US005675992A

United States Patent [19]

Wrightenberry

[11] Patent Number: 5,675,992

[45] Date of Patent: Oct. 14, 1997

[54] **DOUBLE LAYER SOCK WITH ATTACHED LINER AND METHOD FOR FORMING SAME**

[76] Inventor: **Jerry O. Wrightenberry**, 3110 Forestdale Dr., Burlington, N.C. 27215

[21] Appl. No.: **709,618**

[22] Filed: **Sep. 9, 1996**

[51] **Int. Cl.**[6] **D04B 11/00**; D04B 9/46; A41B 11/02

[52] **U.S. Cl.** ..... **66/178 R**; 66/171; 66/188; 2/239

[58] **Field of Search** ..... 66/185, 178 R, 66/171, 188, 182; 2/239, 240

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,263,763	11/1941	Edwards	66/178
3,307,379	3/1967	Woolley et al.	66/178
3,796,067	3/1974	East	66/178
4,341,096	7/1982	Safrit et al.	66/185
4,373,215	2/1983	Guigley	2/239
4,373,361	2/1983	Thorneburg	66/178
4,467,626	8/1984	Coble et al.	66/196
5,226,194	7/1993	Staley	2/239

FOREIGN PATENT DOCUMENTS

722958	3/1932	France	66/178 X
2454766	4/1980	France .	

Primary Examiner—John J. Calvert

[57] **ABSTRACT**

A double layer sock that has a tubular inner ply having a foot portion and a leg portion merging substantially at the ankle of a wearer. A tubular outer ply surrounds the inner ply and has a foot and a leg portion merging substantially at the ankle of the wearer and aligned with the foot and leg portions of the inner ply. The plies are joined adjacent a top opening in the leg portion and arranged to receive a wearer's foot. A seam joins the plies and is located substantially adjacent the merging of the foot and leg portions to maintain proper alignment of the foot portions of the two plies. Methods of making a two ply sock are also disclosed. Preferably, the seam connecting the plies is knit such that the plies maintain proper alignment with one another.

17 Claims, 2 Drawing Sheets

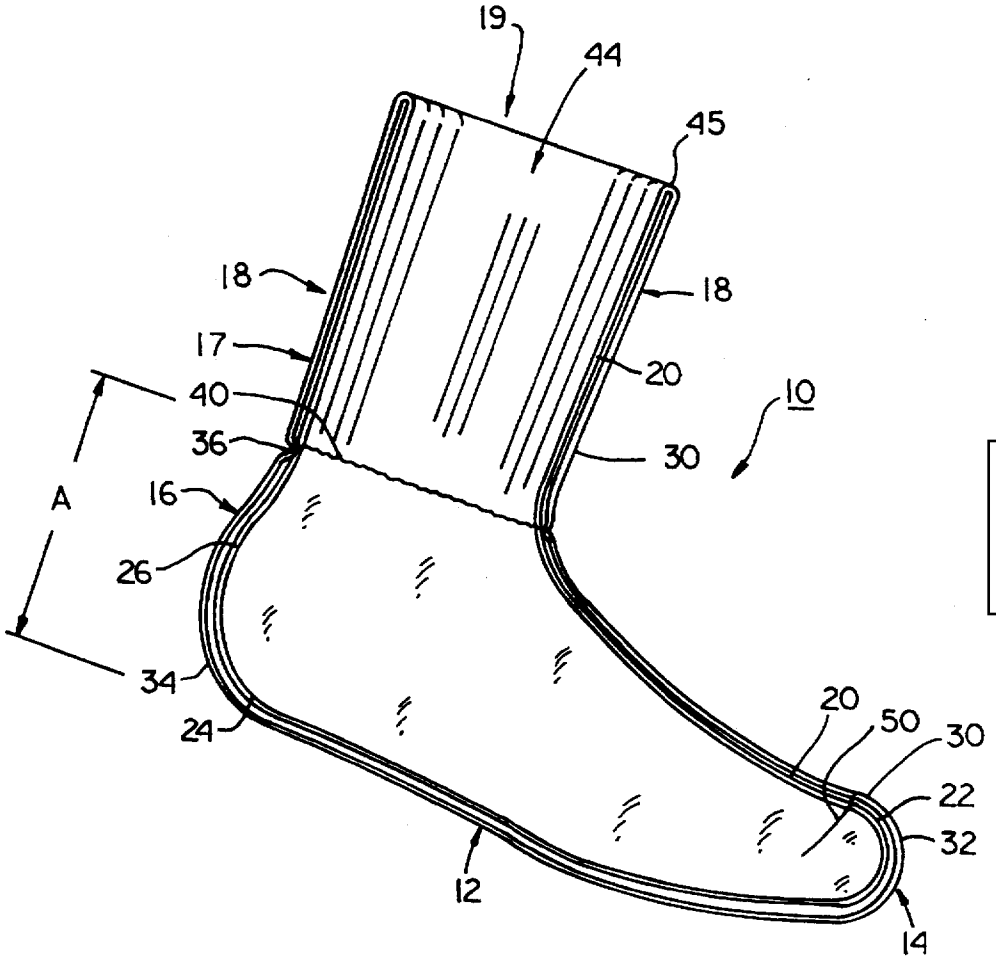

Exhibit A

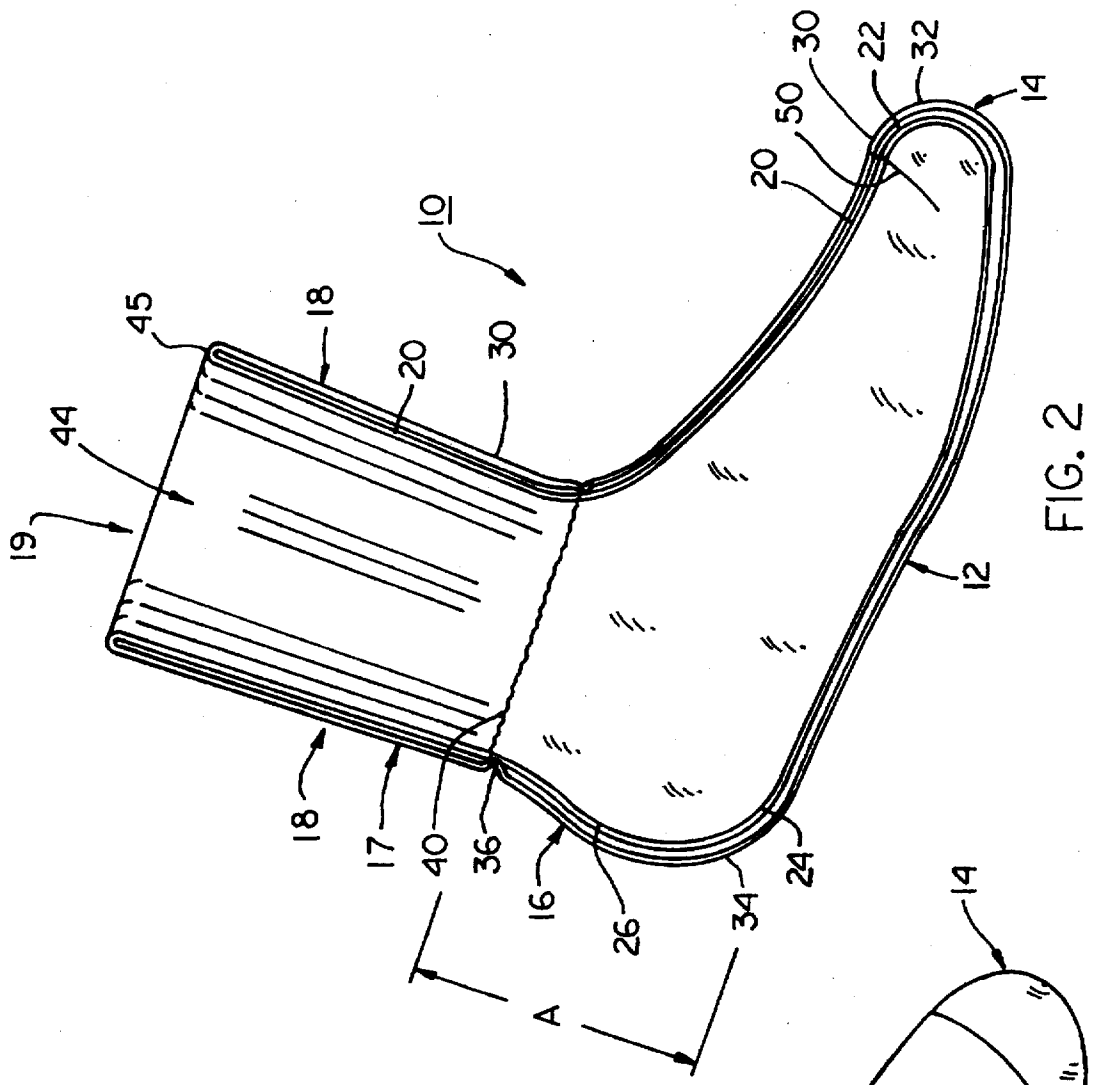
10
45
18
20
30
44
19
30
22
32
14
50
20
12
18
17
40
36
16
26
34
24
A

FIG. 2

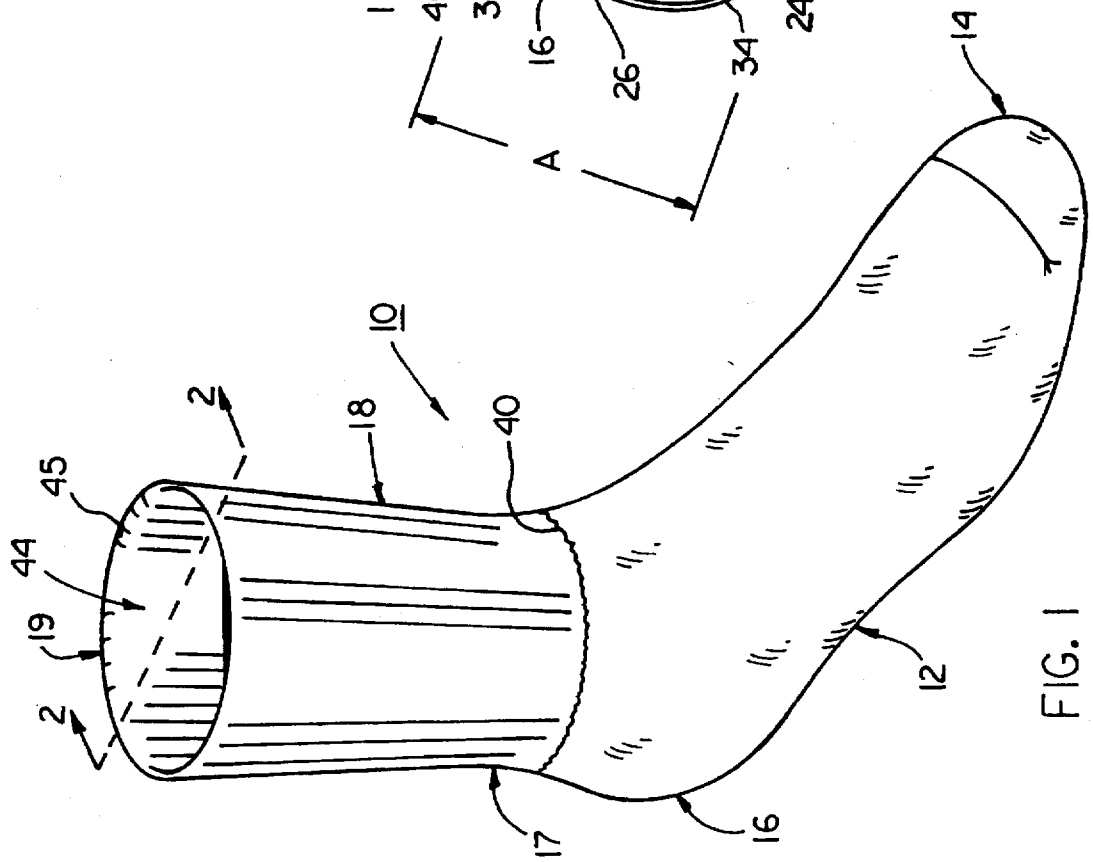
10
2
18
40
45
44
19
2
14
12
17
16

FIG. 1

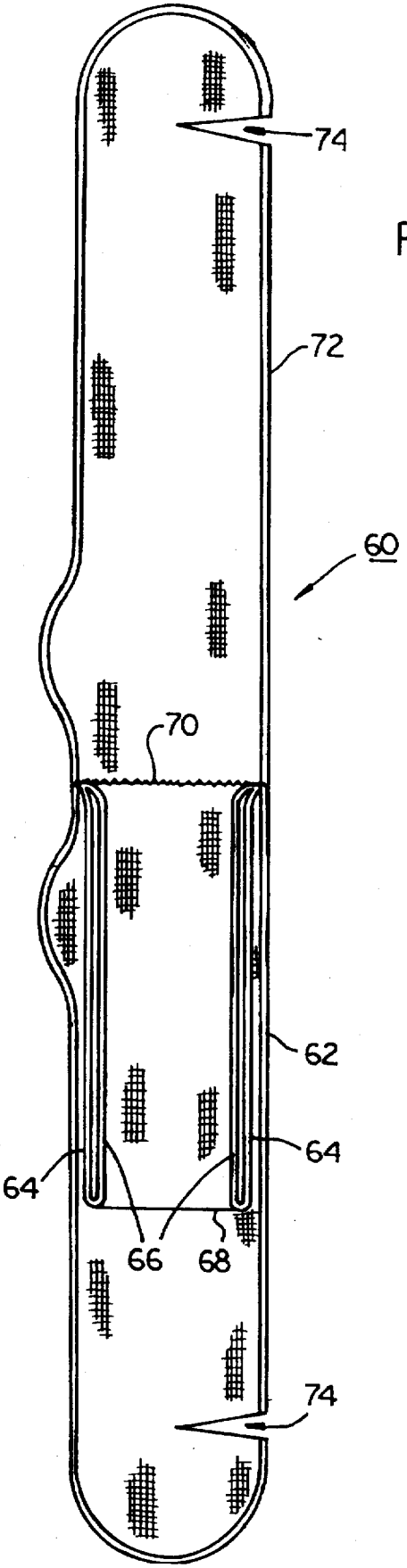

FIG. 3

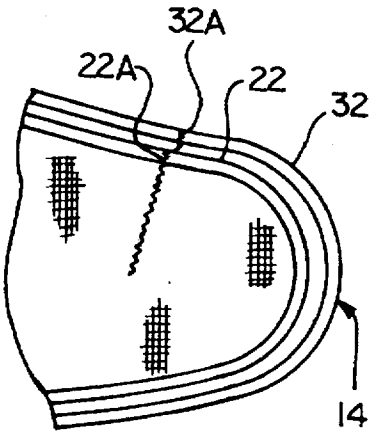

FIG. 4

DOUBLE LAYER SOCK WITH ATTACHED LINER AND METHOD FOR FORMING SAME

FIELD OF THE INVENTION

The present invention is directed to a double ply sock and method for forming the same, and more particularly, to a double ply sock having the inner and outer plies thereof joined by a selectively located seam to ensure proper alignment of the plies.

BACKGROUND OF THE INVENTION

Double layer socks are useful in many applications when a single layer sock is not adequate. A double ply sock provides additional cushioning of the foot and calf which is especially advantageous when engaged in strenuous activities such as running, hiking, playing basketball, and others. The additional cushioning allows the sock to absorb additional impact, reducing the impact upon the wearer. Additionally, the extra ply provides for a more comfortable fit as the rough, hard edges of shoes or boots are isolated from the wearer's foot providing for a reduction in blisters, abrasions, and other skin irritations. A double layer sock is also advantageous in environments requiring additional warmth as the second layer provides an added layer of insulation. Double layer socks provide for movement between the plies thereby reducing the movement between the inner ply and the wearer's foot, resulting in a more comfortable fit. With the many advantages, there are limitations and drawbacks encountered with presently available double layer socks.

A common problem experienced with double layer socks is that the inner layer has a tendency to wrinkle inside the outer layer. As the sock is worn, the inner layer slides relative to the outer layer resulting in bunching at the toes. U.S. Pat. No. 4,467,626, issued to Coble et al., discloses a double layer sock with the plies connected together at one or more locations rearwardly of the toe. This design often results in an uncomfortable fit as the seams located in the foot portion rub against the wearer's skin. This design also prohibits the inner ply from moving freely from the outer ply. Free movement between the plies is desirable to reduce sliding between the inner layer and the wearer's foot, a primary advantage of double ply socks.

Thus, there exists a need for a double layer sock in which the inner layer does not wrinkle or bunch while worn and which ensures alignment of the inner and outer layers. Further, there exists a need for a double layer sock that ensures alignment of the layers but does not unduly restrict relative movement between the inner and outer layers, thereby minimizing movement between the inner layer and foot and providing for a more comfortable fit.

SUMMARY OF THE INVENTION

The present invention is generally directed to a double ply sock which overcomes the various deficiencies noted above, and a method for forming the same. In each embodiment, the double ply sock is provided with a selectively located seam to ensure proper relative alignment of the plies. Preferably, the sock is particularly constructed and provided with certain features and materials as discussed below.

The present invention is directed to a double ply sock. The sock includes a tubular inner ply having a foot portion and a leg portion merging substantially at the ankle of a wearer. A tubular outer ply surrounds the inner ply having a foot portion and a leg portion merging substantially at the ankle of the wearer and aligning with the foot portion and the leg portion, respectively, of the inner ply. The inner ply and the outer ply define a top opening in the leg portion and is arranged and configured to receive a wearer's foot. The inner and outer plies being joined adjacent the top opening. A seam joining the inner ply and the outer ply is located substantially adjacent the merging of the foot portions and leg portions for the purpose of maintaining proper alignment of the foot portions of the two plies and having the plies each extend above and below the seam.

Preferably, the sock is formed such that the inner and outer plies extend the entire length of the sock. Alternatively, the foot portions of the inner and outer plies may extend to a respective toe end. A single ply band may be attached to each of the leg portions of the inner and outer plies at the upper end and extend upwardly therefrom. The sock may be constructed such that each foot portion of the inner and outer plies have respective toe end openings that are closed by a common seam. Alternatively, each foot portion of the inner and outer plies may have respective toe end openings that are closed by a respective end seam. The sock may contain a respective heel pocket in each of the inner and outer plies such that the heel pockets are disposed proximate a wearer's heel when the sock is worn. The heel pocket of each of the foot portions of the inner and outer plies has a respective toe end and are disposed between the connecting seam and the respective toe ends. Preferably, the connecting seam connects the inner ply to the outer ply by a continuous stitch row extending around the circumference of the sock. The plies may be constructed from a unitary knitting operation having the plies connected by a fold line at the top opening. Preferably, the seam is knit into each of the inner and outer plies.

The present invention is further directed to a method of making a two ply sock of unitary tubular construction. A first foot portion is knit. A first leg is knit that is attached to the first foot portion and a second leg portion is knit that is attached to the first leg portion. A common seam is knit joining the first foot portion, the first leg portion and the second leg portion. Next, a second foot portion is knit such that it is attached to the common seam. The first and second foot portions are closed. Preferably, the step of knitting the seam includes knitting the seam such that it extends about the circumference of the sock.

The present invention is further directed to a method as follows for making a two ply sock having an inner ply and an outer ply. A singular tubular garment having opposed open ends is knit having a first continuous section corresponding to the inner ply and a second continuous section corresponding to the outer ply. A fold is then formed between the first and second sections. The open ends of the garment are closed. The first and second sections are joined together by a connecting seam at a location in the garment above a wearer's ankle when the sock is worn.

In the method described immediately above, preferably the step of joining the first and second sections includes inserting the connecting seam such that it extends about the circumference of the sock. The step of joining the first and second sections preferably includes knitting the connecting seam into each of the first and second sections. Alternatively, the step of joining the first and second sections includes sewing the connecting seam into each of the first and second sections.

A primary objective of the present invention is to provide an improved double ply sock.

It is an object to provide a double ply sock in which the plies are connected by a seam that ensures alignment of the inner and outer plies.

An object of the present invention is to provide a double ply sock in which the inner and outer plies can move freely of each other.

Yet another object is to provide a double ply sock as described above which reduces sliding movement between the inner ply and the wearer's foot.

The preceding and further objects of the present invention will be appreciated by those of ordinary skill in the art from a reading of the figures and the detailed description of the preferred embodiment which follow, such description being merely illustrative of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side, perspective view of a sock according to the present invention.

FIG. **2** is a cross-sectional side view taken along line **2**—**2** of FIG. **1**.

FIG. **3** is a cross-sectional side view of a unitary, continuous knitted tube for forming a sock according to the present invention.

FIG. **4** is a fragmentary, cross-sectional view of a sock according to the present invention incorporating an alternative toe closure construction.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIGS. **1** and **2**, a sock according to the present invention is shown therein and generally denoted by the numeral **10**. Sock **10** is of a double ply construction, and is characterized by the provision of a selectively located seam interconnecting the plies. The interconnecting seam serves to overcome certain drawbacks of conventional double ply socks without sacrificing the benefits of such socks.

Turning to the sock in more detail, sock **10** has foot portion **12** extending from toe end **14** to ankle end **16**. Leg portion **18** has lower end **17** which is attached to ankle end **16** of foot portion **12**. Leg portion **18** extends to upper end **19** which defines top opening **44**. Sock **10** includes inner ply **20** disposed within outer ply **30**, each extending through at least a portion of foot portion **12** and through at least a portion of leg portion **18**. Seam **40** connects inner ply **20** and outer ply **30**. While sock **10** may be of any length, it is preferably sized such that top opening **44** is positioned at or just above the wearer's calf when the sock is worn.

In the preferred embodiment as shown in FIG. **2**, inner and outer plies **20**, **30** extend the entire length of sock **10** from toe end **14** to top opening **44**. Outer ply **30** surrounds inner ply **20** such that toe end **32**, heel pocket **34** and ankle end **36** of the outer ply align with the corresponding parts **22**, **24**, **26** of the inner ply. It is also contemplated that the inner and outer plies may extend through less than the full length of the sock. In such case, the two plies must both extend continuously through at least a portion of the foot and leg portions. That is, the sock must have two plies at seam **40**.

Seam **40** attaches inner ply **20** and outer ply **30** to one another between ankle end **16** and top opening **44**. Seam **40** is positioned such that the two plies extend both above and below the seam. Preferably, seam **40** extends about the entire circumference of the sock thereby joining the plies in a continuous manner. One of ordinary skill in the art will realize that seam **40** may also extend a distance less than the entire circumference of the sock, though with less beneficial results. Seam **40** is knit to attach the plies which ensures alignment of the plies. More particularly, as described more fully hereinbelow, seam **40** is preferably knit during the knitting of the tube which forms the sock in a manner which ensures proper alignment of the wales of the inner ply with the wales of the outer ply. It will be understood by one of ordinary skill in the art that seam **40** may be comprised of a single stitch row, double stitch, or similar method. Preferably, seam **40** is positioned a distance A from the bottom of heel pocket **34** of from about 1½ to 2½ inches.

The joinder of plies **20**, **30** by seam **40** serves to maintain the two plies in alignment. In particular, heel pockets **24**, **34** are kept aligned when the sock is being washed or pulled onto the foot, for example. On the other hand, this construction does not restrict movement of inner ply **20** in relation to outer ply **30** in the range typically experienced when the sock is worn, thereby allowing inner ply **20** to move with the wearer's foot to maintain comfort.

In the preferred embodiment as shown, inner and outer plies **20**, **30** are formed from a single, continuous knit tube. Top opening **44** is formed by fold **45** in the continuous tube between inner and outer plies **20**, **30**. Top opening **44** is arranged and configured to receive a wearer's foot. It will also be understood that top opening **44** may also be defined by a single ply band(not shown) attached to leg portion **18** at upper end **19**. The single ply band may join the plies **20**, **30**, or may be sewn to fold **45**. In either case, the single ply band extends upwardly from the upper end **19** of leg portion **18**.

Preferably, inner ply toe end **22** and outer ply toe end **32** are closed by a common seam **50** as seen in FIG. **2**. This arrangement keeps both plies aligned throughout the toe end **14** and heel pockets **24**, **34**. Alternatively, as seen in FIG. **4**, inner ply toe end **22** is closed by seam **22A** and outer ply toe end **32** is closed by seam **32A**.

Sock **10** may be formed in the following manner using a conventional circular knitting machine. Suitable machines include any 54 to 240 needle, 1½–6 inches diameter circular hosiery knitting machine with dial tops available from Speizman Industries, P.A.M. Trading Co., and others. With reference to FIG. **3**, a sock construction for forming sock **10** is shown therein in cross-section. Inner foot portion **62** is knit by the knitting needles of the machine (not shown) in a conventional manner such that the tubular fabric that is formed extends downwardly through the needle cylinder (not shown). After inner foot portion **62** is knit to the desired length, the dial bits come out and receive the knitting yarn. The yarn is knit on the dial bits for one or more revolutions of the machine. The dial bits, still holding the last knit course, are then pulled in out of the way of the knitting needles and held in. While the inner foot portion **62** is held by the dial bits, the inner leg portion **64** and subsequently outer leg portion **66** are knit by the knitting needles. The continuous tube of the leg portions **64**, **66** drops down into inner foot portion **62**. When the leg portions, separated by fold line **68**, have been knit to the desired length (preferably equal lengths), the dial bits come back out into the paths of the knitting needles, causing the knitting needles to take the yarn of the last course of the inner foot portion and to knit this course into the outer ply which is being formed. That is, the inner foot portion **62** is released back into the path of the knitting needles thereby joining the inner foot portion **62** to the outer ply via a common seam **70** that is knit into both plies and which extends around the circumference of the sock.

After the common seam **70** is knit into the sock, the outer foot portion **72** is knit, the remainder of the construction

falling down into the cylinder. After the outer foot portion **72** is knit to the desired length, the sock is removed from the knitting machine as shown in FIG. **3**. The open toe ends **74** are then closed forming a foot portion. It will be understood by one of ordinary skill in the art that the order of knitting the foot portions may be reversed such that the outer foot portion **72** may be the knit before inner foot portion **62**.

A primary advantage of the method just described is provided by the steps of knitting seam **70** (ultimately seam **40** of the sock). Because the seam is knit during the knitting of the tube, exact alignment of the wales of the inner ply with the wales of the outer ply at the seam is ensured by the knitting machine. In this way, exact alignment of the plies is ensured without requiring expensive and inefficient supplemental procedures.

It is also contemplated that the seam may be sewn into the sock following formation of the tube. However, it will be appreciated that the benefits of knitting the seam as just described will be lost.

An alternative embodiment of the present invention is contemplated wherein inner ply **20** is formed separately of outer ply **30**. The sections are attached by sewing or similar methods adjacent the top opening **44** and seam **40**.

While preferred embodiments of the present invention have been described, it will be appreciated by those of ordinary skill in the art that certain modifications may be made without departing from the scope of the present invention. All such modifications are intended to come within the scope of the claims which follow.

What is claimed is:

1. A double layer sock comprising:

a) a tubular inner ply having a foot portion and a leg portion merging substantially at the ankle of a wearer;

b) a tubular outer ply surrounding said inner ply, said outer ply having a foot portion and a leg portion merging substantially at the ankle of the wearer and aligning with said foot portion and said leg portion, respectively, of said inner ply;

c) said inner ply and said outer ply defining a top opening in said leg portion arranged and configured to receive a wearer's foot, said inner and outer plies being joined adjacent said top opening; and

d) a seam joining said inner ply and said outer ply, said seam located in a location substantially adjacent said merging of said foot portions and leg portions for the purpose of maintaining proper alignment of the foot portions of the two plies, said inner and outer plies each extending above and below said seam.

2. The sock of claim **1**, wherein each of said inner and outer plies extend the entire length of said sock.

3. The sock of claim **1**, wherein each of said foot portions of said inner and outer plies extends to a respective toe end.

4. The sock of claim **1**, including a single ply band attached to each of said leg portions of said inner and outer plies at said upper ends thereof and extending upwardly therefrom.

5. The sock of claim **1**, wherein each of said foot portions of said inner and outer plies has a respective toe end opening, said respective toe end openings being closed by a common seam.

6. The sock of claim **1**, wherein each of said foot portions of said inner and outer plies has a respective toe end opening closed by a respective end seam.

7. The sock of claim **1**, further including a respective heel pocket in each of said inner and outer plies, said heel pockets disposed proximate a wearer's heel when said sock is worn.

8. The sock of claim **7**, wherein each of said foot portions of said inner and outer plies has a respective toe end and said heel pockets are disposed between said connecting seam and said respective toe ends.

9. The sock of claim **1**, wherein said connecting seam connects said inner ply to said outer ply by a continuous stitch row extending around the circumference of said sock.

10. The sock of claim **1**, wherein said inner and outer plies are constructed from a unitary knitting operation, said plies connected by a fold line at said top opening.

11. The sock of claim **1**, wherein said seam is knit into each of said inner and outer plies.

12. A method of making a two ply sock of unitary tubular construction, comprising the steps of:

a) knitting a first foot portion;

b) knitting a first leg portion that is attached to the first foot portion and a second leg portion that is attached to the first leg portion;

c) knitting a common seam joining the first foot portion, the first leg portion and the second leg portion;

d) knitting a second foot portion attached to the common seam; and

e) closing the first and second foot portions.

13. The method of claim **12**, wherein the step of knitting the seam includes knitting the seam such that it extends about the circumference of the sock.

14. A method of making a two ply sock having an inner ply and an outer ply, comprising the steps of:

a) knitting a singular tubular garment having a first continuous section corresponding to the inner ply and a second continuous section corresponding to the outer ply, the garment having opposed open ends;

b) forming a fold between the first and second sections;

c) closing the open ends of the garment; and

d) joining the first and second sections together by a connecting seam at a location in the garment above a wearer's ankle when the sock is worn.

15. The method of claim **14**, wherein the step of joining the first and second sections includes inserting the connecting seam such that it extends about the circumference of the sock.

16. The method of claim **14**, wherein the step of joining the first and second sections includes knitting the connecting seam into each of the first and second sections.

17. The method of claim **14**, wherein the step of joining the first and second sections includes sewing the connecting seam into each of the first and second sections.

* * * * *