

- [54] **PROCESS FOR PREPARING LADIES' SEAMLESS PANTYHOSE**
- [75] Inventors: **Robert M. Matthews**, Pittsboro; **Albert W. Petty**, Siler City, both of N.C.
- [73] Assignee: **Kellwood Company**, St. Louis, Mo.
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- [51] Int. Cl. **A41b 9/04**
- [58] Field of Search ... **2/224 R, 227, 240, 225, 226, 2/243 R; 112/121.27; 223/112**

- [56] **References Cited**
- UNITED STATES PATENTS**
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Primary Examiner—H. Hampton Hunter
Attorney, Agent, or Firm—Robert Irving Williams

[57] **ABSTRACT**
 Pantyhose are formed from two circularly knitted blanks of which the toes have been left unsewn, by an operation wherein the upper portions of the blanks are slit and sewn and then, without turning the entire garment inside out, the garment is slipped over a pair of suction tubes in close proximity to the sewing machine on which the panty portion has been sewed, and suction applied to pull the toe portions through and out of the ends of the tubes in inside-out condition for sewing of the toes which then can be pulled out of the tubes by sliding the leg portions back along the tubes until the toes have been turned to their original position, and then the entire garment slid forwardly off the tubes; thus greatly expediting the operation. The blanks may be dyed and scoured at a boil in advance of these operations.

4 Claims, 9 Drawing Figures

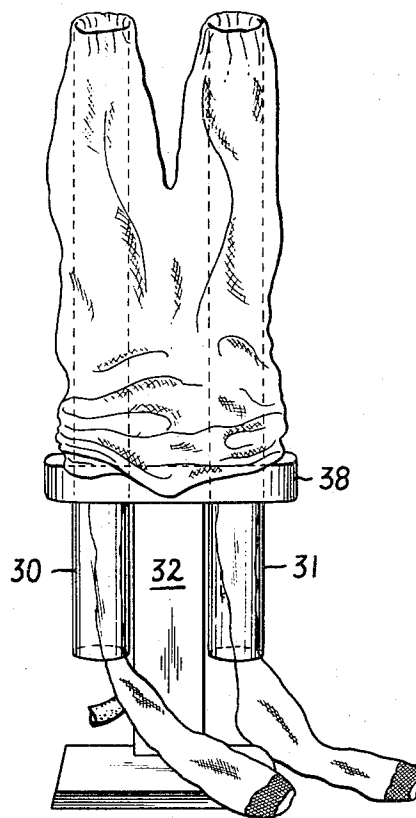


FIG. 1

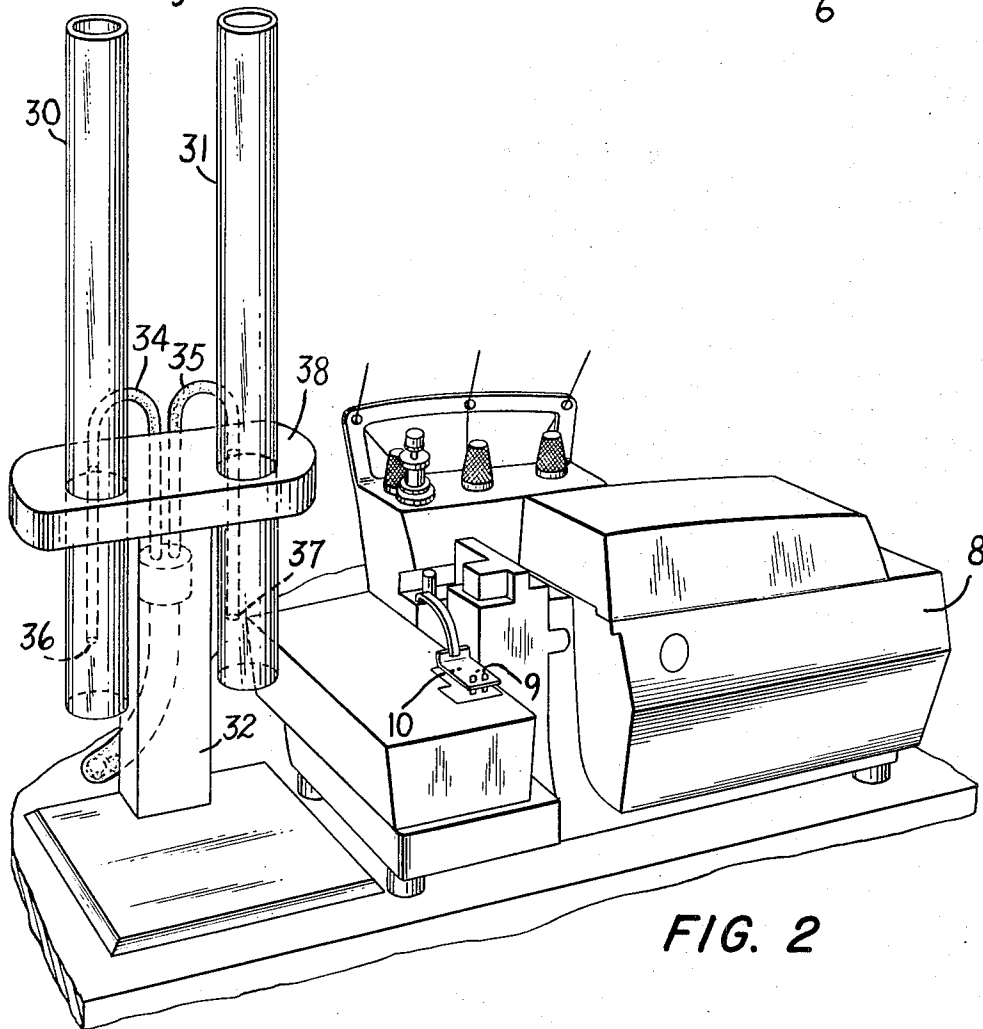
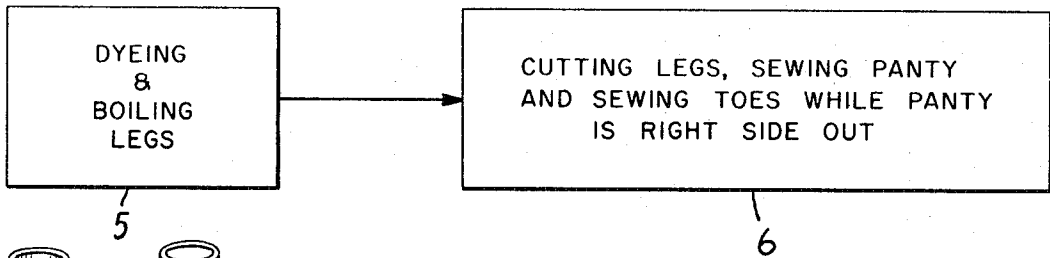


FIG. 5

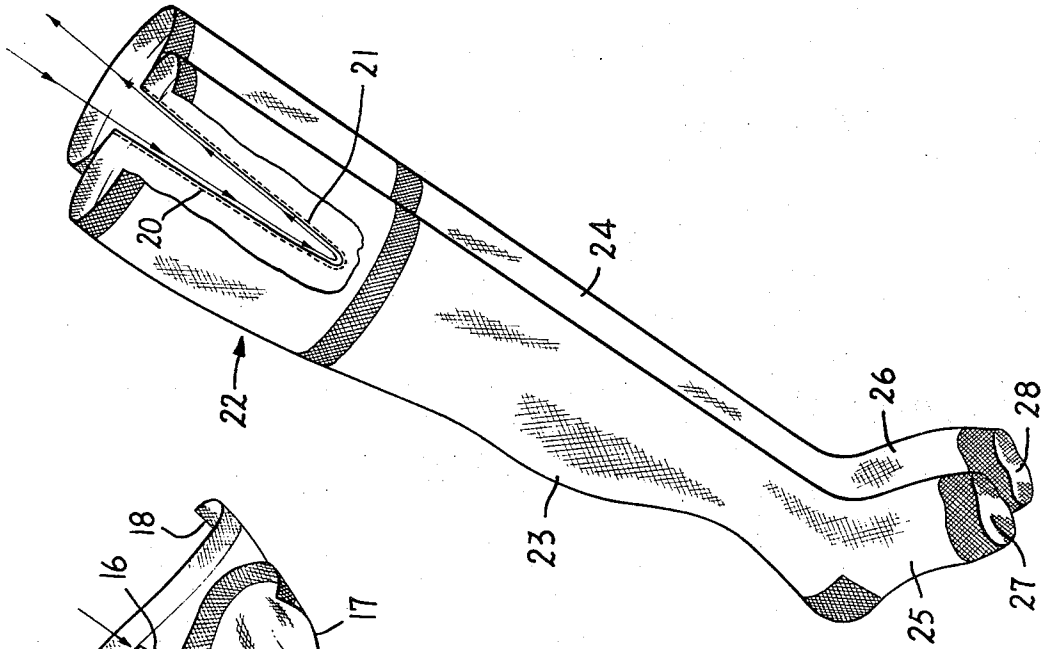


FIG. 4

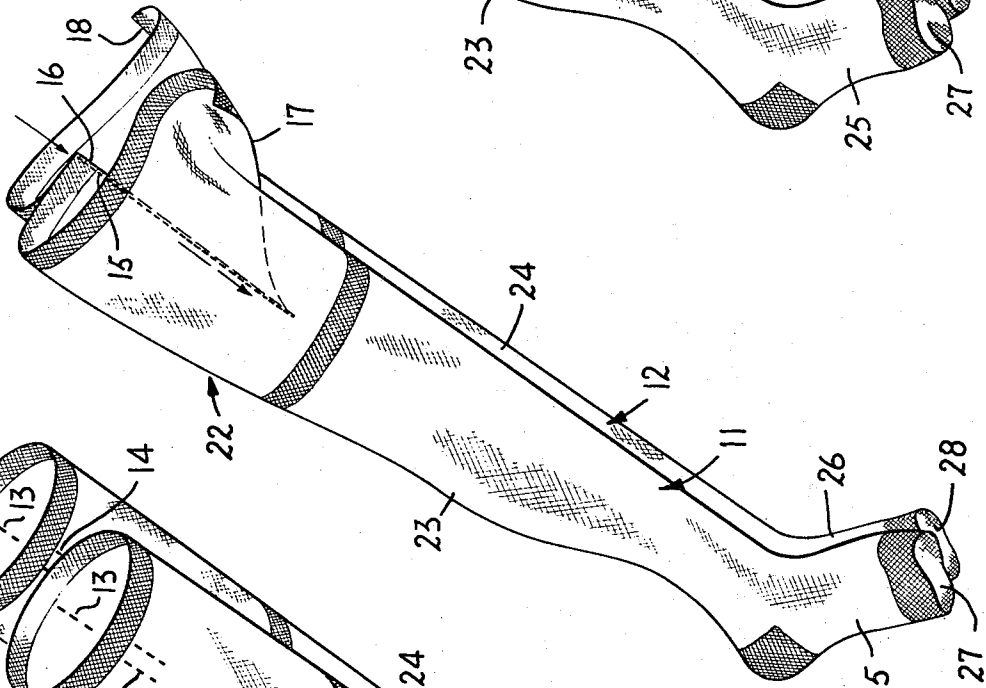
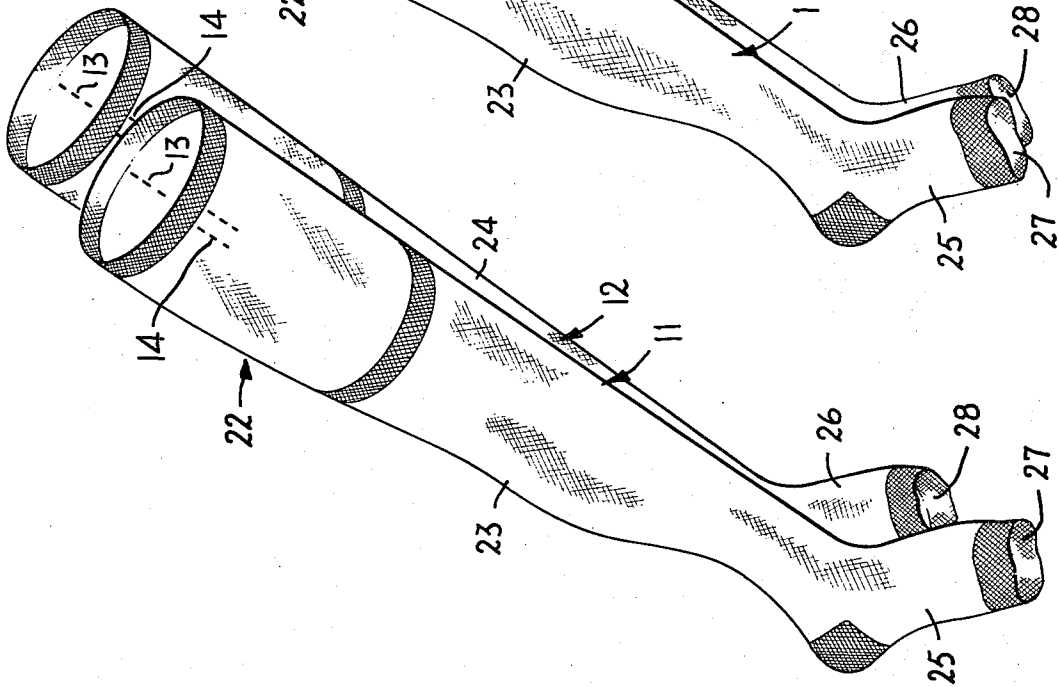


FIG. 3



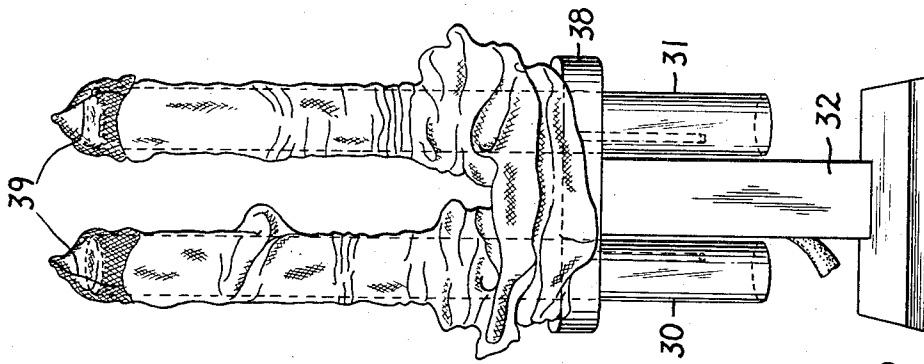


FIG. 9

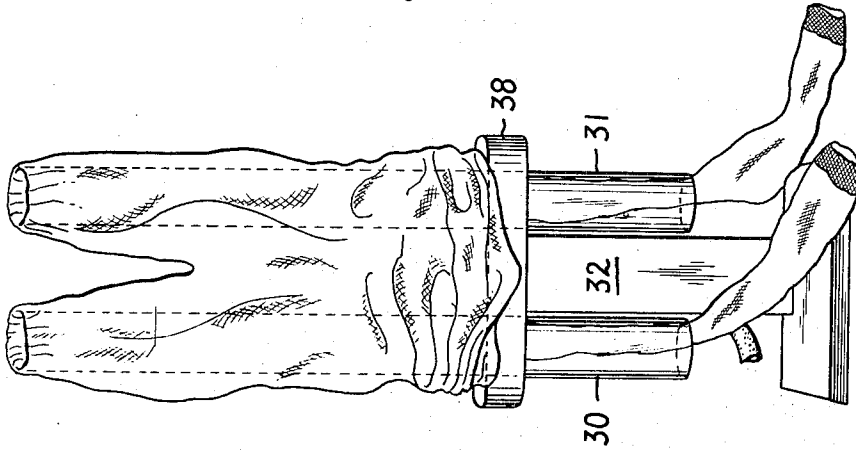


FIG. 8

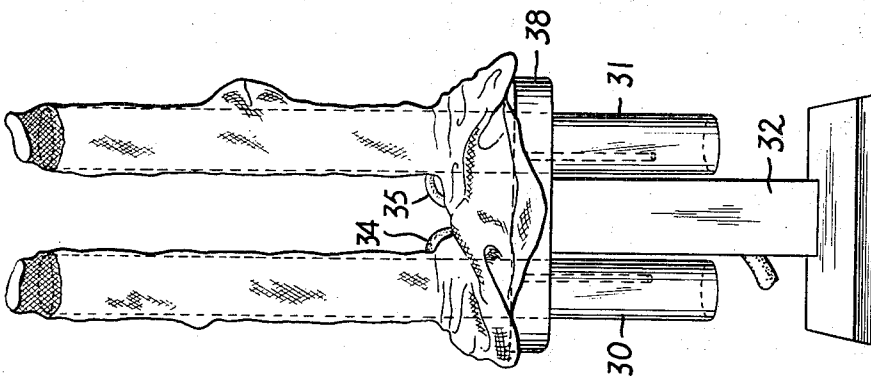


FIG. 7

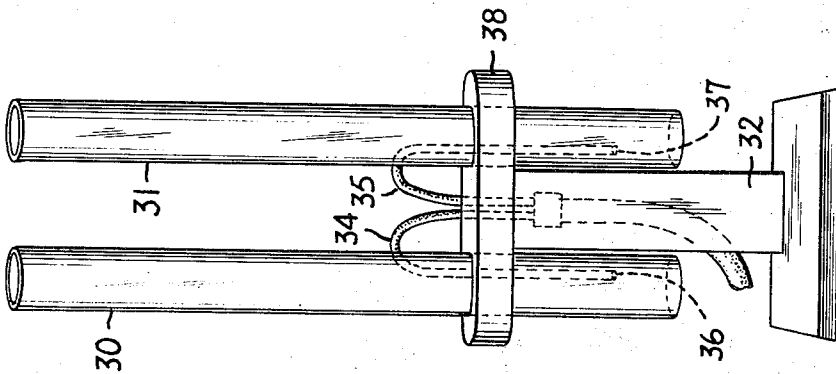


FIG. 6

PROCESS FOR PREPARING LADIES' SEAMLESS PANTYHOSE

BACKGROUND OF THE INVENTION

It is customary for pantyhose to be formed from two seamless circular blanks or legs by slitting mating portions of two blanks and sewing the rear edges of the two blanks thus cut and the front edges of the two blanks thus cut so as to provide a panty portion. It is also customary to sew the open toes of the blanks after the formation of the panty portions.

Such operations however have involved unnecessary turning of the garments inside out and unnecessary handling and transportation of the garments. In addition, it has been common practice to boil and dye the goods in separate operations.

SUMMARY

In view of the foregoing and other considerations, the present invention contemplates cutting and sewing the upper portions of a pair of blanks, preferably in a continuous operation, on a sewing machine, and providing tubes in such proximity to the sewing machine that the leg portions of a ladies' pantyhose can each be extended therefrom to the sewing machine for the sewing of the toe. Preferably suction means are provided for each tube, and the panty portion slid over the pair of tubes and each leg portion slid over a tube past its heel portion, so that the suction will draw each toe portion and much of the leg portion behind it into the tube and out the other end, after which the same operator who has cut the upper portion of the pantyhose by means of a knife on the sewing machine and has sewn the pantyhose by the sewing elements thereof can also sew the toes of the same pantyhose garment, and then remove it from the tubes by turning the leg portions and toes rightside out to correspond to the pantyhose. This is carried out by sliding that part of the entire leg portions which remain on the outside of the tubes down the tubes and continuing to slide and gather the leg portions until the sewn toe reaches the top of the tubes, whereupon the whole garment may be drawn upwardly off the tubes without turning it inside out and otherwise rearranging it for use.

Preferably also the blanks are boiled and dyed before being assembled in pairs into pantyhose, thus eliminating a steaming step later in the operation. The boiling at the dyeing stage serves to relax the fabric and shrink it, and to reduce the tendency to picks and pulls in subsequent processing and handling; and for the reduction in the number of operations. Also it is of assistance in this connection by reducing the handling and transportation operations.

The invention further contemplates the employment of certain features thereof in combination with steps for producing from polyamide (nylon) yarn a pantyhose which has highly desirable qualities, but which is so knitted as to be especially subject to picks and pulls. At least the leg portions of such a pantyhose are formed by steps comprising knitting a pair of open-ended circular blanks each having in interknitted rows, respectively, a plural-filament lively nylon yarn of not over 21 denier which has been subjected to a S-twist of from over 150 to not over 200 (for example 180) twists per inch and heat set and thereafter subjected to a Z-twist of from over 150 to not over 200 (for example 180) twists per inch, and of a plural-filament lively

nylon yarn of not over 21 denier which has been subjected to a Z-twist of from over 150 to not over 200 (for example 180) twists per inch and heat set and thereafter subjected to a S-twist from over 100 to not over 200 (for example 180) twists per inch; and may be formed from low-denier plural-filament nylon yarn such; for example, as 18 denier, 4 filament, or:

10 denier, 7 filament
10 denier, 2 filament
15 denier, 3 filament
15 denier, 5 filament

17 denier, 3 filament
18 denier, 3 filament
20 denier, 7 filament
21 denier, 3 filament.

SHORT DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic showing of the invention in one of its aspects;

FIG. 2 is a perspective view of certain apparatus useful in carrying out the invention;

FIG. 3 shows a pair of cylindrical blanks ready for the formation of the upper parts thereof into a panty portion of pantyhose;

FIG. 4 shows these upper parts cut downwardly and with the rear edges thereof sewn downwardly;

FIG. 5 shows the garment of FIG. 4 with the front edges of the cut portions sewn upwardly;

FIG. 6 is an enlarged detail view of a pair of tubes for use in connection with the toe sewing operation;

FIG. 7 shows a pantyhose with the panty portion extending about the tubes and each leg and open-toed foot portion on a respective tube;

FIG. 8 shows the foot and leg portions after they have been sucked through their individual tubes by the suction means and projected underneath the same in inside-out condition for sewing of the toes; and

FIG. 9 shows the pantyhose with the panty and leg portions gathered outside the tubes so that on removal, they will be in right-side out condition when pulled off the tubes.

DETAILED DISCLOSURE

Preferably and as exemplified, open-ended cylindrical "legs" or blanks from pairs of which pantyhose garments are to be formed are brought to a boil in the dye bath itself — at least to 190° F., and preferably to 208° to 210° F. if practicable — prior to cutting and sewing, and in this manner handling of the blanks and/or the garments is reduced and consequent effects of the handling on the goods is minimized. This step, as indicated at 5 in FIG. 1, is carried out in a normal dye bath, but the temperature is raised to 208° F. to avoid the necessity of boiling at this temperature at a separate stage of the total operation.

The cutting and sewing of the panty and the sewing of the toes are performed at a single sewing station indicated at 6 in FIG. 1 by a single sewing machine 8 shown in FIG. 2 and having a knife element 9 and a sewing unit 10. Such an arrangement is a Union Special class 39500 sewing machine which may have a retractable knife and a sewing element adapted for the stitching (seaming) of ladies' pantyhose with predyed thread. With the knife in operative position, a pair of cylindrical blanks 11 and 12 are assembled as indicated in FIG. 3 with marking 13 on one blank positioned in proximity to a different marking 14 on the other blank. These blanks are then moved in contact with each other at their upper ends, and fed to the sewing unit and knife 9 of the sewing machine. The knife will sever both

blanks downwardly to produce rear edges 15 and 16 and front edges 17 and 18, as the sewing unit stitches the edges 15 and 16 together to provide a rear seam 20 for the pantyhose portion. Thereafter, the edges 17 and 18 may be sewn together by the sewing unit preferably 5 continuing upwardly from the downwardly extending seam 20 so as to provide an upwardly extending seam 21 (FIG. 5) which, in the present instance, is continuous with the seam 20. There is thus provided a garment having an upper pantyhose portion 22, leg portions 23 and 24, foot portions 25 and 26, and open-toe portions 27 and 28.

In order to sew the toe portions in inside-out position while the panty portion is still in right-side-out position and thus avoid a double inversion of the entire garment with the extra handling thus required, there is provided a means and procedure whereby the toes can be sewn closed in inside-out position while the panty remains right-side-out. In close proximity to the sewing unit 10, and with their lower ends close enough thereto so that the toes extending downwardly therefrom can be sewn closed by the sewing unit 10, there are provided a pair of tubes 30 and 31 (see FIG. 2 and 6) spaced from each other just enough to receive the panty portion of a pantyhose such as shown in FIG. 5 and of sufficient internal size so that the foot and toe portions and any necessary part of the leg portions may be sucked thereto. These are mounted on a support 32 containing passageways (not shown) leading to a blower or other suitable air-pressure means (not shown) as from suction forming pipes 34 and 35 which discharge downwardly as at 36 and 37 just outside of the lower end of the respective tubes 30 and 31. The panty portion of a pantyhose may be slipped about the outside of the tubes 30 and 31 and moved downwardly to a platform 38, and the leg and foot portions drawn over the outside of the respective tubes 30 and 31. The air-pressure is then turned on and the toe portions pulled through the interior of the tubes 31 and 32, with the foot portions and part of the leg portions following, as shown in FIG. 8 40 so that the toe portions project well out of the tubes with the foot portions and any necessary part of the leg portions projecting out also if necessary to permit the toes to be readily stitched closed by the sewing unit 10 while the toes are in inside-out position. After the closing of the toes has been completed, the air-pressure is turned off, and the panty and leg portions may be pushed down on the outside of the tubes so as to permit

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the rest of the leg portions and the foot and toe portions to be drawn out of the tubes and to obtain the position shown in FIG. 9 with the toes each closed by a seam 39 now on the interior of the toes so that the entire garment is again in right-side-out position. The garment may then be moved off the tubes without further inversion.

What is claimed is:

1. A process of forming pantyhose which comprises first knitting each of a pair of tubular blanks in right-side out condition, slitting downwardly the upper portion of both blanks and sewing together at a sewing station the slitted edges at the rear of said blanks and the slitted edges at the front of said blanks to provide a panty portion above a pair of foot-and-leg-portions all in a right-side out condition, thereafter slipping the panty portion over a pair of foot-and-leg-portion-receiving tubes at said station and drawing each leg portion at least partially over an individual one of said tubes, moving the open end of each leg-and-foot portion through its tube in a wrong-side out condition followed by at least part of its leg portion while the panty portion remains in its right-side out condition, sewing each of said ends at said sewing station to provide closed toes, drawing the leg portions and toes out of the tubes while turning them right-side out, and removing the garment from said tubes in a right-side out condition.

2. A process as in claim 1 wherein said forming step comprises subjecting a pair of circularly-knitted blanks to a simultaneous cutting and sewing operation.

3. A process as in claim 1 wherein the toes are moved through said tubes by air pressure action.

4. A process of forming pantyhose comprising assembling a pair of tubular blanks knitted in a right-side out condition, slitting adjacent sides of the blanks downwardly for a given distance and sewing the rear edges of the slits together on a sewing machine and the front edges of the slits together on said sewing machine to form a panty portion above two leg-and-foot portions, everting at least the lower parts of the leg-and-foot portions without everting the entire garment, sewing the toe portions on said machine in the everted condition while the panty portion remains in a right-side out condition, and inverting said everted lower portions to their original right-side out condition.

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