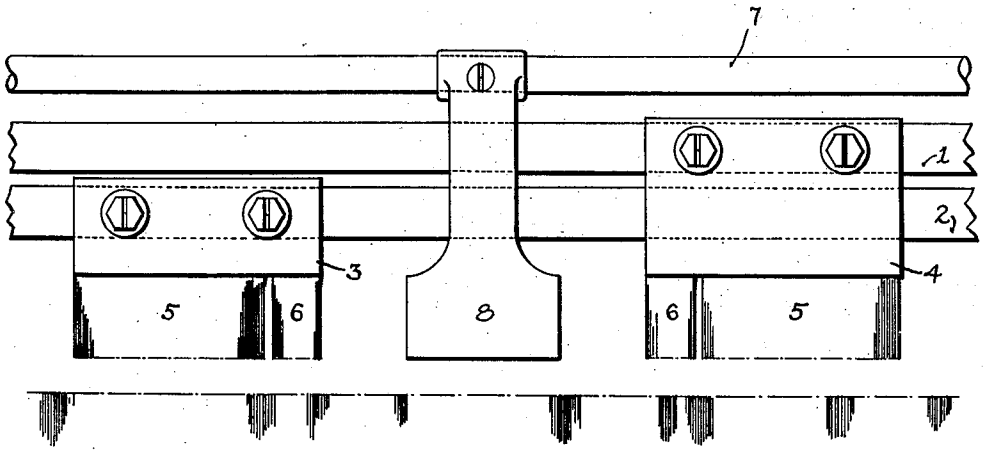
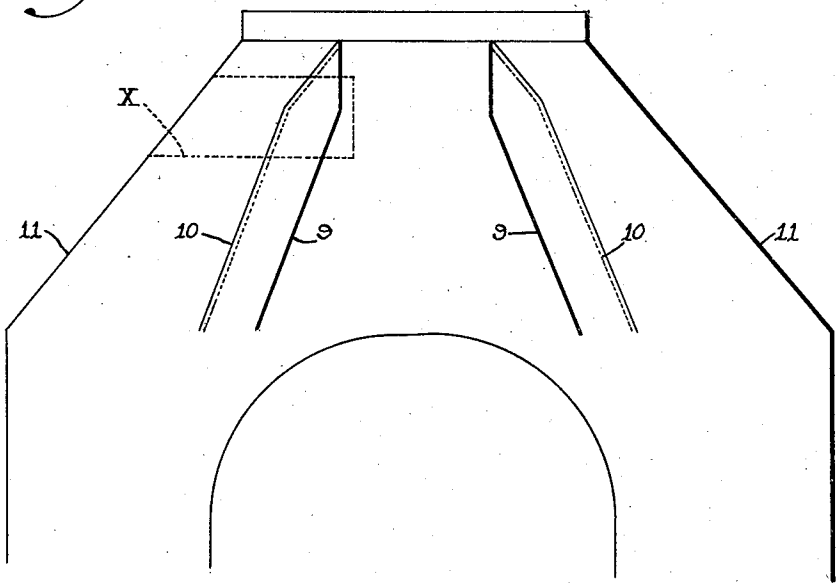


Fig. 2



Witness
H. E. Van Dine

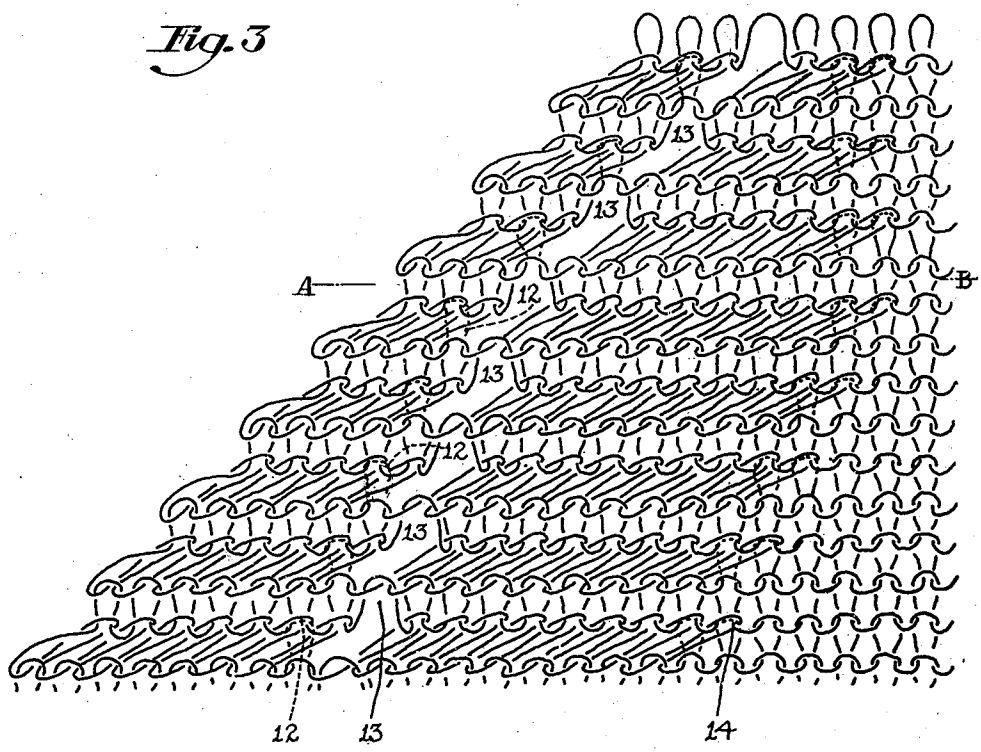
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MANUFACTURE OF FULL-FASHIONED HOSIERY

Filed Dec. 30, 1938 2 Sheets-Sheet 2

Fig. 3



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UNITED STATES PATENT OFFICE

2,243,612

MANUFACTURE OF FULL-FASHIONED HOSIERY

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In Germany December 30, 1937

9 Claims. (Cl. 66—89)

The present invention relates to improvements in the manufacture of full-fashioned hosiery, and more particularly to a fashioned stocking blank having a French foot with the characteristic French gores, and a method of manufacture of the improved stocking on a flat full-fashioned type knitting machine.

Full-fashioned hosiery of the general type referred to, having the so-called French foot, has the toe portion thereof formed with French gores, the gore lines of which run in a generally parallel direction slantwise toward the center line of the stocking, the selvage edges of the toe converging still more sharply toward the tip portion thereof. It is the usual practice in the manufacture of stockings of this type, to introduce a cover knife which operates during the knitting of the last courses of the toe to prevent further narrowing at the inner edge of the French gore, which then runs parallel to the center line of the stocking, and converges with the outer edge of the gore to a point.

The mechanism ordinarily employed for forming the French toe on full-fashioned knitting machines, and more particularly on so-called footers, comprises a pair of relatively narrow French gore narrowing fingers, and independently movable wide narrowing fingers spaced outside of the French gore narrowing fingers toward the ends of the knitting section. In order to produce the characteristic French gore and the more sharply converging selvage edge, it is the usual practice with each narrowing operation in forming the toe, to space the French gore and wide narrowing fingers apart one needle index. The outer narrowing finger is then transferred inwardly two needle indexes, while the inner finger is transferred inwardly only one needle index. Prior to the next narrowing operation, the wide narrowing finger is again moved outwardly one needle index, and the operation is again repeated. In full-fashioned machines which have been adapted for the knitting of a complete stocking blank including the fashioned leg portion and the French foot, it has been found that the use of four individually activated narrowing fingers for each knitting section, results in an extreme complication of the machine.

In carrying out the present invention, it is proposed to rigidly mount each of the French gore narrowing fingers and the wide narrowing fingers associated therewith, to move as a single unit, and to manipulate these combined narrowing units in such a manner as to produce the characteristic form of the French toe without the necessity of imparting relative positioning movements to the French gore and wide narrowing fingers during the knitting of the toe. It will be understood that the French gore narrowing fingers above referred to, are sufficiently wide, so that these French gore narrowing fingers may be employed to effect the usual leg narrowings, and also the narrowings in the heel and upper portions of the foot, the wide narrowing fingers being brought into operation only for the separate operation of knitting the French toe. It will be understood that the present invention contemplates the provision of the usual mechanism for controlling each of the narrowing units in the usual manner for the performance of the leg and foot narrowings above referred to. It is further contemplated that the narrowing units prior to the knitting of the French toe, will be shifted inwardly into the proper position for the French toe narrowings, and that the units will then be actuated by mechanism which may be the usual mechanism for controlling the wide narrowing fingers only, for the knitting of applicant's novel and improved French toe.

More specifically, in accordance with the present invention, it is proposed for the knitting of the French toe, to cause each of the combined units to engage with and transfer the engaged loops inwardly two needles, and then prior to the next narrowing operation to shift the entire unit outwardly one needle index. The method of operation above described, results in the formation of a French toe having the characteristic French gore angled slantwise toward the center line of the stocking, and with the more sharply converging selvage edges, but also results in a different loop structure, particularly in the formation of the outer edge of the French gore.

Further in accordance with the present invention, there is preferably provided at least one knitted course between each of the successive toe narrowings, which has the effect of assisting in the formation of a desired loop structure joining the outer edge of the French gore with the outer toe narrowings.

The several features of applicant's invention set forth in the appended claims, will be readily understood by one skilled in the art from the following description taken in connection with the accompanying drawings, in which Fig. 1 is a detail view in front elevation illustrating applicant's improved narrowing mechanism applied to a multiple section flat full-fashioned knitting machine adapted for the knitting of full-fashioned foot and leg stocking blanks, only so much

of the machine having been disclosed as is believed necessary to illustrate the connection of the present invention therewith; Fig. 2 is a somewhat diagrammatic view showing the toe portion of applicant's improved stocking blank having the usual French gores, and illustrating particularly the somewhat emphasized outer edge of the French gore produced with applicant's improved method; and Fig. 3 is a detail view of the loop structure of applicant's French toe covering the small area indicated at X in Fig. 2, to illustrate particularly the manner of forming the outer edges of the French gore and the connecting inner edge of the outer toe narrowings.

Fig. 1 of the drawings, illustrates applicant's improved combined narrowing finger units together with the usual cover knife as applied to one section of a multiple section flat full-fashioned type knitting machine. It will be understood that the machine is provided with the usual spring beard needles having vertical and forward and back movements with relation to a press edge, cooperating yarn measuring sinkers and knockover bits, yarn feeding carriers, and the appropriate mechanisms for moving these parts actuated from a main cam shaft extending along the length of the machine. It will be further understood that in accordance with the usual practice, the machine is provided with the usual narrowing devices including the usual narrowing machine frame and the cooperating mechanism for imparting the usual narrowing movements to the spring beard needles to cooperate with the narrowing finger units disclosed in Fig. 1.

As shown in the drawings, the machine is provided with only two narrowing rods designated respectively at 1 and 2, the rod 1 supporting the right hand narrowing fingers for each section, and the rod 2 supporting the left hand narrowing fingers for each section. For each section there is mounted on the rod 2, a narrowing unit 3, and on the narrowing rod 1, a narrowing unit 4. Each of these narrowing units comprises a wide narrowing finger 5 and a relatively narrow French gore narrowing finger 6, the fingers 5 and 6 in each instance being separated by one needle index. In accordance with the usual practice, the narrowing rods 1 and 2 are supported on a narrowing frame which is moved vertically to impart the usual vertical movements thereto to lift and return the loops to the needles, and the rods 1 and 2 are shiftable lengthwise in opposite directions to effect the transfer of the loops from one needle to another. Also as shown in Fig. 1, there is provided above the narrowing rods 1 and 2, a rod 7 which is rigidly supported on the narrowing frame against lengthwise movement thereon, and has mounted thereon a cover knife 8. It may be further assumed that the rod 7 is capable of rotation to move the cover knife 8 into and out of operative position as desired. It will be understood that the cover knife performs the usual function of rendering the inner narrowing points of the French gore narrowing fingers 6 inoperative during the knitting of the last courses of the French toe to form the parallel portions of the inner edges of the French gores, as shown in Figs. 2 and 3. In the knitting of the French toe, the narrowing rods 1 and 2 are arranged to engage with and lift their loops, and then to be shifted inwardly two needle indexes, and to return their loops to the needles. Prior to the next narrowing operation, a plain course is knitted, and the narrowing units are shifted outwardly again one needle index. During the knitting of the so-called diamond points, that is, beginning with the course marked A—B in Fig. 3, the cover knife 8 is brought into operation in the usual manner to inactivate the inner points of the inner or French gore narrowing point fingers, as successive narrowings cause these points to be brought under the influence of the cover knife.

Fig. 2 is a somewhat diagrammatic showing of the French toe produced by applicant's method, having French gores with the inner gore lines 9 and the outer gore lines 10 which run slantwise toward the toe of the stocking, and in which the direction of the inner gore lines 9 is changed through the operation of the cover knife 8 to form the diamond points. It will be noted also that the selvage edges 11 of the tip portion of the stocking converge still more sharply to produce the characteristic shape of the French toe.

Referring to Fig. 3 which illustrates in greater detail the loop structure produced by applicant's method, it will be noted that each group of loops transferred inwardly by the inner or French gore narrowing fingers, is shifted inwardly two needle indexes forming at their inner end double loops 14 which serve to delineate the inner edge 9 of the French gore (see also Fig. 2). With each successive narrowing, an equal number of French gore loops is thus transferred starting one wale inwardly toward the center line of the stocking. The outer group of loops starting with the selvage loop of the narrowed course, is similarly transferred inwardly two needle indexes, and inasmuch as in each instance the outermost or selvage loop is transferred two needle indexes inwardly, the selvage edge 11 will converge toward the center line of the stocking more rapidly than the parallel gore lines 9 and 10. Owing to the spacing maintained between the inner and outer narrowing fingers, an opening designated at 13 is produced with each narrowing between the group of loops forming the French gore and the associated outer group of transferred loops. The inner edge of the outer group of loops abutting the opening 13 is further formed with a double loop 12 in the wale opposite the gap between the inner and outer narrowing fingers of the unit.

It will be understood that applicant is not limited as to the exact width of the spacing employed between the inner narrowing fingers 6 and the outer narrowing fingers 5, it being requisite only that this needle spacing be equal to at least one needle index. It will further be understood that the positioning of the narrowing units for each successive narrowing operation, will depend primarily upon the shape desired in the knitting of the French toe.

The nature and scope of the invention having been indicated, what is claimed is:

1. The method of effecting the toe narrowings to form the French toe of a fashioned stocking on a flat knitting machine having narrowing units each comprising a narrow French toe gore narrowing finger, and a wide narrowing finger fixedly spaced outwardly therefrom one needle index, and a cover knife, which comprises knitting a course of loops, operating said narrowing fingers to take and to transfer inwardly two needle indexes the French toe gore loops and all the remaining loops outwardly considered from said French toe gore loops excepting only the single loops left between the separated wide and narrow fingers, knitting at least one plain course,

shifting the narrowing fingers outwardly one index, and repeating said narrowing operation.

2. The method of effecting the toe narrowings to form the French toe of a fashioned stocking on a flat knitting machine having a pair of narrowing units each comprising a French toe gore narrowing finger and a wide narrowing finger spaced a fixed number of needle indexes therefrom outwardly of the French gore narrowing fingers, which comprises moving each of said narrowing units to perform successive narrowing operations, and between each of said narrowing operations shifting said narrowing units outwardly.

3. The method of effecting the toe narrowings to form the French toe of a fashioned stocking on a flat knitting machine having a pair of narrowing units each comprising a French toe gore narrowing finger and a wide narrowing finger spaced a fixed number of needle indexes therefrom outwardly of the French gore narrowing fingers, which compriss positioning and moving each of said narrowing units to perform successive narrowing operations.

4. A narrowing mechanism for a flat full-fashioned knitting machine comprising a pair of narrowing units each comprising a French gore narrowing finger and a wide narrowing finger fixedly supported with relation to and outwardly of the French gore narrowing finger a distance therefrom of at least one needle index.

5. A narrowing mechanism for a flat full-fashioned knitting machine comprising a pair of narrowing units each comprising a French gore narrowing finger and a wide narrowing finger fixedly supported with relation to and outwardly of the French gore narrowing finger a distance therefrom of at least one needle index, and a cover knife located centrally between said narrowing units.

6. A narrowing mechanism for a flat knitting machine comprising a pair of narrowing units arranged to lift and to transfer loops inwardly two needle indexes, and thereafter to be shifted outwardly one needle index, each of said narrowing units comprising a French toe gore narrowing unit and a wide narrowing unit fixedly spaced with relation to and outwardly of the cooperating French toe gore finger a distance of one needle index.

7. Narrowing mechanism for forming a French toe on a flat full-fashioned knitting machine which comprises a right hand narrowing point unit, a narrowing rod for supporting and shifting the unit lengthwise of the needle series, a left hand narrowing point unit, a separate narrowing rod for supporting and shifting the left hand unit, each of said units comprising an inner series of points spaced to engage with adjacent needles and an outer series of points spaced to engage with adjacent needles, said outer series of points having a fixed relation to said inner series and disposed outwardly therefrom a fixed distance equal to at least one needle index.

8. Narrowing mechanism for forming a French toe on a flat full-fashioned knitting machine which comprises a right hand narrowing point unit, a narrowing rod for supporting and shifting the unit lengthwise of the needle series, a left hand narrowing point unit, a separate narrowing rod for supporting and shifting the left hand unit, each of said units comprising an inner series of points and an outer series of points having a fixed relation to said inner series and disposed outwardly therefrom a fixed distance equal to at least one needle index, and a cover device to inactivate the inner points of the inner series.

9. Narrowing mechanism for forming a French toe on a flat full-fashioned knitting machine which comprises a right hand narrowing point unit, a narrowing rod for supporting and shifting the unit lengthwise of the needle series, a left hand narrowing point unit, a separate narrowing rod for supporting and shifting the left hand unit, each of said units comprising an inner series of points and an outer series of points having a fixed relation to said inner series and disposed outwardly therefrom a fixed distance equal to at least one needle index, said inner point series being further constructed and arranged for fashioning certain outer selvage portions of the blank.

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