



(11) **EP 3 424 355 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
29.01.2020 Bulletin 2020/05

(51) Int Cl.:
A41B 11/00 ^(2006.01) **A43B 17/00** ^(2006.01)
D04B 1/26 ^(2006.01) **D04B 9/56** ^(2006.01)
A41B 11/02 ^(2006.01) **D04B 1/12** ^(2006.01)

(21) Application number: **18191559.6**

(22) Date of filing: **02.12.2007**

(54) **A SOCK AND A METHOD FOR ITS MANUFACTURE**
SOCKE UND VERFAHREN ZU DEREN HERSTELLUNG
CHAUSSETTE ET SON PROCÉDÉ DE FABRICATION

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR

(30) Priority: **01.12.2006 US 868183 P**

(43) Date of publication of application:
09.01.2019 Bulletin 2019/02

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
07827459.4 / 2 091 364

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Description

BACKGROUND

[0001] A sock is a knitted garment used for enclosing and covering the human foot and often also the lower part of the leg. Socks are usually aimed at isolating the foot from the outside temperature, absorbing moisture and sweat, and mitigating friction between the foot and the shoe.

[0002] Socks are often made of cotton, wool, polyester, nylon or other materials. They come in many colors and patterns, although the complexity and structure of the patterns is usually limited by the manufacturing techniques in use today.

[0003] Commercially manufactured socks are produced using circular knitting machines. These machines employ needles mounted on a cylinder or sometimes a double cylinder. The cylinder spins and the needles interlock loops of yarn. When the knitting process is over, the produced sock usually looks like a tube of cloth, open from both sides. Later on in the process, the sock is moved to a sewing or stitching machine for closing its toe area. Such machines are often referred to as "toe closing machines".

[0004] The foregoing examples of the related art and limitations related therewith are intended to be illustrative and not exclusive. Other limitations of the related art will become apparent to those of skill in the art upon a reading of the specification and a study of the figures.

[0005] JP 2003 013343 A discloses a cylindrical knitted fabric having a toe area which has a stripe pattern with sub-areas abutting at a borderline.

[0006] Split-worked knitted fabrics are also known from EP 1 717 362 A1 and US 2,179,336 A.

SUMMARY

[0007] According to the invention, there is provided a sock showing the features as defined by claim 1, thereby comprising a toe area, wherein the toe area is divided to at least two sub-areas, wherein a borderline between at least two adjacent sub-areas extends essentially parallel to a central axis of the sock.

[0008] According to some embodiments, there is provided a sock comprising a heel area, wherein the heel area is divided to at least two sub-areas, wherein a borderline between at least two adjacent sub-areas extends essentially parallel to a central axis of the sock.

[0009] According to the invention, there is provided a method for manufacturing the sock of the invention.

[0010] According to other embodiments, there is provided a method for manufacturing a sock comprising forming a heel area divided to at least two sub-areas, wherein a borderline between at least two adjacent sub-areas is essentially vertical.

[0011] Forming according to the invention means knitting.

[0012] The at least two adjacent sub-areas are integrally formed. The at least two adjacent sub-areas are formed during the knitting process of the sock. The at least two sub-areas may be distinguished from each other by at least one property.

[0013] A property may include at least one of: elasticity, strength, softness, isolation, friction, density, thickness, liquid absorption, shock absorption, appearance, color, yarn color, knitting type, yarn composition, yarn thickness, yarn count, yarn physical property, and/or any other property.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

- Fig. 1 schematically shows a perspective view of a sock;
- Fig. 2 schematically shows a partial perspective view of a sock;
- Fig. 3 schematically shows a partial perspective view of a sock not covered by the invention;
- Fig. 4 schematically shows another perspective view of a sock not covered by the invention;
- Fig. 5 schematically shows a plan view of a sock, viewed from the rear not covered by the invention;
- Fig. 6 schematically shows a partial plan view of the heel area of a sock, viewed from the rear;
- Fig. 7 schematically shows a plan view of a knitting pattern;
- Fig. 8 schematically shows a magnified plan view of knitting area 730 of Fig. 7.

DETAILED DESCRIPTION

[0015] In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of the invention.

[0016] The two adjacent sub-areas of a sock according to the invention may be characterized in different properties (such as elasticity, strength, softness, isolation, friction, density, thickness, liquid (such as sweat) absorption, shock absorption, appearance, colors, yarn colors, knitting types (such as plain knitting, terry knitting or any other knitting type), yarn compositions (for example, natural yarns such as cotton and wool yarns, man-made yarns such as viscose yarns, synthetic yarns such as polyester, nylon and polypropylene yarns and the like, and other yarns composition including any combination and ratios of materials), yarn count (such as yarn thickness), yarn physical properties (such as elasticity,

strength or any other property) or any combination thereof.

[0017] The term vertical as referred to herein may include the direction which extends essentially along the central axis of formation of the sock. In other words, the term vertical as referred to herein may include the longer tubular dimension of the sock. The central axis (which may also be referred to as the longer tubular dimension) of the sock is schematically illustrated in Fig. 5 as central axis 580. Fig. 5 relates to further aspects useful for understanding the invention.

[0018] A borderline between at least two adjacent sub-areas is referred to herein as having a "vertical component" if it is not perpendicular to a central axis of formation of the sock, such as central axis 580. Examples of borderlines between at least two adjacent sub-areas having "vertical components" include, line 558 in Fig. 5 and line 104 in Fig. 1.

[0019] The toe area and/or the heel area may also be referred to as the reciprocated areas of the sock since there are generally being knitted by a reciprocating process wherein the knitting is performed in a "back and forth" manner as opposed to the spiral continuous knitting that is generally applied for the rest of the sock areas.

[0020] Generally, the toe area and/or the heel area are currently being knitted using needle pickers.

[0021] According to some embodiments, the toe area and/or the heel area may be knitted according to the three-dimensional "needle by needle selection" process.

[0022] Reference is made to Fig. 1, which shows a perspective view of an exemplary sock, shown at 100. Sock 100 may be schematically divided into three areas:

a toe area, such as toe area 110, that may include a first toe sub-area ("FITOE"), such as FITOE 106, and a second toe sub-area ("SETOE"), such as SETOE 108;

- a heel area, such as heel area 150, that may include a first heel sub-area ("FIHEEL"), such as FIHEEL 152, and a second heel sub-area ("SEHEEL"), such as SEHEEL 154;

and a residual area, such as residual area 102, that may constitute an area of sock 100 not contained within toe area 110 and heel area 150.

[0023] Exemplary sock 100, as can be discerned from the general shape of its outline, may be intended to fit the right foot of a user. It will be understood by persons of skill in the art that the present disclosure applies also to a sock (not shown) that may fit the left foot or a user - such sock (not shown) may be an identical mirror image of sock 100 described herein. In other embodiments (not shown), a pair of socks may include two socks that are not identical mirror images of each other - for example, when a user has feet of different shapes and/or sizes, or

when socks with different characteristics are otherwise required.

[0024] Toe area 110 and/or heel area 150 of sock 100 may include multiple combinations of yarn types, yarn thicknesses, yarn colors, knitting types and the like. Examples of such combinations, as well as other characteristics of toe area

[0025] 110 and/or heel area 150 are further described below, in section 1 ("The Toe Area") and section 2 ("The Heel Area").

1. The Toe Area

[0026] Exemplary toe area 110 shown in Fig. 1, may be an area essentially surrounding or covering the toes of a user's foot when sock 100 is worn - whereby "surrounding" may include both surrounding the top side of the toes (which may lie essentially under 110) and surrounding the bottom side of the toes (not shown). In other embodiments (not shown), a toe area may essentially surround only the top side of the toes or, alternatively, only the bottom side of the toes. In further embodiments (not shown), a toe area may have a more complex pattern. For example, a toe area may surround portion(s) of the top side of the toes and portion(s) of the bottom side of the toes, as well as optionally include further areas of the sock essentially covering other portion(s) of the user's foot.

[0027] Toe area 110 may include, as already noted, FITOE 106 and SETOE 108. Exemplary FITOE 106 may essentially cover a big toe of a user's foot, whereas exemplary SETOE 108 may essentially cover the rest of the user's toes.

[0028] Referring now to Fig. 2, another embodiment is shown, wherein a toe area, such as toe area 210, may include three sub-areas: a FITOE, such as FITOE 206; a SETOE, such as SETOE 208; and a third toe sub-area ("TITOE"), such as TITOE 212. FITOE 206 may essentially cover a big toe of a user's foot, SETOE 208 may essentially cover the two toes next to the big toe, and TITOE 212 may essentially cover the two toes farthest from the big toe. Other embodiments (not shown) may include a plurality of sub-areas that may essentially correspond to the location of different toes. Furthermore, sub-areas (not shown) may each correspond to the location of groups of one or more toes.

[0029] The embodiments of a toe area shown at 110 in Fig. 1 and at 210 in Fig. 2, include sub-areas, as described above, that may essentially cover and/or correspond to the location of the user's toes. An alternative embodiment not according to the invention is shown in Fig. 3, wherein a toe area, such as toe area 310, may include a FITOE, such as FITOE 306, and a SETOE, such as SETOE 308. FITOE 306 may have an essentially prolonged oval shape which may extend from approximately above the user's big toe, about the tip of the big toe, and then under the big toe. SETOE 308 may essentially constitute the rest of toe area 310 not contained

within FITOE 206.

[0030] Sub-areas, such as FITOE 106 and SETOE 108 of Fig. 1, FITOE 206, SETOE 208 and TITOE 212 of Fig. 2, and FITOE 306 and SETOE 308 of Fig. 3, may differ from one another in various characteristics. For example, different sub-areas may essentially differ in yarn types, yarn thicknesses, yarn colors, knitting methods and the like - such differences may be reflected in a cloth having different attributes. Alternatively, one or more sub-areas of a toe area may share some or all of the same characteristics, whereas other one or more sub-areas of that same toe area may share different or similar sets of some or all of the same characteristics. Additionally, different sub-areas may be knitted, for example, using the same one or more yarns, but the knitting method used to form each sub-area may result in a sub-area having different textures, thicknesses, structures and/or other attributes. Alternatively, the difference in texture, thickness, structure and/or other attributes may be the outcome of using additional combinations of similar or different yarns with similar or different knitting methods, across different sub-areas. Some of the possible textures, thicknesses and structures of the cloth forming sub-areas, such as FITOE 106 and SETOE 108 of Fig. 1, FITOE 206, SETOE 208 and TITOE 212 of Fig. 2, and FITOE 306 and SETOE 308 of Fig. 3, may be essentially resulting from different methods of knitting, such as terry- knitting (a knitting method often producing a towel-like cloth), plain mesh knitting (a knitting method often producing an essentially flat cloth) and/or tuck stitching (a knitting or stitching method often producing a denser, heavier cloth). These and other knitting methods may be performed in conjunction with different or similar types, thicknesses and/or colors of yarn.

[0031] Referring now to Fig. 1, sub-areas, such as FITOE 106 and SETOE 108, abut each other along a borderline, such as first borderline 104, and may both abut a residual area of a sock, such as residual area 102 of sock 100 along a borderline, such as second borderline 108. FITOE 106, SETOE 108 and residual area 102 are integrally formed by means of knitting. Integrally forming these three areas together is preferred over stitching for multiple reasons. For example, the production process of a sock, such as sock 100, may be faster this way; a sock, such as sock 100, may be more durable and less prone to tearing if its sub-areas are integrally formed; and a sock, such as sock 100, may be more decoratively attractive if its sub-areas are integrally formed rather than stitched together.

[0032] Referring now to Fig. 4, an alternative sock not according to the invention is shown, in a side view, at 400; as Fig. 4 relates to further aspects useful for understanding the invention. Sock 400 may have a borderline, such as second borderline 408, which may be identical or similar to second borderline 108 of Fig. 1. Second borderline 408 may essentially extend over the top half of sock 400, meaning, it may run above the top side of the user's foot when sock 400 is worn, rather than below the

bottom side of the user's foot. In other alternatives (not shown), a second borderline may run below the bottom side of the user's foot. Sock 400 may also have a toe area, such as toe area 410, which may be identical or similar to toe area 110 of Fig. 1, and a residual area, such as residual area 402, which may be identical or similar to residual area 102 of Fig. 1. Residual area 402 and toe area 410 may be essentially stitched to one another along second borderline 408.

[0033] Such stitching may be advantageous, in some cases, essentially due to the characteristics of a knitting machine which may be used to knit sock 400, or due to other reasons. Such knitting machine may be a circular knitting machine, which may knit a sock, such as sock 400, in essentially circular patterns. The essentially final product of such a circular knitting machine may be an essentially tubular cloth, open at its two ends (not shown). One of the open ends may be at second borderline 408, although an open position of a sock is not shown in Fig. 4. Essentially after the circular knitting machine had completed producing the tubular cloth, which may be open at its two ends, the tubular cloth may be closed at one end by stitching together a toe area, such as toe area 410, and a residual area, such as residual area 402. Such stitching, as mentioned above, may be sometimes preferred over integrally forming toe area 410 and residual area 402. Firstly, such stitching is common among current regular socks, and therefore it may not be decoratively interfering. Secondly, such stitching may be, on some instances and/or when using certain knitting machines, faster and thereby more efficient than integrally forming toe area 410 and residual area 402.

[0034] Referring now to Fig. 1, there are many benefits to forming a sock, such as sock 100, with a plurality of sub-areas, such as FITOE 106 and SETOE 108. For example, a plurality of sub-areas, such as FITOE 106 and SETOE 108, may allow satisfying specific, individual needs of a certain toe or a group of toes, and/or needs of other part(s) of the user's foot. Such needs may be medical needs, needs pertaining to the user's comfort and coziness and/or needs of protecting certain area(s) of the foot against bruising, fluids, sharp objects, undesired temperature and/or other environmental conditions that may be considered by the user as generally undesired. Furthermore, forming a sock, such as sock 100, with at least one sub-area, such as FITOE 106 or SETOE 108, having a relatively thick, heavy and/or dense cloth, may result in better cushioning and/or shock-absorbing of the relevant sub-area(s). In addition, a smoother cloth may prevent rash and/or inflammation of the skin in area(s) of the foot essentially adjacent to that cloth. Moreover, a thicker cloth and/or terry may essentially absorb sweat and/or other liquids, and may additionally isolate part(s) of the foot from undesired high or low temperatures. As to a more decorative aspect of forming a sock, such as sock 100, with a plurality of sub- areas, such as FITOE 106 and SETOE 108 - usage of yarns of various colors to essentially form differently colored sub-areas,

such as FITOE 106 and SETOE 108, an optionally also a residual area, such as residual area 102, may result in a colorful, eye-catching and attractive sock, such as sock 100.

2. The Heel Area

[0035] Exemplary heel area 150 shown in Fig. 1, may be an area essentially surrounding or covering the heel of a user's foot when sock 100 is worn. In other embodiments (not shown), a heel area may surround portion(s) of the user's heel, as well as portion(s) of other part(s) of the user's foot, such as the ankle.

[0036] Heel area 150 may essentially cover the heel of a user's foot, and may have the general shape of a hemisphere. When viewed perspectivevly from the side, heel area 150 may appear to have an outline with two 90° angles two of its opposite sides - one of these angles, located on the right side of sock 100, is shown at a, and the opposite angle is not visible in Fig. 1. In other embodiments, the angles may have different measurements - for example, 95°, 85°, 81° or the like. The essentially hemispherical shape of heel area 150 may become more apparent when viewed from the rear side of sock 100. Such view is illustrated in Fig. 5, in which a heel area, that may be identical or similar to heel area 150 of Fig. 1, is shown at 550. As can be noticed when observing Fig. 5, heel area 550 may have a round or a somewhat oval outline when viewed from the rear. The round or somewhat oval shape of heel area 550 may be, as already noted, essentially hemispherical, having a sphericity elevating generally towards the viewer - and therefore not observable in Fig. 5. Further observing now Fig. 5, a residual area, such as residual area 102 of Fig. 1, is shown at 502. The upper part of residual area 502, that is shown at 530, may essentially be directed towards the top opening of a sock (only partially shown in Fig. 5, and shown in whole at 100 in Fig. 1), whereas the lower part of residual area 502, that is shown at 532, may be directed towards the lower end and a toe area, such as toe area 110 shown in Fig. 1, of a sock, (only partially shown in Fig. 5, and shown in whole at 100 in Fig. 1).

[0037] Referring now to Fig. 1, heel area 150 may include a FIHEEL, such as FIHEEL 152, and a SEHEEL, such as SEHEEL 154. FIHEEL 152 and SEHEEL 154 may constitute adjacent regions of heel area 150. Exemplary SEHEEL 154 may extend over an essentially central portion of heel area 150, and may have the shape of essentially an ellipse extending horizontally, a central part of which is essentially perpendicularly protruding downwards. The shape of SEHEEL 154 may be better observed in Fig. 5, which shows it, at 554, from a rear view. SEHEEL 554 may be essentially located, when sock 100 of Fig. 1 is worn, below an area of the user's heel applying an essentially substantial force resulting from the user's body weight.

[0038] Similar to the exemplary heel area shown at 150 and 550 in Figs. 1 and 5, respectively, other embodiments

(some are not shown) may include further combinations of sub-areas, such as FIHEEL 152 and 552 and SEHEEL 154 and 554 shown in Figs. 1 and 5, respectively, optionally having various shapes, sizes, layouts, patterns and/or paths. For example, referring now to Fig. 6, a heel area, such as heel area 650, may be essentially vertically divided into two halves- a FIHEEL, such as FIHEEL 652, and a SEHEEL, SEHEEL 654.

[0039] It will become apparent to those of skill in the art, that the embodiments of a heel area shown at 150, 550 and 650 in Figs. 1, 5 and 6, respectively, represent merely three examples of possible shapes, sizes, layouts, patterns and/or paths of sub-areas of a heel area. Those of skill in the art will recognize that various other possibilities and combinations may exist, all of which are within the intended scope of this disclosure.

[0040] Similar to what was disclosed herein in section 1 ("The Toe Area"), sub- areas of a heel area, such as FIHEEL 152, 552 and 652, SEHEEL 154, 554 and 654 of heel area 150, 550 and 650 shown in Figs. 1, 5 and 6, respectively, may also abut each other, as well as optionally abut a residual area, such as residual area 102 and 502 shown in Figs. 1 and 5, respectively. Such abutting may occur along borderlines, such as third borderline 156 and fourth borderline 158 shown in Fig. 1, and along respective third borderline 556 and fourth borderline 558 shown in Fig. 5. The different methods of essentially functionally connecting, attaching or integrally forming different sub-areas and/or a residual area, may be similar to the methods already disclosed herein in section 1. It will become apparent to those of skill in the art, that methods such as those disclosed in section 1, are fully applicable here, and therefore do not require repetition.

[0041] Additionally, descriptions of combinations of yarn types, yarn thicknesses, yarn colors, knitting types and the like, that were already disclosed in section 1, may apply also to a heel area, such as heel area 150, 550 and 650 shown in Figs. 1, 5 and 6, respectively. It will become apparent to those of skill in the art, that yarn types, yarn thicknesses, yarn colors, knitting types and the like, such as those disclosed in section 1, are fully applicable here, and therefore do not require repetition. Furthermore, it will become apparent to those of skill in the art, that the description in section 1 of benefits and advantages of forming a sock, such as sock 100 shown in Fig. 1, with multiple sub-areas of a heel area, such as FIHEEL 152, 552 and 652, SEHEEL 154, 554 and 654 of heel area 150, 550 and 650 shown in Figs. 1, 5 and 6, respectively, is fully applicable here, and therefore does not require repetition. In addition to what was disclosed in section 1, the specified shape and/or location of a SEHEEL, such as SEHEEL 554 shown in Fig. 5, may be especially advantageous in cushioning and/or supporting an area of the user's heel located essentially above it when the sock, such as sock 100 shown in Fig. 1 is worn. Such area of the user's foot may concentrate an essentially substantial force, resulting from the user's body weight and applied essentially downwards. There-

fore, providing a SEHEEL, such as SEHEEL 554 shown in Fig. 5, having cushioning and/or supportive characteristics (such as when forming it with a relatively soft, rigid and/or soft cloth) may be advantageous.

[0042] Reference is now made to Fig. 7, which schematically illustrates a knitting pattern of the toe area, according to the invention. The knitting pattern 700 includes a top side 702 (which is adapted to fit the top side of the toes) and a bottom side 704 which is adapted to fit the bottom side of the toes. The top side 702 and the bottom side 704 are separated by line 706 (which may optionally an imaginary line). The top side 702 includes two sub areas, namely, sub-area 708 and sub-area 710 which are separated by a separating zone 712 which extends in parallel to the central axis of formation of the sock. Each one of sub-area 708 and sub-area 710 includes horizontal knitted sections 716 (which extends perpendicular to the central axis of formation of the sock) such as sections 716 a-f. Knitted sections 716 a, c and e of sub-area 710 are intermittently positioned and with knitted sections 716 b, d and of sub-area 708. The knitted sections of sub-area 710, such as knitted sections 716 a, c and the knitted sections of sub-area 708, such as knitted sections 716 b, d and f are intermittently positioned and partially overlap in the separating zone 712. The bottom side 704 shown herein includes only one sub-area, but may include two or more sub-areas, such as those described for the top side 702.

- Fig. 8 schematically shows a magnified plan view of the knitting area 730 of Fig. 7.

[0043] Knitted section 816 c includes two parallel and adjacent knitted lines, namely knitted line 818 c and knitted line 820 c. Each one of knitted line 818 c and knitted line 820 c includes a plurality of abutting columns. The columns of knitted line 818 c are sequentially numbered 1, 2, 3, ..., n, n+1, ..., k. The columns of knitted line 820 c are sequentially numbered 1', 2', 3', ..., n'-1, n', n'+1, ..., k'. Each column represents the potential location of a needle. The needles (not shown), which are adapted to operate in a "selected needle by needle" mode can be in a knitting position (in other words in a "clear level"), if selected to knit, or in a "miss level" position, wherein the needle will not knit. Therefore, columns which represent needles in a knitting position (clear level) will include a knitted loop and columns, which represent miss needles will not include a knitted loop.

[0044] The number of columns in knitted line 818 c is k. Columns 1 to n-2 and n include knitted loops, while column n-1 and columns n+1 to k do not include a knitted loop.

[0045] The number of columns in knitted line 820 c is k'. Columns 1 to n'-1 include knitted loops. Columns n' to k' do not include knitted loops. The number n may be equal to n'. The number k may be equal to k'.

[0046] Knitted section 816 d includes two parallel and adjacent knitted lines, namely knitted line 818 d and knitted line 820 d. Each one of knitted line 818 d and knitted line 820 d includes a plurality of abutting columns. The columns of knitted line 818 d are sequentially numbered (from the opposite side relative to the numbering of knitted line 818 c and knitted line 820 c) 1*, 2*, 3* ..., m* m*+1, ..., k*. The columns of knitted line 820 c are sequentially numbered 1**, 2**, 3**, ..., m** -1, m**, m**+1, ..., k**. Each column represents the potential location of a needle. The number of columns in knitted line 818 d is k*. Columns 1* to m* -2 and m* include knitted loops, while column m* -1 and columns m*+1 to k* do not include a knitted loop. The number of columns in knitted line 820 d is k**. Columns 1 to m** -1 include knitted loops. Columns m** to k** do not include knitted loops. The number m** may be equal to m**. The number k may be equal to k', to k* and/or to k**.

[0047] The separating zone 812 includes columns n, n-1 in parallel to n', n'-1 in parallel to m*, m* -1 in parallel to m**, m** -1, which when repeated multiple times results in a zipper like structure. Of course any other knitting pattern that may result in a zipper like structure that is located between two adjacent sub-areas is covered under the scope of this disclosure. For example, wherein any one (one or more) of columns n, n-1, n', n'-1, m*, m* -1, m**, m** -1 (or any other column) may represent two or more needles positions and may thus result in two or more loops when knitted.

3. A Knitting Process, According to Some Embodiments

EXAMPLES:

[0048] The following non-limiting options (examples) are for illustrative purposes; of course other configuration of yarn fingers and/or types of yarn (color, material, properties and like) may be used in any possible combination. For example, the plaiting yarn(s) and/or the background yarn(s) may be knitted through any other yarn finger or any combinations of yarn fingers.

[0049] Option 1 : One plaiting yarn for the heel and/or toe with different background. The plaiting yarn is knitted through yarn finger No. 4.

[0050] The background yarns in the different areas (such as areas A and B) are knitted through yarn fingers as follows:

No. 3 - sub-area 708

No. 5 - sub-area 710

Option 2:

[0051] Different plaiting yarn for the heel and/or toe areas with different background.

[0052] The plaiting yarns are knitted through yarn fingers

No. 4 - sub-area 710

No. 2 - sub-area 708

[0053] The background yarns in the different areas (such as areas A and B) are knitted through yarn fingers as follows:

No. 3 - sub-area 708

No. 5 - sub-area 710

[0054] The reciprocated areas of the sock, such as the heel and/or the toe areas, may be knitted with a knitting principle of the three dimensional knitting by the use of selection of needles (such as electronic selection of needles) and optionally without the usage of the needle pickers.

[0055] On the first course (for example, when starting knitting a line) forward rotation of the reciprocated part of the sock is performed, while two yarn fingers are entering to the knitting process (yarn fingers 4 & 5, which are the yarns of sub-area 710) and all other yarn fingers are temporarily inactive. Each of the needles knit in the same line, however the last needle of sub-area 710 is missed. On the same line, the first needle of sub-area 708 is clear needle (the needle knits) and all other needles in this line are in miss level (do not knit). The second course (course 2) is a backward rotation and all needles are in miss level. On that course (course 2) in option 1 yarn finger 3 is going in, in option 2 yarn fingers 2&3 are going in (yarns of sub-area 708). The next course (course 3) is forward rotation course. Yarns of sub-area 710 are going out and only the selected needles of sub-area 708 are in clear level while all the others are in miss level. On the next backward rotation (course 4) the last needle of sub-area 710 is in clear level, the first needle of sub-area 708 is in miss level and only the needles of sub-area 708 (besides the first) are in clear levels while all the others are in miss levels. On the next forward course (course 5) all needles are in miss level, the yarns of sub-area 710 are going in. On the next backward rotation (course 6), yarn fingers of sub-area 708 are going out, only the needles of sub-area 710 are in clear level while all the others are miss needles. On the next forward rotation (course 7), the last needle of sub-area 710 is miss needle, the first of sub-area 708 is clear needle and only the rest of the needles of 710 area are clear needles while all the other are miss needles.

[0056] From this point the process repeats on courses 2 to 7 until the end of the reciprocated part of the sock. The position of the binding line of the two areas may be changed according to the design of the sock.

Claims

1. A sock (100, 400) comprising a toe area (110, 210), wherein said toe area is divided to at least two sub-areas (106, 108, 206, 208, 212, 816c, 816d), wherein

at least two adjacent sub-areas abut each other along a first borderline (104, 812) which is substantially parallel to a central axis (580) of the sock, wherein the at least two adjacent sub-areas (106, 108, 206, 208, 212, 816c, 816d) are integrally formed with each other along the first borderline by knitting, the sock being **characterized in that** a first (816c) of said two sub-areas includes two parallel and adjacent knitted lines (818c, 820c), each one of the adjacent knitted lines including corresponding abutting columns 1, 2, 3, ..., n, n+1, ..., k; 1', 2', 3', ..., n', n'+1, ..., k', each column representing a potential location of a knitted loop, wherein columns 1 to n-2 and n of one of the knitted lines (818c) include knitted loops while columns n-1 and n+1 to k do not include knitted loops, wherein columns 1' to n'-1 of the other of the adjacent knitted lines (820c) include knitted loops while columns n' to k' do not include knitted loops, wherein a second (816d) of said two sub-areas includes two parallel and adjacent knitted lines (818d, 820d), each one of the adjacent knitted lines including corresponding abutting columns 1*, 2*, 3*, ..., m*, m*+1, ..., k*; 1**, 2**, 3**, ..., m**, m**+1, ..., k**, each column representing a potential location of a knitted loop, wherein columns 1* to m*-2 and m* of one of the knitted lines (818d) include knitted loops while columns m*-1 to and m*+1 to k* do not include knitted loops, wherein columns 1** to m**-1 of the other of the adjacent knitted lines (820d) include knitted loops while columns m** to k** do not include knitted loops, wherein a separating zone (812) forming the border line includes first columns n, n-1 in parallel to n', n'-1 in parallel to m*, m*-1 in parallel to m**, m**-1, which are repeated multiple times to result in a zipper like structure.

2. The sock (100, 400) according to claim 1, **characterized in that** the at least two subareas (106, 108, 206, 208, 212, 816c, 816d) are distinguished from each other by at least one property, wherein the at least one property comprises at least one of: elasticity, strength, softness, thermal isolation, friction, density, thickness, liquid absorption, shock absorption, knitting type, yarn composition, yarn thickness, yarn count, yarn elasticity, yarn strength, wherein the friction relates to a friction between a foot of a wearer and a shoe, and wherein the yarn composition relates to a yarn type, e.g. natural yarns such as cotton and wool yarns, man-made yarns such as viscose yarns, synthetic yarns such as polyester, nylon and polypropylene yarns and the like, and other yarns composition including any combination and ratios of materials.

3. The sock (100, 400) according to claim 1 or claim 2, **characterized in that** said at least two adjacent sub-areas (106, 108, 206, 208, 212, 816c, 816d) are integrally formed with a residual area (102, 402) of the

sock (100, 400) by knitting.

4. The sock (100, 400) according to any one of claims 1-3, **characterized in that** said at least two adjacent sub-areas (106, 108, 206, 208, 212, 816c, 816d) are formed during a knitting process of the sock. 5
5. The sock (100, 400) according to any one of claims 1-4, **characterized in that** the at least two sub-areas (106, 108, 206, 208, 212, 816c, 816d) are further distinguished from each other by yarn color. 10
6. The sock (100, 400) according to any one of claims 1 to 5, **characterized in that** the sock comprises a heel area (150, 650), wherein said heel area is divided into at least two sub-areas, wherein a second borderline between at least two adjacent sub-areas of the heel area is substantially parallel to the central axis (580) of the sock. 15
7. The sock (100, 400) according to claim 6, **characterized in that** said at least two adjacent sub-areas (152, 154, 652, 654) of the heel area (150, 650) are integrally formed. 20
8. The sock (100, 400) according to claim 6 or 7, **characterized in that** said at least two adjacent sub-areas (152, 154, 652, 654) of the heel area (150, 650) are integrally formed with a residual area (102, 402) of the sock (100, 400) by knitting. 25
9. The sock (100, 400) according to claim 7 or 8, **characterized in that** said at least two adjacent sub-areas (106, 108, 206, 208, 212, 816c, 816d) are integrally formed with each other along the second borderline by knitting. 30
10. The sock (100, 400) according to any one of claims 6 to 9, **characterized in that** said at least two adjacent sub-areas (152, 154, 652, 654) of the heel area (150, 650) 15 are formed during a knitting process of the sock. 40
11. The sock (100, 400) according to any one of claims 6 to 10, **characterized in that** at least two sub-areas (152, 154, 652, 654) of the heel area (150, 650) are distinguished from each other by at least one property, wherein the at least one property comprises at least one of: elasticity, strength, softness, thermal isolation, friction, density, thickness, liquid absorption, shock absorption, yarn color, knitting type, yarn composition, yarn thickness, yarn count, yarn elasticity, yarn strength, wherein the friction relates to a friction between a foot of a wearer and a shoe, and wherein the yarn composition relates to a yarn type, e.g. natural yarns such as cotton and wool yarns, man-made yarns such as viscose yarns, synthetic yarns such as polyester, nylon and polypropylene 45

yarns and the like, and other yarns composition including any combination and ratios of materials.

12. A method for manufacturing the sock (100, 400) according to any one of claims 1 to 11, which comprises a forming step of forming the toe area (110, 210) divided into the at least two sub-areas (106, 108, 206, 208, 212, 816c, 816d) with the first borderline (104) between the at least two adjacent sub-areas of the toe area, wherein the first borderline is substantially parallel to the central axis (580) of the sock. 5
13. The method according to claim 12, **characterized in that** it further comprises a forming step for forming the heel area (150, 650) divided into at least two sub-areas (152, 154, 652, 654), wherein the at least two sub-areas abut each other at the second borderline. 10
14. The method according to claim 12, **characterized in that** said forming is performed by at least one needle being in a knitting position and at least one needle being in a miss level position. 15
15. The method according to claims 12 and 13, **characterized in that** the first sub-area and the second sub-area are distinguished from each other by at least one property, wherein the at least one property comprises at least one of: elasticity, strength, softness, thermal isolation, friction, density, thickness, liquid absorption, shock absorption, yarn color, knitting type, yarn composition, yarn thickness, yarn count, yarn elasticity, yarn strength, wherein the friction relates to a friction between a foot of a wearer and a shoe, and wherein the yarn composition relates to a yarn type, e.g. natural yarns such as cotton and wool yarns, man-made yarns such as viscose yarns, synthetic yarns such as polyester, nylon and polypropylene yarns and the like, and other yarns composition including any combination and ratios of materials. 20

Patentansprüche

1. Socke (100, 400) mit einem Zehenbereich (110, 210), wobei der Zehenbereich in mindestens zwei Teilbereiche (106, 108, 206, 208, 212, 816c, 816d) unterteilt ist, wobei mindestens zwei benachbarte Teilbereiche entlang einer ersten Begrenzungslinie (104, 812) aneinanderstoßen, die im Wesentlichen parallel zu einer Mittelachse (580) der Socke verläuft, wobei die mindestens zwei benachbarten Teilbereiche (106, 108, 206, 208, 212, 816c, 816d) entlang der ersten Begrenzungslinie durch Stricken einstückig miteinander ausgebildet sind, wobei die Socke **dadurch gekennzeichnet ist, dass** ein erster (816c) der beiden Teilbereiche zwei parallele und benachbarte gestrickte Linien (818c, 820c) umfasst, 45

- wobei jede der benachbarten gestrickten Linien entsprechende aneinanderstoßende Spalten 1, 2, 3, ..., n, n+1, ..., k; 1', 2', 3', ..., n', n'+1, ..., k' umfasst, wobei jede Spalte eine potentielle Position einer gestrickten Schlaufe darstellt, wobei die Spalten 1 bis n-2 und n einer der gestrickten Linien (818c) gestrickte Schlaufen aufweisen, während die Spalten n-1 und n+1 bis k keine gestrickten Schlaufen aufweisen, wobei die Spalten 1' bis n'-1 der anderen der benachbarten gestrickten Linien (820c) gestrickte Schlaufen aufweisen, während die Spalten n' bis k' keine gestrickten Schlaufen aufweisen, wobei ein zweiter (816d) der beiden Teilbereiche zwei parallele und benachbarte gestrickte Linien (818d, 820d) umfasst, wobei jede der benachbarten gestrickten Linien entsprechende aneinanderstoßende Spalten 1*, 2*, 3*, ..., m*, m*+1, ..., k*; 1**, 2**, 3**, ..., m**, m**+1, ..., k** umfasst, wobei jede Spalte eine potentielle Position einer gestrickten Schlaufe darstellt, wobei die Spalten 1* bis m*-2 und m* einer der gestrickten Linien (818d) gestrickte Schlaufen aufweisen, während die Spalten m*-1 bis und m*+1 bis k* keine gestrickten Schlaufen aufweisen, wobei die Spalten 1** bis m**-1 der anderen der benachbarten gestrickten Linien (820d) gestrickte Schlaufen aufweisen, während die Spalten m** bis k** keine gestrickten Schlaufen aufweisen, wobei eine Trennzone (812), die die Begrenzungslinie bildet, die ersten Spalten n, n-1 parallel zu n', n'-1 parallel zu m*, m*-1 parallel zu m**, m**-1 umfasst, die mehrfach wiederholt werden, um eine reiverschlussähnliche Struktur zu ergeben.
2. Socke (100, 400) nach Anspruch 1, **dadurch gekennzeichnet, dass** die mindestens zwei Teilbereiche (106, 108, 206, 208, 212, 816c, 816d) durch mindestens eine Eigenschaft voneinander unterschieden werden, wobei die mindestens eine Eigenschaft mindestens eine der folgenden Eigenschaften umfasst: Elastizität, Festigkeit, Weichheit, thermische Isolierung, Reibung, Dichte, Dicke, Flüssigkeitsaufnahme, Stodämpfung, Strickart, Garnzusammensetzung, Garndicke, Garnfeinheit, Garnelastizität, Garnfestigkeit, wobei sich die Reibung auf eine Reibung zwischen einem Fuß eines Trägers und einem Schuh bezieht, und wobei sich die Garnzusammensetzung auf einen Garn typ, z.B. natürliche Garne wie Baumwoll- und Wollgarne, künstliche Garne wie Viskosegarne, synthetische Garne wie Polyester-, Nylon- und Polypropylengarne und dergleichen und auf andere Garnzusammensetzungen einschließlich beliebiger Materialkombinationen und Materialverhältnisse bezieht.
 3. Socke (100, 400) nach Anspruch 1 oder Anspruch 2, **dadurch gekennzeichnet, dass** die mindestens zwei benachbarten Teilbereiche (106, 108, 206, 208, 212, 816c, 816d) durch Stricken mit einem verbleibenden Bereich (102, 402) der Socke (100, 400) einstückig ausgebildet sind.
 4. Socke (100, 400) nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** die mindestens zwei benachbarten Teilbereiche (106, 108, 206, 208, 212, 816c, 816d) während eines Vorgangs zum Stricken der Socke gebildet werden.
 5. Socke (100, 400) nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die mindestens zwei Teilbereiche (106, 108, 206, 208, 212, 816c, 816d) ferner durch die Garnfarbe voneinander unterschieden werden.
 6. Socke (100, 400) nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Socke einen Fersenbereich (150, 650) aufweist, wobei der Fersenbereich in mindestens zwei Teilbereiche unterteilt ist, wobei eine zweite Begrenzungslinie zwischen mindestens zwei benachbarten Teilbereichen des Fersenbereichs im Wesentlichen parallel zur Mittelachse (580) der Socke verläuft.
 7. Socke (100, 400) nach Anspruch 6, **dadurch gekennzeichnet, dass** die mindestens zwei benachbarten Teilbereiche (152, 154, 652, 654) des Fersenbereichs (150, 650) einstückig ausgebildet sind.
 8. Socke (100, 400) nach Anspruch 6 oder 7, **dadurch gekennzeichnet, dass** die mindestens zwei benachbarten Teilbereiche (152, 154, 652, 654) des Fersenbereichs (150, 650) durch Stricken mit einem verbleibenden Bereich (102, 402) der Socke (100, 400) einstückig ausgebildet sind.
 9. Socke (100, 400) nach Anspruch 7 oder 8, **dadurch gekennzeichnet, dass** die mindestens zwei benachbarten Teilbereiche (106, 108, 206, 208, 212, 816c, 816d) durch Stricken entlang der zweiten Begrenzungslinie einstückig miteinander ausgebildet sind.
 10. Socke (100, 400) nach einem der Ansprüche 6 bis 9, **dadurch gekennzeichnet, dass** die mindestens zwei benachbarten Teilbereiche (152, 154, 652, 654) des Fersenbereichs (150, 650) während eines Vorgangs zum Stricken der Socke gebildet werden.
 11. Socke (100, 400) nach einem der Ansprüche 6 bis 10, **dadurch gekennzeichnet, dass** mindestens zwei Teilbereiche (152, 154, 652, 654) des Fersenbereichs (150, 650) durch mindestens eine Eigenschaft voneinander unterschieden werden, wobei die mindestens eine Eigenschaft mindestens eine der folgenden Eigenschaften umfasst: Elastizität, Festigkeit, Weichheit, thermische Isolierung, Rei-

bung, Dichte, Dicke, Flüssigkeitsaufnahme, Stoßdämpfung, Garnfarbe, Strickart, Garnzusammensetzung, Garndicke, Garnfeinheit, Garnelastizität, Garnfestigkeit, wobei sich die Reibung auf eine Reibung zwischen einem Fuß eines Trägers und einem Schuh bezieht, und wobei sich die Garnzusammensetzung auf einen Garntyp, z.B. natürliche Garne wie Baumwoll- und Wollgarne, künstliche Garne wie Viskosegarne, synthetische Garne wie Polyester-, Nylon- und Polypropylengarne und dergleichen und auf andere Garnzusammensetzungen einschließlich beliebiger Materialkombinationen und Materialverhältnisse bezieht.

12. Verfahren zur Herstellung der Socke (100, 400) nach einem der Ansprüche 1 bis 11, das einen Formschnitt zum Formen des Zehenbereichs (110, 210) umfasst, der in die mindestens zwei Teilbereiche (106, 108, 206, 208, 212, 816c, 816d) unterteilt ist, wobei die erste Begrenzungslinie (104) zwischen den mindestens zwei benachbarten Teilbereichen des Zehenbereichs liegt, wobei die Begrenzungslinie im Wesentlichen parallel zur Mittelachse (580) der Socke verläuft.
13. Verfahren nach Anspruch 12, **dadurch gekennzeichnet, dass** es ferner einen Formschnitt zum Formen des Fersenbereichs (150, 650) umfasst, der in mindestens zwei Teilbereiche (152, 154, 652, 654) unterteilt ist, wobei die mindestens zwei Teilbereiche an der zweiten Begrenzungslinie aneinanderstoßen.
14. Verfahren nach Anspruch 12, **dadurch gekennzeichnet, dass** das Formen durch mindestens eine Nadel, die sich in einer Strickposition befindet, und mindestens eine Nadel, die sich in einer Überspringenposition befindet, durchgeführt wird.
15. Verfahren nach den Ansprüchen 12 und 13, **dadurch gekennzeichnet, dass** der erste Teilbereich und der zweite Teilbereich durch mindestens eine Eigenschaft voneinander unterschieden werden, wobei die mindestens eine Eigenschaft mindestens eine der folgenden Eigenschaften umfasst: Elastizität, Festigkeit, Weichheit, thermische Isolierung, Reibung, Dichte, Dicke, Flüssigkeitsaufnahme, Stoßdämpfung, Garnfarbe, Strickart, Garnzusammensetzung, Garndicke, Garnfeinheit, Garnelastizität, Garnfestigkeit, wobei sich die Reibung auf eine Reibung zwischen einem Fuß eines Trägers und einem Schuh bezieht, und wobei sich die Garnzusammensetzung auf einen Garntyp, z.B. natürliche Garne wie Baumwoll- und Wollgarne, künstliche Garne wie Viskosegarne, synthetische Garne wie Polyester-, Nylon- und Polypropylengarne und dergleichen und auf andere Garnzusammensetzungen einschließlich beliebiger Materialkombinationen und Materialverhältnisse bezieht.

Revendications

1. Chaussette (100, 400) comprenant une zone d'orteils (110, 210), la zone d'orteils étant divisée en au moins deux sous-zones (106, 108, 206, 208, 212, 816c, 816d), au moins deux sous-zones adjacentes étant en butée l'une contre l'autre suivant une première ligne limite (104, 812) qui est sensiblement parallèle à un axe médian (580) de la chaussette, lesdites au moins deux sous-zones adjacentes (106, 108, 206, 208, 212, 816c, 816d) étant réalisées d'un seul tenant l'une avec l'autre par tricotage le long de la première ligne limite, la chaussette étant **caractérisée en ce qu'**une première (816c) des deux sous-zones comprend deux lignes tricotées parallèles et adjacentes (818c, 820c), chacune des lignes tricotées adjacentes comprenant des colonnes correspondantes en butée 1, 2, 3, ..., n, n+1, ..., k; 1', 2', 3', ..., n', n'+1, ..., k', chaque colonne représentant un emplacement potentiel d'une boucle tricotée, les colonnes 1 à n-2 et n de l'une des lignes tricotées (818c) comprenant des boucles tricotées tandis que les colonnes n-1 et n+1 à k ne comprennent pas de boucles tricotées, les colonnes 1' à n'-1 de l'autre des lignes tricotées adjacentes (820c) comprenant des boucles tricotées tandis que les colonnes n' à k' ne comprennent pas de boucles tricotées, une deuxième (816d) des deux sous-zones comprenant deux lignes tricotées parallèles et adjacentes (818d, 820d), chacune des lignes tricotées adjacentes comprenant des colonnes correspondantes en butée 1*, 2*, 3*, ..., m*, m*+1, ..., k*; 1**, 2**, 3**, ..., m**, m**+1, ..., k**, chaque colonne représentant un emplacement potentiel d'une boucle tricotée, les colonnes 1* à m*-2 et m* de l'une des lignes tricotées (818d) comprenant des boucles tricotées tandis que les colonnes m*-1 à et m*+1 à k* ne comprennent pas de boucles tricotées, les colonnes 1** à m**-1 de l'autre des lignes tricotées adjacentes (820d) comprenant des boucles tricotées tandis que les colonnes m** à k** ne comprennent pas de boucles tricotées, une région de séparation (812) formant la ligne limite comprenant des premières colonnes n, n-1 en parallèle à n', n'-1 en parallèle à m*, m*-1 en parallèle à m**, m**-1, lesquelles sont répétées plusieurs fois de manière à obtenir une structure de fermeture à glissière.
2. Chaussette (100, 400) selon la revendication 1, **caractérisée en ce que** lesdites au moins deux sous-zones (106, 108, 206, 208, 212, 816c, 816d) sont distinguées l'une de l'autre par au moins une propriété, ladite au moins une propriété comprenant au moins l'une des propriétés suivantes : élasticité, solidité, douceur, isolation thermique, frottement, densité, épaisseur, absorption de liquide, absorption de choc, type de tricot, composition de fil, épaisseur de fil, finesse de fil, élasticité de fil, solidité de fil, le frot-

- tement se rapportant à un frottement entre un pied du porteur et une chaussure, et la composition du fil se rapportant à un type de fil, par exemple les fils naturels tels que les fils de coton et de laine, les fils artificiels tels que les fils de viscose, les fils synthétiques tels que les fils de polyester, de nylon et de polypropylène et similaires, et à d'autres compositions de fils, y compris toute combinaison et tout rapport de matériaux.
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3. Chaussette (100, 400) selon la revendication 1 ou la revendication 2, **caractérisée en ce que** lesdites au moins deux sous-zones adjacentes (106, 108, 206, 208, 212, 816c, 816d) sont réalisées d'un seul tenant avec une zone résiduelle (102, 402) de la chaussette (100, 400) par tricotage.
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4. Chaussette (100, 400) selon l'une des revendications 1 à 3, **caractérisée en ce que** lesdites au moins deux sous-zones adjacentes (106, 108, 206, 208, 212, 816c, 816d) sont formées pendant un processus de tricotage de la chaussette.
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5. Chaussette (100, 400) selon l'une des revendications 1 à 4, **caractérisée en ce que** lesdites au moins deux sous-zones (106, 108, 206, 208, 212, 816c, 816d) sont en outre distinguées l'une de l'autre par la couleur du fil.
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6. Chaussette (100, 400) selon l'une des revendications 1 à 5, **caractérisée en ce que** la chaussette comprend une zone de talon (150, 650), la zone de talon étant divisée en au moins deux sous-zones, une deuxième ligne limite entre au moins deux sous-zones adjacentes de la zone de talon étant sensiblement parallèle à l'axe médian (580) de la chaussette.
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7. Chaussette (100, 400) selon la revendication 6, **caractérisée en ce que** lesdites au moins deux sous-zones adjacentes (152, 154, 652, 654) de la zone de talon (150, 650) sont réalisées d'un seul tenant.
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8. Chaussette (100, 400) selon la revendication 6 ou 7, **caractérisée en ce que** lesdites au moins deux sous-zones adjacentes (152, 154, 652, 654) de la zone de talon (150, 650) sont réalisées d'un seul tenant avec une zone résiduelle (102, 402) de la chaussette (100, 400) par tricotage.
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9. Chaussette (100, 400) selon la revendication 7 ou 8, **caractérisée en ce que** lesdites au moins deux sous-zones adjacentes (106, 108, 206, 208, 212, 816c, 816d) sont réalisées d'un seul tenant l'une avec l'autre par tricotage le long de la deuxième ligne limite.
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10. Chaussette (100, 400) selon l'une des revendications 6 à 9, **caractérisée en ce que** lesdites au moins deux sous-zones adjacentes (152, 154, 652, 654) de la zone de talon (150, 650) sont formées pendant un processus de tricotage de la chaussette.
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11. Chaussette (100, 400) selon l'une des revendications 6 à 10, **caractérisée en ce qu'**au moins deux sous-zones (152, 154, 652, 654) de la zone de talon (150, 650) se distinguent l'une de l'autre par au moins une propriété, ladite au moins une propriété comprenant au moins l'une des propriétés suivantes : élasticité, solidité, douceur, isolation thermique, frottement, densité, épaisseur, absorption de liquide, absorption de choc, couleur de fil, type de tricot, composition de fil, épaisseur de fil, finesse de fil, élasticité de fil, solidité de fil, le frottement se rapportant à un frottement entre un pied du porteur et une chaussure, et la composition du fil se rapportant à un type de fil, par exemple les fils naturels tels que les fils de coton et de laine, les fils artificiels tels que les fils de viscose, les fils synthétiques tels que les fils de polyester, de nylon et de polypropylène et similaires, et à d'autres compositions de fils, y compris toute combinaison et tout rapport de matériaux
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12. Procédé de fabrication de la chaussette (100, 400) selon l'une des revendications 1 à 11, lequel comprend une étape de formage de la zone d'orteils (110, 210) divisée en lesdites au moins deux sous-zones (106, 108, 206, 208, 212, 816c, 816d) avec la première ligne limite (104) entre lesdites au moins deux sous-zones adjacentes de la zone d'orteils, la première ligne limite étant sensiblement parallèle à l'axe médian (580) de la chaussette.
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13. Procédé selon la revendication 12, **caractérisé en ce qu'**il comprend en outre une étape de formage pour former la zone de talon (150, 650) divisée en au moins deux sous-zones (152, 154, 652, 654), lesdites au moins deux sous-zones étant en butée l'une contre l'autre au niveau de la deuxième ligne limite.
14. Procédé selon la revendication 12, **caractérisé en ce que** le formage est réalisé par au moins une aiguille qui se trouve en position de tricotage et au moins une aiguille qui se trouve en position de sautage de niveau.
15. Procédé selon les revendications 12 et 13, **caractérisé en ce que** la première sous-zone et la deuxième sous-zone se distinguent l'une de l'autre par au moins une propriété, ladite au moins une propriété comprenant au moins l'une des propriétés suivantes : élasticité, solidité, douceur, isolation thermique, frottement, densité, épaisseur, absorption de liquide, absorption de choc, couleur de fil, type de tricot, composition de fil, épaisseur de fil,

finesse de fil, élasticité de fil, solidité de fil, le frottement se rapportant à un frottement entre un pied du porteur et une chaussure, et la composition du fil se rapportant à un type de fil, par exemple les fils naturels tels que les fils de coton et de laine, les fils artificiels tels que les fils de viscose, les fils synthétiques tels que les fils de polyester, de nylon et de polypropylène et similaires, et à d'autres compositions de fils, y compris toute combinaison et tout rapport de matériaux

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Fig. 1

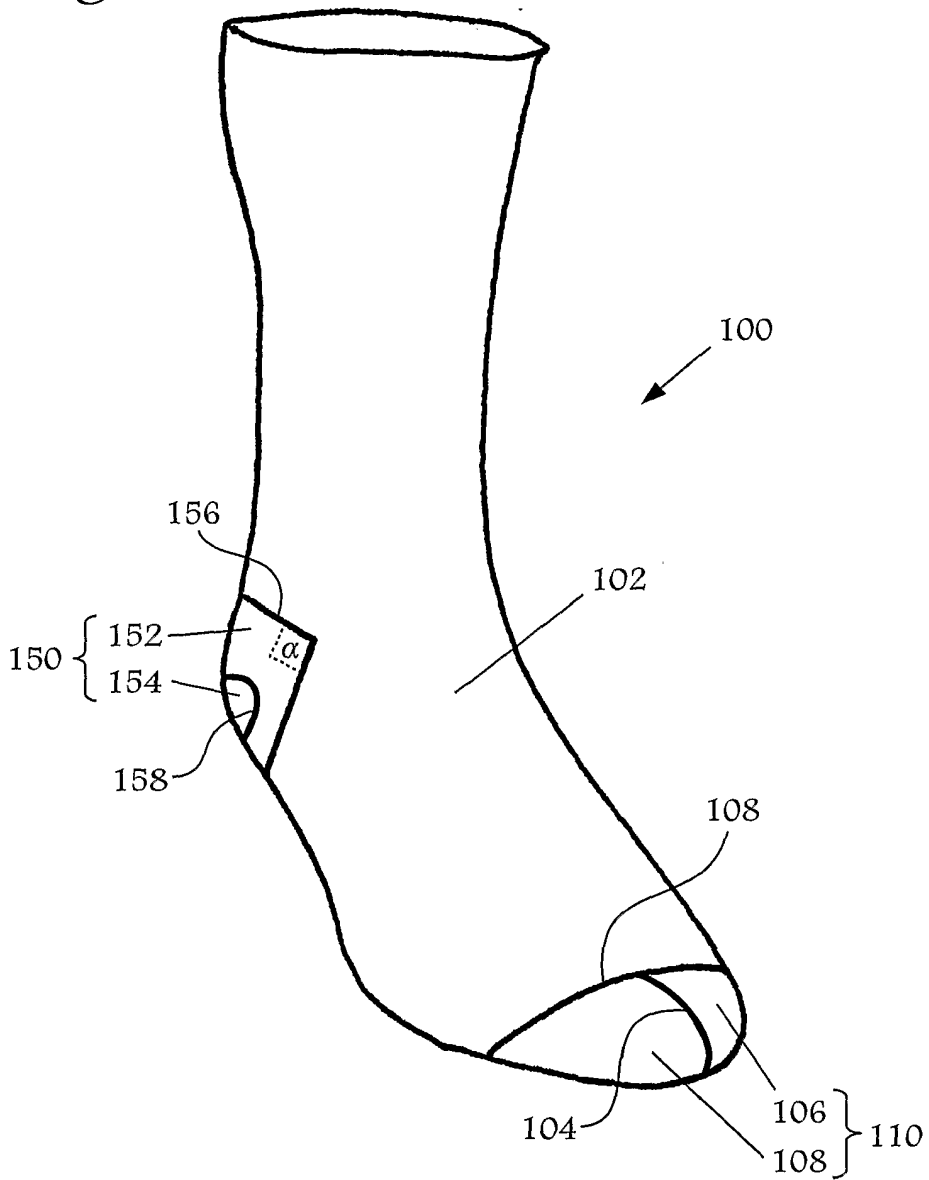


Fig. 2

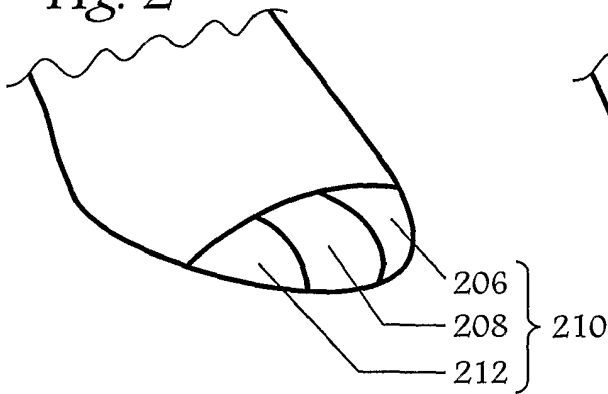


Fig. 3

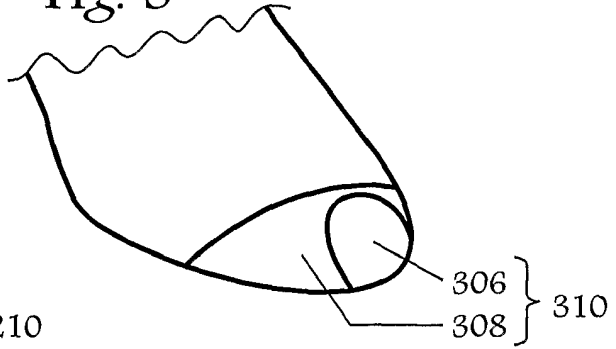


Fig. 4

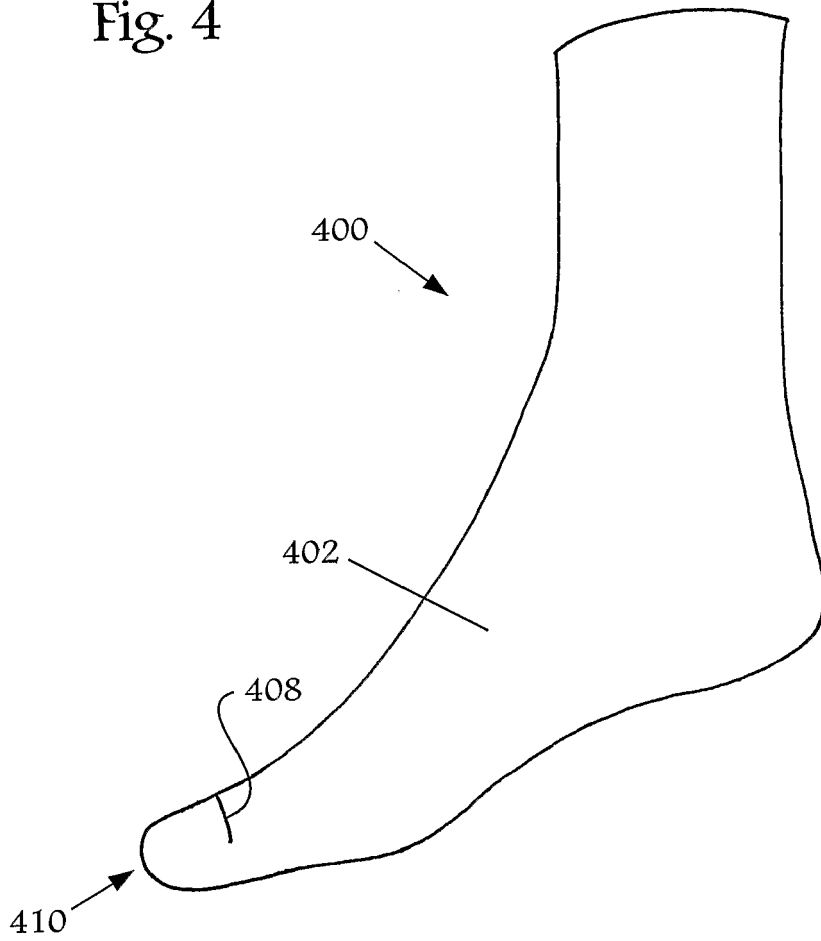


Fig. 5

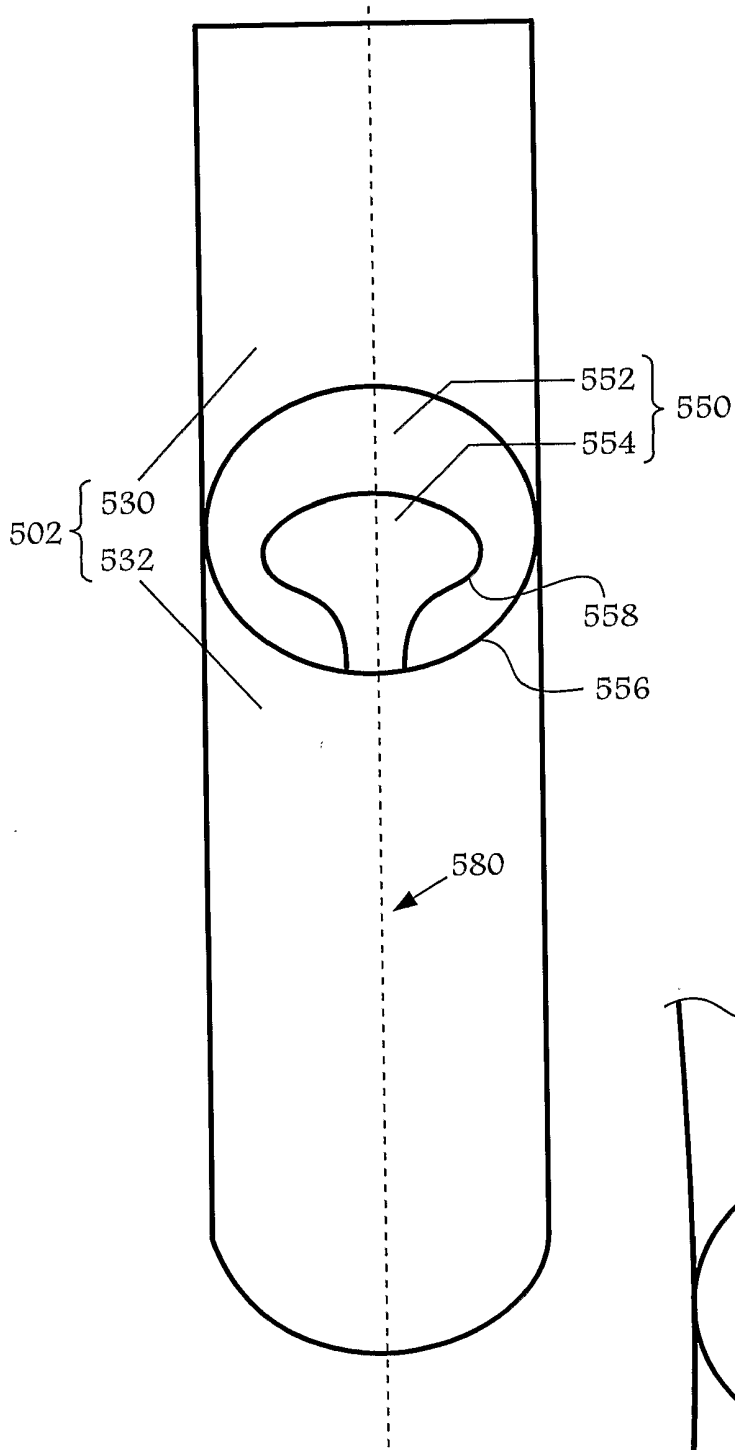
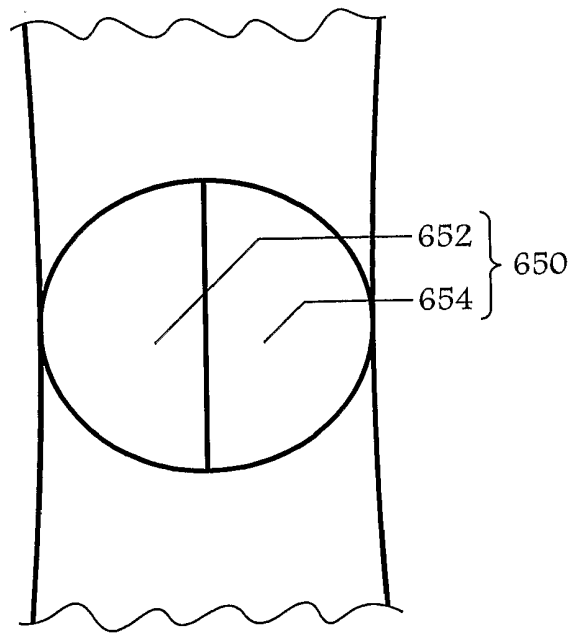


Fig. 6



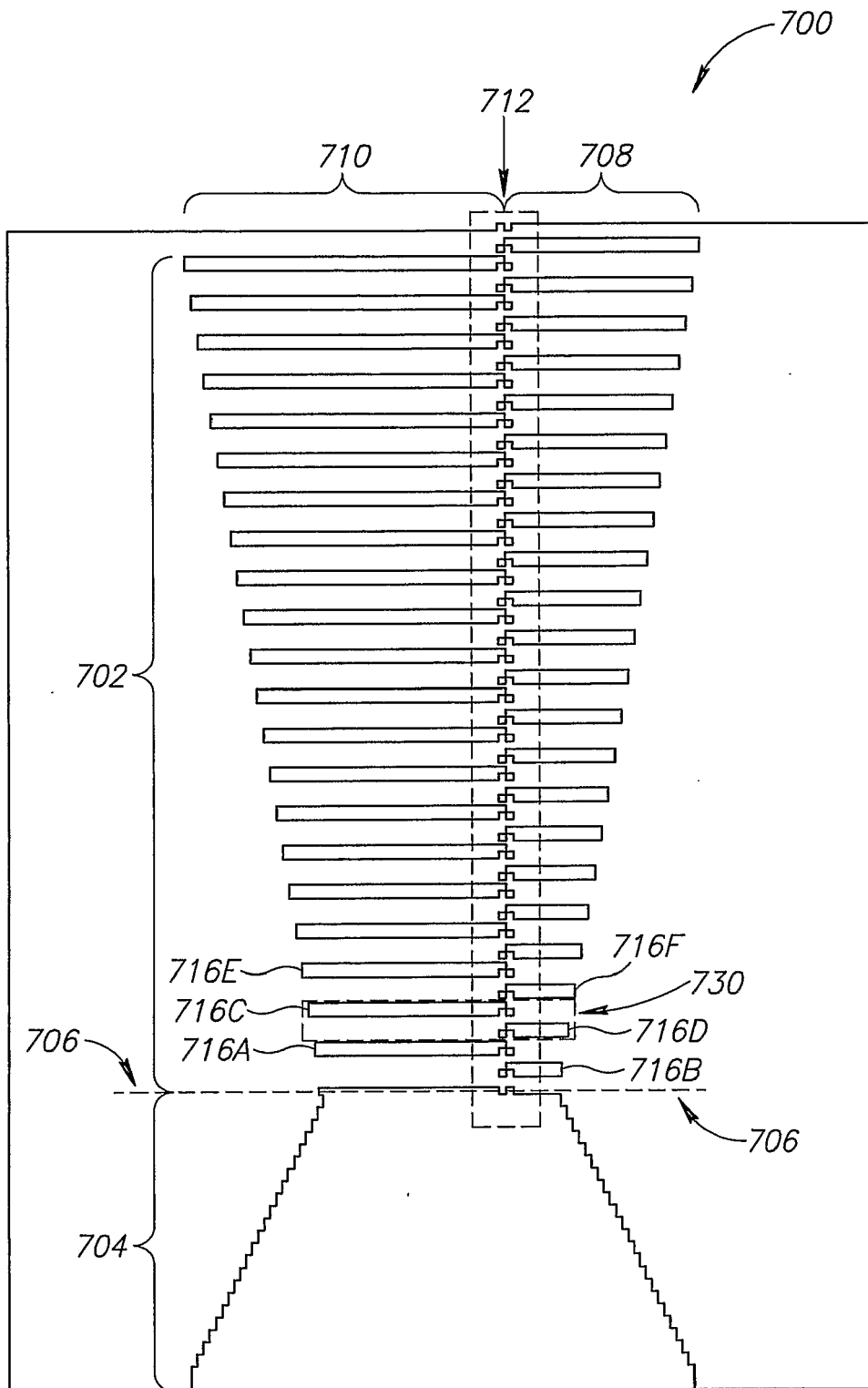
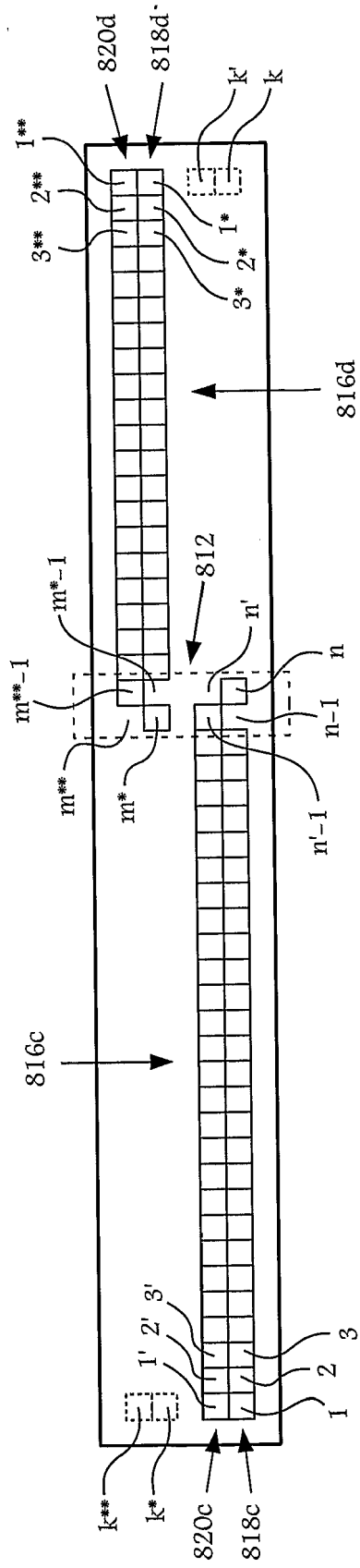


FIG. 7

Fig. 8



REFERENCES CITED IN THE DESCRIPTION

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