bottom end thereof.

[0013] With this arrangement, when a yarn carrier crosses with another yarn carrier, if their guides contact with each other, the contacting point will shift from an upper part to a lower part of side edges, and the yarn carriers will be flexed and will cross more closely. Thus impacts of the collision between these yarn carriers is moderated.

[0014] Preferably, said flat knitting machine having a yarn feeding system further comprises a member being located near the bottom end of said feeder rod and above the yarn feeding eyelet, surrounding the feeder rod, being thicker in an upper part thereof than in a lower end thereof, being tapered towards the yarn feeding eyelet, and having an ellipsiodal horizontal section having a major axis being parallel with the carrier rail and a minor axis being perpendicular to the carrier rail.

[0015] With this arrangement, when the yarn carrier cross another yarn carrier, on the side of their feeder rods, the members of which sections are elliptic will contact with each other. As they are free of angles, impacts of collision are moderate, and they push away from each other to separate the yarn carriers.

[0016] Preferably, said flat knitting machine having a yarn feeding system is characterized by a yarn feeding member mounted on a lower end of said feeder rod, tapered towards the trick gap, and having a bottom end forming said yarn feeding eyelet.

[0017] The yarn feeding member is tapered, and can be made thinner than the feeder rod. Hence the yarn feeding member at the bottom end of the feeder rod will not interfere with a yarn from another yarn carrier when the yarn carrier is moved.

[0018] Preferably, said plurality of carrier rails are arranged along an arc facing said trick gap.

[0019] With this arrangement, all the yarn carriers arranged over needle beds is made of the same shape. Moreover, the higher is the position, the greater is the clearance between the yarn carriers. Hence collision is prevented by raising feeder rods.

[0020] Further, preferably, said raising means comprises a spring having two ends, one end mounted on said base and one end mounted on the feeder rod, and pushing up the feeder rod; and

a second guide is mounted on said base and guides the feeder rod vertically.

[0021] With this arrangement, the feeder rod is pressed upward by the spring coil, and the vertical movement of the feeder rod is guided by the guide member.

[0022] Preferably, said flat knitting machine having a yarn feeding system furthere comprises:

a catching member for catching and trailing the yarn carrier and comprising a main part, a pin driven by a solenoid so as to descend from the main part, swing members swingably mounted on the main part, and a rotational arm having two ends and rotatably mounted at said two ends, one at said swing member and one at said pin; and

an engaging member formed on an upper end of the base of said yarn carrier and engageable with the pin of said catching member, wherein

said feeder rod has a top engageable with and pushed down by said swing member while the swing member is swung towards the top.

[0023] With this arrangement, before the catching member catches the yarn carrier, a swing member will be swung to a position at which the swing member will push down the top of the feeder rod, and while the catching member travels, the swing member pushes down the top of the feeder rod. When the catching member does not catch, the swing member swings to a position at which the member will not push down the top of the feeder rod. Hence the push-down distance of the feeder rod by the swing member is made longer than the downward stroke of the pin for catching.

[0024] Preferably, said flat knitting machine having a yarn feeding system is characterized by a pair of swing pieces provided on the upper end of said base, being able to swing in a vertical plane, and having a gap in between and respective ends at said gap pushed up, and by

said engaging member comprising said gap.

[0025] With this arrangement, with the travel of the catching member, initially the catching pin pushes down one swing member and runs onto it, and when the pin reaches the gap between the pair of swing members, the swing members will be pushed up by a spring coil and the catching pin will be locked by the pair of swing members. As a result, the yarn carrier is caught and trailed reliably.

[0026] Certain embodiments of the invention will now be described, by way of example only, and with reference to the accompanying drawings:

Fig. 1 is a side view of a flat knitting machine provided with a yarn feeding system of an embodiment.

Fig. 2 is a partially cutaway front view of the yarn feeding system of Fig. 1.

Fig. 3 is a side view of the yarn feeding system along the line A-A of Fig. 2.

Fig. 4 is a front view of a feeder rod of a yarn carrier.

Fig. 5 is a front view of a feeder rod guide of the yarn carrier.

Fig. 6 is a diagram showing a guide provided to the feeder rod guide.

Fig. 7 is a diagram showing that the lower end of a catching pin of a catching member is in contact with the top of a swing member.

Fig. 8 is a diagram showing that the yarn carrier is being caught and trailed by the catching member.

Fig. 9 is a diagram showing a support means seen from the back of the yarn carrier.

Fig. 10 is a partially cutaway front view of a yarn

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carrier of a modification.

Fig. 11 is a front view of a yarn carrier of another modification.

Fig. 12 is a rear view of the yarn carrier of above modification.

Fig. 1. is a side view of a flat knitting machine having a yarn feeding system according to the present invention, and 1 denotes the flat knitting machine generally.

a side view of a flat knitting machine having a yarn feeding system according to the present invention, and 1 denotes the flat knitting machine generally.

[0027] In this flat knitting machine 1, top ends of a pair of needle beds 2, one. in the front and one in the rear, are opposed to each other on a frame 4, with the needle beds 2 forming an inverted V when seen from the side. Plural needles 6 are mounted on each needle bed 2 so that these needles 6 can be moved forward and backward. Carriages 8 are driven, by a belt driving means not illustrated, over the tops of the needle beds 2 to reciprocate and move needles 6 forward or backward through knitting cams 9 mounted on the carriages 8. The carriages 8 are integrally provided with a gate arm 10 that strides over the front and back needle beds 2. A catching member 14 for catching a yarn carrier 12 is mounted on the gate arm 10.

[0028] Four carrier rails 16 are supported by supporting brackets, that are provided on both ends of the flat knitting machine and are not illustrated, above the needle beds 2 in the longitudinal direction thereof. The carrier rails 16 are arranged radially with the center being close to the top ends of the needles 6 arranged on the needle beds 2. Yarn carriers 2, that will be described later, are movably supported on both the front and back faces of each carrier rail 16. The section of the carrier rail 16 is tapered downwards, and a yarn feeder 18 that is provided at the bottom end of each yarn carrier is positioned close to the top ends of needles 6 arranged on needle beds 2. When the carrier rails 16 are radially arranged as described above, all the yarn carriers supported by respective carrier rails 16 can have an identical form. In the present embodiment, two needle beds 2 are used. The number of needle beds 2, however, is not limited to two. For example, three or more needle beds 2 may be used.

[0029] Fig. 2 is a partially cutaway front view of the yarn feeding system, and Fig. 3 is a side view of the yarn feeding system along the line A-A. The yarn feeding system comprises a yarn carrier 12, a catching member 14 and a lowering means 22. The yarn carrier 12 is movably supported on a carrier rail 16 and feeds yarn to a needle 6. The catching member 14 catches and carries the yarn carrier 12 by means of a catching pin 20 that can be operated by a carriage 8 to move forward and backward. The lowering means 22 lowers a yarn feeder 18 that is provided at the lower end of the yarn carrier 12 close to the top end of a needle 6.

[0030] A carrier base 25 of the yarn carrier 12 is provided with a feeder rod 24 that can be moved up and down and a feeder rod guide 26. A yarn feeder 18 for feeding yarn to a needle 6 is mounted at the lower end of the feeder rod 24. The feeder rod guide 26 hangs down from the carrier base 25 and guides the feeder rod 24 in a vertical direction at the lower end of the guide 26. Fig. 4 and Fig. 5 are diagrams showing the feeder rod 24 and the feeder rod guide 25, respectively. Fig. 6 is a front view and a bottom view of a guide 46 that is provided on the feeder rod guide 26.

[0031] The feeder rod 24 is provided with a rod 28 that is a long and narrow plate, pipe, etc., a rising guide 38 above the rod 28, a push-down part 40 above the rising guide 38, and a yarn feeder 18 having a yarn feeding eyelet at the bottom end of the rod 28. A spring coil 30 is mounted on the rising guide 38 as a spring for energizing the feeder rod 24 upward. A protruding piece 34 is provided on a feeder box 32 to support the lower end of the spring coil 30, and a slot 36 is made in the rising guide 38 in the vertical direction. The protruding piece 34 is put into this slot 36. The push-down part 40 contacts the lowering means 22 that will be described later. The rising guide is made thicker than the rod 28. In the present embodiment, a pipe-shaped yarn feeder 18 is fitted at the bottom end of the rod 28. A slot 42 is formed in the upper end of the rod 28, and the rising guide 38 and the rod 28 are joined together with a screw 44; their overall height can be adjusted.

[0032] The feeder rod guide 26 is made of a thin plate having appropriate elasticity and hardness. The guide 26 is wider than the feeder rod 24. There is a broad part 27 in the lower part of the feeder rod guide 26. To guide the feeder rod 24 in the vertical direction, a guide 46 is fitted at the bottom end of the guide 26. The guide 46 is provided with grooves 48 for vertically guiding the lower parts of the guide 26 and a through hole 50 for vertically guiding the yarn feeder 18. Thick and smooth buffer surfaces 47 are formed on both the front and the back of the guide 46. These buffer surfaces moderate impacts when the yarn carrier 12 come to cross and contact with another yarn carrier 12; the yarn carriers 12 will push each other to separate from each other. As described above, when the feeder rod 24 is guided at the lower end of the feeder rod guide 26 in the vertical direction, yarn will be fed to a needle 6 reliably.

[0033] Both the left and right side edges of the broad part 27 in the lower portion of the feeder rod guide 26 are tapered downward to form flanks 52a, 52b of the yarn carrier 12. They are designed to moderate shocks of contacts the yarn carrier 12 may have with another yarn carrier 12 when the yarn carrier 12 is moved by the catching member 14 that will be described later. The flanks of the yarn carrier 12 are divided into two parts: the lower carrier flanks 52a and the upper carrier flanks 52b. When two yarn carriers 12, that are normally adjacent to each other, cross with each other, the lower carrier flanks 52a of the respective yarn carriers 12 will contact with each other. Since the lower carrier flanks 52a

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are tapered towards the bottom end, they can moderate shocks of contacts between the yarn carriers 12. At the time of a contact, the feeder rod guides 26 of both yarn carriers 12 will be flexed, and the guides 46 of the two yarn carriers 12, being provided on the feeder rod guides 26, will contact with each other. Since buffer surfaces 47 being thick smooth slopes are formed on the guides 46, the guides 46 will moderate the shocks of contacts between the yarn carriers 12. The buffer surfaces 46 act to push against each other to separate the yarn carriers.

[0034] When a yarn carrier 12, that is moving with its feeder rod guide 26 being flexed due to a contact with another yarn carrier 12, cross another (third) yarn carrier 12, their upper carrier flanks 52b will contact with each other. Since the upper flanks 52b are tapered downward just like the lower flanks 52b, they can moderate the shocks of contacts between yarn carriers 12.

[0035] Slopes 53, being tapered downward, are formed on both left and right side edges of the top end of the feeder rod guide 26, that is below the guide 46. These slopes 53 act to avoid interference with yarn extending from another yarn carrier 12 to the needle 6 when the yarn carrier 12 is moved by the catching member 14. The feeder rod guide 26 of the present invention is formed integrally with the carrier base 25 to reduce the number of parts of the yarn carrier 12 and the weight thereof.

[0036] An engaging means 54 is formed on the top end of the yarn carrier 12, and the catching member 14, that will be described later, makes a catching pin 20 engage with the engaging means 54 to catch and trail the yarn carrier 12. The engaging means 54 is formed between a pair of left and right swing pieces 56, 56 that are supported by axes in the upper portion of the yarn carrier 12 so that they can swing in vertical directions. One end, on the center side of the yarn carrier 12, of the swing piece 56 is energized upward by a spring coil 59 in a groove 58 of the feeder box 32 to assume a position higher than the fulcrum of the swing piece 56.

[0037] The catching member 14 comprises a solenoid 62 and a transmission lever 64. The solenoid 62 receives signals from a controller not illustrated to make an output plunger 60 protrude or retract. The transmission lever 64 transmits the movement of the output plunger 60 of the solenoid 62 to the catching pin 20. The catching pin 20 is energized downward by a spring coil 66, and the catching member 14 makes the catching pin 20 engage with the engaging means 54 formed between a pair of left and right swing pieces 56, 56 on the top of each yarn carrier to catch and trail the yarn carrier 12.

[0038] With the feeder rod 24 being energized upward by the spring coil 30, the rising guide 38 of the feeder rod 24 is supported in a groove 68 made in the feeder box 32 so that the feeder rod 24 can be moved upward and downward. The lowering means 22 is provided with a cam plate 70 for pressing down the feeder rod 24, and the cam plate 70 is linked with the catching pin 20 of the catching member 14, via a linking arm 72. Being interlocked with the vertical movements of the catching pin 20, the cam plate 70 will swing to and fro with a pin 74 of the swing axis as the center. On the lower end of the cam plate 70 is formed a push-down cam 78 for pushing down the top end 76 of the push-down part 40 of the feeder rod 24. When the cam plate 70 of the lowering means 22 pushes down the feeder rod 24, the yarn feeder 18 being provided at the lower end of the feeder rod 24 will protrude from the bottom end of the feeder rod guide 26.

[0039] Next, the action of the yarn feeding system at the time of knitting will be described.

[0040] When the carriage 8 is driven by a belt driving means, according to output signals of a controller not illustrated, to travel over the needle bed 2, needles 6 arranged on the needle bed 2 are moved forward or backward by knitting cams 9. When the carriage 8 is travelling, for a portion for which knitting is not made, the solenoid 62 will be actuated by an output signal for pattern knitting to make the output plunger 60 protrude downward. The catching pin 20 of the catching member 14 will be raised by the output plunger 60, via the transmission lever 64, against the tensile force of the spring coil 66. With the rising of this catching pin 20, the cam plate 70 of the lowering means 22 will be swung up with the swing axis pin 74 as the center.

[0041] For a portion for which knitting is made, at a point this side of a position at which the carriage 8 faces a specified yarn carrier for feeding yarn to a needle 6, the solenoid 62 will be actuated by an output signal of the controller not illustrated, and the output plunger 60 will be retracted upward. The catching pin 20, that has been raised, will be pushed down by the tensile force of the spring coil 66. Being interlocked with the pushing down of the catching pin 20, the cam plate 70 of the lowering means 22 will be swung, via the linking arm 72, towards the yarn carrier 12 with the swing axis pin 74 as the center.

[0042] The carriage 8 travels, and the lower end of the protruding catching pin 20 will come to contact with the top of a swing piece 56, on the upstream side of the travel direction of the carriage 8, of the pair of left and right swing members 56 in the upper part of the yarn carrier 12. As a result, one end, on the center side of the yarn carrier 12, of the swing member 56 will be swung downward against the upward energization by the spring coil 59 (Fig. 7). When the carriage 8 travels further, the push-down cam 78, that is formed on the lower end of the cam plate 70, will come to contact the top end 76 of the push-down part of the feeder rod 24 to push the feeder rod 24 downward. As a result, the yarn feeder 18 at the bottom end of the feeder rod 28 will protrude from the bottom end of the feeder rod guide 26 so that it can feed yarn to a needle 6.

[0043] When the catching pin 20 enters into the engaging means 54 between swing pieces 56, 56, the swing piece 56, that has been swung downward by the

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catching pin 20, will be swung back to the original position by the upward energization of the spring coil 59. As a result, the catching pin 20 will be held between the sides 80 of the pair of swing pieces 56, 56, and the yarn carrier 12 will be trailed by the carriage 8. At this time, yarn will be fed from the yarn feeder 18 of the yarn carrier 12 to a needle 6 (Fig. 8). With this arrangement, even if knitting of a fabric is made at a high speed, the catching member 14 can reliably engage the catching pin 20 with the engaging means 54 to catch and trail a yarn carrier 12.

[0044] In the present embodiment, between a pair of left and right swing pieces 56, 56 that are provided on the yarn carrier at the top end and near the center thereof, is provided a space sufficient for engagement of the catching pin 20 of the catching member 14. However, it is not always necessary to provide a space between the pair of left and right swing pieces 56, 56.

[0045] When the carriage 8 comes to a specified position for releasing the yarn carrier 12 or actuating another yarn carrier 12, the solenoid 62 will be actuated by an output signal from the controller not illustrated, and the output plunger 60 will be made to protrude downward. As a result, the catching pin 20, that has been lowered, will be pushed up against the tensile force of the spring coil 66. With the rise of this catching pin 20, the cam plate 70 of the lowering means 22 will be swung up with the swing axis pin 74 as the center.

[0046] When the catching pin 20 is raised and, in turn, the engagement between the catching pin 20 and the side 80, on the center side of the yarn carrier, of the swing piece 56 on the downstream side of the travel direction of the carriage 8 is undone, the yarn carrier 12 will be released, and due to swinging up of the cam plate 70, the feeder rod 24, that has been pressed down, will be pushed up by the spring coil 30 to a position at which the yarn feeder 18 at the bottom end thereof will not interfere with the yarn feeder 18 of another yarn carrier 12, a needle 6, a sinker, etc.

[0047] When the carriage 8 comes to a position for actuating another yarn carrier 12. the solenoid 62 will be actuated by an output signal of the controller, and the output plunger 60 will be retracted upward. The catching pin 20, that has been raised, will be pushed down by the tensile force of the spring coil 66, and the cam plate 70 of the lowering means 22 will be swung towards the yarn carrier 12 with the swing axis pin 74 as the center. The catching pin 20 will be lowered to enter into the engaging means 54 of the yarn carrier 12. Under this condition, when the carriage 8 travels further, the push-down cam 78, that is formed on the lower edge of the cam plate 70, will push down the feeder rod 24, and the yarn feeder 18, that is provided at the bottom end of the feeder rod, will protrude to the yarn feeding position in which the yarn feeder 18 is close to the top end of the needle 6. After that, the fabric is knitted with yarns fed by yarn feeders of yarn carriers 12 selected in a procedure similar to that described above.

[0048] Fig. 9 is a diagram showing a supporting means 82 for supporting a yarn carrier 12 on a carrier rail 16, that is seen from the rear of the yarn carrier 12. A pair of left and right rollers 84A, 84A and a pair of left and right rollers 84B, 84B are mounted in the upper part and the lower part of the carrier base 25 of the yarn carrier 12, respectively. Grooves 86 are made on both the front and the back of the carrier rail 16 in the longitudinal direction thereof. Protruding slopes 88 conical in section are provided in the upper part and the lower part of each groove 86. The yarn carrier 12 is supported by fitting the upper and lower pairs of left and right rollers 84A, 84B on the protruding slopes 88 conical in section, that are formed on the carrier rail 16. The lower pair of left and right rollers 84B, that are mounted on the yarn carrier 12, are energized downward by a leaf spring 90 that is provided between the rollers. With this, the yarn carrier 12 is supported on the carrier rail 16 more reliably. When the yarn carrier 12 is supported on the carrier rail 16 as described above, the yarn carrier 12 can be effectively prevented from coming off the carrier rail 16 and the carrier 12 can be moved with lower friction.

[0049] The carrier rail 16 is provided with plates made of a magnetic material, that are not illustrated, over the entire length thereof. These plates are attracted by a magnet, not illustrated, that is mounted on the yarn carrier being held on the carrier rail 16, on a surface opposing the above plates. Because of this arrangement, when the yarn carrier 12 is released from the catching pin 20, the yarn carrier 12 will quickly come to a halt due to the attractive force of the magnet.

[0050] Supporting means 82 are not limited to rollers. Any means of low frictional resistance such as ball bushings may be used. The carrier rail 16 can be reduced in weight by making the carrier rail 16 from aluminium or the like, and making the slopes 88 conical in section that directly support the rollers 84 of the yarn carrier 12 from steel.

[0051] With regard to the lowering means 22, being linked with catching of the yarn carrier 12 by the catching member 14, the cam plate 70 makes the feeder rod 24 move downward. In this way, the downward movement of the feeder rod 24 is made greater than the amount of protrusion of the catching pin 20. However, the feeder rod 24 may be moved downward directly by the catching pin 20, etc.

[0052] In the above embodiment, flanks 52 are formed on both the left and right side edges in the lower portion of the feeder rod guide 26. These flanks are intended to moderate impacts of a contact that will occur when the yarn carrier 12 is moved by the catching member 14 to cross another yarn carrier 12. However, if the feeder rod guides 26 of yarn carriers 12 do not contact with each other, for example, when the amount of vertical movement that the feeder rod 24 can make is increased and the push-down amount of the feeder rod 24 by the cam plate 70 of the lowering means 22 is increased, there is no need of forming flanks 52 on the

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feeder rod guides 26.

[0053] Next, a modification of the present invention will be described with reference to drawings. Fig. 10 is a partially cutaway front view of a yarn carrier 92. In this modification, flanks 98 for yarn are formed on both sides of a yarn feeder 96 having a yarn feeding eyelet, that is provided at the lower end of the feeder rod 94, by tapering towards the lower end of the yarn feeder 96. The lowering means 22 makes the feeder rod 94 move downward. The feeder rod 94, in turn, makes the yarn feeder 96 having flanks for yarn on both sides thereof protrude from the top end of the feeder rod guide 26. With this arrangement, when the yarn carrier 92 is moved by the catching member 14, the yarn feeder 96 at the bottom end of the feeder rod 94 will not interfere with any yarn extending from the yarn feeder 92 of another yarn carrier 92 to a needle 6; thus more stable supply of yarn can be achieved. The yarn feeder 96 having flanks 98 for yarn is provided with thick and smooth slopes 100 formed on the front and the back of the yarn carrier. These slopes 100 act in such a way that the yarn carrier 92 pushes away another yarn carrier 92.

[0054] With reference to Fig. 11 and Fig. 12, another modification will be described. Except some points that will be described below, this modification is similar to other embodiments. A new yarn carrier 101, that is similar to the yarn carrier 12 of Fig. 1 through Fig. 9, is used. In Fig. 11, 103 denotes a carrier base. A cam plate 105 is provided so that the cam plate 105 can slide sidewise relative to the base 103. A cam groove 107 and a pin 109 that is provided at the top of a member 38 are arranged so that the pin 109 can slide in the cam groove 107. 111 denotes a slide groove that allows the cam plate 105 to slide relative to the base 103. 113 is a driving belt that makes the yarn carrier 101 run along the rail 16.

[0055] The rear of the yarn carrier 101 is shown in Fig. 12. 115 denotes a magnet that is mounted on the back of the cam plate 105. The magnet 115 attracts, for example, the rail 16 made of steel, and generates a frictional force on the cam plate 105 so that the cam plate 105 lags behind the base 103 in movement. As a result, when the yarn carrier 101 is made to run by the belt 113, a kind of force of inertia due to the magnet 115 will work on the cam plate 105, and the cam plate 115 will slide backward relative to the moving direction in the slide groove 111. The pin 109 will be pushed down, and the feeder rod 24 will move downward and the yarn feeder 18 will come close to a needle. When the belt 113 is stopped and the yarn carrier 101 is stopped, under the influence of the spring coil 30, the pin 109 will move towards the center of the slide groove 107. With this force, the cam 105 will move in the slide groove 111, and the pin 109 will be restored to the top of the groove 107.

[0056] In Fig. 11 and Fig. 12, the yarn carrier 101 is driven by the belt 113. However, it may be driven by the catching member 14. In that case, the cam plate 70, etc. will not be required. With regard to processing after stoppage of the yarn carrier 101, for example, the belt 113 may be moved in the reverse direction just a little to use the force to restore the cam plate 105. Or the restoring force of the pin 109 to the top of the cam groove 107 may be increased by attaching one end of a spring coil to the left and one end of another spring coil to the right of the spring coil and attaching the other ends of the spring coils to the cam plate 105.

[0057] In the above embodiments, a flat knitting machine in which plural carrier rails 16 are arranged radially was described. The present invention, however, can be applied to a flat knitting machine in which plural carrier rails 16 are arranged horizontally. In this case, to bring the lower ends of the yarn carriers 12, 92 close to a needle 6, the feeder rod guides 26 are bent in the middle, and the rods of the feeder rods 24, 94 are mode of a flexible material such as a leaf spring.

Claims

1. A flat knitting machine having at least a pair of needle beds with a large number of needles, one in a front and one in a back, top ends of said needle beds being opposed to each other so as to form a trick gap in between, said flat knitting machine having a yarn feeding system comprsing at least a carrier rail arranged above the needle beds and a yarn carrier movable along the carrier rail and for feeding yarn to the needles,

   said flat knitting machine characterized in that said yarn carrier comprises :
   a base movable'along the carrier rail;
   a plate guide having one end fixed to said base and extending from said base towards the trick gap; and
   a feeder rod supported by said plate guide, extending from the base towards the trick gap, movable vertically, and having a yarn feeding eyelet at a bottom end towards the trick gap side, and that
   said flat knitting machine furthere comprises:
   raising means for keeping said feeder rod in a raised position while the yarn feeder is in a stand-by position; and
   lowering means for lowering said feeder rod while yarn is to be fed from said yarn feeding eyelet to a needle.

2. A flat knitting machine having a yarn feeding system of claim 1 characterized by

   a plurality of said carrier rails and a plurality of said yarn carriers being provided;
   said plate guide and said base being an integral member;
   the plate guides of the plural yarn carriers being arranged in radial directions having a center at

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the trick gap; and
the feeder rods being movable up and down in the radial directions.

3. A flat knitting machine having a yarn feeding system of claim 1 or 2 characterized by said plate guide being broader than said feeder rod and having two side edges along the carrier rail being tapered towards the bottom end thereof.

4. A flat knitting machine having a yarn feeding system of claim 3 further comprising a member being located near the bottom end of said feeder rod and above the yarn feeding eyelet, surrounding the feeder rod, being thicker in an upper part thereof than in a lower end thereof, being tapered towards the yarn feeding eyelet, and having an ellipsiodal horizontal section having a major axis being parallel with the carrier rail and a minor axis being perpendicular to the carrier rail.

5. A flat knitting machine having a yarn feeding system of claim 1, 2 or 3 characterized by a yarn feeding member mounted on a lower end of said feeder rod, tapered towards the trick gap, and having a bottom end forming said yarn feeding eyelet.

6. A flat knitting machine having a yarn feeding system of any preceding claim characterized in that said plurality of carrier rails are arranged along an arc facing said trick gap.

7. A flat knitting machine having a yarn feeding system of claim 1 characterized in that

said raising means comprises a spring having two ends, one end mounted on said base and one end mounted on the feeder rod, and pushing up the feeder rod; and that
a second guide is mounted on said base and guides the feeder rod vertically.

8. A flat knitting machine having a yarn feeding system of claim 7 further comprising:

a catching member for catching and trailing the yarn carrier and comprising a main part, a pin driven by a solenoid so as to descend from the main part, swing members swingably mounted on the main part, and a rotational arm having two ends and rotatably mounted at said two ends, one at said swing member and one at said pin; and
an engaging member formed on an upper end of the base of said yarn carrier and engageable with the pin of said catching member, wherein said feeder rod has a top engageable with and pushed down by said swing member while the swing member is swung towards the top.

9. A flat knitting machine having a yarn feeding system of claim 8 characterized by a pair of swing pieces provided on the upper end of said base, being able to swing in a vertical plane, and having a gap in between and respective ends at said gap pushed up, and by said engaging member comprising said gap.

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FIG. 1

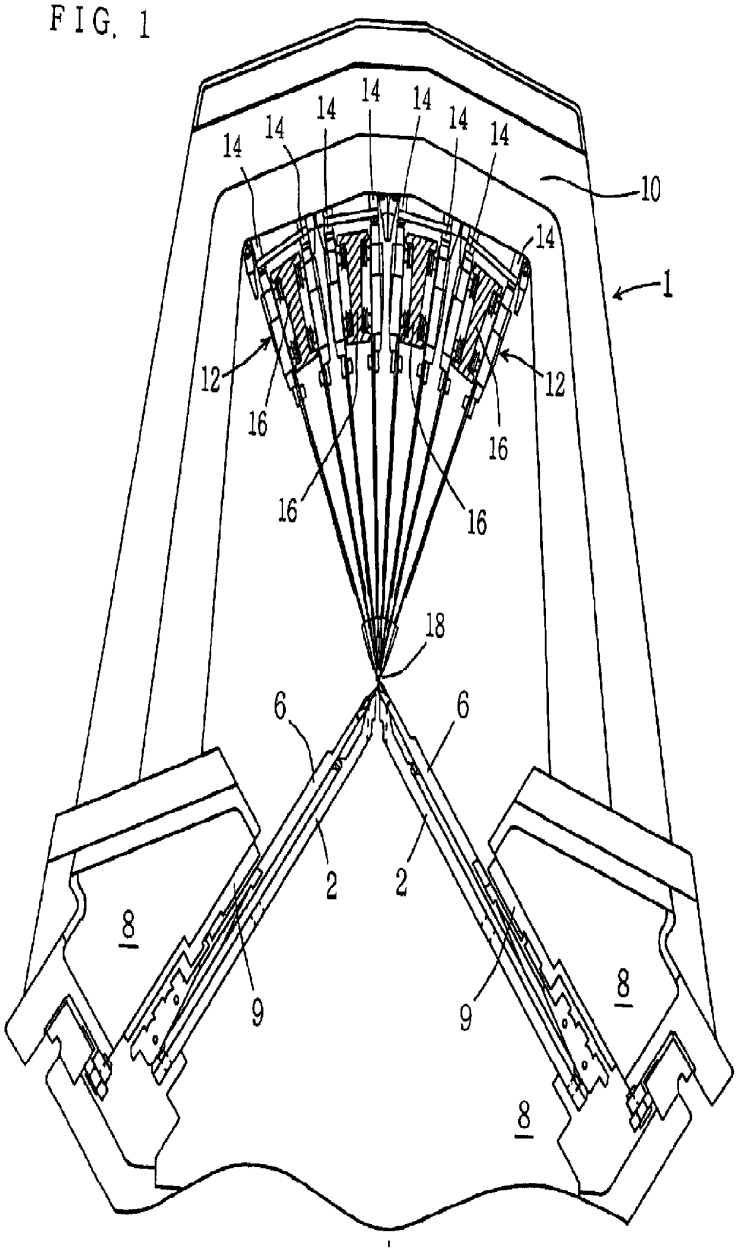


FIG. 2

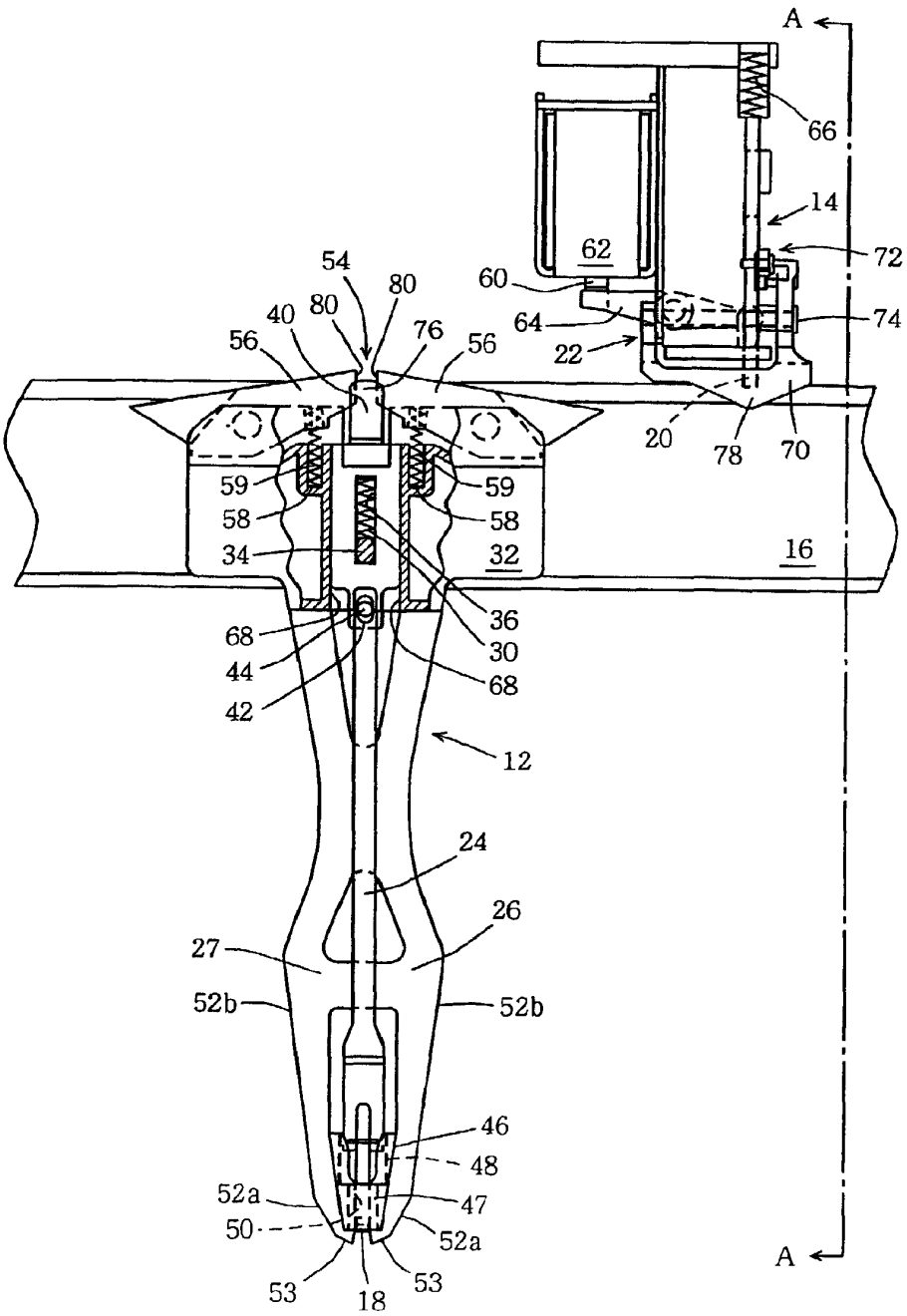

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FIG. 3

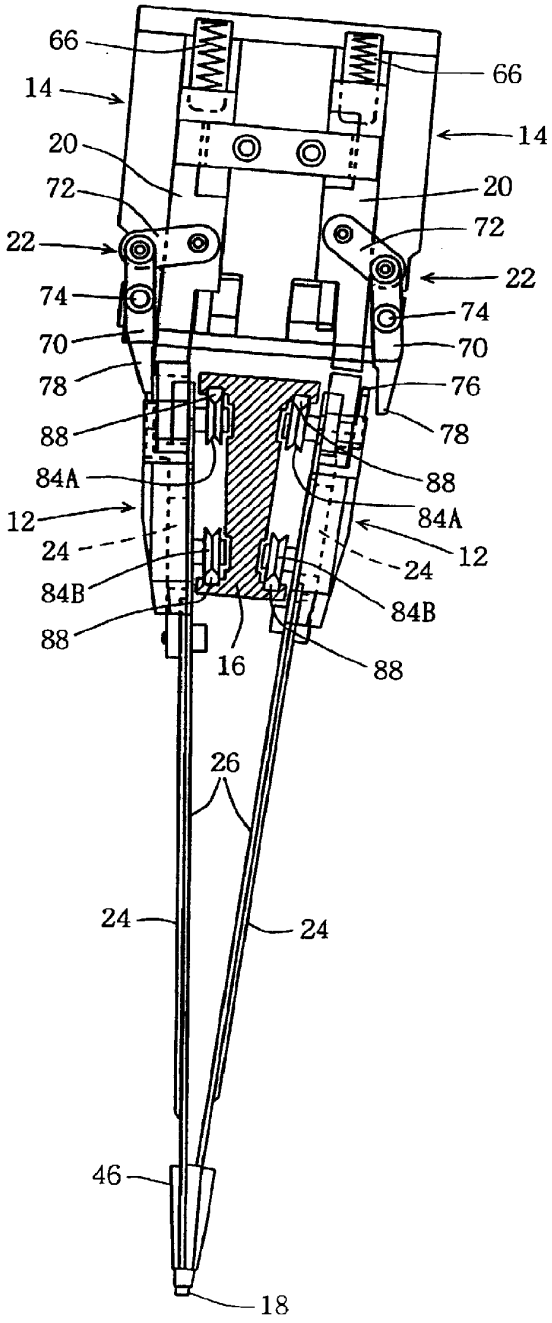

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FIG. 4

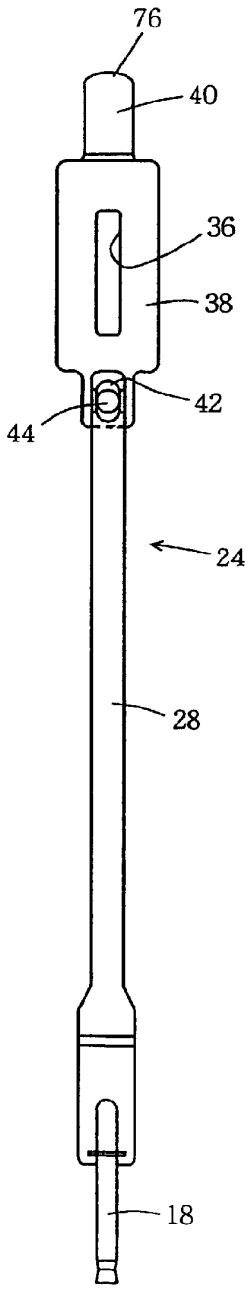


FIG. 5

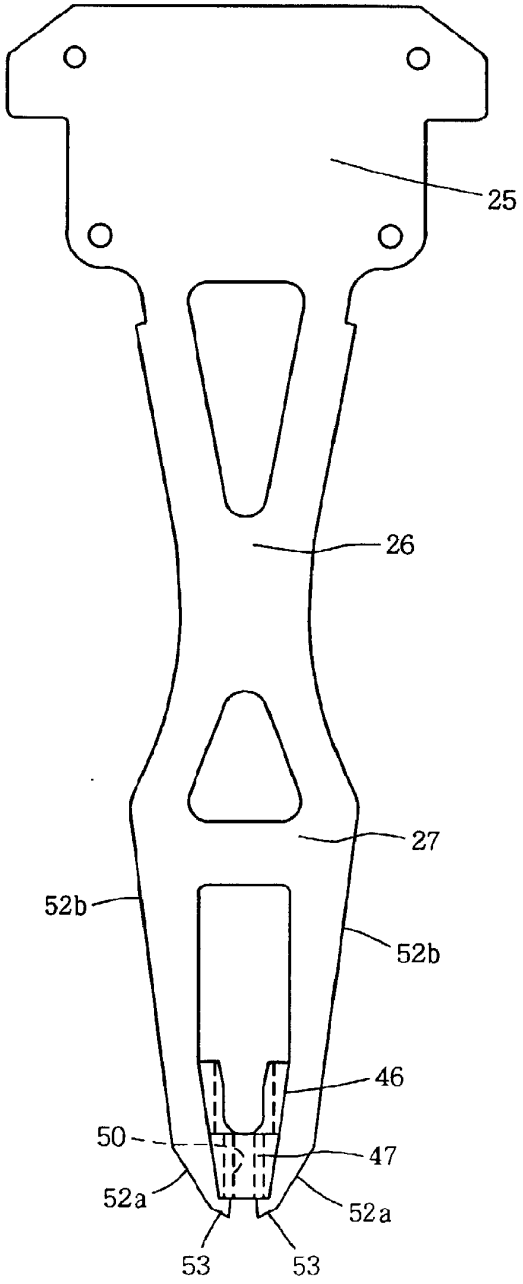


FIG. 6

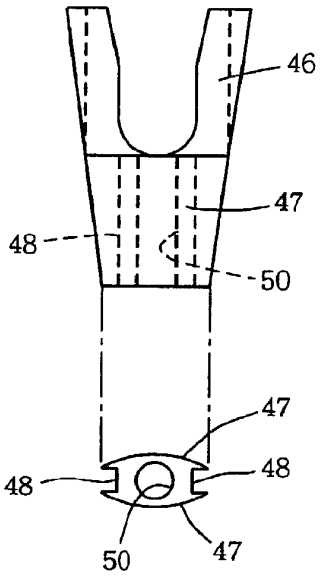


FIG. 7

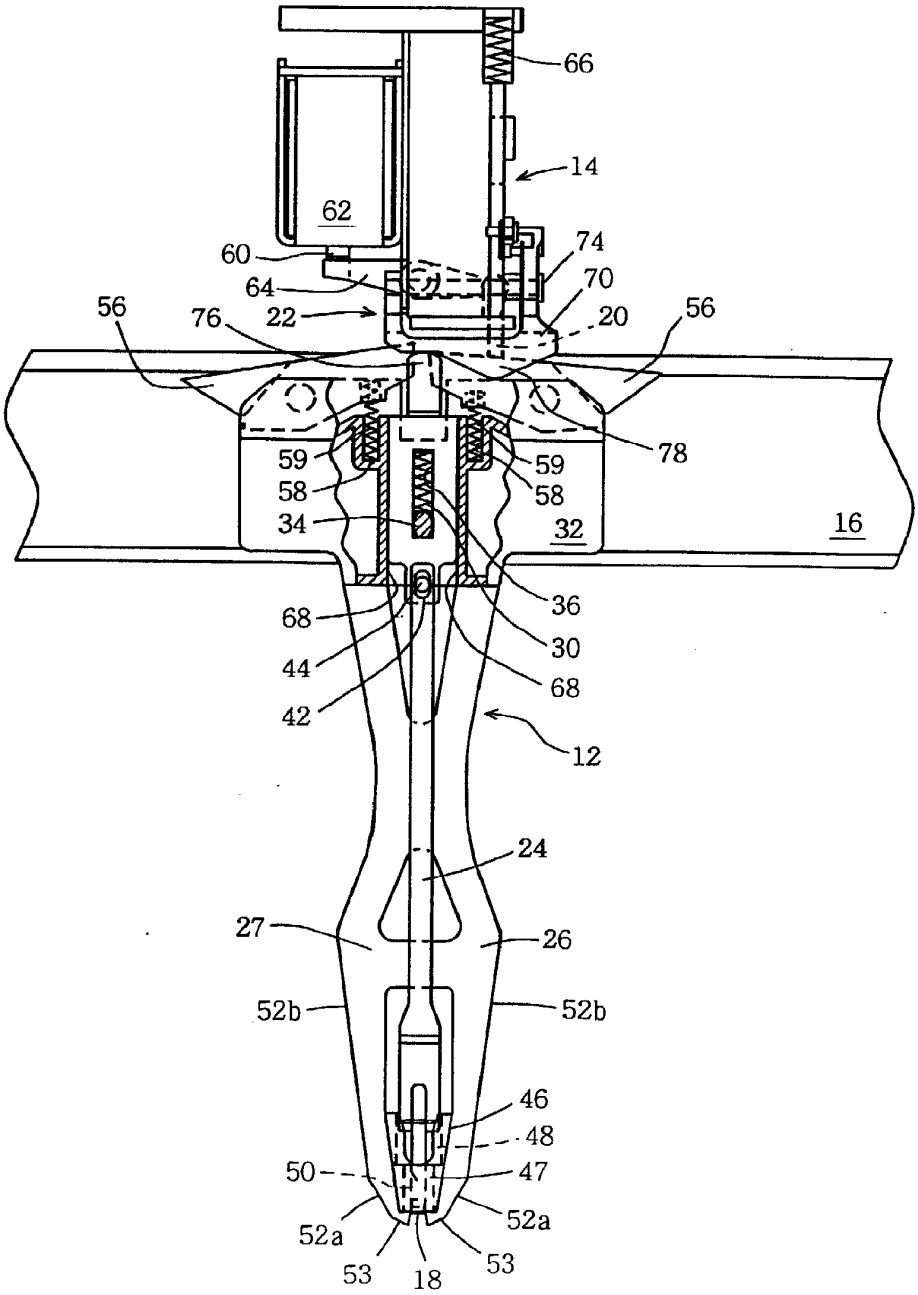

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FIG. 8

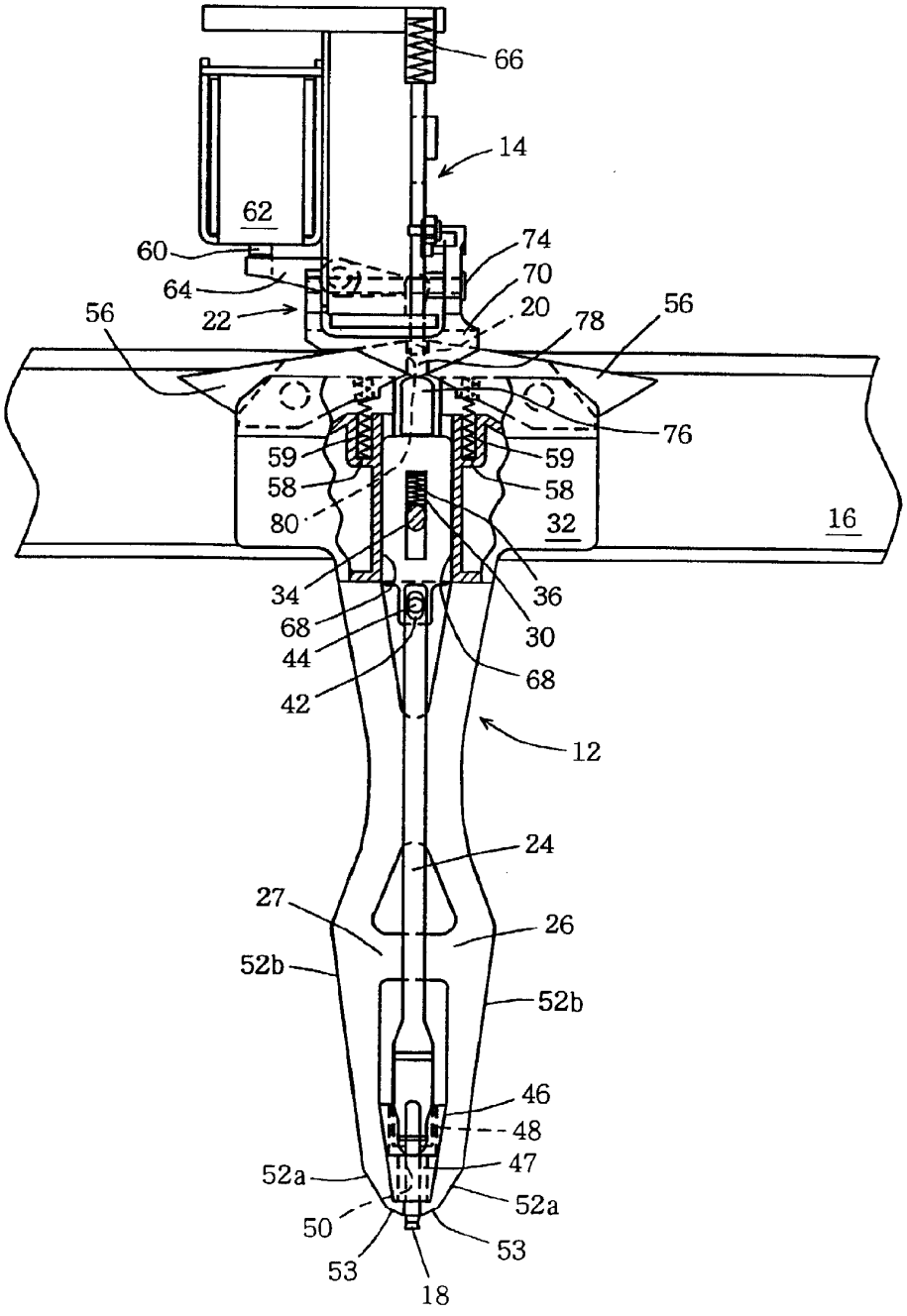

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FIG. 9

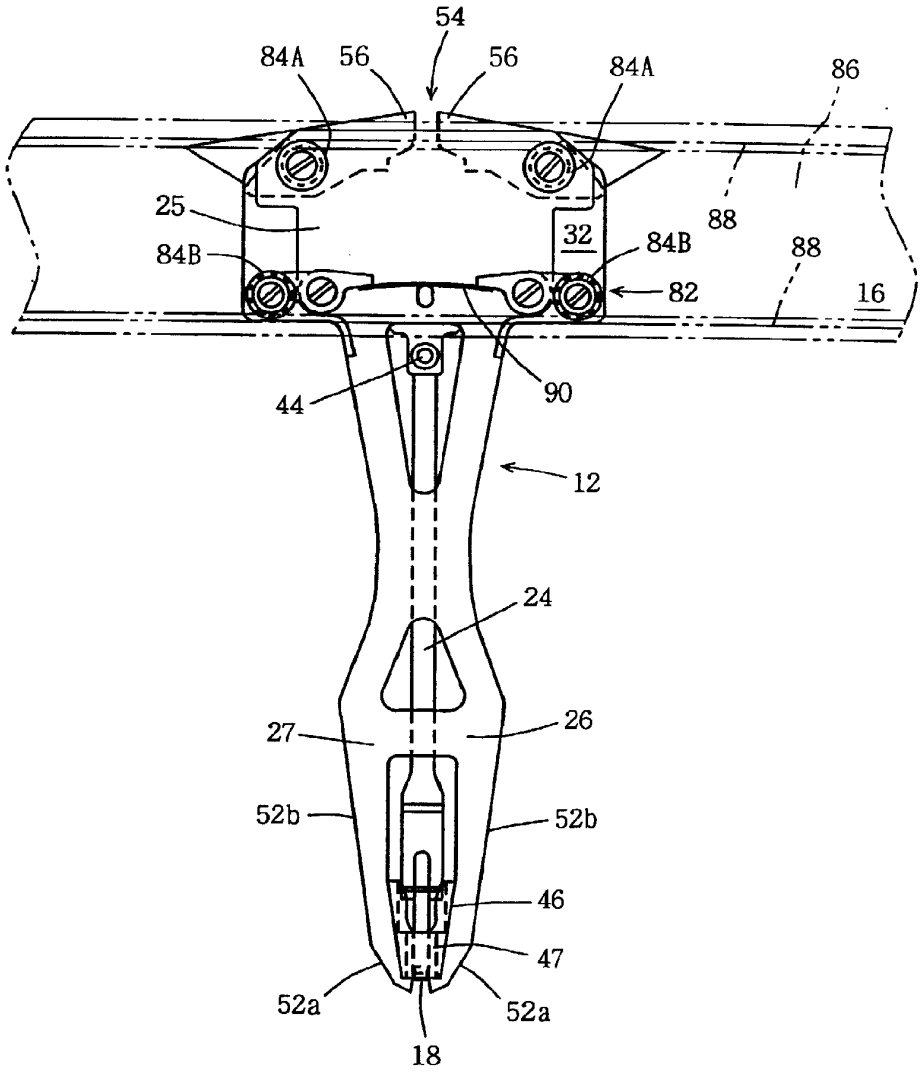

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FIG. 10

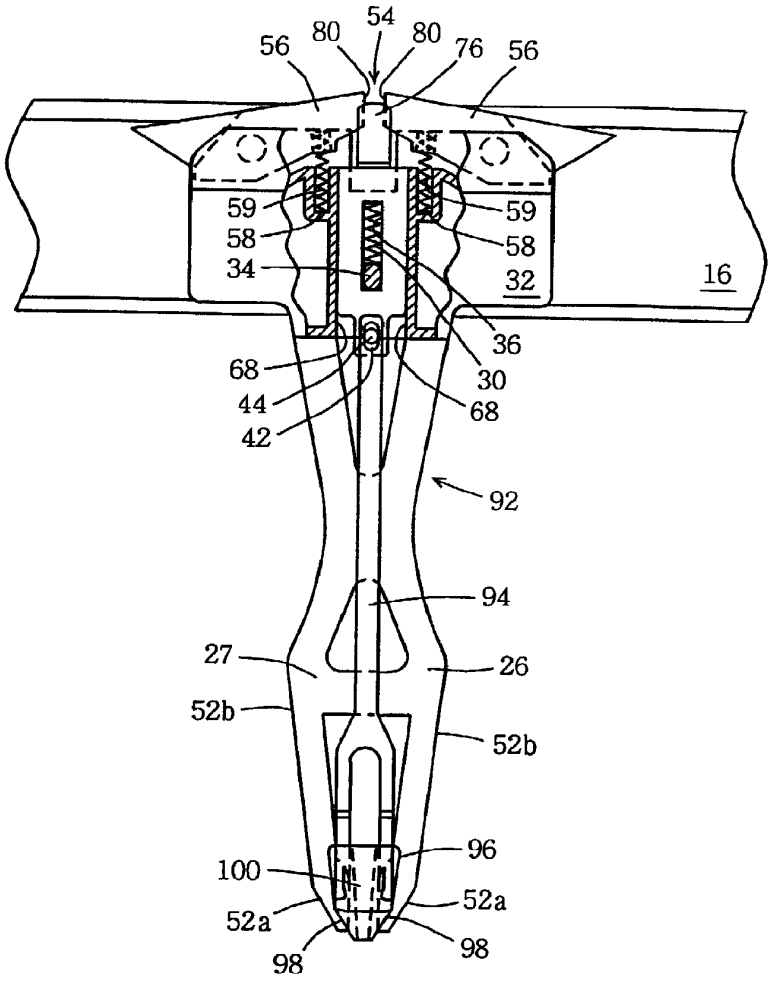

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FIG. 11

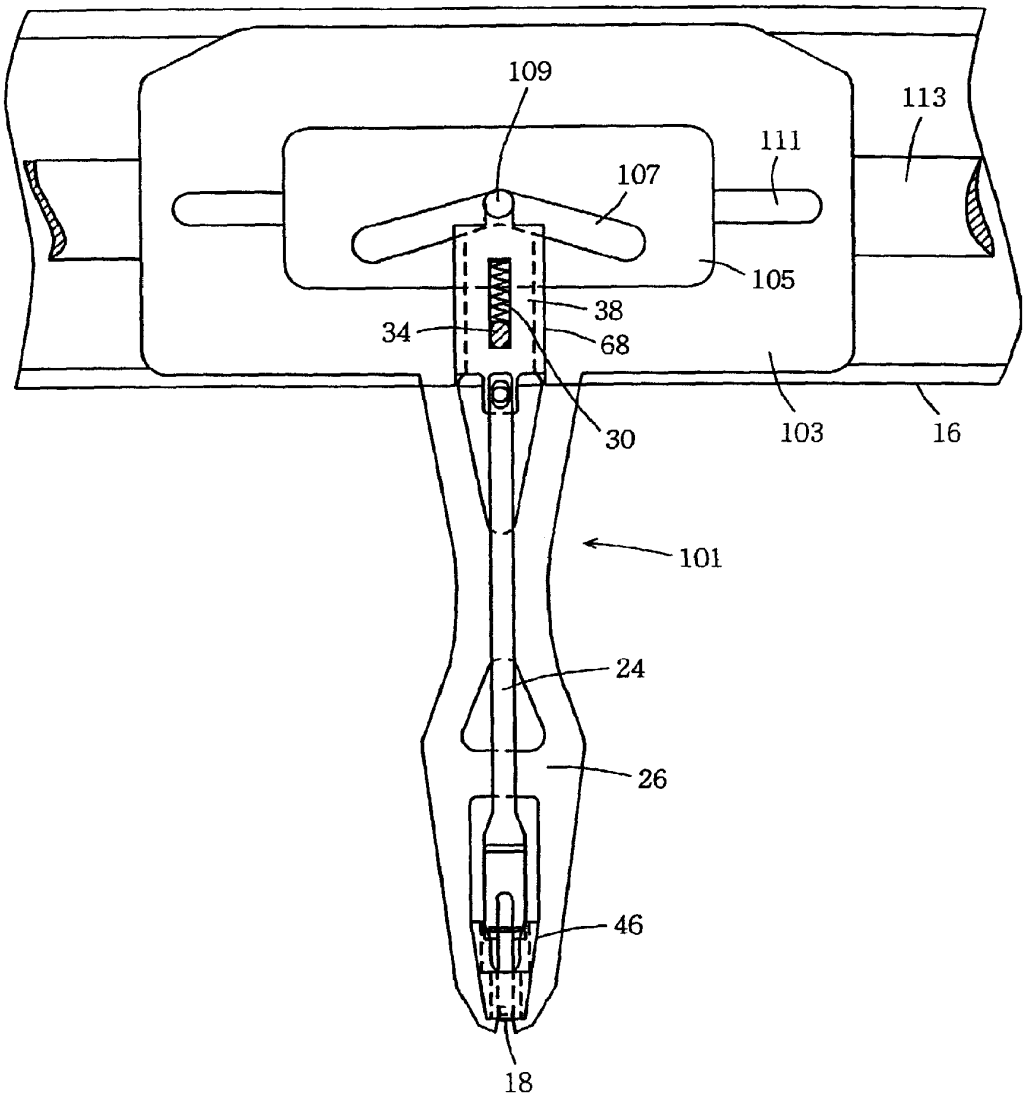
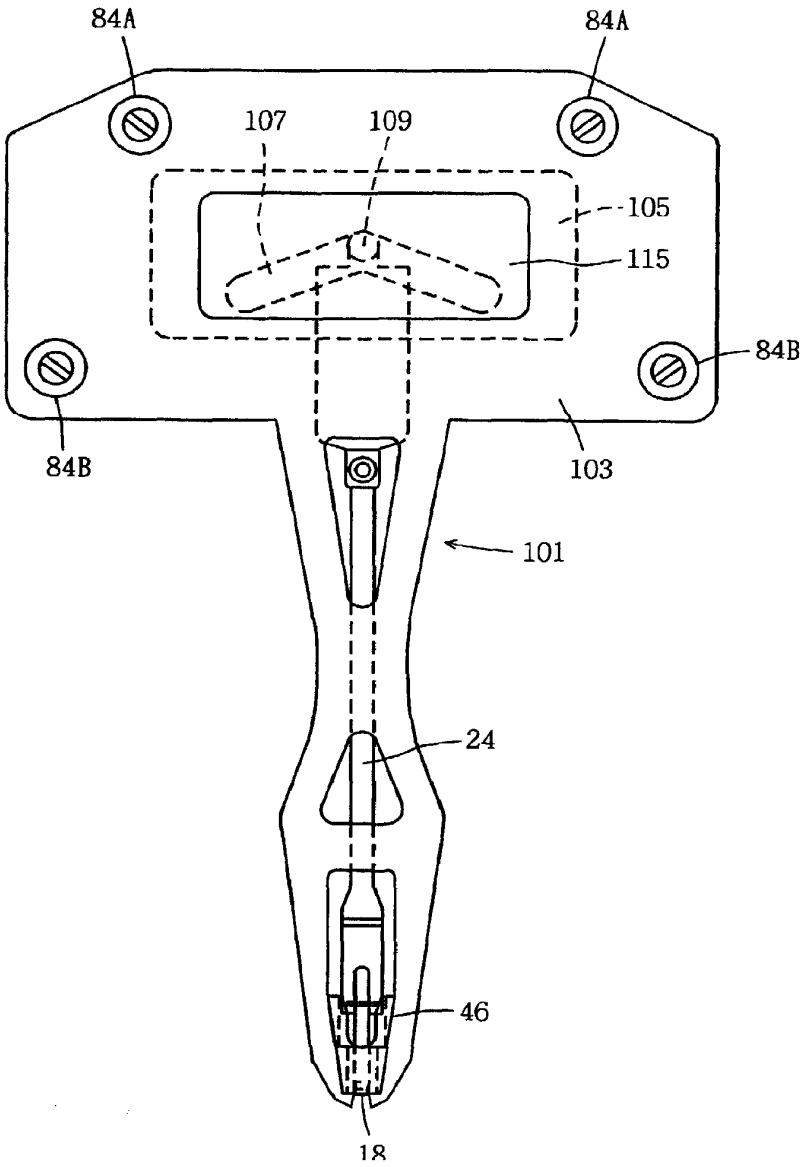


FIG. 12



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(54) Light weight shoes

(57) A shoe (20) including an upper material using a double raschel warp knitted fabric is provided. The upper material includes a first surface having a non-mesh structure and a second surface having a non-mesh structure part (A)(1a-1d), a mesh structure part (B)(2) and a mesh structure part (C)(3a-3d). The burst strengths burst strengths A, B and C of the parts (A, B and C) satisfy the relationship: A > B > C. The non-mesh structure part (A)(1a-1d) is disposed in a part surrounding the tiptoe, a part connecting to a shoe sole and disposed in both sides of the foot for example, in a stripe. The mesh structure part (B)(2) is disposed in the vicinity of the surface of the toe and the mesh structure part (C)(3a-3d) is disposed in the both sides of the foot for example, in a stripe. Thus, a shoe having lightweight, air permeability and durability and a double raschel knitted fabric used for the shoe are provided.

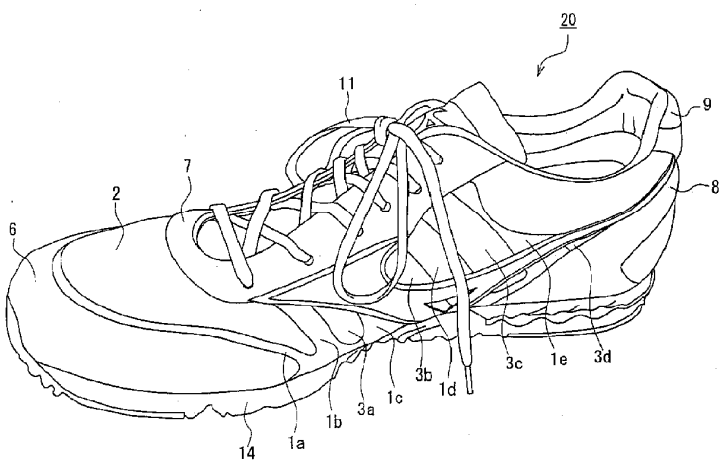


FIG. 2

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Description

[0001] The present invention relates to shoes. More particularly, the present invention relates to shoes incorporating a double raschel warp knitted fabric.

[0002] Conventionally, a warp knitted fabric, a woven fabric, a mesh material, and the like, have been used for shoes (see, for example, application for utility model registration No. 2548713, JP 5(1993)-176804A). In particular, in sport shoes, properties such as lightweight and air permeability are required. A warp knitted fabric having a mesh structure is preferred with respect to the above-mentioned properties, but, on the other hand, it does not have a satisfactory strength and needs reinforcement as a whole. At the present, in most cases, such reinforcement is carried out by using artificial leather, leather, a resin sheet, resin, a woven fabric, and the like, from the side of the front surface. Therefore, in general, the usual weight of one sport shoe is about 150 g to 500 g.

[0003] However, the weight of the conventional sport shoe is heavy for use in marathon, running, and indoor sports such as badminton, ping-pong, etc. Therefore, there is a demand for shoes having lighter weight.

[0004] With the foregoing in mind, in order to solve the above-mentioned conventional problem, it is an object of the present invention to provide a shoe having lightweight and air permeability and also having high durability. This object is solved by the above independent claim 1. The invention also provides a double raschel warp knitted fabric of independent claim 10 and a use of this double raschel warp knitted fabric for a shoe according to independent claim 14. Further advantageous features and aspects of the invention are evident from the dependant claims, the description and the drawings.

[0005] According to one aspect of the present invention a shoe is provided which includes an upper material using a double raschel warp knitted fabric. The upper material includes a first surface having a non-mesh structure and a second surface having a non-mesh structure part (A) and mesh structure parts (B, C); the burst strengths A, B and C of the parts (A, B and C) satisfy the relationship: A > B > C; the non-mesh structure part (A) is disposed in a part surrounding the tiptoe and partially in both sides of the foot; the mesh structure part (B) is disposed in the vicinity of the surface of the toe; and the mesh structure part (C) is disposed partially in the both sides of the foot.

[0006] According to another aspect of the invention a shoe is provided including an upper material using a double raschel warp knitted fabric. The upper material includes a front surface including a mesh structure part and a back surface having a non-mesh structure; and a constituent yarn of the front surface includes a yarn having a melting point that is lower than the melting point of a constituent yarn of the back surface, and at least a part of the front surface is partially fused.

[0007] Another aspect of the present invention relates to a double raschel warp knitted fabric adapted for use with a shoe. The warp knitted fabric includes one surface having a non-mesh structure and another surface having a non-mesh structure part (A) and mesh structure parts (B, C); the burst strengths A, B and C of the parts (A, B and C) satisfy the relationship: A > B > C; the non-mesh structure part (A) is disposed in a part surrounding the tiptoe and partially in both sides of the foot; the mesh structure part (B) is disposed in the vicinity of the front surface of the toe; the mesh structure part (C) is disposed partially in the both sides of the foot; and at least the parts A to C are disposed in one continuous knitted fabric.

[0008] Figure 1 is a plan view showing a shoe pattern using a double raschel warp knitted fabric according to Embodiment 1 of the present invention.

[0009] Figure 2 is a side view showing a sport shoe according to Embodiment 2 of the present invention.

[0010] Figure 3 is a perspective view showing the shoe shown in Figure 2 when a tongue part is taken out of the shoe.

[0011] Figure 4 is a side view showing the shoe of Figure 2 seen from the opposite side.

[0012] Figure 5 is a plan view showing a shoe pattern using a double raschel warp knitted fabric according to Embodiment 3 of the present invention.

[0013] The present invention relates to a shoe including an upper material using a double raschel warp knitted fabric. The double raschel warp knitted fabric is a three-layer warp knitted fabric including a base fabric for a front surface, a base fabric for a back surface and a connecting yarn connecting the front surface to the back surface. This warp knitted fabric is knitted by using a warp knitting machine with a double needle line so that the base fabric for a first surface is knitted as a derivative weave that is jacquard-controlled so as to include a non-mesh structure part (A) and mesh structure parts (B, C) and the base fabric for a second surface is knitted as a homogeneous non-mesh structure. The second surface may be formed of one weave and may be formed with different weave mixed. A warp knitting machine for knitting this knitted fabric is commercially available from KARL MAYER Textilmaschinenfabrik GmbH in Germany (NIPPON MAYER LTD. (a Japan corporation) is included).

[0014] When the surface including the non-mesh structure part (A) and mesh structure parts (B, C) of the knitted fabric is used for the front surface of a shoe, the shoe has an excellent appearance and furthermore, a surface area is increased, thus improving air permeability. On the contrary, when the second surface having a non-mesh structure is used for the front surface of the shoe, water can easily be prevented from entering the shoe from the surface.

[0015] The burst strengths A, B and C of the parts (A, B and C) of the double raschel warp knitted fabric satisfy the relationship: A > B > C. The non-mesh structure part (A) is disposed in a part that requires a high strength,

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that is, a part surrounding the tiptoe (i.e., a tiptoe region of the shoe) and a part connecting to a shoe sole, and also to parts that face the sides of the foot (i.e., side regions of the shoe), the non-mesh structure part (A) is disposed in a stripe. Furthermore, to a part that may have moderate strength and air permeability, that is, a part in the vicinity of the surface of the toe (i.e., a toe region of the shoe), the mesh structure part (B) is placed. Furthermore, to a part that needs air permeability, that is, the side surfaces of the foot (both sides), the mesh structure part (C) is placed, for example, in a stripe. Thus, as a whole, in the shoe, air permeability and durability are balanced.

[0016] The burst strength according to the bursting test based on the JIS L 1096 A of the non-mesh structure part (A) is preferably about 1400 kPa to 1550 kPa with respect to shoes such as marathon shoes, in which lightweight is particularly required. With respect to general shoes for running or jogging, the burst strength is preferably about 1600 kPa. Furthermore, with respect to shoes for a heavy use, for example, shoes for indoor sports such as badminton, ping-pong, etc., the burst strength is preferably about 2400 kPa.

[0017] It is preferable that the burst strength of the mesh structure part (C) is in the range from 900 kPa to 1000 kPa. The mesh structure part (B) may have any burst strength between the burst strength of (A) and that of (C).

[0018] It is preferable that a tiptoe region, a heel region and an eyelet part of the sport shoe are reinforced. Among the above-mentioned parts, the heel part may not be reinforced in the case where lightweight is particularly important.

[0019] It is preferable that a tongue part of the sport shoe includes the mesh structure part (C). It is further preferable that the tongue part may include a mesh structure part (D) having a burst strength that is lower than that of the part (C).

[0020] The double raschel warp knitted fabric may have a property of being stretchable in the width direction of the foot and not stretchable in longitudinal direction of the foot. Thus, the effect of allowing a size of a shoe to be stable and preventing the tiptoe part from stretching when the toe touches to the part at the time of wearing. On the contrary, a property of not being stretchable in the width direction of the foot and stretchable in the longitudinal direction of the foot may be provided. Thus, fitness can be provided in the direction of the width. Furthermore, when a shoe is manufactured by a process called a lasting method, in particular, the manufacturing process of the side part can be carried out easily.

[0021] At least the parts A to C of the double raschel warp knitted fabrics of the present invention are disposed as one continuous knitted fabric. Thus, when the fabrics are cut together with paper pattern, a shoe can be formed, thus enabling the efficiency in the formation to be improved.

[0022] Then, on another surface of the upper material (corresponding to an instep cover) of the present invention, a fiber with a low melting point is used and at least a part thereof is fused. Since the fused part is reinforced by fixing knit stitches, in the case of reinforcing a part with which the calx is brought into contact or a part with which the both sides of the foot are brought into contact, by heating only these parts from the outside, the knit stitch can be reinforced. In this case, it is important that only outside of the upper material is fused. The inner surface side of the upper material is not preferably fused in order to maintain a flexible state because this side covers the foot. An example of the fiber with a low melting point includes, for example, an ethylene vinyl alcohol fiber yarn but is not limited thereto. It is preferable to use fibers whose melting point is 150°C to 200°C. The fiber with a low melting point may be used for an entire surface of the front surface of the double raschel warp knitted fabric. The fiber with a low melting point can be produced by mixing together with a fiber with 20 wt.% or more of high melting point material such as polyester. In the case of polyethylene terephthalate, the melting point is 260°C.

[0023] A constituent yarn of the back surface of the double raschel warp knitted fabric and a connecting yarn connecting the front surface to the back surface are preferably a polyester fiber yarn, and more preferably a polyethylene terephthalate fiber yarn. The other configuration of the present invention may be the same as that of the basic invention mentioned above.

[0024] The present invention can provide a shoe having lightweight and air permeability and further having high durability, and a double raschel warp knitted fabric used therefor.

Example

[0025] Hereinafter, the present invention will be explained in more detail by way of Examples. Note here that the present invention is not limited to the following Examples.

(Example 1)

[0026] Figure 1 shows a double raschel warp knitted fabric (thin melon-net fabric and back-woven half-net) used for a sport shoe according to one Example of the present invention. Shoe patterns 10 matched to paper patterns are placed continuously on one knitted fabric as shown in Figure 1. In the shoe patterns 10, a non-mesh structure part (A) 1a to 1e are disposed in a part surrounding the tiptoe and a part connecting to the shoe sole and stripe-shaped parts on the side surface of the foot (both sides). That is to say, 1a denotes a part surrounding the tiptoe and connected to the shoe sole; 1b to 1e denote stripe-shaped parts arranged on both surfaces of the foot (both sides); and 1f to 1g denote parts folded in the shoe sole. A cut 13 at the tip is a part that

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becomes circular shape at the site of the tiptoe when folded into the shoe sole. A constituent yarn of a front surface and a back surface of this double raschel warp knitted fabric was a multifilament fiber yarn of polyethylene terephthalate (total diameter of fibers: 84 dtex and number of filaments: 24) and a connecting yarn connecting the front surface to the back surface was a monofilament fiber yarn made of polyethylene terephthalate (total diameter of fibers: 33 dtex and number of filament: 1). Gauge of a knitting machine was 24 gauges, and the weight per unit area of an entire knitted fabric was 258.4 g/m^2.

[0027] To a part that may have a moderate strength and air permeability, that is, a part in the vicinity of the surface of the toe, a mesh structure part (B) 2 was placed.

[0028] To a part that needs air permeability, that is, the side surfaces of the foot (both sides), mesh structure parts (C) 3a to 3d were placed in a stripe.

[0029] A tongue part 12 was formed of a mesh structure part (C) 4 and a mesh structure part (D) 5 with higher air permeability.

[0030] The back surface was formed of the same weave as that of the non-mesh structure part (A) of the front surface.

[0031] This double raschel warp knitted fabric had a structure that is stretchable in the X direction and not stretchable in the Y direction.

[0032] When the bursting test was carried out in accordance with JIS L 1096 A method, the burst strength of the non-mesh structure part (A) was 1600 kPa; the burst strength of the mesh structure part (B) was 1500 kPa; the burst strength of the mesh structure part (C) was 1000 kPa; and the burst strength of the mesh structure part (D) was 930 kPa. When the air permeability test was carried out in accordance with the JIS L 1096 A method ("Frazil method"), air permeability of the non-mesh structure part (A) was 240 cm^3/cm^2/s; air permeability of the mesh structure part (B) was 255 cm^3/cm^2/s; air permeability of the mesh structure part (C) was 278 cm^3/cm^2/s; and air permeability of the mesh structure part (D) was 340 cm^3/cm^2/s. The thickness of this knitted fabric was 5 mm. Furthermore, the weight of double raschel warp knitted fabric used for one shoe was 20 g (in the case of 26.0 cm-shoe).

(Example 2)

[0033] Sport shoes were formed by using the warp knitted fabrics obtained in Embodiment 1. Figure 2 is a side view showing a shoe for a right foot. References numerals given to elements except for the elements of the shoe pattern in Figure 1 will be mentioned below. Reference numeral 6 denotes a reinforcing cloth (artificial leather) for a tiptoe part; 7 denotes a reinforcing cloth (artificial leather) for reinforcing eyelets for shoelace 11; 8 denotes a leather part for reinforcing the calx; 9 denotes a cushion part for covering the tarsus; and 14 denotes a shoe sole part formed of synthetic elastomer (EVA resin). Figure 3 is a perspective view showing the shoe of Figure 2 when the tongue portion is taken out of the shoe. Figure 4 is a side view showing the shoe of Figure 2 seen from the opposite side.

[0034] The weight of a 26-cm shoe was 133.1 g, which was significantly lighter as compared with the weight of about 150 g to 200 g of one of the conventional sport shoes of the same kind. This reduction in weight can be achieved by reducing the upper material by minimizing the amount of reinforcing materials as possible and by disposing a part requiring a satisfactory strength and a part requiring air permeability on one continuous warp knitted fabric so as to reduce sewing parts.

[0035] A test in terms of feeling of wearing, air permeability and durability was carried out by actually wearing the formed 26-cm shoes for one month. As a result, it was confirmed that the feeling of wearing, air permeability and durability were good and that the shoes had excellent functional properties as sport shoes. In particular, the shoes were suitable as shoes to be worn in long-distance running such as marathon.

(Example 3)

[0036] Figure 5 shows double raschel warp knitted fabric (thin melon-net fabric and back-woven half-net) used for sport shoes according to one Example of the present invention. A constituent yarn of a front surface of the double raschel warp knitted fabric is a multi-filament yarn made of ethylene vinyl alcohol (total diameter of fibers: 84 dtex, number of filaments: 24, amount of yarns: 78.76 g/m^2, and total ratio: 30.4%), and a constituent yarn of the back surface of the double raschel warp knitted fabric is a multi-filament yarn made of polyethylene terephthalate (total diameter of fibers: 84 dtex, number of filaments: 24, amount of yarns: 94.52 g/m^2, and total ratio: 36.5%); and a connecting yarn connecting the front surface to the back surface is a monofilament fiber yarn made of polyethylene terephthalate (total diameter of fibers: 33 dtex, number of filament: 1, amount of yarns: 85.73 g/m^2, and total ratio: 33.1%). Gauge of a knitting machine was 24 gauges, and the weight per unit area was 259.0 g/m^2. The thickness of this knitted fabric was 5 mm.

[0037] In Figure 5, reference numeral 30 denotes a shoe pattern on knitted fabric. On one knitted fabric, respective parts are placed continuously. For reducing the excess parts so as to increase the yield, the arrangement is changed from that shown in Figure 1. Reference numeral 31 denotes a part for covering the anterior side of the foot and 32 denotes a part for covering the posterior side of the foot. The configuration is different from that shown in Figure 1 in that two parts are combined into one continuous part. Reference numeral 33 denotes a tongue part; and 34 denotes a part to be attached to the posterior side face of the calx. The burst strength of each part is substantially the same as that

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in Example 1. The number of meshes (the number of holes per inch (25.4 mm)) is described below. In the below explanation, X direction denotes a width direction and Y direction denotes a longitudinal direction in Figure 5.

(1) a part 31a1 located above the toe, stripe parts 31a2 and 32a1 of the side part of the foot, a part 32a2 for covering the calx, and a part through which a shoelace passes in a tongue part 33c: 5.5 meshes in the lateral direction and 3 meshes in the longitudinal direction
(2) a tip part 31b of the toe, a side part 32b1 of the foot and a stripe part 32b2, and a part 34 to be attached to the side face of the posterior side of the calx: 11 meshes in the lateral direction and 6 meshes in the longitudinal direction
(3) an anterior side 31c1 folded into a shoe sole and a stripe part 31c2, a reinforcing part 32c1 of a side part of the calx and an edge part 32c2: 12 meshes in the lateral direction and 12 meshes in the longitudinal direction
(4) a central part 33a of the tongue part: 5 meshes in the lateral direction and 2 meshes in the longitudinal direction.
(5) a part 33b except for a central part and a part through which a shoelace passes: 6 meshes in the lateral direction and 3.5 meshes in the longitudinal direction.

[0038] This double raschel warp knitted fabric has a structure that is not stretchable in the X direction and the Y direction.

[0039] A shoe that is the same as that shown in Figures 2 to 4 is formed by using the shoe patterns 30 of a knitted fabric. Thereafter, side parts of the foot corresponding to the parts 1c and 1d of Figure 2 are fused and processed by heating thereof at 170°C. As a result, in the heated part, knit stitch structure became rigid, and thus reinforcement can be carried out.

[0040] The weight of one of the obtained 26-cm shoes was 133 g. A test in terms of feeling of wearing, air permeability and durability was carried out by actually wearing the formed 26-cm shoes for one month. As a result, it was confirmed that the feeling of wearing, air permeability and durability were good and that the shoes had excellent functional properties as sport shoes. In particular, the shoes were suitable as shoes to be worn in long-distance running such as marathon.

Claims

1. A shoe (20) comprising:

an upper material using a double raschel warp knitted fabric;

the upper material including a first surface having a non-mesh structure and a second surface having a non-mesh structure part (A) (1a to 1d) and mesh structure parts (B) (C) (2) (3a to 3d)

the non-mesh structure part (A) and the mesh structure parts (B, C) respectively having burst strengths A, B and C that satisfy the relationship: A > B > C;

the shoe including a tiptoe region, a toe region positioned adjacent to the tiptoe region, a heel region, and two side regions that extend between the heel and toe regions;

the non-mesh structure part (A) being disposed at the tiptoe region (1a) and partially at both side regions (1b to 1e);

the mesh structure part (B) (2) being disposed adjacent the toe region; and

the mesh structure part (C)(3a to 3d) being disposed partially at both side regions.

2. The shoe according to claim 1, wherein in accordance with a bursting test based on JIS L 1096A Method, the burst strength of the non-mesh structure part (A) is 1400 kPa or more and the burst strength of the mesh structure part (C) is 900 kPa to 1200 kPa.

3. The shoe according to claim 1 or 2, wherein the tiptoe region (6), the heel region (8) and an eyelet part (a)(7) of the shoe are reinforced.

4. The shoe according to any one of claims 1 to 3, wherein a tongue part (5) of the shoe comprises the mesh structure part (C).

5. The shoe according to any one of claims 1 to 4, wherein a constituent yarn of the first surface and the second surface, and a connecting yarn connecting the first surface to the second surface are polyester fiber yarns.

6. The shoe according to claim 1, wherein the upper material comprises a front surface having a mesh structure part and a back surface having a non-mesh structure; a constituent yarn of the front surface including a yarn having a melting point that is lower than the melting point of a constituent yarn of the back surface, and at least a part of the front surface is partially fused.

7. The shoe according to claim 6, wherein the constituent yarn of the front surface is an ethylene vinylalcohol fiber yarn.

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8. The shoe according to claim 6 or 7, wherein the constituent yarn of the back surface and the connecting yarn connecting the front surface to the back surface are polyester fiber yarns.

9. The shoe according to any one of the preceeding claims wherein at least the parts (A) to (C) are disposed in one continous knitted fabric.

10. A double raschel warp knitted fabric including one surface having a non-mesh structure and another surface having a non-mesh structure part (A) and mesh structure parts (B, C);
the non-mesh structure part (A) and the mesh structure parts (B, C) including burst strengths A, B and C satisfy the relationship: A > B > C, and
the parts (A) to (C) being disposed in one continuous knitted fabric.

11. The double raschel warp knitted fabric according to claim 10, wherein a constituent yarn of the first surface and the second surface and a connecting yarn connecting the first surface to the second surface is a polyester fiber yarn.

12. The double raschel warp knitted fabric according to claim 10, wherein the upper material comprises a front surface having a mesh structure part and a back surface having a non-mesh structure; and a constituent yarn of the front surface including a yarn having a melting point that is lower than the melting point of a constituent yarn of the back surface.

13. The double raschel warp knitted fabric according to claim 12, wherein the constituent yarn of the front surface is an ethylene-vinyl alcohol fiber yarn.

14. The double raschel warp knitted fabric according to claim 12 or 13, wherein the constituent yarn of the back surface and the connecting yarn connecting the front surface to the back surface are polyester fiber yarns.

15. Use of a double raschel warp knitted fabric according to any one of claims 10 to 14 for a shoe.

16. Use of a double raschel warp knitted fabric according to claim 15 for a shoe:

the shoe including a tiptoe region, a toe region positioned adjacent to the tiptoe region, a heel region, and two side regions that extend between the heel and toe regions;

the non-mesh structure part (A) being disposed at the tiptoe region and partially at the side regions of the shoe;

the mesh structure part (B) being disposed in the vicinity of the toe region of the shoe;

the mesh structure part (C) being disposed partially at the side regions of the shoe.

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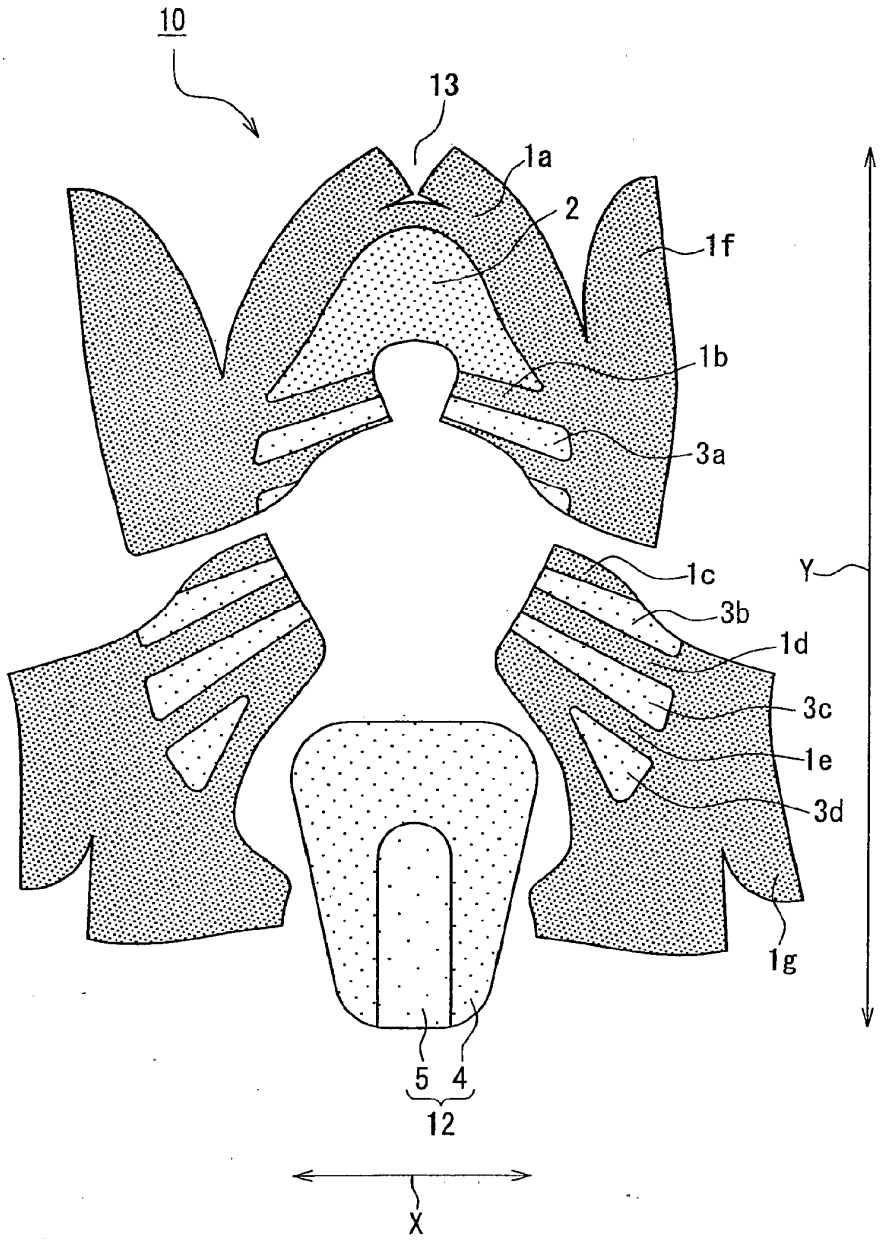


FIG. 1

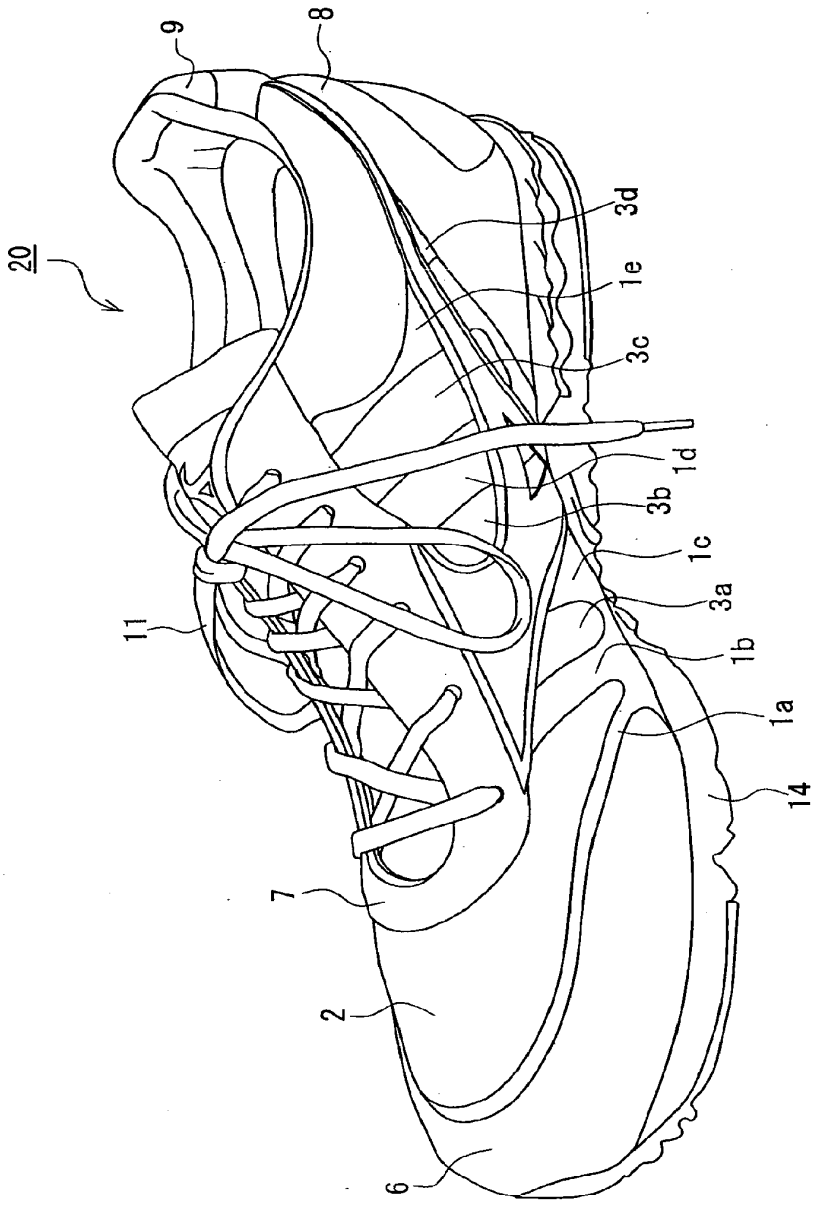


FIG. 2

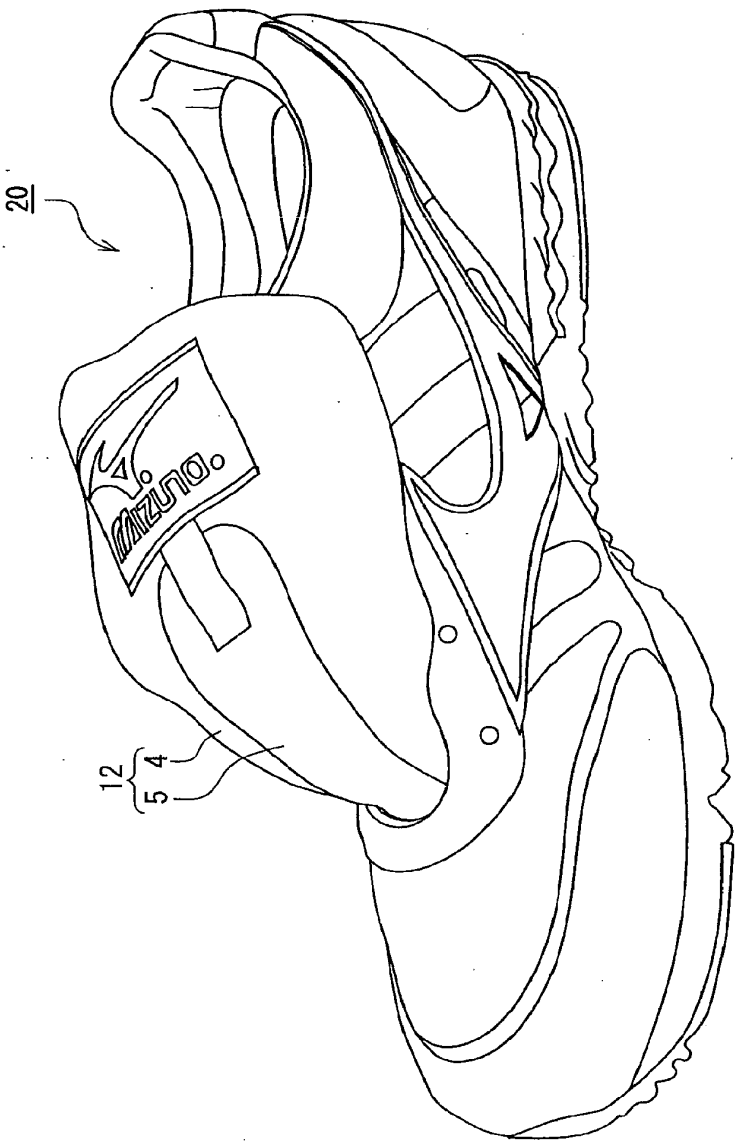


FIG. 3

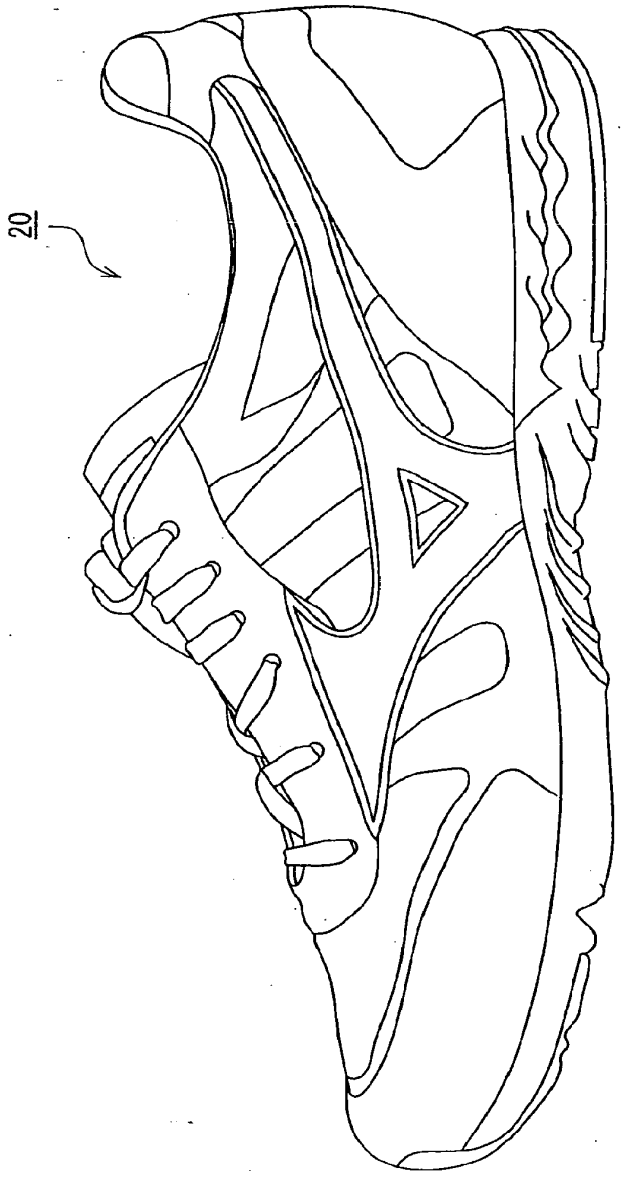


FIG. 4

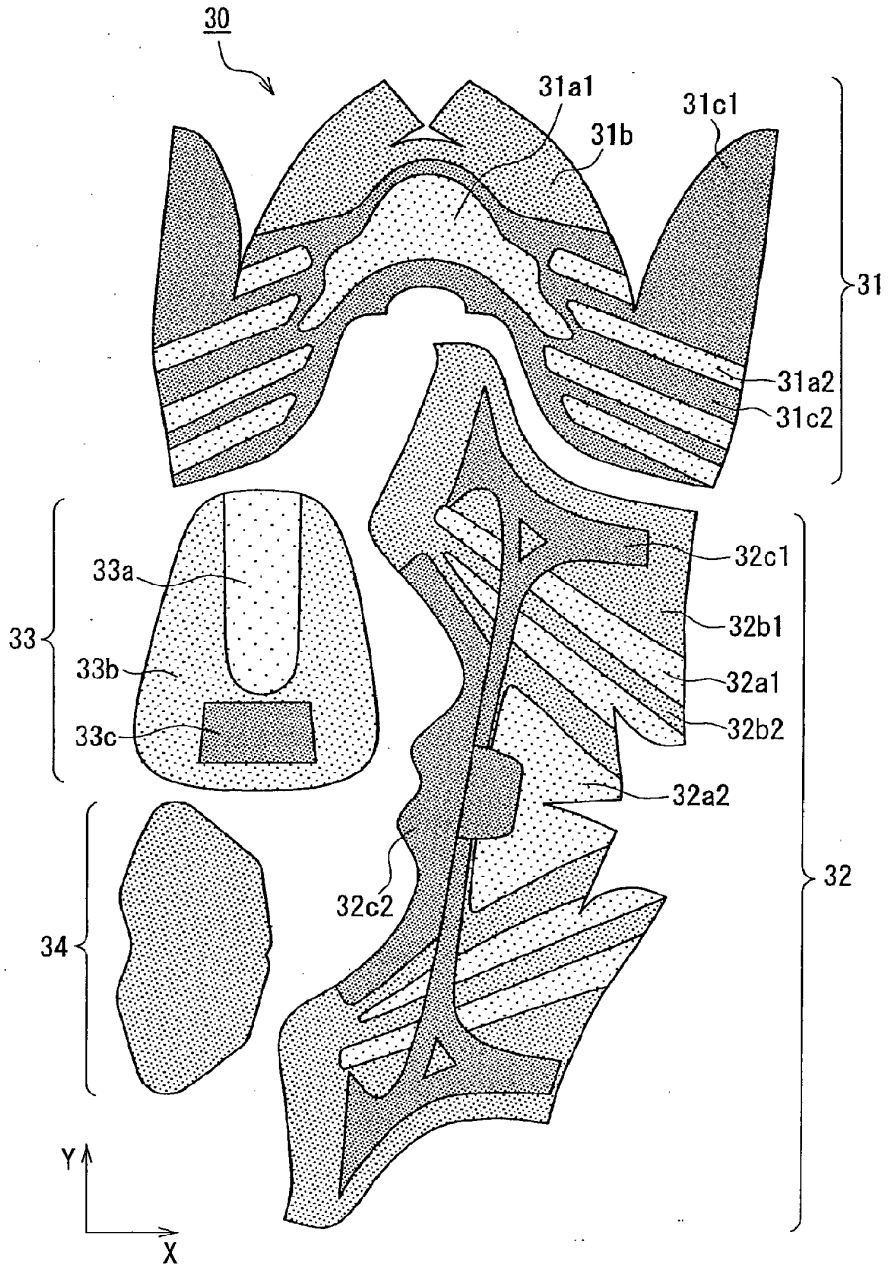

30
31a1
31b
31c1
31
31a2
31c2
33
33a
33b
33c
32c1
32b1
32a1
32b2
32a2
32
32c2
34
Y
X

FIG. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 00 0365

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 06, 30 June 1997 (1997-06-30) & JP 9 047302 A (MIZUNO CORP), 18 February 1997 (1997-02-18) * abstract *	1,10,15, 16	A43B1/00 A43B5/06 A43B7/06 D04B21/02
A	PATENT ABSTRACTS OF JAPAN vol. 2002, no. 07, 3 July 2002 (2002-07-03) & JP 2002 065303 A (TOHO TENAX CO LTD), 5 March 2002 (2002-03-05) * abstract *	1,10,15, 16	
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

A43B
D04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 April 2004	Cianci, S

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 04 00 0365

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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22-04-2004

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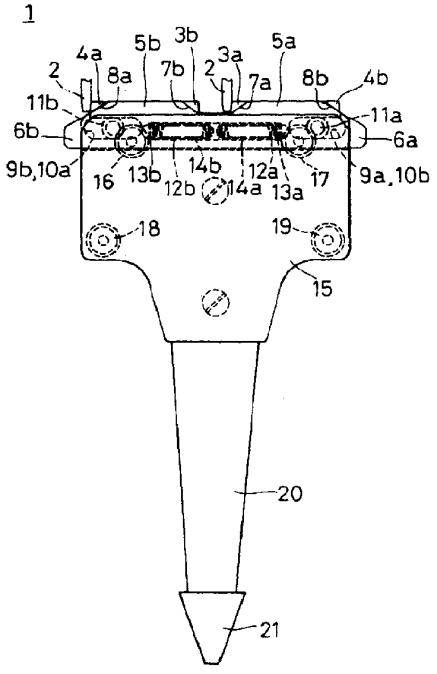
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(54) YARN CARRIER OF WEFT KNITTING MACHINE

(57) When bringing pins (2) are engaged with the yarn carrier at the engagement portions (3a, 3b) near the center of the yarn carrier, the yarn carrier, as a normal carrier, feeds the yarn so that the yarn is applied to a knitting needle performing knitting operation by a carriage. When the bringing pins (2) are engaged with the yarn carrier at the engagement points (4a, 4b) near the rear side thereof in the travel direction, the yarn carrier, as an inlay carrier, feeds the yarn in preference to the knitting operation so that the yarn is not applied to the knitting needle performing the knitting operation by the carriage. When the projection portions (6a, 6b) of engagement releasing members (5a, 5b) are pressed by the contact thereof with the stopper, the engagement releasing members (5a, 5b) are moved backward, and slope portions (7a, 8a; 7b, 8b) push up the bringing pins (2) engaged with the yarn carrier at the engagement points (3a, 4a; 3b, 4b) so as to release the engagement.

FIG. 1



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Description

Technical Field

[0001] The present invention relates to a yarn carrier, in a weft knitting machine, that is brought by a carriage and thereby supplies yarn when producing a knitted fabric by travels of the carriage.

Background Art

[0002] Conventionally, in a typical weft knitting machine, a knitted fabric is produced by letting a carriage travel back and forth along the longitudinal direction of a needle bed on which a large number of knitting needles are provided to be juxtaposed to each other. The carriage is provided with a knitting cam for letting the knitting needles perform a knitting operation. To the knitting needles performing a knitting operation, a knitting yarn is supplied from a yarn carrier that is brought by the carriage. In a weft knitting machine that is provided with at least the front and the rear needle beds, yarn guide rails are installed above a needle bed gap in which the front ends of the knitting needles proceeding from the front and the rear needle beds are opposed to each other, so as to face the needle bed gap, and yarn carriers suspended from the yarn guide rails travel along the yarn guide rails. Carriages are provided at the front and the rear needle beds and linked to each other by a bridge straddling the yarn guide rails. Pins for letting the carriages bring the yarn carriers can project and withdraw at the bridge and are engaged with the yarn carriers in the projecting state. An engagement position of the pin and the yarn carrier is normally set to be a position in which a knitting yarn is supplied from the yarn carrier at a timing at which the front ends of the knitting needles recede from the needle bed gap after proceeding thereinto when the knitting needles are led to perform a knitting operation by the knitting cam.

[0003] When a yarn carrier for supplying a knitting yarn at a normal timing and a yarn carrier for supplying a knitting yarn prior to the normal timing so as not to be hooked on knitting needles are used in combination, it is possible to perform inlay knitting (see Japanese Unexamined Patent Publication JP-A 55-148256, for example). According to JP-A 55-148256, a yarn feeding-member corresponding to a yarn carrier for inlay knitting shown in FIGS. 5 to 9 has a shape different from that of a yarn feeding member for knitting a normal knitted fabric shown in FIG. 4. The shapes are different because the yarn feeding members supply knitting yarns at different timings by being engaged with pins at different positions with respect to a yarn feeding position. The positions of the front ends of the yarn feeding members for supplying knitting yarns at the needle bed gap are also different between the yarn feeding member for normal knitting and the yarn feeding member for inlay knitting.

[0004] In the yarn carrier brought by the carriage, by lifting the pin, engagement can be released and a travel thereof can be halted, so that it is possible to produce a knitted fabric, changing knitting yarns by changing yarn carriers in the middle of the course in which the knitted fabric is produced. When the carriage travels to the end portion of the knitting width and the yarn carrier abuts against a stopper that has been provided on the yarn guide rail, the pin is pushed up by, for example, a slope, and thus engagement with the pin can be mechanically released. In JP-A 55-148256, a configuration is shown in which with respect to the yarn feeding member for normal knitting shown in FIG. 4, the front end of the pin that has been engaged with an engagement point runs over a slope provided at a stopper and thus the engagement is released. With respect to the yarn feeding member for inlay knitting shown in FIGS. 5 to 9, a configuration is disclosed in which a switching component provided at the yarn feeding member can be displaced relatively back and forth, and when the front end of the switching component abuts against a stopper, the switching component recedes and a slope formed at the switching component pushes up the front end of the pin from the engagement point and thus the engagement is released.

[0005] The yarn feeding member for inlay knitting disclosed in JP-A 55-148256 is only for inlay knitting, and thus a timing at which a knitting yarn is supplied so as not to be hooked at a position where the knitting needles perform a knitting operation by the action of the knitting cam mounted on the carriage, and a position in which a knitting yarn is supplied at the needle bed gap are different from those of the yarn feeding member for normal knitting. This method by which the yarn feeding member for normal knitting and the yarn feeding member for inlay knitting are used in combination to produce a knitted fabric enables an inlay knitted fabric to be produced effectively when the knitting width is substantially constant. However, when the knitting width changes, it is impossible to produce a good inlay knitted fabric. More specifically, in the case where the knitting width changes, a better knitted fabric can be produced when the end portions are tucked and hooked on the knitting needles also in the course of inlay knitting. However, in the yarn feeding member only for inlay knitting, a timing at which a knitting yarn is supplied with respect to a knitting operation of knitting needles led by the knitting cam is different from that of the yarn feeding member for normal knitting, and thus it is impossible to supply a knitting yarn for a knitting operation of the knitting needles included in the knitting timing such as tucking.

Disclosure of Invention

[0006] It is an object of the invention to provide a yarn carrier, in a weft knitting machine, in which a plurality of engagement points are provided so that a knitting yarn can be supplied at a plurality of different timings and in

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which engagement with a pin can be released when the yarn carrier abuts against a stopper or the like.

[0007] The invention is directed to a yarn carrier, in a weft knitting machine, that yarn carrier is used for supplying a knitting yarn to knitting needles provided to be juxtaposed to each other in needle beds of the weft knitting machine, that can travel along a yarn guide rail parallel with a longitudinal direction of the needle beds, and that can be engaged with a pin projecting from a carriage and is brought by the carriage when engaged with the pin,

wherein engagement with the pin is possible at a plurality of points that are spaced apart in a travel direction, and

the yarn carrier comprises an engagement releasing member that has a projection portion and a plurality of slope portions, which projection portion is capable of projecting to a front side in a travel direction in which the yarn carrier is brought by the carriage, and is displaceable so that the engagement with the pin at any of the plurality of points can be released at the plurality of slope portions when the projection portion is pressed from the front side and recedes.

[0008] In addition, the invention is characterized in that the plurality of points engaged with the pin include:

an engagement point for a normal carrier in which a knitting yarn can be supplied so as to be hooked on knitting needles performing a knitting operation, and

an engagement point for an inlay carrier in which a knitting yarn can be supplied so as not to be hooked on knitting needles performing a knitting operation.

[0009] In addition, the invention is characterized in that the engagement releasing members are provided so that the front sides thereof, with respect to back-and-forth travels of the carriage, are paired to be on one side and the other side of the yarn guide rail.

[0010] In addition, the invention is characterized in that the yarn carrier further comprises a spring that biases the projection portion of the engagement releasing member so as to project to the front side.

Brief Description of Drawings

[0011] Other and further objects, features, and advantages of the invention will be more explicit from the following detailed description taken with reference to the drawings wherein:

FIG. 1 is a front view showing a schematic configuration of a yarn carrier 1 according to an embodiment of the invention;

FIG. 2 is a front view showing a state in which the yarn carrier 1 in FIG. 1 travels along a yarn guide rail 22 and is halted abutting against a stopper 23;

FIG. 3 is a right side cross-sectional view showing a configuration in which the yarn carriers 1 in FIG. 1 are attached to the plurality of yarn guide rails 22 and displaceably supported by rollers 16, 17, 18, and 19;

FIG. 4 is a front view showing components that constitute a main unit 15 of the yarn carrier 1 in FIG. 1;

FIG. 5 is a view showing the relative positional relationship among engagement releasing members 5a and 5b and a spacer 31 in the yarn carrier 1 in FIG. 1; and

FIG. 6 is a view showing a sock 40 as an example of a knitted fabric that can be preferably produced using the yarn carrier 1 in FIG. 1.

Best Mode for Carrying out the Invention

[0012] Now referring to the drawings, preferred embodiments of the invention are described below.

[0013] FIG. 1 shows a schematic configuration of a yarn carrier 1 according to an embodiment of the invention. The yarn carrier 1 of this embodiment can travel back and forth along the longitudinal direction of needle beds of a weft knitting machine, and has a plurality of engagement points 3a, 3b; 4a, 4b that can be engaged with a bringing pin 2 projecting and withdrawing at, for example, a bridge portion of a carriage (not shown). The yarn carrier 1 is brought by the carriage to travel back and forth to the left or the right in the drawing, and has the engagement points 3a and 4a used in a travel to the right and the engagement points 3b and 4b used in a travel to the left at symmetrical positions with respect to the center. When the bringing pin 2 is engaged with the engagement points 3a and 3b, which are close to the center, the yarn carrier 1 functions as a normal carrier and supplies a knitting yarn so as to be hooked on the knitting needles performing a knitting operation led by the carriage. When the bringing pin 2 is engaged with the engagement points 4a and 4b, which are close to the rear sides with respect to the travel directions, the yarn carrier 1 functions as an inlay carrier and supplies a knitting yarn prior to a knitting operation so as not to be hooked on the knitting needles performing a knitting operation led by the carriage. With the engagement points 3a, 3b; 4a, 4b that are engaged with the bringing pin 2, it is possible to switch between functions of a normal carrier and an inlay carrier, and thus it is possible to easily perform knitting in which both ends of an inlay knitted fabric are tucked on the knitting needles.

[0014] In order to release engagement of the bringing pin 2 that is engaged with each of the engagement points 3a, 3b; 4a, 4b, engagement releasing members 5a and 5b are provided. The engagement releasing members 5a and 5b are provided in such a manner that with respect to back-and-forth travels of the carriage, the engagement releasing member 5a that operates during a travel to the right in the drawing is paired with the engagement releasing member 5b that operates during a travel to the left. The engagement releasing

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member 5a has a projection portion 6a that projects to the right on the yarn carrier 1 in the drawing and slope portions 7a and 8a that release engagement of the bringing pin 2 at the engagement points 3a and 4a. The engagement releasing member 5b has a projection portion 6b that projects to the left on the yarn carrier 1 in the drawing and slope portions 7b and 8b that release engagement of the bringing pin 2 at the engagement points 3b and 4b.

[0015] These engagement releasing members 5a and 5b are formed by a metal plate or other materials, and are provided with pairs of elongated holes 9a, 10a; 9b, 10b that are spaced apart in the horizontal direction of the drawing. The elongated hole 9a of the engagement releasing member 5a and the elongated hole 10b of the engagement releasing member 5b are arranged at positions where one overlaps the other, and a supporting pin 11a is inserted into the holes. Furthermore, the elongated hole 9b of the engagement releasing member 5b and the elongated hole 10a of the engagement releasing member 5a are arranged at positions where one overlaps the other, and a supporting pin 11b is inserted into the holes. The engagement releasing members 5a and 5b can be displaced with relative to the yarn carrier 1 within a range in which the both ends of the elongated holes 9a, 10a; 9b, 10b do not abut against the supporting pins 11a and 11b. At positions between the pairs of the elongated holes 9a, 10a; 9b, 10b of the engagement releasing members 5a and 5b, elongated holes 12a and 12b are provided. At the elongated hole 12a of the engagement releasing member 5a, a spring receiving portion 13a is formed by partial bending on the right side in the drawing. At the elongated hole 12b of the engagement releasing member 5b, a spring receiving portion 13b is formed by partial bending on the left side in the drawing. The front ends of the spring receiving portions 13a and 13b are inserted into an elongated hole of a spacer (described later), and receive one ends of coil springs 14a and 14b.

[0016] A main unit 15 of the yarn carrier 1 that has the engagement points 3a, 3b; 4a, 4b for the bringing pin 2 and that is provided with the displaceable engagement releasing members 5a and 5b, is provided with rollers 16, 17, 18, and 19, and can be supported in such a manner that the main unit 15 can run on a yarn guide rail 22 (described later). An arm 20 is extended from the main unit 15, and the front end of the arm 20 is provided with a yarn feeding port 21 for supplying a knitting yarn to a needle bed gap.

[0017] FIG. 2 shows a state in which the yarn carrier 1 of this embodiment travels along the yarn guide rail 22 and is halted abutting against a stopper 23. For example, when the bringing pin 2 is engaged with any of the engagement points 3b and 4b and lets the yarn carrier 1 travel to the left in the drawing, the projection portion 6b of the engagement releasing member 5b abuts against the right side face of the stopper 23. When the bringing pin 2 is intended to further travel to the left, the projection portion 6b is pressed down and the engagement releasing member 5b is displaced to the right with relative to the main unit 15. With this relative displacement, the slope portion 7b or 8b pushes up the front end of the bringing pin 2 that is engaged with the engagement point 3b or 4b and releases the bringing pin 2 from the engagement point 3b or 4b. The bringing pin 2 is biased by a spring to project downwards, and thus when pushed up by the slope portion 7b or 8b with a force that is greater than the spring bias, the bringing pin 2 is pushed up from the engagement point 3b or 4b resisting the spring bias. The bringing pin 2 continues to travel to the left even after pushed up from the engagement point 3b or 4b, and thus the bringing pin 2 is parted from the engagement point 3b or 4b and thus the engagement is released. Also, in the case where the yarn carrier 1 abuts against the stopper 23 on the right side, the engagement releasing member 5a performs an operation to release the engagement of the bringing pin 2 in a similar manner.

[0018] Furthermore, a magnet is attached to the yarn carrier 1. Even after engagement of the bringing pin 2 at the engagement points 3a, 3b; 4a, 4b is released, a sliding friction on the yarn guide rail 22 deriving from the magnetic attraction of the magnet is set to be greater than the bias of the coil springs 14a and 14b, and thus the yarn carrier 1 holds the current position. Therefore, the bringing pin 2 that was engaged with the engagement points 4a and 4b for an inlay carrier and whose engagement is released reaches the engagement points 3a and 3b for a normal carrier when the carriage continues to travel. However, since the engagement points 3a and 3b are closed with the slope portions 7a and 7b of the engagement releasing members 5a and 5b, the bringing pin 2 is not engaged with the engagement point 3a or 3b.

[0019] It should be noted that a plurality of yarn carriers 1 can be arranged in the longitudinal direction of one yarn guide rail 22. One of the plurality of yarn carriers 1 is selected by letting the bringing pin 2 project and be engaged with the engagement point 3a, 3b, 4a, or 4b. As for the knitting cam provided at the carriage, a plurality of sets can be provided so that a plurality of knitting operations can be performed in one travel. Each of the plurality of knitting cams brings the yarn carrier 1 to let a knitting yarn be supplied. Therefore, the stopper 23 provided on the yarn guide rail 22 is to halt travels of the plurality of yarn carriers 1. As for the yarn carrier 1 of this embodiment, when between the stopper 23 and the yarn carrier 1 engaged with the bringing pin 2, there is another yarn carrier 1, the yarn carrier 1 on the frontmost abuts against the stopper 23 and is halted first. Subsequently, the yarn carrier 1 abuts against its preceding yarn carrier 1 and is halted sequentially, and engagement with the bringing pin 2 can be released by, instead of abutting against the stopper 23, abutting against the preceding yarn carrier 1, and the travel thereof can be thus halted.

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[0020] FIG. 3 shows a cross-sectional configuration in which the plurality of yarn carriers 1 are attached to the plurality of yarn guide rails 22 and displaceably supported by the rollers 16, 17, 18, and 19. Although the arm 20 and the yarn feeding port 21 are shown only for one yarn carrier 1, also in other yarn carriers 1, the yarn feeding port 21 provided at the front end of the arm 20 faces the needle bed gap 24 and supplies a knitting yarn in a basically similar manner. A position for supplying a knitting yarn is a position in which knitting needles 25 and 26 proceed from the front and the rear needle beds and can catch a knitting yarn with the hooks thereof. When the bringing pin 2 is engaged with the engagement points 3a and 3b for a normal carrier, a knitting yarn is supplied from the yarn feeding port 21 at a timing at which the knitting needles 25 and 26 recede from the needle bed gap after proceeding thereinto, and thus it is possible to perform knitting by hooking the knitting yarn on the knitting needles 25 and 26. When the bringing pin 2 is engaged with the engagement points 4a and 4b for an inlay carrier, a knitting yarn is supplied from the yarn feeding port 21 prior to a timing at which the knitting needles 25 and 26 proceed into the needle bed gap 24, and thus the knitting yarn goes under the knitting needles 25 and 26, so that it is possible not to hook the knitting yarn on the knitting needles 25 and 26.

[0021] FIG. 4 shows components that constitute the main unit 15 of the yarn carrier 1 in this embodiment. A base 30 is formed by a metal plate or other materials, is formed in one piece with the arm 20, and is disposed on the rear face side in the drawing. To the surface of the base 30, a spacer 31 is attached that is formed, for example, a synthetic resin. On the spacer 31, the elongated holes 32a and 32b for accommodating the coil springs 14a and 14b are formed on positions that are close to the center. On the both sides of the elongated holes 32a and 32b, supporting holes 33a and 33b for letting the supporting pins 11a and 11b shown in FIG. 1 through are provided.

[0022] On the front face side of the spacer 31, the engagement releasing members 5a and 5b are arranged one on top of the other. For example, the engagement releasing member 5a is on the rear face side, and the spring receiving portion 13a is inserted into the elongated hole 32a of the spacer 31 and receives one end of the coil spring 14a. The other end of the coil spring 14a abuts against the end portion of the elongated hole 32a at a position that is close to the center. In this manner, the coil spring 14a biases the engagement releasing member 5a to the right in the drawing. On the front face side of the engagement releasing member 5a, the engagement releasing member 5b is disposed. The spring receiving portion 13b of the engagement releasing member 5b goes into the elongated hole 12a of the engagement releasing member 5a to be inserted into the elongated hole 32b of the spacer 31 and receives one end of the coil spring 14b. The other end of the coil spring 14b abuts against the end portion of the elongated hole 32b at a position that is close to the center. In this manner, the coil spring 14b biases the engagement releasing member 5b to the left in the drawing. The surface of the main unit 15 is covered by a cover 35.

[0023] FIG. 5 shows the relative positional relationship among the engagement releasing members 5a and 5b and the spacer 31. Herein, drawing of the elongated holes 32a and 32b of the spacer 31 has been omitted. FIG. 5(a) shows a state in which the bringing pin 2 is engaged with the engagement point 3a, 4a, 3b, or 4b and can move in connection therewith as shown in FIG. 1, and FIG. 5(b) shows a state in which engagement is released by abutting against, for example, the stopper 23 as shown in FIG. 2. In the state where engagement is possible as shown in FIG. 5 (a), the projection portions 6a and 6b of the engagement releasing members 5a and 5b project and the slope portions 7a, 8a; 7b, 8b are apart from the engagement points 3a, 4a; 3b, 4b, and thus engagement with the bringing pin 2 is possible. In the state where, for example, in a travel to the left, the projection portion 6b of the engagement releasing member 5b, which is one of the engagement releasing members, abuts against the stopper 23 or the side face of another yarn carrier 1, the engagement releasing member 5b moves relatively to the right, and thus the slope portions 7b and 8b cover the engagement points 3b and 4b as shown in FIG. 5(b). When any of the engagement points 3b and 4b is engaged with the bringing pin 2, the front end of the bringing pin 2 is pushed up by the slope portion 7b or 8b, and thus the engagement is released.

[0024] During this travel to the left, since the other engagement releasing member 5a is not displaced, when the amount at which the tail portion of the engagement releasing member 5a projects is set, even in the most receding state, not to project to the right exceeding the front end of the projection portion 6a of the other engagement releasing member 5a, the apparent amount at which the pair of engagement releasing members 5a and 5b projects to the right can be set not to change overall. Although it is possible to form the pair of engagement releasing members 5a and 5b in one piece, in the case where the pair is formed in one piece, when the projection portion 6b abuts against, for example, the stopper 23 and recedes, the other projection portion 6a projects further, and thus it is necessary to provide a mechanism that can return the engagement releasing member to the center position reliably. In this embodiment, the pair of engagement releasing members 5a and 5b are separately formed, and thus an operation to release engagement can be performed reliably and simply.

[0025] Also, the yarn carrier 1 of this embodiment further includes the coil springs 14a and 14b that bias the projection portions 6a and 6b of the engagement releasing members 5a and 5b to project forwards, but it is also possible that the spring bias of, for example, the coil springs 14a and 14b is not applied. In the case where the engagement releasing members 5a and 5b can trav-

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el smoothly, the engagement releasing members 5a and 5b can be displaced by the bringing pin 2, as long as the projection portion 6a or 6b does not abut against, for example, the stopper 23 or another yarn carrier 1. Even when the slope portion 7a, 8a, 7b, or 8b covers the engagement point 3a, 4a, 3b, or 4b, the front end of the bringing pin 2 presses the slope portion 7a, 8a, 7b, or 8b to let the engagement releasing member 5a or 5b move to the side of the projection portion 6a or 6b, so that the slope portion 7a, 8a, 7b, or 8b does not cover the engagement point 3a, 4a, 3b, or 4b.

[0026] In this embodiment, however, the coil springs 14a and 14b bias the projection portions 6a and 6b of the engagement releasing members 5a and 5b to project forwards. With this configuration, as long as the projection portion 6a or 6b does not abut against, for example, the stopper 23, it is possible to let the projection portions 6a and 6b always project so that the slope portion 7a, 8a, 7b, or 8b does not cover the engagement point 3a, 4a, 3b, or 4b, and thus engagement with the bringing pin 2 can be reliably performed.

[0027] FIG. 6 shows an example of a knitted fabric that can be preferably produced using the yarn carrier 1 of this embodiment. FIG. 6(a) shows a sock 40 as a completed knitted fabric. The sock 40 has a heel portion 41, and is to be produced in three dimensions. FIG. 6 (b) shows a knitted fabric in which the sock 40 in FIG. 6 (a) is cylindrically knitted separately between the front and the rear needle beds of the weft knitting machine. For example, a rear needle bed knitted fabric 43, which is to be produced at the rear needle bed, includes a knitting width changing portion to form the heel portion 41. A front needle bed knitted fabric 45, which is to be produced at the front needle bed, is produced with the substantially constant knitting width. When inlay knitting is performed in the heel portion 41, it is preferable that a knitting yarn is not only simply led through the knitted fabric, but also tucked on the knitting needles at the both sides of the knitting width. The heel portion 41 is knitted by short rows.

[0028] With use of the yarn carrier 1 of this embodiment, the bringing pin 2 can be engaged with the engagement points 3a and 3b to perform tucking at the start of knitting, and then the bringing pin 2 can be engaged with the engagement points 4a and 4b to perform inlay knitting. Switching between the engagement points 3a, 4a; 3b, 4b at the start of knitting is performed by letting the carriage that has once moved recede and then move again.

[0029] It should be noted that the position of the yarn feeding port 21 with respect to the needle bed gap 24 can be changed by applying the configuration for letting the position of a yarn feeding portion of a yarn carrier approach to the front end portion of knitting needles, which has been disclosed by the applicant of the invention in Japanese Unexamined Patent Publication JP-A 11-61606.

[0030] As described above, the yarn carrier 1 in a weft knitting machine in this embodiment is used for supplying a knitting yarn to the knitting needles 25 and 26 that are provided side by side on the needle beds of the weft knitting machine, can travel along the yarn guide rail 22 parallel with the longitudinal direction of the needle beds, and can be engaged with the bringing pin 2 projecting from the carriage. The yarn carrier 1 is brought by the carriage and travels when engaged with the bringing pin 2. The engagement with the bringing pin 2 is possible at the plurality of engagement points 3a, 4a; 3b, 4b that are provided to be spaced apart in the travel direction, and thus it is possible to let timings for supplying a knitting yarn be different, depending on the engagement points 3a, 4a; 3b, 4b. This change of timings for supplying a yarn is useful not only when using functions of a normal carrier and an inlay carrier properly, but also when producing various knitted fabrics and when letting the end of a yarn be drawn into the knitted fabric. The yarn carrier 1 includes the engagement releasingmembers 5a and 5b, and the engagement releasingmembers 5a and 5b have the projection portions 6a and 6b and the plurality of slope portions 7a, 8a; 7b, 8b. The projection portions 6a and 6b of the engagement releasing members 5a and 5b can project to the front sides in the travel directions in which the yarn carrier 1 is brought by the carriage, and can be displaced so that the engagement with the bringing pin 2 can be released at any of the plurality of slope portions 7a, 8a; 7b, 8b when the projection portions 6a and 6b are pressed from the front sides and recede. When, for example, the stopper 23 is provided in the middle of the yarn guide rail 22, the projection portions 6a and 6b of the engagement releasing members 5a and 5b abut against the stopper 23 or so forth, and thus engagement with the bringing pin 2 can be released at the slope portions 7a, 8a; 7b, 8b.

[0031] The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and the range of equivalency of the claims are therefore intended to be embraced therein.

Industrial Applicability

[0032] As described above, according to the invention, a yarn carrier in a weft knitting machine is used for supplying a knitting yarn to knitting needles provided to be juxtaposed to each other in needle beds of the weft knitting machine, can travel along a yarn guide rail parallel with the longitudinal direction of the needle beds, and can be engaged with a pin projecting from a carriage, and is brought by the carriage and travels when engaged with the pin. Engagement with the pin is possible at a plurality of points that are spaced apart in the

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travel direction, and thus it is possible to let timings for supplying a knitting yarn be different, depending on the engagement points. The yarn carrier includes an engagement releasing member, and the engagement releasing member has a projection portion and a plurality of slope portions. The projection portion of the engagement releasing member can project to the front side in the travel direction in which the yarn carrier is brought by the carriage, and the releasing member is displaceable so that the engagement with the pin can be released at any of the plurality of slope portions when the projection portion is pressed from the front side and recedes. When, for example, a stopper is provided in the middle of the yarn guide rail, the projection portion of the engagement releasing member abuts against the stopper or so forth, and thus engagement with the pin can be released at the slope portion.

[0033] Furthermore, according to the invention, the plurality of points engaged with the pin include an engagement point for a normal carrier in which a knitting yarn can be supplied so as to be hooked on knitting needles performing a knitting operation, and an engagement point for an inlay carrier in which a knitting yarn can be supplied so as not to be hooked on knitting needles performing a knitting operation. Thus, the yarn carrier can be used for not only inlay knitting but also normal knitting.

[0034] Furthermore, according to the invention, the engagement releasing members are provided so that the front sides thereof, with respect to back-and-forth travels of the carriage, are paired to be on one side and the other side of the yarn guide rail. Thus, only one side of the engagement releasing member that corresponds to the travel direction of the carriage abuts against, for example, the stopper, to be displaced, and thus the engagement with the pin can be released. The engagement releasing members that project to one sides are provided to be paired with each other. Thus, it is not necessary to let the opposite side of the projection portion project as much as the other projection portion, and when the projection portion abuts against, for example, the stopper and recedes, it is possible to suppress the projection of the opposite side within a range in which the other projection portion projects.

[0035] Furthermore, according to the invention, a spring biases the projection portion of the engagement releasing member so as to project to the front side. Thus, it is possible to let the projection portion project, as long as the projection port ion does not abut against, for example, the stopper, so that engagement with the pin is not released at the slope portion and the bringing pin can be reliably engaged.

Claims

1. A yarn carrier, in a weft knitting machine, that yarn carrier is used for supplying a knitting yarn to knitting needles provided to be juxtaposed to each other in needle beds of the weft knitting machine, that can travel along a yarn guide rail parallel with a longitudinal direction of the needle beds, and that can be engaged with a pin projecting from a carriage, and is brought by the carriage when engaged with the pin,

   wherein engagement with the pin is possible at a plurality of points that are spaced apart in a travel direction, and the yarn carrier comprises an engagement releasing member that has a projection portion and a plurality of slope portions, which projection portion is capable of projecting to a front side in a travel direction in which the yarn carrier is brought by the carriage, and is displaceable so that the engagement with the pin at any of the plurality of points can be released at the plurality of slope portions when the projection portion is pressed from the front side and recedes.

2. The yarn carrier of claim 1, wherein the plurality of points engaged with the pin include:

   an engagement point for a normal carrier in which a knitting yarn can be supplied so as to be hooked on knitting needles performing a knitting operation, and
   an engagement point for an inlay carrier in which a knitting yarn can be supplied so as not to be hooked on knitting needles performing a knitting operation.

3. The yarn carrier of claim 1 or 2, wherein the engagement releasing members are provided so that the front sides thereof, with respect to back-and-forth travels of the carriage, are paired to be on one side and the other side of the yarn guide rail.

4. The yarn carrier of any one of claims 1 to 3, further comprising a spring that biases the projection portion of the engagement releasing member so as to project to the front side.

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FIG. 1

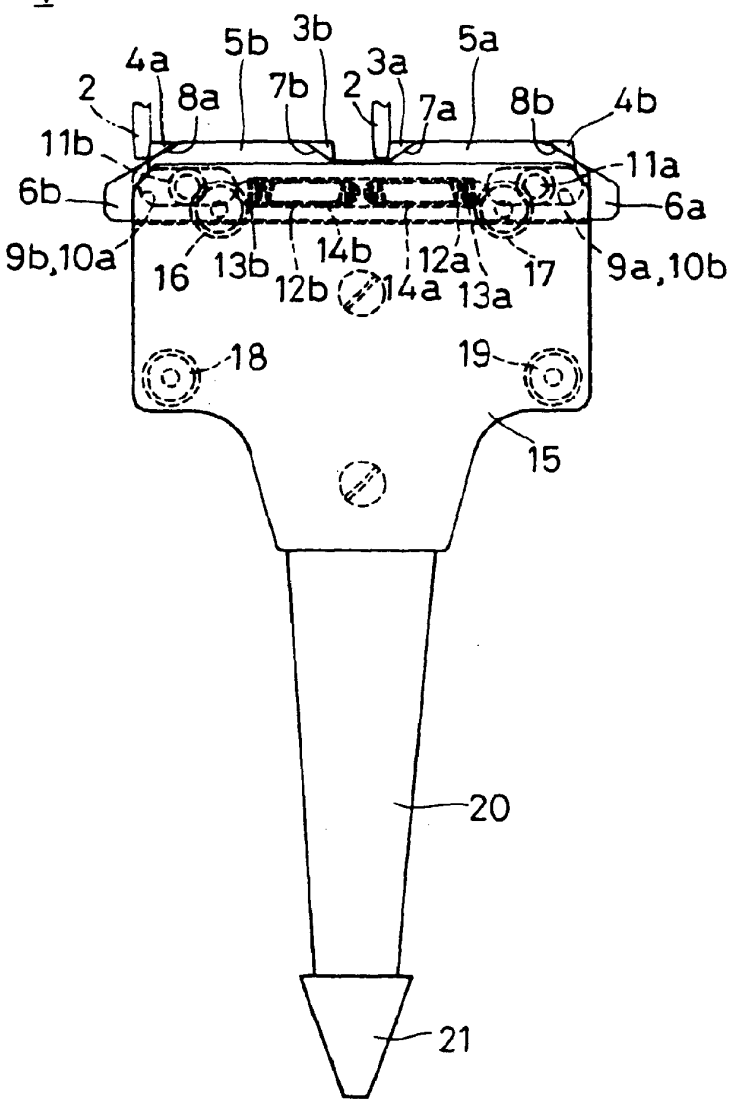

1
2
4a
8a
5b
3b
7b
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3a
7a
5a
8b
4b
11b
11a
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6a
9b,10a
16
13b
12b
14b
14a
12a
13a
17
9a,10b
18
19
15
20
21

FIG. 2

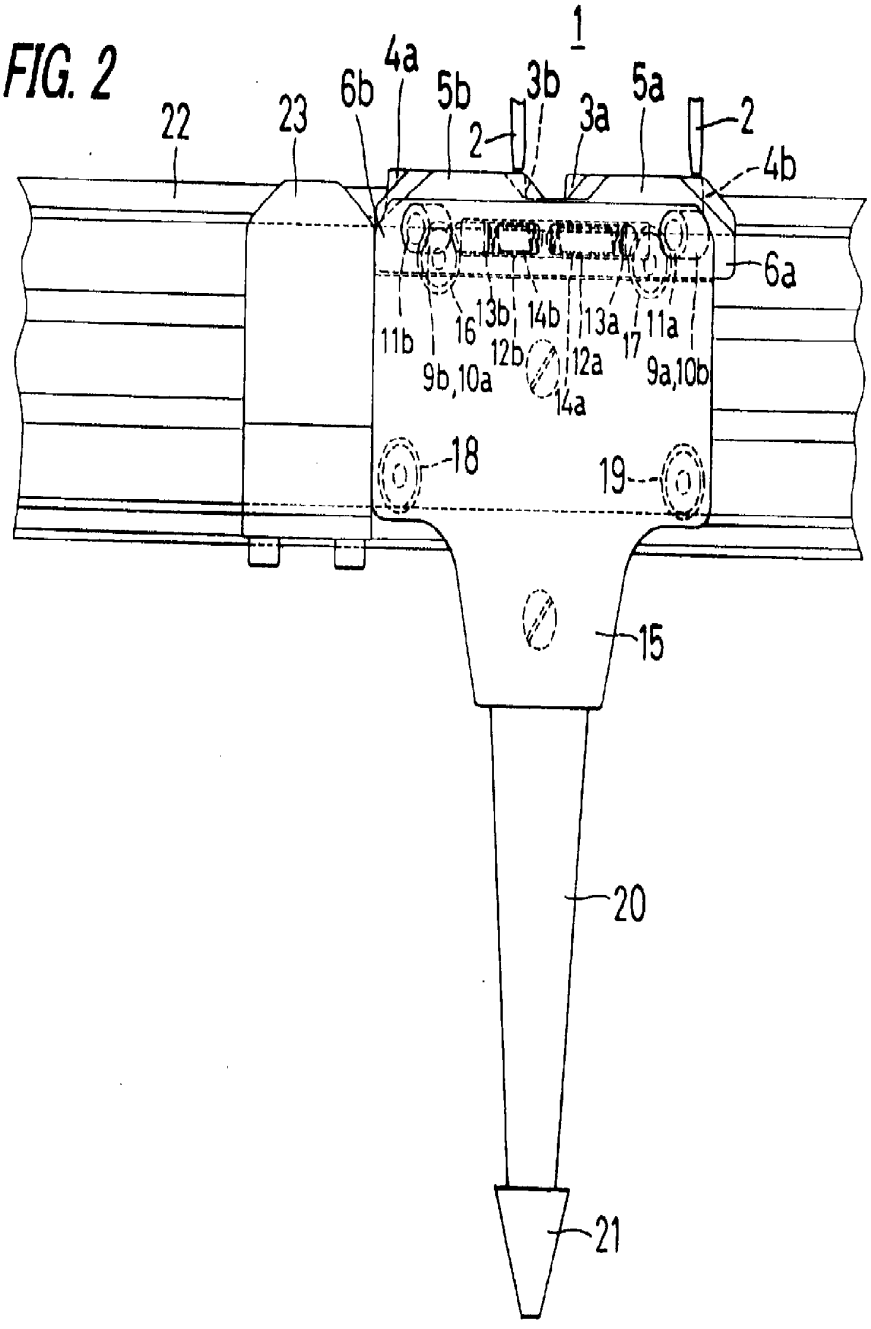

1
22
23
6b
4a
5b
2
3b
3a
5a
2
4b
6a
11b
16
13b
14b
12b
13a
17
11a
9b,10a
12a
14a
9a,10b
18
19
15
20
21

FIG. 3

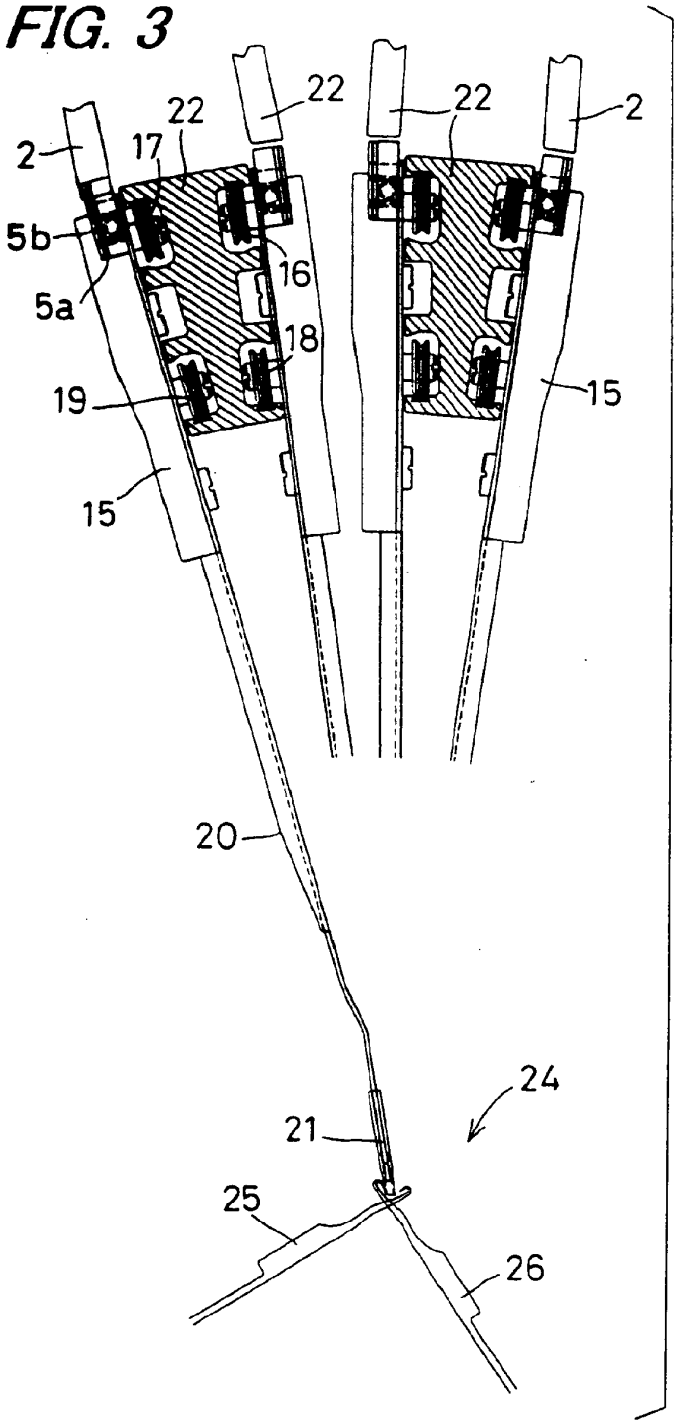


FIG. 4

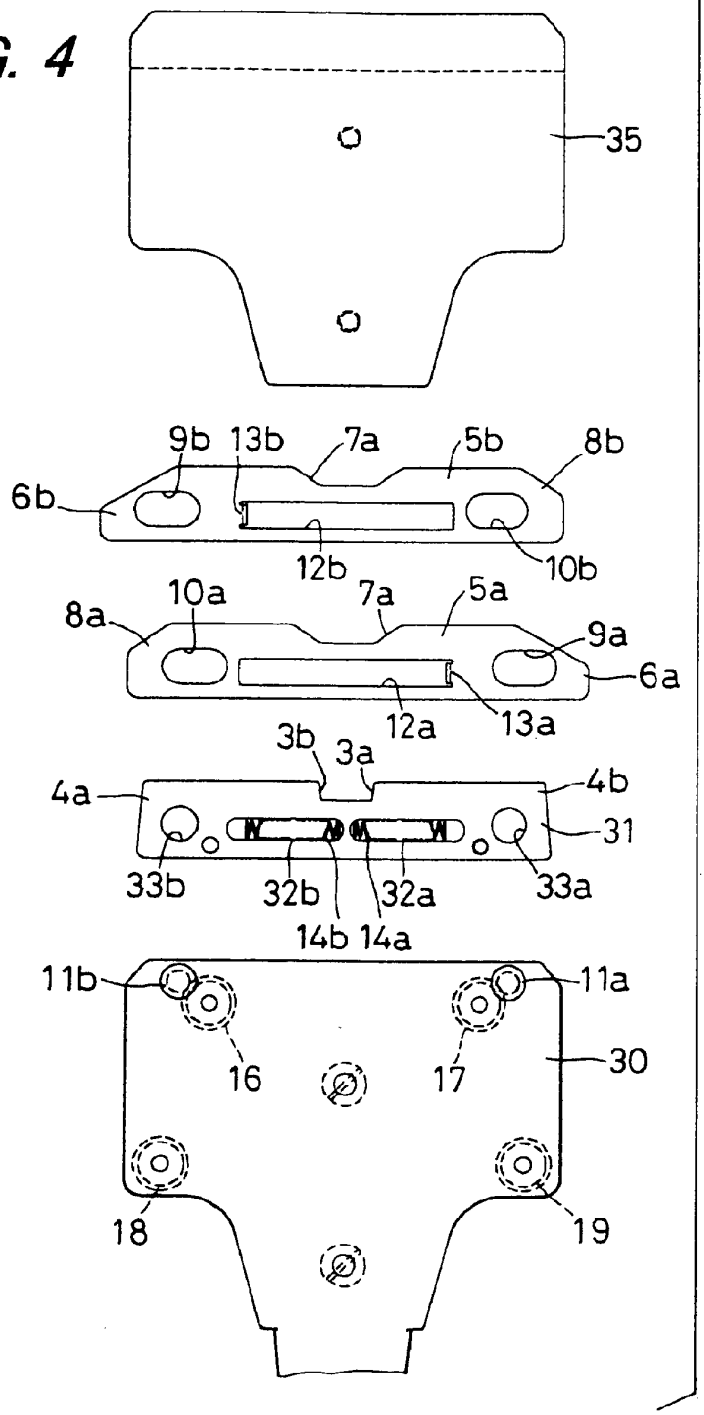

35
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7a
5b
8b
6b
12b
10b
10a
7a
5a
8a
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6a
12a
13a
3b
3a
4a
4b
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33a
14b
14a
11b
11a
16
17
30
18
19

FIG. 5

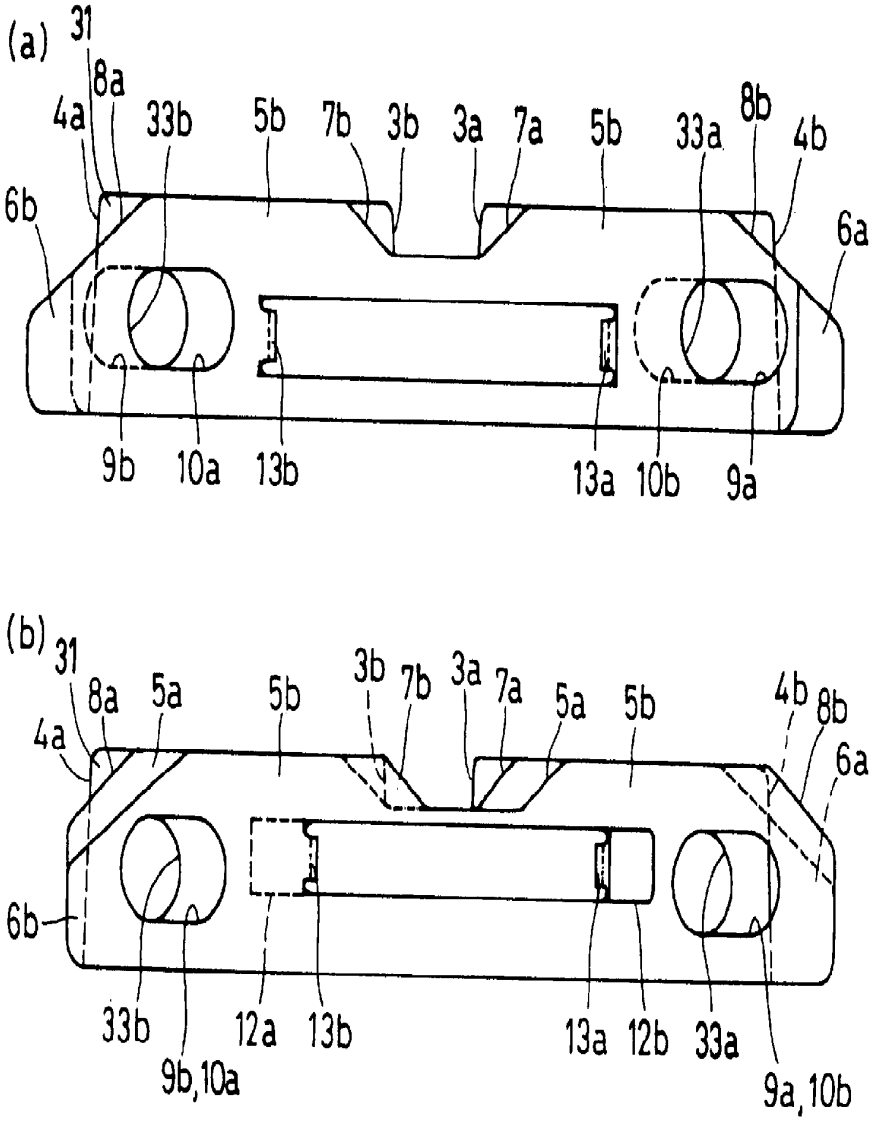
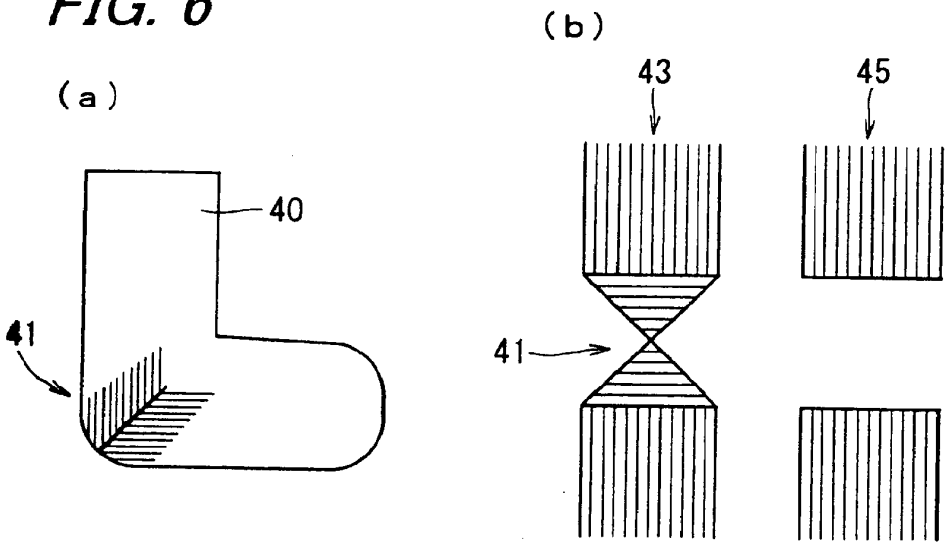

(a)
31
8a
4a
33b
5b
7b
3b
3a
7a
5b
33a
8b
4b
6b
6a
9b
10a
13b
13a
10b
9a
(b)
31
8a
5a
5b
3b
7b
3a
7a
5a
5b
4b
8b
4a
6a
6b
33b
9b,10a
12a
13b
13a
12b
33a
9a,10b

FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2004/002194

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] D04B15/56

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] D04B15/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Toroku Jitsuyo Shinan Koho	1994-2004
Kokai Jitsuyo Shinan Koho	1971-2004	Jitsuyo Shinan Toroku Koho	1996-2004

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 8-13295 A (Kabushiki Kaisha Sansei Seisakusho), 16 January, 1996 (16.01.96), (Family: none)	1-4
A	US 4513588 A (Universal Maschinenfabrik), 30 April, 1985 (30.04.85), & JP 61-58578 B & DE 3245233 A & ES 8406587 A & FR 2537170 A & GB 2131460 A & IT 1194497 A & SU 1447292 A	1-4
A	JP 61-58576 B2 (Kabushiki Kaisha Shima Idea Center), 12 December, 1986 (12.12.86), (Family: none)	1-4

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
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"O" document referring to an oral disclosure, use, exhibition or other means
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 March, 2004 (31.03.04)	13 April, 2004 (13.04.04)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2004/002194

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 62-45019 Y2 (Kabushiki Kaisha Shima Idea Center), 30 November, 1987 (30.11.87), (Family: none)	1-4
A	US 6021651 A (Shima Seiki Manufacturing, Ltd.), 08 February, 2000 (08.02.00), & JP 3044370 B2 & EP 898002 B1 & CN 1133765 B & TW 421681 A	1-4
A	JP 55-148256 A (Kabushiki Kaisha Sansei Seisakusho), 18 November, 1980 (18.11.80), (Family: none)	1-4

Form PCT/ISA/210 (continuation of second sheet) (January 2004)

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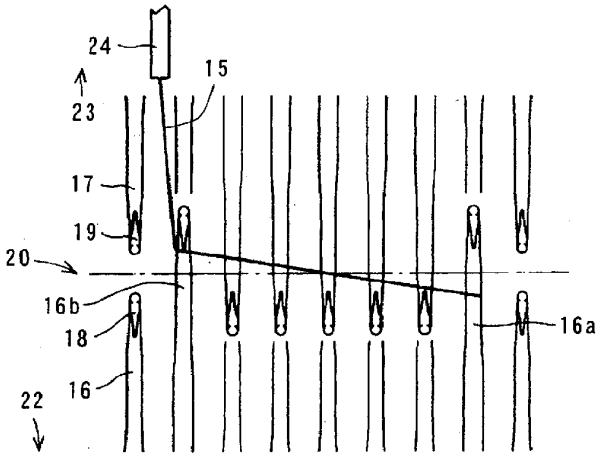
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(54) WEFT KNITTING MACHINE CAPABLE OF INSERTING WARP AND KNITTING METHOD BY THAT WEFT KNITTING MACHINE

(57) The invention relates a warp insertable weft knitting machine in which a knitting yarn is fed only to knitting needles on one of the needle beds, and a fabric can be knitted also with knitting needles on the other of the needle beds, without using a special yarn guide apparatus or the like, using a warp, and a knitting method in the weft knitting machine. When hooks (19) of five knitting needles (17) are advanced from a back needle bed (23) between knitting needles (16a, 16b) on a front needle bed (22), it is possible to knit back stitches with these five knitting needles (17). The number of knitting needle (16a) and the number of knitting needle (16b) may not limited to one, respectively. The knitting needles (16) from the front needle bed (22) can be advanced to an area in which the knitting needles (17) have been advanced from the back needle bed (23), and thus rib, links, or other structures with the knitting needles (16, 17) from the front and back needle beds can be knitted using a knitting yarn fed as a warp.

FIG. 1



EP 1 972 706 A1

Printed by Jouve, 75001 PARIS (FR)

Description

Technical Field

[0001] The present invention relates to a warp insertable weft knitting machine having not only a function to perform basic knitting of a fabric with a weft as a knitting yarn, but also a function to perform knitting of a fabric with a knitting yarn that can act as a warp, fed from a lace bar, and a knitting method in the weft knitting machine.

Background Art

[0002] It is conventionally known that a weft knitting machine 1 as shown in Fig. 10 is capable of knitting a structure similar to a warp knitting structure (see Japanese Examined Patent Publication JP-B2 3452639, for example). In the weft knitting machine 1, a pair of needle beds, a front needle bed 2 and a back needle bed 3, are opposed to each other at a needle bed gap 4. A warp insertion mechanism 5 is provided above the needle bed gap 4. A plurality of knitting needles 6 and 7 are arranged side by side respectively on the front needle bed 2 and the back needle bed 3. The warp insertion mechanism 5 can feed a knitting yarn that can act as a warp to a hook at a leading end of the knitting needle 6 which is advanced from the front needle bed 2 to the needle bed gap 4. Carriages 8 and 9 on which a cam mechanism is mounted are arranged on the front needle bed 2 and the back needle bed 3 so as to be capable of traveling back and forth in a direction perpendicular to a plane of paper. The cam mechanism is for selectively driving a plurality of knitting needles 6 and 7 back and forth with respect to the needle bed gap 4. Yarn feeders 10 are supported by yarn guide rails 11 above the needle bed gap 4 so as to be capable of traveling back and forth in a direction perpendicular to the plane of paper. A plurality of yarn guide rails 11 (for example, three yarn guide rails 11, in Fig. 10) extend above the needle bed gap 4 in a direction perpendicular to the plane of paper. Tracks on which the yarn feeders 10 travel are located on both sides of the yarn guide rails 11. The carriages 8 and 9 can selectively bring any one of the yarn feeders 10. The yarn feeders 10 feed a knitting yarn to the knitting needles 6 and 7 which are advanced to the needle bed gap 4. The weft knitting machine 1 can obtain a knitted fabric of a basic weft knitting structure by causing the carriages 8 and 9 to bring the yarn feeders 10 and causing the cam mechanism to drive the knitting needles 6 and 7.

[0003] The warp insertion mechanism 5 can perform a swing motion about a swing shaft 12 and a reciprocating motion along the swing shaft 12. The warp insertion mechanism 5 includes a plurality of lace bars 13. A plurality of yarn feeding tubes 14 can be attached to each of the lace bars 13. Each of the yarn feeding tubes 14 can feed a knitting yarn to a hook at the leading end of the knitting needle 6 which is advanced from the front needle bed 2 to the needle bed gap 4. The plurality of yarn feeding tubes 14 are spaced away from each other in a direction perpendicular to the plane of paper. Four rows of yarn feeding tubes 14 can be arranged in the warp insertion mechanism 5, as shown in Fig. 10. The swing motion of the warp insertion mechanism 5 about the swing shaft 12 causes the tip of the yarn feeding tube 14 to perform a swing operation crossing the needle bed gap 4. The reciprocating motion of the warp insertion mechanism 5 along the swing shaft 12 causes the tip of the yarn feeding tube 14 to perform a lapping operation in the longitudinal direction of the needle bed gap 4. A structure similar to a warp knitting structure can be knitted with a combination of the swing operation and the lapping operation of the yarn feeding tube 14 on the knitting needle 6. Herein, in a case where knitting yarns are fed to a plurality of knitting needles 6 with the lapping operation, a weft knitting structure is knitted with intermediate knitting needles 6. It should be noted that the swing operation and the lapping operation are performed in a state where the carriages 8 and 9 and the yarn feeders 10 have been stopped at positions away from the yarn feeding tubes 14 in a direction perpendicular to the plane of paper.

[0004] The warp insertion mechanism 5 can be used for the purpose of not only knitting a structure similar to a warp knitting structure but also knitting a weft knitting structure (see Japanese Unexamined Patent Publication JP-A 8-74146 (1996), for example). Fig. 16 in JP-A 8-74146 shows an example in which plating knitting is partially performed with a combination of knitting yarns corresponding to those fed from the yarn feeder 10 and from the yarn feeding tube 14 in Fig. 10 of the present application. Fig. 17 in JP-A 8-74146 shows an example in which a belt-like pattern with a relatively narrow width is knitted using many yarn feeding tubes 14 that can be attached at relatively narrow intervals to the lace bar 13. Fig. 1 in JP-A 8-74146 shows the arrangement of cams on a front carriage corresponding to the carriage 8 for the front needle bed 2 shown in Fig. 10 of the present application. Three cam systems are mounted on the front carriage. The middle system is a weft cam lock having functions of knitting and stitch transfer. The systems on both sides of the middle system are warp cam locks for performing knitting with a knitting yarn fed from the warp insertion mechanism 5.

[0005] With the weft knitting machine 1 as shown in Fig. 10, it is also possible to knit a weft knitting structure as described above using a knitting yarn fed from the yarn feeding tube 14 in the warp insertion mechanism 5. However, the weft knitting machine 1 is specified such that the warp insertion mechanism 5 feeds a knitting yarn only to the knitting needles 6 on the front needle bed 2, which is one of two needle beds. According to the specification of this type of weft knitting machine 1, a knitting yarn is not fed from the yarn feeding tube 14 to the knitting needles 7 on the back needle bed 3, which is the other of the needle beds, and a warp cam lock adapted for knitting using a knitting yarn fed from the yarn feeding

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tube 14 is not mounted on the carriage 9. The reason for this is that a knitting yarn cannot be stably fed at all times to the hook of the knitting needle 7 which is advanced from the back needle bed 3 to the needle bed gap 4 although a knitting yarn may be able to be fed thereto from a limited number of the rows of yarn feeding tubes 14, for example, the left rows in Fig. 10 with the swing operation and the lapping operation.

[0006] A configuration is also conceivable in which a knitting yarn fed from a yarn feeding tube 14 is guided by an additional special guide apparatus, or the like, to the hook of the knitting needle 7 on the back needle bed 3. However, with this sort of guide apparatus or the like, the configuration of the weft knitting machine 1 may be complicated, and the number of the yarn feeders 10 or the yarn feeding tubes 14 that can be used may be limited.

Disclosure of Invention

[0007] It is an object of the invention to provide a warp insertable weft knitting machine in which a knitting yarn is fed only to knitting needles on one of the needle beds as in conventional apparatuses, and a fabric can be knitted also with knitting needles on the other of the needle beds, without using a special yarn guide apparatus or the like, using a knitting yarn inserted as a warp and a knitting method in the weft knitting machine.

[0008] The invention is directed to a warp insertable weft knitting machine comprising a pair of needle beds which are opposed to each other at a needle bed gap and a lace bar capable of feeding a knitting yarn that can act as a warp only to one of the needle beds, comprising:

a plurality of hook members that are arranged on the one of the needle beds and can be advanced to the needle bed gap;
advancement drive means which drives the hook members such that the hook members are advanced from the one of the needle beds to the needle bed gap, at positions on both sides of an area in which knitting is performed with knitting needles on the other of the needle beds; and
knitting drive means which drives the knitting needles such that the knitting needles are advanced from the other of the needle beds and knits a fabric using a knitting yarn that is fed from the lace bar and hooked between the hook members.

[0009] Moreover, the invention is directed to a knitting method in a warp insertable weft knitting machine comprising a pair of needle beds which are opposed to each other at a needle bed gap and a lace bar capable of feeding a knitting yarn that can act as a warp only to one of the needle beds, wherein knitting is also performed on the other of the needle beds using the knitting yarn fed from the lace bar, comprising:

advancing hook members from the one of the needle beds at positions inside the needle bed gap on both sides of an area in which knitting is performed with knitting needles on the other of the needle beds;
advancing the knitting needles from the other of the needle beds at a position in the area in which knitting is performed inside the needle bed gap;
feeding a knitting yarn from the lace bar such that the knitting yarn is hooked between the hook members which are advanced from the one of the needle beds to the needle bed gap; and
knitting a fabric using the hooked knitting yarn with the knitting needles which are advanced from the other of the needle beds to the needle bed gap.

[0010] Furthermore, in the invention, it is preferable that the knitting needles on the other of the needle beds are advanced to the needle bed gap, after the hook members are advanced from the one of the needle beds to the needle bed gap and the knitting yarn fed from the lace bar is hooked between the hook members.

[0011] Furthermore, in the invention, it is preferable that the knitting needles on the one of the needle beds are used as the hook members.

[0012] Furthermore, in the invention, it is preferable that a fabric using the knitting yarn hooked between the hook members is knitted also with the knitting needles on the one of the needle beds.

Brief Description of Drawings

[0013] Other and further objects, features, and advantages of the invention will be more explicit from the following detailed description taken with reference to the drawings.

[0014] Fig. 1 is a partial plan view showing a basic concept which is to make it possible to knit a fabric using a warp also with knitting needles on a back needle bed, in a weft knitting machine in which the warp can be fed only to knitting needles on a front needle bed as one embodiment of the invention.

[0015] Fig. 2 is a right side cross sectional view showing a state in which a swing operation of swinging a yarn feeding tube in Fig. 1 in a direction away from a needle bed gap has been performed to pull out the warp to a position below a path on which a knitting needle on the front needle bed is advanced and retracted with respect to the needle bed gap.

[0016] Fig. 3 is a right side cross sectional view showing a state in which a swing operation of swinging the yarn feeding tube in Fig. 1 toward a position above the needle bed gap has been performed to hook the warp from below to above around a needle shaft of the knitting needle on the front needle bed as the knitting needle is advanced to the needle bed gap.

[0017] Fig. 4 is a right side cross sectional view showing a state in which a lapping operation of moving the yarn feeding tube in Fig. 1 to a deeper side on a plane of paper and a swing operation of swinging the yarn feed-

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ing tube in a direction away from the needle bed gap have been performed to hook the warp on a hook of a knitting needle and then to pull out the warp to a position above the back needle bed.

[0018] Fig. 5 is a right side cross sectional view showing a state in which hooks of the knitting needles have been advanced from the back needle bed in Fig. 1 to the needle bed gap.

[0019] Fig. 6 is a right side cross sectional view showing a state in which a swing operation of swinging all of four rows of yarn feeding tubes toward positions above the needle bed gap in the weft knitting machine in Fig. 1.

[0020] Fig. 7 is a view showing a simplified configuration of a cam mechanism that enables knitting to be performed using the warp as shown in Fig. 1 also with the knitting needles on the back needle bed.

[0021] Fig. 8 is a view showing in a simplified manner a configuration of warp cams in Fig. 7, loci of butts of knitting needles guided by the cams and a configuration of the knitting needle.

[0022] Fig.9 is a view showing in a simplified manner the configuration of the warp cams in Fig. 7 and the loci of butts of knitting needles guided by the cams.

[0023] Fig. 10 is a right side cross sectional view showing a schematic configuration of a conventional weft knitting machine in which the warp can be inserted.

Best Mode for Carrying out the Invention

[0024] Now referring to the drawings, preferred embodiments of the invention are described below.

[0025] Fig. 1 shows a basic concept which is to make it possible to knit a fabric using a warp 15 also with knitting needles 17 on a back needle bed 23, in a weft knitting machine 21 in which the warp 15 can be fed only to knitting needles 16 on a front needle bed 22 as one embodiment of the invention. As described above, the warp 15 is not necessarily a knitting yarn used for knitting a warp knitting structure, but is referred to as a "warp" for the sake of convenience. The warp 15 is fed so as to be hooked on a needle shaft at a point closer to a trailing end than a hook 18 of one of the knitting needles 16 on the front needle bed 22. The knitting needles 16 for hooking the warp 15 on the front needle bed 22 are selected so as to be spaced away from each other. Hooks 19 of the knitting needles 17 on the back needle bed 23 are advanced between the knitting needles 16. A needle bed gap 20 to which the hooks 18 and 19 are advanced is formed as a gap where the front needle bed 22 and the back needle bed 23 are opposed to each other in the weft knitting machine 21. With the yarn feeders 10 as shown in Fig. 10, a knitting yarn can be fed to both knitting needles which are advanced from the front and back needle beds. However, the warp 15 is fed with a combination of a swing operation and a lapping operation of a yarn feeding tube 24, and thus the warp 15 cannot be stably fed to the knitting needles 17 on the back needle bed 23. The warp 15 can be stably fed from the yarn feeding tube 24 to the needle bodies of the knitting needles 16 on the front needle bed 22, and thus the warp 15 can be reliably hooked between the knitting needles 16. Furthermore, when the warp 15 is hooked in the needle bed gap 20 between the knitting needles 16 from the front needle bed 22, it is possible to form a knitting loop, by advancing the hook 19 of the knitting needle 17 from the back needle bed 23 to hook the warp 15 on the hook 19, and then pulling the knitting needle 17 into the back needle bed 23. Hereinafter, among the knitting needles 16 hooking the warp 15, a knitting needle on which the warp is initially hooked is referred to as a knitting needle 16a, and a knitting needle on which the warp is subsequently hooked which warp communicates with the yarn feeding tube 24 is referred to as a knitting needle 16b.

[0026] It is possible to form back stitches with five knitting needles 17, by advancing the hooks 19 of the five knitting needles 17 from the back needle bed 23, between the knitting needles 16a and 16b that are advanced from the front needle bed 22 to the needle bed gap 20 as shown in Fig. 1. The number of the knitting needle 16a that is advanced from the front needle bed 22 to the needle bed gap 20 is not limited to one, and the number of the knitting needle 16b that is advanced from the front needle bed 22 to the needle bed gap 20 is not limited to one. The warp 15 may be hooked between the knitting needles 16a and 16b on the front needle bed 22, at the boundary between a region in which face stitches are to be formed with a plurality of knitting needles 16 and.a region in which back stitches are to be formed with a plurality of knitting needles 17. Furthermore, in Fig. 1, the knitting needles 16 from the front needle bed 22 can be advanced to an area in which the knitting needles 17 have been advanced from the back needle bed 23, and thus rib, links, or other structures with the knitting needles 16 and 17 from the front and back needle beds can be knitted using a knitting yarn fed as a warp. Herein, in the weft knitting machine 21, a cam mechanism mounted on carriages that travel along the needle beds drives the knitting needles 16 and 17 to advance and retract them. Thus, the state is not kept in which the knitting needles 16 and 17 have been advanced to the needle bed gap 20 as shown in Fig. 1. In Fig. 1, the knitting needles are driven such that the knitting needle 16a is initially advanced and retracted with respect to the needle bed gap 20, the five knitting needles 17 are subsequently advanced and retracted with sequentially shifted phases with respect to the needle bed gap 20, and then the knitting needle 16b is finally advanced and retracted with respect to the needle bed gap 20.

[0027] Figs. 2, 3, 4, and 5 show a schematic procedure in which knitting is performed using the warp 15 with the knitting needles 17 on the back needle bed 23 as shown in Fig. 1. Fig. 2 shows a state in which the swing operation of swinging the yarn feeding tube 24 in a direction away from the needle bed gap 20 has been performed to pull out the warp 15 to a position below the path on which the knitting needle 16a on the front needle bed 22 is ad-

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vanced and retracted with respect to the needle bed gap 20. Fig. 3 shows a state in which the swing operation of swinging the yarn feeding tube 24 toward a position above the needle bed gap 20 has been performed to hook the warp 15 from below to above around the needle shaft of the knitting needle 16a on the front needle bed 22 as the knitting needle are advanced to the needle bed gap 20. Fig. 4 shows a state in which the lapping operation of moving the yarn feeding tube 24 to the deeper side on a plane of paper and the swing operation of swinging the yarn feeding tube 24 in a direction away from the needle bed gap 20 have been performed to hook the warp 15 on the needle shaft of the knitting needle 16b and then to pull out the warp 15 to a position above the back needle bed 23. Fig. 5 shows a state in which the hooks 19 of the knitting needles 17 have been advanced from the back needle bed 23 to the needle bed gap 20.

[0028] As shown in Fig. 10, a plurality of rows of yarn feeding tubes 24, for example, four rows can be provided. However, in Figs. 2 to 5, only one row is shown for the sake of convenience. The knitting needles 16 and 17 are latch needles. A stitch transfer blade 25 is attached to one side face of the latch needle. The hooks 18 and 19 at leading ends of the knitting needles 16 and 17 can be opened and closed with latches 26 and 27. The knitting needles 16 and 17 are accommodated in needle grooves so as to be capable of being advanced and retracted with respect to the needle bed gap 20. The needle grooves are formed between needle plates 28 and 29 that are arranged upright at a constant pitch respectively on the front needle bed 22 and the back needle bed 23. Wires 30 and 31 such as piano wires are arranged in a direction perpendicular to the plane of paper so as to pass through the vicinity of the ends of the front needle bed 22 and the back needle bed 23 that face the needle bed gap 20. The wires 30 and 31 function substantially as front edges of the front needle bed 22 and the back needle bed 23 that are located on the side of the needle bed gap 20. In the weft knitting machine 21, the wires 30 and 31 are supported by fixed sinkers 32 and 33 that are respectively attached to the front needle bed 22 and the back needle bed 23.

[0029] As the knitting needles 16 and 17, it is also possible to use compound needles in which a needle main body and a slider can be advanced and retracted independently of each other, instead of using latch needles. In a case where a compound needle is used in which a tongue at the leading end of the needle is separated into two portions as a slider to sandwich a hook of a needle main body therebetween, it is possible to perform stitch transfer and the like by advancing the slider to the needle bed gap 20. Thus, the stitch transfer blade 25 does not have to be used.

[0030] Fig. 6 shows a state in which the swing operation of swinging all of four rows of yarn feeding tubes toward positions above the needle bed gap 20. The swing operation is performed by angularly displacing a warp insertion mechanism 35 about a swing shaft 34 perpendicular to the plane of paper. In Figs. 2 to 5, only one yarn feeding tube 24 is shown, but the yarn feeding tube 24 is the yarn feeding tube that is the farthest from the front needle bed 22 of the four rows of yarn feeding tubes. The yarn feeding tube that is the closest to the front needle bed 22 of the four rows is referred to as a yarn feeding tube 36. Each of rows of yarn feeding tubes is attached to a lace bar 37. The lace bar 37 can be angularly displaced about the swing shaft 34 of the warp insertion mechanism 35. This swinging displacement is driven by a swing mechanism 38. The swing operation of the lace bar 37 driven by the swing mechanism 38 causes the swing operation in which the tip of each yarn feeding tube is swung between a position above the needle bed gap 20 and a position away from the needle bed gap 20 above the back needle bed 23. Herein, it is not possible to pull the warp 15 to a position below the knitting needles 17 as the knitting needles are advanced from the back needle bed 23 to the needle bed gap 20, even with the swing operation of the yarn feeding tube 24 to a position above the needle bed gap 20. More specifically, the states corresponding to Figs. 2 and 4 cannot be realized for the knitting needles 17 from the back needle bed 23. Thus, in this embodiment, the warp 15 has been hooked between the needle bodies of the knitting needles 16 which are advanced from the front needle bed 22 to the needle bed gap 20 as shown in Figs. 2 to 4. It should be noted that a knitting yarn acting as a weft can be fed from yarn feeders 39 to each of the knitting needles 16 and 17.

[0031] Fig. 7 shows the simplified configuration of a cam mechanism 40 that enables knitting to be performed using the warp 15 also with the knitting needles 17 on the back needle bed 23. The cam mechanism 40 is mounted separately as a carriage on the side of the front needle bed 22 and a carriage on the side of the back needle bed 23. Three cam systems are mounted on each of the carriages. The middle systems serving as knitting and stitch transfer cams 41F and 41B are mounted on the side of the front needle bed 22 and on the side of the back needle bed 23, respectively. Hereinafter, symbols "F" and "B" refer to the side of the front needle bed 22 and the side of the back needle bed 23, respectively. The knitting and stitch transfer cams 41F and 41B are formed for the purpose of enabling a knitting operation and a stitch transfer operation to be performed with a weft fed from the yarn feeders 39 in Fig. 6. Warp cams 42F and 42B; 43F and 43B are respectively provided on both sides of the knitting and stitch transfer cams 41F and 41B on the carriages. When the carriages travel to the left, the warp cams 42F and 42B are at the front, and the warp cams 43F and 43B are at the back. When the carriage travel to the right, the warp cams 43F and 43B are at the front, and the warp cams 42F and 42B are at the back.

[0032] Herein, the carriages for the front needle bed 22 and the back needle bed 23 can also bring the yarn feeders 39 along with the warp cams 42F and 42B; 43F and 43B. Thus, it is also possible to perform knitting with a weft fed from the yarn feeder 39, using the warp cams

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42F and 42B; 43F and 43B. Moreover, it is possible to perform the kitting operation of knit with a first cam system S1 and to perform the stitch transfer operation with a second cam system S2, of the three cam systems.

[0033] Figs. 8 and 9 show in a simplified manner the configuration of the warp cams 43F and 43B in Fig. 7 and the loci of butts of knitting needles guided by the cams. Fig. 8 also shows the configuration of the knitting needle 16. The hook 18 and the latch 26 are arranged at the leading end of the knitting needle 16. A needle jack 45 is linked to the trailing end of the knitting needle 16. The needle jack 45 includes a butt 46 projecting upward from the needle groove. The cam mechanism 40 in Fig. 7 acts on the butt 46 of the needle jack 45. Herein, in a case where the knitting needle is a compound needle, a slider cam is also provided. Furthermore, also on the side of the back needle bed 23, a needle jack is linked to the knitting needle 17, and the cams act on a butt of the needle jack to drive the knitting needle 17. Elements on the side of the back needle bed 23 are shown in the upper portion, and those of the front needle bed 22 are shown in the lower portion, with the needle bed gap 20 interposed therebetween.

[0034] The warp cams 43F and 43B include needle raising cams 50F and 50B, guard cams 51F and 51B, and knitting cams 52F and 52B. The knitting cams 52F and 52B are situated only on the side closer to the knitting and stitch transfer cams 41F and 41B in Fig. 7. A butt path 53 is provided on the side farther from the knitting and stitch transfer cams 41F and 41B, on the warp cam 43F on the side of the front needle bed 22. The butt path 53 guides the butt 46 from a tuck-height path 53a to a plating-height path 53b.

[0035] Fig. 8 shows butt loci 54F and 54B when the carriages travel to the left. The butt locus 54F on the side of the front needle bed 22 extends from a position below the knitting cam 52F through the gap between the needle raising cam 50F and the guard cam 51F. At a peak 50Fa of the needle raising cam 50F, the butt locus 54F reaches a knit height and the most advancing position with respect to the needle bed gap 20. In a case where a knitting loop is held on the hook 18 of the knitting needle 16, the latch 26 is opened and the knitting loop is moved toward the needle shaft, and thus the knitting loop is cleared. After the peak 50Fa, the butt locus 54F returns to the tuck height. In a case where the knitting needle 16 has been selected for tuck, the peak 50Fa does not act, and thus the butt locus 54F is kept at the tuck height. After the peak 50Fa, the butt 46 is guided so as to enter the tuck-height path 53a and then the plating-height path 53b of the butt path 53. Consequently, after the travel of the carriage, the knitting needle 16 has been advanced to the needle bed gap 20 at the plating height that is slightly higher than the tuck height. On the side of the back needle bed 23, the butt does not project from the needle groove and is sunk therein such that the butt locus 54B of the needle jack extends without receiving the action of the needle raising cam 50B. Consequently, even after the travel of the carriage, the knitting needle 17 stays pulled back into the back needle bed 23, without being advanced to the needle bed gap 20. Herein, it is also possible to end the butt locus 54F at the tuck height, without providing the butt path 53 on the side of the front needle bed 22 with the plating-height path 53b.

[0036] Fig. 9 shows butt loci 55F and 55B when the carriages travel to the right. The butt locus 55F on the side of the front needle bed 22 extends from the plating-height path 53b to the tuck-height path 53a of the butt path 53 in the opposite direction of Fig. 8. The tuck height is kept by causing the peak 50Fa of the needle raising cam 50F so as not to act, and the knitting cam 52F is caused to act thereby pulling the knitting needle 16 back into the front needle bed 22. The butt locus 55B on the side of the back needle bed 23 guides the butt so that the butt is advanced toward the needle bed gap 20 up to the knit height at a peak 50Ba of the needle raising cam 50B, and the knitting needle 17 is pulled by the knitting cam 52B back into the back needle bed 23.

[0037] Even the warp cams 42F and 42B shown in Fig. 7 can be used for knitting with the warp 15 using the knitting needles 17 on the back needle bed 23, with operations symmetrical to those in Figs. 8 and 9. Herein, the knitting needles 16 have been advanced from the front needle bed 22 to the needle bed gap 20, and the warp 15, fed from the yarn feeding tube 24 of the warp insertion mechanism 25, is hooked between the knitting needles 16. However, the hook members that are advanced from the front needle bed 22 and hook the warp 15 are not limited to the knitting needles 16. For example, a member such as a yarn guide that is advanced and retracted with respect to the needle bed gap 20 may be provided with a portion for hooking the warp 15 fed from the yarn feeding tube 24, or a member only for receiving and hooking the warp 15 may be provided. Furthermore, in a case where a compound needle is used as the knitting needle, it is also possible to hook the warp 15 on the slider by changing the path along which the slider is guided. When the hook member that is advanced to the needle bed gap 20 does not pull the warp 15 into the front needle bed 22 but releases the warp 15 at the needle bed gap 20, it is possible to form only back stitches with the knitting needles 17 on the back needle bed 23.

[0038] In Fig. 8, the knitting needles 16 on the front needle bed 22 are advanced to the needle bed gap 20 with the travel of the carriages, and then the warp 15 is hooked between the knitting needles 16. With the next travel of the carriages, the knitting needles 17 on the back needle bed 23 are advanced to the needle bed gap 20 and then retracted therefrom, and the knitting needles 16 on the front needle bed 22 are also retracted from the needle bed gap 20. However, it is also possible to advance both the knitting needles 16 on the front needle bed 22 and the knitting needles 17 on the back needle bed 23 between the knitting needles 16 to the needle bed gap 20 with the travel of the carriages, so as to hook the warp 15 between the knitting needles 16 on the front

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needle bed 22, and then to simultaneously retract the knitting needles 16 on the front needle bed 22 and the knitting needles 17 on the back needle bed 23 from the needle bed gap 20 with the next travel of the carriages.

[0039] In order to enable this sort of knitting operation to be performed, the guard cam 51B for the back needle bed 23 shown in Figs. 8 and 9 may be provided with the butt path 53 as in the guard cam 51F for the front needle bed 22. When the guard cam 51B is also provided with the butt path 53, the warp cams 42F and 42B; 43F and 43B are longitudinally symmetrical. It is possible to simultaneously advance the front and back knitting needles 16 and 17 to the needle bed gap 20, to hook the warp 15 between the knitting needles 16 and 17, and then to perform knitting using the hooked warp 15 with the knitting needles 17 on the back needle bed 23, by making the butt loci on the side of the back needle bed 23 longitudinally symmetrical to the butt loci 54F and 55F on the side of the front needle bed 22.

[0040] As described above, in the warp insertable weft knitting machine 21, a pair of needle beds such as the front needle bed 22 and the back needle bed 23 are opposed to each other at the needle bed gap 20. The lace bar 37 can feed a knitting yarn that can act as the warp 15 only to one of the needle beds such as the front needle bed 22. The weft knitting machine 21 includes hook members such as the knitting needles 16, advancement drive means such as the warp cams 42F and 43F, and knitting drive means such as the warp cams 42B and 43B. A plurality of hook members are arranged on the one of the needle beds, and can be advanced to the needle bed gap 20. The advancement drive means advances the hook members to the needle bed gap 20, at positions on both sides of an area in which knitting is performed at the other of the needle beds such as the back needle bed 23. A knitting yarn fed from the lace bar 37 can be hooked between the hook members which are advanced to the needle bed gap 20. In a state where the knitting yarn has been hooked between the hook members, it is possible to perform knitting using the other of the needle beds, without using a special yarn guide apparatus or the like, by driving the knitting needles 17 with the knitting drive means such that the knitting needles 17 are advanced from the other of the needle beds at positions between the hook members and knit a fabric using the hooked knitting yarn. For example, even when only face stitches can be formed with the knitting needles 16 on the one of the needle beds, back stitches also can be formed with the knitting needles 17 on the other of the needle beds.

[0041] The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and the range of equivalency of the claims are therefore intended to be embraced therein.

Industrial Applicability

[0042] According to the invention, in a needle bed gap, hook members can be advanced from one of the needle beds of the needle beds at positions on both sides of an area in which knitting is performed at another of the needle beds, and a knitting yarn fed from a lace bar can be hooked between the hook members. In a state where the knitting yarn is hooked between the hook members, it is possible to perform knitting using a knitting needle on the other of the needle beds, without using a special yarn guide apparatus or the like, by driving the knitting needle on the other of the needle beds such that the knitting needle that has been advanced to the needle bed gap is retracted therefrom between the hook members. The knitting needle on the other of the needle beds may be advanced to the needle bed gap, either before or after the knitting yarn is hooked between the hook members. For example, even when only face stitches can be formed with a knitting needle on the one of the needle beds, back stitches also can be formed with the knitting needle on the other of the needle beds.

[0043] Furthermore, according to the invention, the hook members are advanced from the one of the needle beds at positions inside the needle bed gap on both sides of an area in which knitting is performed at the other of the needle beds. The knitting needle is advanced from the other of the needle beds to a position within this area inside the needle bed gap. The knitting yarn is fed from the lace bar so as to be hooked between the hook members which are advanced from the one of the needle beds to the needle bed gap. A fabric is knitted with the knitting needle which is advanced from the other of the needle beds to the needle bed gap, using the knitting yarn hooked between the hook members. Thus, it is possible to perform knitting using the other of the needle beds, without using a special yarn guide apparatus or the like.

[0044] Furthermore, according to the invention, after the knitting yarn fed from the lace bar is hooked between the hook members which are advanced from the one of the needle beds to the needle bed gap, the knitting needle is advanced from the other of the needle beds to a position between the yarn feeding members. Thus, it is possible to knit a fabric using the knitting yarn fed from the lace bar also with the knitting needle on the other of the needle beds.

[0045] Furthermore, according to the invention, knitting needles on the one of the needle beds are used as the hook members. Thus, it is possible to perform knitting using the knitting needle on the other of the needle beds, in the basic configuration of conventional weft knitting machines.

[0046] Furthermore, according to the invention, a fabric using the knitting yarn hooked between the hook members is knitted also with the knitting needle on the one of the needle beds. Thus, it is possible to knit rib, links, or

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other structures using the knitting yarn fed as a warp, with the knitting needles on both needle beds that are opposed to each other with the needle bed gap interposed therebetween.

Claims

1. A warp insertable weft knitting machine comprising a pair of needle beds which are opposed to each other at a needle bed gap and a lace bar capable of feeding a knitting yarn that can act as a warp only to one of the needle beds, comprising:

   a plurality of hook members that are arranged on the one of the needle beds and can be advanced to the needle bed gap;
   advancement drive means which drives the hook members such that the hook members are advanced from the one of the needle beds to the needle bed gap, at positions on both sides of an area in which knitting is performed with knitting needles on the other of the needle beds; and
   knitting drive means which drives the knitting needles such that the knitting needles are advanced from the other of the needle beds and knits a fabric using a knitting yarn that is fed from the lace bar and hooked between the hook members.

2. A knitting method in a warp insertable weft knitting machine comprising a pair of needle beds which are opposed to each other at a needle bed gap and a lace bar capable of feeding a knitting yarn that can act as a warp only to one of the needle beds, wherein knitting is also performed on the other of the needle beds using the knitting yarn fed from the lace bar, comprising:

   advancing hook members from the one of the needle beds at positions inside the needle bed gap on both sides of an area in which knitting is performed with knitting needles on the other of the needle beds;
   advancing the knitting needles from the other of the needle beds at a position in the area in which knitting is performed inside the needle bed gap;
   feeding a knitting yarn from the lace bar such that the knitting yarn is hooked between the hook members which are advanced from the one of the needle beds to the needle bed gap; and
   knitting a fabric using the hooked knitting yarn with the knitting needles which are advanced from the other of the needle beds to the needle bed gap.

3. The method of claim 2, wherein the knitting needles on the other of the needle beds are advanced to the needle bed gap, after the hook members are advanced from the one of the needle beds to the needle bed gap and the knitting yarn fed from the lace bar is hooked between the hook members.

4. The method of claim 2 or 3, wherein the knitting needles on the one of the needle beds are used as the hook members.

5. The method of any one of claims 2 to 4, wherein a fabric using the knitting yarn hooked between the hook members is knitted also with the knitting needles on the one of the needle beds.

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FIG. 1

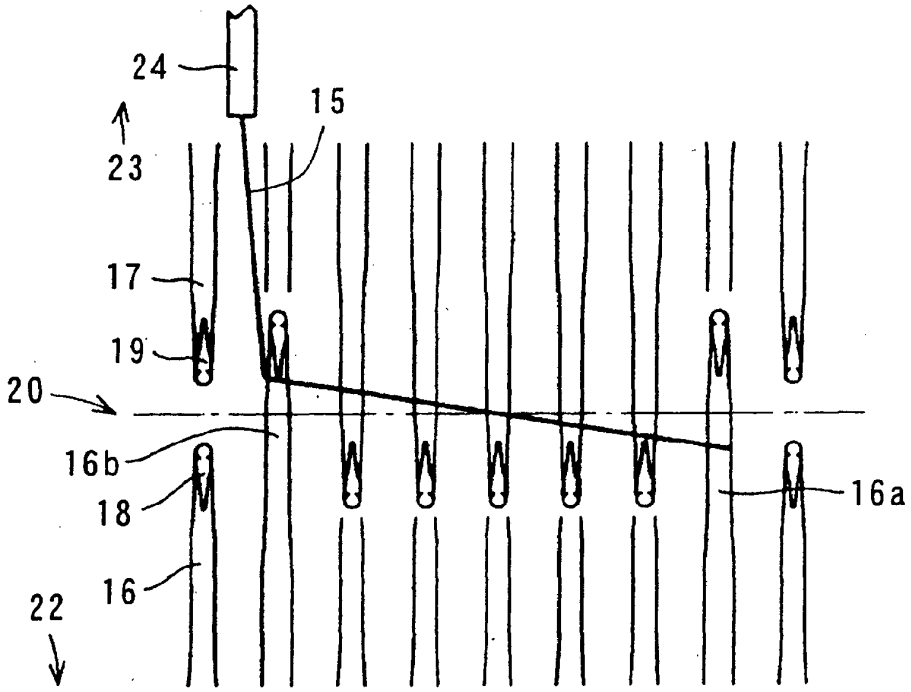


FIG. 2

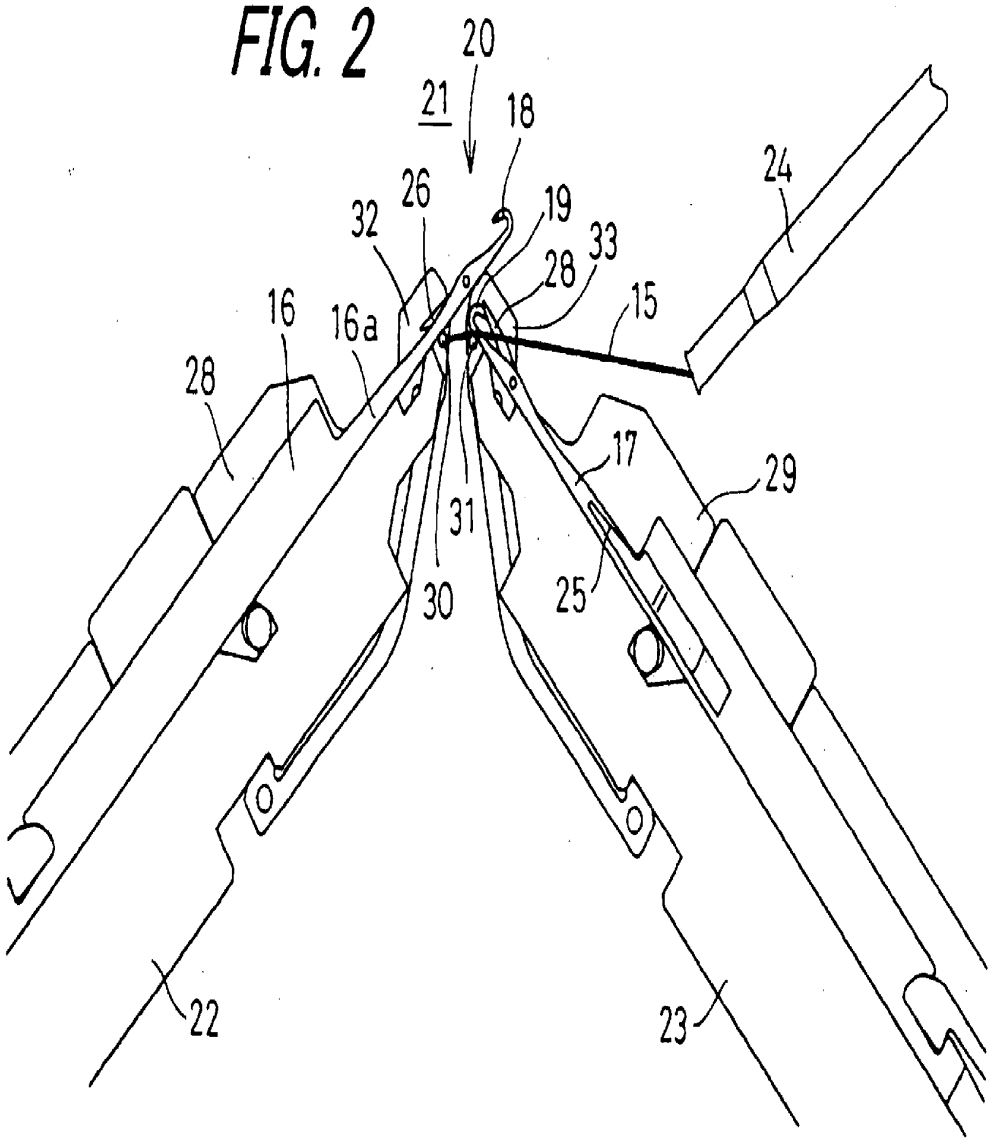


FIG. 3

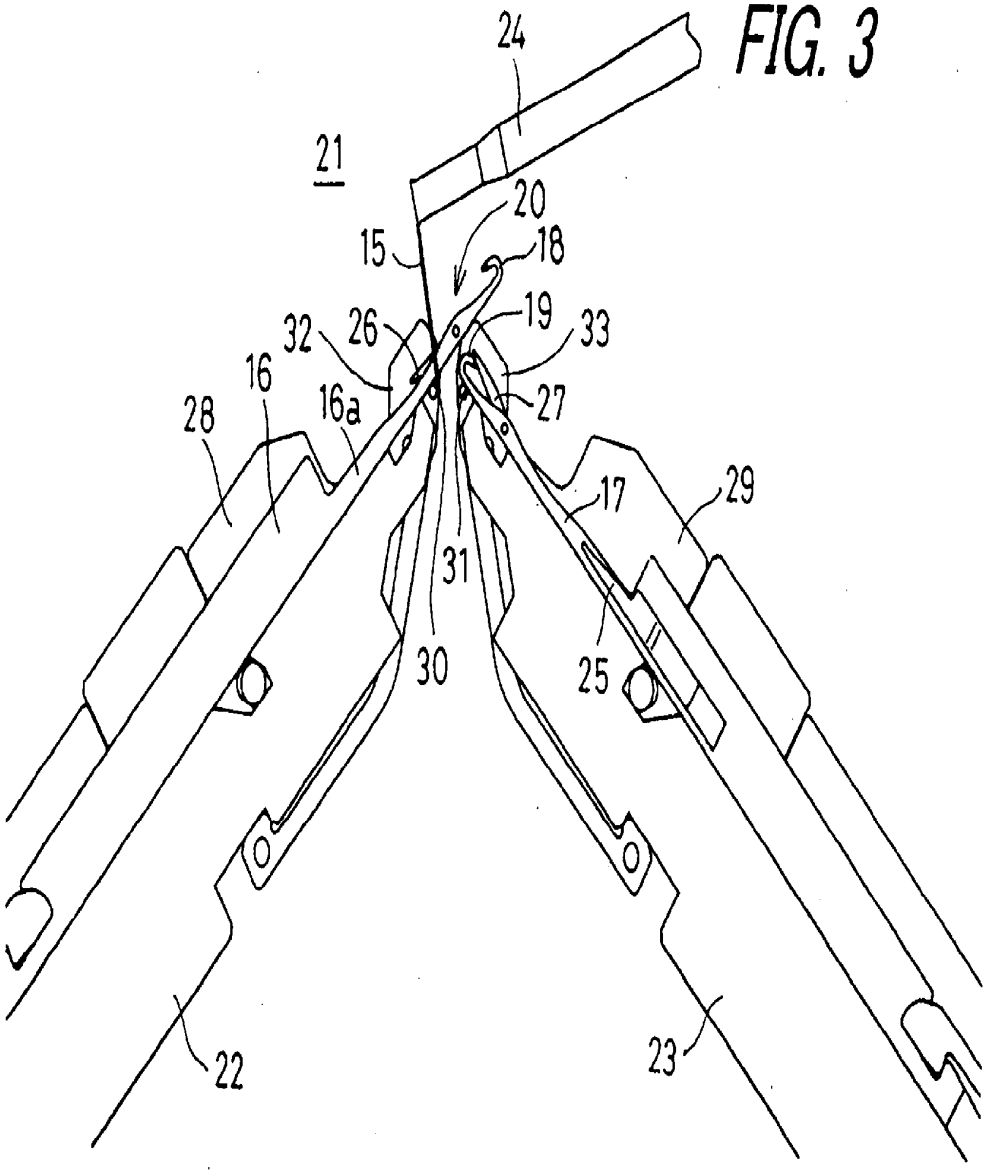


FIG. 4

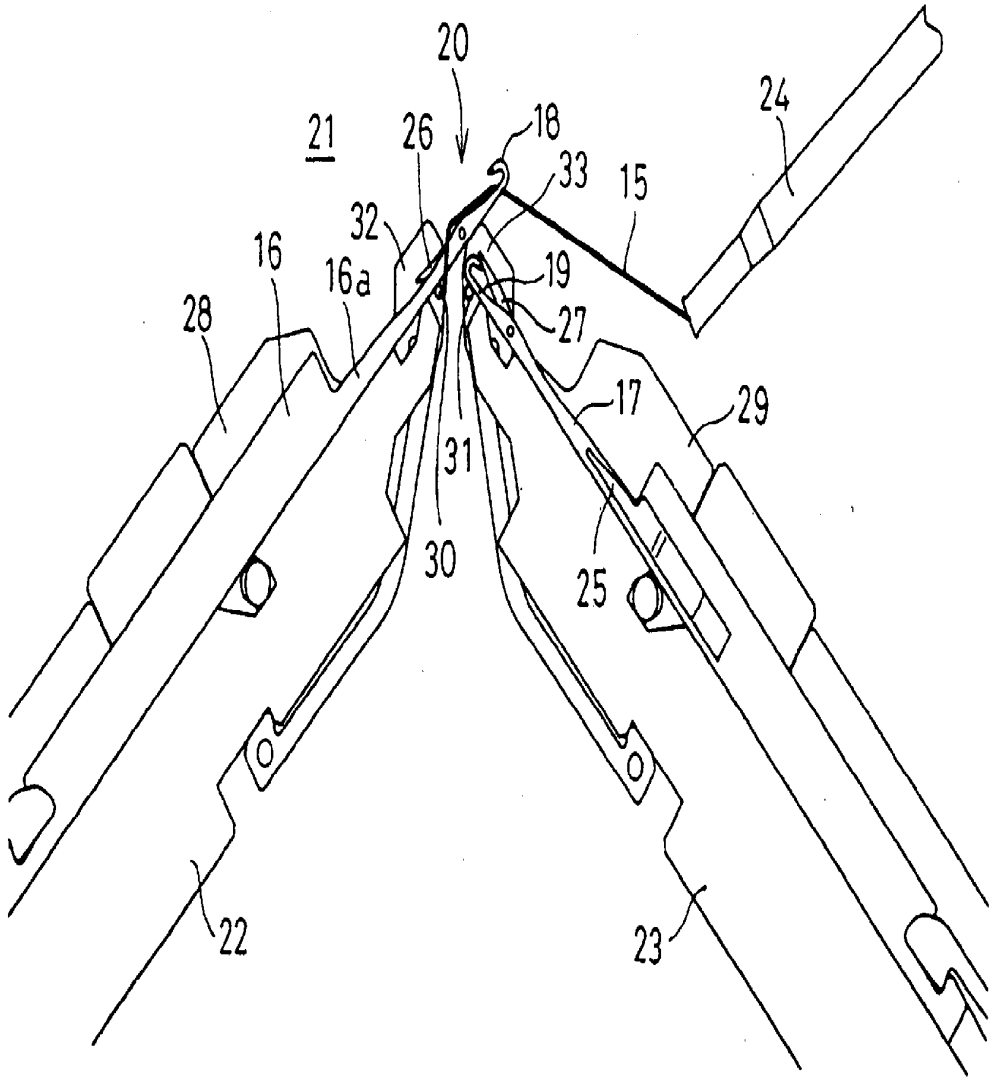


FIG. 5

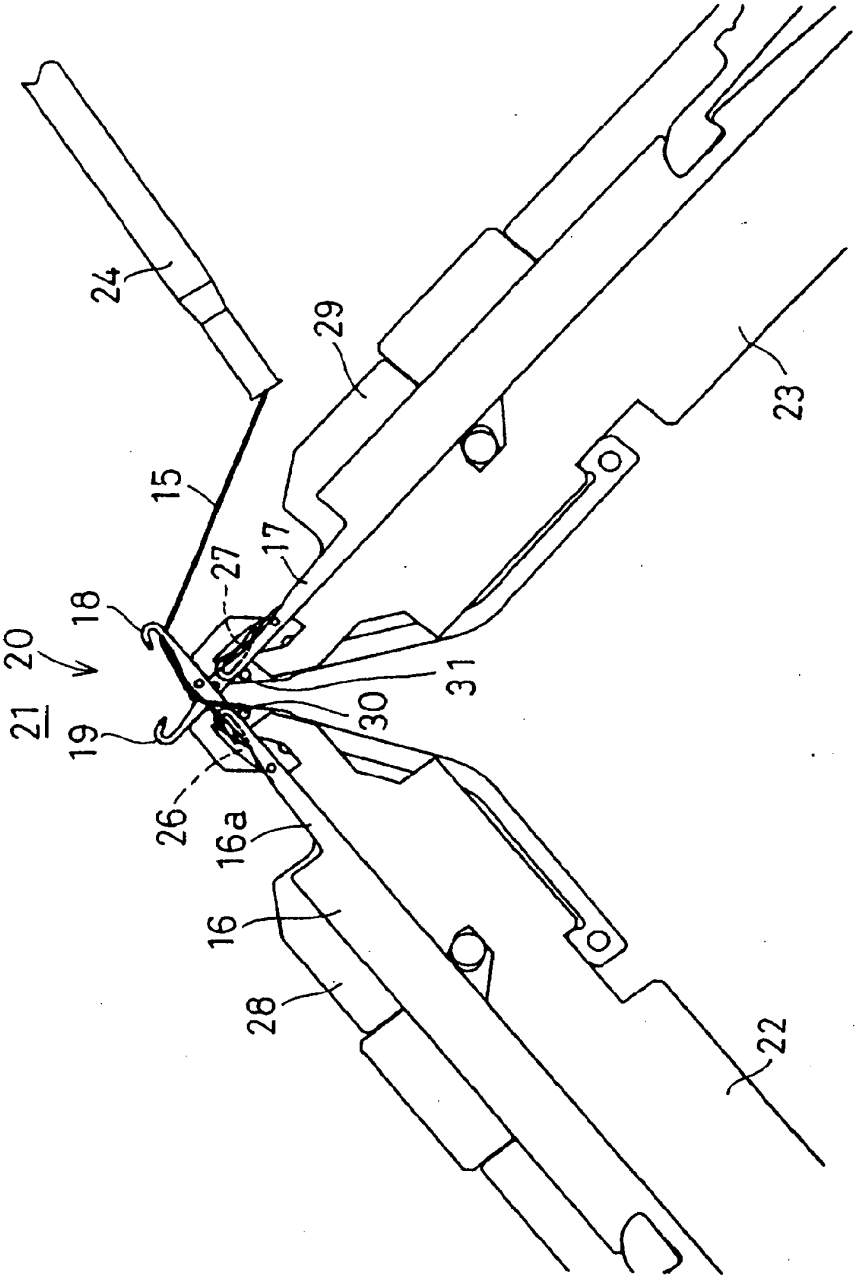


FIG. 6

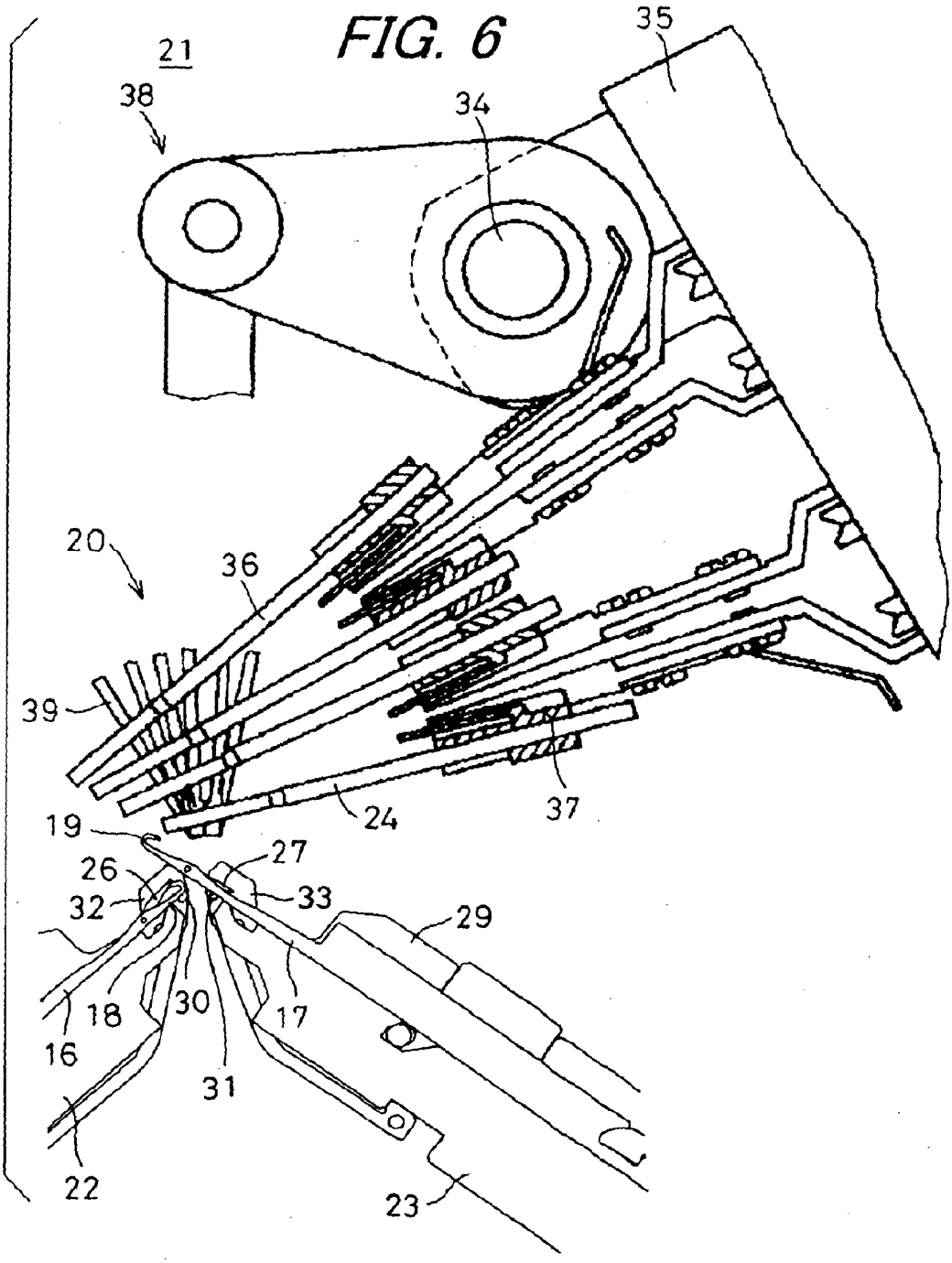
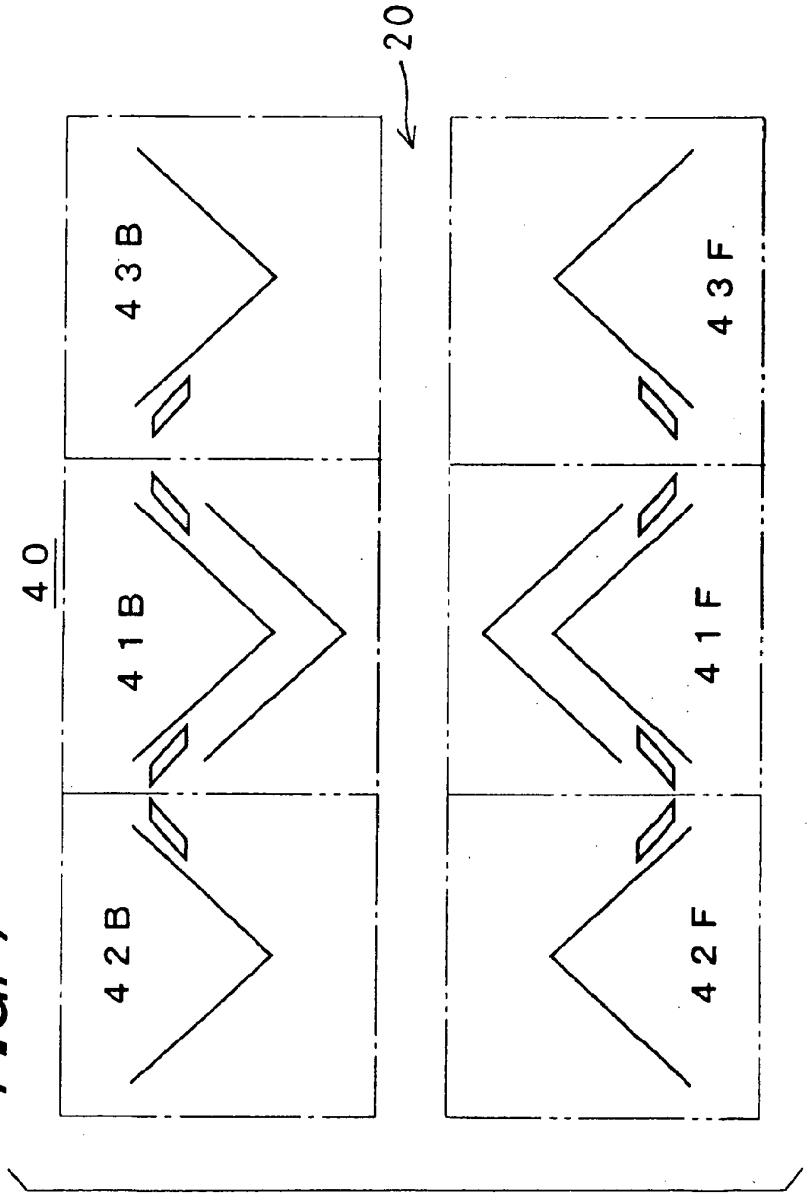


FIG. 7



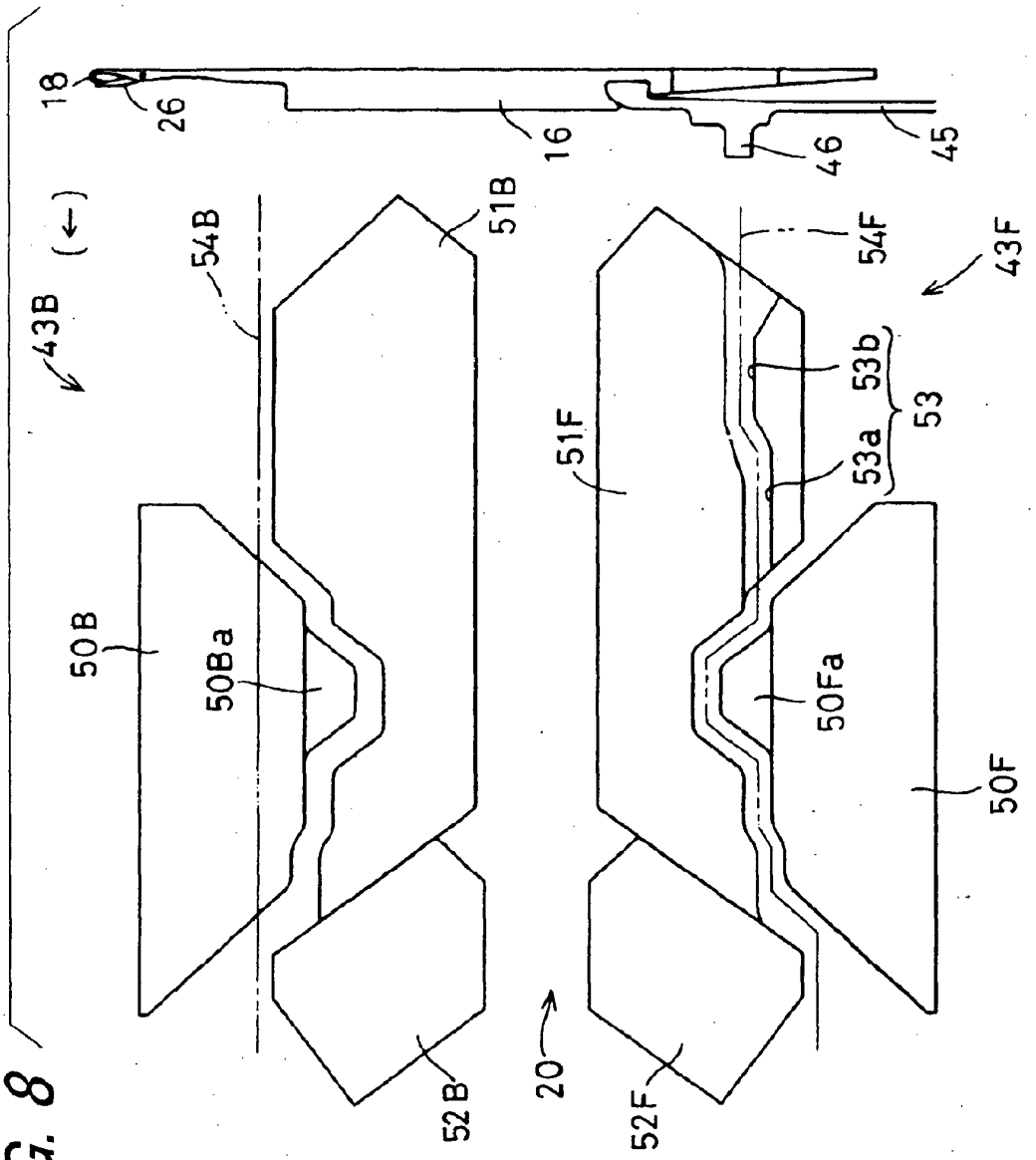

18
26
16
46
45
43B (←)
54B
51B
50B
50Ba
52B
20
51F
54F
43F
53b
53a
53
50Fa
50F
52F

FIG. 8

FIG. 9

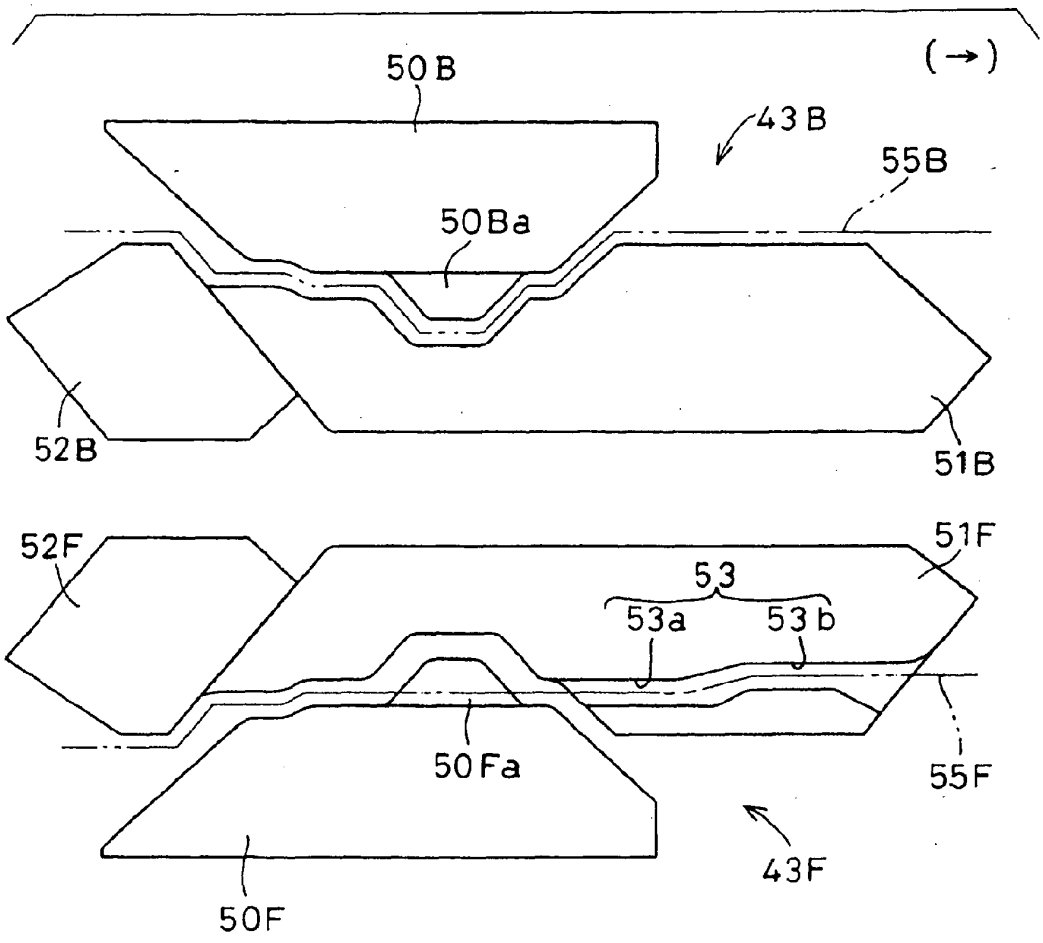
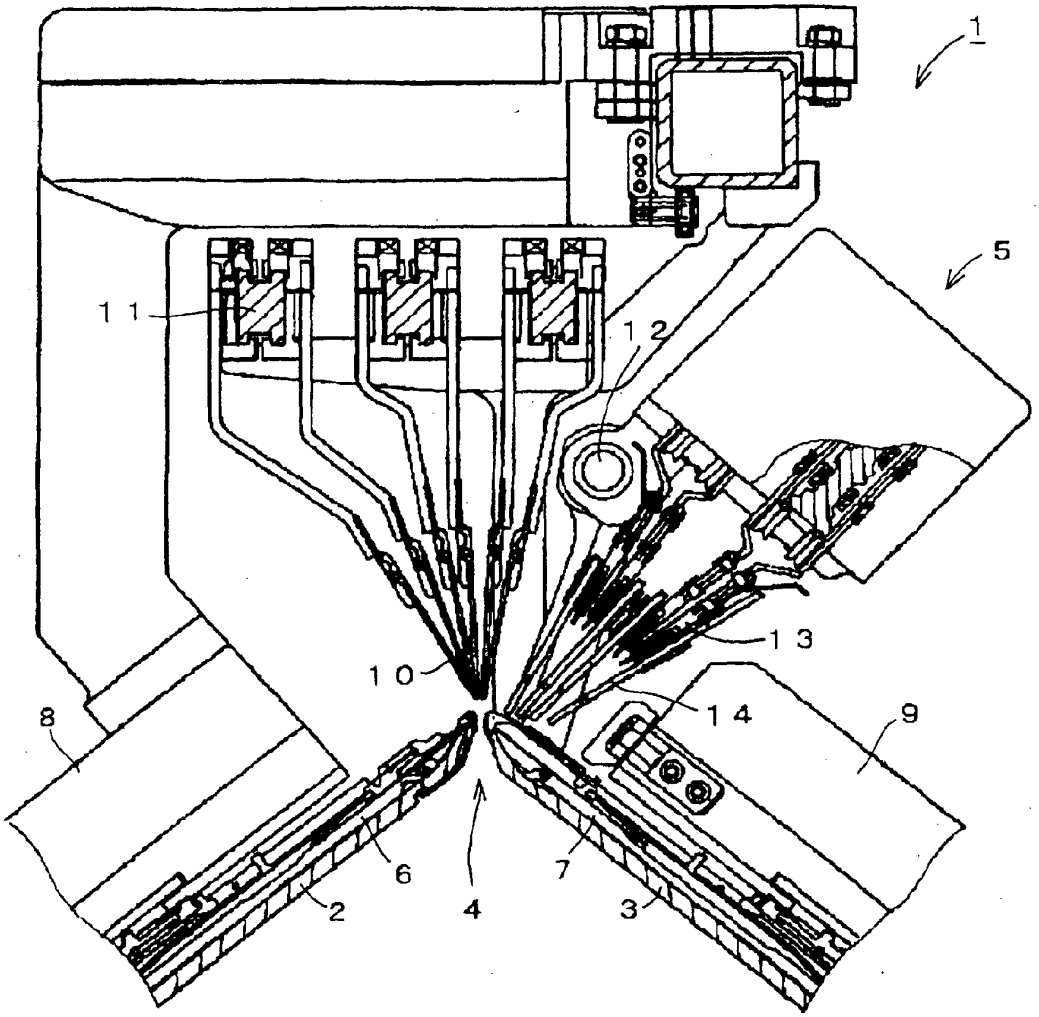


FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2006/322889

A. CLASSIFICATION OF SUBJECT MATTER
D04B7/14(2006.01)i, *D04B15/56*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D04B7/12-7/18, D04B15/56

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2006
Kokai Jitsuyo Shinan Koho 1971-2006 Toroku Jitsuyo Shinan Koho 1994-2006

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	JP 3452639 B2 (Shima Seiki Mfg., Ltd.), 29 September, 2003 (29.09.03), & US 5544502 A & EP 682133 A1 & DE 69503831 C & KR 161162 B	1 2-5
A	JP 51-42225 B2 (Kabushiki Kaisha Shima Idea Center), 15 November, 1976 (15.11.76), (Family: none)	2-5
A	JP 34-4254 Y1 (Toshiro SUMIDA), 27 March, 1959 (27.03.59), (Family: none)	2-5
A	JP 2005-290572 A (Shima Seiki Mfg., Ltd.), 20 October, 2005 (20.10.05), & WO 2005/95697 A1	2-5

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
30 November, 2006 (30.11.06)	12 December, 2006 (12.12.06)
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REFERENCES CITED IN THE DESCRIPTION

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(54) **A flat knitting machine for the production of Intarsia knitwear**

(57) A flat knitting machine for the production of Intarsia knitwear comprises a knitting carriage, guide bars for the thread guides and a control device for the thread guides, each thread guide comprising a plunger-type thread feeder.

Associated with each guide bar is a control device, rigidly connected to the knitting carriage and cooperating with at least one thread guide, consisting of a cam (1) comprising at least three different dip levels (8, 12, 10) and actuating the plunger type thread feeders situated on its passage, regardless of the direction of displacement of the knitting carriage.

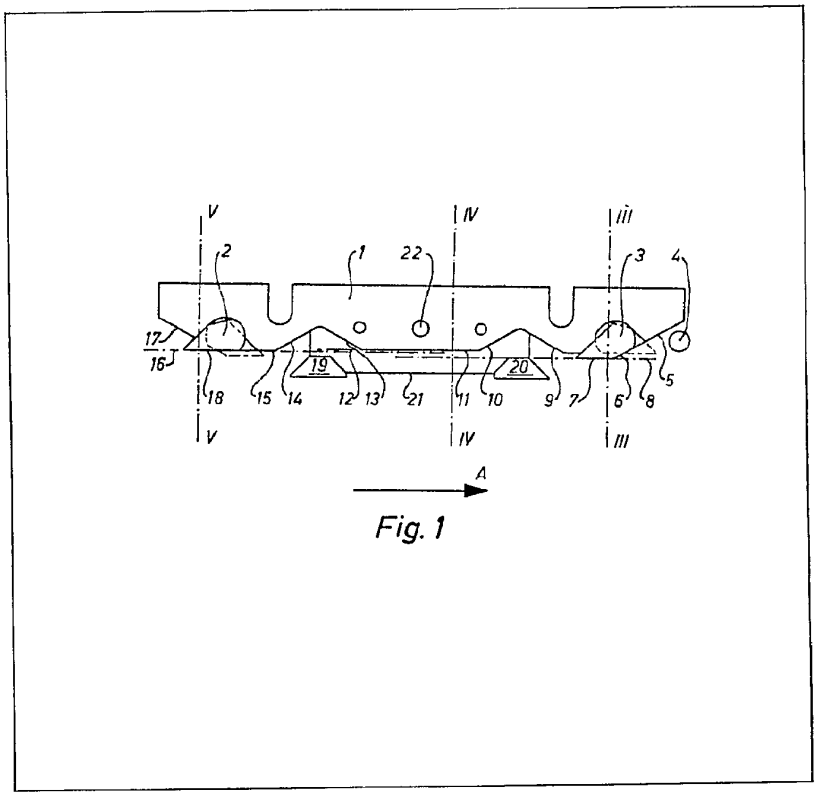


Fig. 1

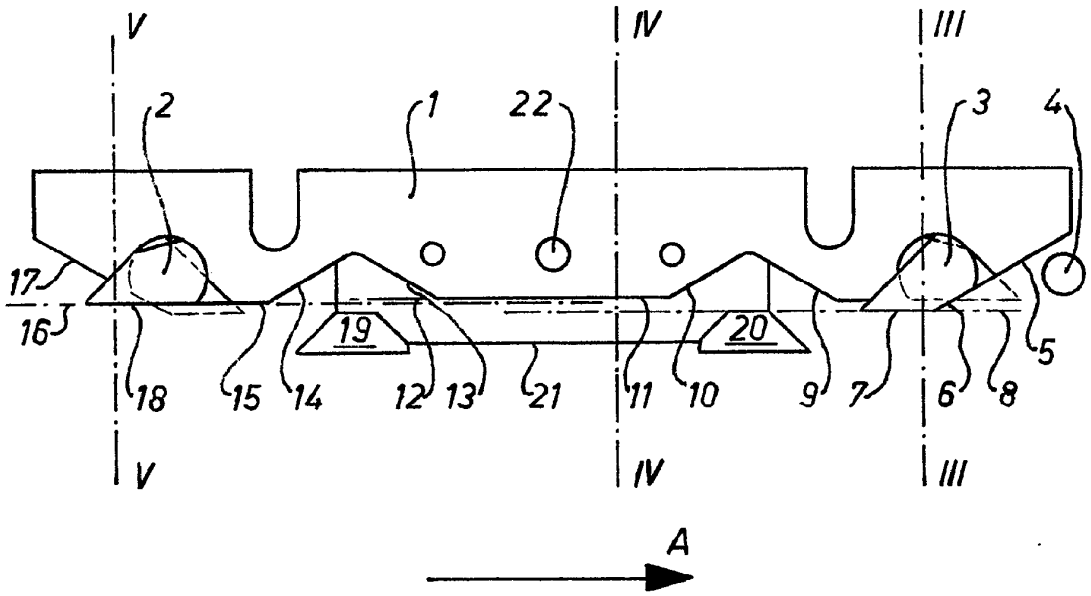

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Fig. 1


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Fig. 6

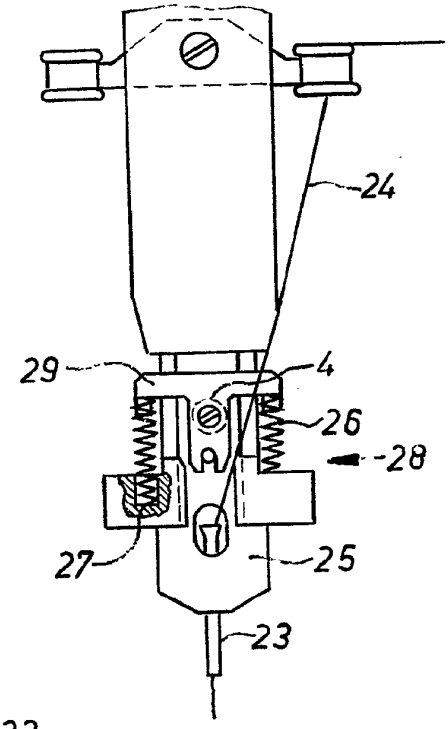


Fig. 2

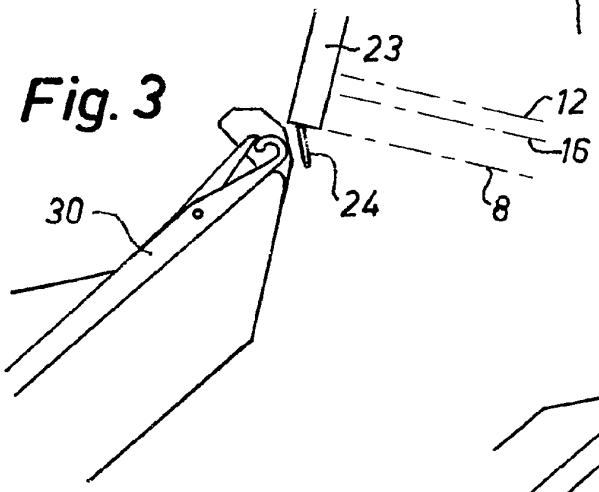


Fig. 3

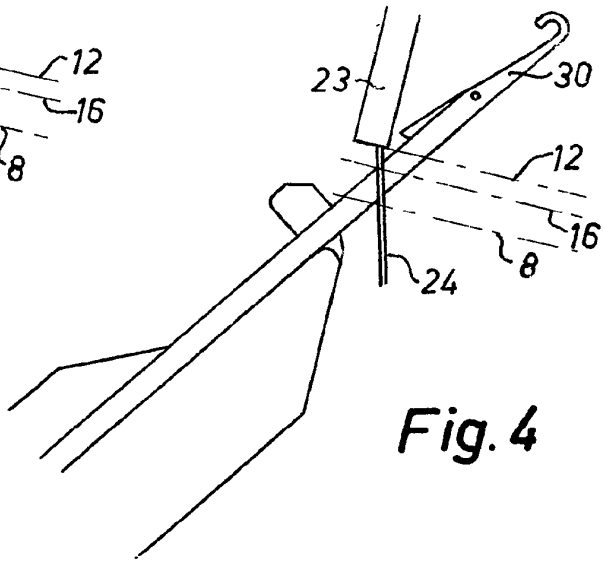


Fig. 4

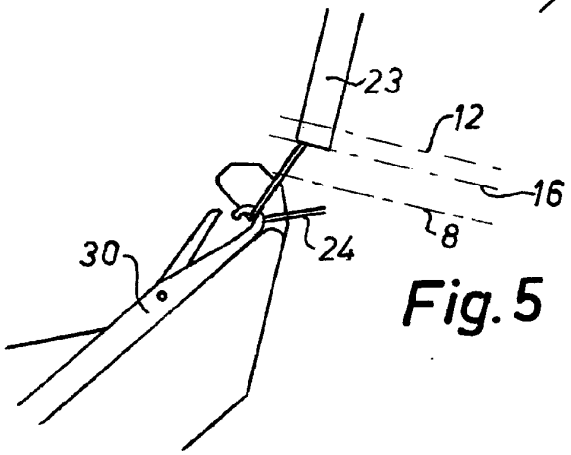


Fig. 5

SPECIFICATION

A flat knitting machine for the production of Intarsia knitwear

The present invention relates to a flat knitting machine for the production of Intarsia knitwear, and is concerned more particularly with a knitting machine of the kind comprising a knitting carriage, guide bars for the thread guides, said thread guides each comprising a plunger-type thread feeder, and a control device for the thread feeders.

Knitting machines of this kind are already known, such as that described in the German Patent DT-AS 2 459 693. Nevertheless, this Patent restricts the effectiveness of the plunger-type thread feeders to waiting at the end of travel to permit them to pick up a thread. It is actually a question of a machine comprising a device acting on thread guides driven by a knitting carriage and having no means of acting on the thread guides temporarily out of action.

The object of the present invention is to provide a simple device, easily adaptable to existing machines, permitting the production of Intarsia patterns, even with looped yarns, acting on all the thread guides used in the article to be knitted, regardless of whether they are in action or not in the row of knitting in question, in such a manner as to permit the production of Intarsia patterns, even if they are separated from one another, without the floating threads being able to be a hindrance in production.

According to the present invention there is provided a flat knitting machine of the kind described, wherein a control device is associated with each guide bar, and each control device is rigidly connected to the knitting carriage and cooperates with at least one thread guide.

The accompanying drawings illustrate, by way of example, one form of embodiment of the invention in which,

Figure 1 is the front view of the device for controlling the thread feeders,

Figure 2 is a partial front view of a thread guide,

Figure 3 is a diagrammatic view of the position of a guide tube in relation to the needles on III-III in Figure 1,

Figure 4 is a diagrammatic view of the position of a guide tube in relation to the needles on IV-IV in Figure 1,

Figure 5 is a diagrammatic view of the position of a guide tube in relation to the needles on V-V in Figure 1,

Figure 6 shows a curve of the rise and fall of the needles in relation to the cam of Figure 1.

The device for controlling the thread feeders, illustrated in Figure 1, comprises a cam 1 equipped with pivoting tongues 2, 3. This cam, which is rigidly connected to a known knitting carriage, not illustrated, by means which are likewise known and not illustrated, is displaced with said knitting carriage in a backward and forward movement. For the description, we assume that the knitting carriage is being displaced from left to right in the drawing, in the direction indicated by the arrow A. The cam 1 cooperates with a cam follower in the form of a stud 4, rigidly connected to each thread feeder, as described in connection with Figure 2.

The cam 1 comprises a first inclined ramp 5 extended by a ramp 6 of the pivoting tongue 3 which comprises a face 7 situated at a dip level 8. The cam 1 also comprises a rising ramp 9, a descending ramp 10, a face 11 forming a dip level 12, a rising ramp 13, a descending ramp 14, a face 15 forming a dip level 16 and a ramp 17. The pivoting tongue 2 comprises a face 18 situated in the extension of the face 15 and at the dip level 16. Safety cams 19, 20, rigidly connected to a plate 21 fixed to the cam 1 by fixing means 22, guarantee a rising movement of the stud 4 during its displacement over the profile of the cam 1, defined by the above-mentioned ramps and faces. During a displacement of the carriage in the opposite direction to the arrow A, the tongues are displaced by the stud 4 and assume the positions indicated in dotted lines. The geometry of the cam and consequently that of the path of the stud 4 is similar, seen in the direction of displacement of said stud, to that described above.

The thread guide illustrated in Figure 2 comprises a tube 23 into which the thread 24 fits. Said tube is rigidly connected to a slide 25 behind which the stud 4 is fixed. Under the effect of the compression springs 26 bearing on the one hand against an abutment 27 rigidly connected to the thread feeder 28 and on the other hand against the end 29 of the slide 25, said thread feeder is always restored to the high position.

The cam 1, of Figure 1, acts on the stud 4, against the action of the springs 26.

The function of the different dip levels 8, 12, 16 is described with reference to Figures 3, 4 and 5.

The diagrammatic view of Figure 3 is a partial cross-section of the needle beds, on III-III in Figure 1, showing the position of the tube 23 in relation to the needles 30 of a needle bed, when the stud 4 of the thread feeder 28 is at the dip level 8 defined by the face 7 of the cam 1. In this phase of the descent, it is a question of positioning the thread 24 with precision between two adjacent needles 30, at the lowest level to permit the raised needle to pass above the thread. This position is the more important the greater the distance separating two fields of work of the same colour, knitted with the same thread feeder, to guarantee the position of the thread 24 below the needle during long displacement of the thread feeders, whichs has led to the appearance of long floating threads.

The partial cross-section on IV-IV of Figure 1, illustrated in Figure 4 shows the position of the tube 23 in relation to the needles 30, when the stud 4 of the thread feeder 28 is at the dip level 12 defined by the face 11 of the cam 1. It is a question of positioning the tube 23 between two needles in such a manner that it is low enough for the closed latch of the needle not to prick into the thread during the last rising phase 31 of the needle (Figure 6), and then, for the open latch not to be closed by a fibril or loop of this thread during the first phase 32 of clearing the knitting cam system of the needle (Figure 6), which would inevitably lead to a dropped loop in the

knitting.

The partial cross-section on V-V of Figure 1 illustrates the relative positions of the tube and of the needle when the stud 4 is at the dip level 16 defined by the face 18 of the cam 1. Here it is a question of keeping the thread feeder in a sufficiently low position, guaranteeing the placing of the thread in the hook long enough for the thread not to be able to escape from said hook before it is held by the closed latch.

Figure 6 disposed opposite Figure 1, illustrates the position of the rise curve of the needles in relation to the cam 1. It should be noted that the descending movements of the thread feeder take place when the latter is stopped.

The drive of the thread feeder by the carriage, in a conventional manner not described within the scope of this invention, takes place when the stud 4 arrives at the top of the ramp 13. Said stud will remain in this position until the thread feeder arrives at the end of its travel. From then on, the stud follows the profile of the cam 1 defined by the ramp 14, the face 18 and the ramp 17.

A distinction must be made between the cases of two thread feeders, working or out of operation. The thread feeder which is not to be brought into operation during the knitting of the row in question will not remain at the top of the ramp 13 and will continue its descending movement controlled by the ramp 14. It is absolutely essential that the thread feeders out of operation should follow the same descending movements, in order to avoid errors in knitting which could appear if the thread guided by these thread feeders were in the path of the rising needles.

In this device, the ramps 9 and 10 only function in the opposite direction to the displacement of the carriage. They position the thread feeder so as to be high enough to be able to be entrained by the carriage without coming into contact with the needles.

Thus the knitter has a simple machine at his disposal without any limitation, enabling him to produce all the types of Intarsia patterns. This machine would comprise as many devices as shown in Figure 1 as it comprises guide bars for the thread guides.

CLAIMS:

1 A flat knitting machine for the production of Intarsia knitwear, comprising a knitting carriage, guide bars for the thread guides, said thread guides each comprising a plunger-type thread feeder, and a control device for the plunger-type thread feeders, characterised in that, associated with each guide bar is a control device, and that each control device is rigidly connected to the knitting carriage and cooperates with at least one thread guide.

2. A knitting machine as claimed in claim 1, characterised in that the control device is a cam operating alternately in one direction or in the other of the displacement of the knitting carriage.

3. A knitting machine as claimed in claim 2, characterised in that the cam (1) comprises at least three different levels of dip (8, 12, 16) acting on a stud (4) of the thread feeders (28) out of action and at least one intermediate position afforded by the intersection of ramps (13, 14 and 9, 10 respectively) positioning said stud (4) during a simultaneous displacement of the knitting carriage and of a thread guide.

4. A knitting machine as claimed in claim 3, characterised in that the cam (1) comprises at least two tongues (2, 3) which can be orientated into two distinct positions, by the stud (4) according to the direction of displacement of the knitting carriage and in that the two distinct positions of each tongue form two different levels of dip (8, 16).

5. A flat knitting machine for the production of Intarsia knitwear, substantially as hereinbefore described with reference to the accompanying drawings.

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KNITTED FABRIC AND METHOD FOR PRODUCING THE SAME

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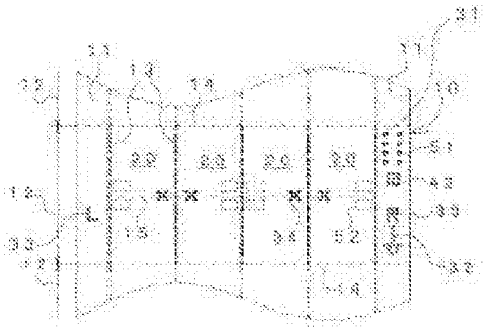
Classification: **- international:** ***D04B1/00***
- cooperative:

Application number: JP20070139317 20070525

Priority number(s): JP20070139317 20070525

Abstract of JP2008291402 (A)

PROBLEM TO BE SOLVED: To impart various kinds of accurate and easily viewable information required for handling a knitted fabric to the knitted fabric without requiring excess labor. ;SOLUTION: The knitted fabric includes information display parts 31-52 composed of knitted structures in an unused region not utilized for a final product from among the knitted fabric. The information display parts 31-52 can be formed of a jacquard pattern selected from a group consisting of a character, a symbol and a figure by a thin texture pattern structure, a thick texture pattern structure, a mesh structure and a chain stitch structure, etc. which are each changed structure of jacquard knitted structure and can contain production information, handling information, identification information and inspection information, etc. ;COPYRIGHT: (C) 2009,JPO&INPIT



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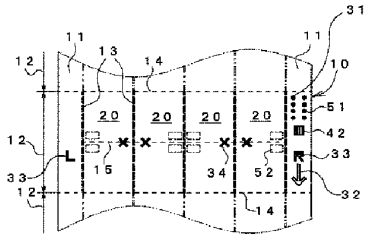
審査請求 有　請求項の数 7　ＯＬ　（全 14 頁）

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Ｆターム(参考)　4L002 AC01　BB03　CA01　CA03　CA04　EA00

(54)【発明の名称】編地とその製造方法



[0001]　本発明は、編地とその製造方法に関し、詳しくは、各種衣料品の素材となる編地とその製造方法とを対象にしている。

[0002]　編地（ニット生地）は、アウターウェア、インナーウェア、スポーツウェアなど幅広い用途に利用されている。生産性が高く、しかも、着用感などの品質性能にも優れた衣料品が提供できる。

編地には、編成方法によって、丸編地、緯編地、経編地などが知られている。このうち、経編地は、トリコット経編機、ラッシェル経編機などの編成装置で製造される。また、ジャカード機構を備えたジャカード経編機は、複雑で多彩な柄模様を作り出したり、１枚の経編地に部分的に機能や特性の異なる部分を容易に設けたりできるとされている。

例えば、特許文献１には、ジャカード経編機を使用して、ジャカード柄模様を有すると同時に、ジャカード柄の編組織の変化によって伸縮パワーや伸長性をも変化させる技術が示されている（請求項７、図１など参照）。

[0003] 特許文献２には、電子制御ジャカード編機でダブルジャージーよこ編地を編成する際に、ジャカード制御によって、最終製品となる布帛の表面からは見えず裏面だけに見える識別マークを組み込む技術が示されている。識別マークは、周囲と異なる糸を用いることで、識別を可能にしている（請求項５、図４など参照）。

これらの編地製造においては、編成装置から送り出された編地に対して、熱セット加工や染色加工、裁断加工など、様々な処理加工が施される。これらの加工工程間における運搬や保管、検査作業なども行なわれる。完成した編地を出荷したり流通販売したりする。最終製品である衣料品の製造では、編地を裁断して所定形状に材料取りを行なう。

[0004] このような編地の様々な取り扱い過程において、特定の編地を他の編地と区別することや、編地の姿勢、編成方向を知ることが必要になる。例えば、編地を検査して不良が発見されたときに、不良が発生した製品ロットや編成装置などを特定するには、生産された編地に識別番号などをつけておく必要がある。編地に各種の処理加工を行なうときに、編地の上下や編成方向によって取り扱いを変える必要がある場合がある。例えば、編地が抜き糸による分離構造を備えていて、編地の端辺から抜き糸を抜き取ると左右に分離することができる編地の場合、抜き糸が抜き取れる方向は１方向だけであり、反対方向に抜き糸を引っ張っても抜き取れないから、編地の編成方向は重要な情報である。

[0005] そこで、編成装置から送り出された編地に、その場で、連続番号などの識別表示その他の情報を、マーキングペンなどで追記することが行なわれている。

【特許文献 1】 特開２００３－１３８４５６号公報

【特許文献 2】 特開平５－８４３６６号公報

[0006] 前記した編地への情報追記は、編成装置から送り出された直後の編地に対して行なう必要がある。編地を編成装置から取り外して別の場所に移動させたりしたあとでは、先に編成された別の編地と区別できなくなったり、編成方向が不明になったりするためである。

しかし、編成装置から連続的に送り出されてくる編地に、その場でマーキング作業を行なうのは、大変に手間がかかる。作業者が常時、編成装置のそばについていなければならない。作業者の誤記によって、誤った情報が記載される心配もある。幅が広く長い編地には、作業者の手が届く編地の端部近くにしかマーキングできない。編地の中央で正確な位置にマーキングを行なうのは実質的に不可能である。油性インクあるいは水性インクの何れを用いてマーキングを行なったとしても、その後に編地に熱をかけたり溶媒や化学薬剤による処理を行ったり表面を強く擦るような処理を行ったりすると、マーキングが薄くなったり消えてしまったりして、読めなくなることがある。インクの材料が溶け出して、編地のうち最終製品になる領域に移行して汚してしまうことも起こる。

[0007] 本発明の課題は、編地の取り扱いに必要とされる各種の情報付与に関する前記した従来技術の問題点を解消し、正確で見易い情報を余計な手間をかけることなく編地に付与できるようにすることである。

[0008] 本発明にかかる編地は、最終製品に利用されない不使用領域に、編成組織による情報表示部を備える。

各構成について、具体的に説明する。なお、以下の説明では、経編地を中心に説明するが、共通する技術事項は、緯編地あるいは丸編地などにも適用される。

〔情報表示部〕

情報表示部は、編地の取り扱いに必要とされる各種の情報を表示する部分であり、編成組織によって、編地のうち、最終製品に利用されない不使用領域に設けられる。

＜不使用領域＞

不使用領域は、編地の構造、最終製品としての利用形態によって違ってくる。

[0009] 通常の経編地の場合、編地の幅方向の両端には、最終製品には使用されない耳部が設けられるので、この耳部は不使用領域になり、情報表示部を設けることができる。

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最終製品として衣料品を製造する編地の場合、１枚の編地から複数着の衣料品を得る。また、１着の衣料品は、複数枚の様々な形をなす材料部片を縫製して製造されるのが普通である。ジャカード柄模様や特性・機能の異なる領域も、それぞれの衣料品毎あるいは材料部片毎に設けられる。したがって、編地には、切り取る個々の衣料品あるいは材料部片の間に、一定量の空間や隙間があくことになる。このような空間や隙間も不使用領域であり、情報表示部を配置することができる。しかも、このような空間や隙間は、編地の端辺だけでなく、中央部にも存在するので、情報表示部を編地の中央部分にも配置できることになる。

[0010] 経編地の場合、一定の長さ毎に、同じ編成組織あるいは同じジャカード柄模様や機能領域が繰り返し形成されることがある。このような繰り返しの基本単位である一定長さ分の編地を編地単位と呼ぶことができる。経編地は、編地単位毎に裁断分離されて取り扱われることになる。この編地単位からは、１着の衣料品すなわち最終製品が得られる場合もあるし、複数の最終製品が得られる場合もある。編地単位毎に裁断分離するための境界部分にも、最終製品には利用されない不使用領域が存在し、情報表示部に利用できる。

一つの編地単位に、１着分の衣料品に対応する一定面積のパネル状をなす製品片が、複数個配置されることがある。編地単位から個々の製品片を裁断分離して、衣料品の製造に供給することができる。このようなパネル状の製品片は、編地単位の幅方向および長さ方向に複数列で配置することができる。製品片毎の境界部分にも、最終製品には利用されない不使用領域が存在し、情報表示部に利用できる。また、通常、衣料品を構成する材料部片は、矩形をなす製品片の四隅近くからは裁断しないので、四隅近くには一定の不使用領域が存在するのが一般的である。

[0011] ＜情報の内容＞

情報表示部の内容としては、従来の編地において手書きなどでマーキングされていた情報が含まれる。従来のマーキング技術では適用できなかった情報も含めることができる。

例えば、製造情報、取扱情報、識別情報、検査情報などに分類することができる。

製造情報は、編地の製造に関わる情報であり、例えば、製造工場、製造装置、製造時期、製造ロットなどの情報が含まれる。編地を後工程で処理したりしている間に、不具合や品質不良などの問題が発生したときに、その原因を解明したり、製造工程の見直しを行ったりすることが容易になる。

[0012] 取扱情報は、編地の取り扱いに必要な情報である。例えば、編地の編成方向を示す記号や図象が採用できる。例えば、編地が抜き糸による分離構造を備えていて、編地の端辺から抜き糸を抜き取ると左右に分離することができる編地の場合、抜き糸が抜き取れる方向は１方向だけであり、反対方向に抜き糸を引っ張っても抜き取れないが、前記情報があれば、容易に抜き糸の正しい抜き取り方向が判断できる。加工装置にセットするときの配置や姿勢を示す情報がある。前記姿勢を示す情報とは、例えば、編地単位の前後、左右、表裏などに関する情報をいう。前記情報があれば、編地の姿勢が変化した場合などに、容易に正しい姿勢に戻すことができる。加工処理を施す位置や処理条件を示す情報もある。前記情報があれば、各処理段階において、適切な位置や処理条件を容易に知ることができる。裁断位置や裁断線を示す情報がある。前記情報があれば、正確かつ容易に裁断を行ない得る。このような取扱情報は、作業者に視覚的に認識して作業ができるようにしておく場合と、各種の処理装置がセンサなどを使って機械的に認識できるようにしておく場合とがある。

[0013] 識別情報は、編地を識別するために必要な情報であり、編地毎、一定長さの編地単位毎および／または１着の衣料品に対応する製品片毎に付することができる。それぞれの単位毎に番号や記号を付することによって、その単位毎の識別が可能となる。前記番号や記号は、編地の編成によって単位毎に順次連続的に付されるものであっても良いし、編地の設計書や生産指示書などで特定されるもの、生地や顧客などの情報と関連して付されるものなどであってもよい。前記番号や記号が、生地や顧客などの情報と関連する場合としては、例えば、前記番号や記号が、生地品番や機台ナンバーであったり、顧客を特定するためのものであったりといった場合がある。

[0014] 検査情報は、編地の品質性能などを検査するのに利用できる情報である。例えば、編地を構成する編成組織の状態を示す情報が含まれる。組織に関する前記情報は、完成された編地では判断が難しい編成組織同士の位置ずれなどを示す。

以上に説明した以外にも、編地の取り扱いに有用な情報であれば、情報表示部に含めておくことができる。

なお、同種の編地が複数の製造工場や製造装置で製造される場合には、製造工場や製造装置などに関連し、前記製造情報として機能する番号や記号が、同時に、編地を識別するための識別情報としても機能する。また、編地の編成によって順次連続的に付される番号や記号と、製造工場や製造装置などに関連して付される番号や記号が組み合わされ、一体となって１つの情報表示部を構成する場合もある。このように、１つの情報表示部が、製造情報と識別情報などのように複数の情報を同時に含む場合もある。例えば、一般的に使用される品番は、主に識別情報とし

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て機能するが、同時に製造情報などを含む場合が多い。

[0015] ＜情報の形態＞

情報表示部を構成する情報の形態としては、文字、記号、図象など、人間あるいは機械が認識できる情報形態を任意に組み合わせて利用することができる。文字には、平仮名や片仮名、数字、英字などが含まれる。記号には、矢印や星印、不等号、シャープ記号などが含まれる。図象には、単純な直線や曲線とその組み合わせ、丸や多角形などの幾何学図形、具象形状、具象形状を簡略化したマーク図形などが含まれる。単純な直線や図形の集合であって、それらの間隔や配置を変えて情報を表現するバーコードや２次元バーコードも含まれる。

[0016] 何れの場合も、ジャカード編成組織の変化によって表現可能な形態であることが好ましい。少なくとも、従来のジャカード編地においてジャカード柄模様として採用されていた形態であれば容易に採用できる。

＜情報の表示手段＞

情報表示部は、前記不使用領域に編成組織によって形成される。ここで、本発明において「編成組織」は、糸によって構成され、情報表示可能な組織であれば良く、例えば、単に糸の配列のみによって形成された組織も含まれる。

前記編成組織としては、特にジャカード編成組織が好ましく利用できる。以下、このようなジャカード編成組織について詳述する。

[0017] ジャカード編成組織を編成するためのジャカード編成装置としては、通常のジャカード編成装置がそのまま使用できる。ジャカード編成装置には、ジャカード機構が組み込まれている。ジャカード経編装置の場合、通常の筬に加えて、ジャカード機構が組み込まれたジャカード筬を備えている。

ジャカード筬の基本構造は、１枚のジャカード筬を全体として一体的に運動させる、通常の筬と同様の作動機構に加えて、１枚のジャカード筬において個々のゲージ位置毎に別々に、編成位置を一定方向に変位させるか変位させないかを、任意に選択して作動制御する機構を備えている。このような作動機構をジャカード機構と呼ぶ。

[0018] ジャカード筬の全体作動は、パターンホイールなどを用いて、一定コース毎に繰り返すパターン制御を行なうことができる。パターンホイールを用いる場合、ラッセル機においては１２コースの約数（具体的には、２、３、４、６、１２コース）のうち、任意のコースを１繰り返し単位に設定することができ、トリコット機においては１６コースの約数（具体的には、２、４、８、１６コース）、１２コースの約数（具体的には、２、３、４、６、１２コース）、１０コースの約数（具体的には、２、５、１０コース）のうち、任意のコースを１繰り返し単位に設定することができる。また、チェーンリンクを用いる場合、２コース以上の任意のコースを１繰り返し単位に設定することができる。後述する電子制御を行なえば、パターンホイールのような物理的な作動機構が全くなくてもよい場合もある。

[0019] ジャカード筬のゲージ位置毎の作動制御は、予め作製された紋紙（ジャカードカード）を用いて行なうことができ、また、電子的な記憶情報に基づく電子制御で行なうこともできる。

ジャカードカードを用いる場合、該ジャカードカードには、コース毎に、各ゲージ位置での作動、すなわち、ジャカード機構の作用・非作用あるいは編成位置の変位・非変位の違いが、穿孔などによって物理的に記録されている。

電子制御を行なう場合、予め、コース毎に、各ゲージ位置での作動、すなわち、ジャカード機構の作用・非作用あるいは編成位置の変位・非変位の違いに関する指令情報が、コンピュータに記憶されていたり、所定のソフトウェアによって生成されたりする。コンピュータに入力された編成組織あるいは柄模様に関するデータから、ジャカード筬の各ゲージ位置における作動条件を演算し、その結果をジャカード筬の作動制御命令として出力することができる。

[0020] 前記ジャカード編成装置では、ジャカード筬に、通常のジャカード柄模様の編成を行なうための作動制御に加えて、目的とする情報表示部を形成するための作動制御を行なわせることができる。そのためには、コンピュータに組み込まれた演算プログラムによって、ジャカード筬の作動制御を適切かつ迅速に行なうことが望ましい。

ジャカード編成装置は、一対のジャカード筬を備えているものを用いることができる。一対のジャカード筬は、それぞれが通常のジャカード筬と同様のジャカード機構を備えていて、前記したゲージ位置毎の作用・非作用を制御できる。このような一対のジャカード筬を用いることで、ジャカード編成組織を自由に変化でき、目的とする情報表示部の組込みも容易になる。なお、それぞれのジャカード筬は、フルセットで糸通しされるのではなく、１イン１アウトのハーフセットで糸通しされ、一対のジャカード筬を組み合わせることで、フルセット分のジャカード

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編成組織が構成されるようにできる。

[0021] ジャカード編成装置には、ジャカード筬以外に、通常の筬が備えられている。通常の筬とは、ジャカード機構を備えておらず、基本的に、筬の全体を一体的に作動制御させるものである。但し、通常の筬であっても、筬のうち、複数のゲージ位置を含む一部分を他の部分とは別個に機械的に変位できる機構、例えば、カットプレッサ機構などを備えたものを使用することはできる。この場合は、ジャカード筬のように、個々のゲージ位置毎に任意に変位させることはできない。

通常の筬の枚数は、１枚以上の任意の枚数に設定できる。通常は４枚程度までである。

ジャカード筬によって編成されるジャカード編成組織には、一定の繰り返し単位を有する基本組織から変化させてなる変化組織を含むことができる。

[0022] 基本組織は、前記したパターンホイールなどで設定されるので、例えば６コースなど、一定コース毎に同じパターンを繰り返す比較的に単純な編成組織である。具体的には、鎖編、デンビ編、アトラス編などが採用できる。繰り返し単位１０／１２／／などが挙げられる。この基本組織だけでは、ジャカード柄模様や機能、特性の違いを自由に変化させることはできない。

ジャカード編成組織は、変化組織を含むことで、目的とするジャカード柄模様や場所による機能などの違いを与えることが可能になる。例えば、変化組織において、基本組織とは振り幅や振り方向が異なる個所を設けることができる。振り幅の違いは、その部分の糸密度あるいは生地厚さの違いとして表れたり、緊迫力や伸びの違いになったりする。隣接する編成糸が逆方向に振られて互いに交差する個所は、編成糸の重なりで厚みが生じたり拘束作用が生じたりする。また、このような編成組織の違いが複数コースあるいは複数ウェールにわたって任意に組み合わせられることで、経編地の一定領域における柄模様として現出したり、機能や特性の違う領域が生じたりする。このような変化組織による柄模様あるいは機能・特性の変化自体は、通常のジャカード編成組織においても達成されていたことである。

[0023] 情報の表示に利用できるジャカード編成組織の変化組織としては、上記した通常のジャカード柄模様や機能領域の形成に使用されていた変化組織とその組み合わせが採用できる。例えば、薄地柄組織、厚地柄組織、メッシュ組織、鎖編組織などが採用できる。薄地柄組織と厚地柄組織との対比などで情報を表現することもできる。

本発明では、このような通常のジャカード編成組織と共通する技術を基本にして、それ以上の複雑な付加装置や機構を加えることなく、情報表示部を形成させることができる。

さらに、ジャカード編成組織以外の編成組織により情報表示部が形成された編地も本発明の範囲に含まれる。

[0024] 〔編地〕

編地は、最終製品に利用されない不使用領域に、編成組織による前記情報表示部を備えること以外は、通常の編地と同様に、種々の編成組織を採用することができる。例えば、一対のジャカード筬によって編成されるジャカード編成組織により情報表示部を備えた編地の場合、前記ジャカード編成組織だけで構成することもできるし、ジャカード編成組織に加えて別の編成組織を組み合わせて構成することもできる。

別の編成組織として、ジャカード筬とは異なる筬によって弾性糸が挿入または編み込まれてなる弾性糸編成組織を備えることができる。弾性糸編成組織を備えることで、ジャカード編地に優れた伸縮性を付与することができる。弾性糸編成組織が挿入組織であれば、伸縮性はより高まる。

[0025] ジャカード編成組織における部分的な組織変化だけでは、領域毎の緊迫力や伸びなどの特性に大きな差を付けることには限界があるが、弾性糸編成組織が加わると、領域毎の特性の差を格段に大きくすることができる。

別の編成組織として、非弾性糸による編成組織も勿論加えることができる。非弾性糸による編成組織で、ジャカード編地の表面特性や機能性などを向上させることができる。

ジャカード編地に要求される機能や特性に合わせて、さまざまな別の編成組織の採用、組み合わせを変更することができる。

ジャカード編地として、分割可能な構造を設けることができる。ジャカード編地の一部に、抜き糸、抜き糸の左右に配置される耳部編成組織など、通常の分割可能な編地と同様の編成組織を付加することができる。このような分割可能な構造を構成するための編成組織を、ジャカード編成組織の一部に組み込むことができる。一対のジャカード筬で編成する変化組織の一部を、抜き糸や耳部編成組織になるように変化させれば、分割構造を構成するために余分の筬を使う必要がなくなる。

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[0026] 〔編地の製造〕

特定条件を備える編成組織を編成すること以外は、基本的に、通常の編地と共通する製造技術がそのまま適用できる。

編成糸の準備、編成装置への糸通し、糸の供給条件、編成条件、編成後の加工処理、染色加工など、通常の編地と同様の処理工程が行なわれる。弾性糸編成組織を含む編地では、熱セット加工などで、弾性糸の固定を行なうことができる。

＜編成糸＞

編地の編成に用いる編成糸としては、通常の編地に使用されている糸種および糸条件の範囲で、目的に合わせて設定できる。

[0027] 非弾性糸としては、ナイロン、ポリエステルなどの合成繊維、レーヨン、アセテートなどの再生繊維、木綿、絹などの天然繊維などからなるものを、編地の用途や要求性能に合わせて適宜に選択して使用することができる。複数の繊維材料を組み合わせた複合糸も使用できる。

弾性糸としては、ポリウレタン繊維などの弾性繊維からなるものが使用できる。

弾性糸に非弾性糸を被覆した被覆弾性糸や、非弾性繊維と弾性繊維とを組み合わせた複合糸なども使用できる。

非弾性糸と弾性糸とは、伸び率によって区別することができる。通常、非弾性糸は伸び率１００%未満であり、弾性糸は伸び率１５０%以上、好ましくは２００%以上である。

[0028] 編成糸の太さは、編地の目的や要求性能によっても異なるが、非弾性糸の場合には、通常、１６～４７０ｄｔｅｘ、より好ましくは、２２～２３５ｄｔｅｘの範囲に設定できる。また、弾性糸の場合には、通常、１１～３７３０ｄｔｅｘ、より好ましくは、２２～１２４０ｄｔｅｘの範囲に設定できる。

ジャカード筬などの各筬には、全ての針位置に同じ編成糸を糸通ししても良いし、太さや種類が異なる編成糸を組み合わせることもできる。同じ針位置に、複数本の糸を揃えて給糸することもできる。

特に、弾性糸編成組織として、弾性糸を複数本揃えて編成すると、前記したジャカード編成組織の部分的な組織変化による領域毎の緊迫力や伸びの違いを、さらに増大させることができる。弾性糸編成組織に、弾性糸が単独で編成される個所と、弾性糸を複数本揃えて編成する個所とを含んでいると、弾性糸が単独の個所と、弾性糸が複数本の個所とで、特性の違いをより大きくできる。

[0029] 〔編地の用途〕

編地のうち、最終製品に利用される領域については、通常の編地と全くかわりのないものとなる。したがって、従来の編地が利用されていた各種用途にそのまま適用することが可能である。

具体的には、インナーウェアやアウターウェア、スポーツウェアなどになる編地が挙げられる。

[0030] 本発明にかかる編地は、基本的には通常の編地と同様のジャカード柄模様や機能・特性の違う領域を自由に設けることができる上で、最終製品に利用されない不使用領域に、編成組織による情報表示部を備えることで、編地の取り扱いが行ない易くなる。

編成組織によって形成された情報表示部は、編成後の洗浄や染色その他の処理加工を施しても情報が消えたり読み難くなったりすることがない。薄くなったり消えたりした情報を書き直すような面倒な作業が省ける。

編成装置から連続的に生産される編地の側端だけでなく中央部分など任意の位置に、何らの困難性もなく必要な情報表示部を設けることができるので、編地を裁断したあとでも、個々の裁断部分毎に必要な情報表示部を残しておくことが可能になる。編地の全体での取り扱いだけでなく、最終製品になる直前に近い段階まで、必要とされる情報を備えた状態を維持することが可能になる。

[0031] 特に、編成装置としてジャカード編成装置を用いた場合には、該ジャカード編成装置に組み込まれた制御情報によって、文字、記号、図象などを任意に組み合わせた正確で判りやすい情報が、編地そのものの編成と同時に形成されるので、マーキングペンを用いた手書きによる情報追記などに比べて、情報表示に要する手間とコストを大幅に削減できるとともに、情報の正確さにおいても格段に向上する。

[0032] 〔編地〕

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図１は、ジャカード経編機で編成されたジャカード経編地１０を示している。図２は、要部を拡大して示している。

図１に示すように、ジャカード経編地１０の幅方向の両端辺には、通常の経編地と同様、細幅の耳部１１が設けられる。耳部１１よりも内側の部分が製品に利用され、耳部１１は廃棄される。

経編地１０の長さ方向で、一定長さ毎に同じ構造の編地単位１２が繰り返し配置される。前後の編地単位１２、１２同士は、一定のコース分だけ編成組織を違えて設けられた単位境界線１４を有するので、この単位境界線１４に沿って裁断すれば、個別の編地単位１２が分離できる。一つの編地単位１２は、タテ２列ヨコ４列の合計８枚の矩形をなす製品片２０からなる。

[0033] 製品片２０には、最終製品を１着分だけ材料取りできる素材が含まれている。最終製品によって材料取りする部片の配置や数、形状は異なる。図２では、点線で輪郭を示す複数の材料部片２４が材料取りされる。材料部片２４には、必要に応じて、ジャカード柄模様２２や緊迫力、伸びなどの機能が異なる領域などが配置される。

したがって、編地単位１２を製品片２０毎に切り離して、個別の製品片２０から所定の材料部片２４を裁断し、縫製することによって、１着分の衣料品が完成する。

経編地１０の長さ方向で製品片２０同士を上下に仕切る境界には、製品片裁断線１５が設けられる。製品片裁断線１５は、前記した単位境界線１４と同様に、特定コース分の編成組織を違えることで形成されている。

[0034] 経編地１０には、製品片２０同士を幅方向で左右に仕切る境界、および、左右の製品片２０と耳部１１との境界に、分離線部１３が設けられる。分離線部１３は、通常の経編地における抜き糸構造を有している。すなわち、分離線部１３に組み込まれた抜き糸（図示省略）を経編地１０から引き抜くと、抜き糸で連結されていた左右の編地が分離する。このような分離構造あるいは抜き糸構造は、通常の分離構造を有する経編地と同様に、編成組織および編成糸の選択によって構成されている。

以上に説明した、経編地１０を耳部１１や編地単位１２、製品片２０で構成すること自体は、通常の経編地においても採用されている構造である。

[0035] 経編地１０には、上記構造に加えて情報表示部を有している。

〔情報表示部〕

以下に説明する情報表示部は全て、ジャカード編成組織の組織を変化させることで形成されるものである。情報表示部の部分だけに特別な編成糸を用いたり、特別な筬を使用したりするものではない。

また、ジャカード編成組織の組織変化で形成された全ての情報表示部は、経編地１０の表側だけでなく、裏側からも視認できる。経編地１０を裏返して取り扱う場合にも、情報を確実に取得できる。

[0036] また、編成組織で構成された情報表示部は、目視による認識だけでなく、センサによる画像認識などで機械的あるいは電子的に認識させることもできる。

＜製造情報＞

図１において、耳部１１には、製造情報を示す情報表示部として、長さ方向に沿って並ぶ文字によって、工場情報部３１が設けられている。図２に詳しく示すように「ｖｉｏｌｅｔｔａ」という文字列からなり、該文字列により生地を製造した工場が特定できるようになっている。

工場情報部３１のほかに、さらに、製造装置、製造時期、製造ロットなどを特定する文字情報を含む情報表示部を設けておくこともできる。これらの情報表示部で示される製造情報により、編地の不具合や品質不良などが生じた際の原因解明などの処置をスムーズに行ない得る。

[0037] ＜取扱情報＞

取扱情報を示す情報表示部としては、方向情報部３２、姿勢情報部３３、裁断情報部３４が設けられている。

方向情報部３２は、矢印の形状をなしている。矢印の指し示す方向が、編成方向を表している。前記した分離線部１３において、抜き糸を抜き取って左右の編地を分離するには、抜き糸を一定方向から抜き取らなければならない。適切な方向に抜き取ればスムーズに抜き取ることができるが、反対方向では、いくら強い力を加えても、編目がほどけず、抜き糸を引き抜けない。勿論、経編地１０が編成装置から送り出された段階では、編成方向は判っている。しかし、編成後の経編地１０を後の工程で処理している間、特に、経編地１０を個別あるいは一定数の編地単

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位１２ごとに裁断して取り扱っていると、編成方向が何れの方向かが判らなくなる。このとき、方向情報部３２が存在していれば、容易に正しい編成方向すなわち抜き糸の抜き取り方向を見つけることができる。

[0038] なお、方向情報部３２は、１枚の編地単位１２毎に設けておくほか、一つの製品片２０毎に設けておくこともできる。製品片２０を分離した状態でも元の経編地１０の編成方向が判るようになり、その後の加工や処理に役立つ。

姿勢情報部３３は、左右の耳部１１、１１のそれぞれに存在し、「Ｒ」および「Ｌ」の英文字からなる。

前記同様に、経編地１０を編地単位１２に裁断した状態では、編地単位１２は、その前後、左右、表裏などに関して、様々な姿勢を取り得るため、各種の処理加工を施す際における正しい姿勢を判別することが難しい場合がある。前記した工場情報部３１や方向情報部３２が片側の耳部１１だけに配置されていれば、それを手掛かりに左右を区別できる場合もあるが、何れの耳部１１にも工場情報部３１や方向情報部３２を形成して左右対称にしておく場合などは、編地単位１２の左右を区別することさえも困難である。

[0039] そこで、姿勢情報部３３が存在していれば、単独の編地単位１２をどのような姿勢にして取り扱ったとしても、基本的な姿勢に戻すことができる。編地単位１２に各種の処理加工を施す際に正しい姿勢を間違いなく知ることができる。

裁断情報部３４は、製品片裁断線１５の端部あるいは途中に存在し、「×」印からなる。

裁断情報部３４は、編地単位１２の上下方向中心線である製品片裁断線１５の途中で、製品片２０毎に設けられている。

したがって、左右の裁断情報部３４を結ぶ線に沿って経編地１０を裁断すれば、正確かつ容易に、製品片裁断線１５に沿って裁断することができる。製品片裁断線１５が細かったり周囲との違いが判り難かったりする場合でも、明確な「×」印からなる裁断情報部３４があれば、裁断作業が極めて行ない易くなる。裁断作業を手作業で行なう場合は勿論のこと、センサなどで裁断情報部３４を画像認識して裁断を機械化あるいは自動化する場合にも有用となる。

[0040] ＜識別情報＞

図１において、耳部１１には、識別情報を示す情報表示部として、長さ方向に沿って並ぶ文字によって、編地単位の識別情報部５１が設けられている。図２に詳しく示すように「ＡＢＣ－０３Ｊ」という文字列からなる。

前記編地単位の識別情報部５１は、編成の際に順次連続的に振られる番号や記号、生地や顧客に関連する番号や記号、経編地１０の設計書や生産指示書などで特定される番号や記号などが、編地単位１２毎に表記されたものであるので、以後の編地単位１２毎の取り扱いが確実に行なえる。編地単位の識別情報部５１が前記工場表示部３１などと一体となって１つの情報表示部を構成しても良いし、また、編地単位の識別情報部５１自体が同時に製造情報として機能するものであっても良い。このような場合には、１つの情報表示部が製造情報と識別情報を同時に含むものとなる。

[0041] さらに、図２に詳しく示すように、各製品片２０の隅部には、識別情報を示す情報表示部として、「Ｌ」「Ｙ０７」という文字列からなる製品片の識別情報部５２も設けられている。

製品片の識別情報部５２は、１枚分の編地単位１２における個々の製品片２０を区別することができる情報を示す。なお、最終製品となる衣料品が、左右対称の材料部片を組み合わせて構成されるので、同じ「Ｙ０７」番号で、右側の材料部片を材料取りする製品片２０には「Ｒ」の記号、左側の材料部片を材料取りする製品片２０には「Ｌ」の記号をつけている。同じ番号「Ｙ０７」で「Ｌ」と「Ｒ」の記号がついた一対の製品片２０を組み合わせれば、一つの衣料製品が製造できることになる。

[0042] したがって、編地単位１２を、個々の製品片２０に裁断分離したあとでも、衣料製品を完成するのに必要な製品片２０を、確実かつ容易に取り出すことができる。

製品片の識別情報部５２は前記編地単位の識別情報部５１と同様に、製造情報などの識別情報以外の情報を含んでいても良い。

＜検査情報＞

経編地１０の耳部１１には、検査情報を示す情報表示部として、小さな矩形状をなす組織情報部４２が設けられている。

組織情報部４２は、経編地１０を編成する複数の筬によるそれぞれの編成組織が、互いに位置ずれを起こすこと

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なく正確に配置されていることを確認する機能を有する。

[0043] 具体的には、組織情報部４２では、経編地１０を構成する編成組織のうち、ジャカード編成組織が残りの地筬による編成組織のいずれかと同調するよう編成されているか、または、孔あき状態になっている。

ジャカード編成組織を除く他の編成組織は、基本的に全てのウェールで一定のコース毎に、同じ組織が繰り返される規則的な編成組織であるのに対し、ジャカード編成組織は、コース毎およびウェール毎に複雑で多彩な変化を有する。そのため、何ら工夫を施さなければ、ジャカード編成組織を含む経編地１０の編目状態を観察しても、編成組織同士の位置ずれを正確に評価することは難しい。

[0044] しかし、編地において柄を形成しているジャカード編成組織のうち、組織情報部４２にかかる部分を、残りの地筬による編成組織のいずれかと同調するよう変化させれば、柄ずれが発生したときに、同調するよう編成されている前記二つの編成組織にずれが生じ、目視で糸が二重であると認識できることとなり、これにより、ジャカード編成組織の位置ずれを容易に確認できるのである。

また、組織情報部４２において、ジャカード編成組織が孔あき状態にしている場合、ジャカード編成組織による変化を除いた規則的な編成組織同士の組み合わせだけが見えることになるので、ジャカード編成組織以外の編成組織同士の位置ずれが確認し易くなる。

[0045] 組織情報部４２は、１枚の経編地１０あるいは一つの編地単位１２に、１個所だけ設けておいても有用であるが、複数個所に設けてあれば、より確実に組織の確認作業を行なえることになる。

〔変化組織の具体例〕

図３は、情報表示部の１つである編地単位の識別情報部５１の形成に利用できるジャカード編成組織における変化組織の具体例を示している。何れも、実線で表示された編成糸と点線で表示された編成糸とが、一対のジャカード筬にそれぞれ１イン１アウトのハーフセットで糸通しされて編成された編成組織である。

[0046] 図３（ａ）は、薄地柄組織であり、以下の繰り返し単位を有する。

１０／１２／／

図３（ｂ）は、厚地柄組織であり、以下の繰り返し単位を有する。

１０／２３／／

図３（ｃ）は、鎖編による孔地柄組織であり、以下の繰り返し単位を有する。

１０／０１／／

これら図３（ａ）～（ｃ）の何れか一つの編成組織で、文字、記号などを表現し、その周囲を別の編成組織で編成すれば、生地の厚みや透けなどの質感の違いによって、視覚的に明確に、文字や記号を認識させることができる。

[0047] 〔組織情報部の具体例〕

図４は、組織情報部４２を編成するための編成組織の具体例を示している。

図４における、ジャカード機構を備えない通常の筬ＧＢ２～ＧＢ４による各編成組織は、いずれも、全てのウェールで一定のコース毎に、同じ組織が繰り返される規則的な編成組織である。

ＧＢ２は、以下の繰り返し単位を有する。

１０／１２／２１／２３／２１／１２／／

ＧＢ３は、以下の繰り返し単位を有する。

[0048] １１／００／／

ＧＢ４は、以下の繰り返し単位を有する。

３３／２２／３３／００／１１／００／／

次に、図４におけるジャカード筬ＪＢによる編成組織は、組織情報部４２において、ジャカード編成組織における変化組織を組み合わせて形成された編成組織であり、具体的には、図３（ａ）～（ｃ）で示したジャカード編成組織における変化組織を組み合わせたものである。組織情報部４２以外の部分では特に制限なく、目的に応じた柄

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組織が形成されていて良い。そして、図４から分かるとおり、組織情報部４２における前記ジャカード筬ＪＢによる編成組織は、前記筬ＧＢ２による編成組織と同調するように変化組織が組み合わされている。

[0049] このような組織情報部４２を設けておくことにより、柄ずれが発生したときに、同調するよう編成されている前記ジャカード筬ＪＢによる編成組織と筬ＧＢ２による編成組織の二つの編成組織間でずれが生じ、目視で糸が二重であると認識でき、ジャカード編成組織の位置ずれを容易に確認できるのである。各編成組織が互いに位置ずれを起こすことなく正確に配置されていることを、視覚的に明確に確認することができる。

〔他の実施形態〕

ジャカード編成組織による情報表示部を備えた上記編地だけでなく、ジャカード編成組織以外の編成組織による情報表示部を備えた編地も本発明に含まれる。その一例を以下に示す。

[0050] 伸縮性編地は、弾性糸によって、染色工程で耳部カールが生じるおそれがあるため、一般に、編み工程で耳部の弾性糸を一定間隔で挿入しないことにより、前記耳部カールを防止している。この業界慣行を利用して、弾性糸を挿入しない間隔を左右で違えておくことによって、左右を区別することができ、これにより編地の編方向を判別することができる。

具体的に図を用いて説明する。図５は、伸縮性編地の耳部弾性糸６０のみに着目したもので、耳部弾性糸６０以外の糸、耳部弾性糸６０の屈曲、耳部以外の領域Ｃなどを省略したモデル的な図である。

[0051] 図５（ａ）は、通常一般に行なわれているように、耳部カールを防止するために、両側の耳部Ａ，Ｂについて、耳部弾性糸６０を５本連続挿入した後１本分は挿入しないという通常のパターンが左右各６箇所ずつ設けられている状態を示している。

図５（ｂ）は、本発明にかかる編地であって、左側耳部Ａについては、通常と同様の間隔で耳部弾性糸６０を挿入しないパターンとなっているが、右側耳部Ｂについては、５本連続挿入した後１本分は挿入しないという通常のパターンは５箇所のみであり、１箇所は１１本連続挿入した後１本分は挿入しない、という変則的なパターンが設けられた状態を示している。

[0052] 図５（ｂ）で示す編地は、従来の図５（ａ）で示す編地と異なり、耳部Ａ，Ｂにおける耳部弾性糸６０が左側耳部Ａでは通常のパターン、右側耳部Ｂでは変則的なパターンとなっているため、左右が視覚的に明確に区別できるので、編地の編方向を判別することも可能となる。この場合、不使用領域である耳部Ａ，Ｂに、耳部弾性糸６０による編成組織によって、編地の編方向を判別するための情報表示部が形成されていることになる。

このようにジャカード編成組織以外の編成組織であっても、不使用領域に様々な情報を書き込むことは可能である。

[0053] 本発明の編地は、例えば、各種衣料品の素材となる編地製品を工業的に生産するために有効に利用される。編成後の編地の取り扱いに有用な各種の情報を、確実かつ正確で経済的に表示されたものとなり、衣料品などの生産性、品質の向上および生産コストの低減に大きく貢献することができる。

[0055]
１０　経編地
１１　耳部
１２　編地単位
１３　分離線部
１４　単位境界線
１５　製品片裁断線
２０　製品片
３１　工場情報部
３２　方向情報部
３３　姿勢情報部

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３４　　裁断情報部

４２　　組織情報部

５１　　編地単位の識別情報部

５２　　製品片の識別情報部

６０　　耳部弾性糸

Ａ　　左側耳部

Ｂ　　右側耳部

Ｃ　　耳部以外の領域

【請求項 1】

編地のうち、最終製品に利用されない不使用領域に、編成組織による情報表示部を備える、

編地。

【請求項 2】

前記情報表示部となる編成組織がジャカード編成組織である、請求項１に記載の編地。

【請求項 3】

前記情報表示部が、製造情報、取扱情報、識別情報、検査情報からなる群から選ばれる情報を含む、請求項１または２に記載の編地。

【請求項 4】

前記情報表示部が、前記検査情報として、前記編地を構成する編成組織の状態を示す組織情報部を含む、請求項３に記載の編地。

【請求項 5】

前記情報表示部が、文字、記号、図象からなる群から選ばれるジャカード柄模様からなる、請求項２から４までのいずれかに記載の編地。

【請求項 6】

請求項２から５までのいずれかに記載の編地を製造する方法であって、

前記ジャカード編成組織を含む編地を編成する際に、

前記不使用領域において、前記ジャカード編成組織の変化組織によって前記情報表示部を形成する、

編地の製造方法。

【請求項 7】

前記ジャカード編成組織の変化組織が、薄地柄組織、厚地柄組織、メッシュ組織、鎖編組織からなる群から選ばれる、請求項６に記載の編地の製造方法。

(57)【要約】

【課題】　編地の取り扱いに必要とされる各種の情報を、正確で見易い情報を余計な手間をかけることなく編地に

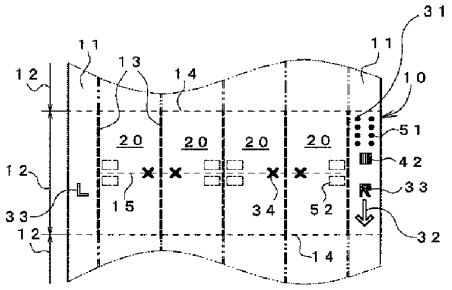
13-11

付与する。

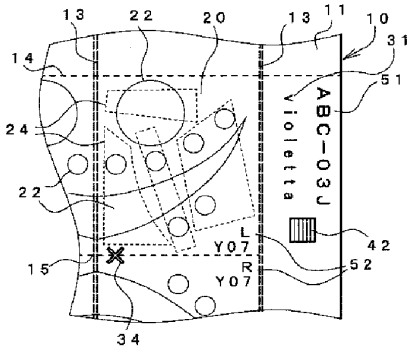
【解決手段】　編地１０のうち、最終製品に利用されない不使用領域に、編成組織による情報表示部３１～５２を備える。情報表示部３１～５２は、ジャカード編成組織の変化組織である薄地柄組織、厚地柄組織、メッシュ組織、鎖編組織などによる、文字、記号、図象からなる群から選ばれるジャカード柄模様で形成でき、製造情報、取扱情報、識別情報、検査情報などを含むことができる。

【選択図】図１

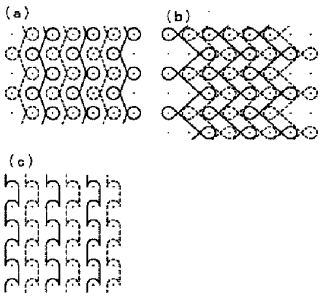
【圖 1】



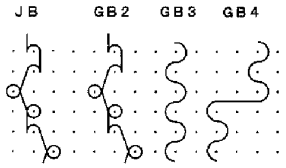
【圖 2】



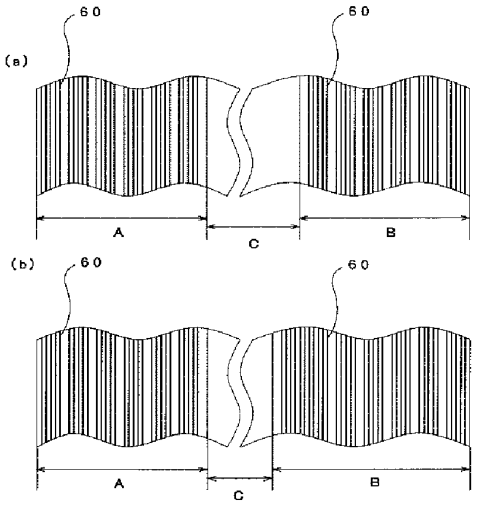
【圖 3】



【圖 4】



【圖 5】



Espacenet

Bibliographic data: JP2012512698 (A) — 2012-06-07

Article Of Footwear Having An Upper Incorporating A Knitted Component

Inventor(s):

Applicant(s):

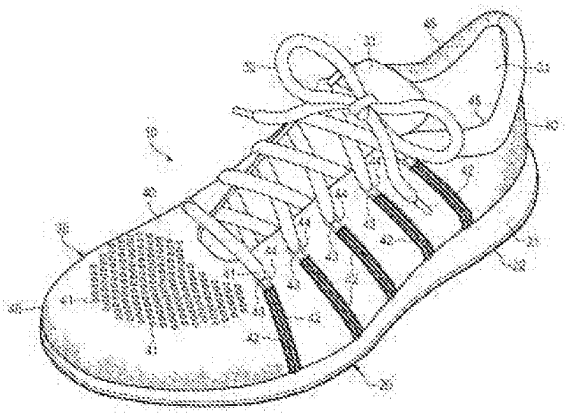
Classification: - international: *A43B23/02*
- cooperative: **A43B1/04**; **A43B23/0205**; **A43B23/0215**; **A43B23/0245**; **A43B7/20**; **A43C1/04**; **D04B1/106**; **D04B1/123**; **D04B1/16**; D10B2403/0113; D10B2403/022; D10B2501/043

Application number: JP20110542154 20090914

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Abstract not available for JP2012512698 (A)
Abstract of corresponding document: US2010154256 (A1)



An article of footwear has an upper that includes a knitted component and a sole structure secured to the upper. The knitted component may define a tube formed of unitary knit construction, and a strand may extend through a length of the tube. As another example, the knitted component may have a pair of at least partially coextensive knitted layers formed of unitary knit construction, and a plurality of floating yarns may extend between the knitted layers. In some configurations, the knit type or yarn type may vary in different regions of the knitted component to impart different properties. Additionally, the knitted component may incorporate a thermoplastic yarn that is fused in different regions of the knitted component to impart different properties. A flat knitting process or a variety of other knitting processes may be utilized to form the knitted component.

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審査請求 有　予備審査請求 未請求　（全 30 頁）

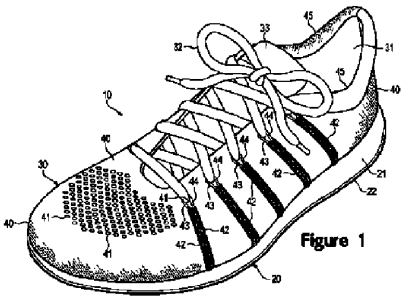
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最終頁に続く

(54)【発明の名称】ニット構成要素を組み込んだアッパーを有する履物製品

(57)【要約】
【課題】アッパーに使用する要素および材料の数を減少させることにより、製造効率およびリサイクルの可能性を高めつつ、廃棄物を減少させられる履物製品を提供する。
【解決手段】履物製品10は、ニット構成要素を含むアッパー30と、アッパーに固定されたソール構造20とを有している。ニット構成要素は、一体のニット構成で形成されたチューブ42を区画していてもよく、ストランド43が、チューブの長さを通って延びていてもよい。別の例として、ニット構成要素は、一体のニット構成で形成された、少なくとも一部が同一の広がりを持つ1対のニット層を有していてもよく、複数のフローティングヤーンが、ニット層の間を延びていてもよい。いくつかの構成では、ニットの種類およびヤーンの種類が、ニット構成要素の異なる領域で変化して、異なる特性を付与していてもよい。
【選択図】図1


Figure 1

【特許請求の範囲】
【請求項１】
アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、
一体のニット構成で形成されたチューブ状の構造を形成するニット構成要素と、
一次元の材料の構成を有し、前記チューブの長手方向の少なくとも一部を通って延びるヤーンとを有する、履物製品。
【請求項２】
前記ニット構成要素が、前記アッパーの外側側部に沿い、前記アッパーの内側側部に沿い、前記アッパーの足先領域にわたり、そして前記アッパーのかかと領域の周りに延びている、請求項1に記載の履物製品。
【請求項３】
前記チューブ状の構造が、前記アッパーの前記外側側部に配置され、前記ソール構造に近接した区域から上方に延びるように方向付けられており、前記ヤーンが、前記チューブ状の構造の端から外側に向かって延びて、ひもを受け入れるループを形成している、請求項2に記載の履物製品。
【請求項４】
前記チューブ状の構造が、前記かかと領域に配置され、前記アッパーの足首開口部の少なくとも一部の周りに配置されており、前記ヤーンおよび複数の追加のヤーンが、前記チューブ状の構造内に配置されている、請求項2に記載の履物製品。
【請求項５】
アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、
前記アッパーの外面の少なくとも一部を形成する第1ニット層と、
前記第1ニット層と一体のニット構成で形成された第2ニット層であって、前記第1ニット層に隣接して配置され、少なくとも一部が前記第1ニット層と同一の広がりを持っていて、前記第1ニット層と当該第2ニット層との間にチューブを区画する第2ニット層と、
一次元の材料の構成を有し、前記チューブを通って前記第1ニット層と前記第2ニット層との間を延びるストランドとを備えた、履物製品。
【請求項６】
前記第1ニット層が、前記アッパーの外側側部に沿い、前記アッパーの内側側部に沿い、前記アッパーの足先領域にわたり、そして前記アッパーのかかと領域の周りに延びている、請求項5に記載の履物製品。
【請求項７】
前記チューブが、前記ソール構造に近接した区域から上方に延びるように方向付けられており、前記ストランドの一部が、前記チューブの端から外側に向かって延びて、ひもを受け入れるループを形成している、請求項5に記載の履物製品。
【請求項８】
前記第1ニット層が、前記チューブの前記端に隣接した開口部を区画しており、前記ひもが、前記開口部を通って延びている、請求項7に記載の履物製品。
【請求項９】
前記ストランドが、前記第1ニット層および前記第2ニット層により形成された別のチューブ内へと延びている、請求項7に記載の履物製品。
【請求項１０】
アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、
それぞれが一体のニット構成で形成された第1チューブおよび第2チューブを区画するニット構成要素であって、前記第1チューブおよび前記第2チューブが、前記ソール構造に近接した区域から上方に延びており、前記第1チューブおよび前記第2チューブの端が、前記アッパーの上側の区域に配置されているニット構成要素と、

前記第1チューブおよび前記第2チューブを通って延びるストランドであって、当該ストランドの一部は、前記第1チューブおよび前記第2チューブの前記端から外側に向かって延びて、ループを形成しているストランドと、
前記ループを通って延びるひもとを備えた、履物製品。
【請求項１１】
前記第1チューブおよび前記第2チューブが、互いに隣接しており平行である、請求項10に記載の履物製品。
【請求項１２】
前記ニット構成要素が、前記第1チューブおよび前記第2チューブの前記端に隣接した開口部を区画しており、前記ひもが、前記開口部を通って延びている、請求項10に記載の履物製品。
【請求項１３】
前記ニット構成要素が、
一体のニット構成で形成された、少なくとも一部が同一の広がりを持つ1対のニット層と、
前記ニット層の間を延びる複数のフローティングヤーンとを含む、請求項10に記載の履物製品。
【請求項１４】
前記ニット層および前記フローティングヤーンが、前記アッパーの足首開口部に隣接して配置されている、請求項13に記載の履物製品。
【請求項１５】
アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、
一体のニット構成で形成された複数のチューブを区画するニット構成要素であって、前記チューブの第1部分が、当該履物の外側側部に配置され、前記チューブの第2部分が、当該履物の内側側部に配置されているニット構成要素と、
前記チューブを通って延び、前記チューブの端から外側に延びて複数のループを形成し、一次元の材料の構成を有するストランドと、
前記ループを通って延びるひもとを備えた、履物製品。
【請求項１６】
前記ニット構成要素が、前記チューブの前記端に隣接した開口部を区画しており、前記ひもが、前記開口部を通って延びている、請求項15に記載の履物製品。
【請求項１７】
前記チューブの少なくとも2つが、互いに隣接しており平行である、請求項15に記載の履物製品。
【請求項１８】
前記ニット構成要素が、前記アッパーの外面の大部分を形成している、請求項15に記載の履物製品。
【請求項１９】
前記ニット構成要素が、
一体のニット構成で形成された、少なくとも一部が同一の広がりを持つ1対のニット層と、
前記ニット層の間に配置され、前記ニット層に実質的に平行な方向に延びる複数のフローティングヤーンとを含み、
前記ニット層および前記フローティングヤーンが、前記アッパーの足首開口部に隣接して配置されている、請求項15に記載の履物製品。
【請求項２０】
前記ニット構成要素の第1区域が第1のタイプのニットを有し、前記ニット構成要素の第2区域が第2のタイプのニットを有し、前記第1のタイプのニットが前記第2のタイプのニットと異なっている、請求項15に記載の履物製品。

【請求項２１】
前記ニット構成要素の第1区域が第1のタイプのヤーンを有し、前記ニット構成要素の第2区域が第2のタイプのヤーンを有し、前記第1のタイプのヤーンが前記第2のタイプのヤーンと異なっている、請求項15に記載の履物製品。
【請求項２２】
締めひもシステムを含むアッパーを有する履物製品であって、前記締めひもシステムが、
（a）一体のニット構成で形成されたチューブ、および、（b）前記チューブの端に隣接して配置された開口部を区画するニット構成要素と、
前記チューブを通って延び、ループを形成するストランドと、
前記ループおよび前記開口部を通って延びるひもとを備えた、履物製品。
【請求項２３】
アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、
少なくとも一部が互いに同一の広がりを持ち、一体のニット構成で形成された第1ニット層および第2ニット層と、
前記第1ニット層と前記第2ニット層との間に配置され、前記第1ニット層および前記第2ニット層に実質的に平行な方向に延びた複数のフローティングヤーンとを含む、ニット構成要素を備えた、履物製品。
【請求項２４】
前記アッパーが、足を受け入れるための内部の空洞と、前記空洞にアクセスするための足首開口部とを区画しており、前記第1ニット層、前記第2ニット層、前記フローティングヤーンが、前記足首開口部に隣接して配置されている、請求項23に記載の履物製品。
【請求項２５】
前記第1ニット層、前記第2ニット層および前記フローティングヤーンが、前記アッパーの内側側部および前記アッパーの外側側部に配置されている、請求項24に記載の履物製品。
【請求項２６】
前記ニット構成要素が、一体のニット構成で形成されたチューブを区画し、ストランドが、前記チューブをその長手方向に通って延びている、請求項23に記載の履物製品。
【請求項２７】
前記ニット構成要素の第1区域が第1のタイプのニットを有し、前記ニット構成要素の第2区域が第2のタイプのニットを有し、前記第1のタイプのニットが前記第2のタイプのニットと異なっている、請求項23に記載の履物製品。
【請求項２８】
前記ニット構成要素の第1区域が第1のタイプのヤーンを有し、前記ニット構成要素の第2区域が第2のタイプのヤーンを有し、前記第1のタイプのヤーンが前記第2のタイプのヤーンと異なっている、請求項23に記載の履物製品。
【請求項２９】
アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、
一体のニット構成で形成された第1ニット層および第2ニット層であって、当該第1ニット層の少なくとも一部が、当該第2ニット層と同一の広がりを持っていて、当該第1ニット層と当該第2ニット層との間に内部の空間を区画している、第1ニット層および第2ニット層と、
前記内部の空間内に配置され、前記第1ニット層と前記第2ニット層との間を延びる複数のフローティングヤーンとを含む、ニット構成要素を備えた、履物製品。
【請求項３０】
前記アッパーが、足を受け入れるための内部の空洞と、前記空洞にアクセスするための足首開口部とを区画しており、前記第1ニット層、前記第2ニット層および前記フローティ

ングヤーンが、前記足首開口部に隣接して配置されている、請求項29に記載の履物製品。
【請求項３１】
前記第1ニット層、前記第2ニット層および前記フローティングヤーンが、前記アッパーの内側側部および前記アッパーの外側側部に配置され、前記アッパーのかかと領域の周りに延びている、請求項30に記載の履物製品。
【請求項３２】
アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、着用者の足を受け入れるための内部の空洞を区画しており、前記アッパーが、前記空洞にアクセスするための足首開口部を有しており、前記アッパーが、
前記足首開口部に隣接し、前記アッパーの外面の少なくとも一部を形成する第1ニット層と、
前記足首開口部に隣接し、前記アッパーの内面の少なくとも一部を形成する第2ニット層と、
前記第1ニット層と前記第2ニット層との間に配置された複数のフローティングヤーンとを含む、ニット構成要素を備え、
前記第1ニット層および前記第2ニット層が、前記足首開口部および前記足首開口部から間隔を空けた箇所で、互いに接合されて、その間に分離された区域を区画しており、前記フローティングヤーンが、前記分離された区域に配置されている、履物製品。
【請求項３３】
前記ニット構成要素が、前記アッパーの外側側部に沿い、前記アッパーの内側側部に沿い、前記アッパーの足先領域にわたり、そして前記アッパーのかかと領域の周りに延びている、請求項32に記載の履物製品。
【請求項３４】
前記フローティングヤーンが、前記第1ニット層および前記第2ニット層に実質的に平行である、請求項32に記載の履物製品。
【請求項３５】
前記ニット構成要素の一部が、一体のニット構成で形成されたチューブを区画する当該履物の中足領域に配置されており、ストランドが、前記チューブをその長手方向に通って延びている、請求項32に記載の履物製品。
【請求項３６】
履物製品を製造する方法であって
平編み処理を使用して、熱可塑性ポリマー材料を組み込んだ少なくとも1本のヤーンを含むニット構成要素を形成するステップと、
前記ニット構成要素の少なくとも一区域を加熱して、前記熱可塑性ポリマー材料を組み込んだ前記ヤーンを溶融させるステップと、
前記ニット構成要素を、前記履物製品のアッパーに組み込むステップとを含む、履物製品を製造する方法。
【請求項３７】
前記平編み処理を使用するステップが、前記熱可塑性ポリマー材料を組み込んだ前記ヤーンを、前記ニット構成要素の全体にわたって配置するステップを含む、請求項36に記載の方法。
【請求項３８】
前記平編み処理を使用するステップが、前記熱可塑性ポリマー材料を組み込んだ前記ヤーンを、前記ニット構成要素の前記区域にのみ配置するステップを含む、請求項36に記載の方法。
【請求項３９】
前記組み込むステップが、前記ニット構成要素の前記区域を、前記履物のかかと領域に配置するステップを含む、請求項36に記載の方法。
【請求項４０】
前記組み込むステップが、前記ニット構成要素の前記区域を、前記履物の足先領域に配

置するステップを含む、請求項36に記載の方法。
【請求項４１】
履物製品を製造する方法であって
平編み処理を使用して、第1ニット層、第2ニット層、ならびに、前記第1ニット層および前記第2ニット層に固定され前記第1ニット層から前記第2ニット層へと延びる複数のヤーンを含むニット構成要素を形成するステップと、
前記ニット構成要素を、前記履物製品のアッパーに組み込むステップとを含む、履物製品を製造する方法。
【請求項４２】
単繊維のヤーンとなるように前記ヤーンを選択するステップをさらに含む、請求項41に記載の方法。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、ニット構成要素を組み込んだアッパーを有する履物製品に関する。
【背景技術】
【０００２】
従来の履物製品は一般に、アッパーおよびソール（履物の底）構造という2つの主要な要素を含んでいる。アッパーは、ソール構造に固定されて、足を快適にかつ安定して受け入れるために、履物の内部に空洞を形成する。ソール構造は、アッパーと地面との間に位置するように、アッパーの下面に固定される。例えば運動用の履物製品のいくつかでは、ソール構造はミッドソールおよびアウトソールを含んでいてもよい。ミッドソールは、地面の反力を弱めて、歩くこと、走ることおよび他の歩行活動中に足および脚にかかる応力を低減するポリマー発泡材料で形成されていてもよい。アウトソール、はミッドソールの下面に固定されて、耐久性のある耐摩耗性の材料で形成されたソール構造の地面係止部を形成する。ソール構造は、履物の快適さを高めるために、空洞内に配置され足の下面に近接する中敷きをも含んでいてもよい。
【０００３】
アッパーは大略的に、足の甲および指（つま先）領域にわたり、足の内側側部（正中線側の部分）および外側側部（正中線と反対側の部分）に沿って、足のかかと区域の周りに延びている。バスケットボール用履物およびブーツなどのいくつかの履物製品では、アッパーは上方へと、足首の周りに延びて、足首に支持または保護を与えてもよい。アッパーの内部の空洞へのアクセスは一般に、履物のかかと領域にある足首開口部により行われる。アッパーの履き心地を調節するために、しばしば締めひもシステムが組み込まれ、それにより、アッパー内の空洞に足を入れること、および空洞から足を抜くことが可能となる。締めひもシステムにより、着用者がアッパーの特定の寸法（特に周長）を調節して、さまざまな寸法の足を収容できるようにすることもできる。くわえて、アッパーは、締めひもシステムの下方に延びて履物の調節可能性を高めるベロ（舌）を含んでいてもよく、アッパーは、かかとの動きを規制するために、ヒールカウンタを組み込んでいてもよい。
【０００４】
さまざまな材料が従来より、アッパーを製造する際に使用されている。例えば運動用の履物のアッパーは、複数の材料要素で形成されていてもよい。耐伸張性、耐摩耗性、柔軟性、通気性、圧縮性および速乾性などを含むさまざまな特性に基づいて、材料を選択してもよい。アッパーの外側について、比較的程度の高い耐摩耗性を付与するために、足指区域およびかかと区域を、皮革、合成皮革またはゴム材料で形成してもよい。皮革、合成皮革またはゴム材料は、外側の他のさまざまな区域について、望ましい程度の柔軟性および通気性を示さない場合がある。したがって、外側の他の区域を、例えば合成繊維で形成してもよい。ゆえに、アッパーの外側は、それぞれがアッパーに異なる特性を付与する多数の材料要素で形成されていてもよい。アッパーの中間層または中央層を、クッションになり快適性を高める軽量のポリマー発泡材料で形成してもよい。同様に、アッパーの内側を

、足を直接に包囲する区域からの汗を除去する快適で速乾性の織物で形成してもよい。さまざまな材料要素および他の構成要素を、接着剤または縫製により接合してもよい。

【先行技術文献】

【特許文献】

【０００５】

【特許文献１】米国特許第6,931,762号明細書

【特許文献２】米国特許第7,347,011号明細書

【特許文献３】米国特許出願公開第2008/0110048号明細書

【特許文献４】米国特許第6,910,288号明細書

【発明の概要】

【発明が解決しようとする課題】

【０００６】

したがって、従来のアッパーは、それぞれが履物のさまざまな区域に異なる特性を付与するさまざまな材料要素で形成されている。

【課題を解決するための手段】

【０００７】

平編み処理または他のさまざまな編み処理を、履物製品のアッパー用のニット構成要素を形成するために使用してもよい。さまざまな特徴をニット構成要素に与えてもよい。例えば、ニット構成要素は、一体のニット構成で形成されたチューブを区画していてもよく、ストランド（撚り糸）がチューブをその長手方法に通って延びていてもよい。別の例として、ニット構成要素は、一体のニット構成で形成された少なくとも一部が同じ広がりを持つ一対のニット層を有していてもよく、複数のフローティングヤーン（定着していない糸）がニット層とニット層との間に延びていてもよい。いくつかの構成では、編みの種類またはヤーンの種類は、異なる特性を付与するために、ニット構成要素の異なる領域で変化してもよい。くわえて、ニット構成要素は、異なる特性を付与するために、ニット構成要素の異なる領域で溶融された熱可塑性のヤーンを組み込んでいてもよい。

【図面の簡単な説明】

【０００８】

【図１】履物製品の斜視図である。

【図２】履物製品の外側側部の立面図である。

【図３】履物製品の内側側部の立面図である。

【図４】履物製品の平面図である。

【図５Ａ】図2の5A－5A切断線による、履物製品の断面図である。

【図５Ｂ】図2の5B－5B切断線による、履物製品の断面図である。

【図５Ｃ】図2の5C－5C切断線による、履物製品の断面図である。

【図５Ｄ】図2の5D－5D切断線による、履物製品の断面図である。

【図６】履物製品のアッパーの一部を形成するニット構成要素の平面図である。

【図７Ａ】図2に対応する側方立面図であり、履物製品のさらなる構成を示している。

【図７Ｂ】図2に対応する側方立面図であり、履物製品のさらなる構成を示している。

【図７Ｃ】図2に対応する側方立面図であり、履物製品のさらなる構成を示している。

【図７Ｄ】図2に対応する側方立面図であり、履物製品のさらなる構成を示している。

【図７Ｅ】図2に対応する側方立面図であり、履物製品のさらなる構成を示している。

【図７Ｆ】図2に対応する側方立面図であり、履物製品のさらなる構成を示している。

【図７Ｇ】図2に対応する側方立面図であり、履物製品のさらなる構成を示している。

【図８Ａ】図5Dに対応する断面図であり、履物製品のさらなる構成を示している。

【図８Ｂ】図5Dに対応する断面図であり、履物製品のさらなる構成を示している。

【発明を実施するための形態】

【０００９】

本発明の新規で特徴的な局面の長所および特徴は、添付の特許請求の範囲で特に指摘されている。しかし、発明の長所および特徴のよりよい理解を得るには、本発明に関するさ

まざまな構成および概念を説明および図示した以下の説明事項および添付図面を参照することができる。

上記概要および以下の詳細な説明は、添付図面とともに読むときに、よりよく理解されるであろう。

【００１０】

以下の説明および添付図面は、ニット構成要素を含むアッパーを有する履物製品を開示している。履物製品は、歩くことまたは走ることに適した一般的な構成を有するものとして開示されている。アッパーを含む、履物と関連する概念も、野球靴、バスケットボールシューズ、クロストレーニングシューズ、サイクリングシューズ、フットボールシューズ、テニスシューズ、サッカーシューズ、ハイキング用ブーツなどを含む他の種類のさまざまな運動用の履物に適用されてもよい。この概念はまた、ドレスシューズ、ローファー、サンダルおよび作業用ブーツを含む、一般に非運動用とみなされている種類の履物に適用されてもよい。ゆえに、本明細書に開示する概念は、幅広い範囲の種類の履物に当てはまる。

全体的な履物構成

履物製品10が図1～図5Dに示されており、ソール（履物の底）構造20およびアッパー30を含んでいる。参照の目的で、履物10は、3つの一般的な領域に分けられてもよい。それは、図2および図3に示すように、足先領域11、中足領域12およびかかと領域13である。履物10は、外側側部（体の正中線側に対応する部分）14および内側側部（体の正中線と反対側に対応する部分）15をも含んでいる。足先領域11は一般に、足指、および、中足骨と指骨とを接続する関節に対応する履物10の部分を含んでいる。中足領域12は一般に、足のアーチ区域に対応する履物10の部分を含み、かかと領域13は、踵骨を含む足の後部に対応している。外側側部14および内側側部15は、各領域11～13を通って延びており、履物10の両側に対応する。領域11～13および側部14、15は、履物10の厳密な区域を区別することを意図していない。むしろ、領域11～13および側部14、15は、以下の説明の助けとして、履物10の一般的な区域を示すことを意図している。履物10に加えて、領域11～13および側部14、15はまた、ソール構造20、アッパー30、および、それらの個々の要素に適用されてもよい。

【００１１】

ソール構造20は、アッパー30に固定されていて、履物10を履いたときに、足と地面との間で延びる。ソール構造20の主要な要素は、ミッドソール21、アウトソール22および中敷き23である。ミッドソール21は、アッパー30の下面に固定されていて、歩いていて、走っていて、または他の歩行活動をしていて、足と地面との間で圧縮されたときに、地面の反力を緩和する（減衰させる、すなわち、クッションとなる）圧縮可能なポリマー発泡要素（例えば、ポリウレタンまたはエチルビニルアセテート発泡体）で形成されていてもよい。さらなる構成では、地面の反力を緩和する特性を補足する、流体を充填したブラダ（袋）を、ミッドソール21は組み込んでいてもよく、または、ミッドソール21は、流体を充填したブラダで主に形成されていてもよい。アウトソール22は、ミッドソール21の下面に固定されていて、牽引力（トラクション）を与えるように織られた耐磨耗性のゴム材料で形成されていてもよい。中敷き23は、アッパー30内に配置されていて、足の下面の下を延びるよう配置されている。ソール構造20用のこの構成は、アッパー30に関連して使用されてもよいソール構造の一例を提供しているが、ソール構造20用の他の従来のまたは従来にないさまざまなものを使用してもよい。したがって、ソール構造20、または、アッパー30とともに使用されるソール構造の構造および特徴は、大きく変化してもよい。

【００１２】

アッパー30は、ソール構造20に対して足を受け入れ、かつ固定するための空洞を、履物10内に区画する。空洞は、足を収容する形状とされており、足の外側側部に沿い、足の内側側部に沿い、足の上方に、かかとを周りに、足の下方に延びている。少なくともかかと領域13に配置された足首開口部31により、空洞に到達（アクセス）することができる。ひも32が、以下に、より詳細に説明するように、アッパー30の一部を通って延びており、着

用者が、アッパー30の寸法を調節し、足を、大きさに合わせて収容できるようにする。より詳しくは、ひも32は、着用者が、足の周りにアッパー30を締め付けることができるようにし、ひも32は、着用者が、アッパー30を緩めて、空洞から（すなわち、足首開口部31を介して）の足の出し入れを容易にできるようにする。くわえて、アッパー30は、ひも32の下方を延びているベロ33を含んでいる。

【００１３】

アッパー30の大部分は、ニット構成要素40で形成されている。ニット構成要素40は例えば、平編み処理により製造されていてもよい。ニット構成要素40は、各領域11～13を通って、外側側部14および内側側部15の両方に沿い、足先領域11の上方に、そしてかかと領域13の周りに延びている。くわえて、ニット構成要素40は、アッパー30の内面および反対側の外面の両方を形成している。このように、ニット構成要素40は、アッパー30内の空洞の少なくとも一部を区画しており、ニット構成要素40は、空洞へ到達できるようにするための足首開口部31も区画している。いくつかの構成では、ニット構成要素40はまた、足の下方に延びていてもよい。しかし、さまざまな図では例示の目的で、シュトローベル式中敷き34が、ニット構成要素40に固定されており、アッパー30の足の下方に延びる部分の大部分を形成している。この構成では、中敷き23は、シュトローベル式中敷き34の上方に延びており、足が置かれる表面を形成している。

ニット構成要素の構成

ニット構成要素40は、アッパー30の別個の区画に異なる特性を付与するさまざまな種類のニット（編んだ生地）を組み込んでいる。図1、図4および図5Aに示された例では、ニット構成要素40は、足先領域11においてアッパー30を通って延びるさまざまな開口部41を形成しているが、一方で、アッパー30の他の多くの区域は、より連続した、または開口部がより少ない構成を有している。アッパー30内で空気が循環するよう、より大きな透過性を付与することに加えて、開口部41は、足先領域11でアッパー30の柔軟性および伸張の両方を増加させてもよい。さらなる例として、ニット構成要素40の特定の区域のために特別な種類のニットを選択することにより変化させてもよい他の特性には、液体に対する透過性、ニット構成要素40が伸張するまたは伸張に抵抗する方向、ニット構成要素40の剛性、およびニット構成要素40の圧縮性が含まれる。異なる特性を付与するための異なる種類のニットを備えた区域を有する履物アッパー用のニット構成要素の追加の例が、上記特許文献1（Dua）および上記特許文献2（Dua, et al.）に見られるであろう。これらは両方とも、引用により本明細書に全体が組み込まれている。関連した事項として、ニット構成要素40内のニットの密度は、例えば浸透性がより少ない部分または剛性がより高い部分を設けるために、アッパー30の別個の区域間で変化してもよい。したがって、ニット構成要素40は、区域について選択された特定の種類のニットに応じて、別個の区域でさまざまな特性を示してもよい。

【００１４】

ニット構成要素40は、アッパー30の別個の区域に異なる特性を付与するさまざまな種類のヤーン（糸）を組み込んでいてもよい。さらに、さまざまな種類のヤーンを、さまざまな種類の縫製（ステッチ）と組み合わせることにより、ニット構成要素40は、アッパー30の別個の区域に、ある範囲の異なる特性を付与してもよい。特定の種類のヤーンがニット構成要素40の一区域に付与することになる特性は、ヤーン内のさまざまなフィラメントおよびファイバを形成している材料に、部分的に依存している。例えば綿は、柔らかい、自然な美観を提供し、生分解性である。エラステインおよび伸張性ポリエステルはそれぞれ、十分な伸張および復元力を提供し、伸張性ポリエステルはリサイクル可能でもある。レーヨンは、光沢に優れ、吸湿性を有している。ウールも、絶縁性に加えて、高い吸湿性を有している。ナイロンは、高い伸張を有する、耐久性のある耐摩耗性材料である。ポリエステルは、疎水性の材料で、比較的高い耐久性をも示す。材料に加えて、ヤーンに関連する他の局面が、アッパー30の特性に影響する場合もある。例えば、ヤーンは、単繊維（モノフィラメント）ヤーンまたは多繊維（マルチフィラメント）ヤーンであってもよい。ヤーンはまた、それぞれが異なる材料で形成された別個のフィラメントを含んでいてもよい

。ヤーンはまた、２種以上の異なる材料でそれぞれが形成されたフィラメント（例えば、さや－核構成を有するフィラメントまたは半分ずつ異なる材料で形成されたフィラメントによる複合繊維ヤーン）を含んでいてもよい。撚りおよび嵩の程度を異ならせること、ならびに、デニールを異ならせることで、ヤーンが配置されたアッパー30の特性に影響を与えてもよい。したがって、ヤーンを形成する材料およびヤーンの他の性質の両方を、アッパー30の別個の区域にさまざまな特性を付与するために選択してもよい。

【００１５】

ニットの種類およびヤーンの種類に加えて、ニット構成要素40は、さまざまなニット構造を組み込んでいてもよい。例えば図2および図3を参照して、ニット構成要素40は、ストランド（撚り糸）43が配置されたさまざまなチューブ42を含んでいる。チューブ42は大略的に、図5Bおよび図5Cに示すように、ニット材料の、2つの、重なり合った、少なくとも一部が同一の広がりを持つ層により形成された空洞の構造である。チューブ42を形成するニット材料の一方の層の側部および縁部は、他の層に固定されていてもよいが、中央の区域は一般に、他の要素（例えば、ストランド43）が、ニット材料の2つの層の間に配置されて、チューブ42を貫通することができるように、固定されていない。重なり合った、または少なくとも一部が同一の広がりを持つ層を有する履物アッパー用のニット構成要素の追加の例が、上記特許文献3（Dua, et al.）に見られるであろう。これは、引用により本明細書に組み込まれている。

【００１６】

チューブ42は、外側側部14および内側側部15に沿って上方に延びている。各チューブ42は、少なくとも1つの他のチューブ42に隣接して、チューブ対を形成している。一般に、ストランド43の1つが、チューブ対の第1チューブ42を貫通して、第1チューブ42の上端から外部に向かって延び、アッパー30の外部にループ44を形成し、チューブ対の第2チューブ42の上端内へと延び、第2チューブ42を貫通している。すなわち、各ストランド43は、少なくとも2つのチューブ42を貫通しており、ストランド43の露出した部分はループ44を形成している。

【００１７】

個々のストランド43は、ストランド43が単独のループ44を形成するよう、2つの隣接したチューブ42（すなわち、単独のチューブ対）を貫通しているだけでもよい。この構成では、ストランド43の端部が、2つの隣接したチューブ42の下端から出ており、当該端部がチューブ42の1つを通って引っ張られるのを防ぐため、例えば、シュトローベル式中敷き34の下方でソール構造20に固定されていてもよい。別の構成では、個々のストランド43は、各チューブ42を貫通して、複数のチューブ対を貫通し複数のループ44を形成していてもよい。さらに別の構成では、1つのストランド43が、外側側部14に配置された各チューブ42を貫通し、別のストランド43が、内側側部15に配置された各チューブ42を貫通していてもよい。ゆえに、一般に、個々のストランド43は、少なくとも1つのチューブ対を貫通して少なくとも1つのループ44を形成しているが、複数のチューブ対を貫通して複数のループ44を形成していてもよい。

【００１８】

図1～図4を参照して、ひも32は、各ループ44を通って延びており、かつ、各ループ44に隣接したニット構成要素40に形成されたさまざまな開口部41を貫通してもいる。ひも32、ひも32が中を通って延びる開口部41、外側側部14および内側側部15の両方にあるさまざまなチューブ42、ストランド43ならびにループ44が組み合わされて、アッパー30用の効果的な締めひもシステムを提供する。ひも32が引っ張り変形させられた場合（すなわち、着用者がひも32を結んだ場合）、ストランド43にも引っ張り変形が起きる場合がある。ストランド43がなければ、ニット構成要素40の他の部分が、引っ張り変形および結果として生じる締められたひも32からの張力に耐えることになる。しかし、ストランド43があれば、引っ張り変形および張力に耐える別個の要素が提供される。さらに、ニット構成要素40の大部分は全体として、引っ張り変形されたときに伸張する種類のニットおよびヤーンを選択して形成することができ、それにより、アッパー30が足の輪郭に一致するようにできる。

しかし、ストランド43は一般に、アッパー30に比べて非伸張性であってもよい。

【００１９】

ストランド43は、さまざまな材料で形成されていてもよく、例えば、ロープ、スレッド、網、ケーブル、ヤーン、フィラメントまたは鎖の構成を有していてもよい。いくつかの構成では、ストランドは、ニット構成要素40を形成する編み処理中にチューブ42内に配置される。このように、ストランド43は、ニット構成要素40を形成する編み機または他の装置で使用することのできる大略的に一次元の材料で形成されていてもよい。本発明に関連して使用する際、「一次元の材料」またはその変形例は、幅および厚みよりも実質的に大きい長さを持つ大略的に長尺の（細長い）材料を包含することを意図している。したがって、ストランド43に適した材料は、レーヨン、ナイロン、ポリエステル、ポリアクリル、絹、綿、炭素、ガラス、アラミド（例えば、パラアラミドファイバおよびメタアラミドファイバ）超高分子量ポリエチレンならびに液晶ポリマーで形成されたさまざまなフィラメント、ファイバおよびヤーンを含んでいる。フィラメントおよびヤーンに加えて、他の一次元の材料をストランド43に使用してもよい。一次元の材料はしばしば、幅および厚みが実質的に等しい断面（例えば、円形または正方形の断面）を有するものであるが、一次元の材料の中には、厚みよりもやや大きい幅を有するもの（例えば、矩形、楕円、または他の長尺の断面）があってもよい。幅がより大きくても、材料の長さが、材料の幅および厚みよりも実質的に大きければ、材料は一次元であるとみなすことができる。

【００２０】

ニット構成要素40により形成される別の構造は、足首開口部31の少なくとも一部の周りに延びている当て物カラー45である。図1～図3を参照して、カラー45は、ニット構成要素40の他の多くの部分よりも大きな厚みを有している。一般に、カラー45は、図5Dに示すように、ニット材料の、重なり合った、少なくとも一部が同一の広がりを持つ、2つの層（すなわち、チューブ状の構造）と、これらの層の間に延びた複数のフローティングヤーン（定着されていない糸）46とにより形成されている。カラー45を形成するニット材料の一方の層の側部または縁部は、ニット材料の他方の層に固定されていてもよいが、中央の区域は一般に固定されていない。このように、ニット材料の層は、チューブ42に類似したチューブまたはチューブ状の構造を効果的に形成しており、フローティングヤーン46は、ニット材料の2つの層の間に配置されまたは埋め込まれて、チューブを貫通していてもよい。すなわち、フローティングヤーン46は、ニット材料の層の間を延びており、ニット材料の表面に大略的に平行であり、また、層の間の内部空間を貫通および充填している。ニット構成要素40の大部分が、ニット構成要素を形成するよう機械的に操作されたヤーンで形成されているのに対し、フローティングヤーン46は一般に、拘束されておらず、またはカラー45の外部を形成するニット材料の層の間の内部空間内に他の仕方で埋め込まれている。

【００２１】

チューブ42が単独のストランド43を含んでいるのに対し、カラー45は、ニット材料の層の間の区域を通って延びる複数のフローティングヤーン46を含んでいる。したがって、ニット構成要素40は、チューブ状の構造内に1本または複数のヤーンを有する大略的にチューブ状の構造を形成していてもよい。さらに、フローティングヤーン46は、さまざまな材料で形成されていてもよく、ニット構成要素40を形成する編み処理中に、カラー45内に配置されてもよい。このように、フローティングヤーン46は、ニット構成要素40を形成する編み機または他の装置で使用することのできる大略的に一次元の材料で形成されていてもよい。

【００２２】

フローティングヤーン46があることで、カラー45に圧縮可能な性質が付与され、足首開口部31の区域での履物製品10の快適性が高められる。従来の履物製品の多くは、ポリマー発泡要素または他の圧縮可能な材料をカラー区域に組み込んでいる。従来の履物製品と異なり、カラー45は、フローティングヤーン46を使用して、圧縮可能な構造を提供している。

【００２３】
チューブ42とストランド43との組み合わせにより、例えば、締めひもシステムでの伸張に抵抗する構造的な要素がアッパー30に設けられる。同様に、カラー45とフローティングヤーン46との組み合わせにより、例えば、圧縮されて足首開口部31の周りに、より大きな快適性を付与する構造的な要素がアッパー30に設けられる。これらのニット構造は、アッパー30に異なる長所を与えるものの、（ａ）一体のニット構成で形成されたニット材料の、2つの、重なり合った、少なくとも一部が同一の広がりを持つ層で形成されたチューブ構造と、（ｂ）チューブ状の構造内に埋め込まれ、または他の仕方で配置され、チューブ状の構造の長さの少なくとも一部を通って延びる少なくとも1本のヤーン、ストランドまたは他の一次元の材料とを、それぞれが含んでいるという点で、これらのニット構造は類似している。

平編み処理

ニット構成要素40を製造するために、平編み処理を使用してもよい。平編みは、周期的に折り返されたニット材料を製造するための方法である（すなわち、材料は、両方の側から交互に編まれている）。材料の2つの側（または、面と呼ぶ）は従来から、表（おもて）側（すなわち、外側の、観察者に面する側）および裏側（すなわち、内側の、観察者から反対の側）と呼ばれている。平編みは、ニット構成要素40を形成するための適切なやり方を提供するが、ニット構成要素40に与えられる特徴により、他の編み処理を使用してもよい。使用してもよい他の編み処理の例には、太筒の丸編み、細筒の丸編みジャカード、縦編みの丸編みジャカード、二重編みの丸編みジャカード、縦編みのトリコット、縦編みのラッシェルおよび二重針棒のラッシェルが含まれる。

【００２４】
ニット構成要素40を製造するために平編み処理を使用することの利点は、上記特徴のそれぞれを、平編み処理によりニット構成要素40に付与することができることにある。すなわち、平編み処理により、例えば、（ａ）アッパー30の別個の区域に異なる特性を付与するさまざまな種類のニット、（ｂ）アッパー30の別個の区域に異なる特性を付与するさまざまな種類のヤーン、（ｃ）チューブ42の重なり合ったニット層の構成を有するニット構成要素、（ｄ）チューブ42に埋め込まれたストランド43などの材料、（ｅ）カラー45の重なり合ったニット層の構成を有するニット構成要素、（ｆ）カラー45のニット材料の層の間のフローティングヤーンを有するように、ニット構成要素40を形成することができる。さらに、他の特徴とともに、これらの特徴のそれぞれを、単独の平編み処理によりニット構成要素40に与えてもよい。このように、履物10にとって有利なさまざまな特性および構造的な特徴を有するようアッパー30を実質的に形成するために、平編み処理を使用してもよい。

【００２５】
ニット構成要素40を形成するために、1つ以上のヤーンを、個人が機械的に操作してもよい（すなわち、ニット構成要素40を手で形成してもよい）が、平編み機により、比較的たくさんのニット構成要素40を形成する効率的なやり方を提供してもよい。平編み機はまた、足の長さおよび幅の一方または両方に基づく異なる寸法を有する履物に適したアッパー30を形成するため、ニット構成要素40の寸法を変更するために使用してもよい。くわえて、平編み機は、左足および右足の両方に適したアッパー30を形成するため、ニット構成要素40の構造を変更するために使用してもよい。また、個人に合った履き心地を提供するために、ニット構成要素40のさまざまな性質を変更してもよい。したがって、機械式の平編み機を使用することにより、異なる寸法および構成を有する複数のニット構成要素40を形成する有効なやり方を提供してもよい。

【００２６】
ニット構成要素40は、一体のニット構成で形成されたさまざまな特徴および構造を組み込んでいる。一般に、これらの特徴および構造は、平編み処理のあとで行われる他の処理（たとえば、縫製、結合、成形）によってではなく、平編み処理によってニット構成要素40に組み込まれるときに、一体のニット構成で形成される。例として、チューブ42とカラ

ー45の部分とは、ニット材料の、重なり合った、少なくとも一部が同一の広がりを持つ層で形成されており、一方の層の側部または縁部は、他方の層に固定されていてもよい。ニット材料の2つの層は全体として、平編み処理中に形成され、補完的な縫製、結合または成形処理を含まない。ゆえに、重なり合った層は、平編み処理により、一体のニット構成で形成されている。別の例では、開口部41を区画する種類のニットで形成されたニット構成要素40の領域が、平編み処理により、一体のニット構成で形成されている。さらに別の例では、フローティングヤーン46が、一体のニット構成で形成されている。

【００２７】

平編み処理を使用してニット構成要素40を形成することのさらなる利点は、アッパー30に三次元的な性質を組み込むことができることにある。足の周りに延びて足の形に適合する、湾曲した構造、または他の三次元の構造を、アッパー30は有している。足の形を補完するために、平編み処理により、例えば、いくらか湾曲した、ニット構成要素40の区域を形成してもよい。三次元の性質を有する履物アッパー用のニット構成要素の例が、上記特許文献3（Dua, et al.）に見られるであろう。これは、引用により本明細書に組み込まれている。

【００２８】

図6において、ニット構成要素40は、履物10から分離して示されており、平編み処理が施されている。多くの織物材料の縁部は、織物材料を形成するヤーンの端が露出するように切断されているが、ニット構成要素40は、仕上げの済んだ構成を有するよう形成されていてもよい。すなわち、平編みまたは他の編み技術を使用して、ニット構成要素40内のヤーンの端が、ニット構成要素40の縁部に実質的に存在しないよう、ニット構成要素40を形成してもよい。平編みにより形成された、仕上げの済んだ構成の利点は、ニット構成要素40の縁部を形成するヤーンが、よりほどけにくいことにある。これは、横編みニット材料に固有の性質である。仕上げの済んだ縁部を形成することにより、ニット構成要素40の一体性が強化され、ほどけることを防ぐために必要な後処理工程が少なくなるか、または、なくなる。くわえて、緩い（固定されていない）ヤーンはまた、アッパー30の美観を損なうことが、より少ない。すなわち、ニット構成要素40の仕上げの済んだ構成により、製造効率を高めつつ、アッパー20の耐久性および美的品質を向上させてもよい。

【００２９】

ニット構成要素40により、履物10のアッパー30に適した構成の一例が提供される。履物製品の使用目的、履物製品の所望の特性および履物製品の有利な構造的属性などに依存して、ニット構成要素40に類似したニット構成要素を、平編みにより形成し、所望の特徴を持たせてもよい。すなわち、（a）ニット構成要素の所望の区域に、特定の種類のニットを配置するため、（b）ニット構成要素の所望の区域に、特定の種類のヤーンを配置するため、（c）ニット構成要素の所望の区域に、チューブ42およびカラー45に類似する重なり合ったニット層を形成するため、（d）ニット層の間に、ストランド43およびフローティングヤーン46に類似するストランドまたはフローティングヤーンを配置するため、（e）ニット構成要素に三次元的な性質を形成するため、ならびに、（f）仕上げの済んだ縁部を付与するために、平編みを使用してもよい。より詳しくは、例えば上記特徴のいずれかを、ニット構成要素内で併用および調和させて、履物アッパー用の特別な特性または構造的属性を形成してもよい。

さらなる構成

上述したアッパー30の特徴により、履物10用のふさわしい構成の一例が提供される。また、さまざまな他の構成を使用してもよい。例として、上記特徴のいくつかは、履物10のいくつかの構成において、ニット構成要素40に存在しなくてもよい。図7Aを参照して、カラー45は、ニット構成要素40に存在せず、ニット材料の単独の層が、足首開口部31の周りに延びる区域を形成している。同様に、チューブ42およびストランド43は、図7Bに存在しない。例えば特定の運動に有効な構造または特徴のみを使用することにより、履物10に、必要なまたは有利な要素のみを有する最小の構成を持たせてもよい。

【００３０】

上述したように、アッパー30の別個の区域は、それらの区域で異なる種類のニットまたはヤーンを使用することにより、異なる特性を有していてもよい。特定の区域の特性を修正する別のやり方は、これらの区域のヤーンの熱可塑性材料を溶融することに関連する。すなわち、特定の区域を、熱可塑性ポリマー材料を組み込んだヤーンで形成してもよい。熱可塑性ポリマー材料を加熱することにより、隣接するヤーン、フィラメントまたはファイバが、これらの区域で互いに溶融（溶結）してニットループを互いに固定し、それにより剛性または耐磨耗性を向上してもよい。いくつかの構成では、ニット構成要素40の個々の層（例えば、チューブ42もしくはカラー45の外層もしくは内層）またはニット構成要素40内に埋め込まれたヤーン（すなわち、ストランド43もしくはフローティングヤーン46）を、熱可塑性ポリマー材料を組み込んだヤーンで形成してもよい。また、代わりに、ニット構成要素40全体を、熱可塑性ポリマー材料を組み込んだヤーンで形成してもよく、溶融された区域47に対応する部分のみを加熱して特性を修正してもよい。図7Cを参照して、ニット構成要素40は、2つの溶融された区域47を含んでいる。溶融された区域47の一方は、かかと領域13にあり、履物10にヒールカウンタを効果的に提供するために、より大きな剛性を付与してもよい。溶融された領域を有する履物アッパーの例が、上記特許文献4（Dua）に見られるであろう。これは、引用により本明細書に組み込まれている。別の溶融された区域47が足先領域11にあり、足先区域に、より大きな耐摩耗性を付与していてもよい。溶融はまた、開口部41を補強するため、柔軟性の低い区域を設けるため、または、透過性を減少するために使用されてもよい。

【００３１】

ニット構成要素40の区域を溶融することで、これらの区域に、より大きな剛性および耐摩耗性を付与することができる一方で、別の方法により、特定の区域のニット密度を増加させてもよい。図7Dを参照して、ニット構成要素40は2つの密度の高い区域48を含んでいる。密度の高い区域48の一方は、かかと領域13にあり、履物10にヒールカウンタを効果的に提供するために、より大きな剛性を付与してもよい。別の密度の高い区域48が足先領域11にあり、足先区域に、より大きな耐摩耗性を付与していてもよい。溶融された区域47を形成するのと同様に、より密度の高いニットを形成することもまた、開口部41を補強するため、柔軟性の低い区域を設けるため、または、透過性を減少するために使用されてもよい。

【００３２】

ニット構成要素40は、アッパー30の内面および反対側の外面の両方を形成している。履物10のいくつかの構成では、他の要素をニット構成要素40と組み合わせて使用してもよく、他の要素で、内面または外面の一部または全体を形成してもよい。図7Eを参照して、ヒールカウンタ35は、かかと領域13でニット構成要素40に固定されており、比較的剛性の高いポリマー材料で形成されていてもよい。接着剤結合処理を使用して、ヒールカウンタ35をニット構成要素40に接合してもよい。他の構成では、裏地を内面にわたって延ばして、アッパー30内に空洞の一部を形成してもよい。他の材料を、外面に溶融接合、接着または結合して、ニット構成要素40のニット構造を保護してもよく、または、履物10に他の利点を与えてもよい。

【００３３】

図2および図3にはチューブ42が示されており、少なくとも1つの他のチューブ42に直接に隣接している。しかし、チューブ42の相対的な位置は、大きく変化してもよい。図7Fを参照して、チューブ42は、互いに分離されており、V字状の構造を形成している。チューブ42を締めひもシステムの一部として使用してもよいが、チューブ42または類似の構造を、長手方向の耐伸張性を付与するために使用してもよい。図7Gを参照して、チューブ42は長手方向に延びており、チューブ42内のストランド43は、領域11～13それぞれを通しての伸張に抵抗してもよい。

【００３４】

ヤーン46をカラー45に組み込むやり方は、大きく変化してもよい。上記構成では、フローティングヤーン46は、チューブ状の構造を通過するときに、カラー45を形成するニット

材料の層と大略的に平行である。図8Aを参照して、ヤーン46は、ニット材料の1つの層からニット材料の別の層へと延びており、これらの層に大略的に垂直であり、それにより、平編み処理により形成されたスペーサ-ニット材料に類似した構造を付与する。図8Aの拡大された区域に示すように、ヤーン46は、ニット層を形成するヤーンの周りに延びていてもよい。1つの構成では、ヤーン46は、ニット層を形成するヤーンと同じであってもよい。すなわち、ヤーン46は、ニット層を形成するヤーンの編まれていない部分であってもよい。別の構成では、ヤーン46は、固定されていなくてもよく、または、他のやり方で、ニット層を形成するヤーンを分離していても（すなわち、ヤーンの周りに延びていなくても）よい。したがって、ヤーン46を、さまざまなやり方で、ニット構成要素40に組み込んでもよい。さらなる事項として、アッパー30のいくつかの構成は、ニット構成要素40の製造後に、ニット材料の層の間に配置されるポリマー発泡材料を含んでいてもよい。

【００３５】

上述したように、カラー45は、スペーサ-ニット材料に類似した構造を有していてもよく、その際、ヤーン46は、ニット材料の1つの層からニット材料の別の層へと、これらの層に大略的に垂直な方向へ延びている。カラー45は、この構成を持たせるのに適した区域であるが、平編み処理を使用して、ニット構成要素40の区域にスペーサ-ニット材料の構造を付与してもよい。例えば、足先領域11または中足領域12の側部14および15のいずれかにスペーサ-ニット構成を配置して、アッパー20にクッション性の性質または圧縮可能な性質を付与してもよい。また、シュトローベル式中敷き24またはベロ33の一部を、平編み処理により形成して、スペーサ-ニット構成を持たせてもよい。さらに、単繊維ヤーンまたは織物ヤーンを含むさまざまな種類のヤーンを、スペーサ-ニット構成を有するニット構成要素40の区域用に使用してもよい。

【００３６】

上述したさまざまな構成において、中敷き23は、アッパー20の空洞内に配置された別個の要素であり、シュトローベル式中敷き34は、ニット構成要素40の縁部に接合された別個の要素である。平編み処理はまた、図8Bに示すように、一体のニット構成の中敷き23およびシュトローベル式中敷き34を形成するために使用されていてもよい。カラー45と同様に、一体のニット構成の中敷き23は、圧縮可能な構成を付与するフローティングヤーン46を含むよう構成されていてもよい。また、平編み処理を使用して、一体のニット構成の他の要素（ベロ33など）を形成してもよい。

製造効率

背景技術で説明したように、例えば運動用の履物のアッパーは、履物のさまざまな区域に異なる特性をそれぞれが付与する複数の材料要素で形成されていてもよい。従来のアッパーを製造するために、材料要素を所望の形状に切断し、次いで、通常は縫製または接着剤結合により、互いに接合する。アッパーに組み込まれる材料要素の数および種類が増加すると、材料要素の輸送、保管、切断および接合に関連する時間および費用も増加する場合がある。切断および縫製処理による廃材も、アッパーに組み込まれる材料要素の数および種類が増加すると、よりたくさん蓄積される。さらに、より多くの材料、材料要素および他の構成要素を有する履物は、より少ない要素および材料で形成されたアッパーよりも、リサイクルが困難である。ゆえに、アッパーに使用する要素および材料の数を減少させることにより、製造効率およびリサイクルの可能性を高めつつ、廃棄物を減少させられる場合がある。

【００３７】

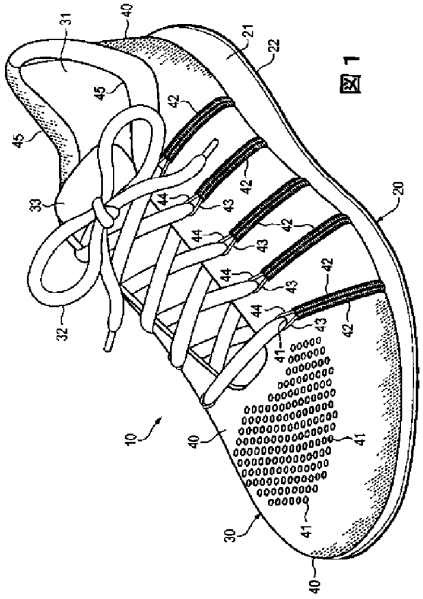
複数の材料要素を含むさまざまな製造工程が従来のアッパーには必要であったが、ニット構成要素40は単独の平編み処理により形成することができる。平編み処理により、ニット構成要素40を履物10に組み込むために必要な工程の数が、比較的少なくなる。より詳しくは、シュトローベル式中敷き34をニット構成要素40の縁部に接合し、かかと領域13の2つの縁部を接合し、ひも32を組み込み、実質的に完成されたアッパー30をソール構造20に固定する。ニット構成要素40を使用することで、従来の製造処理に比べ、製造工程の全体的な数を低減することができる。くわえて、リサイクルの可能性を高めつつ、廃棄物を減

少させられる場合がある。

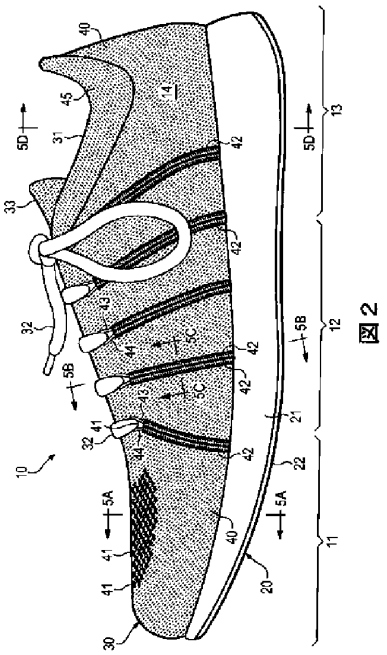
【００３８】

さまざまな構成を参照しつつ、上記および添付図面において、本発明を開示している。しかし、本開示の目的は、本発明に関するさまざまな特徴および概念の例を提供することであり、発明の範囲を限定することではない。添付の特許請求の範囲に規定された本発明の範囲を逸脱することなく、多くの変更および修正を上記構成に行えることを、当業者は理解するであろう。

【図１】



【図２】



【図３】

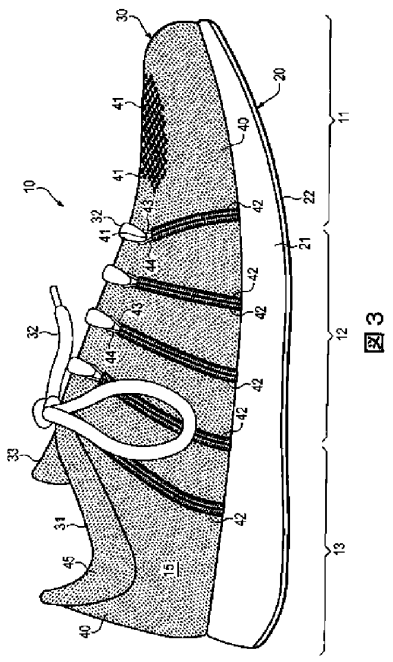


図３

【図４】

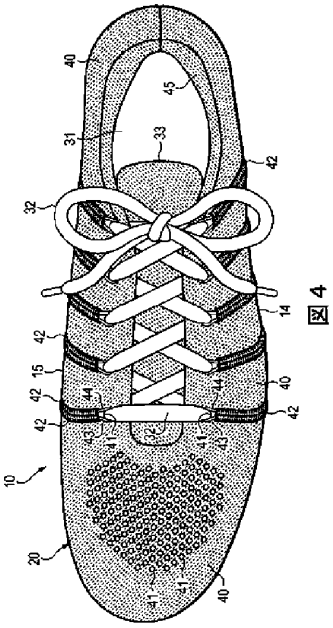


図４

【図５Ａ】

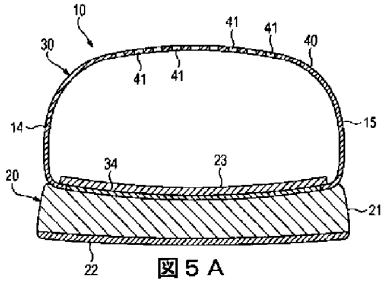


図５Ａ

【図５Ｂ】

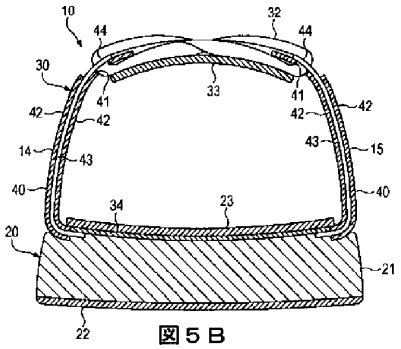


図５Ｂ

【図５Ｃ】

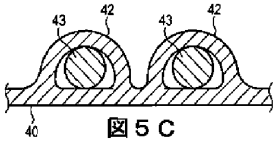


図５Ｃ

【図５Ｄ】

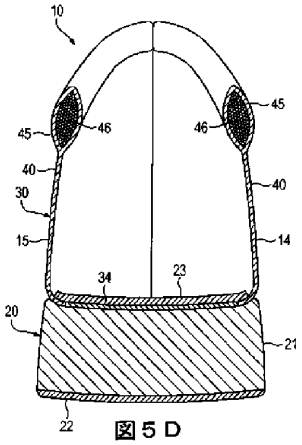
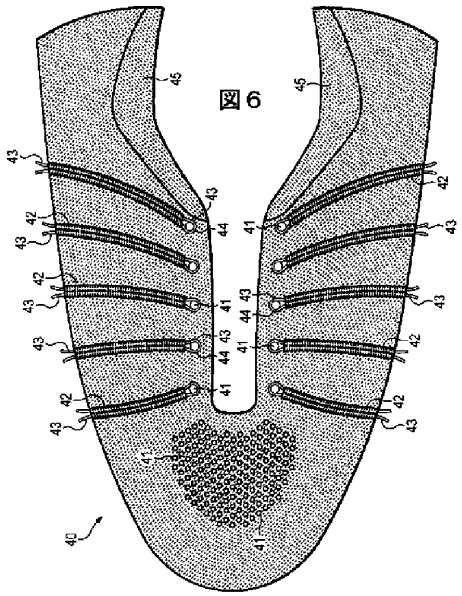
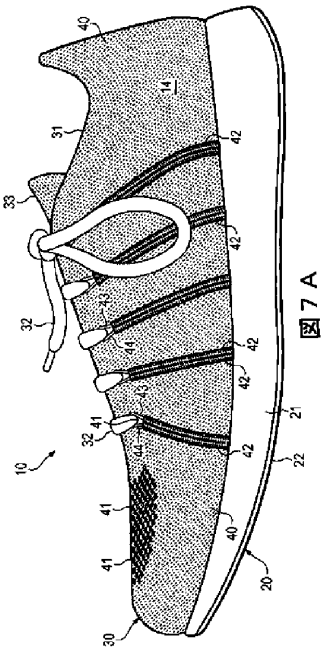


図５Ｄ

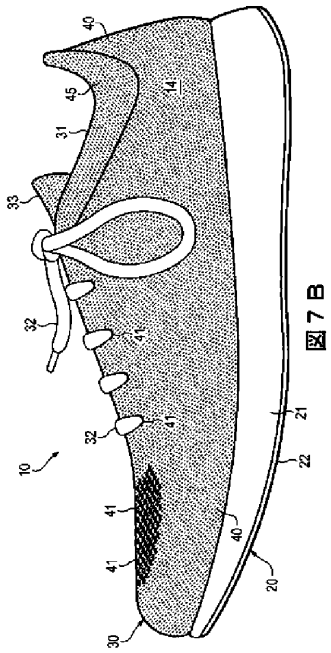
【図６】



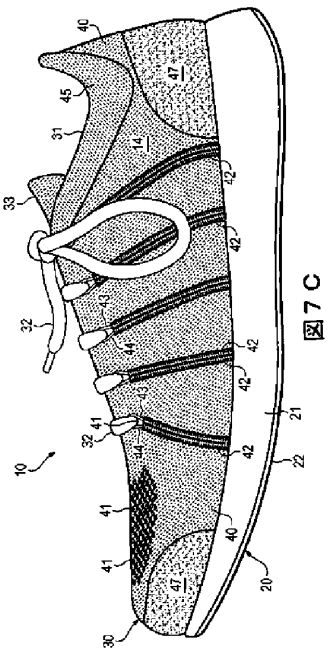
【図７Ａ】



【図７Ｂ】



【図７Ｃ】



【図７Ｄ】

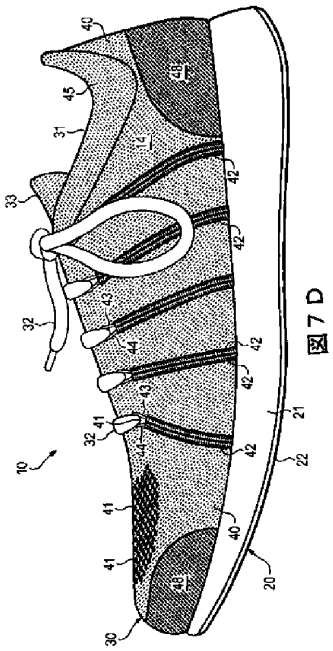


図７Ｄ

【図７Ｅ】

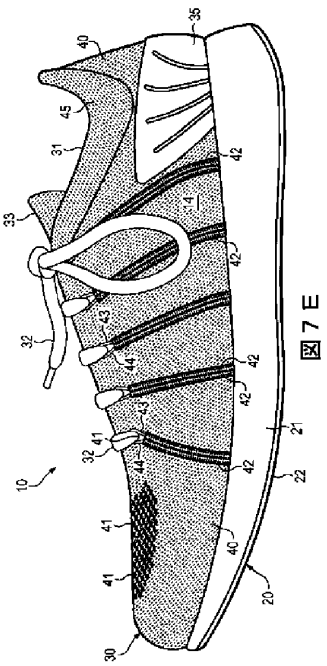


図７Ｅ

【図７Ｆ】

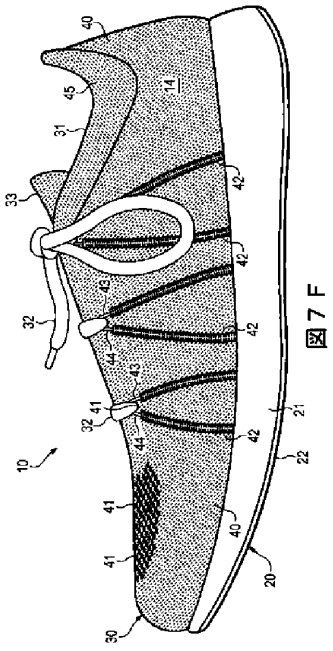


図７Ｆ

【図７Ｇ】

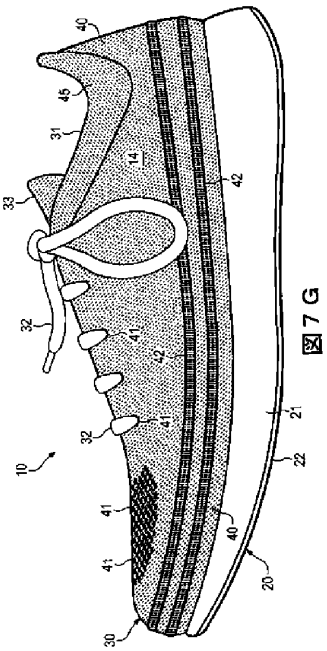


図７Ｇ

【図８Ａ】

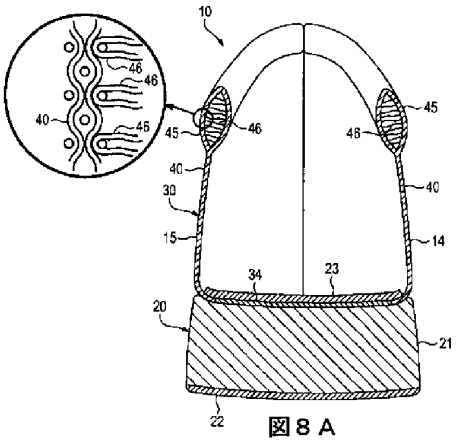


図８Ａ

【図８Ｂ】

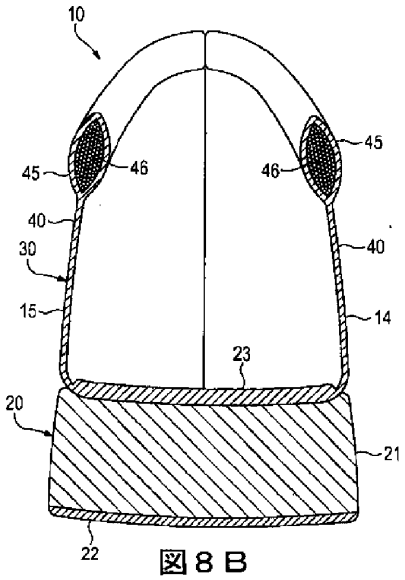


図８Ｂ

【手続補正書】
【提出日】平成23年8月12日(2011.8.12)
【手続補正１】
【補正対象書類名】特許請求の範囲
【補正対象項目名】全文
【補正方法】変更
【補正の内容】
【特許請求の範囲】
【請求項１】
アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、
一体のニット構成で形成されたチューブ状の構造を形成するニット構成要素と、
一次元の材料の構成を有し、前記チューブの長手方向の少なくとも一部を通って延びるヤーンとを有する、履物製品。
【請求項２】
前記ニット構成要素が、前記アッパーの外側側部に沿い、前記アッパーの内側側部に沿い、前記アッパーの足先領域にわたり、そして前記アッパーのかかと領域の周りに延びている、請求項1に記載の履物製品。
【請求項３】
前記チューブ状の構造が、前記アッパーの前記外側側部に配置され、前記ソール構造に近接した区域から上方に延びるように方向付けられており、前記ヤーンが、前記チューブ状の構造の端から外側に向かって延びて、ひもを受け入れるループを形成している、請求項2に記載の履物製品。
【請求項４】
前記チューブ状の構造が、前記かかと領域に配置され、前記アッパーの足首開口部の少

なくとも一部の周りに配置されており、前記ヤーンおよび複数の追加のヤーンが、前記チューブ状の構造内に配置されている、請求項2または3に記載の履物製品。
【請求項５】
アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、
前記アッパーの外面の少なくとも一部を形成する第1ニット層と、
前記第1ニット層と一体のニット構成で形成された第2ニット層であって、前記第1ニット層に隣接して配置され、少なくとも一部が前記第1ニット層と同一の広がりを持っていて、前記第1ニット層と当該第2ニット層との間にチューブを区画する第2ニット層と、
一次元の材料の構成を有し、前記チューブを通って前記第1ニット層と前記第2ニット層との間を延びるストランドとを備えた、履物製品。
【請求項６】
前記第1ニット層が、前記アッパーの外側側部に沿い、前記アッパーの内側側部に沿い、前記アッパーの足先領域にわたり、そして前記アッパーのかかと領域の周りに延びている、請求項5に記載の履物製品。
【請求項７】
前記チューブが、前記ソール構造に近接した区域から上方に延びるように方向付けられており、前記ストランドの一部が、前記チューブの端から外側に向かって延びて、ひもを受け入れるループを形成している、請求項5または6に記載の履物製品。
【請求項８】
前記第1ニット層が、前記チューブの前記端に隣接した開口部を区画しており、前記ひもが、前記開口部を通って延びている、請求項7に記載の履物製品。
【請求項９】
前記ストランドが、前記第1ニット層および前記第2ニット層により形成された別のチューブ内へと延びている、請求項7または8に記載の履物製品。
【請求項１０】
アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、
それぞれが一体のニット構成で形成された第1チューブおよび第2チューブを区画するニット構成要素であって、前記第1チューブおよび前記第2チューブが、前記ソール構造に近接した区域から上方に延びており、前記第1チューブおよび前記第2チューブの端が、前記アッパーの上側の区域に配置されているニット構成要素と、
前記第1チューブおよび前記第2チューブを通って延びるストランドであって、当該ストランドの一部は、前記第1チューブおよび前記第2チューブの前記端から外側に向かって延びて、ループを形成しているストランドと、
前記ループを通って延びるひもとを備えた、履物製品。
【請求項１１】
前記第1チューブおよび前記第2チューブが、互いに隣接しており平行である、請求項10に記載の履物製品。
【請求項１２】
前記ニット構成要素が、前記第1チューブおよび前記第2チューブの前記端に隣接した開口部を区画しており、前記ひもが、前記開口部を通って延びている、請求項10または11に記載の履物製品。
【請求項１３】
前記ニット構成要素が、
一体のニット構成で形成された、少なくとも一部が同一の広がりを持つ1対のニット層と、
前記ニット層の間を延びる複数のフローティングヤーンとを含む、請求項10ないし12のいずれか1項に記載の履物製品。
【請求項１４】

前記ニット層および前記フローティングヤーンが、前記アッパーの足首開口部に隣接して配置されている、請求項13に記載の履物製品。

【請求項１５】

アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、

一体のニット構成で形成された複数のチューブを区画するニット構成要素であって、前記チューブの第1部分が、当該履物の外側側部に配置され、前記チューブの第2部分が、当該履物の内側側部に配置されているニット構成要素と、

前記チューブを通って延び、前記チューブの端から外側に延びて複数のループを形成し、一次元の材料の構成を有するストランドと、

前記ループを通って延びるひもとを備えた、履物製品。

【請求項１６】

前記ニット構成要素が、前記チューブの前記端に隣接した開口部を区画しており、前記ひもが、前記開口部を通って延びている、請求項15に記載の履物製品。

【請求項１７】

前記チューブの少なくとも2つが、互いに隣接しており平行である、請求項15または16に記載の履物製品。

【請求項１８】

前記ニット構成要素が、前記アッパーの外面の大部分を形成している、請求項15ないし17のいずれか1項に記載の履物製品。

【請求項１９】

前記ニット構成要素が、

一体のニット構成で形成された、少なくとも一部が同一の広がりを持つ1対のニット層と、

前記ニット層の間に配置され、前記ニット層に実質的に平行な方向に延びる複数のフローティングヤーンとを含み、

前記ニット層および前記フローティングヤーンが、前記アッパーの足首開口部に隣接して配置されている、請求項15ないし18のいずれか1項に記載の履物製品。

【請求項２０】

前記ニット構成要素の第1区域が第1のタイプのニットを有し、前記ニット構成要素の第2区域が第2のタイプのニットを有し、前記第1のタイプのニットが前記第2のタイプのニットと異なっている、請求項15ないし19のいずれか1項に記載の履物製品。

【請求項２１】

前記ニット構成要素の第1区域が第1のタイプのヤーンを有し、前記ニット構成要素の第2区域が第2のタイプのヤーンを有し、前記第1のタイプのヤーンが前記第2のタイプのヤーンと異なっている、請求項15ないし20のいずれか1項に記載の履物製品。

【請求項２２】

締めひもシステムを含むアッパーを有する履物製品であって、前記締めひもシステムが、

（a）一体のニット構成で形成されたチューブ、および、（b）前記チューブの端に隣接して配置された開口部を区画するニット構成要素と、

前記チューブを通って延び、ループを形成するストランドと、

前記ループおよび前記開口部を通って延びるひもとを備えた、履物製品。

【請求項２３】

アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、

少なくとも一部が互いに同一の広がりを持ち、一体のニット構成で形成された第1ニット層および第2ニット層と、

前記第1ニット層と前記第2ニット層との間に配置され、前記第1ニット層および前記第2ニット層に実質的に平行な方向に延びた複数のフローティングヤーンとを含む、ニット構

成要素を備えた、履物製品。
【請求項２４】
前記アッパーが、足を受け入れるための内部の空洞と、前記空洞にアクセスするための足首開口部とを区画しており、前記第1ニット層、前記第2ニット層、前記フローティングヤーンが、前記足首開口部に隣接して配置されている、請求項23に記載の履物製品。
【請求項２５】
前記第1ニット層、前記第2ニット層および前記フローティングヤーンが、前記アッパーの内側側部および前記アッパーの外側側部に配置されている、請求項24に記載の履物製品。
【請求項２６】
前記ニット構成要素が、一体のニット構成で形成されたチューブを区画し、ストランドが、前記チューブをその長手方向に通って延びている、請求項23ないし25のいずれか1項に記載の履物製品。
【請求項２７】
前記ニット構成要素の第1区域が第1のタイプのニットを有し、前記ニット構成要素の第2区域が第2のタイプのニットを有し、前記第1のタイプのニットが前記第2のタイプのニットと異なっている、請求項23ないし26のいずれか1項に記載の履物製品。
【請求項２８】
前記ニット構成要素の第1区域が第1のタイプのヤーンを有し、前記ニット構成要素の第2区域が第2のタイプのヤーンを有し、前記第1のタイプのヤーンが前記第2のタイプのヤーンと異なっている、請求項23ないし27のいずれか1項に記載の履物製品。
【請求項２９】
アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、
一体のニット構成で形成された第1ニット層および第2ニット層であって、当該第1ニット層の少なくとも一部が、当該第2ニット層と同一の広がりを持っていて、当該第1ニット層と当該第2ニット層との間に内部の空間を区画している、第1ニット層および第2ニット層と、
前記内部の空間内に配置され、前記第1ニット層と前記第2ニット層との間を延びる複数のフローティングヤーンとを含む、ニット構成要素を備えた、履物製品。
【請求項３０】
前記アッパーが、足を受け入れるための内部の空洞と、前記空洞にアクセスするための足首開口部とを区画しており、前記第1ニット層、前記第2ニット層および前記フローティングヤーンが、前記足首開口部に隣接して配置されている、請求項29に記載の履物製品。
【請求項３１】
前記第1ニット層、前記第2ニット層および前記フローティングヤーンが、前記アッパーの内側側部および前記アッパーの外側側部に配置され、前記アッパーのかかと領域の周りに延びている、請求項30に記載の履物製品。
【請求項３２】
アッパー、および、前記アッパーに固定されたソール構造を有する履物製品であって、前記アッパーが、着用者の足を受け入れるための内部の空洞を区画しており、前記アッパーが、前記空洞にアクセスするための足首開口部を有しており、前記アッパーが、
前記足首開口部に隣接し、前記アッパーの外面の少なくとも一部を形成する第1ニット層と、
前記足首開口部に隣接し、前記アッパーの内面の少なくとも一部を形成する第2ニット層と、
前記第1ニット層と前記第2ニット層との間に配置された複数のフローティングヤーンとを含む、ニット構成要素を備え、
前記第1ニット層および前記第2ニット層が、前記足首開口部および前記足首開口部から間隔を空けた箇所で、互いに接合されて、その間に分離された区域を区画しており、前記

フローティングヤーンが、前記分離された区域に配置されている、履物製品。
【請求項３３】
前記ニット構成要素が、前記アッパーの外側側部に沿い、前記アッパーの内側側部に沿い、前記アッパーの足先領域にわたり、そして前記アッパーのかかと領域の周りに延びている、請求項32に記載の履物製品。
【請求項３４】
前記フローティングヤーンが、前記第1ニット層および前記第2ニット層に実質的に平行である、請求項32または33に記載の履物製品。
【請求項３５】
前記ニット構成要素の一部が、一体のニット構成で形成されたチューブを区画する当該履物の中足領域に配置されており、ストランドが、前記チューブをその長手方向に通って延びている、請求項32ないし34のいずれか1項に記載の履物製品。
【請求項３６】
履物製品を製造する方法であって
平編み処理を使用して、熱可塑性ポリマー材料を組み込んだ少なくとも1本のヤーンを含むニット構成要素を形成するステップと、
前記ニット構成要素の少なくとも一区域を加熱して、前記熱可塑性ポリマー材料を組み込んだ前記ヤーンを溶融させるステップと、
前記ニット構成要素を、前記履物製品のアッパーに組み込むステップとを含む、履物製品を製造する方法。
【請求項３７】
前記平編み処理を使用するステップが、前記熱可塑性ポリマー材料を組み込んだ前記ヤーンを、前記ニット構成要素の全体にわたって配置するステップを含む、請求項36に記載の方法。
【請求項３８】
前記平編み処理を使用するステップが、前記熱可塑性ポリマー材料を組み込んだ前記ヤーンを、前記ニット構成要素の前記区域にのみ配置するステップを含む、請求項36に記載の方法。
【請求項３９】
前記組み込むステップが、前記ニット構成要素の前記区域を、前記履物のかかと領域に配置するステップを含む、請求項36ないし38のいずれか1項に記載の方法。
【請求項４０】
前記組み込むステップが、前記ニット構成要素の前記区域を、前記履物の足先領域に配置するステップを含む、請求項36ないし39のいずれか1項に記載の方法。
【請求項４１】
履物製品を製造する方法であって
平編み処理を使用して、第1ニット層、第2ニット層、ならびに、前記第1ニット層および前記第2ニット層に固定され前記第1ニット層から前記第2ニット層へと延びる複数のヤーンを含むニット構成要素を形成するステップと、
前記ニット構成要素を、前記履物製品のアッパーに組み込むステップとを含む、履物製品を製造する方法。
【請求項４２】
単繊維のヤーンとなるように前記ヤーンを選択するステップをさらに含む、請求項41に記載の方法。

【国際調査報告】

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/056795

A. CLASSIFICATION OF SUBJECT MATTER
INV. A43C1/04 A43B23/02 A43B7/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A43C A43B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/110048 A1 (DUA BHUPESH [US] ET AL) 15 May 2008 (2008-05-15) the whole document	1-22
X A	US 2005/284000 A1 (KERNS MARK [US]) 29 December 2005 (2005-12-29) the whole document	1,5 10,15,22
A	US 7 347 011 B2 (DUA BHUPESH [US] ET AL DUA BHUPESH [US] ET AL) 25 March 2008 (2008-03-25) the whole document	1-22
A	US 6 910 288 B2 (DUA BHUPESH [US]) 28 June 2005 (2005-06-28) the whole document	1-22

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[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 December 2009	20/04/2010

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Herry, Manuel

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/056795

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 931 762 B1 (DUA BHUPESH [US]) 23 August 2005 (2005-08-23) the whole document -----	1-22

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/056795

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-22

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (April 2005)

International Application No. PCT/US2009/056795

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-22

Independent claims 1, 5, 10, 15 and 22 specify that the knitted component defines a tubular structure, and that the yarn or strand extends through at least a portion of the tube. With these features a simple tubular structure is provided with a yarn or strand, which can be applied, for instance, to receive a lace.

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2. claims: 23-35, 41-42

Independent claims 23, 29, 32 and 41 specify the provision of two knitted layers in the footwear upper, with a plurality of yarns located between these layers, the yarns floating or extending between the knitted layers to which they are secured. These features provide improved cushioning properties at selected areas of the footwear upper.

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3. claims: 36-40

Independent claim 36 specifies that the knitted component includes at least one yarn incorporating a thermoplastic polymer, an area being heated to fuse the yarn. These features provide a method for reinforcing particular areas of the upper.

INTERNATIONAL SEARCH REPORT

Information on patent family members

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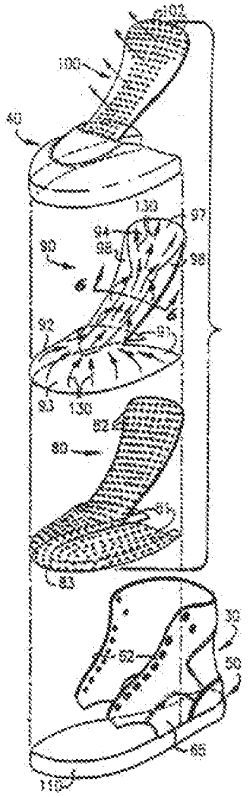
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(57) Abstract

The footwear has a knitted sock and a shoe in combination. The knitted sock has a toe portion formed of hydrophilic knit fabric and an instep portion adjacent the toe portion formed of hydrophobic knit fabric. Perspiration from the toe portion of the foot of the wearer is absorbed by the knit hydrophilic toe portion of the knitted sock and wicked therefrom by the hydrophobic knit instep portion of the knitted sock. The shoe has a tongue portion overlying and contacting the hydrophobic knit instep portion of the knitted sock. The tongue portion (70) of the shoe has overlying inner (80) and outer (100) fabric layers formed of hydrophilic fabric and an intermediate fabric layer (90) positioned between the overlying inner and outer hydrophilic fabric layers. The intermediate fabric layer (90) has a medial portion formed of a hydrophobic fabric layer (94) and opposite side portions formed of hydrophilic fabric layers (92). The inner hydrophilic fabric layer (80) overlies and, is in contacting engagement with the hydrophobic knit instep portion of the knitted sock. The perspiration from the hydrophobic knit instep portion of the knitted sock is absorbed by the overlying and contacting inner hyrophilic fabric layer (80) and the hydrophilic fabric opposite side portions (92) of the intermediate fabric layer (90) and wicked therefrom by the contacting hydrophobic fabric layer medial portion (94) of the intermediate fabric layer. The perspiration (130) is then transferred from the hydrophobic fabric layer medial portion (94) to the overlying outer hydrophilic fabric layer (100) of the tongue portion of the shoe for evaporation therefrom to atmosphere.



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FOOTWEAR FOR FACILITATING THE REMOVAL AND DISSIPATION OF PERSPIRATION

Field Of Invention

This invention relates generally to footwear and more particularly to footwear for providing added comfort to the wearer by facilitating the removal and dissipation of perspiration from the foot of the wearer.

Background Of The Invention

Generally, moisture or perspiration forms in the foot area of a person especially when a sock or shoe is worn on the foot. The perspiration may become excessive when the person exercises, such as when hiking or running. This excess perspiration accumulating around the foot and in the footwear is often uncomfortable and irritating.

Previously, shoes have been designed and constructed to keep moisture out of the shoe with little or no consideration for perspiration formed within the shoe. An example of such shoes may be seen in U.S. Patent No. 2,897,610 to Campagna entitled *Heat Insulated, Gusset-Type, Waterproof Footwear*. Recently, shoes have been designed which attempt to keep the innermost layer of the shoe nearest the foot dry by providing a high moisture permeable and low moisture holding material for this layer of the entire shoe and a layer overlying the innermost layer for further insulating the foot from moisture. An example of such a shoe may be seen in U.S. Patent No. 4,430,811 to Okada entitled *Footwear*. Also,

other shoes have been designed which recognize the need to ventilate the shoe by providing perforations in the tongue area of the shoe. An example of this type of shoe is disclosed in U.S. Patent No. 4,458,429 to Schmid entitled *Tongue for a Shoe, Particularly a Sport Shoe, and a Shoe Including a Tongue*.

Unfortunately, these prior shoes failed to recognize that about two thirds of the perspiration from the wearer accumulates in the ball and toe areas of the foot. Simply insulating the foot from outside moisture, absorbing moisture into the footwear, and providing ventilation to the shoe through a series of perforations did not solve the problem of accumulation of excess perspiration around the ball and toe areas of the foot.

The inventor of the present invention, on the other hand, recognized that the prior footwear failed to adequately remove perspiration from the ball and toe areas and, therefore, developed and patented a unique sock, disclosed in U.S. Patent No. 4,898,007 entitled *Moisture Management Sock*, to solve this problem. While this unique moisture management sock improved the dissipation of moisture from conventional shoes, further improvement is still highly desirable.

Summary Of The Invention

It is therefore an object of the present invention to provide footwear for the removal and dissipation of perspiration from the foot of the wearer.

This and other objects are provided in accordance with the present invention, by footwear for facilitating the removal and dissipation of perspiration from the foot of a wearer. Particularly, the footwear has a knitted sock and a shoe in combination.

The knitted sock has a toe portion made of hydrophilic knit fabric and an instep portion made of hydrophobic knit fabric adjacent the hydrophilic knit toe

portion. Perspiration around the toe portion of the foot of the wearer is absorbed by the hydrophilic knit toe portion of the knitted sock and wicked therefrom by the adjacent hydrophobic knit instep portion of the knitted sock.

The shoe has a tongue portion overlying and contacting the hydrophobic knit instep portion of the knitted sock. The tongue portion of the shoe has overlying inner and outer fabric layers comprising a hydrophilic inner layer and a hydrophilic outer layer. An intermediate fabric layer comprising a medial portion formed of a hydrophobic fabric layer and opposite side portions formed of hydrophilic fabric layers is positioned between the overlying inner and outer hydrophilic fabric layers and is in contacting engagement therewith. The inner hydrophilic fabric layer overlies and contacts the hydrophobic knit instep portion of the knitted sock so that perspiration from the hydrophobic knit instep portion is absorbed by the overlying inner hydrophilic fabric layer and the overlying and contacting hydrophilic fabric opposite side portions of the intermediate fabric layer of the tongue portion of the shoe and wicked therefrom by the contacting hydrophobic fabric layer medial portion of the intermediate fabric layer of the tongue portion of the shoe. The perspiration is then transferred from the contacting intermediate hydrophobic fabric layer medial portion to the overlying outer hydrophilic fabric layer for evaporation therefrom to atmosphere.

Additionally, wick stitching formed of textile thread may extend from the hydrophobic fabric layer medial portion into the hydrophilic fabric opposite side portions of the intermediate fabric layer of the tongue portion of the shoe and further extend from the intermediate fabric layer into the inner hydrophilic

fabric layer to enhance the flow of perspiration therethrough.

Brief Description Of The Drawings

FIG. 1 is a perspective view of an embodiment according to the present invention in the form of an athletic shoe with parts broken away for clarity.

FIG. 2 is also a perspective view of another embodiment according to the present invention in the form of a boot.

FIG. 3 is a perspective view of yet another embodiment according to the present invention in the form of a casual dress shoe.

FIG. 4 is an exploded view of the athletic shoe shown in FIG. 1.

FIG. 5 is a front cross-sectional view of the athletic shoe shown in FIG. 1 taken along line 5-5 with parts broken away for clarity.

FIG. 6 is a fragmentary perspective view of the intermediate fabric layer of the tongue portion of the athletic shoe shown in FIG. 4 taken along line 6-6.

FIG. 7 is a fragmentary perspective view of the tongue portion of the athletic shoe shown in FIG. 5 taken along line 7-7.

FIG. 8 is a perspective view of the footwear according to the present invention showing a moisture management knitted sock in combination with the athletic shoe shown in Fig. 1.

FIG. 9 is a perspective view of the moisture management knitted sock without the shoe as shown in FIG. 8.

FIG. 10 is an exploded perspective view of the moisture management knitted sock of FIG. 9.

FIG. 11 is a perspective view of another embodiment of the moisture management knitted sock with a banded

instep portion.

FIG. 12 is a longitudinal vertical cross-sectional view of the footwear according to the present invention taken along line 12-12 of FIG. 8.

FIG. 13 is a transverse vertical cross-sectional view of the footwear according to the present invention taken along line 13-13 of FIG. 8 with parts broken away for clarity.

FIG. 14 is an exploded perspective view of the intermediate fabric layer of the tongue portion of the shoe showing the hydrophobic fabric layer medial portion and the hydrophilic fabric opposite side portions of the intermediate fabric layer according to the present invention.

FIG. 15 is another perspective view of the intermediate fabric layer of the tongue portion of the shoe showing the hydrophobic fabric layer medial portion and hydrophilic fabric opposite side portions stitched together with cross-stitching.

FIG. 16 is an enlarged view of the cross-stitching as shown in FIG. 15.

FIG. 17 is an exploded view of the intermediate fabric layer and the inner hydrophilic fabric layer of the tongue portion of the shoe with wick stitching extending from the hydrophobic fabric layer medial portion and into the hydrophilic fabric side portions of the intermediate fabric layer, and wick stitching also extending from the internal intermediate fabric layer into the inner hydrophilic fabric layer.

FIG. 18 is an enlarged fragmentary view of the wick stitching as shown in FIG. 17.

FIG. 19 is a perspective view of the tongue portion of the shoe showing the cross-stitching and wick stitching according to the present invention with parts broken away for clarity.

FIG. 20 is an exploded view of the tongue portion of the shoe similar to FIG. 4, but including the wick stitching according to the present invention.

FIG. 21 is a transverse cross-sectional view taken along line 21-21 of FIG. 20.

FIG. 22 is another perspective view of the tongue portion of Fig. 20 with parts broken away for clarity.

FIG. 23 is an enlarged fragmentary cross-sectional view of the layered construction of the tongue portion of the shoe and showing the wick stitching extending from the intermediate fabric layer and into the inner hydrophilic fabric layer.

Description of The Preferred Embodiments

The present invention now will be described more fully hereinafter with reference to the accompanying drawings in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

Referring to Figs. 1-3, shown are perspective views of various embodiments of shoes according to the present invention. The embodiment of Fig. 1 is in the form of an athletic shoe 30 with a perforated tongue portion 70. The athletic shoe 30 has a toe portion 40, a heel portion 50, an instep portion 60, and a sole portion 110. The toe portion 40 of the athletic shoe 30 is connected to the instep portion 60. The instep portion 60 has a tongue portion 70 and a lower arch portion 65. The tongue portion 70 of the instep portion 60 is connected to the toe portion 40 and a facing section 62 of the instep portion 60. A series of perforations 102 are

shown along the outer surface of the tongue portion 70. The lower arch portion 65 of the instep portion 60, in turn, is connected to the toe portion 40, the heel portion 50, and the sole portion 110.

The tongue portion 70 of the athletic shoe 30 shown in Fig. 1 may also be adapted for other embodiments of shoes such as the boot shown in Fig. 2 and the casual dress shoe shown in Fig. 3. References to additional figures herein will use the athletic shoe 30 of Fig. 1, but the description would similarly apply to other embodiments such as those shown in Figs. 2 and 3. Similar elements in Figs. 2 and 3 are labelled with prime and double prime notation corresponding to Fig. 1 and are not described further herein.

Now for further describing the tongue portion of athletic shoe 30, reference will be made to Figs. 4-7. In Fig. 4, shown is an exploded view of the athletic shoe 30 shown in Fig. 1 illustrating the layered tongue portion 70 and toe portion 40 of the shoe 30. An inner fabric layer 80 of the tongue portion 70 is constructed of hydrophilic fabric having perforations 82. The fabric in this inner layer so is not restricted to any one fiber type and may be leather or nylon. The perforations 82 enhance the flow of perspiration 130 through the inside of the shoe 30. The flow or movement of the perspiration 130 is enhanced by heat and movement around the wearer's foot. This flow of perspiration 130 through the tongue portion 70 of the shoe 30 may further be seen in the fragmentary perspective views of Figs. 5-7.

Referring to Figs. 4 and 5, an intermediate fabric layer 90 is in contacting engagement with the inner hydrophilic fabric layer 80. In the illustrated embodiment, the intermediate fabric layer 90 includes a medial portion formed of a hydrophobic fabric layer 94 and opposite side portions formed of hydrophilic fabric

92 forming an underlying fabric layer, no inner hydrophilic fabric layer would be needed, and the aforementioned overlying outer hydrophilic fabric layer 100 would still be the outer fabric layer of the tongue portion 70 of the shoe 30.

Additionally, the inner 80, intermediate 90, and outer 100 fabric layers of the tongue portion 70 of the shoe 30 may also extend into the toe portion 40 of the shoe 30 for similar functional purposes. The toe portions 83, 93 of the inner fabric layer and intermediate fabric layer are shown in Fig. 4. The inner hydrophilic fabric layer 80 and the hydrophilic opposite side portions 92 of the intermediate fabric layer 90 may also extend into the lower arch portion 65 of the instep portion 60 of the shoe 30 to thereby form side wing portions 81, 91 respectively as seen Fig. 4 and the parts broken away in Fig. 1. The side wing portions 81 of the inner hydrophilic fabric layer 80 are adapted to overlie the lower arch portion of the instep portion of the wearer's foot to thereby absorb the perspiration 130 therefrom. In turn, the hydrophilic fabric side wing portions 91 of the intermediate fabric layer 90 overlie and are in contacting engagement with the hydrophilic fabric side wing portions 81 of the inner hydrophilic fabric layer 80 to thereby further absorb the perspiration 130 therefrom. The perspiration 130 in the hydrophilic fabric side wing portions 91 of the intermediate fabric layer 90 is also wicked by the hydrophobic fabric layer medial portion 94 for transferring to the overlying outer hydrophilic fabric layer 100 as described above.

The combination of the shoe 30 as shown in Fig. 1 and the moisture management knit sock 150 according to U.S. Patent No. 4,828,007 by the same inventor, and hereby incorporated herein by reference, is shown in

Figs. 8-13.

An exploded perspective view of the knitted sock 150 is shown in Fig. 10 illustrating the various portions of the knitted sock 150: the toe portion 152, instep portion 154, heel portion 157, ankle portion 158 and sock upper portion 159. The toe portion 152 is formed from hydrophilic knit fabric. The instep portion 154 has an upper 155 and lower 156 section both formed of hydrophobic knit fabric in this embodiment. Also shown in Fig. 10 are a knit heel portion 157 formed of hydrophilic knit fabric and a knit ankle portion 158 formed of hydrophobic knit fabric. The sock upper portion 159 is tubular and cushioned to fit about the wearer's leg and may be formed of various knit fabrics well known to those skilled in the art. Fig. 11 shows another embodiment of the knitted sock 180 having a knit instep portion 184 with bands 186 of hydrophilic knit fabric adjacent hydrophobic knit fabric 188.

Figs. 12 and 13 illustrate the removal and dissipation of the perspiration 130 from the wearer's foot. In these views, perspiration 130 accumulating in the toe portion of the foot is absorbed by the hydrophilic knit fabric of the toe portion 152 of the knitted sock 150. The perspiration 130 is then wicked from the hydrophilic knit toe portion 152 to the hydrophobic knit instep portion 154 of the knitted sock 150 for transferring to the overlying and contacting tongue portion 70 of the shoe 30. The hydrophilic knit heel portion 157 of the knitted sock 150 also absorbs perspiration 130 which is then also wicked to the hydrophobic knit instep portion 154 of the knitted sock 150 for transferring to the tongue portion 70 of the shoe 30.

In the knitted sock embodiment of Fig. 11, the perspiration 130 is also absorbed by the medial bands 186

of hydrophilic knit fabric in the instep portion 184 of the knitted sock 180. The adjacent hydrophobic knit fabric 188 of the knitted sock 180 then wicks the perspiration 130 from the hydrophilic knit medial bands 186 and the hydrophilic knit toe portion for transferring to the tongue portion 70 of the shoe 30 similar to the embodiment of Figs. 9 and 10.

The inner hydrophilic fabric layer 80 of the athletic shoe 30 is overlying and is in contacting engagement with the upper section 155 of the hydrophobic knit instep portion 154 of the knitted sock 150. Perspiration 130 in the upper section 155 of the hydrophobic knit instep portion 154 of the knitted sock 150 is then transferred to the overlying and contacting inner hydrophilic fabric layer 80 of the tongue portion 70 of the athletic shoe 30. In addition, the toe portion 83 and the side wing portions 81 of the inner hydrophilic fabric layer 80 of the shoe 30 also absorb perspiration 130 from the knit instep portion 154 and knit toe portion 152 of the knitted sock 150.

The perspiration 130 is further transferred to the hydrophilic fabric opposite side portions 92, toe portions 93 and side wing portions 91, of the intermediate fabric layer 90 of the shoe 30 through absorption from the inner hydrophilic fabric layer 80. The perspiration 130 is then wicked from the hydrophilic fabric layers 92 of the intermediate fabric layer 90 to the hydrophobic fabric layer medial portion 94. In turn, the overlying and contacting outer hydrophilic fabric layer 100 absorbs the wicked perspiration 130 from the hydrophobic fabric layer medial portion 94 of the intermediate fabric layer 90 for evaporation to the surrounding atmosphere and thereby removing and dissipating the perspiration 130 from the wearer's foot.

The construction of the intermediate fabric layer 90

of the tongue portion 70 of the shoe 30 is best understood by reference to Figs. 14-23. Figs. 14 and 15 illustrate the hydrophobic fabric layer medial portion 94 and the hydrophilic fabric opposite side portions 92 secured to the lengthwise extending edges of the hydrophobic fabric layer medial portion 94. The hydrophobic fabric layer medial portion 94 and the hydrophilic fabric opposite side portions 92 are both preferably die cut from the respective fabrics. The hydrophobic fabric layer medial portion 94 has an upper 97 and lower end 98 as do each of the hydrophilic fabric opposite side portions 92. The hydrophobic fabric layer medial portion 94 is preferably shaped to diverge at the upper end 97 for increasing the surface area of the hydrophobic fabric. In turn, the hydrophilic fabric opposite side portions 92 preferably converge and terminate at the upper end 97 to permit the enlarging of the hydrophobic fabric layer medial portion 94 at the upper end 97 thereof. The lower end 98 of the hydrophobic fabric layer medial portion 94 preferably converges to decrease the surface area of the hydrophobic fabric layer 94 of the intermediate fabric layer 90. The lower end 98 of the hydrophilic fabric opposite side portions 92 diverge and join to increase the surface area of the hydrophilic fabric layer 92 of the intermediate fabric layer 90.

The hydrophobic fabric layer medial portion 94 is preferably formed of a woven acrylic material such as Duraspun. But other hydrophobic materials may be used, such as polyproplene or polyester and they may be formed of a knit, woven, non-woven or felted fibers. The hydrophilic fabric opposite side portions 92 are preferably formed of a knit, woven, non-woven, or felted fibers. The two fabric layers 92, 94 are also preferably cross-stitched together by a hydrophobic multi-filament

textile thread, but other methods well known to those skilled in the art may also be used to keep the two fabric layers 92, 94 together or to form a single fabric layer 90. Fig. 16 best illustrates the cross-stitching 99 used in the intermediate fabric layer 90 (Fig. 15) to join the hydrophilic fabric layer medial portion 94 and the hydrophobic fabric opposite side portions 92.

Referring to Figs. 17-23, shown is wick stitching 96 formed of textile thread extending from the hydrophobic fabric layer medial portion 94 and into the hydrophilic fabric opposite side portions 92 of the intermediate fabric layer 90. The wick stitching 96, shown enlarged in Fig. 18, also preferably further extends from the intermediate fabric layer into the inner hydrophilic fabric layer 80. It is also contemplated that the wick stitching, however, may also only extend across the hydrophobic 94 and hydrophilic 92 fabric layers of the intermediate fabric layer 90 to enhance wicking of perspiration between these two intermediate fabric layers. In addition, the combination of two above wick stitching 96 locations may be used. The wick stitching 96 is preferably a hydrophobic multi-filament yarn such as polypropylene to thereby further assist the wicking of perspiration 130 from the hydrophilic fabric opposite side portions 92 in the intermediate fabric layer 90 to the hydrophobic fabric layer medial portion 94. The wick stitching 96 also enhances the wicking of perspiration 130 from the inner hydrophilic fabric layer 80 to the hydrophobic fabric layer medial portion 94 of the intermediate fabric layer 90.

As shown in Fig. 21, the wick stitching 96 is located in the hydrophobic fabric layer medial portion 94 of the intermediate fabric layer 90 from the view taken along line 21-21 of Fig. 20. The wick stitching 96 is arranged in sinusoidal or other patterns extending into

the various fabric layers of the tongue portion 70 of the shoe 30, again preferably between the inner hydrophilic fabric layer 80 and the intermediate fabric layer 90. An enlarged view of this wick stitching 96 extending into the inner hydrophilic fabric layer 80 for construction purposes is best illustrated in Fig. 23.

In the drawings and specification, there have been disclosed typical preferred embodiments of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for the purposes of limitation, the scope of the invention being set forth in the following claims.

THAT WHICH IS CLAIMED IS:

1. Footwear for providing added comfort to the wearer by facilitating the removal and dissipation of perspiration from the foot of the wearer, said footwear comprising a knitted sock and a shoe, said knitted sock having a toe portion and an instep portion adjacent thereto, said toe portion comprising a hydrophilic knit fabric and said instep portion comprising a hydrophobic knit fabric so that perspiration from the toe portion of the foot of the wearer is absorbed by said hydrophilic knit toe portion and wicked therefrom by said hydrophobic knit instep portion of said knitted sock, said shoe comprising a tongue portion overlying and contacting said hydrophobic knit instep portion, said tongue portion having overlying inner and outer fabric layers comprising hydrophilic fabric, and an intermediate fabric layer having at least a medial portion comprising a hydrophobic fabric layer positioned between said overlying inner and outer hydrophilic fabric layers and being in contacting engagement therewith, said inner hydrophilic fabric layer overlying and being in contacting engagement with said hydrophobic knit instep portion of said knitted sock so that perspiration from said hydrophobic knit instep portion is absorbed by said overlying and contacting inner hydrophilic fabric layer of said tongue portion of said shoe and wicked therefrom by said contacting intermediate hydrophobic fabric layer and thereby transferred to said overlying outer hydrophilic fabric layer of said tongue portion of said shoe for evaporation therefrom to atmosphere.

2. Footwear according to Claim 1 further comprising wick stitching formed of textile thread extending from said intermediate fabric layer into said inner hydrophilic fabric layer of said tongue portion of said shoe for providing added wicking of perspiration

from said inner hydrophilic fabric layer to said intermediate fabric layer.

3. Footwear according to Claim 2 wherein said wick stitching forms a sinusoidal pattern along said intermediate fabric layer and said inner hydrophilic fabric layer.

4. Footwear according to Claim 1 wherein said inner hydrophilic fabric layer and said intermediate fabric layer of said tongue portion of said shoe extend from said tongue portion and into a toe portion of said shoe for absorbing perspiration in said hydrophilic knit toe portion of said knitted sock by said inner hydrophilic layer so as to in turn be wicked therefrom by said hydrophobic fabric layer of said intermediate fabric layer and thereby being transferred to said overlying outer hydrophilic fabric layer of said tongue portion of said shoe for evaporation therefrom to atmosphere.

5. Footwear according to Claim 4 wherein said intermediate fabric layer and said inner hydrophilic fabric layer toe portions of said shoe extend into an instep portion of said shoe for absorbing and wicking perspiration from said hydrophobic knit instep portion of said knitted sock.

6. Footwear according to Claim 1 wherein said knitted sock further comprises a heel portion of hydrophilic knit fabric adjacent said hydrophobic knit instep portion so that perspiration from the heel portion of the wearer's foot is absorbed by said hydrophilic knit heel portion and wicked therefrom by said hydrophobic knit instep portion for transferring to said tongue portion of said shoe.

7. Footwear according to Claim 1 wherein said knit instep portion of said knitted sock further comprises at least minor areas of hydrophilic knit fabric.

8. Footwear according to Claim 1 wherein said knit

instep portion of said knitted sock further comprises at least one medial band of hydrophilic knit fabric.

9. Footwear according to Claim 1 wherein both of said inner and outer hydrophilic fabric layers of said tongue portion of said shoe include a series of perforations for facilitating the transfer of perspiration therethrough.

10. Footwear according to Claim 1 wherein both of said overlying inner and outer hydrophilic fabric layers of said tongue portion of said shoe comprise leather for added comfort to the wearer.

11. Footwear according to Claim 10 wherein said inner leather layer of said tongue portion of said shoe is formed of softer more pliable leather than said overlying outer leather layer of said tongue portion of said shoe for added comfort to the wearer.

12. Footwear according to Claim 1 wherein said hydrophobic fabric layer of said tongue portion of said shoe comprises a woven acrylic material.

13. Footwear according to Claim 1 wherein said hydrophobic fabric layer of said tongue portion of said shoe comprises a woven polyproplene material.

14. Footwear for providing added comfort to the wearer by facilitating the removal and dissipation of perspiration from the foot of the wearer, said footwear comprising a knitted sock and a shoe, said knitted sock having a toe portion and an instep portion adjacent thereto, said toe portion comprising a hydrophilic knit fabric and said instep portion comprising a hydrophobic knit fabric so that perspiration from the toe portion of the foot of the wearer is absorbed by said hydrophilic knit toe portion and wicked therefrom by said hydrophobic knit instep portion of said knitted sock, said shoe comprising a tongue portion overlying and contacting said hydrophobic knit instep portion, said tongue portion

having overlying inner and outer fabric layers comprising hydrophilic fabric, and an intermediate fabric layer positioned between said overlying inner and outer hydrophilic fabric layers and being in contacting engagement therewith, said intermediate fabric layer having a medial portion comprising a hydrophobic fabric layer and opposite side portions comprising hydrophilic fabric layers, said inner hydrophilic fabric layer overlying and being in contacting engagement with said hydrophobic knit instep portion of said knitted sock so that perspiration from said hydrophobic knit instep portion is absorbed by said inner hydrophilic fabric layer and said contacting hydrophilic fabric opposite side portions of said intermediate fabric layer and wicked therefrom by said contacting hydrophobic fabric layer medial portion of said intermediate fabric layer and thereby transferred to said overlying outer hydrophilic fabric layer of said tongue portion of said shoe for evaporation therefrom to atmosphere.

15. Footwear according to Claim 14 further comprising wick stitching formed of textile thread extending from said hydrophobic fabric layer medial portion into said hydrophilic fabric opposite side portions of said intermediate fabric layer of said tongue portion of said shoe for providing added wicking of perspiration.

16. Footwear according to Claim 15 wherein said wick stitching further extends into said inner hydrophilic fabric layer of said tongue portion of said shoe for providing added wicking from said inner hydrophilic fabric layer to said hydrophobic fabric layer medial portion of said intermediate fabric layer.

17. Footwear according to Claim 15 wherein said wick stitching forms a sinusoidal pattern along said hydrophobic fabric layer medial portion and said

hydrophilic fabric opposite side portions.

18. Footwear according to Claim 14 wherein said hydrophobic fabric layer medial portion of said intermediate fabric layer comprises an upper end and a lower end, said upper end diverging for increasing the surface area of said hydrophobic fabric layer, said lower end converging for decreasing the surface area of said hydrophobic fabric layer.

19. Footwear according to Claim 18 wherein said hydrophilic fabric opposite side portions of said intermediate fabric layer comprises upper and lower ends, said upper end converging and terminating at said upper end thereof for increasing the surface area of said hydrophobic fabric layer medial portion, said lower end diverging for increasing the surface area of the hydrophilic fabric layer of said intermediate fabric layer.

20. Footwear according to Claim 14 further comprising cross-stitching formed of textile thread joining said hydrophobic fabric layer medial portion and said hydrophilic fabric opposite side portions of said intermediate fabric layer.

21. Footwear according to Claim 14 wherein said inner hydrophilic fabric layer and said intermediate hydrophilic fabric layer of said tongue portion of said shoe extend from said tongue portion and into a toe portion of said shoe for absorbing perspiration in said hydrophilic knit toe portion of said knitted sock so as to in turn be wicked therefrom by said contacting hydrophobic fabric layer medial portion of said intermediate fabric layer and thereby transferred to said overlying outer hydrophilic fabric layer of said tongue portion of said shoe for evaporation therefrom to atmosphere.

22. Footwear according to Claim 21 wherein said

intermediate fabric layer and said inner hydrophilic fabric layer toe portions of said shoe extend into an instep portion of said shoe for absorbing and wicking perspiration from said hydrophobic knit instep portion of said knitted sock.

23. Footwear according to Claim 14 wherein said knitted sock further comprises a heel portion of hydrophilic knit fabric adjacent said hydrophobic knit instep portion of said knitted sock so that perspiration from the heel portion of the wearer's foot is absorbed by said hydrophilic knit heel portion of said knitted sock and wicked therefrom by said hydrophobic knit instep portion for transferring to said tongue portion of the shoe.

24. Footwear according to Claim 14 wherein both of said overlying inner and outer hydrophilic fabric layers of said tongue portion of said shoe include a series of perforations for facilitating the transfer of perspiration therethrough.

25. Footwear according to Claim 14 wherein both of said overlying inner and outer hydrophilic fabric layers of said tongue portion of said shoe comprise leather for added comfort to the wearer of the shoe.

26. Footwear according to Claim 25 wherein said inner leather layer of said tongue portion of said shoe is formed of softer more pliable leather than said overlying outer leather layer of said tongue portion of said shoe for added comfort to the wearer of the shoe.

27. Footwear according to Claim 14 wherein said knit instep portion of said knitted sock further comprises at least minor areas of hydrophilic knit fabric.

28. Footwear according to Claim 14 wherein said knit instep portion of said knitted sock further comprises at least one medial band of hydrophilic knit

fabric.

29. Footwear according to Claim 14 wherein said hydrophobic fabric layer medial portion of said tongue portion of said shoe comprises a woven acrylic material.

30. Footwear according to Claim 14 wherein said hydrophobic fabric layer medial portion of said tongue portion of said shoe comprises a woven polypropiene material.

31. Footwear for providing added comfort to the wearer by facilitating the removal and dissipation of perspiration from the foot of the wearer, said footwear comprising a knitted sock and a shoe, said knitted sock having a toe portion and an instep portion adjacent thereto, said toe portion comprising a hydrophilic knit fabric and said instep portion comprising a hydrophobic knit fabric so that perspiration from the toe portion of the foot of the wearer is absorbed by said hydrophilic knit toe portion and wicked therefrom by said hydrophobic knit instep portion of said knitted sock, said shoe comprising a tongue portion overlying and contacting said hydrophobic knit instep portion, said tongue portion having an overlying fabric layer comprising a hydrophilic fabric and an underlying fabric layer being in contacting engagement therewith, said underlying fabric layer having a medial portion comprising a hydrophobic fabric layer and opposite side portions comprising hydrophilic fabric layers, said underlying fabric layer being in contacting engagement with said hydrophobic instep portion of said knitted sock so that perspiration from said hydrophobic knit instep portion is absorbed by said contacting hydrophilic fabric opposite side portions and wicked therefrom by said hydrophobic fabric layer medial portion and thereby transferred to said overlying and contacting outer hydrophilic fabric layer of said tongue portion of said shoe for evaporation therefrom to atmosphere.

32. Footwear according to Claim 31 further comprising wick stitching formed of textile thread extending from said hydrophobic fabric layer medial portion into said hydrophilic fabric opposite side portions of said tongue portion of said shoe for providing added wicking from said hydrophilic fabric opposite side portions to said hydrophobic fabric layer medial portion.

33. Footwear according to Claim 32 wherein said wick stitching forms a sinusoidal pattern extending from said hydrophobic fabric layer medial portion to said hydrophilic fabric opposite side portions.

34. Footwear according to Claim 31 wherein said hydrophobic fabric layer medial portion comprises an upper end and a lower end, said upper end diverging for increasing the surface area of said hydrophobic fabric layer, said lower end converging for decreasing the surface area of said hydrophobic fabric layer.

35. Footwear according to Claim 34 wherein said hydrophilic fabric opposite side portions comprise upper and lower ends, said upper end converging for increasing the surface area of said hydrophobic fabric layer medial portion, said lower end diverging for increasing the surface area of the hydrophilic fabric layer of said intermediate fabric layer.

36. Footwear according to Claim 31 further comprising cross-stitching formed of textile thread joining said hydrophobic fabric layer medial portion and said hydrophilic fabric opposite side portions of said underlying fabric layer.

37. Footwear according to Claim 31 wherein said underlying fabric layer of said tongue portion extends from said tongue portion and into a toe portion of said shoe for absorbing perspiration from said hydrophilic knit toe portion of said knitted sock so as to in turn be

wicked therefrom by said hydrophobic fabric layer medial portion and thereby transferred to said overlying outer hydrophilic fabric layer of said tongue portion of said shoe for evaporation therefrom to atmosphere.

38. Footwear according to Claim 37 wherein said underlying fabric layer of said toe portion of said shoe extends into an instep portion of said shoe for absorbing and wicking perspiration from the hydrophobic knit instep portion of said knitted sock.

39. Footwear according to Claim 31 wherein said knitted sock further comprises a heel portion of hydrophilic knit fabric adjacent said hydrophobic knit instep portion of said knitted sock so that perspiration from the heel portion of the wearer's foot is absorbed by said hydrophilic knit heel portion of said knitted sock and wicked therefrom by said hydrophobic knit instep portion for transferring to said tongue portion of the shoe.

40. Footwear according to Claim 31 wherein said knit instep portion of said knitted sock further comprises at least minor areas of hydrophilic knit fabric.

41. Footwear according to Claim 31 wherein said knit instep portion of said knitted sock further comprises at least one medial band of hydrophilic knit fabric.

42. Footwear according to Claim 31 wherein said outer hydrophilic fabric layer of said tongue portion of said shoe includes a series of perforations for facilitating the transfer of perspiration therethrough.

43. Footwear according to Claim 31 wherein said outer hydrophilic fabric layer of said tongue portion of said shoe comprises leather.

44. Footwear according to Claim 31 wherein said hydrophobic fabric layer medial portion of said tongue

portion of said shoe comprises a woven acrylic material.

45. Footwear according to Claim 31 wherein said hydrophobic fabric layer medial portion of said tongue portion of said shoe comprises a woven polyproplene material.

46. A shoe for providing added comfort to the wearer by facilitating the removal and dissipation of perspiration from the foot of the wearer, said shoe comprising a tongue portion adapted to overlie the instep portion of the wearer's foot, said tongue portion having overlying inner and outer fabric layers comprising hydrophilic fabric, and an intermediate fabric layer having at least a medial portion comprising a hydrophobic fabric layer positioned between said overlying inner and outer hydrophilic fabric layers and being in contacting engagement therewith, said inner hydrophilic fabric layer adapted to overlie and be in contacting engagement with the instep portion of the wearer's foot so that perspiration from the foot of the wearer is absorbed by said overlying and contacting inner hydrophilic fabric layer of said tongue portion of said shoe and wicked therefrom by said contacting intermediate hydrophobic fabric layer and thereby transferred to said overlying outer hydrophilic fabric layer of said tongue portion of said shoe for evaporation therefrom to atmosphere.

47. A shoe according to Claim 46 further comprising wick stitching formed of textile thread extending from said intermediate fabric layer into inner hydrophilic fabric layer of said tongue portion of said shoe for providing added wicking of perspiration from said inner hydrophilic fabric layer to said intermediate fabric layer.

48. A shoe according to Claim 47 wherein said wick stitching forms a sinusoidal pattern along said intermediate fabric layer and said inner hydrophilic

fabric layer.

49. A shoe according to Claim 46 wherein said inner hydrophilic fabric layer and said intermediate fabric layer of said tongue portion of said shoe extend from said tongue portion and into a toe portion of said shoe and adapted for absorbing perspiration from the toe portion of the wearer's foot so as to in turn be wicked therefrom by said intermediate hydrophobic fabric layer of said tongue portion of said shoe and thereby transferred to said overlying outer hydrophilic fabric layer for evaporation therefrom to atmosphere.

50. A shoe according to Claim 49 wherein said intermediate fabric layer and said inner hydrophilic fabric layer toe portions of said shoe extend into an instep portion of said shoe for absorbing and wicking perspiration from the hydrophobic knit instep portion of said knitted sock.

51. A shoe according to Claim 46 wherein both of said overlying inner and outer hydrophilic fabric layers of said tongue portion of said shoe include a series of perforations for facilitating the transfer of perspiration therethrough.

52. A shoe according to Claim 46 wherein both of said overlying inner and outer hydrophilic fabric layers of said tongue portion of said shoe comprise leather for added comfort to the wearer of the shoe.

53. A shoe according to Claim 52 wherein said inner leather layer of said tongue portion of said shoe is formed of softer more pliable leather than said overlying outer leather layer of said tongue portion of said shoe for added comfort to the wearer of the shoe.

54. A shoe according to Claim 46 wherein said hydrophobic fabric layer of said intermediate fabric layer of said tongue portion comprises a woven acrylic material.

55. A shoe according to Claim 46 wherein said hydrophobic fabric layer of said tongue portion of said shoe comprises a woven polyproplene material.

56. A shoe for providing added comfort to the wearer by facilitating the removal and dissipation of perspiration from the foot of the wearer, said shoe comprising a tongue portion adapted to overlie the instep portion of the wearer's foot, said tongue portion having overlying inner and outer fabric layers comprising hydrophilic fabric, and an intermediate fabric layer positioned between said overlying inner and outer hydrophilic fabric layers and being in contacting engagement therewith, said intermediate fabric layer having a medial portion comprising a hydrophobic fabric layer and opposite side portions comprising hydrophilic fabric layers, said inner hydrophilic fabric layer adapted to overlie and be in contacting engagement with the instep portion of the wearer's foot so that perspiration from the foot of the wearer is absorbed by said overlying and contacting inner hydrophilic fabric layer and said hydrophilic fabric opposite side portions of said intermediate fabric layer of said tongue portion of said shoe and wicked therefrom by said hydrophobic fabric layer medial portion of said intermediate fabric layer and thereby transferred to said overlying outer hydrophilic fabric layer of said tongue portion of said shoe for evaporation therefrom to atmosphere.

57. A shoe according to Claim 56 further comprising wick stitching formed of textile thread extending from said hydrophobic fabric layer medial portion into said hydrophilic fabric opposite side portions of said intermediate fabric layer for providing added wicking of perspiration.

58. A shoe according to Claim 57 wherein said wick stitching further extends into said inner hydrophilic

fabric layer of said tongue portion of said shoe for providing wicking from said inner hydrophilic fabric layer to said hydrophobic fabric layer medial portion of said intermediate fabric layer.

59. A shoe according to Claim 57 wherein said wick stitching forms a sinusoidal pattern along said hydrophobic fabric layer medial portion and said hydrophilic fabric opposite side portions.

60. A shoe according to Claim 56 wherein said hydrophobic fabric layer medial portion of said intermediate fabric layer comprises an upper end and a lower end, said upper end diverging for increasing the surface area of said hydrophobic fabric layer, said lower end converging for decreasing the surface area of said hydrophobic fabric layer.

61. A shoe according to Claim 60 wherein said hydrophilic fabric opposite side portions of said intermediate fabric layer comprise upper lower ends, said upper end converging and terminating at said upper end thereof for increasing the surface area of said hydrophobic fabric layer medial portion, said lower end diverging for increasing the surface area of the hydrophilic fabric layer of said intermediate fabric layer.

62. A shoe according to Claim 56 further comprising cross-stitching formed of textile thread joining said hydrophobic fabric layer medial portion and said hydrophilic fabric opposite side portions of said intermediate fabric layer.

63. A shoe according to Claim 56 wherein said inner hydrophilic fabric layer and said hydrophilic fabric of said intermediate fabric layer of said tongue portion of said shoe extend from said tongue portion and into a toe portion of said shoe and adapted for absorbing perspiration from the toe portion of the wearer's foot so

as to in turn be wicked therefrom by said hydrophobic fabric layer medial portion of said intermediate fabric layer of said tongue portion and thereby transferred to said overlying outer hydrophilic fabric layer for evaporation therefrom to atmosphere.

64. A shoe according to Claim 63 wherein said intermediate fabric layer and said inner hydrophilic fabric layer toe portions of said shoe extend into an instep portion of said shoe and adapted for absorbing and wicking perspiration from the instep portion of the wearer's foot.

65. A shoe according to Claim 56 wherein both of said overlying inner and outer hydrophilic fabric layers of said tongue portion of said shoe include a series of perforations for facilitating the transfer of perspiration therethrough.

66. A shoe according to Claim 56 wherein both of said overlying inner and outer hydrophilic fabric layers of said tongue portion of said shoe comprise leather for added comfort to the wearer of said shoe.

67. A shoe according to Claim 66 wherein said inner leather layer of said tongue portion of said shoe is formed of softer more pliable leather than said overlying outer leather layer of said tongue portion of said shoe for added comfort to the wearer of said shoe.

68. A shoe according to Claim 56 wherein said hydrophobic fabric layer medial portion of said tongue portion of said shoe comprises a woven acrylic material.

69. A shoe according to Claim 56 wherein said hydrophobic fabric layer medial portion of said tongue portion of said shoe comprises a woven polyproplene material.

70. A shoe for providing added comfort to the wearer by facilitating the removal and dissipation of perspiration from the foot of the wearer, said shoe

comprising a tongue portion adapted to overlie the instep portion of the wearer's foot, said tongue portion having an overlying outer fabric layer comprising a hydrophilic fabric and an underlying fabric layer being in contacting engagement therewith, said underlying fabric layer having a medial portion comprising of a hydrophobic fabric layer and opposite side portions comprising hydrophilic fabric layers, said underlying fabric layer adapted to overlie the instep portion of the wearer's foot so that perspiration from the foot of the wearer is absorbed by said underlying hydrophilic fabric opposite side portions of said tongue portion and wicked therefrom by said underlying hydrophobic fabric layer medial portion and thereby transferred to said overlying and contacting outer hydrophilic fabric layer for evaporation therefrom to atmosphere.

71. A shoe according to Claim 70 further comprising wick stitching formed of textile thread extending from said hydrophobic fabric layer medial portion in said hydrophilic fabric opposite side portions of said tongue portion of said shoe for providing added wicking of perspiration from said hydrophilic opposite side portions to said hydrophobic fabric layer medial portion.

72. A shoe according to Claim 71 wherein said wick stitching forms a sinusoidal pattern extending from said hydrophobic fabric layer medial portion to said hydrophilic fabric opposite side portions.

73. A shoe according to Claim 70 wherein said hydrophobic fabric layer medial portion of said underlying fabric layer comprises an upper end and a lower end, said upper end diverging for increasing the surface area of said hydrophobic fabric layer, said lower end converging for decreasing the surface area of said hydrophobic fabric layer.

74. A shoe according to Claim 73 wherein said

hydrophilic fabric opposite side portions of said underlying fabric layer comprise upper and lower ends, said upper end converging and terminating at said upper end thereof for increasing the surface area of said hydrophobic fabric layer medial portion, said lower end diverging for increasing the surface area of the hydrophilic fabric of said intermediate fabric layer.

75. A shoe according to Claim 70 further comprising cross-stitching formed of textile thread joining said hydrophobic fabric layer medial portion and said hydrophilic fabric opposite side portions of said underlying fabric layer.

76. A shoe according to Claim 70 wherein said underlying hydrophilic fabric layer of said tongue portion of said shoe extends from said tongue portion and into a toe portion of said shoe and adapted for absorbing perspiration from the toe portion of the foot of the wearer so as to in turn be wicked therefrom by said hydrophobic fabric layer medial portion and thereby transferred to said overlying outer hydrophilic fabric layer of said tongue portion of said shoe for evaporation therefrom to atmosphere.

77. A shoe according to Claim 76 wherein said underlying fabric layer of said toe portion of said shoe extends into an instep portion of said shoe for absorbing and wicking perspiration from the hydrophobic knit instep portion of said knitted sock.

78. A shoe according to Claim 70 wherein said outer hydrophilic fabric layer comprises leather.

79. A shoe according to Claim 70 wherein said outer hydrophilic fabric layer includes a series of perforations for facilitating the transfer of perspiration therethrough.

80. A shoe according to Claim 70 wherein said hydrophobic fabric layer medial portion of said tongue

portion of said shoe comprises a woven acrylic material.

81. A shoe according to Claim 70 wherein said hydrophobic fabric layer medial portion of said tongue portion of said shoe comprises a woven polyproplene material.

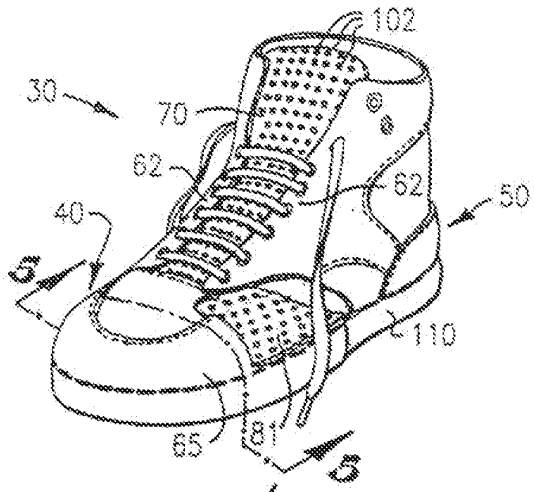


Fig-1

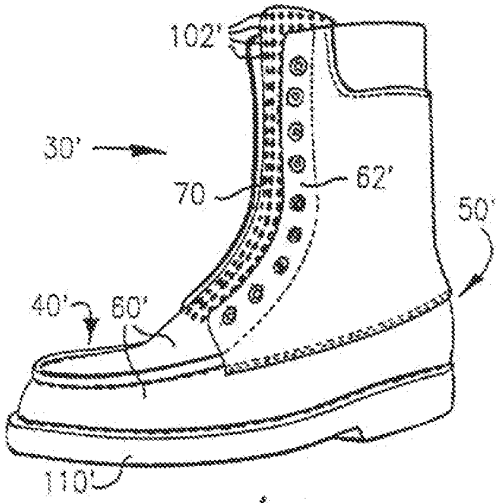


Fig-2

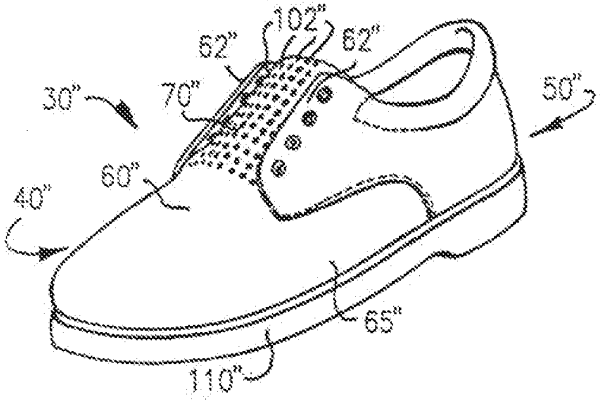


Fig-3

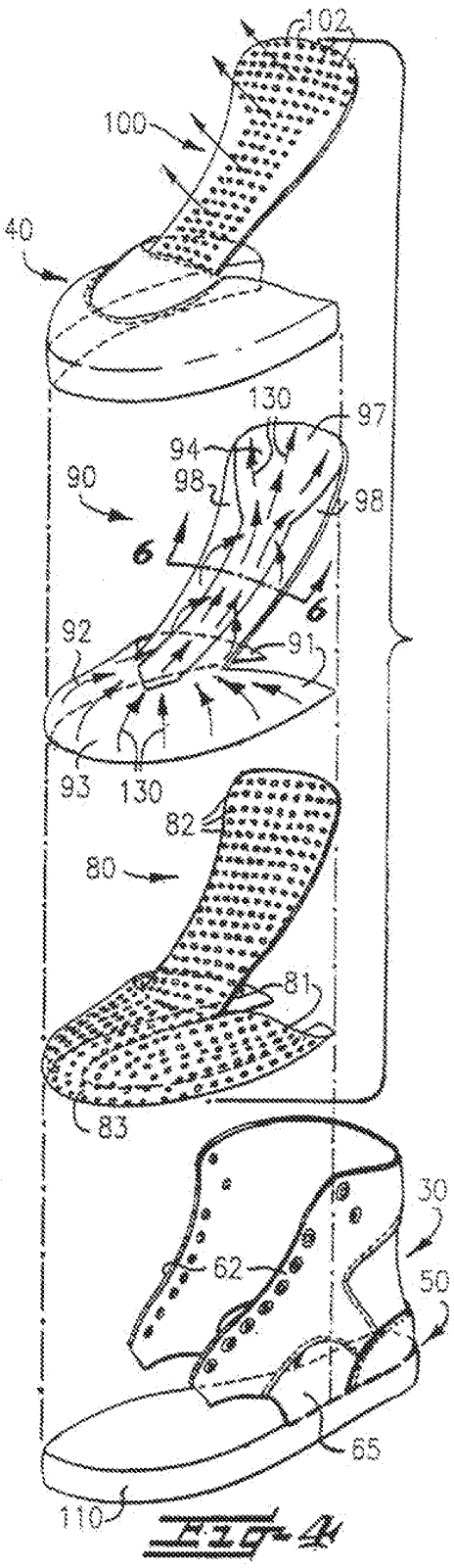


Fig-4

SUBSTITUTE SHEET

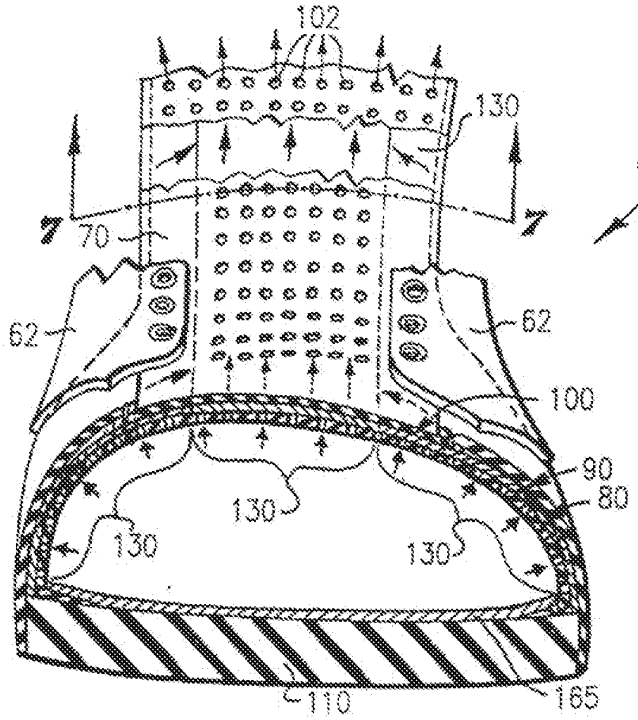


Fig-5

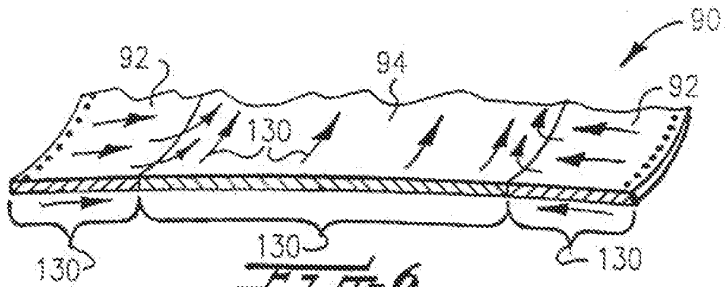


Fig-6

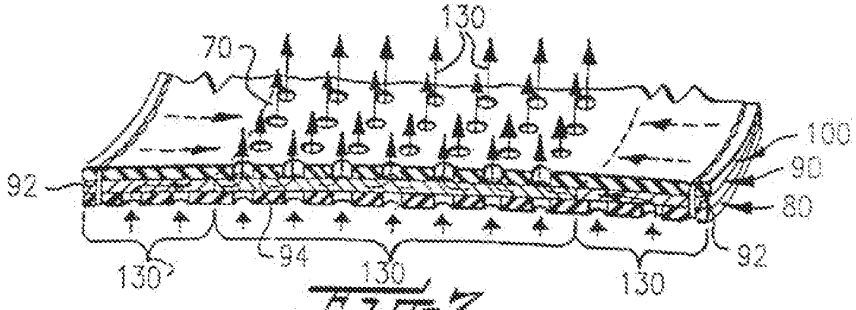


Fig-7

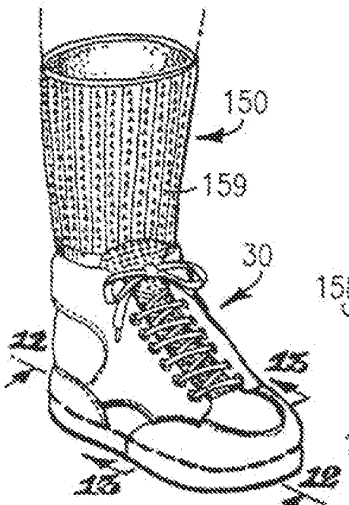


Fig-8

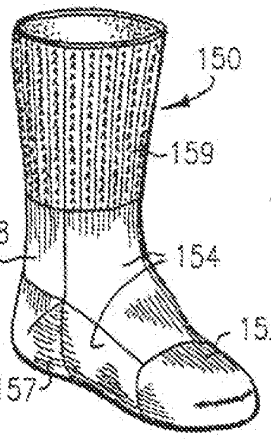


Fig-9

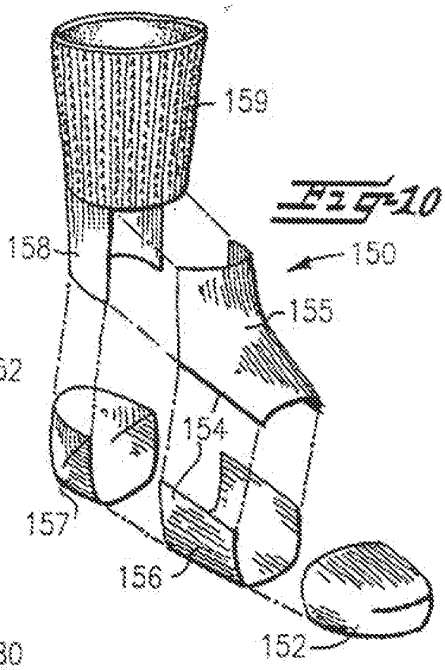


Fig-10

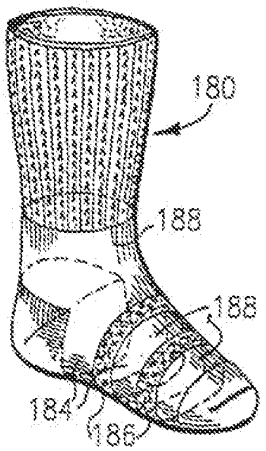


Fig-11

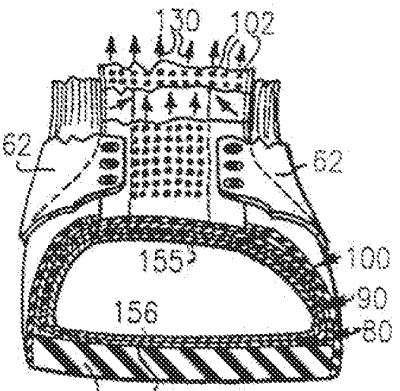


Fig-13

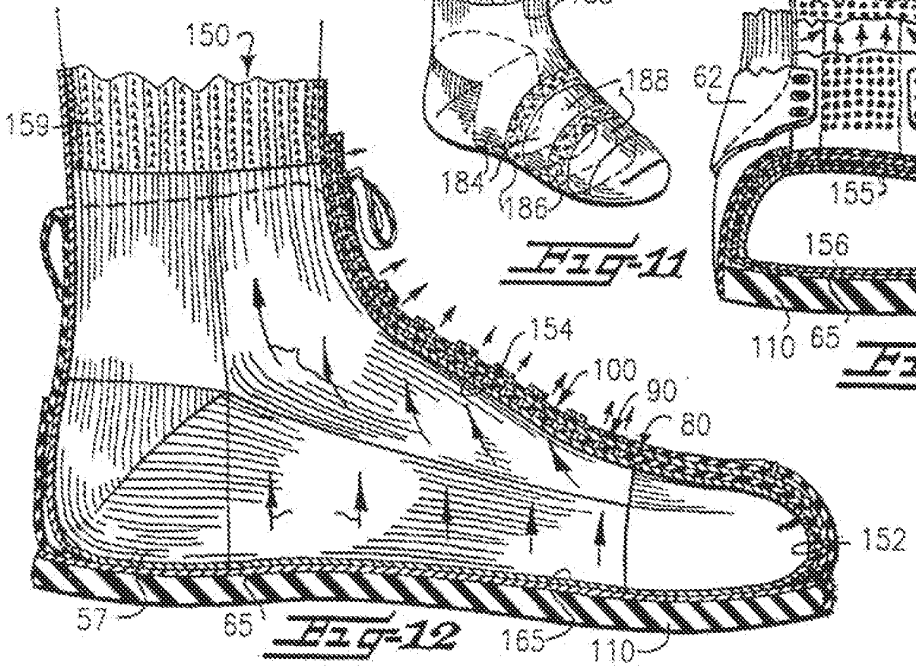


Fig-12

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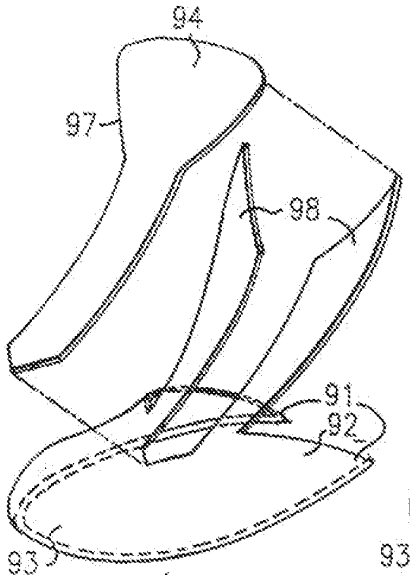


Fig-14

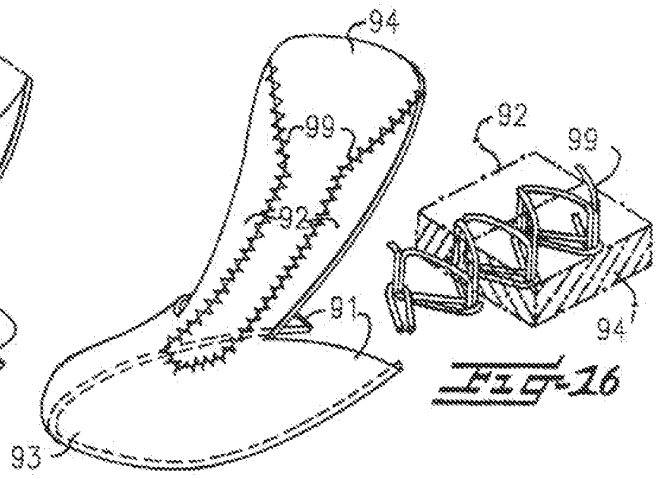


Fig-15

Fig-16

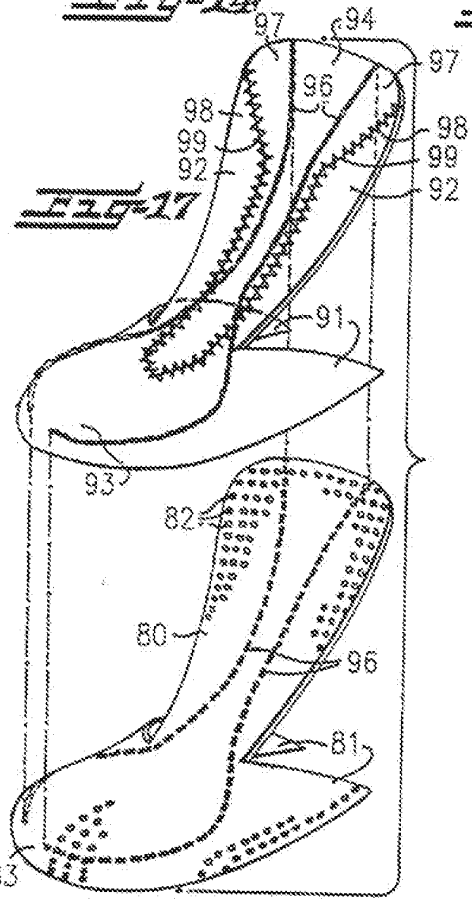


Fig-17

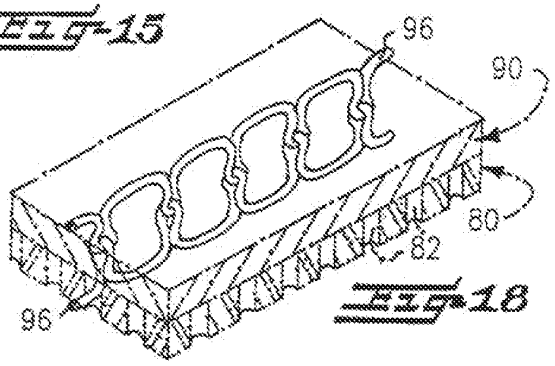


Fig-18

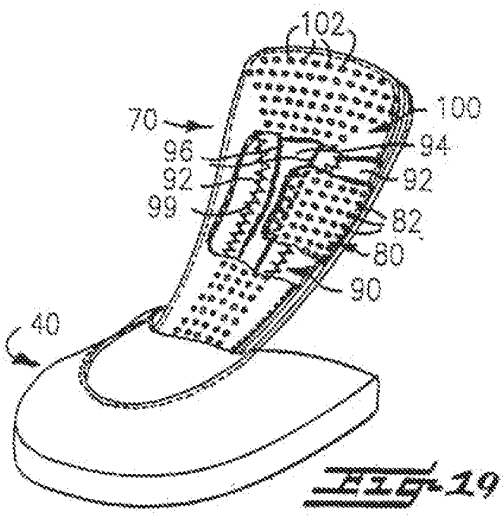


Fig-19

INTERNATIONAL SEARCH REPORT

International Application No PCT/US 93/05600

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 A43B17/10; A43B7/12; A43B23/26

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	A43B ; A41B

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category[10]	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X	US,A,4 430 811 (OKADA) 14 February 1984 cited in the application	46,51~55
Y		1,9~13
Y	US,A,4 898 007 (DAHLGREN) 6 February 1990	1,9~13
A		14~17, 31~33
Y	EP,A,0 353 430 (THE TIMBERLAND COMPANY) 7 February 1990	1,12~14, 29~31, 44~46, 54~56, 68~70, 80,81

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* Special categories of cited documents :[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
13 OCTOBER 1993	05 -11- 1993
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	MATHEY X.C.M.

Form PCT/ISA/210 (second sheet) (January 1985)

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
Y	US,A,4 615 188 (HURSH ET AL.) 7 October 1986	1,12-14, 29-31, 44-46, 54-56, 68-70, 80,81
A	US,A,2 004 897 (LUSSIER) 11 June 1935	4,5,21, 22,37, 38,49, 50,63, 64,76,77
A	US,A,4 461 099 (BAILLY) 24 July 1984 see claims 1-3	1,2,6, 14-16, 23,31, 32,39, 46-47, 56-58,70
A	GB,A,2 080 092 (SARRAGAN SA) 3 February 1982 cited in the application & US,A,4 458 429 (SCHMID) 10 July 1984	9,24,42, 51,65,79
A	EP,A,0 182 245 (PUMA) 28 May 1986 see page 3, paragraph 2 see page 4, paragraph 4; claims 1,2,10	14,31, 56,70

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. US 9305600
SA 76152

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-4430811	14-02-84	None		
US-A-4898007	06-02-90	None		
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		JP-A-	2161901	21-06-90
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EPO FORM P0479

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
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(54) **Title**: ARTICLE OF FOOTWEAR HAVING AN UPPER INCORPORATING A KNITTED COMPONENT

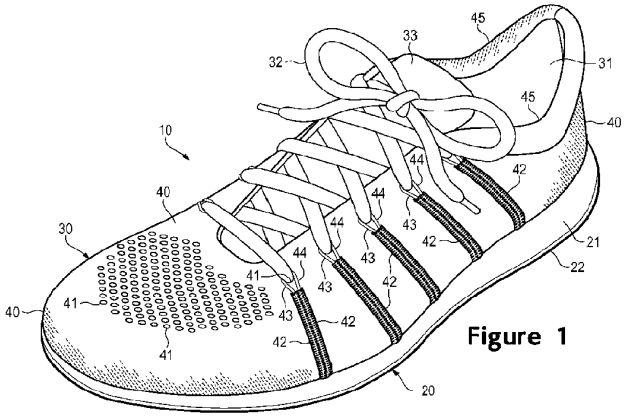


Figure 1

(57) **Abstract**: An article of footwear (10) has an upper (30) that includes a knitted component and a sole structure (20) secured to the upper. The knitted component may define a tube (42) formed of unitary knit construction, and a strand (43) may extend through a length of the tube. As another example, the knitted component may have a pair of at least partially coextensive knitted layers formed of unitary knit construction, and a plurality of floating yarns may extend between the knitted layers. In some configurations, the knit type or yarn type may vary in different regions of the knitted component to impart different properties. Additionally, the knitted component may incorporate a thermoplastic yarn that is fused in different regions of the knitted component to impart different properties. A flat knitting process or a variety of other knitting processes may be utilized to form the knitted component.

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ARTICLE OF FOOTWEAR HAVING AN UPPER INCORPORATING A KNITTED COMPONENT

BACKGROUND

[01] Conventional articles of footwear generally include two primary elements, an upper and a sole structure. The upper is secured to the sole structure and forms a void on the interior of the footwear for comfortably and securely receiving a foot. The sole structure is secured to a lower surface of the upper so as to be positioned between the upper and the ground. In some articles of athletic footwear, for example, the sole structure may include a midsole and an outsole. The midsole may be formed from a polymer foam material that attenuates ground reaction forces to lessen stresses upon the foot and leg during walking, running, and other ambulatory activities. The outsole is secured to a lower surface of the midsole and forms a ground-engaging portion of the sole structure that is formed from a durable and wear-resistant material. The sole structure may also include a sockliner positioned within the void and proximal a lower surface of the foot to enhance footwear comfort.

[02] The upper generally extends over the instep and toe areas of the foot, along the medial and lateral sides of the foot, and around the heel area of the foot. In some articles of footwear, such as basketball footwear and boots, the upper may extend upward and around the ankle to provide support or protection for the ankle. Access to the void on the interior of the upper is generally provided by an ankle opening in a heel region of the footwear. A lacing system is often incorporated into the upper to adjust the fit of the upper, thereby permitting entry and removal of the foot from the void within the upper. The lacing system also permits the wearer to modify certain dimensions of the upper, particularly girth, to accommodate feet with varying dimensions. In addition, the upper may include a tongue that extends under the lacing system to enhance adjustability of the footwear, and the upper may incorporate a heel counter to limit movement of the heel.

[03] Various materials are conventionally utilized in manufacturing the upper. The upper of athletic footwear, for example, may be formed from multiple material elements. The materials may be selected based upon various properties, including stretch-resistance, wear-resistance, flexibility, air-permeability, compressibility, and moisture-wicking, for example. With regard to an exterior of the upper, the toe area and the heel area may be formed of leather, synthetic leather, or a rubber material to impart a relatively high degree of wear-resistance. Leather, synthetic leather, and rubber materials may not exhibit the desired degree of flexibility and air-permeability for various other areas of the exterior. Accordingly, the other areas of the exterior may be formed from a synthetic textile, for example. The exterior of the upper may be formed, therefore, from numerous material elements that each impart different properties to the upper. An intermediate or central layer of the upper may be formed from a lightweight polymer foam material that provides cushioning and enhances comfort. Similarly, an interior of the upper may be formed of a comfortable and moisture-wicking textile that removes perspiration from the area immediately surrounding the foot. The various material elements and other components may be joined with an adhesive or stitching. Accordingly, the conventional upper is formed from various material elements that each impart different properties to various areas of the footwear.

SUMMARY

[04] A flat knitting process or a variety of other knitting processes may be utilized to form a knitted component for an upper of an article of footwear. Various features may be incorporated into the knitted component. For example, the knitted component may define a tube formed of unitary knit construction, and a strand may extend through a length of the tube. As another example, the knitted component may have a pair of at least partially coextensive knitted layers formed of unitary knit construction, and a plurality of floating yarns may extend between the knitted layers. In some configurations, the knit type or yarn type may vary in

different regions of the knitted component to impart different properties. Additionally, the knitted component may incorporate a thermoplastic yarn that is fused in different regions of the knitted component to impart different properties.

[05] The advantages and features of novelty characterizing aspects of the invention are pointed out with particularity in the appended claims. To gain an improved understanding of the advantages and features of novelty, however, reference may be made to the following descriptive matter and accompanying figures that describe and illustrate various configurations and concepts related to the invention.

FIGURE DESCRIPTIONS

[06] The foregoing Summary and the following Detailed Description will be better understood when read in conjunction with the accompanying figures.

[07] Figure 1 is a perspective view of an article of footwear.

[08] Figure 2 is a lateral side elevational view of an article of footwear.

[09] Figure 3 is a medial side elevational view of the article of footwear.

[10] Figure 4 is a top plan view of the article of footwear.

[11] Figures 5A-5D are cross-sectional views of the article of footwear, as respectively defined by section lines 5A-5D in Figure 2.

[12] Figure 6 is a top plan view of a knitted component that forms a portion of an upper of the article of footwear.

[13] Figures 7A-7G are side elevational views corresponding with Figure 2 and depicting further configurations of the article of footwear.

[14] Figures 8A and 8B are cross-sectional views corresponding with Figure 5D and depicting further configurations of the article of footwear.

DETAILED DESCRIPTION

[15] The following discussion and accompanying figures disclose an article of footwear having an upper that includes a knitted component. The article of footwear is disclosed as having a general configuration suitable for walking or running. Concepts associated with the footwear, including the upper, may also be applied to a variety of other athletic footwear types, including baseball shoes, basketball shoes, cross-training shoes, cycling shoes, football shoes, tennis shoes, soccer shoes, and hiking boots, for example. The concepts may also be applied to footwear types that are generally considered to be non-athletic, including dress shoes, loafers, sandals, and work boots. The concepts disclosed herein apply, therefore, to a wide variety of footwear types.

General Footwear Structure

[16] An article of footwear 10 is depicted in Figures 1-5D as including a sole structure 20 and an upper 30. For reference purposes, footwear 10 may be divided into three general regions: a forefoot region 11, a midfoot region 12, and a heel region 13, as shown in Figures 2 and 3. Footwear 10 also includes a lateral side 14 and a medial side 15. Forefoot region 11 generally includes portions of footwear 10 corresponding with the toes and the joints connecting the metatarsals with the phalanges. Midfoot region 12 generally includes portions of footwear 10 corresponding with the arch area of the foot, and heel region 13 corresponds with rear portions of the foot, including the calcaneus bone. Lateral side 14 and medial side 15 extend through each of regions 11-13 and correspond with opposite sides of footwear 10. Regions 11-13 and sides 14-15 are not intended to demarcate precise areas of footwear 10. Rather, regions 11-13 and sides 14-15 are intended to represent general areas of footwear 10 to aid in the following discussion. In addition to footwear 10, regions 11-13 and sides 14-15 may also be applied to sole structure 20, upper 30, and individual elements thereof.

[17] Sole structure 20 is secured to upper 30 and extends between the foot and the ground when footwear 10 is worn. The primary elements of sole structure 20 are a midsole 21, an outsole 22, and an sockliner 23. Midsole 21 is secured to a lower surface of upper 30 and may be formed from a compressible polymer foam element (e.g., a polyurethane or ethylvinylacetate foam) that attenuates ground reaction forces (i.e., provides cushioning) when compressed between the foot and the ground during walking, running, or other ambulatory activities. In further configurations, midsole 21 may incorporate a fluid-filled bladder that supplements the ground reaction force attenuation properties, or midsole 21 may be primarily formed from the fluid-filled bladder. Outsole 22 is secured to a lower surface of midsole 21 and may be formed from a wear-resistant rubber material that is textured to impart traction. Sockliner 23 is located within upper 30 and is positioned to extend under a lower surface of the foot. Although this configuration for sole structure 20 provides an example of a sole structure that may be used in connection with upper 30, a variety of other conventional or nonconventional configurations for sole structure 20 may also be utilized. Accordingly, the structure and features of sole structure 20 or any sole structure utilized with upper 30 may vary considerably.

[18] Upper 30 defines a void within footwear 10 for receiving and securing a foot relative to sole structure 20. The void is shaped to accommodate the foot and extends along the lateral side of the foot, along the medial side of the foot, over the foot, around the heel, and under the foot. Access to the void is provided by an ankle opening 31 located in at least heel region 13. A lace 32 extends through portions of upper 30, as described in greater detail below, and permits the wearer to modify dimensions of upper 30 to accommodate the proportions of the foot. More particularly, lace 32 permits the wearer to tighten upper 30 around the foot, and lace 32 permits the wearer to loosen upper 30 to facilitate entry and removal of the foot from the void (i.e., through ankle opening 31). In addition, upper 30 includes a tongue 33 that extends under lace 32.

[19] A majority of upper 30 is formed from a knitted component 40 that may, for example, be manufactured through a flat knitting process. Knitted component 40 extends through each of regions 11-13, along both lateral side 14 and medial side 15, over forefoot region 11, and around heel region 13. In addition, knitted component 40 forms both an interior surface and an opposite exterior surface of upper 30. As such, knitted component 40 defines at least a portion of the void within upper 30, and knitted component 40 also defines ankle opening 31 to provide access to the void. In some configurations, knitted component 40 may also extend under the foot. For purposes of example in the various figures, however, a strobel sock 34 is secured to knitted component 40 and forms a majority of the portion of upper 30 that extends under the foot. In this configuration, sockliner 23 extends over strobel sock 34 and forms a surface upon which the foot rests.

Knitted Component Configuration

[20] Knitted component 40 incorporates various knit types that impart different properties to separate areas of upper 30. As an example that is depicted in Figures 1, 4, and 5A, knitted component 40 forms various apertures 41 that extend through upper 30 in forefoot region 11, whereas many other areas of upper 30 have a more continuous or less-apertured configuration. In addition to imparting greater permeability, which allows air to circulate within upper 30, apertures 41 may increase both the flexibility and stretch of upper 30 in forefoot region 11. As further examples, other properties that may be varied through selecting particular knit types for a particular area of knitted component 40 include permeability to liquids, the directions in which knitted component 40 stretches or resists stretch, the stiffness of knitted component 40, and the compressibility of knitted component 40. Additional examples of knitted components for footwear uppers that have areas with different knit types to impart different properties may be found in U.S. Patent Number 6,931,762 to Dua and U.S. Patent Number 7,347,011 to Dua, et al., both of which are entirely incorporated herein by reference. As a related matter, the density of the knit

within knitted component 40 may vary among separate areas of upper 30 to, for example, make less-permeable or stiffer portions. Accordingly, knitted component 40 may exhibit various properties in separate areas depending upon the particular knit type that is selected for the areas.

[21] Knitted component 40 may also incorporate various yarn types that impart different properties to separate areas of upper 30. Moreover, by combining various yarn types with various stitch types, knitted component 40 may impart a range of different properties to separate areas of upper 30. The properties that a particular type of yarn will impart to an area of knitted component 40 partially depend upon the materials that form the various filaments and fibers within the yarn. Cotton, for example, provides a soft hand, natural aesthetics, and biodegradability. Elastane and stretch polyester each provide substantial stretch and recoverability, with stretch polyester also providing recycleability. Rayon provides high luster and moisture absorption. Wool also provides high moisture absorption, in addition to insulating properties. Nylon is a durable and abrasion-resistant material with high strength. Polyester is a hydrophobic material that also provides relatively high durability. In addition to materials, other aspects relating to the yarn may affect the properties of upper 30. For example, the yarn may be a monofilament yarn or a multifilament yarn. The yarn may also include separate filaments that are each formed of different materials. The yarn may also include filaments that are each formed of two or more different materials, such as a bicomponent yarn with filaments having a sheath-core configuration or two halves formed of different materials. Different degrees of twist and crimping, as well as different deniers, may affect the properties of upper 30 where the yarn is located. Accordingly, both the materials forming the yarn and other aspects of the yarn may be selected to impart a variety of properties to separate areas of upper 30.

[22] In addition to knit types and yarn types, knitted component 40 may incorporate various knitted structures. Referring to Figures 2 and 3, for example, knitted component 40 includes various tubes 42 in which strands 43 are located. Tubes

42 are generally hollow structures formed by two overlapping and at least partially coextensive layers of knitted material, as depicted in Figures 5B and 5C. Although the sides or edges of one layer of the knitted material forming tubes 42 may be secured to the other layer, a central area is generally unsecured such that another element (e.g., strands 43) may be located between the two layers of knitted material and pass through tubes 42. An additional example of knitted components for footwear uppers that have overlapping or at least partially coextensive layers may be found in U.S. Patent Application Publication 2008/0110048 to Dua, et al., which is incorporated herein by reference.

[23] Tubes 42 extend upward along lateral side 14 and medial side 15. Each tube 42 is adjacent to at least one other tube 42 to form a tube pair. In general, one of strands 43 passes through a first tube 42 of a tube pair, extends outward from an upper end of the first tube 42, forms a loop 44 on the exterior of upper 30, extends into an upper end of a second tube 42 of the tube pair, and passes through the second tube 42. That is, each strand 43 passes through at least two tubes 42, and an exposed portion of the strand 43 forms a loop 44.

[24] An individual strand 43 may only pass through two adjacent tubes 42 (i.e., a single tube pair) such that the strand 43 forms a single loop 44. In this configuration, end portions of the strand 43 exit lower ends of the two adjacent tubes 42 and may be secured to sole structure 20 under strobel sock 34, for example, to prevent the end portions from being pulled through one of tubes 42. In another configuration, an individual strand 43 may pass through each of tubes 42, thereby passing through multiple tube pairs and forming multiple loops 44. In yet another configuration, one strand 43 may pass through each of tubes 42 located on lateral side 14, and another strand 43 may pass through each of tubes 42 located on medial side 15. In general, therefore, an individual strand 43 passes through at least one tube pair to form at least one loop 44, but may pass through multiple tube pairs to form multiple loops 44.

[25] Referring to Figures 1-4, lace 32 extends through each of loops 44 and also passes through various apertures 41 that are formed in knitted component 40 adjacent to each of loops 44. The combination of lace 32, the apertures 41 through which lace 32 extends, the various tubes 42 on both lateral side 14 and medial side 15, strands 43, and loops 44 provide an effective lacing system for upper 30. When lace 32 is placed in tension (i.e., when the wearer is tying lace 32), tension may also be induced in strands 43. In the absence of strands 43, other portions of knitted component 40 would bear the tension and resulting stresses from tying lace 32. The presence of strands 43, however, provides a separate element to bear the tension and stresses. Moreover, a majority of knitted component 40 may be generally formed through selection of knit type and yarn type to stretch when placed in tension, thereby allowing upper 30 to conform with the contours of the foot. Strands 43, however, may be generally non-stretch in comparison with upper 30.

[26] Strands 43 may be formed from a variety of materials and may have the configurations of a rope, thread, webbing, cable, yarn, filament, or chain, for example. In some configurations, strands are located within tubes 42 during the knitting process that forms knitted component 40. As such, strands 43 may be formed from any generally one-dimensional material that may be utilized in a knitting machine or other device that forms knitted component 40. As utilized with respect to the present invention, the term "one-dimensional material" or variants thereof is intended to encompass generally elongate materials exhibiting a length that is substantially greater than a width and a thickness. Accordingly, suitable materials for strands 43 include various filaments, fibers, and yarns, that are formed from rayon, nylon, polyester, polyacrylic, silk, cotton, carbon, glass, aramids (e.g., para-aramid fibers and meta-aramid fibers), ultra high molecular weight polyethylene, and liquid crystal polymer. In addition to filaments and yarns, other one-dimensional materials may be utilized for strands 43. Although one-dimensional materials will often have a cross-section where width and thickness are substantially equal (e.g., a round or square cross-section), some one-dimensional materials may have a width that is somewhat greater than a

thickness (e.g., a rectangular, oval, or otherwise elongate cross-section). Despite the greater width, a material may be considered one-dimensional if a length of the material is substantially greater than a width and a thickness of the material.

[27] Another structure formed by knitted component 40 is a padded collar 45 that extends at least partially around ankle opening 31. Referring to Figures 1-3, collar 45 exhibits a greater thickness than many other portions of knitted component 40. In general, collar 45 is formed by two overlapping and at least partially coextensive layers of knitted material (i.e., a tubular structure) and a plurality of floating yarns 46 extending between the layers, as depicted in Figure 5D. Although the sides or edges of one layer of knitted material forming collar 45 may be secured to the other layer of knitted material, a central area is generally unsecured. As such, the layers of knitted material effectively form a tube or tubular structure similar to tubes 42, and floating yarns 46 may be located or laid-in between the two layers of knitted material to pass through the tubes. That is, floating yarns 46 extend between the layers of knitted material, are generally parallel to surfaces of the knitted material, and also pass through and fill an interior volume between the layers. Whereas a majority of knitted component 40 is formed from yarns that are mechanically-manipulated to form a knitted component, floating yarns 46 are generally free or otherwise laid-in within the interior volume between the layers of knitted material forming the exterior of collar 45.

[28] Whereas tubes 42 include a single strand 43, collar 45 includes a plurality of floating yarns 46 that extend through the area between the layers of knitted material. Accordingly, knitted component 40 may form generally tubular structures having one or multiple yarns within the tubular structures. Moreover, floating yarns 46 may be formed from a variety of materials and may be located within collar 45 during the knitting process that forms knitted component 40. As such, floating yarns 46 may be formed from any generally one-dimensional

material that may be utilized in a knitting machine or other device that forms knitted component 40.

[29] The presence of floating yarns 46 imparts a compressible aspect to collar 45, thereby enhancing the comfort of footwear 10 in the area of ankle opening 31. Many conventional articles of footwear incorporate polymer foam elements or other compressible materials into a collar area. In contrast with the conventional articles of footwear, collar 45 utilizes floating yarns 46 to provide a compressible structure.

[30] The combination of tubes 42 and strands 43 provides upper 30 with a structural element that, for example, resists stretch in a lacing system. Similarly, the combination of collar 45 and floating yarns 46 provides upper 30 with a structural element that, for example, compresses to impart greater comfort around ankle opening 31. Although these knitted structures provide different benefits to upper 30, these knitted structures are similar in that each includes (a) a tubular structure formed from two overlapping and at least partially coextensive layers of knitted material formed of unitary knit construction and (b) at least one yarn, strand, or other one-dimensional material that is laid-in or otherwise located within the tubular structure and extends through at least a portion of a length of the tubular structure.

Flat Knitting Process

[31] A flat knitting process may be utilized to manufacture knitted component 40. Flat knitting is a method for producing a knitted material that is turned periodically (i.e., the material is knitted from alternating sides). The two sides (otherwise referred to as faces) of the material are conventionally designated as the right side (i.e., the side that faces outwards, towards the viewer) and the wrong side (i.e., the side that faces inwards, away from the viewer). Although flat knitting provides a suitable manner for forming knitted component 40, other knitting processes may also be utilized, depending upon the features that are incorporated into knitted component 40. Examples of other knitting processes

that may be utilized include wide tube circular knitting, narrow tube circular knit jacquard, single knit circular knit jacquard, double knit circular knit jacquard, warp knit tricot, warp knit raschel, and double needle bar raschel.

[32] An advantage to utilizing a flat knitting process to manufacture knitted component 40 is that each of the features discussed above may be imparted to knitted component 40 through the flat knitting process. That is, a flat knitting process may form knitted component 40 to have, for example, (a) various knit types that impart different properties to separate areas of upper 30, (b) various yarn types that impart different properties to separate areas of upper 30, (c) knitted components with the configuration of overlapping knitted layers in tubes 42, (d) a material such as strand 43 that is laid into tubes 42, (e) knitted components with the configuration of overlapping knitted layers in collar 45, and (f) floating yarns between layers of knitted material in collar 45. Moreover, each of these features, as well as other features, may be incorporated into knitted component 40 through a single flat knitting process. As such, a flat knitting process may be utilized to substantially form upper 30 to have various properties and structural features that are advantageous to footwear 10.

[33] Although one or more yarns may be mechanically-manipulated by an individual to form knitted component 40 (i.e., knitted component 40 may be formed by hand), flat-knitting machines may provide an efficient manner of forming relatively large numbers of knitted component 40. The flat-knitting machines may also be utilized to vary the dimensions of knitted component 40 to form uppers 30 that are suitable for footwear with different sizes based on one or both of the length and width of a foot. Additionally, the flat-knitting machines may be utilized to vary the configuration of knitted component 40 to form uppers 30 that are suitable for both left and right feet. Various aspects of knitted component 40 may also be varied to provide a custom fit for individuals. Accordingly, the use of mechanical flat-knitting machines may provide an efficient manner of forming multiple knitted components 40 having different sizes and configurations.

[34] Knitted component 40 incorporates various features and structures formed of unitary knit construction. In general, the features and structures are formed of unitary knit construction when incorporated into knitted component 40 through the flat knitting process, rather than other processes (e.g., stitching, bonding, shaping) that are performed after the flat knitting process. As an example, tubes 42 and portions of collar 45 are formed from overlapping and at least partially coextensive layers of knitted material, and sides or edges of one layer may be secured to the other layer. The two layers of knitted material are generally formed during the flat knitting process and do not involve supplemental stitching, bonding, or shaping processes. The overlapping layers are, therefore, formed of unitary knit construction through the flat knitting process. As another example, the regions of knitted component 40 formed from knit types that define apertures 41 are formed of unitary knit construction through the flat knitting process. As yet another example, floating yarns 46 are formed of unitary knit construction.

[35] A further advantage of utilizing a flat knitting process to form knitted component 40 is that three-dimensional aspects may be incorporated into upper 30. Upper 30 has a curved or otherwise three-dimensional structure that extends around the foot and conforms with a shape of the foot. The flat knitting process may, for example, form areas of knitted component 40 with some curvature in order to complement the shape of the foot. Examples of knitted components for footwear uppers that have three-dimensional aspects may be found in U.S. Patent Application Publication 2008/0110048 to Dua, et al., which is incorporated herein by reference.

[36] Knitted component 40 is depicted separate from footwear 10 and following the flat knitting process in Figure 6. Whereas edges of many textile materials are cut to expose ends of the yarns forming the textile materials, knitted component 40 may be formed to have a finished configuration. That is, flat-knitting or other knitting techniques may be utilized to form knitted component 40 such that ends of the yarns within knitted component 40 are substantially absent from the edges of knitted component 40. An advantage of the finished configuration formed

through flat-knitting is that the yarns forming the edges of knitted component 40 are less likely to unravel, which is an inherent issue with weft knit materials. By forming finished edges, the integrity of knitted component 40 is strengthened and fewer or no post-processing steps are required to prevent unraveling. In addition, loose yarns are also less likely to inhibit the aesthetic appearance of upper 30. In other words, the finished configuration of knitted component 40 may enhance the durability and aesthetic qualities of upper 20, while increasing manufacturing efficiency.

[37] Knitted component 40 provides one example of a configuration that is suitable for upper 30 of footwear 10. Depending upon the intended use of an article of footwear, the desired properties of the article of footwear, and advantageous structural attributes of the article of footwear, for example, a knitted component similar to knitted component 40 may be formed through flat knitting to have the desired features. That is, flat knitting may be utilized to (a) locate specific knit types in desired areas of the knitted component, (b) locate specific yarn types in desired areas of the knitted component, (c) form overlapping knitted layers similar to tubes 42 and collar 45 in desired areas of the knitted component, (d) place strands or floating yarns similar to strands 43 and floating yarns 46 between the knitted layers, (e) form three-dimensional aspects in the knitted component, and (f) impart finished edges. More particularly, any of the features discussed above, for example, may be mixed and matched within a knitted component to form specific properties or structural attributes for a footwear upper.

Further Configurations

[38] The features of upper 30 discussed above provides one example of a suitable configuration for footwear 10. A variety of other configurations may also be utilized. As an example, some of the features discussed above may be absent from knitted component 40 in some configurations of footwear 10. Referring to Figure 7A, collar 45 is absent from knitted component 40 such that a single layer

of knitted material forms the area extending around ankle opening 31. Similarly, tubes 42 and strands 43 are absent in Figure 7B. By utilizing only the structures or features that are beneficial for a particular athletic activity, for example, footwear 10 may have a minimal configuration with only necessary or advantageous elements.

[39] As discussed above, separate areas of upper 30 may have different properties due to utilizing different knit types or yarn types in those areas. Another manner of modifying the properties of particular areas relates to fusing thermoplastic materials from the yarns in those areas. That is, particular areas may be formed from yarns that incorporate thermoplastic polymer materials. By heating the thermoplastic polymer materials, adjacent yarns, filaments, or fibers may fuse to each other in those areas to lock the knit loops together, thereby increasing stiffness or wear-resistance. In some configurations, individual layers of knitted component 40 (e.g., the exterior layer or the interior layer of tubes 42 or collar 45) or laid-in yarns within knitted component 40 (i.e., strands 43 or floating yarns 46) may be formed from yarns that incorporate thermoplastic polymer materials. As an alternative, the entirety of knitted component 40 may also be formed from yarns that incorporate thermoplastic polymer materials, and only portions corresponding with fused areas 47 may be heated to modify the properties. Referring to Figure 7C, knitted component 40 includes two fused areas 47. One of fused areas 47 is in heel region 13 and may impart greater stiffness in order to effectively provide a heel counter to footwear 10. Examples of footwear uppers having fused regions may be found in U.S. Patent Number 6,910,288 to Dua, which is incorporated herein by reference. Another of fused area 47 is in forefoot region 11 and may impart greater wear-resistance to the forefoot area. Fusing may also be utilized to reinforce apertures 41, provide areas of decreased flex, or decrease permeability.

[40] While fusing areas of knitted component 40 may impart greater stiffness and wear-resistance to those areas, another method may be to increase the knit density in specific areas. Referring to Figure 7D, knitted component 40 includes

two dense areas 48. One of dense areas 48 is in heel region 13 and may impart greater stiffness in order to effectively provide a heel counter to footwear 10. Another of dense areas 48 is in forefoot region 11 and may impart greater wear-resistance to the forefoot area. As with forming fused areas 47, forming a denser knit may also be utilized to reinforce apertures 41, provide areas of decreased flex, or decrease permeability.

[41] Knitted component 40 forms both an interior surface and an opposite exterior surface of upper 30. In some configurations of footwear 10, other elements may be utilized in combination with knitted component 40, and the other elements may form a portion or all of one of the interior or exterior surfaces. Referring to Figure 7E, a heel counter 35 is secured to knitted component 40 in heel region 13 and may be formed from a relatively stiff polymer material. An adhesive bonding process may be utilized to join heel counter 35 to knitted component 40. In other configurations, a lining may extend over the interior surface, thereby forming a portion of the void within upper 30. Other materials may be welded, adhered, or bonded onto the exterior surface to protect the knit structure of knitted component 40 or provide other benefits to footwear 10.

[42] Tubes 42 are depicted in Figures 2 and 3 as being immediately adjacent to at least one other tube 42. The relative positions of tubes 42 may, however, vary significantly. Referring to Figure 7F, tubes 42 are separated from each other and form V-shaped structures. Whereas tubes 42 may be utilized as part of a lacing system, tubes 42 or similar structures may also be utilized to impart longitudinal stretch-resistance. Referring to Figure 7G, tubes 42 extend longitudinally, and strands 43 within tubes 42 may resist stretch through each of regions 11-13.

[43] The manner in which yarns 46 are incorporated into collar 45 may vary significantly. In the configuration discussed above, floating yarns 46 are generally parallel to the layers of knitted material forming collar 45 when passing the tubular structure. Referring to Figure 8A, yarns 46 extend from one layer of knitted material to another layer of knitted material and are generally

perpendicular to the layers, thereby imparting a structure similar to a spacer-knit material that is formed through the flat knitting process. As depicted in an enlarged area of Figure 8A, yarns 46 may extend around yarns forming the knitted layers. In one configuration, yarns 46 may be the same yarns that form the knitted layers. That is, yarns 46 may be unknitted portions of the yarns that form the knitted layers. In another configuration, yarns 46 may be unsecured or otherwise separate (i.e., do not extend around) the yarns forming the knitted layers. Accordingly, yarns 46 may be incorporated into knitted component 40 in a variety of ways. As a further matter, some configurations of upper 30 may include a polymer foam material that is placed between the layers of knitted material following the manufacture of knitted component 40.

[44] As noted above, collar 45 may have a structure similar to a spacer-knit material, wherein yarns 46 extend from one layer of knitted material to another layer of knitted material and in a direction that is generally perpendicular to the layers. Although collar 45 is a suitable area for having this structure, the flat-knitting process may be utilized to impart the structure of a spacer-knit material to any area of knitted component 40. For example, the spacer-knit configuration may be positioned on either of sides 14 and 15 in forefoot region 11 or midfoot region 12 to impart a cushioning or compressible aspect to upper 20. Portions of strobel sock 23 or tongue 33 may also be formed through a flat knitting process to have a spacer-knit configuration. Moreover, a variety of yarns types may be utilized for areas of knitted component 40 having the spacer-knit configuration, including mono-filament yarns or textured yarns.

[45] In the various configurations discussed above, sockliner 23 is a separate element that is located within the void in upper 20 and strobel sock 34 is a separate element that is joined with edges of knitted component 40. The flat knitting process may also be utilized to form sockliner 23 and strobel sock 34 of unitary knit construction, as depicted in Figure 8B. As with collar 45, a sockliner 23 of unitary knit construction may be formed to include floating yarns that impart a

compressible configuration. The flat knitting process may also be utilized to form other elements, such as tongue 33, of unitary knit construction.

Manufacturing Efficiency

[46] As discussed in the Background section above, the upper of athletic footwear, for example, may be formed from multiple material elements that each impart different properties to various areas of the footwear. In order to manufacture a conventional upper, the material elements are cut to desired shapes and then joined together, usually with stitching or adhesive bonding. As the number and types of material elements incorporated into an upper increases, the time and expense associated with transporting, stocking, cutting, and joining the material elements may also increase. Waste material from cutting and stitching processes also accumulates to a greater degree as the number and types of material elements incorporated into the upper increases. Moreover, footwear with a greater number of materials, material elements, and other components may be more difficult to recycle than uppers formed from few elements and materials. By decreasing the number of elements and materials utilized in an upper, therefore, waste may be decreased while increasing the efficiency of manufacture and recycleability.

[47] Whereas conventional uppers require a variety of manufacturing steps involving a plurality of material elements, knitted component 40 may be formed through a single flat knitting process. Following the flat knitting process, a relatively small number of steps are required to incorporate knitted component 40 into footwear 10. More particularly, strobel sock 34 is joined to edges of knitted component 40, two edges in heel region 13 are joined, lace 32 is incorporated, and the substantially completed upper 30 is secured with sole structure 20. In comparison with conventional manufacturing processes, the use of knitted component 40 may reduce the overall number of manufacturing steps. Additionally, waste may be decreased while increasing recycleability.

[48] The invention is disclosed above and in the accompanying figures with reference to a variety of configurations. The purpose served by the disclosure, however, is to provide an example of the various features and concepts related to the invention, not to limit the scope of the invention. One skilled in the relevant art will recognize that numerous variations and modifications may be made to the configurations described above without departing from the scope of the present invention, as defined by the appended claims.

CLAIMS

1. An article of footwear having an upper and a sole structure secured to the upper, the upper comprising:

a knitted component defining a tubular structure formed of unitary knit construction; and

a yarn having a configuration of a one-dimensional material, the yarn extending through at least a portion of a length of the tube.

2. The article of footwear recited in claim 1, wherein the knitted component extends along a lateral side of the upper, along a medial side of the upper, over a forefoot region of the upper, and around a heel region of the upper.

3. The article of footwear recited in claim 2, wherein the tubular structure is located on the lateral side of the upper and is oriented to extend upward from an area proximal the sole structure, and the yarn extends outward from an end of the tubular structure to form a loop that receives a lace.

4. The article of footwear recited in claim 2, wherein the tubular structure is located in the heel region and around at least a portion of an ankle opening of the upper, and the yarn and a plurality of additional yarns are located within the tubular structure.

5. An article of footwear having an upper and a sole structure secured to the upper, the upper comprising:

a first knitted layer that forms at least a portion of an exterior surface of the upper;

a second knitted layer formed of unitary knit construction with the first knitted layer, the second knitted layer being positioned adjacent to the first knitted layer and at least partially coextensive with the first knitted layer to define a tube between the first knitted layer and the second knitted layer; and

a strand having a configuration of a one-dimensional material, the strand extending through the tube and between the first knitted layer and the second knitted layer.

6. The article of footwear recited in claim 5, wherein the first knitted layer extends along a lateral side of the upper, along a medial side of the upper, over a forefoot region of the upper, and around a heel region of the upper.

7. The article of footwear recited in claim 5, wherein the tube is oriented to extend upward from an area proximal the sole structure, a portion of the strand extending outward from an end of the tube and forming a loop that receives a lace.

8. The article of footwear recited in claim 7, wherein the first knitted layer defines an aperture adjacent to the end of the tube, and the lace extends through the aperture.

9. The article of footwear recited in claim 7, wherein the strand extends into another tube formed by the first knitted layer and the second knitted layer.

10. An article of footwear having an upper and a sole structure secured to the upper, the upper comprising:

a knitted component defining a first tube and a second tube each formed of unitary knit construction, the first tube and the second tube extending in an upward direction from an area proximal the sole structure, and ends of the first tube and the second tube being located in an upper area of the upper;

a strand extending through the first tube and the second tube, a portion of the strand extending outward from the ends of the first tube and the second tube to form a loop; and

a lace extending through the loop.

11. The article of footwear recited in claim 10, wherein the first tube and the second tube are adjacent and parallel to each other.

12. The article of footwear recited in claim 10, wherein the knitted component defines an aperture adjacent to the ends of the first tube and the second tube, and the lace extends through the aperture.

13. The article of footwear recited in claim 10, wherein the knitted component includes:

a pair of at least partially coextensive knitted layers formed of unitary knit construction; and

a plurality of floating yarns extending between the knitted layers.

14. The article of footwear recited in claim 13, wherein the knitted layers and the floating yarns are located adjacent to an ankle opening of the upper.

15. An article of footwear having an upper and a sole structure secured to the upper, the upper comprising:

a knitted component defining a plurality of tubes formed of unitary knit construction, a first portion of the tubes being located on a lateral side of the footwear, and a second portion of the tubes being located on a medial side of the footwear;

at least one strand extending through the tubes and extending outward from ends of tubes to form a plurality of loops, the strand having a configuration of a one-dimensional material; and

a lace extending through the loops.

16. The article of footwear recited in claim 15, wherein the knitted component defines apertures adjacent to the ends of the tubes, and the lace extends through the apertures.

17. The article of footwear recited in claim 15, wherein at least two of the tubes are adjacent and parallel to each other.

18. The article of footwear recited in claim 15, wherein the knitted component forms a majority of an exterior surface of the upper.

19. The article of footwear recited in claim 15, wherein the knitted component includes:

a pair of at least partially coextensive knitted layers formed of unitary knit construction; and

a plurality of floating yarns located between the knitted layers and extending in a direction that is substantially parallel to the knitted layers,

the knitted layers and the floating yarns being located adjacent to an ankle opening of the upper.

20. The article of footwear recited in claim 15, wherein a first area of the knitted component has a first knit type and a second area of the knitted component has a second knit type, the first knit type being different than the second knit type.

21. The article of footwear recited in claim 15, wherein a first area of the knitted component has a first yarn type and a second area of the knitted component has a second yarn type, the first yarn type being different than the second yarn type.

22. An article of footwear having an upper that includes a lacing system, the lacing system comprising:

a knitted component that defines (a) a tube formed of unitary knit construction and (b) an aperture positioned adjacent to an end of the tube;

a strand extending through the tube and forming a loop; and

a lace extending through the loop and the aperture.

23. An article of footwear having an upper and a sole structure secured to the upper, the upper comprising a knitted component that includes:

a first knitted layer and a second knitted layer that are at least partially coextensive with each other and formed of unitary knit construction; and

a plurality of floating yarns located between the first knitted layer and the second knitted layer and extending in a direction that is substantially parallel to the first knitted layer and the second knitted layer.

24. The article of footwear recited in claim 23, wherein the upper defines an interior void for receiving a foot and an ankle opening providing access to the void, the first knitted layer, the second knitted layer, and the floating yarns being positioned adjacent to the ankle opening.

25. The article of footwear recited in claim 24, wherein the first knitted layer, the second knitted layer, and the floating yarns are located on a medial side of the upper and a lateral side of the upper.

26. The article of footwear recited in claim 23, wherein the knitted component defines a tube formed of unitary knit construction, and a strand extends through a length of the tube.

27. The article of footwear recited in claim 23, wherein a first area of the knitted component has a first knit type and a second area of the knitted component has a second knit type, the first knit type being different than the second knit type.

28. The article of footwear recited in claim 23, wherein a first area of the knitted component has a first yarn type and a second area of the knitted component has a second yarn type, the first yarn type being different than the second yarn type.

29. An article of footwear having an upper and a sole structure secured to the upper, the upper comprising a knitted component that includes:

a first knitted layer and a second knitted layer formed of unitary knit construction, the first knitted layer being at least partially coextensive with the second knitted layer to define an interior volume between the first knitted layer and the second knitted layer; and

a plurality of floating yarns located within the interior volume and extending between the first knitted layer and the second knitted layer.

30. The article of footwear recited in claim 29, wherein the upper defines an interior void for receiving a foot and an ankle opening providing access to the void, the first knitted layer, the second knitted layer, and the floating yarns being positioned adjacent to the ankle opening.

31. The article of footwear recited in claim 30, wherein the first knitted layer, the second knitted layer, and the floating yarns are located on a medial side of the upper, located on a lateral side of the upper, and extend around a heel region of the upper.

32. An article of footwear having an upper and a sole structure secured to the upper, the upper defining an interior void for receiving a foot of a wearer, and the upper having an ankle opening that provides access to the void, the upper comprising a knitted component that includes:

a first knitted layer forming at least a portion of an exterior surface of the upper adjacent to the ankle opening;

a second knitted layer forming at least a portion of an interior surface of the upper adjacent to the ankle opening; and

a plurality of floating yarns located between the first knitted layer and the second knitted layer,

wherein the first knitted layer and the second knitted layer are joined to each other at the ankle opening and at a location spaced from the ankle opening to define a separated area therebetween, and the floating yarns are located in the separated area.

33. The article of footwear recited in claim 32, wherein the knitted component extends along a lateral side of the upper, along a medial side of the upper, over a forefoot region of the upper, and around a heel region of the upper.

34. The article of footwear recited in claim 32, wherein the floating yarns are substantially parallel to the first knitted layer and the second knitted layer.

35. The article of footwear recited in claim 32, wherein a portion of the knitted component located in a midfoot region of the footwear defining a tube formed of unitary knit construction, and a strand extends through a length of the tube.

36. A method of manufacturing an article of footwear, the method comprising:
utilizing a flat knitting process to form a knitted component that includes at least one yarn incorporating a thermoplastic polymer material;
heating at least an area of the knitted component to fuse the yarn incorporating the thermoplastic polymer material; and
incorporating the knitted component into an upper of the article of footwear.

37. The method recited in claim 36, wherein the step of utilizing the flat knitting process includes locating the yarn incorporating the thermoplastic polymer material throughout the knitted component.

38. The method recited in claim 36, wherein the step of utilizing the flat knitting process includes locating the yarn incorporating the thermoplastic polymer in only the area of the knitted component.

39. The method recited in claim 36, wherein the step of incorporating includes locating the area of the knitted component in a heel region of the footwear.

40. The method recited in claim 36, wherein the step of incorporating includes locating the area of the knitted component in a forefoot region of the footwear.

41. A method of manufacturing an article of footwear, the method comprising:
utilizing a flat knitting process to form a knitted component that includes a first knitted layer, a second knitted layer, and a plurality of yarns secured to the

first knitted layer and the second knitted layer and extending from the first knitted layer to the second knitted layer; and

incorporating the knitted component into an upper of the article of footwear.

42. The method recited in claim 41, further including a step of selecting the yarns to be mono-filament yarns.

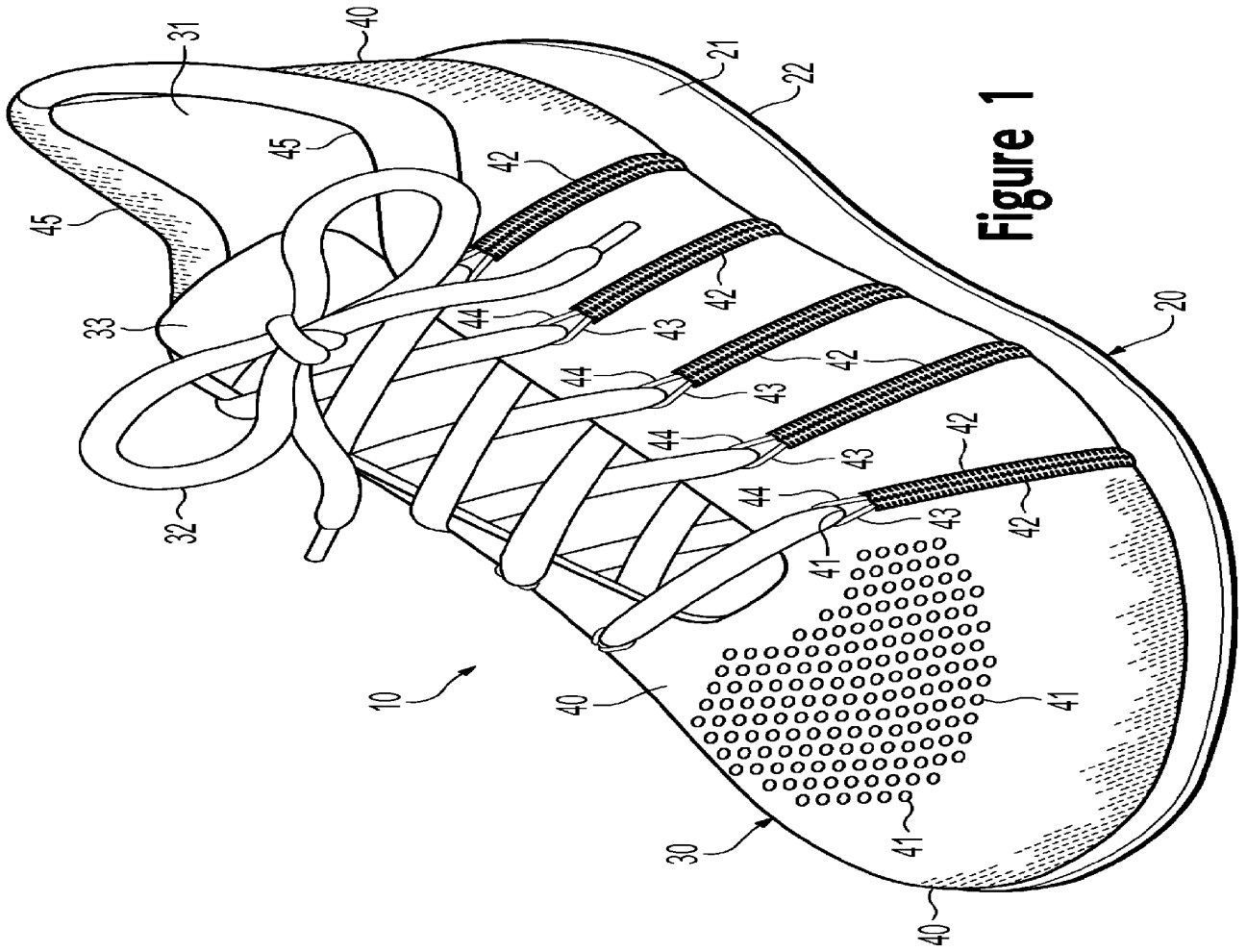


Figure 1

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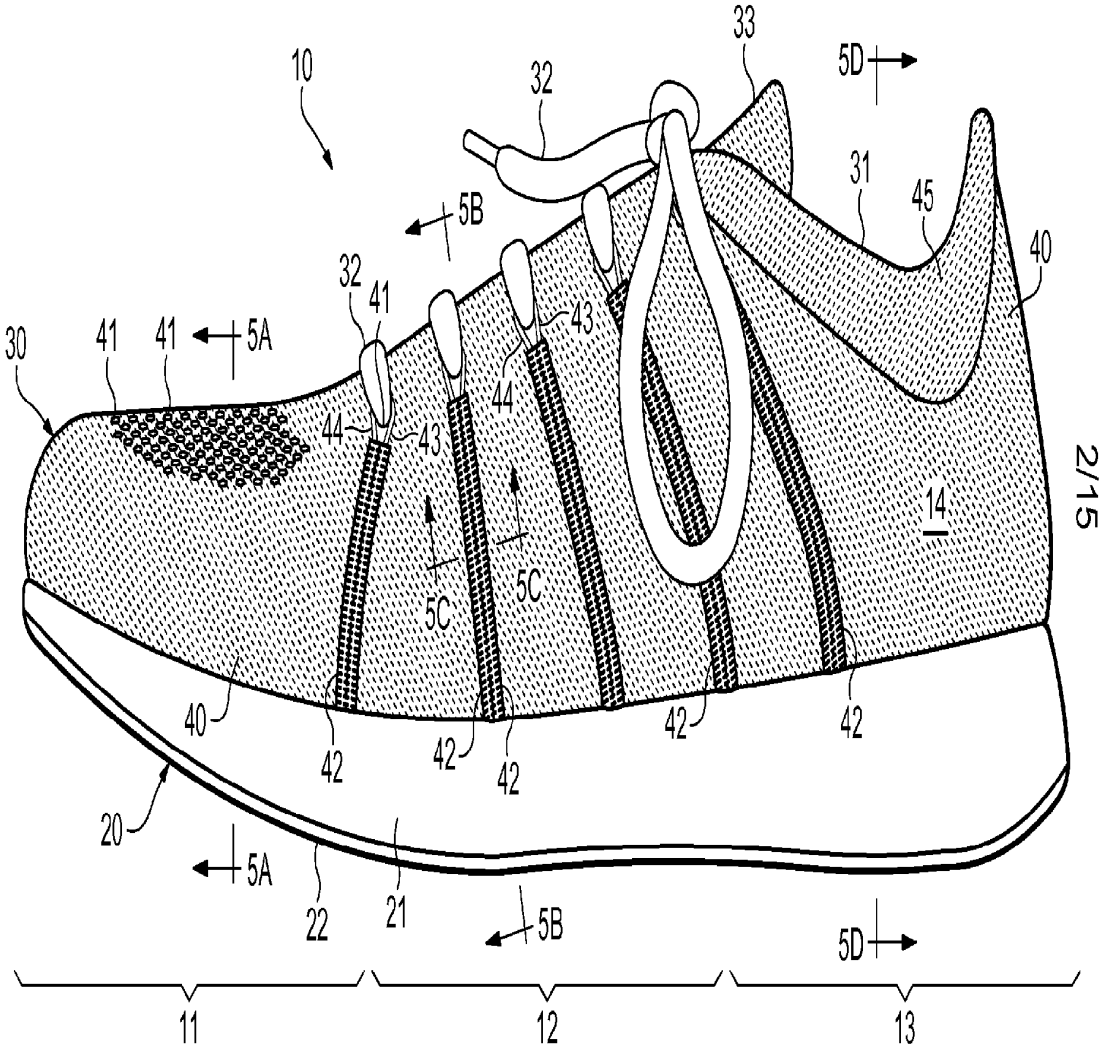

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Figure 2

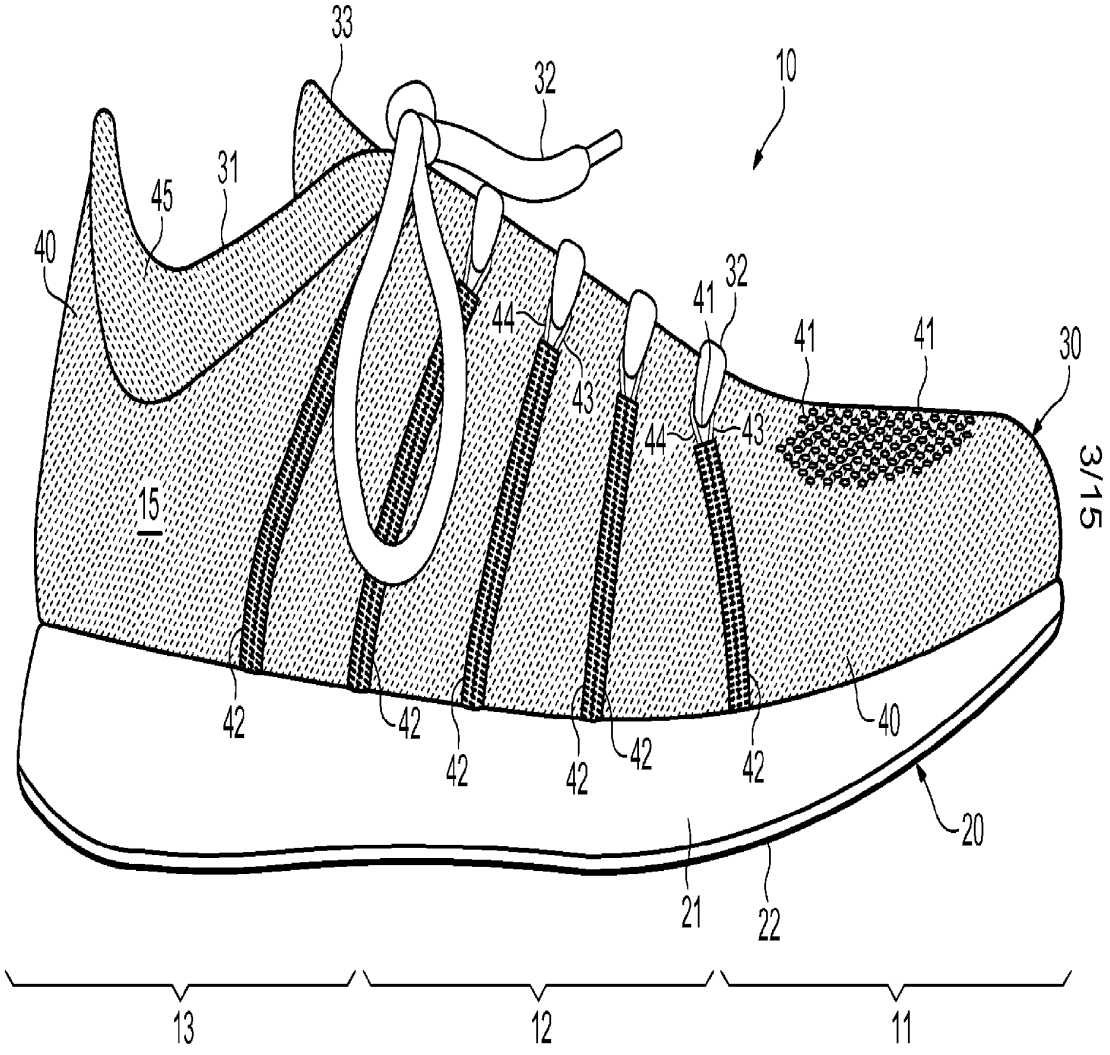

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Figure 3

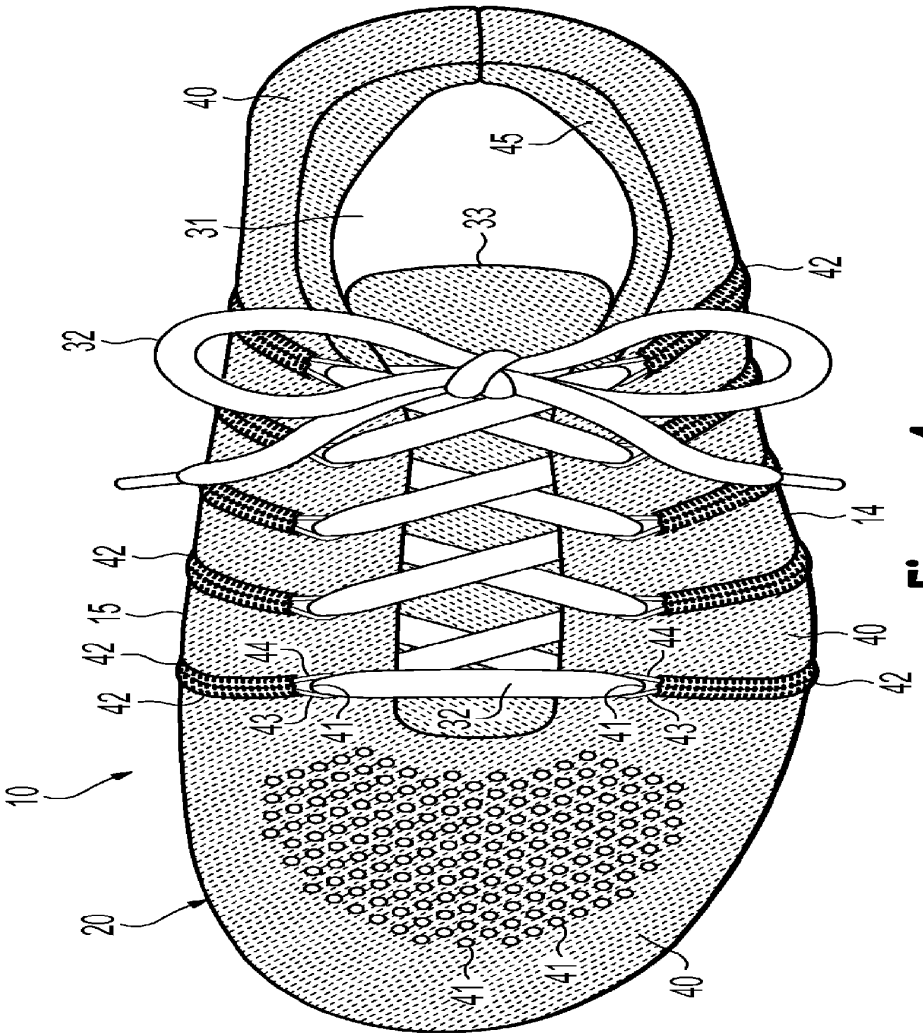


Figure 4

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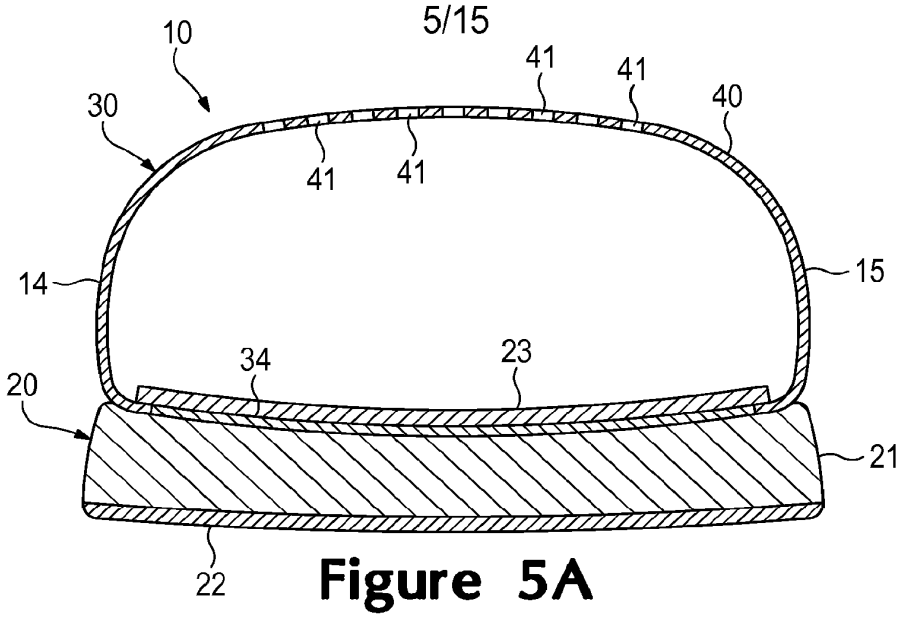


Figure 5A

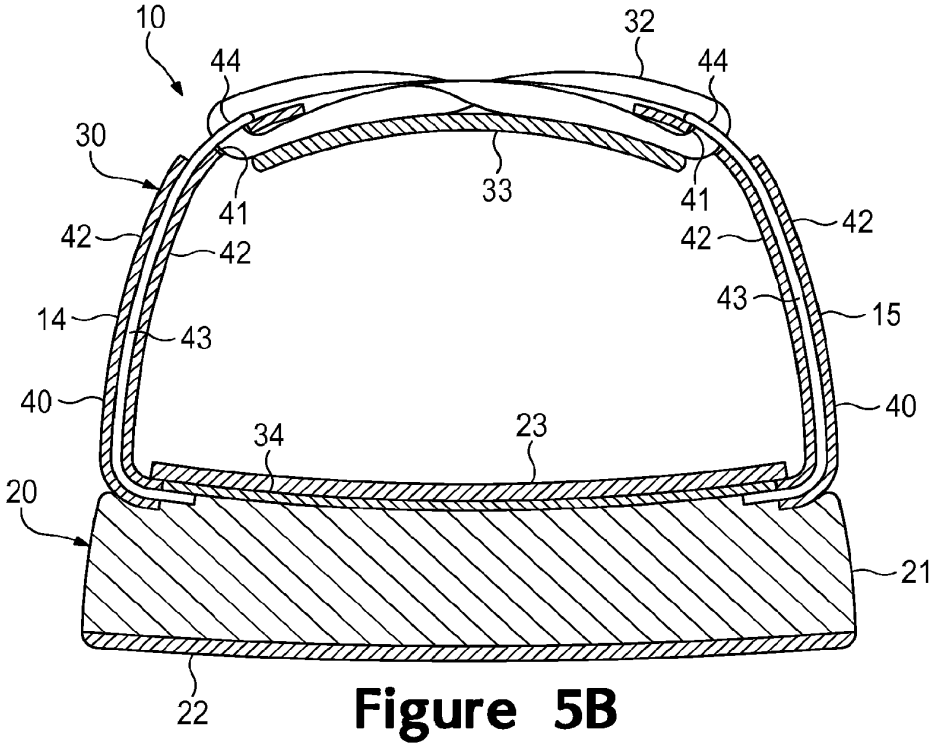


Figure 5B

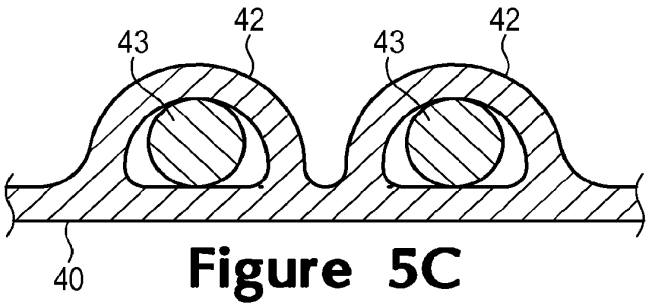


Figure 5C

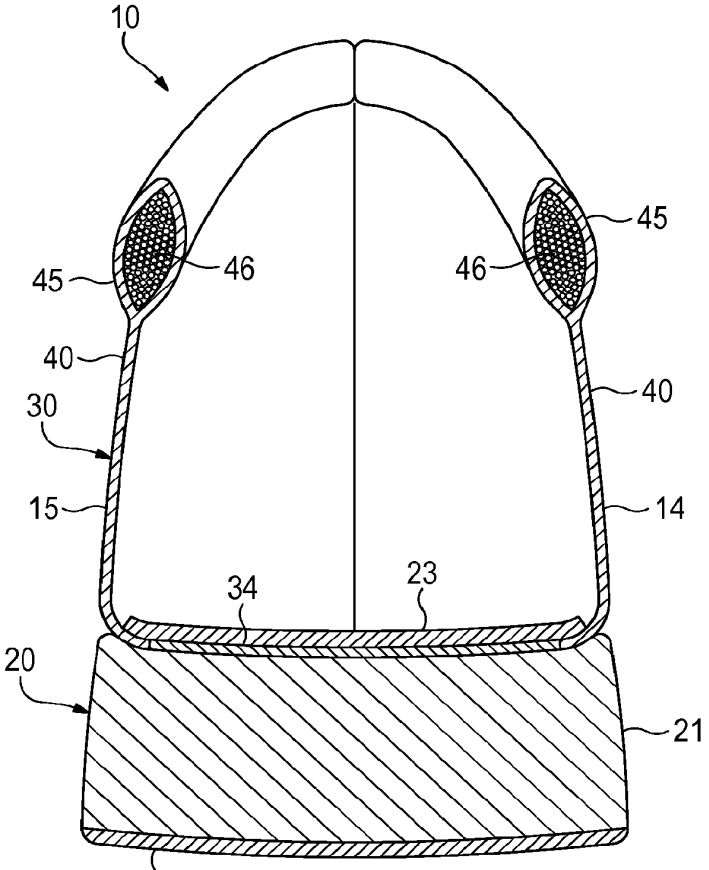


Figure 5D

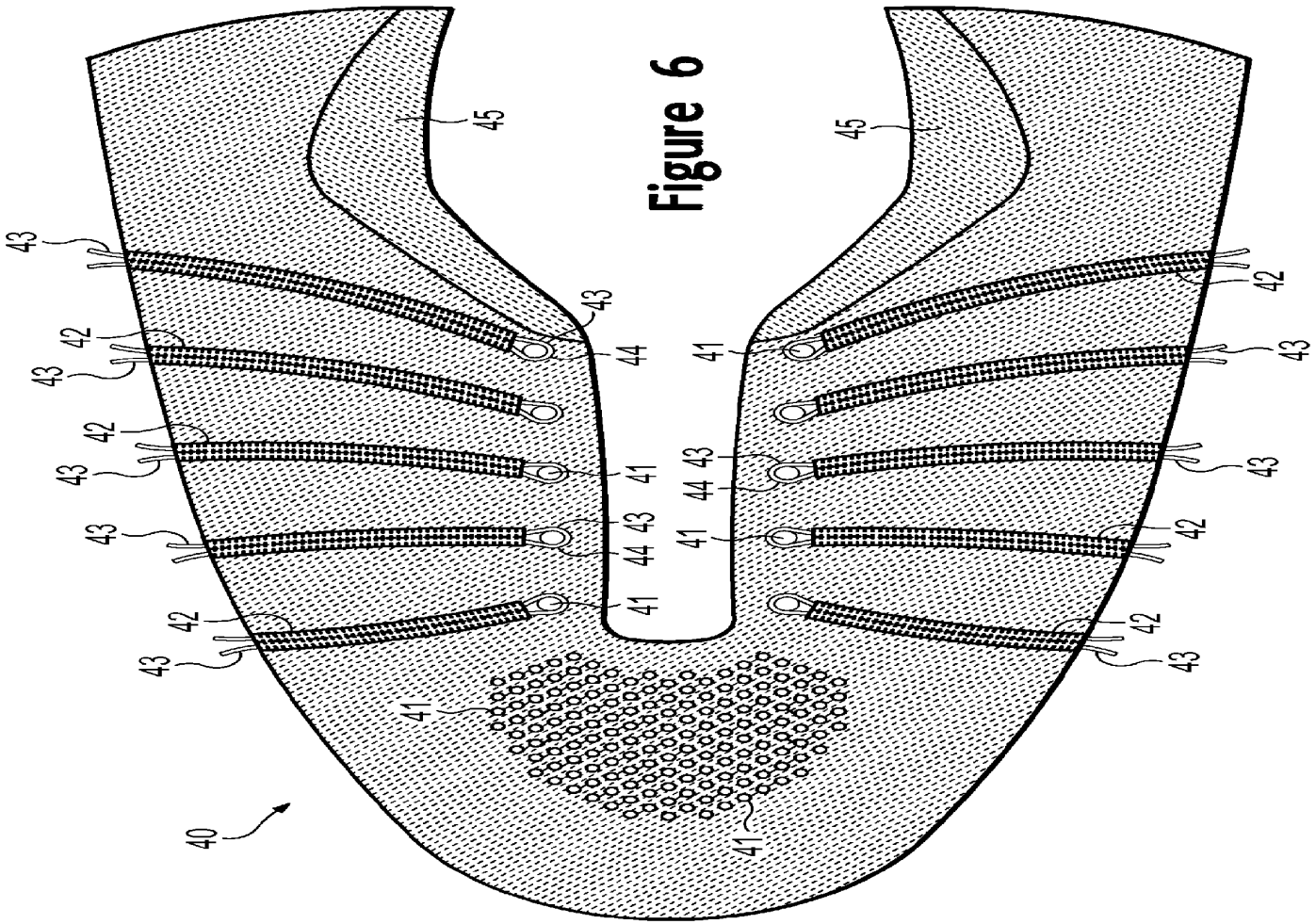


Figure 6

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Figure 7A

Figure 7B

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Figure 7C

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Figure 7D

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Figure 7E

Figure 7F

Figure 7G

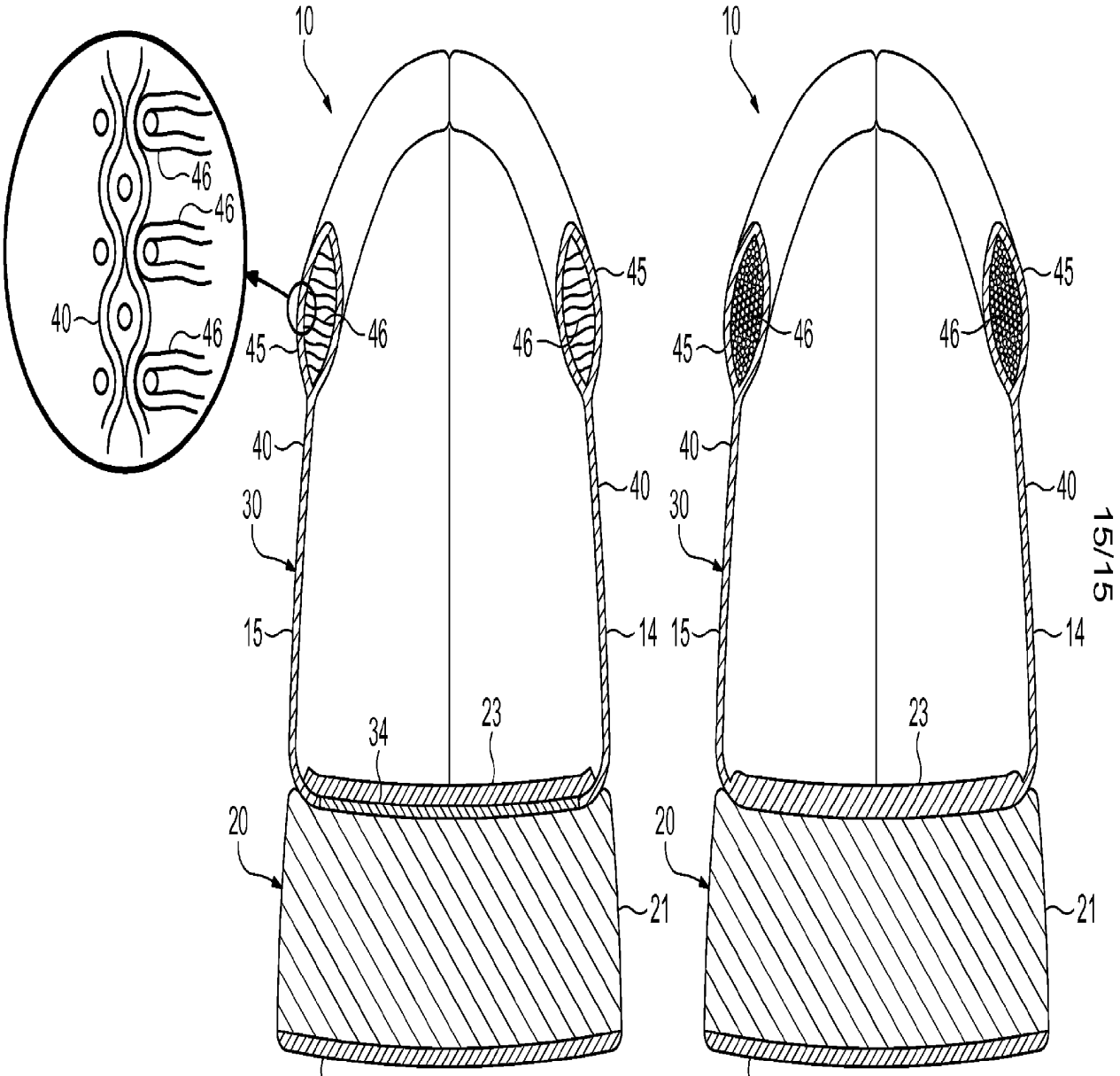


Figure 8A Figure 8B

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/056795

A. CLASSIFICATION OF SUBJECT MATTER
INV. A43C1/04 A43B23/02 A43B7/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A43C A43B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/110048 A1 (DUA BHUPESH [US] ET AL) 15 May 2008 (2008-05-15) the whole document	1-22
X	US 2005/284000 A1 (KERNS MARK [US]) 29 December 2005 (2005-12-29)	1,5
A	the whole document	10,15,22
A	US 7 347 011 B2 (DUA BHUPESH [US] ET AL DUA BHUPESH [US] ET AL) 25 March 2008 (2008-03-25) the whole document	1-22
A	US 6 910 288 B2 (DUA BHUPESH [US]) 28 June 2005 (2005-06-28) the whole document	1-22

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 December 2009	20/04/2010

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Herry, Manuel

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/056795

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 931 762 B1 (DUA BHUPESH [US]) 23 August 2005 (2005-08-23) the whole document -----	1-22

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/056795

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-22

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-22

Independent claims 1, 5, 10, 15 and 22 specify that the knitted component defines a tubular structure, and that the yarn or strand extends through at least a portion of the tube. With these features a simple tubular structure is provided with a yarn or strand, which can be applied, for instance, to receive a lace.

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2. claims: 23-35, 41-42

Independent claims 23, 29, 32 and 41 specify the provision of two knitted layers in the footwear upper, with a plurality of yarns located between these layers, the yarns floating or extending between the knitted layers to which they are secured. These features provide improved cushioning properties at selected areas of the footwear upper.

---

3. claims: 36-40

Independent claim 36 specifies that the knitted component includes at least one yarn incorporating a thermoplastic polymer, an area being heated to fuse the yarn. These features provide a method for reinforcing particular areas of the upper.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2009/056795

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		WO 2004060093 A1	22-07-2004
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International Bureau

(43) International Publication Date
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PCT

(10) International Publication Number
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(51) International Patent Classification:
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(54) **Title**: ARTICLE OF FOOTWEAR HAVING AN UPPER WITH KNITTED ELEMENTS

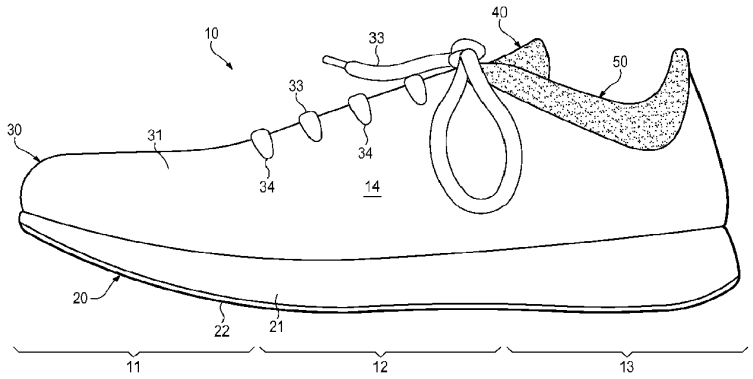


Figure 2

(57) **Abstract**: An article of footwear may incorporate various elements that are at least partially formed through a knitting process, such as a circular knitting process or a flat knitting process. Examples of the elements include tongue elements, collar elements, and collar-throat elements. In some configurations, the elements include compressible areas and flange areas. The compressible areas may include foam cores or floating yarns that impart compressibility, and the flange areas may be utilized to join the components to the article of footwear.

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ARTICLE OF FOOTWEAR HAVING AN UPPER WITH KNITTED ELEMENTS

BACKGROUND

[01] Conventional articles of footwear generally include two primary elements, an upper and a sole structure. The upper is secured to the sole structure and forms a void on the interior of the footwear for comfortably and securely receiving a foot. The sole structure is secured to a lower area of the upper, thereby being positioned between the upper and the ground. In athletic footwear, for example, the sole structure may include a midsole and an outsole. The midsole often includes a polymer foam material that attenuates ground reaction forces to lessen stresses upon the foot and leg during walking, running, and other ambulatory activities. Additionally, the midsole may include fluid-filled chambers, plates, moderators, or other elements that further attenuate forces, enhance stability, or influence the motions of the foot. The outsole is secured to a lower surface of the midsole and provides a ground-engaging portion of the sole structure formed from a durable and wear-resistant material, usually rubber. The sole structure may also include a sockliner positioned within the void and proximal a lower surface of the foot to enhance footwear comfort.

[02] The upper generally extends over the instep and toe areas of the foot, along the medial and lateral sides of the foot, under the foot, and around the heel area of the foot. In some articles of footwear, such as basketball footwear and boots, the upper may extend upward and around the ankle to provide support or protection for the ankle. Access to the void on the interior of the upper is generally provided by an ankle opening in a heel region of the footwear. A lacing system is often incorporated into the upper to adjust the fit of the upper, thereby permitting entry and removal of the foot from the void within the upper. The lacing system also permits the wearer to modify certain dimensions of the upper, particularly girth, to accommodate feet with varying dimensions. In addition, the upper may include a tongue that extends under the lacing system to enhance adjustability of the

footwear, and the upper may incorporate a heel counter to limit movement of the heel.

[03] A variety of material elements (e.g., textiles, polymer foam, polymer sheets, leather, synthetic leather) are conventionally utilized in manufacturing the upper. In athletic footwear, for example, the upper may have multiple layers that each include a variety of joined material elements. As examples, the material elements may be selected to impart stretch-resistance, wear-resistance, flexibility, air-permeability, compressibility, comfort, and moisture-wicking to different areas of the upper. In order to impart the different properties to different areas of the upper, material elements are often cut to desired shapes and then joined together, usually with stitching or adhesive bonding. Moreover, the material elements are often joined in a layered configuration to impart multiple properties to the same areas. As the number and type of material elements incorporated into the upper increases, the time and expense associated with transporting, stocking, cutting, and joining the material elements may also increase. Waste material from cutting and stitching processes also accumulates to a greater degree as the number and type of material elements incorporated into the upper increases. Moreover, uppers with a greater number of material elements may be more difficult to recycle than uppers formed from fewer types and numbers of material elements. By decreasing the number of material elements utilized in the upper, therefore, waste may be decreased while increasing the manufacturing efficiency and recyclability of the upper.

SUMMARY

[04] An article of footwear is disclosed below as having an upper and a sole structure secured to the upper. The upper includes a material layer forming at least a portion of an exterior surface of the upper. The upper also includes a knitted component formed of unitary knit construction. The knitted component may include a compressible area and a flange area. The compressible area forms a portion of the exterior surface and a portion of an opposite interior surface of the

upper, and the flange area extends outward from the compressible area. The flange area may be located inward from the material layer, and the flange area may be joined with the material layer.

[05] In some configurations, the upper may include a tongue element having a knitted component formed of unitary knit construction and forming a majority of an exterior of the tongue element. A compressible material may be located within a cavity of the knitted component, and an end of the knitted component may be secured to a throat area of the upper.

[06] In another configuration, the upper may include a collar element having a knitted exterior forming at least a portion of an exterior surface and an interior surface of the upper adjacent to an ankle opening of the upper. A plurality of floating yarns may be located within a cavity of the knitted element. Additionally, the collar element may be formed as a separate component from other portions of the upper and secured to the other portions of the upper.

[07] Various methods may be utilized to form components for an article of footwear. For example, circular knitting and flat knitting processes may be utilized to form various components of unitary knit construction. Following knitting, the components may be incorporated into the article of footwear. Moreover, the knitting processes may be utilized to form both compressible areas and flange areas of some components. For example, floating yarns may be laid-in the compressible area to enhance the compressibility.

[08] The advantages and features of novelty characterizing aspects of the invention are pointed out with particularity in the appended claims. To gain an improved understanding of the advantages and features of novelty, however, reference may be made to the following descriptive matter and accompanying figures that describe and illustrate various configurations and concepts related to the invention.

FIGURE DESCRIPTIONS

[09] The foregoing Summary and the following Detailed Description will be better understood when read in conjunction with the accompanying figures.

[10] Figure 1 is a perspective view of an article of footwear.

[11] Figure 2 is a lateral side elevational view of the article of footwear.

[12] Figure 3 is a medial side elevational view of the article of footwear

[13] Figure 4 is a top plan view of the article of footwear.

[14] Figures 5A-5C are cross-sectional views of the article of footwear, as respectively defined by section lines 5A-5C in Figure 4.

[15] Figure 6 is a perspective view of a tongue element of the article of footwear.

[16] Figure 7 is an exploded perspective view of the tongue element.

[17] Figure 8 is a plan view of the tongue element.

[18] Figures 9A and 9B are cross-sectional views of the tongue element, as respectively defined by section lines 9A and 9B in Figure 8.

[19] Figures 10A-10J are plan views corresponding with Figure 8 and depicting further configurations of the tongue element.

[20] Figure 11A-11K are cross-sectional views corresponding with Figure 9A and depicting further configurations of the tongue element.

[21] Figures 12A and 12B are plan views of various joined tongue elements.

[22] Figure 13 is a perspective view of a collar element of the article of footwear.

[23] Figure 14 is a plan view of the collar element.

[24] Figures 15A and 15B are cross-sectional views of the collar element, as respectively defined by section lines 15A and 15B in Figure 14.

[25] Figures 16A-16C are plan views corresponding with Figure 14 and depicting further configurations of the collar element.

[26] Figures 17A and 17B are plan views of various joined collar elements.

[27] Figure 18 is a lateral side elevational view corresponding with Figure 2 and depicting another configuration of the article of footwear.

[28] Figure 19 is a perspective view of a collar-throat element of the configuration of the article of footwear depicted in Figure 18.

[29] Figure 20 is a plan view of the collar-throat element.

[30] Figures 21A and 21B are cross-sectional views of the collar-throat element, as respectively defined by section lines 21A and 21B in Figure 20.

[31] Figures 22A-22D are cross-sectional views corresponding with a portion of Figure 5C and depicting various methods of incorporating the collar element into the article of footwear.

[32] Figure 23 is a plan view of another element.

[33] Figure 24 is a plan view of a tongue-vamp element.

[34] Figure 25 is a cross-sectional view corresponding with Figure 5A and depicting the tongue-vamp element in the article of footwear.

[35] Figure 26 is a cross-sectional view corresponding with Figure 5C and depicting another configuration of the article of footwear.

[36] Figures 27A and 27B are plan views of another collar element.

DETAILED DESCRIPTION

[37] The following discussion and accompanying figures disclose articles of footwear having uppers that includes various knitted elements, such as a tongue and a collar. The articles of footwear are disclosed as having a general configuration suitable for walking or running. Concepts associated with the footwear, including the uppers and the various knitted elements, may also be applied to a variety of other athletic footwear types, including baseball shoes, basketball shoes, cross-training shoes, cycling shoes, football shoes, tennis shoes, soccer shoes, and hiking boots, for example. The concepts may also be applied to footwear types that are generally considered to be non-athletic, including dress shoes, casual shoes, loafers, sandals, and work boots. Accordingly, the concepts disclosed herein relating to the knitted elements and the methods of manufacturing the knitted elements apply to a wide variety of footwear types.

[38] General Footwear Structure

[39] An article of footwear 10 is depicted in Figures 1-5C as including a sole structure 20 and an upper 30. For reference purposes, footwear 10 may be divided into three general regions: a forefoot region 11, a midfoot region 12, and a heel region 13, as shown in Figures 2 and 3. Footwear 10 also includes a lateral side 14 and a medial side 15. Forefoot region 11 generally includes portions of footwear 10 corresponding with the toes and the joints connecting the metatarsals with the phalanges. Midfoot region 12 generally includes portions of footwear 10 corresponding with the arch area of the foot, and heel region 13 corresponds with the heel area of the foot, including the calcaneus bone. Lateral side 14 and medial side 15 extend through each of regions 11-13 and correspond with opposite sides of footwear 10. Regions 11-13 and sides 14-15 are not intended to demarcate precise areas of footwear 10. Rather, regions 11-13 and sides 14-15 are intended to represent general areas of footwear 10 to aid in the following discussion. In addition to footwear 10, regions 11-13 and sides 14-15 may also be applied to sole structure 20, upper 30, and individual elements thereof.

[40] Sole structure 20 is secured to upper 30 and extends between the foot and the ground when footwear 10 is worn. The primary elements of sole structure 20 are a midsole 21, an outsole 22, and a sockliner 23. Midsole 21 is secured to a lower area of upper 30 and may be formed from a compressible polymer foam member (e.g., a polyurethane or ethylvinylacetate foam) that attenuates ground reaction forces (i.e., provides cushioning) when compressed between the foot and the ground during walking, running, or other ambulatory activities. In additional configurations, midsole 21 may incorporate fluid-filled chambers, plates, moderators, or other elements that further attenuate forces, enhance stability, or influence motions of the foot, or midsole 21 may be primarily formed from a fluid-filled chamber. Outsole 22 is secured to a lower surface of midsole 21 and may be formed from a wear-resistant rubber material that is textured to impart traction. Sockliner 23 is located within upper 30 and is positioned to extend under a lower surface of the foot. Although this configuration for sole structure 20 provides an example of a sole structure that may be used in connection with upper 30, a variety of other conventional or nonconventional configurations for sole structure 20 may also be utilized. Accordingly, the configuration and features of sole structure 20 or any sole structure utilized with upper 30 may vary considerably.

[41] Upper 30 is formed from various elements that combine to provide a structure for securely and comfortably receiving a foot. Although the configuration of upper 30 may vary significantly, the various elements generally define a void within footwear 10 for receiving and securing the foot relative to sole structure 20. Surfaces of the void within upper 30 are shaped to accommodate the foot and extend over the instep and toe areas of the foot, along the medial and lateral sides of the foot, under the foot, and around the heel area of the foot. A portion of upper 30 is formed from various layers 31 and 32, as shown in Figures 5A-5C. Whereas layer 31 forms a portion of an exterior surface of upper 30, layer 32 forms a portion of an interior surface of upper 30 (i.e., the surface defining the void within upper 30). Each of layers 31 and 32 may be formed from one or more of a plurality of material elements (e.g., textiles, polymer foam, leather,

synthetic leather) that are stitched or bonded together. As an example, layer 31 and may be formed from a synthetic leather material and layer 32 may be formed from a moisture-wicking textile material. As another example, each of layers 31 and 32 may be formed from different textile materials In some configurations, another a polymer foam layer may be located between layers 31 and 32 to enhance comfort. In other configurations of upper 30, one-layer, three-layer, or other multi-layer structures formed from a variety of materials may be utilized in place of layers 31 and 32.

[42] A lace 33 extends through various lace apertures 34 and across a throat area of upper 30 to permit the wearer to modify dimensions of upper 30 and accommodate the proportions of the foot. That is, lace 33 operates in a generally conventional manner to tighten upper 30 around the foot (i.e., when lace 33 is tied) and loosen upper 30 (i.e., when lace 33 is untied). A tongue element 40 extends under lace 33 to enhance the comfort and adjustability of footwear 10. Upper 30 also includes a collar element 50 that is located in at least heel region 13. In addition to enhancing the comfort of footwear 10, collar element 50 forms an ankle opening for providing the foot with access to the void within upper 30. That is, the ankle opening defined by collar element 50 facilitates entry and removal of the foot from the void, particularly when lace 33 is untied to impart a loose-fitting configuration to upper 30 around the foot.

[43] Portions of upper 30, including tongue element 40 and collar element 50, may be knitted components formed with a relatively small number of material elements. As discussed in the Background section above, decreasing the number of material elements utilized in an upper may decrease waste, while also increasing the manufacturing efficiency and recyclability of the upper. The tongue and collar of conventional uppers are often formed from multiple joined material elements. As discussed in greater detail below, however, tongue element 40 and collar element 50 may be primarily formed through knitting processes (rather than stitch and turn methods) that decrease waste and increase manufacturing efficiency and recyclability. Additionally, the structures of tongue element 40 and collar

element 50 may incorporate lesser numbers of seams or other discontinuities, thereby enhancing the overall comfort of footwear 10.

[44] Tongue Element Configuration

[45] Tongue element 40 is centrally-located in a throat area of upper 30 and extends from forefoot region 11 to heel region 13, as well as from lateral side 14 to medial side 15. Side areas of tongue element 40 are positioned adjacent to and in contact with the areas of layer 32 that form lace apertures 34, and a central area of tongue element 40 is in contact with lace 33 and may be exposed between areas of lace 33 that cross each other. In forefoot region 11, tongue element 40 is joined to layers 31 and 32, but a remainder of tongue element 40 is generally free or unsecured to other areas of upper 30. In heel region 13, tongue element 40 may protrude from the ankle opening formed by collar element 50.

[46] The primary components of tongue element 40, as depicted in Figures 6-9B, are a knitted sheath 41 and a compressible core 42. In general, sheath 41 is formed as a knitted element that extends around core 42. More particularly, sheath 41 forms a majority of an exterior of tongue element 40 and also defines an interior cavity in which core 42 is located. Core 42 is a compressible structure within tongue element 40 that enhances the overall comfort of footwear 10. Although core 42 may be formed from polymer foam materials (e.g., polyurethane or ethylvinylacetate foam), core 42 may also be formed from yarns or fluid-filled chambers, for example. In some configurations, tongue element 40 may include additional components, such as (a) logos or trademarks that are screen-printed, stitched, or bonded to sheath 41, (b) lace loops that receive a portion of lace 34 to limit movement of tongue element 40, or (c) care instruction and material placards that are stitched or bonded to sheath 41.

[47] Sheath 41 has a generally tubular structure that forms the cavity in which core 42 is located. In general, sheath 41 includes an upper region 43, a lower region 44, a first end 45, a second end 46, and a pair of flanges 47. Upper region 43 extends over one surface of core 42 and is exposed to the exterior of footwear 10

between the areas of lace 33 that cross each other. Lower region 44, which is positioned opposite upper region 43, extends over another surface of core 42 and forms a portion of the interior surface of upper 30 (i.e., the surface defining the void within upper 30). Referring to Figures 9A and 9B, for example, regions 43 and 44 effectively form layers of knitted material located on opposite sides of core 42 and joined to each other, thereby effectively extending around core 42. Whereas first end 45 has a closed configuration, second end 46 forms an opening through which core 42 is inserted into the cavity within sheath 41. Flanges 47 are located at second end 46 and on opposite sides of the opening. Flanges 47 extend outward from tongue element 40 and may be utilized to join tongue element 40 to upper 30. Referring to Figure 5A, for example, flanges 47 extend between layers 31 and 32 in the throat area of upper 30 and are secured to either or both of layers 31 and 32. Although each of regions 43 and 44 include one of flanges 47, sheath 41 may form only a single flange 47 or both flanges 47 may be absent in some configurations.

[48] Whereas many conventional footwear tongues have a sheath formed from multiple textile elements or other material elements that are joined through stitching or bonding, for example, sheath 41 is formed as a one-piece element through a knitting process, such as circular knitting or flat knitting. More particularly, sheath 41 is generally formed of unitary knit construction through the knitting process. As utilized herein, a knitted component such as sheath 41 is defined as being formed of "unitary knit construction" when constructed as a one-piece knit element that is substantially free of additional stitching or bonding processes. That is, the knitting process substantially forms the various features and structures of sheath 41 without the need for significant additional manufacturing steps or processes. In some configurations, sheath 41 remains formed of unitary knit construction when first end 45 or second end 46 are closed through stitching or bonding in order to seal core 42 within sheath 41, or when areas are trimmed following the knitting process. Additionally, sheath 41 remains formed of unitary knit construction when other minor elements (e.g., logos,

trademarks, lace loops, care instruction and material placards) are added to tongue element 40 following the knitting process.

[49] The knitting process utilized to form sheath 41 of unitary knit construction generally involves mechanically-manipulating one or more yarns to form a series of stitches. A variety of different types of yarns may be incorporated into sheath 41 during the knitting process. Polyester, for example, provides relatively high durability and recyclability, and may also impart non-stretch properties depending upon the knit pattern within sheath 41. Cotton provides a soft hand, natural aesthetics, and biodegradability. Elastane and stretch polyester each provide substantial stretch and recoverability, with stretch polyester also providing relatively easy recyclability. Rayon provides high luster and moisture absorption. Wool also provides high moisture absorption, in addition to insulating properties. Nylon is a durable and abrasion-resistant material with relatively high strength. In addition to specific materials, other aspects relating to the yarn may affect the properties of sheath 41 and tongue 40. For example, the yarn may be a monofilament yarn or a multifilament yarn. The yarn may also include separate filaments that are each formed of different materials. The yarn may also include filaments that are each formed of two or more different materials, such as a bicomponent yarn with filaments having a sheath-core configuration or two halves formed of different materials. Different degrees of twist and crimping, as well as different deniers, may affect the properties of sheath 41 and tongue 40. The yarn may also retain an intended shape when formed from materials that are susceptible to heat set. Accordingly, various types of yarn may be incorporated into sheath 41 depending upon the desired properties for sheath 41 and tongue 40.

[50] Tongue element 40 provides various advantages over conventional footwear tongues. For example, tongue element 40 enhances footwear comfort by incorporating few seams or other discontinuities in areas that contact the foot. As another example, tongue element 40 includes relatively few material elements. As discussed in the Background section above, by decreasing the

number of material elements utilized in the upper, waste may be decreased while increasing the manufacturing efficiency and recyclability of the upper. To further enhance efficiency, forming sheath 41 through a knitting process limits the number of cutting operations or other processes that generally generate waste material, while allowing the creation of contours that are relatively difficult with stitch and turn methods.

[51] Further Tongue Element Configurations

[52] The configuration of tongue element 40 discussed above provides an example of a suitable configuration for footwear 10 and various other types of footwear. Tongue element 40 may, however, incorporate a variety of other features. Whether sheath 41 is formed through circular knitting or flat knitting, the overall shape of tongue element 40 may vary significantly. For example, Figure 10A depicts a configuration wherein tongue element 40 has greater length and lesser width than the configuration from Figures 6-8, whereas Figure 10B depicts a configuration wherein tongue element 40 has lesser length and greater width. Referring to Figure 10C, tongue element 40 has indented side areas. Another configuration is depicted in Figure 10D, wherein tongue element 40 tapers to impart a generally triangular shape. Additionally tongue element 40 may exhibit a generally diamond-shaped configuration, as depicted in Figure 10E. Referring to Figure 10J, flanges 47 may also be absent from sheath 41.

[53] A variety of methods may be utilized to impart the various shapes depicted in Figures 6-8 and 10A-10E. For example, the circular knitting or flat knitting processes that are utilized to form sheath 41 may impart any of the various shapes. That is, knitting machines may be programmed to mechanically-manipulate the yarn to form stitches that combine to impart any of the various shapes discussed above, as well as a variety of other shapes. As another example, stretcher forms may be placed within the cavity in sheath 41 and, upon the application of heat or steam, the stretcher form may modify the overall shape of sheath 41. Additionally, the shape of core 42 may vary to impart different

shapes to sheath 41. An advantage to utilizing stretcher forms or different shapes of core 42 is that a plurality of sheaths 41 may be formed with substantially identical shapes, and the stretcher forms or differently-shaped cores 42 may be utilized to impart shapes to tongue 40 that are suitable for footwear having various sizes or for different types of footwear.

[54] The configuration of sheath 41 depicted in Figures 6-8 incorporates a single type of yarn and a single stitch type. That is, sheath 41 has a generally continuous configuration wherein the properties imparted by the yarn and stitch type are generally the same throughout the various areas of sheath 41. By varying either or both of the yarn and stitch type utilized in various regions of sheath 41, the properties of the various regions may be modified. The yarn and stitch type may be varied, therefore, to impart different properties to different areas of tongue 40. Moreover, both circular knitting and flat knitting permit the combination of yarn and stitch type to be selected for the various regions of sheath 41, thereby allowing the properties of the regions to be selected based upon comfort or performance characteristics.

[55] As discussed above, sheath 41 may incorporate various yarn and stitch types. As an example, sheath 41 is depicted as having two regions formed from different types of yarn in Figure 10G. Whereas a region adjacent to first end 45 is formed from one type of yarn, a region adjacent to second end 46 is formed from another type of yarn. Whereas one region may incorporate elastane to enhance stretch, the other region may incorporate nylon to enhance wear-resistance and durability. Similarly, whereas one region may incorporate yarn with one denier, the other region may incorporate yarn with a greater denier to enhance the thickness or bulk. As another example, the stitch type may vary between the regions, as depicted in Figure 10H. Whereas the region adjacent to first end 45 includes a stitch that imparts a relatively non-textured configuration, the region adjacent to second end 46 has a textured configuration that may impart stretch or different aesthetic qualities. The types of yarn utilized in the different regions of Figure 10H may also vary to further enhance or vary the

properties of tongue 40. As a related matter, the density of the knit within sheath 41 may vary among the regions to, for example, make less-permeable or stiffer portions. Accordingly, sheath 41 may exhibit various properties in separate regions depending upon the particular yarn and knit type that is selected for the regions.

[56] The yarn and knit type may also vary to enhance aspects related to assembling footwear 10. Referring to Figure 10I, sheath 41 exhibits a ribbed configuration around the opening at second end 46. The ribbed configuration may stretch to permit the insertion of core 42, and then the ribbed configuration may contract to ensure that core 42 remains properly positioned within sheath 41. The knit type may also form various apertures in sheath 41, as depicted in Figure 10J. In addition to imparting greater permeability, which allows air to circulate within upper 30, the apertures may increase both the flexibility and stretch of tongue 40. As further examples, other properties that may be varied through selecting particular yarn and knit types for sheath 41 include permeability to liquids, the directions in which sheath 41 stretches or resists stretching, and the stiffness of sheath 41.

[57] The overall configuration of core 42 may also vary depending upon various factors, including the size and type of footwear that tongue 40 is being incorporated into. For example, the thickness, length, and width of core 42 may be modified. Referring to Figure 11A, core 42 exhibits a tapered configuration. Core 42 may also be contoured, as depicted in Figure 11B. In some configurations of tongue 40, core 42 may be formed from two separate elements (e.g., foam elements with different densities), as depicted in Figure 11C. In a similar configuration, core 42 may be formed from two overlapping elements (e.g., foam elements with different densities), as depicted in Figure 11D, which imparts greater thickness and contours. Although foam elements may be utilized as core 42, various other materials may also be utilized. Referring to Figure 11E, various floating yarns are located within the cavity formed by sheath 41. As described in greater detail below for collar element 50, flat knitting processes

may locate floating yarns within a cavity formed between knit layers. Referring to Figure 11F, cut ends from yarns in a circular knitting process, for example, provide material for core 42. Similarly, loops of yarn similar to loops in a terry cloth material may provide material for core 42. In some configurations, core 42 may also be formed from a fibrous mat made from recycled textile and yarn materials utilized in other areas of upper 30, or core 42 may be a fluid-filled bladder.

[58] Although sheath 41 may be formed of unitary knit construction, sheath 41 may also be formed from joined elements that are each formed through knitting processes. Referring to Figure 11G, sheath 41 includes a first knit element adjacent to first end 45 and a second knit element extending from the first knit element to second end 46, and the knit elements are joined through stitching. In some configurations, stitching may extend entirely through tongue 40, as depicted in Figure 11H, to impart contours or other features to tongue 40. Although second end 46 may have an open configuration for inserting core 42, a flap may be formed in lower region 44, as depicted in Figure 11I, for inserting core 42. As noted above, other elements that include a lace loop may be added to sheath 41, as depicted in Figure 11J. As an alternative, a lace loop may be formed of unitary knit construction with sheath 41 during the flat knitting process, as depicted in Figure 11K.

[59] Based upon the above discussion, a variety of features of sheath 41 and core 42 may vary to impart different properties to tongue 40. As discussed, the overall shape of sheath 41 may vary depending upon the type of footwear or size of footwear tongue 40 is incorporated into. In some configurations, the yarn and/or stitch type may also vary among different regions of sheath 41 to impart different properties. Core 42 may also have a variety of shapes or be formed from various types of elements.

Knitting Processes

[60] A variety of knitting processes, including circular knitting and flat knitting, may be utilized to manufacture sheath 41. Circular knitting is a form of knitting that creates a seamless tube, which is effectively the form of sheath 41. Various knitting machines may be utilized to form sheath 41 to have a circular knit structure. For example, specialized sock-knitting machines use individual latch-hook needles to make each stitch in a round frame. Depending upon the type of circular knitting machine utilized, first end 45 may be closed as part of the knitting cycle, or additional finishing steps may be performed to close first end 45. Flat knitting is a method for producing a knitted material that is turned periodically (i.e., the material is knitted from alternating sides). The two sides (otherwise referred to as faces) of the material are conventionally designated as the right side (i.e., the side that faces outwards, towards the viewer) and the wrong side (i.e., the side that faces inwards, away from the viewer).

[61] Advantageously, both circular knitting and flat knitting may be utilized to form sheath 41 to have, for example, (a) various yarn types that impart different properties to separate areas of sheath 41 and (b) various knit types that impart different properties to separate areas of sheath 41. Although each of circular knitting and flat knitting may be utilized to manufacture many configurations of sheath 41, flat knitting may be utilized to add further features to tongue 40, including (a) locating floating yarns within sheath 41 to form core 42, as in Figure 11D, and (b) overlapping knitted layers that form an lace loop of unitary knit construction, as in Figure 11I.

[62] Whereas edges of many textile elements incorporated into footwear tongues are cut to expose ends of the yarns forming the textile elements, sheath 41 may be formed to have a finished configuration when manufactured through circular knitting or flat knitting. That is, circular knitting or flat knitting may be utilized to form sheath 41 such that ends of the yarns within sheath 41 are substantially absent from the edges of sheath 41. An advantage of the finished configuration

is that the yarns forming the edges of sheath 41 are less likely to unravel and fewer finishing steps are necessary after manufacturing sheath 41. By forming finished edges, the integrity of sheath 41 is strengthened and fewer or no post-processing steps are required to prevent unraveling. In addition, loose yarns are also less likely to inhibit the aesthetic appearance of tongue 40. In other words, the finished configuration of sheath 41 may enhance the durability and aesthetic qualities of tongue 40, while increasing manufacturing efficiency.

[63] Circular knitting machines and flat knitting machines may be utilized to form an individual sheath 41. In order to enhance manufacturing efficiency, knitting machines may also be utilized to form a series of joined sheaths 41, as depicted in Figures 12A and 12B. That is, the knitting machines may form a single component that includes a plurality of sheaths 41. Referring to Figure 12A, each of the sheaths 41 may have substantially identical shapes and sizes. Alternately, each of the sheaths 41 may have different shapes and sizes, as depicted in Figure 12B. Moreover, a knit release area may be knitted into the series of sheaths 41 in order to allow the various sheaths 41 to be separated without the need for cutting operations.

[64] Collar Element Configuration

[65] Collar element 50 extends around heel region 13 and from lateral side 14 to medial side 15 to form an ankle opening for providing the foot with access to the void within upper 30. Collar element 50, which is depicted individually in Figures 13-15B, is formed by two overlapping and at least partially coextensive layers of knitted material, particularly an outer layer 51 and an opposite inner layer 52, that envelop a plurality of floating yarns 53. Although edges of layers 51 and 52 are secured to each other in a seamless manner (i.e., of unitary knit construction) through a knitting process, a central area between layers 51 and 52 is generally unsecured to each other in order to form a cavity in which floating yarns 53 are located. As such, the layers of knitted material effectively form a tube or tubular structure, and floating yarns 53 may be located or laid-in between layers 51 and

52 and oriented to be generally parallel to surfaces of layers 51 and 52. That is, floating yarns 53 extend between layers 51 and 52 and also pass through and fill an interior cavity between layers 51 and 52. Whereas layers 51 and 52 are formed from yarns that are mechanically-manipulated (e.g., through a flat knitting process), floating yarns 53 are generally free or otherwise laid-in within the cavity between layers 51 and 52 during the knitting process.

[66] Whereas outer layer 51 forms a portion of an exterior surface of upper 30 in the area of the ankle opening, inner layer 52 forms a portion of the interior surface of upper 30 (i.e., the surface defining the void within upper 30). In an upper area of collar element 50, layers 51 and 52 are seamlessly-joined to each other. Similarly, layers 51 and 52 are seamlessly-joined to each other in a lower area of collar element 50. Additionally, a flange 54 extends outward from layers 51 and 52 and is utilized to join collar element 50 to a remainder of upper 30. More particularly, flange 54 extends between layers 31 and 32 and are secured to either or both of layers 31 and 32, as depicted in Figures 5A and 5C.

[67] The presence of floating yarns 53 imparts a compressible aspect to collar element 50, thereby enhancing the comfort of footwear 10 in the area of the ankle opening. Many conventional articles of footwear incorporate polymer foam elements or other compressible materials into a collar area. In contrast with the conventional articles of footwear, collar element 50 utilizes floating yarns 53 to provide a compressible structure. In some configurations, foam elements or other fibrous elements (e.g., floating yarns and cut ends of yarns) may be located within collar element 50 and in place of floating yarns 53.

[68] Any of the various types of yarn discussed above for sheath 41 may also be utilized in collar element 50. In some configurations, the yarns utilized in layers 51 and 52 may be the same as the yarns utilized for floating yarns 53, or different types of yarn may be utilized for floating yarns 53. As with sheath element 41, collar element 50 may be formed with different yarns in various regions or different stitch types in the various regions.

[69] Collar element 50 may be formed through a flat knitting process to have a unitary knit construction. As such, collar element 50 is constructed as a one-piece knit element that is substantially free of additional stitching or bonding processes. That is, the knitting process substantially forms the various features and structures of collar element 50 without the need for significant additional processes. As discussed above, flat knitting may be utilized to form collar element 50 to have, for example, (a) various yarn types that impart different properties to separate areas of collar element 50 and (b) various knit types that impart different properties to separate areas of collar element 50. Flat knitting may also be utilized to add further features to collar element 50, including (a) forming the tubular structure of layers 51 and 52, (b) forming flange 54 to extend seamlessly-outward from the tubular structure of layers 51 and 52, and (c) locating floating yarns 53 between layers 51 and 52.

[70] As another matter, collar element 50 may be formed to have a finished configuration when manufactured through flat knitting. That is, flat knitting may be utilized to form collar element 50 such that ends of the yarns are substantially absent from the edges of collar element 50. As with sheath 41, an advantage of the finished configuration is that the yarns are less likely to unravel and fewer finishing steps are necessary after manufacturing. By forming finished edges, the integrity of collar element 50 is strengthened and fewer or no post-processing steps are required to prevent unraveling. In addition, loose yarns are also less likely to inhibit the aesthetic appearance of collar element 50.

[71] The specific shape of collar element 50 in Figures 13 and 14 is intended to provide an example of a shape that is suitable for footwear 10. A variety of other shapes may also be utilized. As an example, Figure 16A depicts a more contoured configuration. As further examples, Figures 16B and 16C depict simpler collar profiles that may be incorporated into a variety of footwear types.

[72] A flat knitting machine may be utilized to form an individual collar element 50. In order to enhance manufacturing efficiency, knitting machines may also be utilized

to form a series of joined collar element 50, as depicted in Figures 17A and 17B. That is, the knitting machines may form a single component that includes a plurality of collar element 50. Referring to Figure 17A, each of the collar elements 50 may have substantially identical shapes, but different sizes that are suitable for different sizes of footwear 10. Alternately, each of the collar elements 50 may have different shapes and sizes, as depicted in Figure 17B. A knit release area may be knitted into the series of collar elements 50 in order to allow the various collar elements 50 to be separated without the need for cutting operations. More particularly, a release thread 55 that is located in the release area during in the knitting process may extend between the various collar elements 50. By pulling or otherwise removing release thread 55, collar elements 50 may be separated without cutting or other manufacturing steps. A similar release thread may be utilized to separate the various sheaths depicted in Figures 12A and 12B.

[73] Collar-Throat Element

[74] Another configuration of footwear 10 is depicted in Figure 18 as including a collar-throat element 60 that extends at least partially around the ankle opening and also extends into the throat area of footwear 10 define the various lace apertures 34 on lateral side 14. A similar collar-throat element may also be located on medial side 15. Collar-throat element 60 is similar in construction to collar element 50 and includes an outer layer 61, an opposite inner layer 62, a plurality of floating yarns 63, and a flange 64. Although edges of layers 61 and 62 are secured to each other, a central area between layers 61 and 62 is generally unsecured to each other in order to form a cavity in which floating yarns 63 are located. As such, the layers of knitted material effectively form a tube or tubular structure, and floating yarns 63 may be located or laid-in between layers 61 and 62.

[75] Whereas outer layer 61 forms a portion of an exterior surface of upper 30 in the area of the ankle opening, inner layer 62 forms a portion of the interior surface of

upper 30 (i.e., the surface defining the void within upper 30). In an upper area of collar element 50, layers 61 and 62 are seamlessly-joined to each other. Similarly, layers 61 and 62 are seamlessly-joined to each other in a lower area of collar-throat element 60. Additionally, flange 64 extends outward from layers 61 and 62 and is utilized to join collar-throat element 60 to a remainder of upper 30. As with collar element 50, flange 64 may extend between layers 31 and 32 and are secured to either or both of layers 31 and 32. Flange 64 extends into the throat area and defines various lace apertures 34. A portion of flange 64 adjacent to lace apertures 34 may also extend between layers 31 and 32 and be secured to either or both of layers 31 and 32.

[76] Collar-throat element 60 may be formed through a flat knitting process to have a unitary knit construction, and may also be formed to have a finished configuration. Additionally, any of the various types of yarn or stitch types discussed above may also be utilized in collar-throat element 60. The specific shape of collar-throat element 60 in Figures 19 and 20 is intended to provide an example of a shape that is suitable for footwear 10. In the configuration depicted in Figures 19 and 20, collar-throat element 60 is limited to lateral side 14, and another element may be utilized on medial side 15. In further configurations, however, a single collar-throat element 60 may extend around heel region 13 to form the ankle opening on both of sides 14 and 15, and the single collar-throat element 60 may extend through the throat area on both of sides 14 and 15 to form each of lace apertures 34. A variety of other shapes may also be utilized. As with sheath 41 and collar element 50, a knitting machine may form a single component that includes a plurality of joined collar-throat elements 60 in order to increase manufacturing efficiency.

[77] Another element 70 is depicted in Figure 23 as being a combination of tongue element 40 and collar-throat element 60. Although flat knitting and circular knitting may be utilized to form discrete and relatively small areas of upper 30 (i.e., the areas formed by tongue element 40, collar element 50, and collar-throat element 60), knitting processes may also be utilized to form greater areas that

have unitary knit construction. As another example, a tongue-vamp element 80 is depicted in Figure 24. Tongue-vamp element 80 includes a tongue area 81 and a vamp area 82 that are formed of unitary knit construction. Whereas tongue area 81 may have the general configuration of tongue element 40, vamp area 82 may be a single layer of material, for example. When incorporated into footwear 10, as depicted in Figure 25, vamp area 82 may form an interior lining. Moreover, a portion of vamp area 82 may be exposed through an aperture in layers 31 and 32. Although vamp area 82 may be formed to exhibit a single type of knit structure or may have various knit structures. For example, the area exposed through the aperture in layers 31 and 32 may define various apertures to enhance breathability.

[78] Footwear Incorporation

[79] Each of tongue element 40, collar element 50, and collar-throat element 60 include a compressible area and a flange area. In general, the compressible area forms a comfortable structure that may bear upon the foot, whereas the flange area is utilized to join the elements to footwear 10 (e.g., by joining between layers 31 and 32). With regard to tongue element 40, the compressible area includes portions of tongue element 40 where core 42 is located, and the flange area includes the two flanges 47. With regard to collar element 50, the compressible area includes layers 51 and 52 and floating yarns 53, and the flange area includes flange 54. Similarly, and with regard to collar-throat element 60, the compressible area includes layers 61 and 62 and floating yarns 63, and the flange area includes flange 64. In each or these elements, the various flanges 47, 54, and 64 extend outward from the compressible area and are located inward from one of the material layers forming upper 30 (i.e., layer 31), and the various flanges 47, 54, and 64 are joined with the material layer or another portion of upper 30.

[80] Referring to Figures 5A and 5C, flanges 47 from tongue element 40 and flange 54 from collar element 50 are located between layers 31 and 32 and joined with

at least one of layers 31 and 32. In other configurations, flanges 47 and 54 may be joined to an upper formed from a single layer or may be joined to an upper formed from multiple layers. For example, Figure 22A depicts a configuration wherein collar element 50 is joined with an area of upper 30 including only layer 31. Although flange 54 may be joined to upper 30 inward from a material layer, such as layer 32, Figure 22B depicts a configuration wherein collar element 50 is joined with an exterior of layer 31. Figure 22C depicts a configuration wherein collar element 50 is joined to an area of upper 30 wherein a central layer 35 is present, and flange 54 is positioned between layers 32 and 35. In another configuration, depicted in Figure 22D, collar element 50 includes two compressible areas where floating yarns 53 are present, and one of the compressible areas is exposed through an aperture in layer 31. Similar concepts may be applied to the manner in which tongue element 40 and collar-throat element 60 are joined with other areas of upper 30. In another configuration, depicted in Figure 26, flanges 54 from collar elements 50 extend along the interior surface of the void within upper 30 to form a continuous lining. Accordingly, the manner in which flanges 47, 54, and 64 are utilized to join elements to an article of footwear may vary significantly.

[81] When knitting collar-throat element 60, layers 61 and 62 and opposite sides of flange 64 may be knit symmetrically and of equal quality. When formed in this manner, collar-throat element 60 may be used on either lateral side 14 or medial side 15. That is, collar-throat element 60 may have a symmetrical aspect that allows it to be incorporated into either side of footwear 10, thereby reducing the types of elements that are manufactured for use in footwear 10.

[82] A further advantage of forming knitted elements to have opposite sides of equal quality is that an individual element may be incorporated into versions of footwear 10 for either the right foot or the left foot. Referring to Figures 27A and 27B, for example, opposite sides of another collar element 80 are depicted. Collar element 80 is similar to collar element 50 and has (a) a lateral portion 81 intended to extend into lateral side 14 of footwear 10 and (b) a medial portion 82

intended to extend into medial side 15 of footwear 10. Portions 81 and 82 are shaped differently and impart an asymmetrical aspect to collar element 80 that is suited for sides 14 and 15. The opposite sides or faces of collar element 80, however, are symmetrical and of equal quality. When incorporated into footwear 10, the side that faces outward depends upon whether footwear 10 is shaped for the right foot or the left foot. That is, one side (i.e., the side depicted in Figure 27B) will face outward when incorporated into footwear 10 for the right foot, and an opposite side (i.e., the side depicted in Figure 27A) will face outward when incorporated into footwear 10 for the left foot. Identical collar elements 80 may, therefore, be incorporated into footwear 10 for the right foot and the left foot, depending upon which side faces outward. An advantage to this configuration is that the types of elements that are manufactured for use in different versions of footwear 10 are reduced.

[83] In order to assist with incorporating knitted elements into footwear 10, a registration mark may be knit into the elements. That is, a yarn of different color or a different type of stitch may be knit into the elements to form a registration mark. As an example, element 70 includes a centrally-located registration mark 71, as depicted in Figure 23. When incorporating element 70 into footwear 10, registration mark 71 may be utilized to ensure that element 70 is centrally-positioned and properly aligned with other elements. Similar registration marks may be utilized for tongue element 40 (i.e., on flanges 47), collar element 50, and collar-throat element 60.

[84] The invention is disclosed above and in the accompanying figures with reference to a variety of configurations. The purpose served by the disclosure, however, is to provide an example of the various features and concepts related to the invention, not to limit the scope of the invention. One skilled in the relevant art will recognize that numerous variations and modifications may be made to the configurations described above without departing from the scope of the present invention, as defined by the appended claims.

CLAIMS

1. An article of footwear having an upper and a sole structure secured to the upper, the upper comprising:

a material layer forming at least a portion of an exterior surface of the upper; and

a knitted component formed of unitary knit construction, the knitted component having a compressible area and a flange area, the compressible area forming a portion of the exterior surface and a portion of an opposite interior surface of the upper, and the flange area extending outward from the compressible area,

wherein the flange area is located inward from the material layer, and the flange area is joined with the material layer.

2. The article of footwear recited in claim 1, wherein the compressible area defines a cavity within the knitted component.

3. The article of footwear recited in claim 2, wherein at least one of a foam member, a fibrous material, and a plurality of floating yarns are located within the cavity.

4. The article of footwear recited in claim 1, wherein the knitted component forms at least one of a tongue and a collar of the upper.

5. An article of footwear having an upper and a sole structure secured to the upper, the upper comprising:

a first material layer forming at least a portion of an exterior surface of the upper;

a second material layer located parallel to the first material layer and inward from the exterior surface; and

a knitted component having a first knit layer and a second knit layer formed of unitary knit construction, the first knit layer forming at least a portion of the exterior surface of the upper, and the second knit layer forming at least a portion of an interior surface of the upper, the knitted component defining

a flange extending outward from at least one of the first knit layer and the second knit layer,

wherein the flange is located between the first material layer and the second material layer, and the flange is joined with at least one of the first material layer and the second material layer.

6. The article of footwear recited in claim 5, wherein areas of the first knit layer and the second knit layer are spaced from each other to define a cavity within the knitted component.

7. The article of footwear recited in claim 6, wherein at least one of a foam member, a fibrous material, and a plurality of floating yarns are located within the cavity.

8. The article of footwear recited in claim 6, wherein edges of the first knit layer and the second knit layer are joined to each other around at least a portion of the cavity.

9. The article of footwear recited in claim 5, wherein the knitted component forms at least one of a tongue and a collar of the upper.

10. An article of footwear having an upper and a sole structure secured to the upper, the upper including a tongue element comprising:

a knitted component formed of unitary knit construction and forming a majority of an exterior of the tongue element, the knitted component defining an interior cavity; and

a compressible material located within the cavity,

wherein an end of the knitted component is secured to a throat area of the upper.

11. The article of footwear recited in claim 10, wherein the compressible material is a foam member.

12. The article of footwear recited in claim 10, wherein the end of the tubular structure includes an opening for the cavity.

13. The article of footwear recited in claim 10, wherein the compressible material is a plurality of floating yarns formed of unitary knit construction with the knitted component.

14. The article of footwear recited in claim 10, wherein the knitted component includes a first region having a first stitch type and a second region having a second stitch type, the first stitch type being different than the second stitch type.

15. The article of footwear recited in claim 14, wherein the first region includes a first yarn and the second region includes a second yarn.

16. The article of footwear recited in claim 10, wherein another end of the knitted component is located adjacent to an ankle opening of the upper and has a closed configuration.

17. A method of manufacturing a tongue element for an article of footwear, the method comprising:

knitting a tubular structure having a first end and a second end, at least the first end having a closed configuration;

inserting a compressible material into the tubular structure through the second end; and

securing the second end to an upper of the article of footwear.

18. The method recited in claim 17, wherein the step of knitting includes utilizing one of a flat knitting technique and a circular knitting technique.

19. The method recited in claim 17, wherein the step of knitting includes forming a first region having a first stitch type and a second region having a second stitch type, the first stitch type being different than the second stitch type.

20. The method recited in claim 17, wherein the step of inserting includes selecting the compressible material to be at least one of a foam member and a fibrous material.

21. The method recited in claim 17, wherein the step of inserting includes laying a plurality of floating yarns within the tubular structure.

22. The method recited in claim 17, further including a step of locating a form within the tubular structure and heating the tubular structure to impart shape to the tubular structure.

23. An article of footwear having an upper and a sole structure secured to the upper, the upper defining an interior void for receiving a foot of a wearer, and the upper having an ankle opening that provides access to the void, the upper having a collar element formed of unitary knit construction and comprising:

a knitted exterior forming at least a portion of (a) an exterior surface of the upper adjacent to an ankle opening of the upper and (b) an interior surface of the upper adjacent to the ankle opening, the knitted exterior defining an interior cavity; and

a plurality of floating yarns located within the cavity,

wherein the collar element is formed as a separate component from other portions of the upper and is secured to the other portions of the upper.

24. The article of footwear recited in claim 23, wherein the collar element includes a flange formed of unitary knit construction with the knitted exterior, the flange being secured to the other portions of the upper.

25. The article of footwear recited in claim 23, wherein the knitted exterior includes a first knitted layer and a second knitted layer, the first knitted layer and the second knitted layer being joined to each other at the ankle opening and at a location spaced from the ankle opening to define the cavity.

26. The article of footwear recited in claim 23, wherein the collar element extends along a portion of a lateral side of the upper, around a heel area of the upper, and along a portion of a medial side of the upper in an area of the ankle opening.

27. An article of footwear having an upper and a sole structure secured to the upper, the upper defining an interior void for receiving a foot of a wearer, and the upper having an ankle opening that provides access to the void, the upper having a collar element comprising:

a first knit layer and a second knit layer formed of unitary knit construction, the first knit layer forming at least a portion of the exterior surface of the upper adjacent to the ankle opening, and the second knit layer forming at least a portion of an interior surface of the upper adjacent to the ankle opening, areas of the first knit layer and the second knit layer are spaced from each other to define a cavity within the knitted component;

a plurality of floating yarns located within the cavity and between the first knit layer and the second knit layer; and

a flange extending outward from at least one of the first knit layer and the second knit layer, the flange being secured to another element of the upper.

28. The article of footwear recited in claim 27, wherein edges of the first knit layer and the second knit layer are joined to each other around at least a portion of the cavity.

29. The article of footwear recited in claim 27, wherein the collar element extends along a portion of a lateral side of the upper, around a heel area of the upper, and along a portion of a medial side of the upper in an area of the ankle opening.

30. A method of manufacturing a collar element for an article of footwear, the method comprising:

flat knitting the collar element to have unitary knit construction that includes (a) a tubular structure with an interior cavity and (b) a plurality of floating yarns within the cavity; and

securing the collar element to an upper of the article of footwear.

31. The method recited in claim 30, wherein the step of flat knitting includes forming a flange that extends outward from the tubular structure.

32. The method recited in claim 31, wherein the step of securing includes placing the flange adjacent to a material layer of the upper and joining the flange to the material layer.

33. The method recited in claim 30, wherein the step of securing includes locating the collar element along a portion of a lateral side of the upper, around a heel area of the upper, and along a portion of a medial side of the upper.

34. A method of manufacturing an article of footwear, the method comprising:

knitting a series of footwear elements, at least two of the footwear elements being joined by a release area that includes a release yarn;

removing the release yarn to separate the footwear elements; and

incorporating at least one of the footwear elements into the article of footwear.

35. The method recited in claim 34, wherein the step of knitting includes utilizing one of a flat knitting technique and a circular knitting technique.

36. The method recited in claim 34, wherein the step of knitting includes forming each of the footwear elements of unitary knit construction.

37. The method recited in claim 34, wherein the step of knitting includes forming flanges in the footwear elements, and the step of incorporating includes securing one of the flanges to the article of footwear.

38. The method recited in claim 34, further including a step of heating and altering a shape of at least one of the footwear elements.

39. A method of manufacturing a first article of footwear for a right foot of a wearer and a second article of footwear for a left foot of the wearer, the method comprising:

knitting a first element and a second element, the first element being substantially identical to the second element;

incorporating the first element into the first article of footwear; and

incorporating the second element into the second article of footwear.

40. The method recited in claim 39, wherein the first element has a lateral portion and a medial portion with different shapes, and the first element has opposite sides that are substantially symmetrical.

41. The method recited in claim 39, wherein the first element includes a compressible area and a flange area extending outward from the compressible area, and the step of incorporating the first element into the first article of footwear includes securing the flange area to a material layer of the first article of footwear.

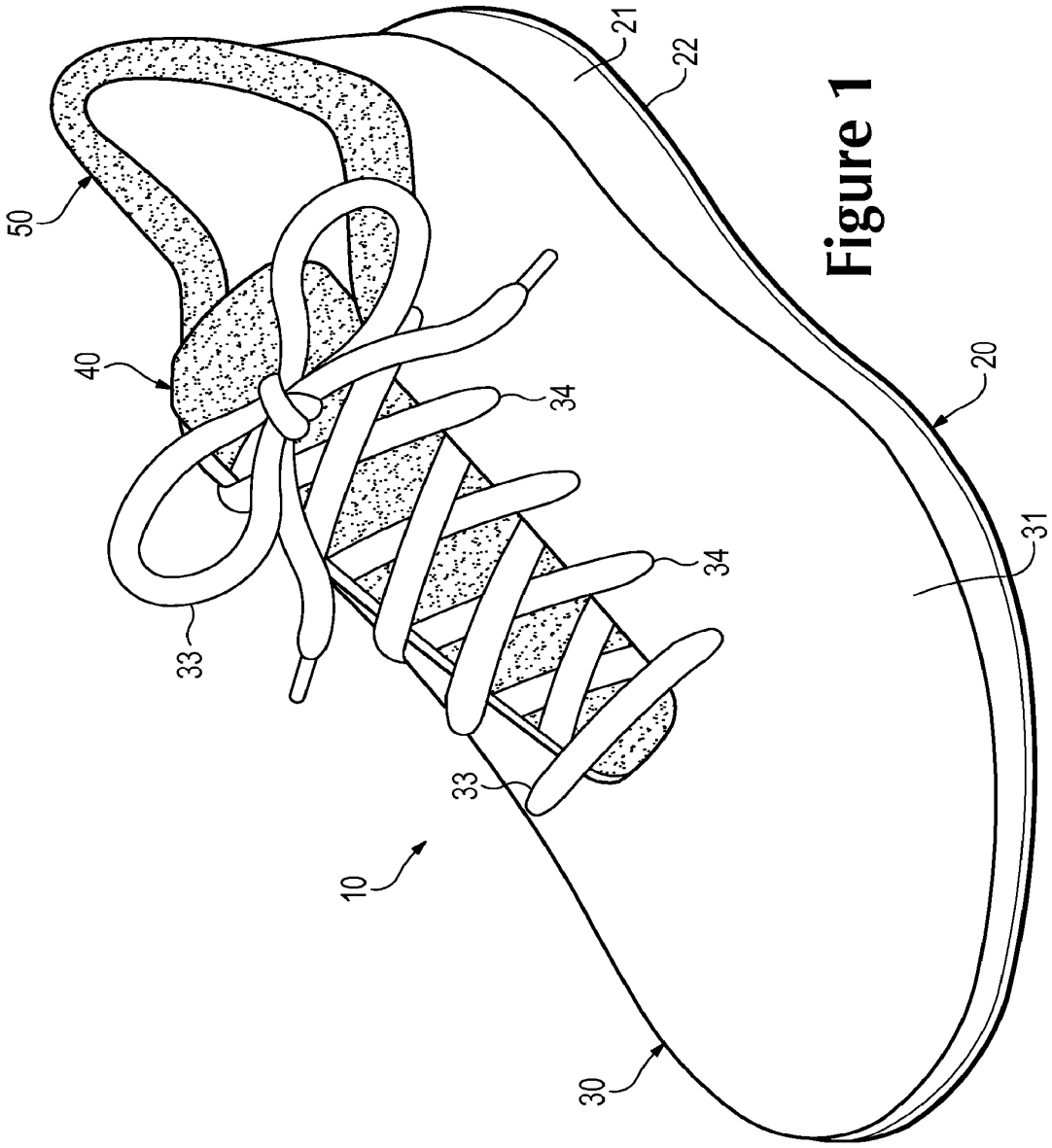


Figure 1

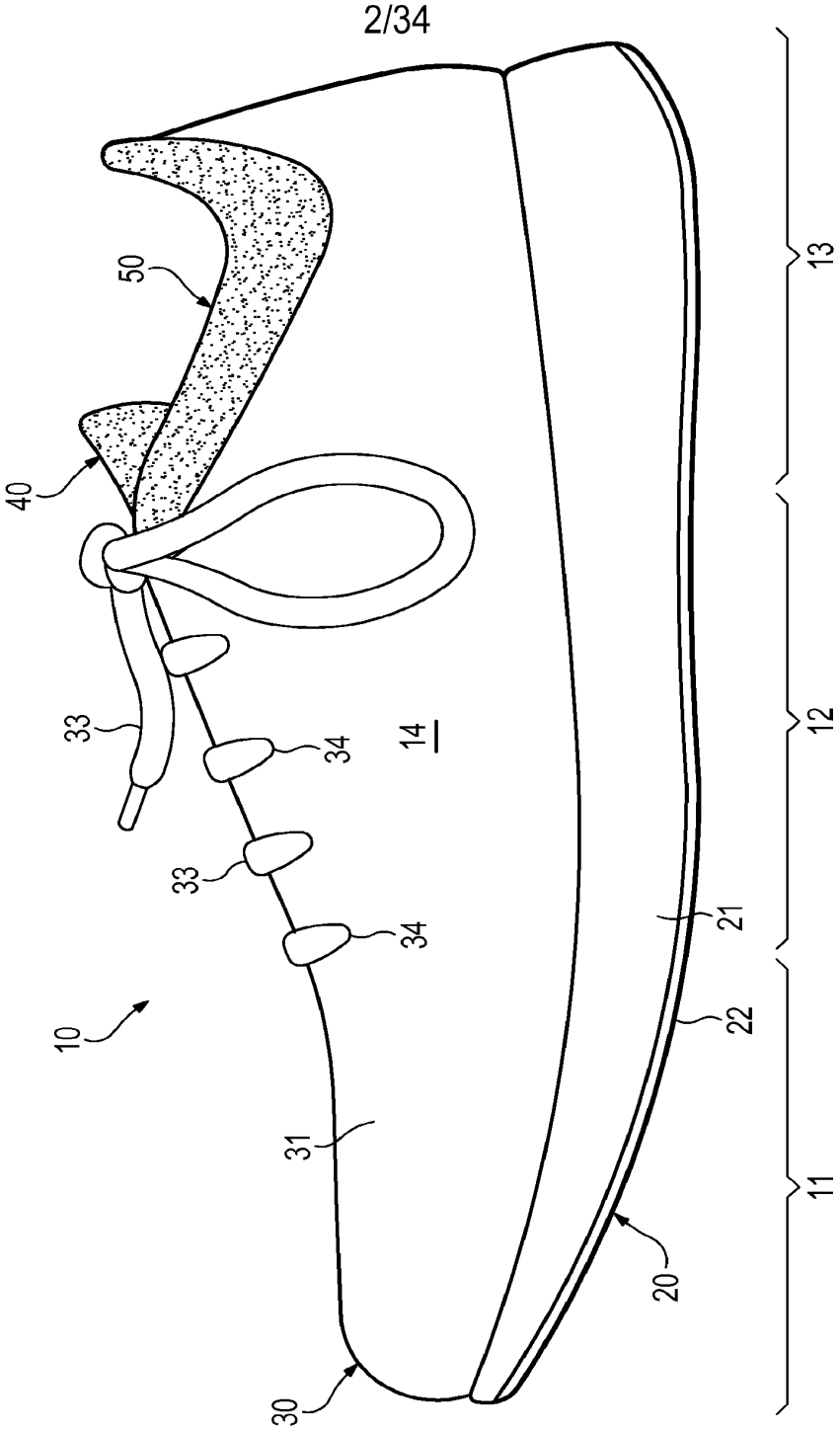


Figure 2

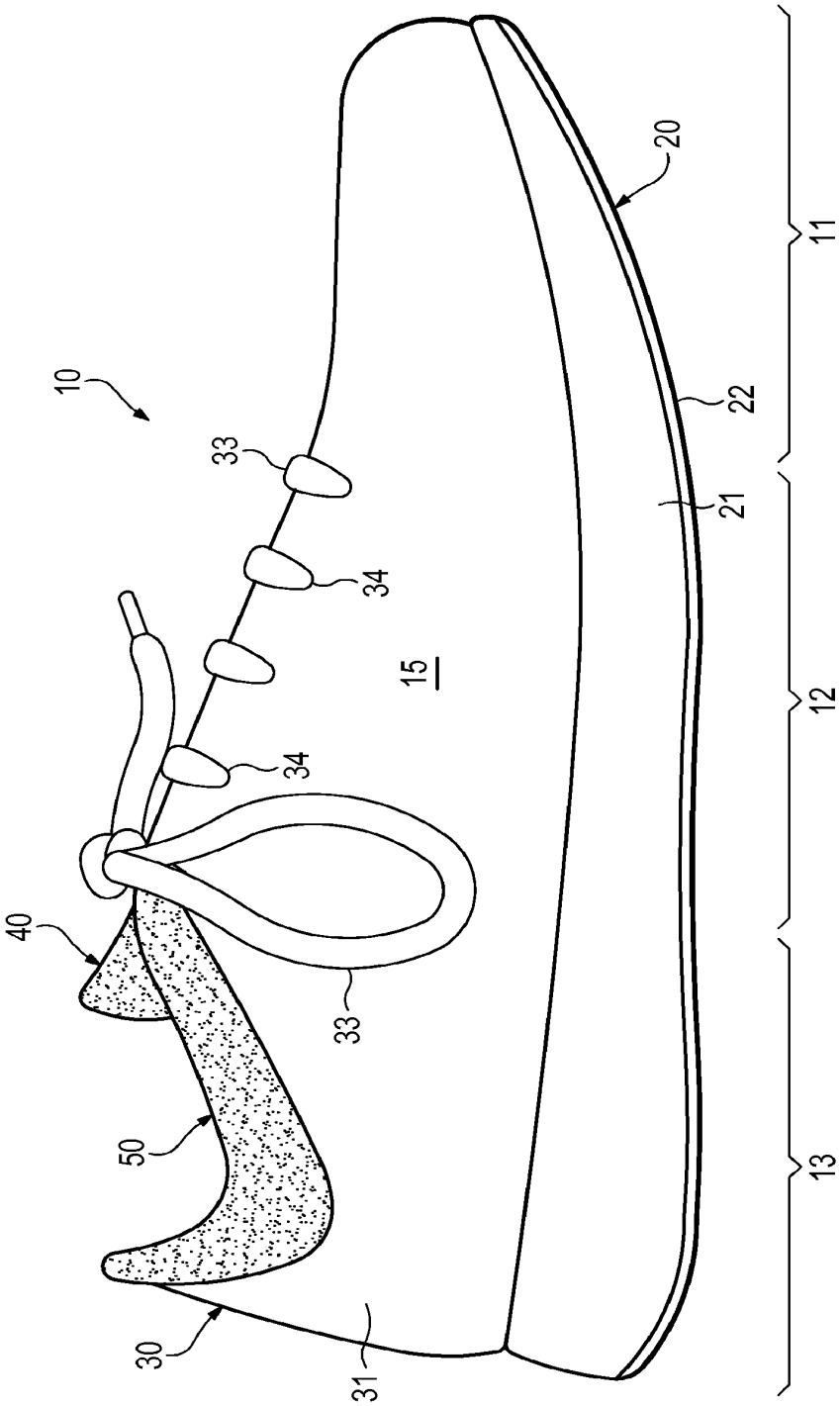


Figure 3

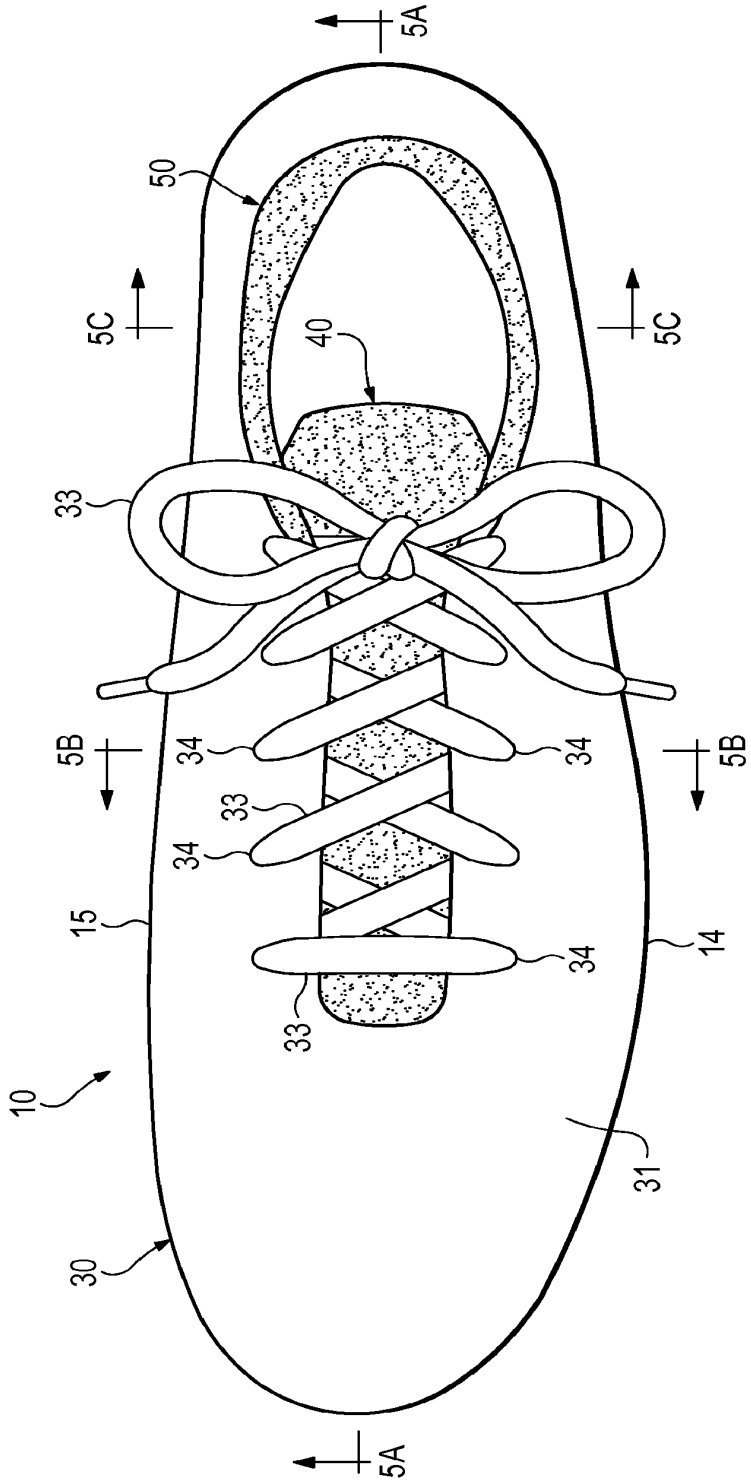


Figure 4

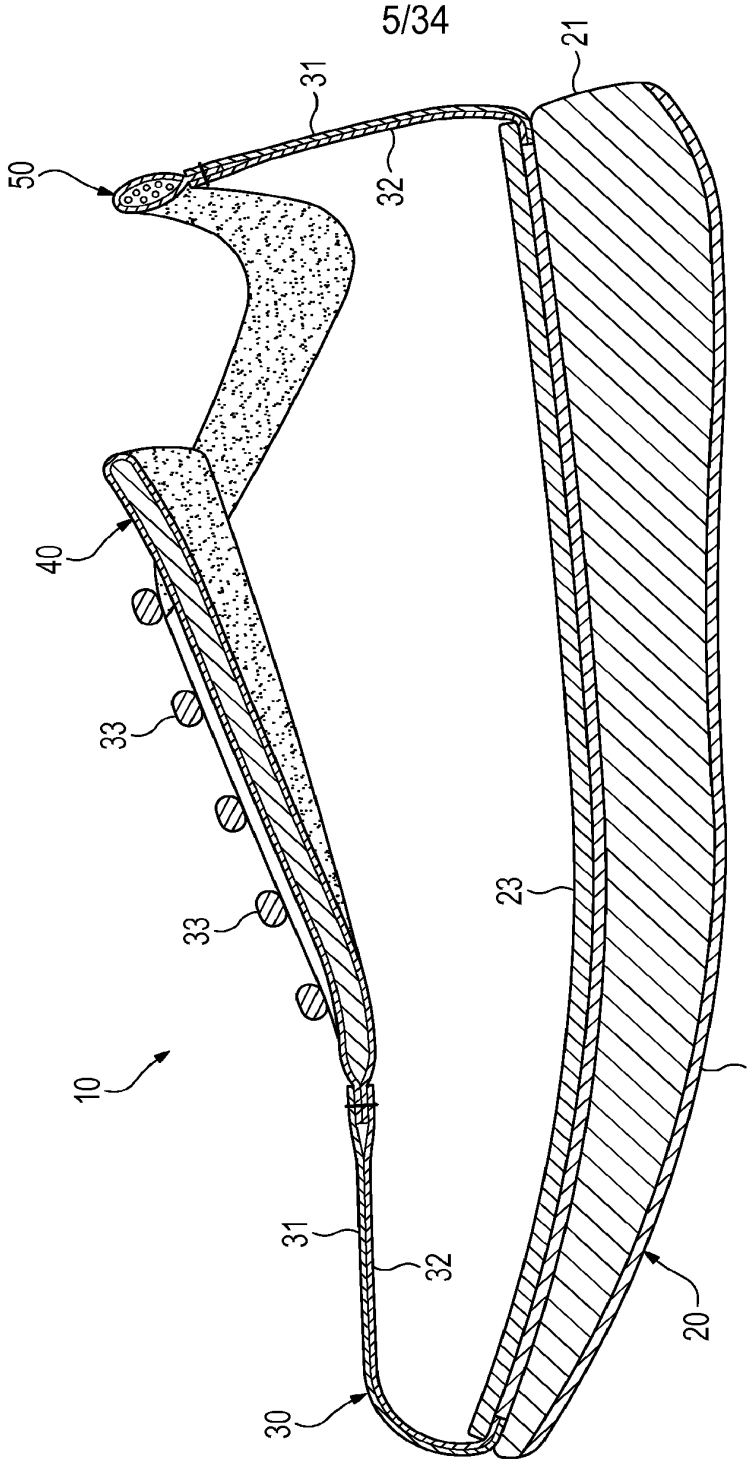


Figure 5A

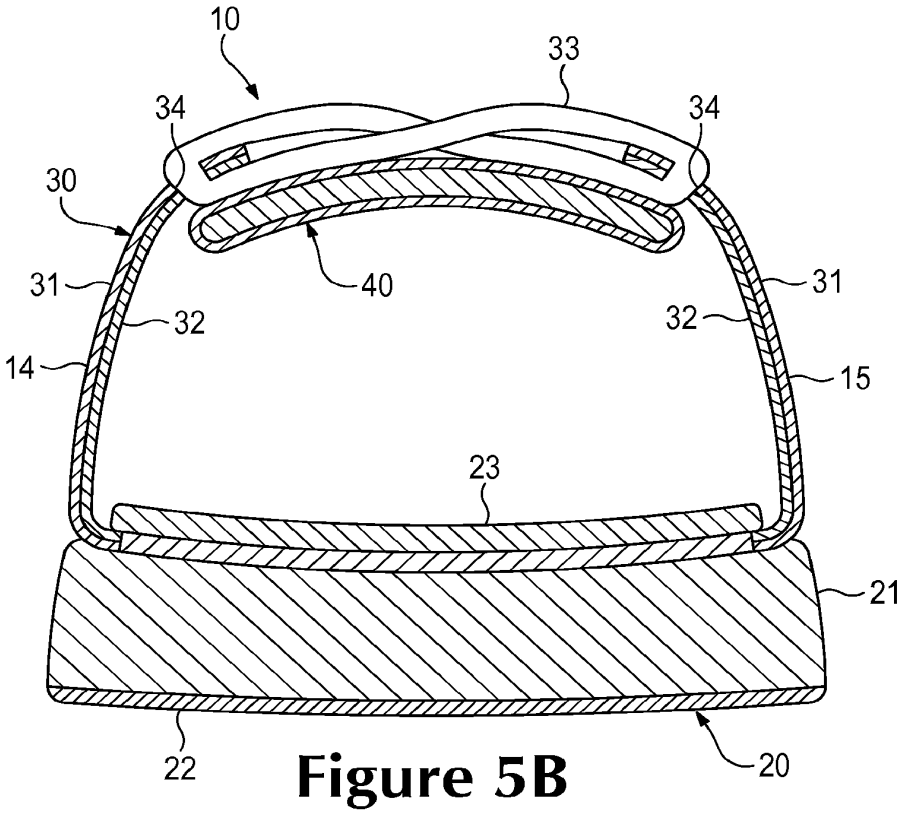


Figure 5B

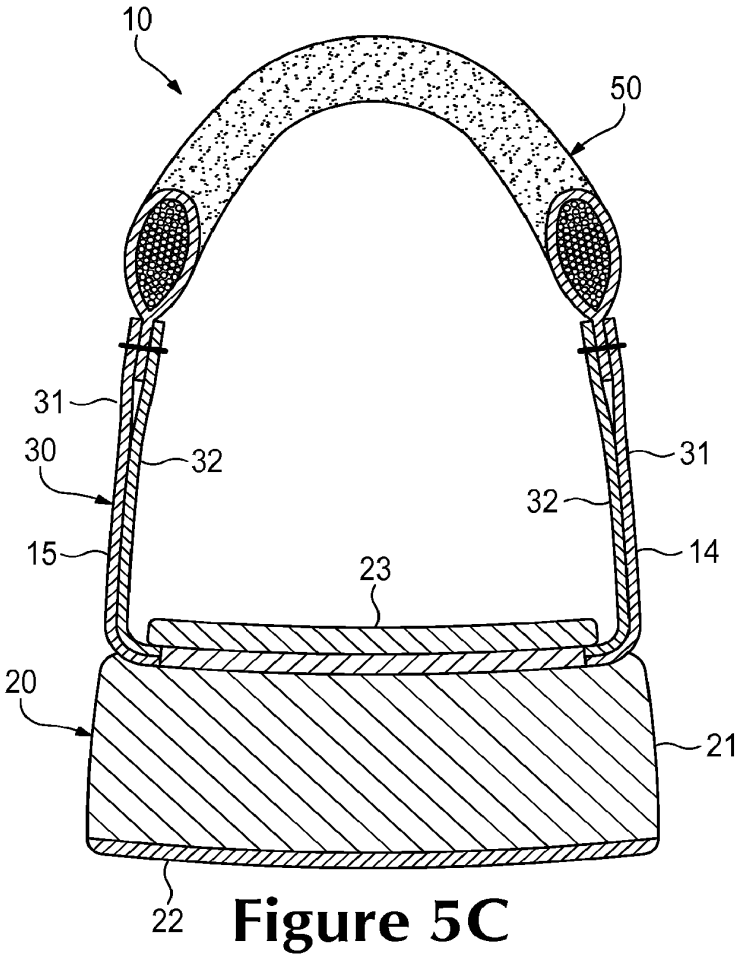


Figure 5C

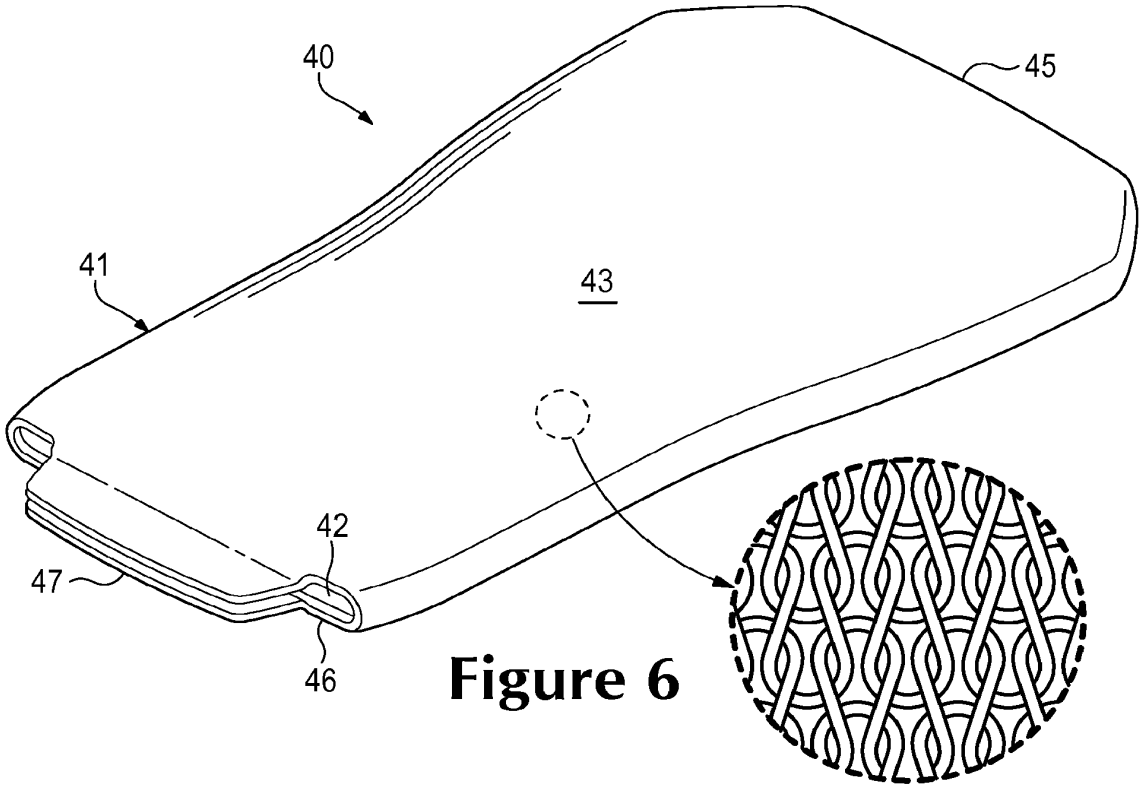


Figure 6

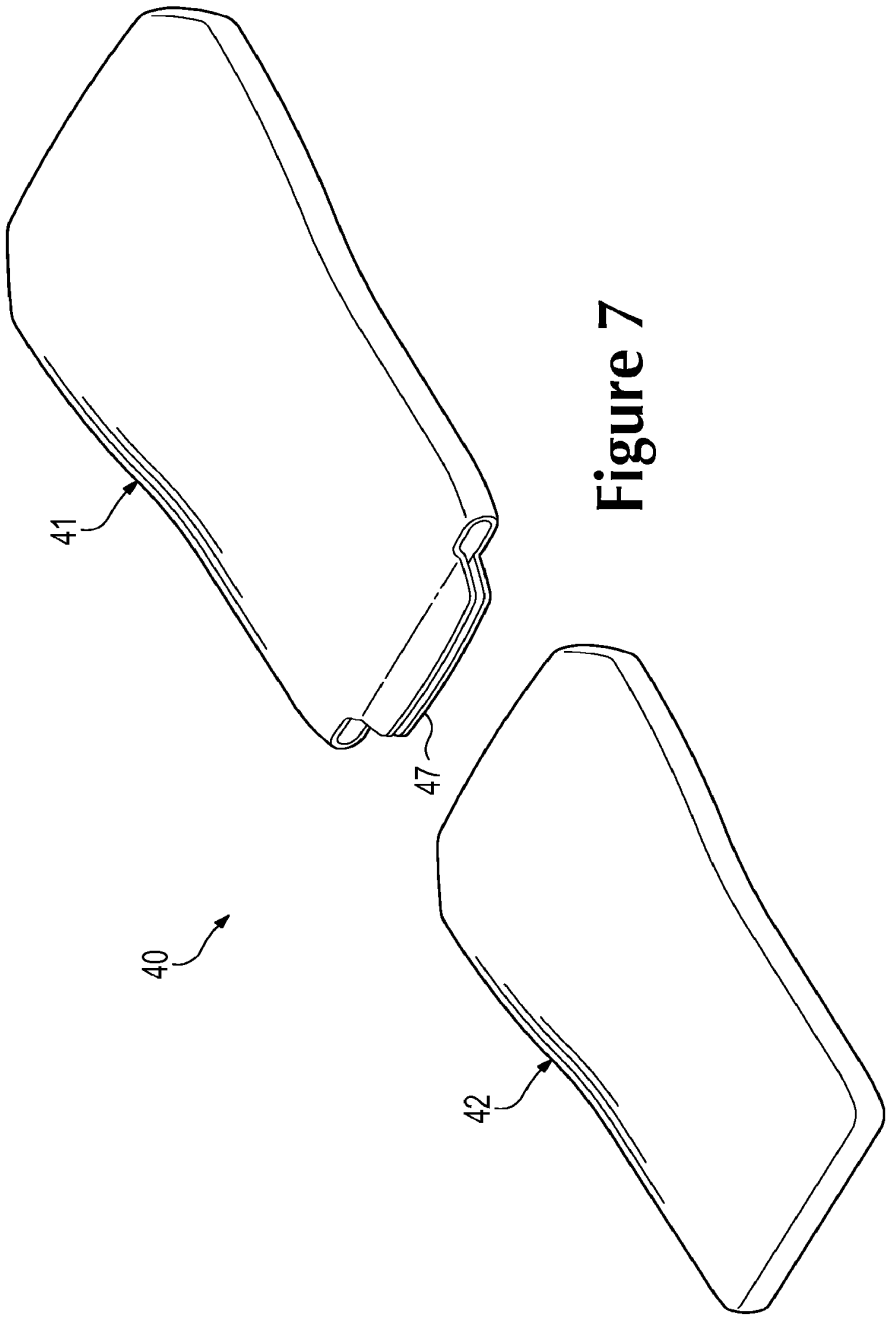


Figure 7

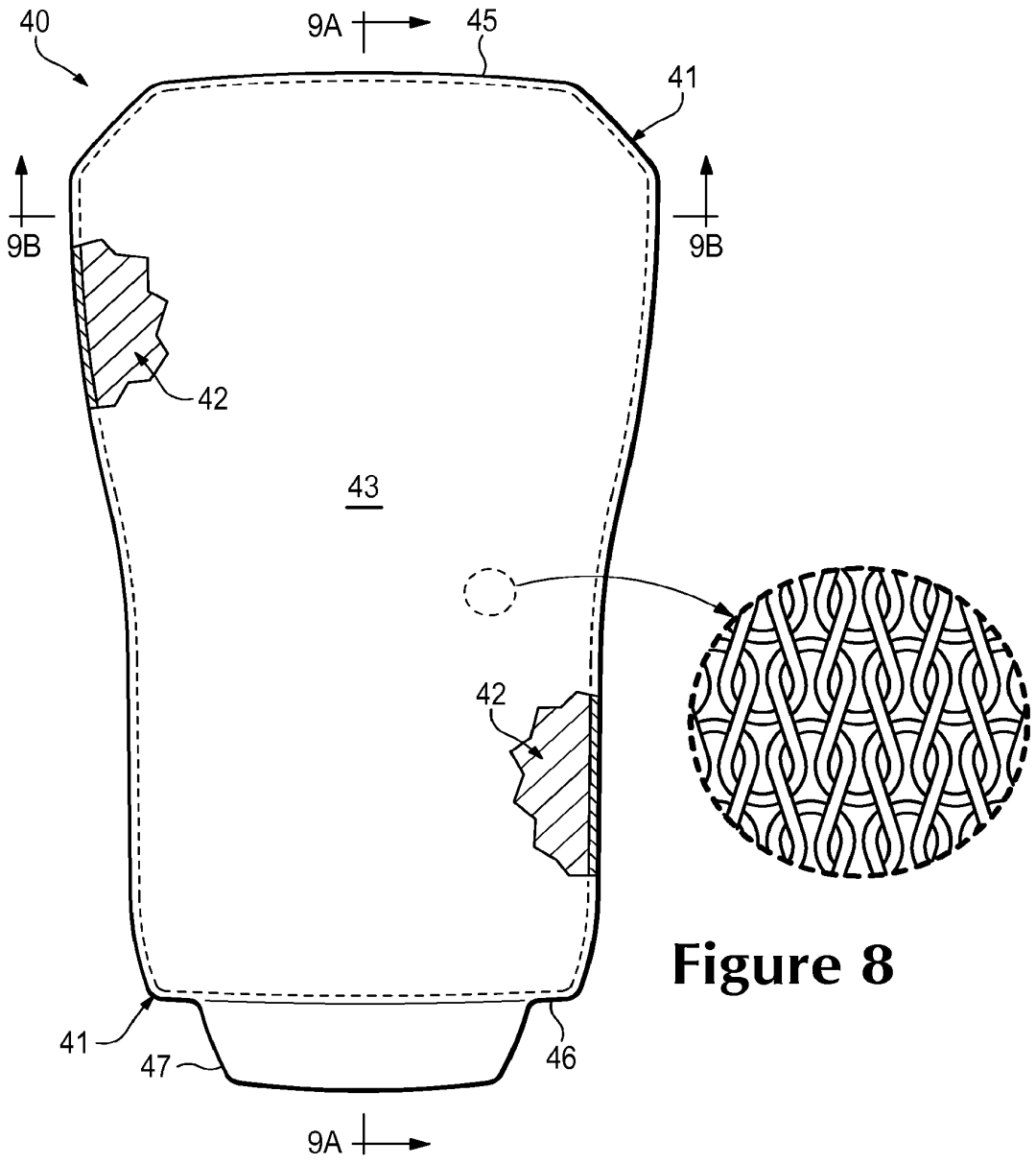


Figure 8

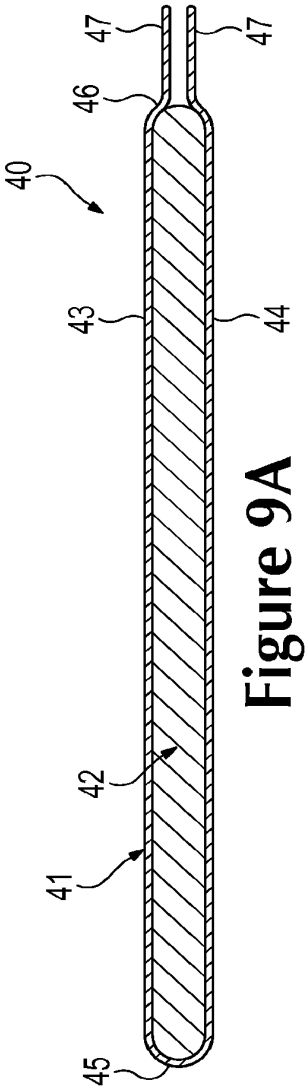


Figure 9A

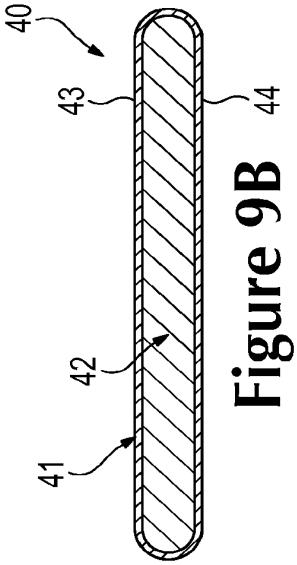


Figure 9B

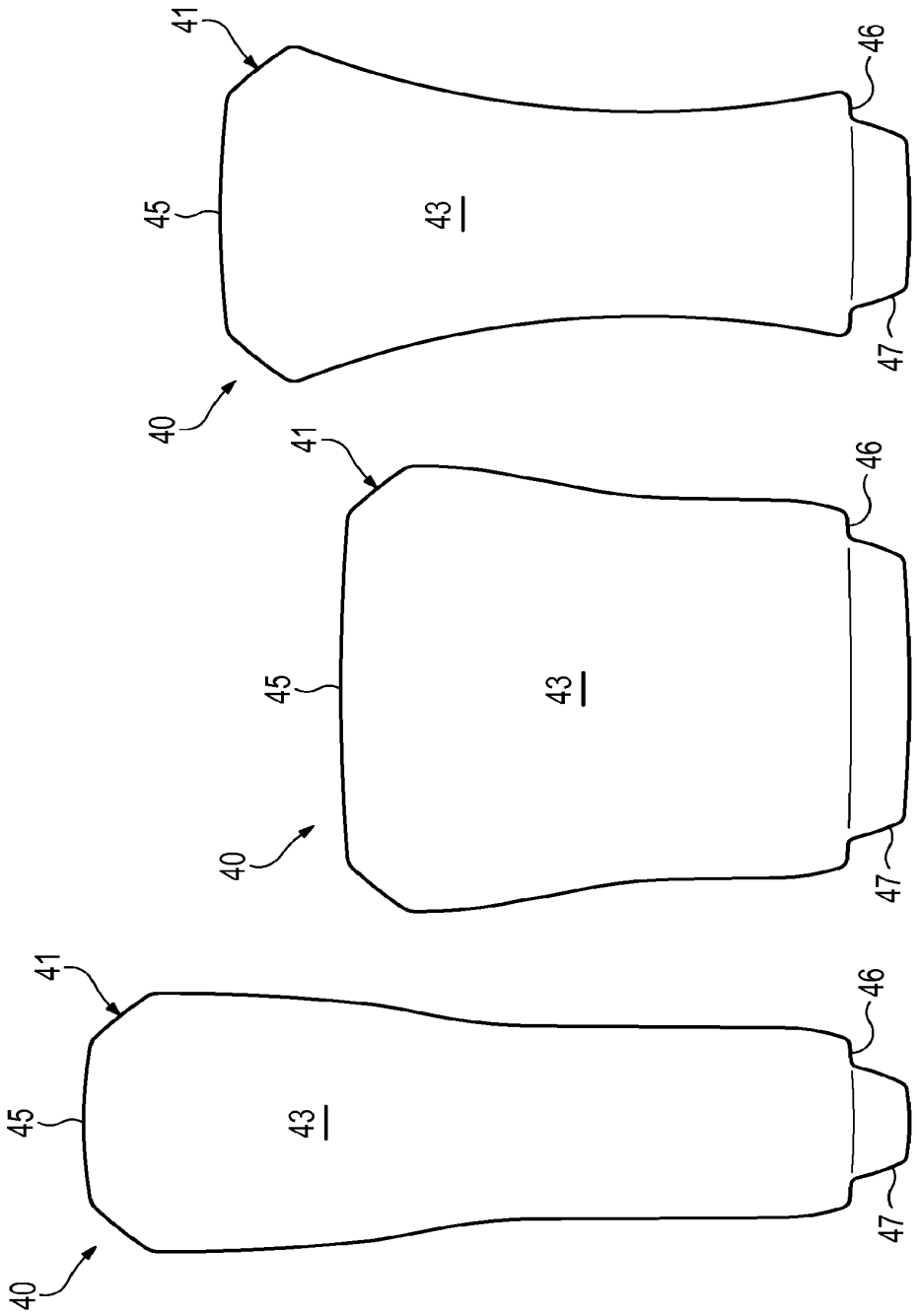


Figure 10A

Figure 10B

Figure 10C

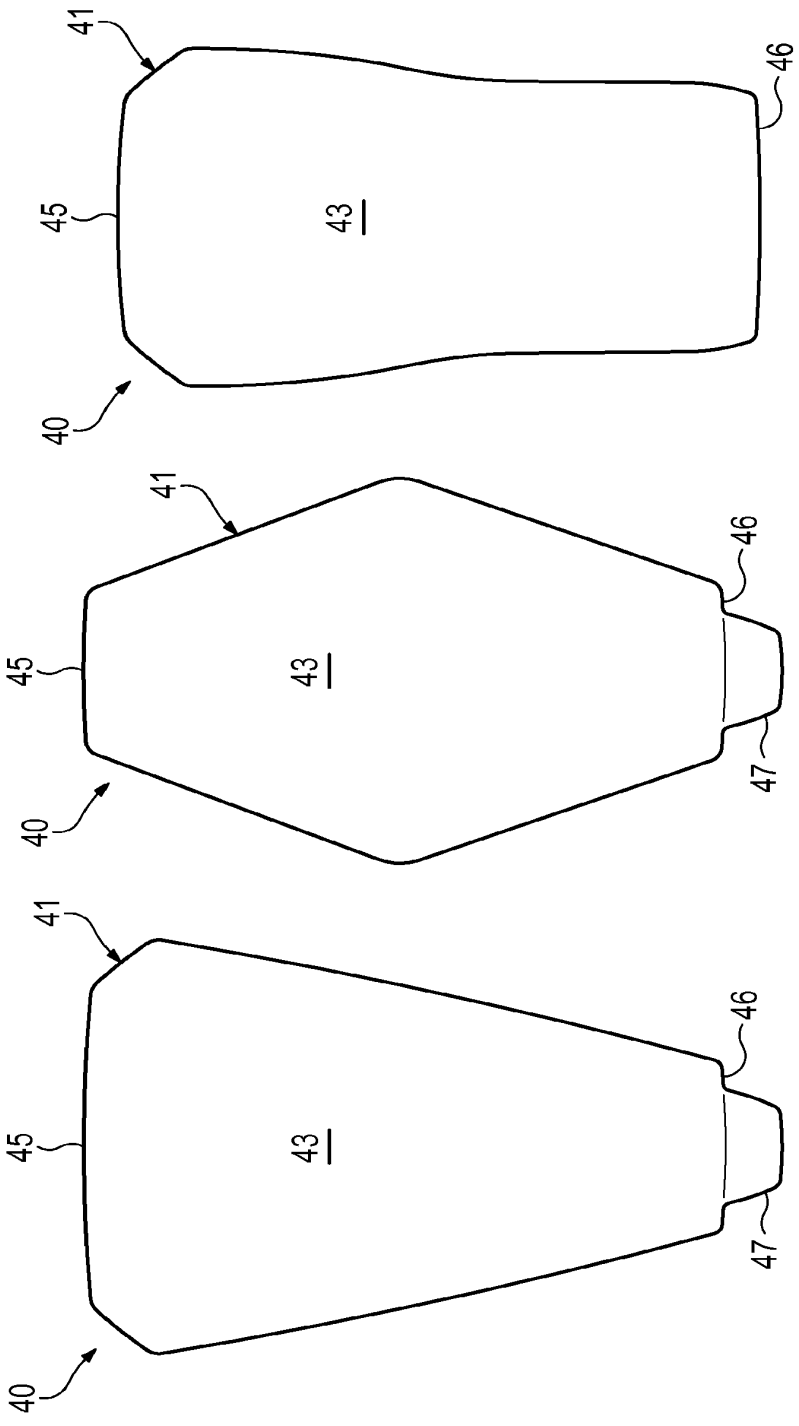


Figure 10F

Figure 10E

Figure 10D

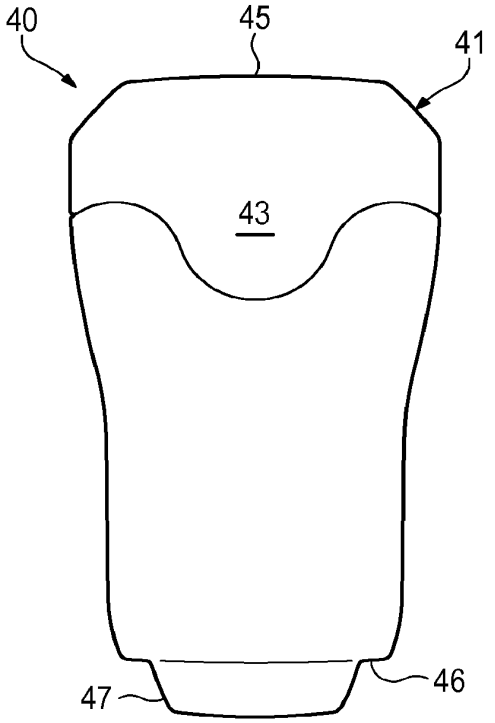


Figure 10G

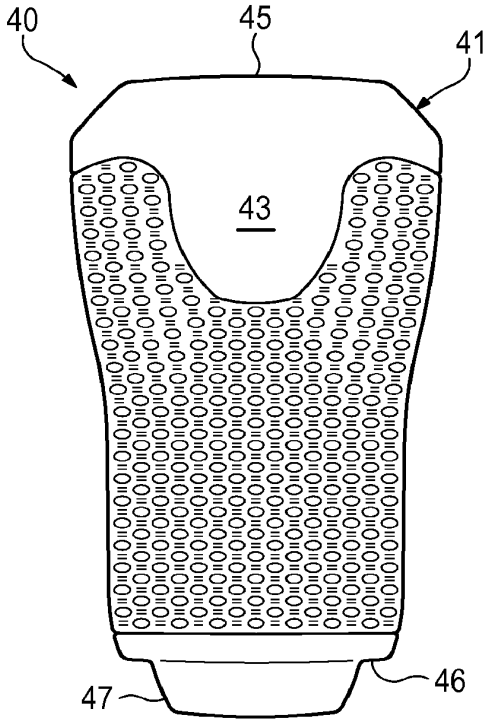


Figure 10H

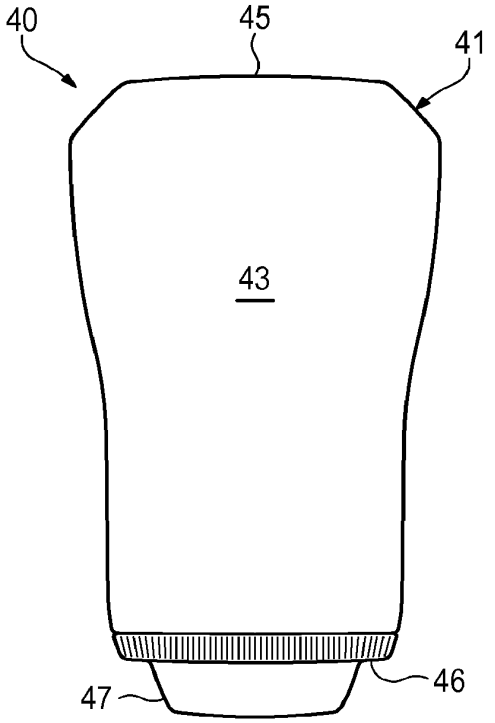


Figure 10I

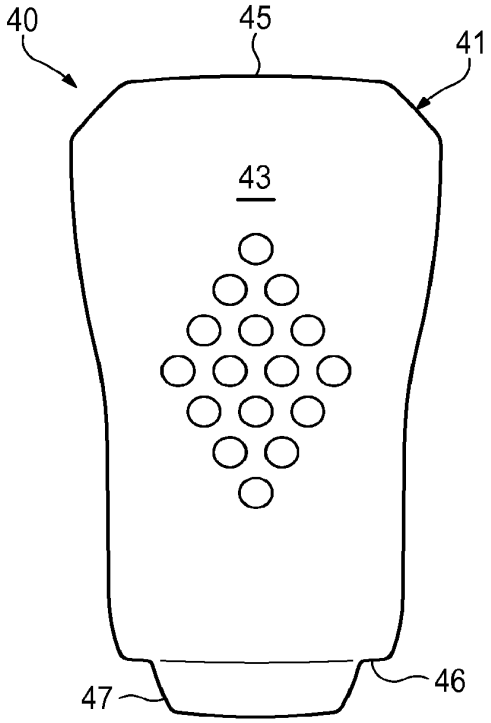


Figure 10J

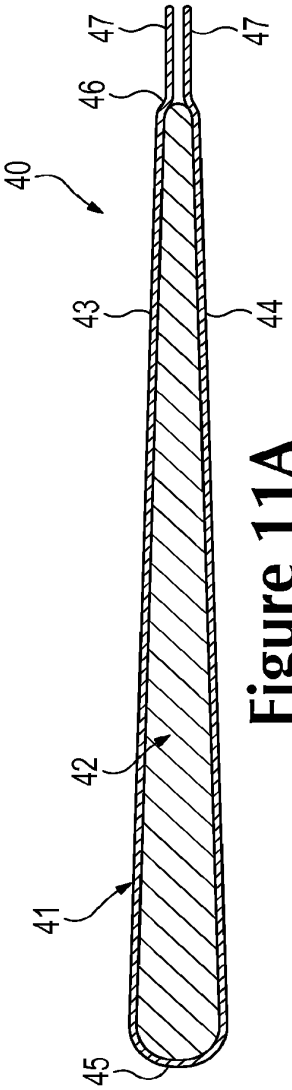


Figure 11A

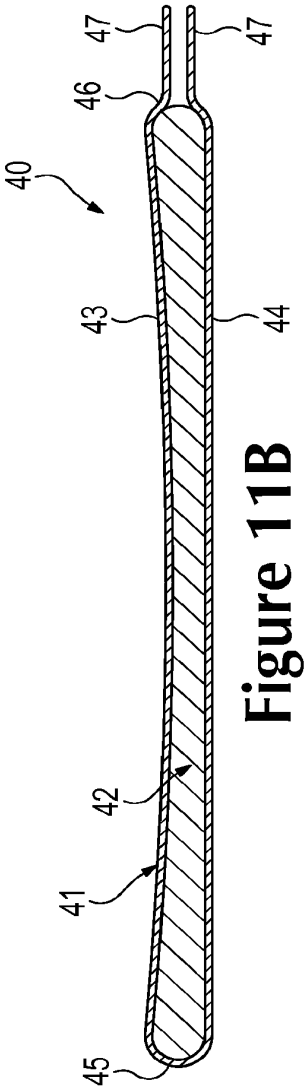


Figure 11B

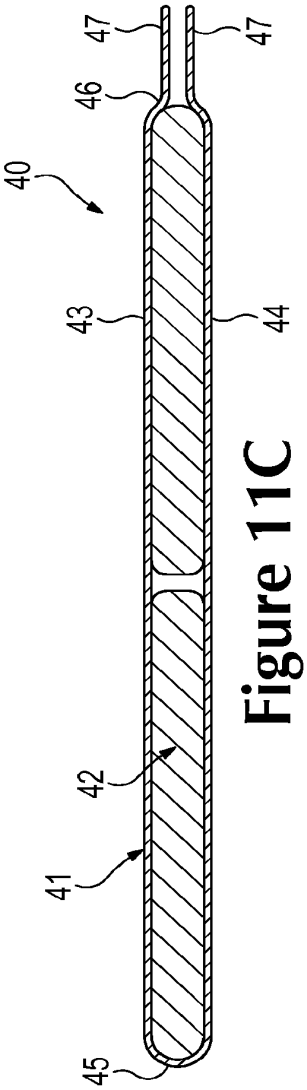


Figure 11C

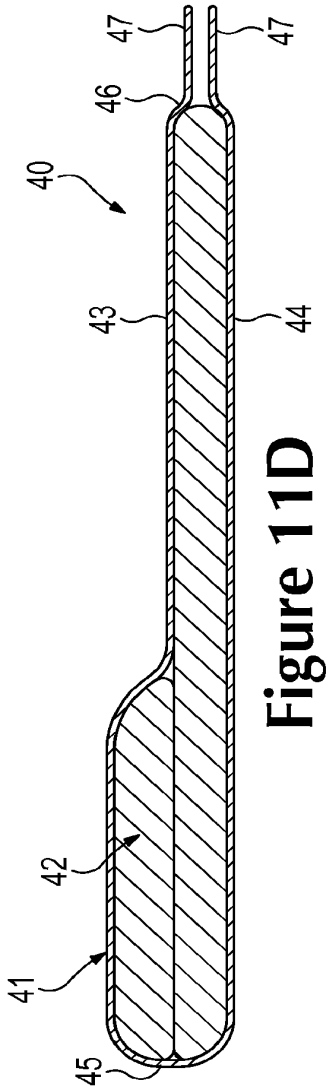


Figure 11D

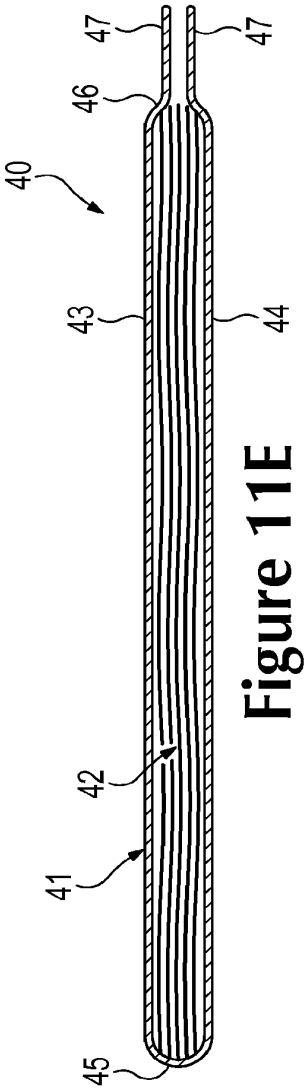


Figure 11E

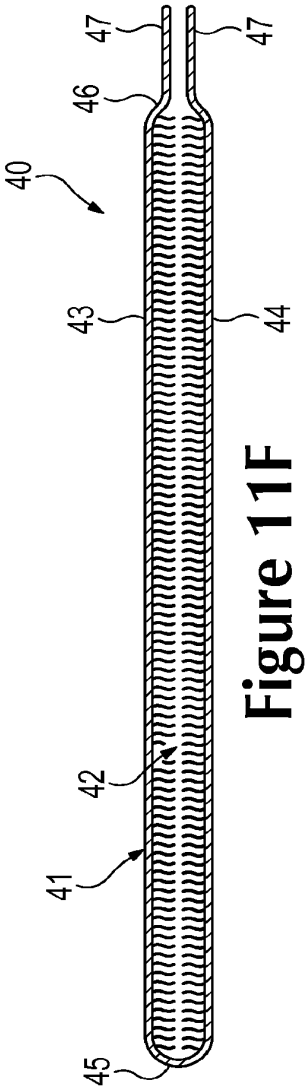


Figure 11F

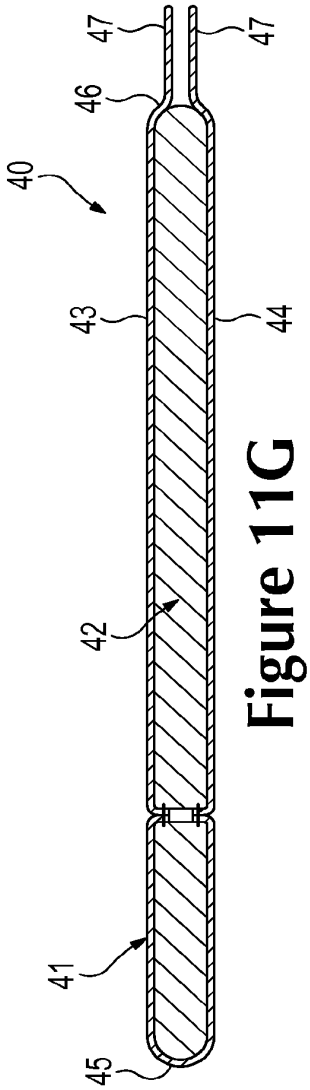


Figure 11G

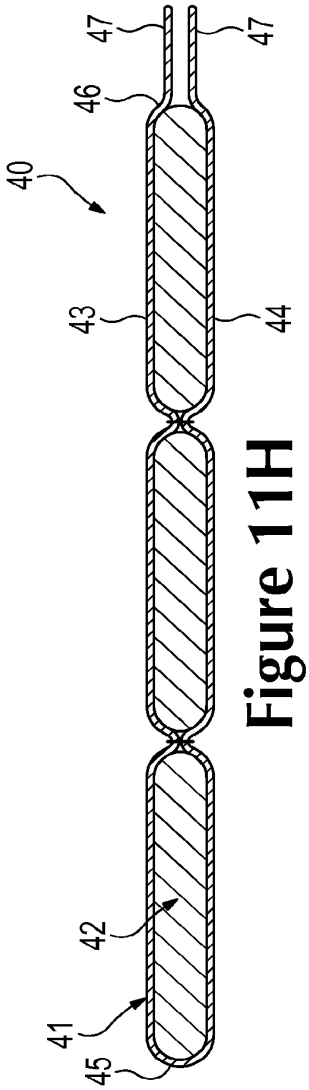


Figure 11H

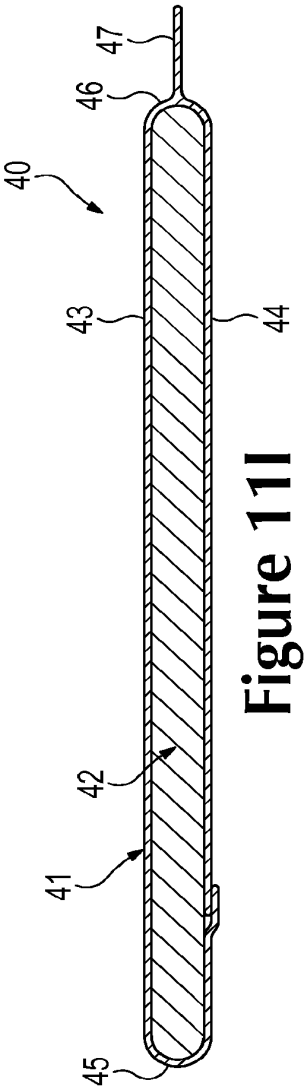


Figure 11I

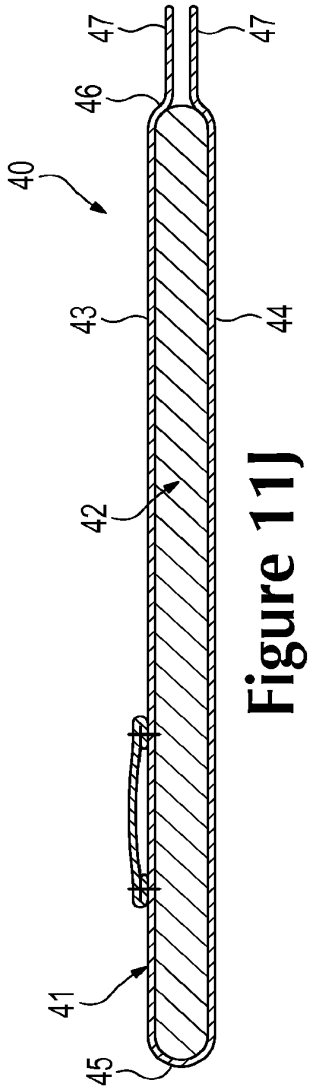


Figure 11J

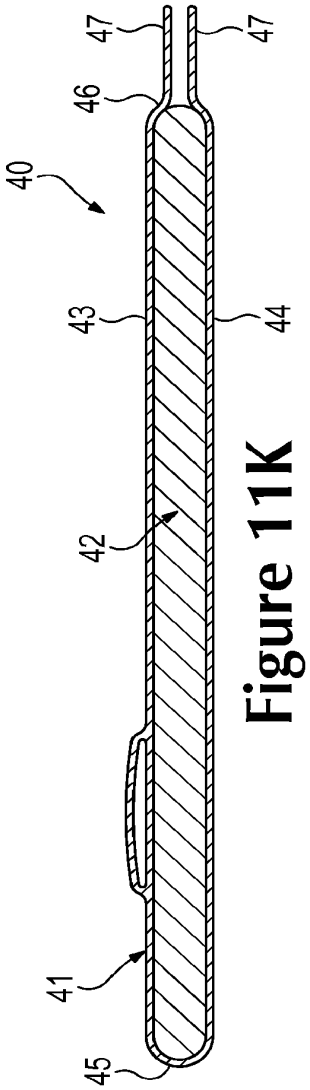


Figure 11K

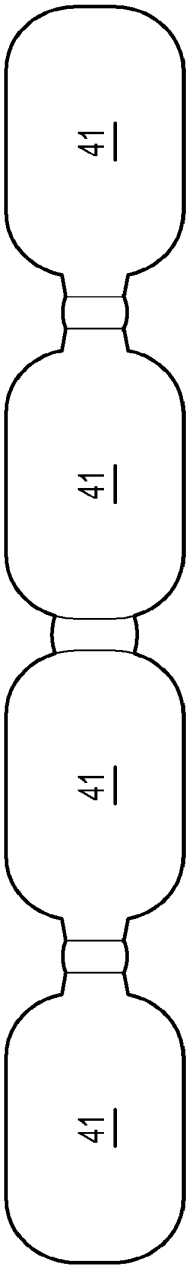


Figure 12A

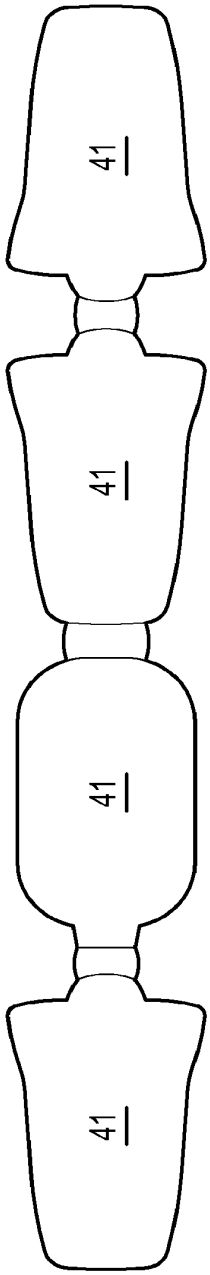


Figure 12B

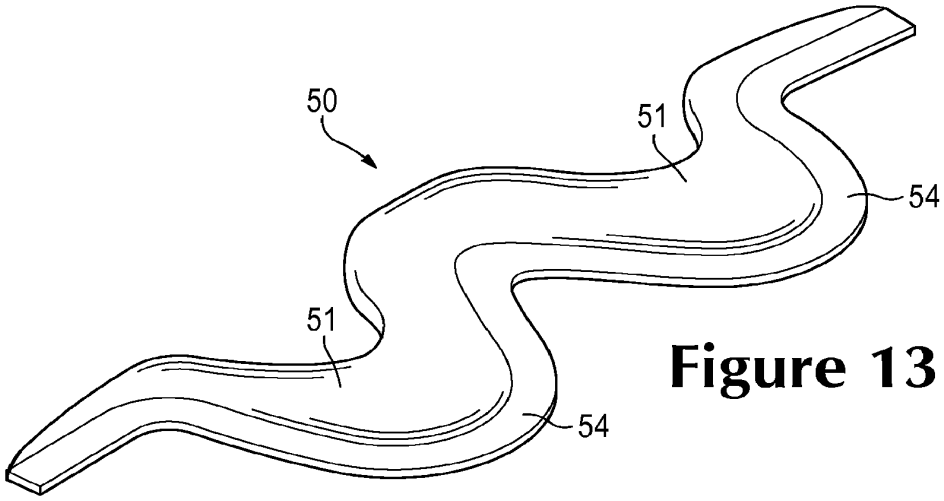


Figure 13

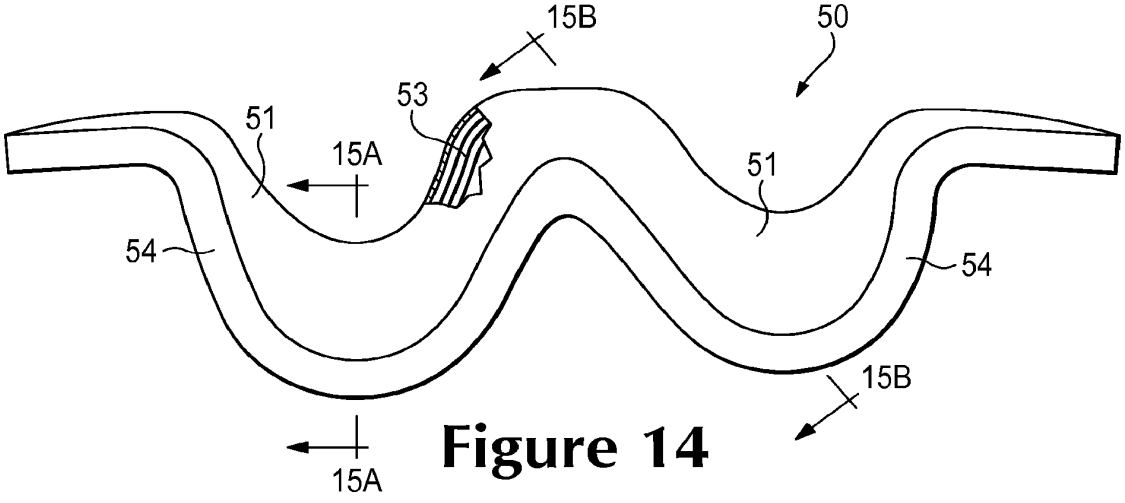


Figure 14

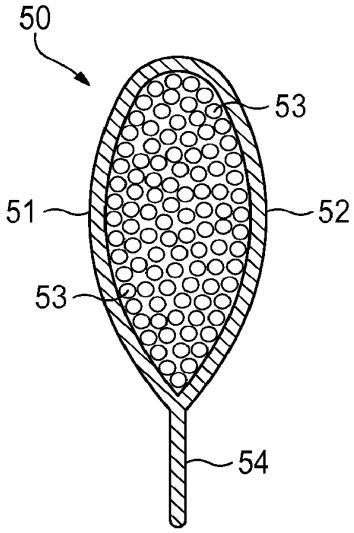


Figure 15A

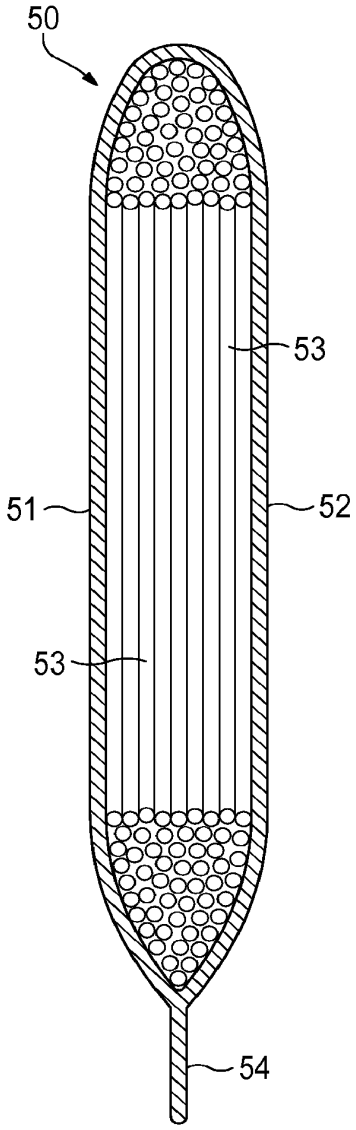


Figure 15B

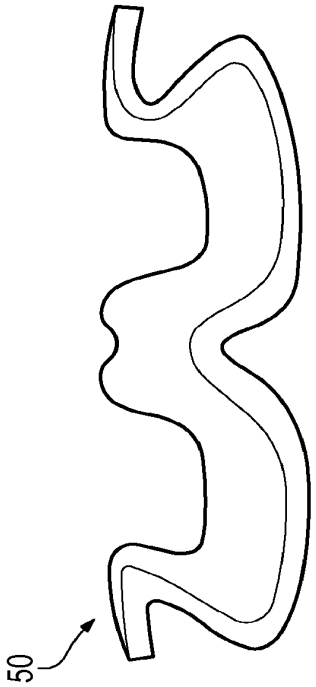


Figure 16A

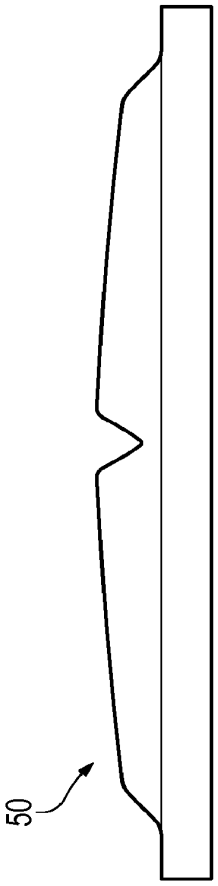


Figure 16B

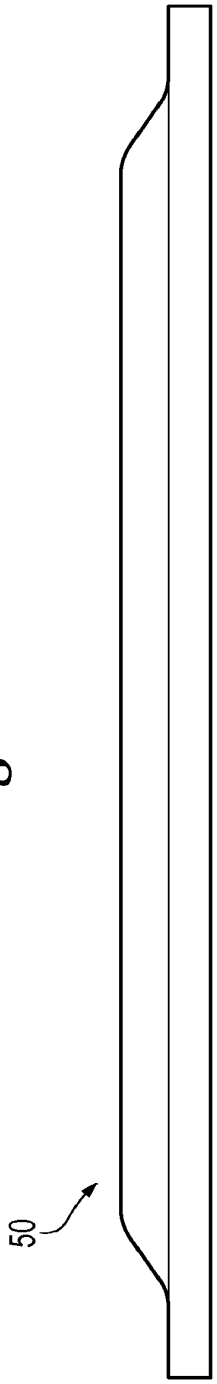


Figure 16C

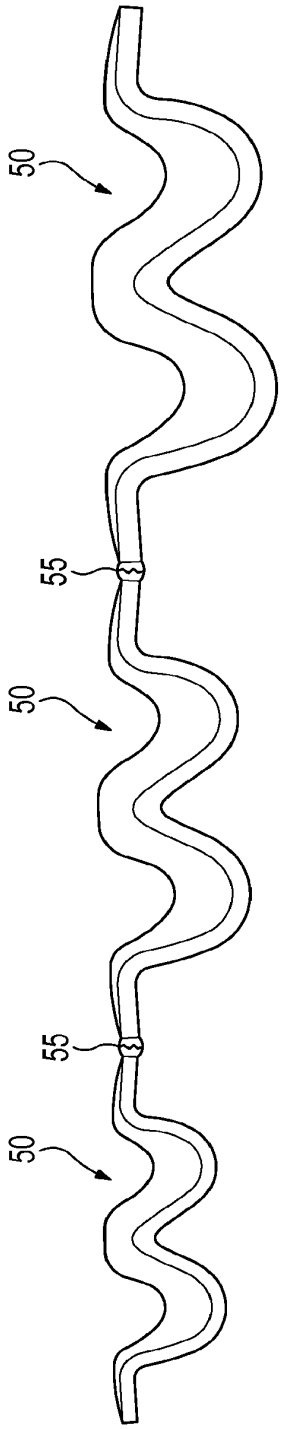


Figure 17A

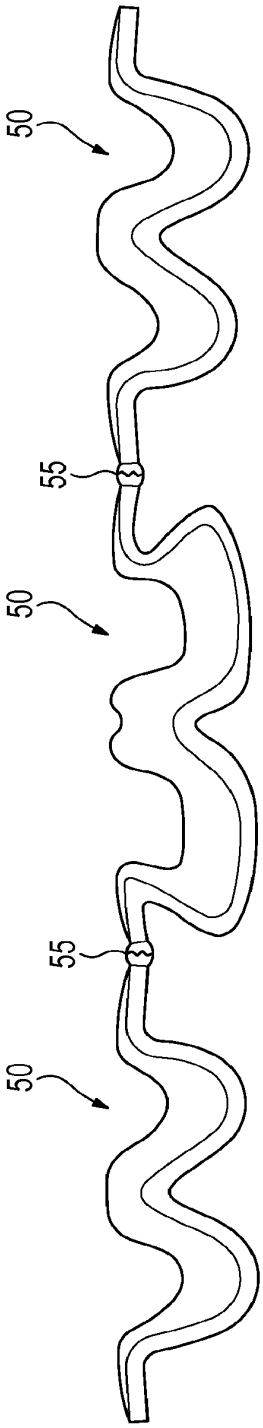


Figure 17B

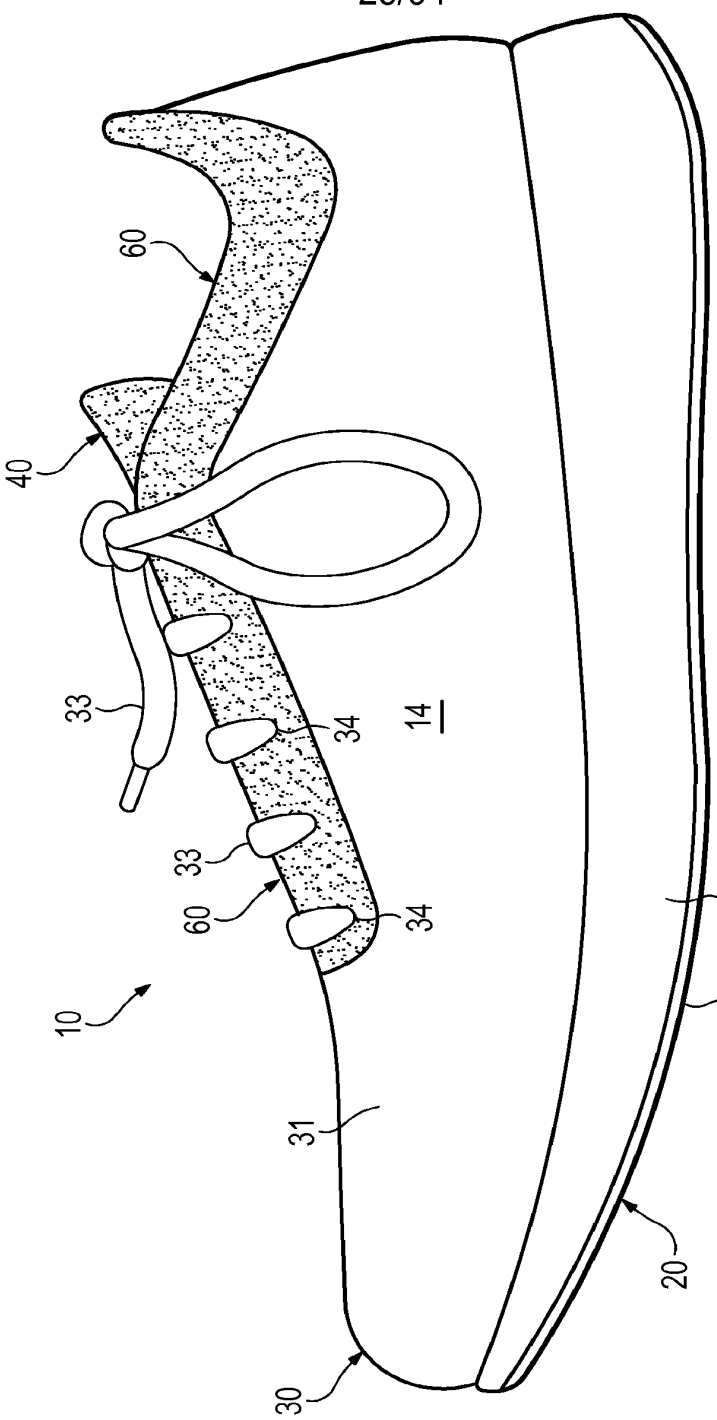


Figure 18

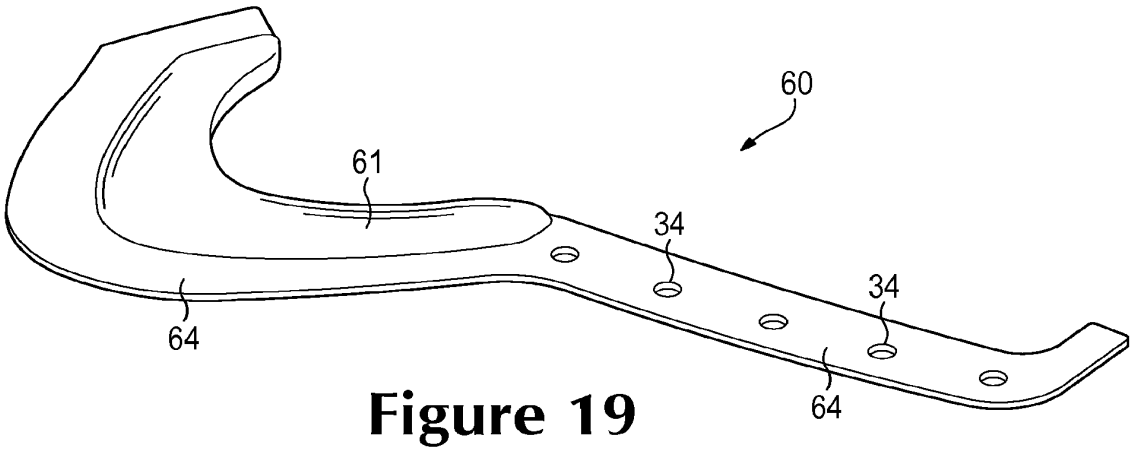


Figure 19

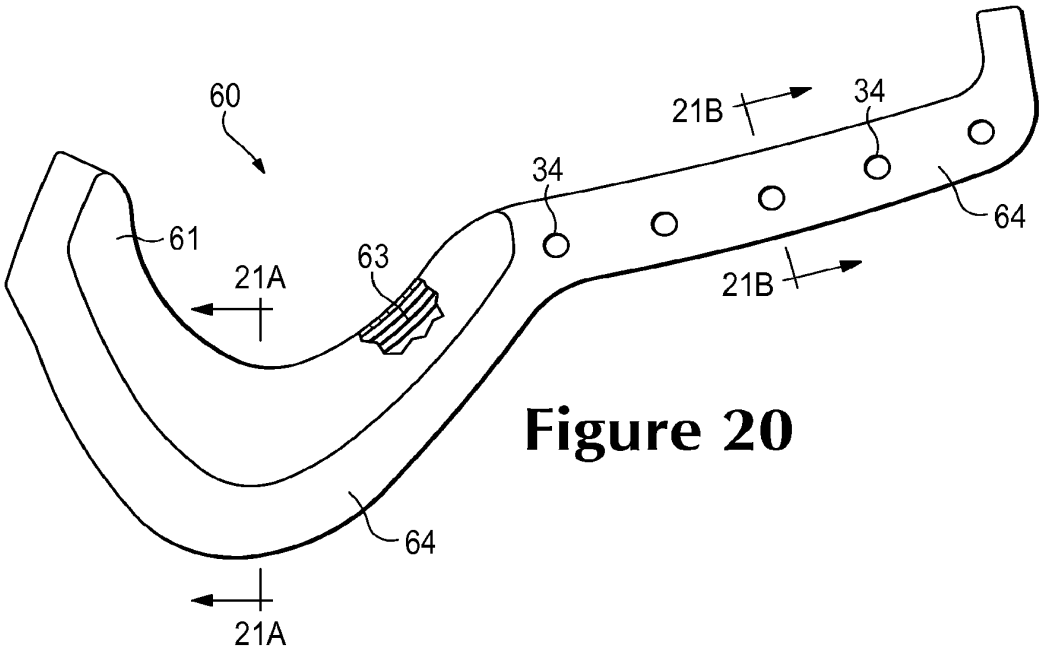


Figure 20

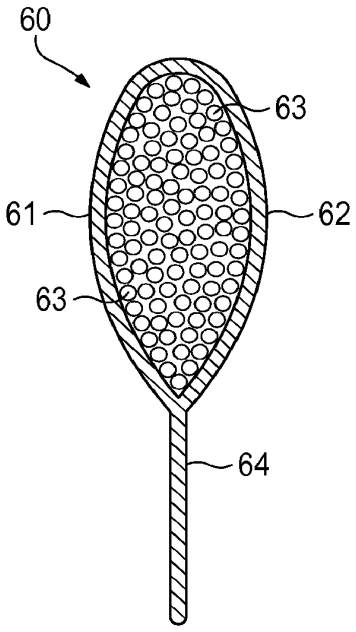


Figure 21A

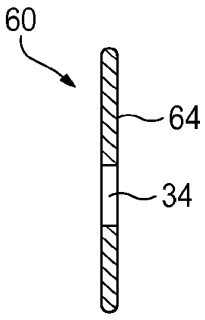


Figure 21B

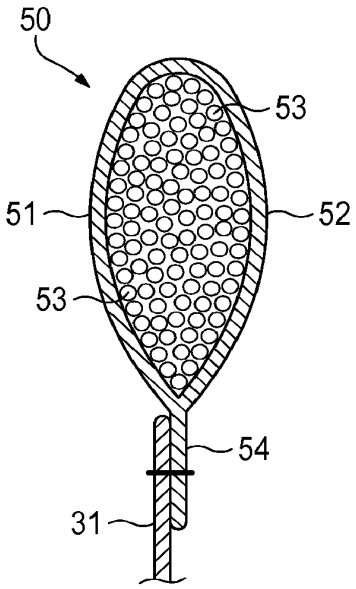


Figure 22A

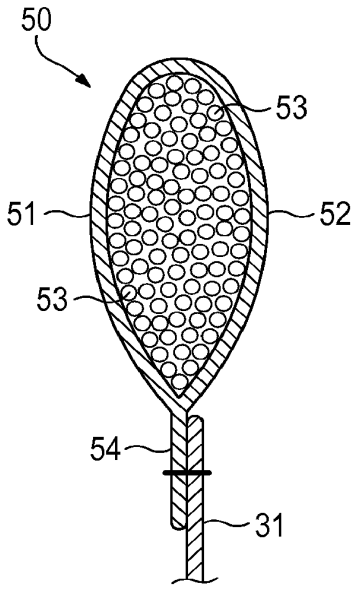


Figure 22B

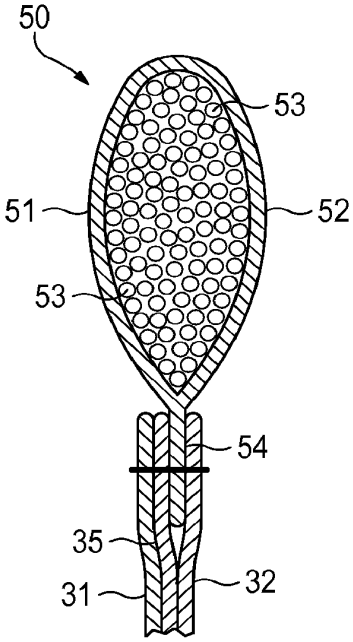


Figure 22C

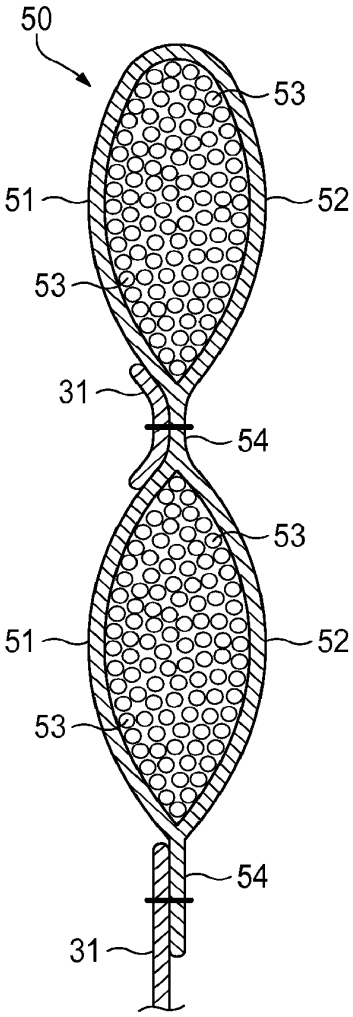


Figure 22D

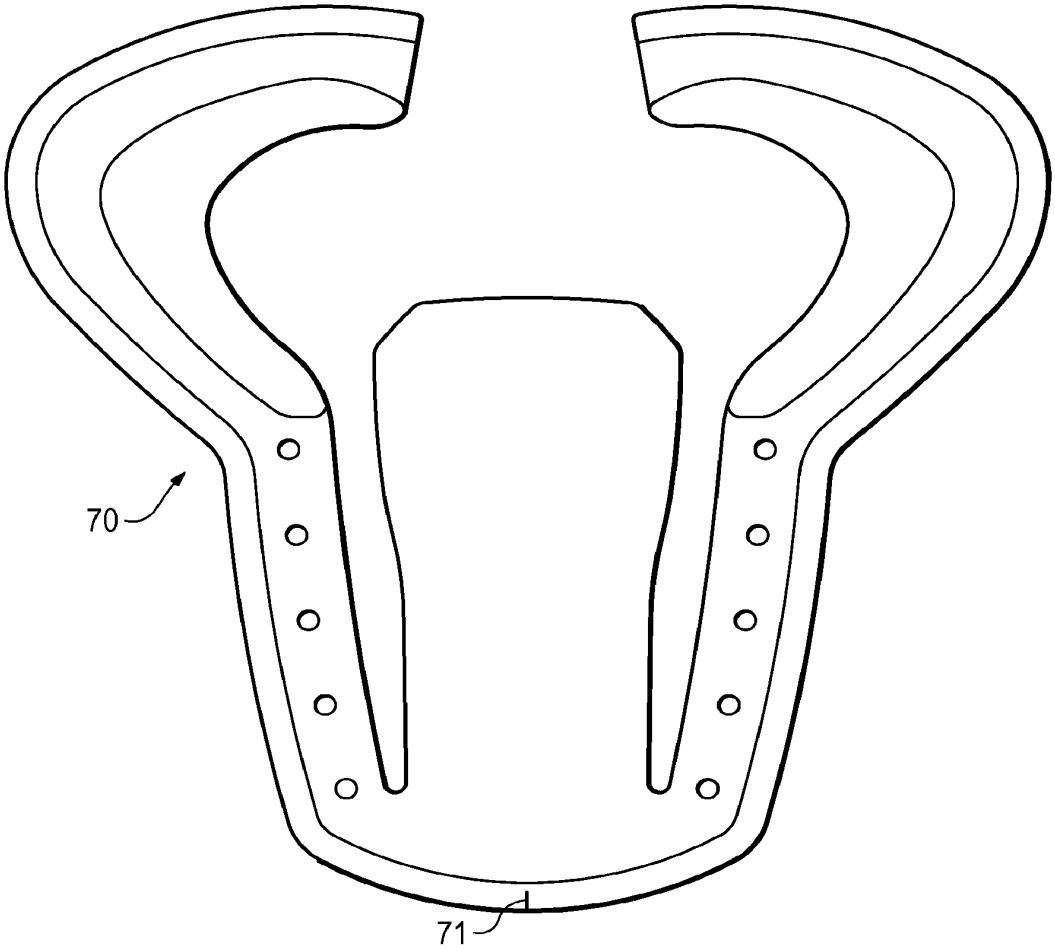


Figure 23

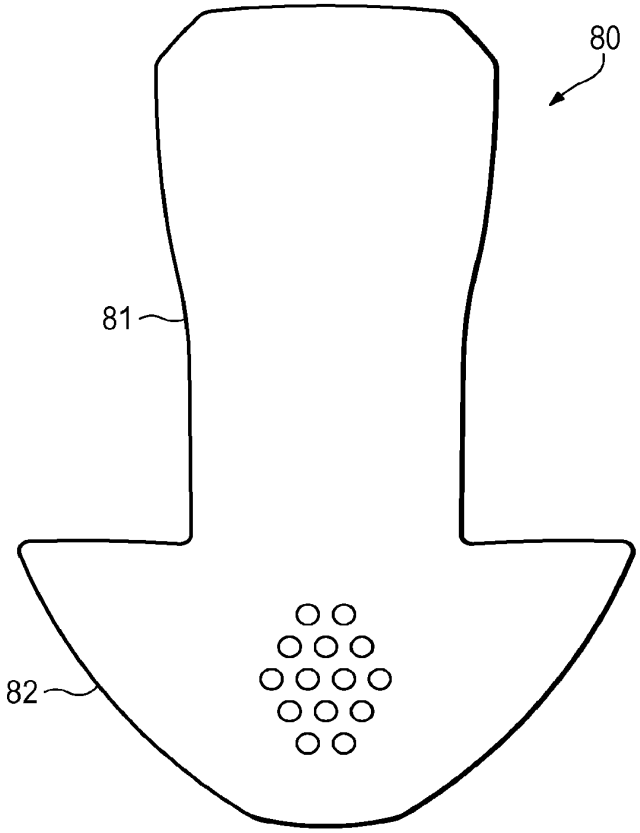


Figure 24

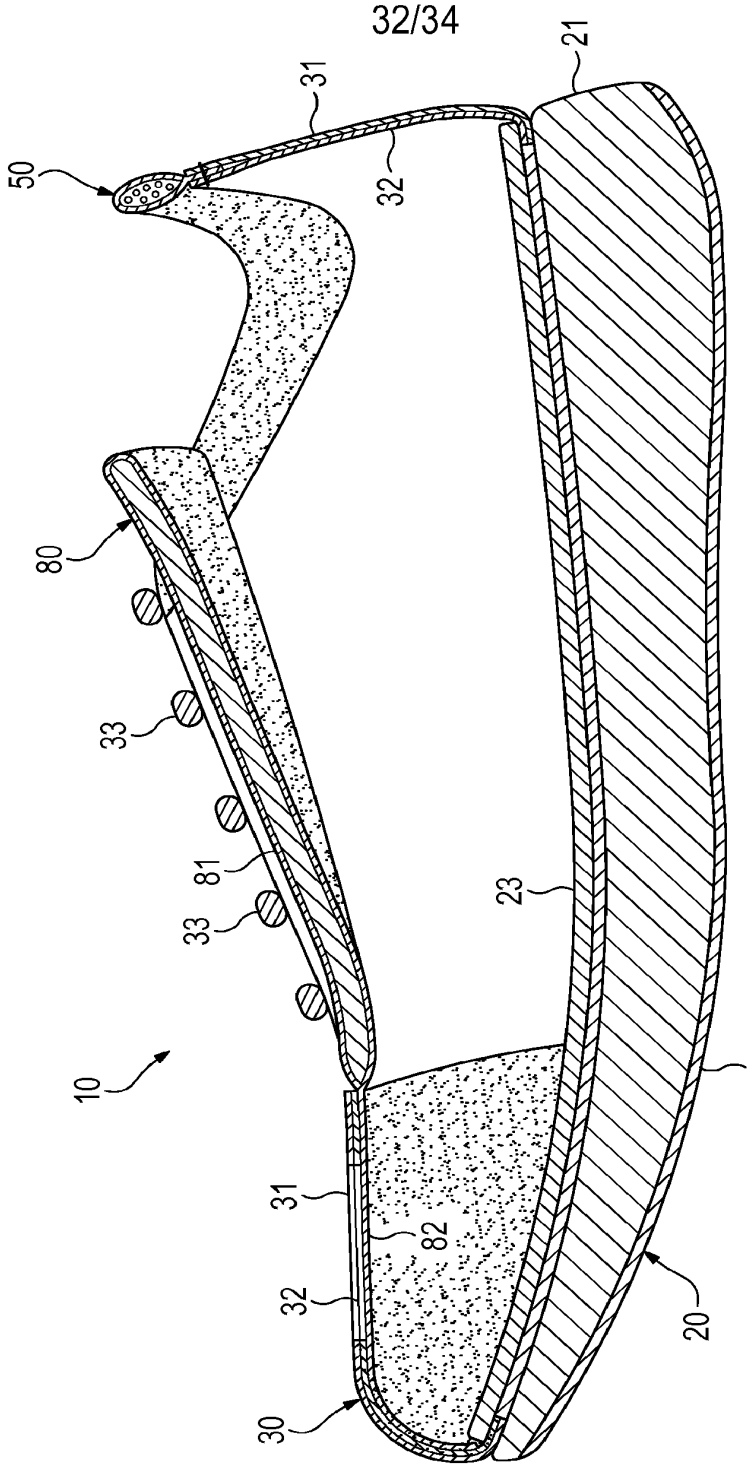


Figure 25

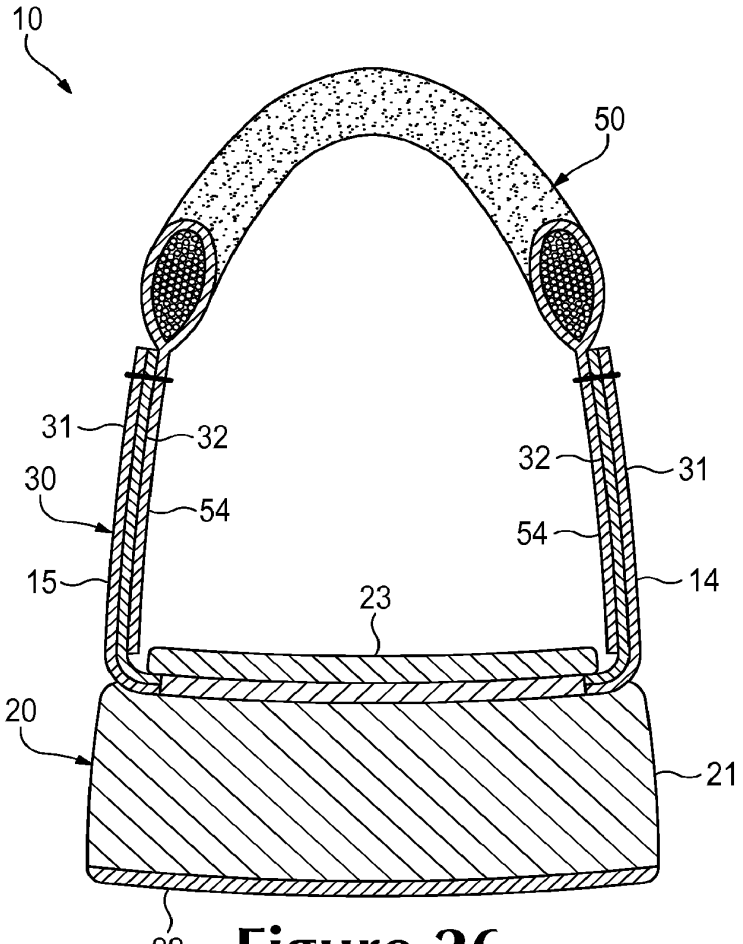


Figure 26

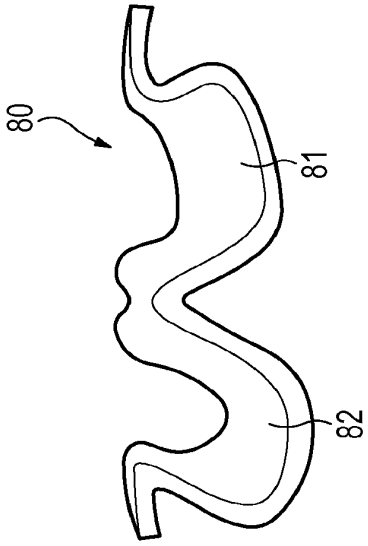


Figure 27B

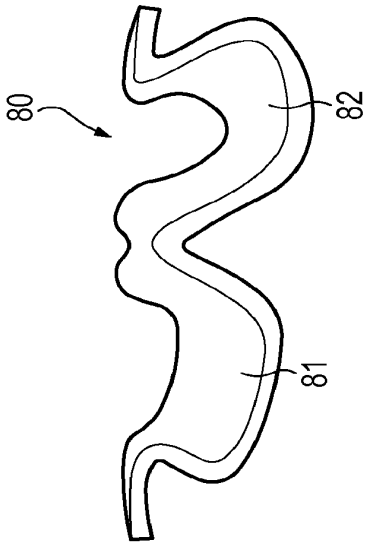


Figure 27A

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
51-1864		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2009/056795	14/09/2009	18/12/2008
Applicant		
NIKE INTERNATIONAL, LTD.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 7 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language,** the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☒ **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   ☐ the text is approved as submitted by the applicant
   ☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☒ as suggested by the applicant
      ☐ as selected by this Authority, because the applicant failed to suggest a figure
      ☐ as selected by this Authority, because this figure better characterizes the invention
   b. ☐ none of the figures is to be published with the abstract

Form PCT/ISA/210 (first sheet) (July 2009)

Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

An article of footwear (10) has an upper (30) that includes a knitted component and a sole structure (20) secured to the upper. The knitted component may define a tube (42) formed of unitary knit construction, and a strand (43) may extend through a length of the tube. As another example, the knitted component may have a pair of at least partially coextensive knitted layers formed of unitary knit construction, and a plurality of floating yarns may extend between the knitted layers. In some configurations, the knit type or yarn type may vary in different regions of the knitted component to impart different properties. Additionally, the knitted component may incorporate a thermoplastic yarn that is fused in different regions of the knitted component to impart different properties. A flat knitting process or a variety of other knitting processes may be utilized to form the knitted component.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/056795

A. CLASSIFICATION OF SUBJECT MATTER
INV. A43C1/04 A43B23/02 A43B7/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A43C A43B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/110048 A1 (DUA BHUPESH [US] ET AL) 15 May 2008 (2008-05-15) the whole document	1-22
X	US 2005/284000 A1 (KERNS MARK [US]) 29 December 2005 (2005-12-29)	1,5
A	the whole document	10,15,22
A	US 7 347 011 B2 (DUA BHUPESH [US] ET AL DUA BHUPESH [US] ET AL) 25 March 2008 (2008-03-25) the whole document	1-22
A	US 6 910 288 B2 (DUA BHUPESH [US]) 28 June 2005 (2005-06-28) the whole document	1-22

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 December 2009	20/04/2010

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Herry, Manuel

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/056795

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 931 762 B1 (DUA BHUPESH [US]) 23 August 2005 (2005-08-23) the whole document _____	1-22

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/056795

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-22

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-22

Independent claims 1, 5, 10, 15 and 22 specify that the knitted component defines a tubular structure, and that the yarn or strand extends through at least a portion of the tube. With these features a simple tubular structure is provided with a yarn or strand, which can be applied, for instance, to receive a lace.

---

2. claims: 23-35, 41-42

Independent claims 23, 29, 32 and 41 specify the provision of two knitted layers in the footwear upper, with a plurality of yarns located between these layers, the yarns floating or extending between the knitted layers to which they are secured. These features provide improved cushioning properties at selected areas of the footwear upper.

---

3. claims: 36-40

Independent claim 36 specifies that the knitted component includes at least one yarn incorporating a thermoplastic polymer, an area being heated to fuse the yarn. These features provide a method for reinforcing particular areas of the upper.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2009/056795

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008110048 A1	15-05-2008	CN 101583294 A	18-11-2009
		EP 2079336 A1	22-07-2009
		WO 2008060928 A1	22-05-2008
US 2005284000 A1	29-12-2005	EP 1778039 A2	02-05-2007
		WO 2006001966 A2	05-01-2006
US 7347011 B2	25-03-2008	CN 1925763 A	07-03-2007
		TW 279198 B	21-04-2007
		US 2008196181 A1	21-08-2008
		US 2005193592 A1	08-09-2005
		WO 2005092134 A1	06-10-2005
US 6910288 B2	28-06-2005	AT 448703 T	15-12-2009
		AU 2003299627 A1	29-07-2004
		CA 2510558 A1	22-07-2004
		EP 1571938 A1	14-09-2005
		ES 2335988 T3	07-04-2010
		JP 4376792 B2	02-12-2009
		JP 2006511306 T	06-04-2006
		WO 2004060093 A1	22-07-2004
		US 2004118018 A1	24-06-2004
US 6931762 B1	23-08-2005	US 2005115284 A1	02-06-2005

Form PCT/ISA/210 (patent family annex) (April 2005)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2009/056795	14.09.2009	18.12.2008

International Patent Classification (IPC) or both national classification and IPC
INV. A43C1/04 A43B23/02 A43B7/20

Applicant
NIKE INTERNATIONAL, LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Herry, Manuel Telephone No. +49 89 2399-8666

Form PCT/ISA/237 (Cover Sheet) (July 2009)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

☐ the entire international application

☒ claims Nos. 23-42

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international search *(specify)*:

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*:

☒ no international search report has been established for the whole application or for said claims Nos. 23-42

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

- ☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
- ☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
- ☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13*ter*.1(a) or (b).

☐ See Supplemental Box for further details

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:

   ☐ paid additional fees

   ☐ paid additional fees under protest and, where applicable, the protest fee

   ☐ paid additional fees under protest but the applicable protest fee was not paid

   ☒ not paid additional fees

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

   ☐ complied with

   ☒ not complied with for the following reasons:

   see separate sheet

4. Consequently, this report has been established in respect of the following parts of the international application:

   ☐ all parts.

   ☒ the parts relating to claims Nos. 1-22

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	4, 13-14, 19
	No:	Claims	1-3, 5-12, 15-18, 20-22
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-22
Industrial applicability (IA)	Yes:	Claims	1-22
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

ITEM III:

The subject-matter of claims 23-42 has not been searched, following an objection of lack unity (see also ITEM IV of the present communication). Consequently, no opinion is given as to the novelty and inventive step of the subject-matter of these claims.

ITEM IV:

Independent claims 1, 5, 10, 15, 22, 23, 29, 32, 36 and 41 have in common that they relate to an article of footwear or to a method for manufacturing it, the article of footwear having an upper, the upper having a knitted component, the knitted component comprising a yarn or a strand (claim 36), or the knitted component being associated with the yarn or strand (other independent claims).

However, this concept is known for instance from US 2008/110048 A1 (par.9: "the upper includes a knitted element formed from at least one mechanically manipulated yarn"), and can thus not constitute a "single general inventive concept" (Rule 13.1 PCT) linking the independent claims of the present application.

The authorized officer is of the opinion that the following groups of inventions are not linked by a single inventive concept (Rule 13.1 PCT):

- independent claims 1, 5, 10, 15 and 22 specify that the knitted component defines a tubular structure, and that the yarn or strand extends through at least a portion of the tube. With these features a simple tubular structure is provided with a yarn or strand, which can be applied, for instance, to receive a lace.

- independent claims 23, 29, 32 and 41 specify the provision of two knitted layers in the footwear upper, with a plurality of yarns located between these layers, the yarns floating or extending between the knitted layers to which they are secured. These features provide improved cushioning properties at selected areas of the footwear upper.

- independent claim 36 specifies that the knitted component includes at least one yarn incorporating a thermoplastic polymer, an area being heated to fuse the yarn. These features provide a method for reinforcing particular areas of the upper.

These features of each of these groups of claims have no equivalent in the other groups of claims. Hence the authorized officer considers that these claims, which are expressed by different "special technical features" (Rule 13.2 PCT), relate to separate inventions.

ITEM V:

Concerning independent claim 1:

In the present application the term "yarn" or "strand", "having a configuration of a one-dimensional material" is intended to encompass all generally elongate materials exhibiting a length that is substantially greater than a width and a thickness (see p.9, par.26). This wording covers the lace elements of US 2008/110048 A1 (fig.1).

US 2008/110048 A1 (**D1**: figures) discloses an article of footwear having an upper and a sole structure secured to the upper, the upper comprising:

- a knitted component defining a tubular structure (44, 54, 45) formed of unitary knit construction (par.41-42); and

- a yarn (33) having a configuration of a one-dimensional material (figs.), the yarn extending through at least a portion of a length of the tube (figs.).

It has thus to be concluded that the subject-matter of claim 1 is not new (Article 33(2) PCT).

The applicant's attention is drawn to the fact, that all the features of claim 1 are also known from US 2005/284000 A1 (**D2**: figs.; par.15-17).

Concerning independent claim 5:

D1 (fig.4B) and D2 (fig.3) specify that the tubes are formed by two adjacent, partially coextensive knitted layers.

The subject-matter of claim 5 is thus not new (Article 33(2) PCT).

Concerning independent claim 10:

The strands of D1 extend through two adjacent tubes and form loops at the ends (fig.4B and par.52).

It has thus to be concluded that the subject-matter of claim 10 is not new (Article 33(2) PCT).

Concerning independent claim 15:

One strand of D1 extends through two adjacent tubes and forms loops at the ends (fig.4B and par.52), whereby a lace extends through the loops (figs.).

The subject-matter of claim 15 is thus not new (Article 33(2) PCT).

Concerning independent claim 22:

For the same reasons the subject-matter of claim 22 is not considered to be new (Article 33(2) PCT).

Concerning dependent claims 2-4, 6-9, 11-14 and 16-21:

Dependent claims are only allowable if they refer to an independent claim fulfilling the requirements of novelty and inventive step. These dependent claims do not seem to contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, since these features are either known from the documents cited in the Search Report (see D1 and D2), or they appear to come within the customary practice followed by persons skilled in the art, especially as the advantages thus achieved can readily be foreseen (claims 4, 13-14 and 19).

ITEM VII:

In order to render the claims more intelligible, appropriate reference signs in parentheses should be placed in the claims (PCT Guidelines, 5.11).

ITEM VIII:

Although claims 1, 5, 10, 15 and 22 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness.

Moreover, lack of clarity of the claims as a whole arises, since the plurality of independent claims makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection.

Hence, these claims do not meet the requirements of Article 6 PCT.

In order to overcome the above-mentioned objections, it appears appropriate to file an amended set of claims defining the relevant subject-matter in terms of one independent claim in each category, followed by dependent claims covering features that are merely optional (Rule 6.4 PCT).

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
Kuzara, Byron S.
PLUMSEA LAW GROUP, LLC
10411 Motor City Drive, Suite 320
Bethesda, MD 20817
ETATS-UNIS D'AMERIQUE

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NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 51-2576	Date of mailing *(day/month/year)* 1 October 2012 (01-10-2012) **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US2012/028576	International filing date *(day/month/year)* 9 March 2012 (09-03-2012)
Applicant NIKE INTERNATIONAL LTD.	

1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 338.82.70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 - 9.011.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	WALLENIUS, Tanja Tel: +49 (0)89 2399-7794

Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
51-2576		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2012/028576	09/03/2012	15/03/2011
Applicant		
NIKE INTERNATIONAL LTD.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of:

[X] the international application in the language in which it was filed

[ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**

[X] the text is approved as submitted by the applicant

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

[X] the text is approved as submitted by the applicant

[ ] the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**

a. the figure of the **drawings** to be published with the abstract is Figure No. 21d

[X] as suggested by the applicant

[ ] as selected by this Authority, because the applicant failed to suggest a figure

[ ] as selected by this Authority, because this figure better characterizes the invention

b. [ ] none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/028576

A. CLASSIFICATION OF SUBJECT MATTER
INV. D04B15/56 D04B1/12
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 623 840 A (ROELL FRIEDRICH [DE]) 29 April 1997 (1997-04-29) column 1, line 28 - column 4, line 11; figures 1-9	1-7, 9-13,16, 17, 19-21, 23-30
X	EP 1 602 762 A1 (SHIMA SEIKI MFG [JP]) 7 December 2005 (2005-12-07) paragraph [0002] - paragraph [0013]; figures 1-6	6,9-13
X	US 5 031 423 A (IKENAGA KATSUYOSHI [JP]) 16 July 1991 (1991-07-16) column 2, line 10 - line 5; figures 1-13	1-4

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 September 2012	01/10/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Zirkler, Stefanie

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/028576

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 018 837 A (DUBIED & CIE SA E) 24 October 1979 (1979-10-24) page 1, line 6 - page 2, line 47; figures 1-6	1-4
X	EP 0 898 002 A2 (SHIMA SEIKI MFG [JP]) 24 February 1999 (1999-02-24) paragraph [0001] - paragraph [0008]; figures 1-12	1-4

1

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2012/028576

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5623840 A	29-04-1997	US 5615562 A	01-04-1997
		US 5623840 A	29-04-1997
EP 1602762 A1	07-12-2005	CN 1764751 A	26-04-2006
		EP 1602762 A1	07-12-2005
		JP 4163212 B2	08-10-2008
		KR 20060014025 A	14-02-2006
		US 2006144096 A1	06-07-2006
		WO 2004076732 A1	10-09-2004
US 5031423 A	16-07-1991	NONE	
GB 2018837 A	24-10-1979	CH 620953 A5	31-12-1980
		DE 2910532 A1	25-10-1979
		FR 2422752 A1	09-11-1979
		GB 2018837 A	24-10-1979
		IT 1165643 B	22-04-1987
		JP 54138650 A	27-10-1979
		US 4237706 A	09-12-1980
EP 0898002 A2	24-02-1999	CN 1209476 A	03-03-1999
		DE 69812503 D1	30-04-2003
		DE 69812503 T2	02-10-2003
		EP 0898002 A2	24-02-1999
		JP 3044370 B2	22-05-2000
		JP 11061606 A	05-03-1999
		TW 421681 B	11-02-2001
		US 6021651 A	08-02-2000

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

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OCT 05 2012
PLUMSEA LAW GROUP

see form PCT/ISA/220

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OCT 05 2012

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Applicant's or agent's file reference see form PCT/ISA/220	Date of mailing *(day/month/year)* see form PCT/ISA/210 (second sheet) **FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2012/028576	09.03.2012	15.03.2011

International Patent Classification (IPC) or both national classification and IPC
INV. D04B15/56 D04B1/12

Applicant
NIKE INTERNATIONAL LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Zirkler, Stefanie Telephone No. +49 89 2399-2056

Form PCT/ISA/237 (Cover Sheet) (July 2009)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2, 3, 8-11, 14, 15, 18, 22-24, 31-40
	No:	Claims	1, 4-7, 12, 13, 16, 17, 19-21, 25-30
Inventive step (IS)	Yes:	Claims	8, 14, 15, 18, 22, 31-40
	No:	Claims	1-7, 9-13, 16, 17, 19-21, 23-30
Industrial applicability (IA)	Yes:	Claims	1-40
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item VIII

Certain observations on the international application

1 **Claim 1** is not clear, because it is not sufficiently clear what is meant by "*inlaying a strand along one of the courses*" and what kind of movement the feeder arm makes to switch between the extended and the retracted position **(Article 6 PCT)**.

2 **Claim 4** is not clear, because it is not clear, what is meant by "*a first side*" and "*an opposite second side of the needle bed*" and how these sides are related to the retracted and the extended position **(Article 6 PCT)**.

3 Although **claims 6, 12, 16 and 20** have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of **Article 6 PCT**.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1 US 5 623 840 A

D2 EP 1 602 762 A1

D3 US 5 031 423 A

D4 GB 2 018 837 A

D5 EP 0 898 002 A2

1 The present application does not meet the criteria of **Article 33(1) PCT** for the following reasons:

1.1 The subject-matter of independent claims 1, 6, 12, 16, 20 and 26 corresponds in substance to a method of knitting disclosed by document D1 (the references in parentheses applying to document D1) that comprises utilizing a combination feeder to supply a yarn for knitting, tucking, and floating, and utilizing the combination feeder to inlay the yarn (column 1, lines 48 to 53 and column 1, line 67 to column 2, line 4); wherein a feeder arm of the combination feeder is reciprocated between an extended position and a retracted position, the combination feeder inlaying the yarn along the courses when the feeder arm is in the extended position (column 2, lines 47 to 52).

Hence, the subject-matter of independent claims 1, 6, 12, 16, 20 and 26 is not new (Articles 33(1) and 33(2) PCT).

1.2 Additionally, also documents D3 to D5 are novelty-destroying for the unclear subject-matter of independent claim 1 and document D2 is novelty-destroying for the subject-matter of independent claims 6 and 12 **(Articles 33(1) and 33 (2) PCT).**

1.3 Moreover, documents D1 to D5 are novelty-destroying for the subject-matter of dependent claims 4, 5, 7, 13, 17, 19, 21, 25, 27, 28, 29 and 30 **(Articles 33 (1) and 33(2) PCT).**

1.4 Dependent claims 2, 3, 9, 10, 11, 23 and 24 do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step, the additional features of claims 2, 3, 9, 10, 11, 23 and 24 being merely straightforward possibilities (choice of material) which are already suggested by documents D2 and which the skilled person would select, in accordance with the circumstances, without the exercise of inventive skill, in order to solve the respective problem posed.

Thus, the subject-matter of claims 2, 3, 9, 10, 11, 23 and 24 cannot be considered to involve an inventive step (Articles 33(1) and 33(3) PCT).

2 The subject-matter of independent **claims 31 and 39** as well as the combination of the features of dependent **claims 8, 14, 15, 18, 22, 32-38 and 40** is not known from the available prior art, as none of the cited documents

discloses "*dispensing a tip of the second feeder from a position that is on one side of an area where the needles cross each other to an opposite side of the area where the needles cross each other*".

The problem to be solved by this additional feature may be regarded as how to ensure that the same feeder is able to supply a yarn for knitting, tucking and floating as well as for inlaying a yarn into a knit component.

This feature is not rendered obvious by the cited documents.

Re Item VII

Certain defects in the international application

1 None of the independent claims is in the two-part form in accordance with **Rule 6.3(b) PCT**.

2 Contrary to the requirements of **Rule 5.1(a)(ii) PCT**, the relevant background art disclosed in documents D1 to D5 is not mentioned in the description, nor are these documents identified therein.

3 In **claim 11** "marching" seems to rather mean "machine".

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
Filing a demand for international preliminary examination	In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT). If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).
Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).
Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
Kuzara, Byron S.
PLUMSEA LAW GROUP, LLC
10411 Motor City Drive, Suite 320
Bethesda, MD 20817
ETATS-UNIS D'AMERIQUE

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PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

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OCT 31 2012

(PCT Rule 44.1)

Applicant's or agent's file reference 51-2575	Date of mailing *(day/month/year)* 19 October 2012 (19-10-2012) **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US2012/028559	International filing date *(day/month/year)* 9 March 2012 (09-03-2012)
Applicant NIKE INTERNATIONAL LTD.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 338.82.70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 - 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	Authorized officer SMYTH-WALKER, Lisa Tel: +49 (0)89 2399-6947

Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
51-2575		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2012/028559	09/03/2012	15/03/2011
Applicant		
NIKE INTERNATIONAL LTD.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language,** the international search was carried out on the basis of:
      [X] the international application in the language in which it was filed
      [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**
   a. the figure of the **drawings** to be published with the abstract is Figure No. 16
      [X] as suggested by the applicant
      [ ] as selected by this Authority, because the applicant failed to suggest a figure
      [ ] as selected by this Authority, because this figure better characterizes the invention
   b. [ ] none of the figures is to be published with the abstract

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/028559

A. CLASSIFICATION OF SUBJECT MATTER
INV. D04B15/56 D04B1/12
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 602 762 A1 (SHIMA SEIKI MFG [JP]) 7 December 2005 (2005-12-07) paragraph [0013] - paragraph [0030]; figures 1-6	1-16
X	EP 0 898 002 A2 (SHIMA SEIKI MFG [JP]) 24 February 1999 (1999-02-24) paragraph [0026] - paragraph [0056]; figures 1-12	1-8, 13-16
X	US 5 031 423 A (IKENAGA KATSUYOSHI [JP]) 16 July 1991 (1991-07-16) column 3, line 35 - column 4, line 38; figures 1-5	1,2,4-7, 13-16
X	EP 1 972 706 A1 (SHIMA SEIKI MFG [JP]) 24 September 2008 (2008-09-24) paragraph [0025] - paragraph [0040]; figures 1-6	17-23

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 October 2012	19/10/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Zirkler, Stefanie

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2012/028559

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1602762 A1	07-12-2005	CN 1764751 A	26-04-2006
		EP 1602762 A1	07-12-2005
		JP 4163212 B2	08-10-2008
		KR 20060014025 A	14-02-2006
		US 2006144096 A1	06-07-2006
		WO 2004076732 A1	10-09-2004
EP 0898002 A2	24-02-1999	CN 1209476 A	03-03-1999
		DE 69812503 D1	30-04-2003
		DE 69812503 T2	02-10-2003
		EP 0898002 A2	24-02-1999
		JP 3044370 B2	22-05-2000
		JP 11061606 A	05-03-1999
		TW 421681 B	11-02-2001
		US 6021651 A	08-02-2000
US 5031423 A	16-07-1991	NONE	
EP 1972706 A1	24-09-2008	CN 101310056 A	19-11-2008
		EP 1972706 A1	24-09-2008
		WO 2007058275 A1	24-05-2007

Form PCT/ISA/210 (patent family annex) (April 2005)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

FOR FURTHER ACTION
See paragraph 2 below

Applicant's or agent's file reference
see form PCT/ISA/220

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2012/028559	09.03.2012	15.03.2011

International Patent Classification (IPC) or both national classification and IPC
INV. D04B15/56 D04B1/12

Applicant
NIKE INTERNATIONAL LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Zirkler, Stefanie Telephone No. +49 89 2399-2056

Form PCT/ISA/237 (Cover Sheet) (July 2009)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1-23
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-23
Industrial applicability (IA)	Yes:	Claims	1-23
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item VIII

Certain observations on the international application

1 The claims are not clear, because they lack conciseness and as such do not meet the requirements of **Article 6 PCT**: **Claims 1, 5, 8, 13, 17 and 20** have been drafted as separate independent claims although they all seem to comprise the subject-matter of claim 1 and as such should have been drafted as dependent claims.

2 **Claim 5** is not clear, because as no "*first side of the carrier*" has been defined it is not clear what is supposed to be meant by "*the second side of the carrier*" (**Article 6 PCT**).

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1 EP 1 602 762 A1

D2 EP 0 898 002 A2

D3 US 5 031 423 A

D4 EP 1 972 706 A1

1 The present application does not meet the criteria of **Article 33(1) PCT** for the following reasons:

1.1 Document D1 discloses (the reference signs in parentheses applying to document D1):

A feeder (Fig. 1) for a knitting machine, the feeder comprising:

a carrier (Fig. 1 (15)) that includes an attachment mechanism for securing the feeder to the knitting machine; and

a feeder arm (Fig. 1 (20)) extending outward from the carrier, the feeder arm including a dispensing area (Fig. 1 (21)) for supplying a strand to the knitting machine, the feeder arm having a retracted position (Fig. 1) and an extended position (Fig. 2), the dispensing area being closer to the carrier in the retracted position than in the extended position.

Hence, the subject-matter of independent claim 1 is not new (Articles 33 (1) and 33(2) PCT).

1.2 Furthermore, document D1 discloses a feeder arm that additionally comprises

at least one actuation member (Fig. 1 (2)) for translating the feeder arm from the retracted to the extended position that is at least partially located exterior of the carrier;

a pair of actuation arms (Fig. 1 (5a), (5b)) each having an outside end and an opposite inside end and being positioned to define a space between their inside ends, wherein a force upon one of the outside ends causes the feeder arm to translate from the retracted to the extended position;

as well as a knitting machine comprising a rail for the attachment of a feeder according to claim 1 and a needle bed ([0001]).

Hence the subject-matter of independent claims 5, 8 and 13 is not new (Articles 33(1) and 33(2) PCT).

1.3 Additionally, also documents D2 and D3 are novelty-destroying for the subject-matter of **independent claims 1, 5, 8 and 13 (Articles 33(1) and 33 (2) PCT)**.

1.4 Moreover documents D1 to D3 are also novelty-destroying for the subject-matter of **dependent claims 2 to 4, 6, 7, 9 to 12 and 14 to 16 (Articles 33(1) and 33(2) PCT)**.

1.5 Document D4 discloses (the reference signs in parentheses applying to document D4):

A knitting machine (Fig. 2) comprising:

a needle bed (Fig. 2 (22), (23)) that includes a plurality of needles, a first portion of the needles being located on a first plane, and a second portion of the needles being located on a second plane, the needles being movable from a first position (Fig. 2, right needle) to a second position (Fig. 2, left needle), the needles being spaced from an intersection of the first plane and the

second plane when in the first position, and the needles passing through the intersection of the first plane and the second plane when in the second position; and

at least one feeder (Fig. 2 (24)) that is movable along the needle bed, the feeder including a feeder arm with a dispensing tip for supplying a strand, the dispensing tip being movable from a retracted position that is located above the intersection of the first plane and the second plane (Fig. 3) to an extended position that is located below the intersection of the first plane and the second plane (Fig. 2).

Hence, the subject-matter of independent claim 17 is not new (Articles 33(1) and 33(2) PCT).

1.6 The subject-matter of **independent claim 20** corresponds in substance to that of independent claim 17 and can therefore also not be considered novel **(Articles 33(1) and 33(2) PCT)**.

1.7 Moreover document D4 is also novelty-destroying for the subject-matter of **dependent claims 18, 19 and 21 to 23 (Articles 33(1) and 33(2) PCT)**.

Re Item VII

Certain defects in the international application

1 None of independent claims 1, 5, 8, 13, 17 and 20 has been drafted in the two-part form in accordance with **Rule 6.3(b) PCT**.

2 Contrary to the requirements of **Rule 5.1(a)(ii) PCT**, the relevant background art disclosed in documents D1 to D4 is not mentioned in the description, nor are these documents identified therein.

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
Filing a demand for international preliminary examination	In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT). If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).
Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).
Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
Kuzara, Byron S.
PLUMSEA LAW GROUP, LLC
10411 Motor City Drive, Suite 320
Bethesda, MD 20817
ETATS-UNIS D'AMERIQUE

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ISR

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NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 51-2574	Date of mailing *(day/month/year)* 17 October 2012 (17-10-2012)
	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/US2012/028534	International filing date *(day/month/year)* 9 March 2012 (09-03-2012)
Applicant NIKE INTERNATIONAL LTD.	

1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 338.82.70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 - 9.011.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	DE BRUIJN, John Tel: +31 (0)70 340-3077

Form PCT/ISA/220 (July 2010)

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
51-2574		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2012/028534	09/03/2012	15/03/2011
Applicant		
NIKE INTERNATIONAL LTD.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 7 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language,** the international search was carried out on the basis of:
      [X] the international application in the language in which it was filed
      [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [X] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   [ ] the text is approved as submitted by the applicant
   [X] the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1+8B
      [ ] as suggested by the applicant
      [ ] as selected by this Authority, because the applicant failed to suggest a figure
      [X] as selected by this Authority, because this figure better characterizes the invention
   b. [ ] none of the figures is to be published with the abstract

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/028534

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 11-40
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/028534

A. CLASSIFICATION OF SUBJECT MATTER
INV. A43B1/04 A43C1/00 A43B23/02
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A43B A43C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2010/154256 A1 (DUA BHUPESH [US]) 24 June 2010 (2010-06-24) paragraphs [0004], [0022] - [0032], [0043] claims 36, 37 figures 1-6, 7C	1-10
A	US 2004/118018 A1 (DUA BHUPESH [US]) 24 June 2004 (2004-06-24) paragraphs [0011] - [0013], [0030], [0031], [0036], [0037], [0050] - [0058] figures 1, 3D-6B	1,2
A	EP 1 437 057 A1 (MIZUNO KK [JP]) 14 July 2004 (2004-07-14) paragraphs [0006], [0022], [0023], [0036] - [0039] figures 1-5	1,2,10

-/--

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 October 2012	17/10/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Been, Mathieu

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/028534

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 785 558 A (SHIOMURA KAZUHIKO [JP]) 22 November 1988 (1988-11-22) column 1, line 47 - line 68 column 2, line 26 - column 3, line 15 figures 1-4	1
A	US 2008/110048 A1 (DUA BHUPESH [US] ET AL) 15 May 2008 (2008-05-15) paragraphs [0038] - [0041], [0052] figures 1-8E	1,9,10

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2012/028534

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010154256 A1	24-06-2010	CN 102271548 A	07-12-2011
		EP 2378910 A1	26-10-2011
		JP 2012512698 A	07-06-2012
		US 2010154256 A1	24-06-2010
		WO 2010080182 A1	15-07-2010
US 2004118018 A1	24-06-2004	AT 448703 T	15-12-2009
		AU 2003299627 A1	29-07-2004
		CA 2510558 A1	22-07-2004
		EP 1571938 A1	14-09-2005
		ES 2335988 T3	07-04-2010
		JP 4376792 B2	02-12-2009
		JP 2006511306 A	06-04-2006
		US 2004118018 A1	24-06-2004
		WO 2004060093 A1	22-07-2004
EP 1437057 A1	14-07-2004	CN 1518910 A	11-08-2004
		DE 602004000536 T2	21-12-2006
		EP 1437057 A1	14-07-2004
		ES 2262039 T3	16-11-2006
		JP 4505212 B2	21-07-2010
		JP 2004230151 A	19-08-2004
		US 2005081402 A1	21-04-2005
US 4785558 A	22-11-1988	JP 63025004 U	18-02-1988
		US 4785558 A	22-11-1988
US 2008110048 A1	15-05-2008	CN 101583294 A	18-11-2009
		EP 2079336 A1	22-07-2009
		JP 2010508994 A	25-03-2010
		US 2008110048 A1	15-05-2008
		US 2010269372 A1	28-10-2010
		US 2010281631 A1	11-11-2010
		WO 2008060928 A1	22-05-2008

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 11-40

The present application contains 40 claims, of which six are independent. There is no clear distinction between the independent claims because of overlapping scope. There are so many claims, and they are drafted in such a way that the claims as a whole are not in compliance with the provisions of clarity and conciseness of Article 6 PCT, as it is particularly burdensome for a skilled person to establish the subject-matter for which protection is sought. The non-compliance with the substantive provisions is to such an extent, that the search was performed taking into consideration the non-compliance in determining the extent of the search (PCT Guidelines 9.19 and 9.25). The search was based on the subject-matter corresponding to claims 1 to 10.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.

Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

ARTICLE OF FOOTWEAR INCORPORATING A KNITTED COMPONENT
An article of footwear (100) may include an upper (120) incorporating a knitted component (130). An inlaid strand (132) extends through the knitted component. A combination feeder (220) may be utilized to inlay the strand within the knitted component.

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

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NOV 09 2012
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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Applicant's or agent's file reference see form PCT/ISA/220	Date of mailing *(day/month/year)* see form PCT/ISA/210 (second sheet) **FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2012/028534	09.03.2012	15.03.2011

International Patent Classification (IPC) or both national classification and IPC
INV. A43B1/04 A43C1/00 A43B23/02

Applicant
NIKE INTERNATIONAL LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	see form PCT/ISA/210	Been, Mathieu Telephone No. +31 70 340-3932

Form PCT/ISA/237 (Cover Sheet) (July 2009)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

☐ the entire international application

☒ claims Nos. 11-40

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international search *(specify)*:

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*:

☒ no international search report has been established for the whole application or for said claims Nos. 11-40

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

- ☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
- ☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
- ☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13*ter*.1(a) or (b).

☐ See Supplemental Box for further details

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	6-8
	No:	Claims	1-5, 9, 10
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-10
Industrial applicability (IA)	Yes:	Claims	1-10
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1 The present application contains 40 claims, of which six are independent. There is no clear distinction between the independent claims because of overlapping scope. There are so many claims, and they are drafted in such a way that the claims as a whole are not in compliance with the provisions of clarity and conciseness of Article 6 PCT, as it is particularly burdensome for a skilled person to establish the subject-matter for which protection is sought. The non-compliance with the substantive provisions is to such an extent, that the search was performed taking into consideration the non-compliance in determining the extent of the search (PCT Guidelines 9.19 and 9.25). The search was based on the subject-matter corresponding to claims 1 to 10.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1 US 2010/154256 A1 (DUA BHUPESH [US]) 24 June 2010 (2010-06-24)

D2 US 2004/118018 A1 (DUA BHUPESH [US]) 24 June 2004 (2004-06-24)

D3 EP 1 437 057 A1 (MIZUNO KK [JP]) 14 July 2004 (2004-07-14)

D4 US 4 785 558 A (SHIOMURA KAZUHIKO [JP]) 22 November 1988 (1988-11-22)

D5 US 2008/110048 A1 (DUA BHUPESH [US] ET AL) 15 May 2008 (2008-05-15)

2 The present application does not meet the criteria of Article 33(2) PCT, because the subject-matter of claim 1 is not new.

2.1 Document D1 discloses (see paragraphs [0004], [0022] - [0032], [0043]; claims 36, 37; figures 1-6, 7C; the references in parentheses applying to this document) an article of footwear (10) having an upper (30) and a sole structure (20) secured to the upper, the upper including a knitted component

(40, 42) comprising a first yarn and a second yarn that are knitted together to form an area of the knitted component (paragraphs 4, 43), the first yarn being at least partially formed from a thermoplastic polymer material (paragraph 43, claim 36), and the second yarn being entirely formed from at least one of a thermoset polymer material and natural fibers (paragraph 43 in combination with document US6910288 cited in this paragraph); and an inlaid strand (43) extending through the area of the knitted component (42).

2.2 It appears that all the technical features of independent claim 1 are known from document D1 and the subject-matter of said claim can therefore not be regarded as new (Article 33(1) and (2) PCT).

3 Dependent claims 2 to 10 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty or inventive step. The reasons therefore are that the additional features of claims 2 to 5, 9 and 10 are directly known from document D1 (Article 33(2) PCT).

3.1 Furthermore, dependent claims 6 to 8 do not appear to contain any additional features which involve an inventive step when combined with the subject-matter of any claim to which they refer (Article 33(3) PCT), as the additional features of claims 6 to 8 concerning a third yarn stretching at least one-hundred percent are a combination of features obvious to the person skilled in the art in consideration of the disclosure of document D1 in combination with the common general knowledge of the skilled person.

Re Item VII

Certain defects in the international application

4 Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art document D1 being placed in the preamble (Rule 6.3(b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

5 The features of claims 1 to 10 are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

6 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in document D1 is not mentioned in the description, nor is this document identified therein.

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
Filing a demand for international preliminary examination	In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT). If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).
Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).
Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 51-2576	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2012/028576	International filing date *(day/month/year)* 09 March 2012 (09.03.2012)	Priority date *(day/month/year)* 15 March 2011 (15.03.2011)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant NIKE INTERNATIONAL LTD.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 17 September 2013 (17.09.2013)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Philippe Bécamel e-mail: pt03.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2012/028576	09.03.2012	15.03.2011

International Patent Classification (IPC) or both national classification and IPC
INV. D04B15/56 D04B1/12

Applicant
NIKE INTERNATIONAL LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Zirkler, Stefanie Telephone No. +49 89 2399-2056

Form PCT/ISA/237 (Cover Sheet) (July 2009)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

   ☐ on paper

   ☐ in electronic form

   b. (time)

   ☐ in the international application as filed

   ☐ together with the international application in electronic form

   ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2, 3, 8-11, 14, 15, 18, 22-24, 31-40
	No:	Claims	1, 4-7, 12, 13, 16, 17, 19-21, 25-30
Inventive step (IS)	Yes:	Claims	8, 14, 15, 18, 22, 31-40
	No:	Claims	1-7, 9-13, 16, 17, 19-21, 23-30
Industrial applicability (IA)	Yes:	Claims	1-40
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item VIII

Certain observations on the international application

1 **Claim 1** is not clear, because it is not sufficiently clear what is meant by "*inlaying a strand along one of the courses*" and what kind of movement the feeder arm makes to switch between the extended and the retracted position **(Article 6 PCT)**.

2 **Claim 4** is not clear, because it is not clear, what is meant by "*a first side*" and "*an opposite second side of the needle bed*" and how these sides are related to the retracted and the extended position **(Article 6 PCT)**.

3 Although **claims 6, 12, 16 and 20** have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of **Article 6 PCT**.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1 US 5 623 840 A

D2 EP 1 602 762 A1

D3 US 5 031 423 A

D4 GB 2 018 837 A

D5 EP 0 898 002 A2

1 The present application does not meet the criteria of **Article 33(1) PCT** for the following reasons:

1.1 The subject-matter of independent claims 1, 6, 12, 16, 20 and 26 corresponds in substance to a method of knitting disclosed by document D1 (the references in parentheses applying to document D1) that comprises utilizing a combination feeder to supply a yarn for knitting, tucking, and floating, and utilizing the combination feeder to inlay the yarn (column 1, lines 48 to 53 and column 1, line 67 to column 2, line 4); wherein a feeder arm of the combination feeder is reciprocated between an extended position and a retracted position, the combination feeder inlaying the yarn along the courses when the feeder arm is in the extended position (column 2, lines 47 to 52).

Hence, the subject-matter of independent claims 1, 6, 12, 16, 20 and 26 is not new (Articles 33(1) and 33(2) PCT).

1.2 Additionally, also documents D3 to D5 are novelty-destroying for the unclear subject-matter of independent claim 1 and document D2 is novelty-destroying for the subject-matter of independent claims 6 and 12 **(Articles 33(1) and 33 (2) PCT).**

1.3 Moreover, documents D1 to D5 are novelty-destroying for the subject-matter of dependent claims 4, 5, 7, 13, 17, 19, 21, 25, 27, 28, 29 and 30 **(Articles 33 (1) and 33(2) PCT).**

1.4 Dependent claims 2, 3, 9, 10, 11, 23 and 24 do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step, the additional features of claims 2, 3, 9, 10, 11, 23 and 24 being merely straightforward possibilities (choice of material) which are already suggested by documents D2 and which the skilled person would select, in accordance with the circumstances, without the exercise of inventive skill, in order to solve the respective problem posed.

Thus, the subject-matter of claims 2, 3, 9, 10, 11, 23 and 24 cannot be considered to involve an inventive step (Articles 33(1) and 33(3) PCT).

2 The subject-matter of independent **claims 31 and 39** as well as the combination of the features of dependent **claims 8, 14, 15, 18, 22, 32-38 and 40** is not known from the available prior art, as none of the cited documents

discloses "*dispensing a tip of the second feeder from a position that is on one side of an area where the needles cross each other to an opposite side of the area where the needles cross each other*".

The problem to be solved by this additional feature may be regarded as how to ensure that the same feeder is able to supply a yarn for knitting, tucking and floating as well as for inlaying a yarn into a knit component.

This feature is not rendered obvious by the cited documents.

Re Item VII

Certain defects in the international application

1 None of the independent claims is in the two-part form in accordance with **Rule 6.3(b) PCT**.

2 Contrary to the requirements of **Rule 5.1(a)(ii) PCT**, the relevant background art disclosed in documents D1 to D5 is not mentioned in the description, nor are these documents identified therein.

3 In **claim 11** "marching" seems to rather mean "machine".

Europäisches Patentamt
European Patent Office
Office européen des brevets

European Patent Office
80298 MUNICH
GERMANY

Questions about this communication ?
Contact Customer Services at www.epo.org/contact

Prinz & Partner mbB
Winterstrasse 2
22765 Hamburg
ALLEMAGNE

Date
06.10.15

Reference	Application No./Patent No.
N 1422 EP	14717892.5 - 1710
Applicant/Proprietor	
NIKE Innovate C.V.	

Communication pursuant to Rules 161(1) and 162 EPC

1. Correction of deficiencies noted in the written opinion and amendment of the application (R. 161(1) EPC)

The above-mentioned international (Euro-PCT) application has entered the European phase.

The EPO as International Searching Authority and, where a demand under Article 31 PCT was filed, also as International Preliminary Examining Authority has drawn up a written opinion on this application or the EPO as Supplementary International Searching Authority has issued explanations pursuant to Rule 45*bis*.7(e) PCT to the supplementary international search report.

You are invited to correct any deficiencies noted in the written opinion of the International Searching Authority or in the International Preliminary Examination Report, or in the explanations to the supplementary international search report and to amend the description, claims and any drawings within a **non-extendable period of six months** after notification of the present invitation.

Should you not comply with or comment on this invitation within the time limit, **the application will be deemed to be withdrawn** in accordance with Rule 161(1) EPC.

2. Amendment of application

Under Articles 28, 41 PCT and Rules 52, 78 PCT the application may be amended before a designated or elected Office, and in accordance with Rule 137(2) EPC the applicant may amend the description, claims and drawings of his own volition together with any comments, corrections or amendments made in response to the communication under Rule 161(1) EPC.

Whether or not you have already done so, you now have a further opportunity to file amended claims or other application documents within the above-mentioned period.

If filing amendments, you must identify them and indicate the basis for them in the application as filed. Failure to meet either requirement may lead to a communication from the Examining Division requesting that you correct this deficiency (R. 137(4) EPC).

The claims applicable on expiry of the above period, i.e. those filed on entry into the European phase or in response to the present communication, will form the basis for the calculation of any claims fee to be paid (see page 2).

Registered letter
EPO Form 1226AA 06.15 (NFS) EUCL (28/09/15)

3. Claims fees under Rule 162 EPC

If the application documents on which the European grant procedure is to be based comprise more than fifteen claims, a claims fee shall be payable for the sixteenth and each subsequent claim within the period provided for in Rule 159(1) EPC.

☐ Based on the application documents currently on file, all necessary claims fees have already been paid (or the documents do not comprise more than 15 claims).

☐ All necessary fees will be debited automatically according to the automatic debit order.

☑ The claims fees due for the claims 16 to 23 were not paid within the above-mentioned period.

Any outstanding claims fee, either based on the current set of claims or on any amended claims to be filed pursuant to Rule 161 EPC (see page 1), may still be validly paid within a **non-extendable period of six months** after notification of this communication (R. 162(2) EPC).

If a payment is made for only some of the claims, you must indicate for which claims it is intended. If a claims fee is not paid in due time, the claim concerned is deemed to be abandoned (R. 162(4) EPC).

If claims fees have already been paid, but on expiry of the above-mentioned period there is a new set of claims containing fewer fee-incurring claims than before, the claims fees in excess of those due under Rule 162(2), second sentence EPC will be refunded (R. 162(3) EPC).

The claims fee is currently

EUR 235 for the 16th and each subsequent claim up to the limit of 50
EUR 580 for the 51st and each subsequent claim

Note to users of the automatic debiting procedure
Unless the EPO receives prior instructions to the contrary, the fees for all claims incurring fees will be debited on the last day of the period for payment. For further details see the Arrangements for the automatic debiting procedure, Annex A.1 to the ADA, Point 6.1(d), supplementary publication 3 - OJ EPO 2015.

Important information concerning fee amounts
Following any amendment to the Rules relating to Fees, the amount(s) mentioned in this communication may be different from the amount(s) **actually due on the date of payment.** The latest version of the Schedule of fees and expenses, published as a Supplement to the Official Journal of the EPO, is also available on the EPO website (**www.epo.org**) and can be found under **www.epo.org/schedule-of-fees**, which allows the viewing, downloading and searching for individual fee amounts, both current and previous.
Please note that procedural fees are usually adjusted every two years, on even years, with effect from 1 April.

Payments by cheque delivered or sent direct to the EPO are no longer accepted as from 1 April 2008 (see OJ EPO 2007, 626).

For the Examining Division



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 51-2574	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2012/028534	International filing date *(day/month/year)* 09 March 2012 (09.03.2012)	Priority date *(day/month/year)* 15 March 2011 (15.03.2011)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant NIKE INTERNATIONAL LTD.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☒	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 17 September 2013 (17.09.2013)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Agnès Wittmann-Regis e-mail: pt06.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2012/028534	09.03.2012	15.03.2011

International Patent Classification (IPC) or both national classification and IPC
INV. A43B1/04 A43C1/00 A43B23/02

Applicant
NIKE INTERNATIONAL LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	see form PCT/ISA/210	Been, Mathieu Telephone No. +31 70 340-3932

Form PCT/ISA/237 (Cover Sheet) (July 2009)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

☐ the entire international application

☒ claims Nos. 11-40

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international search *(specify)*:

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*:

☒ no international search report has been established for the whole application or for said claims Nos. 11-40

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

- ☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
- ☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
- ☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13*ter*.1(a) or (b).

☐ See Supplemental Box for further details

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	6-8
	No:	Claims	1-5, 9, 10
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-10
Industrial applicability (IA)	Yes:	Claims	1-10
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1 The present application contains 40 claims, of which six are independent. There is no clear distinction between the independent claims because of overlapping scope. There are so many claims, and they are drafted in such a way that the claims as a whole are not in compliance with the provisions of clarity and conciseness of Article 6 PCT, as it is particularly burdensome for a skilled person to establish the subject-matter for which protection is sought. The non-compliance with the substantive provisions is to such an extent, that the search was performed taking into consideration the non-compliance in determining the extent of the search (PCT Guidelines 9.19 and 9.25). The search was based on the subject-matter corresponding to claims 1 to 10.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1 US 2010/154256 A1 (DUA BHUPESH [US]) 24 June 2010 (2010-06-24)

D2 US 2004/118018 A1 (DUA BHUPESH [US]) 24 June 2004 (2004-06-24)

D3 EP 1 437 057 A1 (MIZUNO KK [JP]) 14 July 2004 (2004-07-14)

D4 US 4 785 558 A (SHIOMURA KAZUHIKO [JP]) 22 November 1988 (1988-11-22)

D5 US 2008/110048 A1 (DUA BHUPESH [US] ET AL) 15 May 2008 (2008-05-15)

2 The present application does not meet the criteria of Article 33(2) PCT, because the subject-matter of claim 1 is not new.

2.1 Document D1 discloses (see paragraphs [0004], [0022] - [0032], [0043]; claims 36, 37; figures 1-6, 7C; the references in parentheses applying to this document) an article of footwear (10) having an upper (30) and a sole structure (20) secured to the upper, the upper including a knitted component

(40, 42) comprising a first yarn and a second yarn that are knitted together to form an area of the knitted component (paragraphs 4, 43), the first yarn being at least partially formed from a thermoplastic polymer material (paragraph 43, claim 36), and the second yarn being entirely formed from at least one of a thermoset polymer material and natural fibers (paragraph 43 in combination with document US6910288 cited in this paragraph); and an inlaid strand (43) extending through the area of the knitted component (42).

2.2 It appears that all the technical features of independent claim 1 are known from document D1 and the subject-matter of said claim can therefore not be regarded as new (Article 33(1) and (2) PCT).

3 Dependent claims 2 to 10 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty or inventive step. The reasons therefore are that the additional features of claims 2 to 5, 9 and 10 are directly known from document D1 (Article 33(2) PCT).

3.1 Furthermore, dependent claims 6 to 8 do not appear to contain any additional features which involve an inventive step when combined with the subject - matter of any claim to which they refer (Article 33(3) PCT), as the additional features of claims 6 to 8 concerning a third yarn stretching at least one-hundred percent are a combination of features obvious to the person skilled in the art in consideration of the disclosure of document D1 in combination with the common general knowledge of the skilled person.

Re Item VII

Certain defects in the international application

4 Independent claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art document D1 being placed in the preamble (Rule 6.3(b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

5 The features of claims 1 to 10 are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

6 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in document D1 is not mentioned in the description, nor is this document identified therein.

Reference Number: Dispatch Number: 149878 Dispatch Date: March 31, 2016

Notification of Reason(s) for Refusal

Patent Application Number	2014-557864
Drafting Date	March 29, 2016
Examiner of JPO	Kenji TAKEI 3224 3K00
Representative/Applicant	Kosaku INAOKA, et al.
Applied Provision	Patent Law Section 29(2)

This application should be refused for the reason(s) mentioned below. If the applicant has any argument against the reason(s), such argument should be submitted within 3 months from the date on which this notification was dispatched.

Reason(s)

(Inventive step) The invention(s) in the claim(s) listed below of the subject application should not be granted a patent under the provision of Patent Law Section 29(2) since it could have easily been made by a person who has common knowledge in the technical field to which the invention(s) pertains, on the basis of the invention(s) described in the publication(s) listed below which was described in a distributed publication or made available to the public through electric telecommunication lines in Japan or elsewhere prior to the filing of the subject application.

Note (The list of cited document(s) etc. is shown below.)

With respect to reason

- Claims 1 to 9
- Documents 1 and 2
- Remarks:

Document 1 describes that a tongue and first and second portions of a knit element are formed from an integral knit structure (See also [0041] and Figs. 23 and 24 in Japanese Unexamined Patent Publication No. 2013-507183 as a patent family of Document 1.)

Document 2 describes that a material and a way of knitting of a knitted component for an article of footwear can be appropriately change per portion. (See

also descriptions of [0014] and [0015] in Japanese Unexamined Patent Publication No. 2012-512698 as a patent family of Document 1.)

Moreover, a flat knitting machine is a conventionally well-known apparatus even without an example, and it is not specifically difficult to use it for manufacturing the knit structure of above Document 1.

Further, in view of techniques of a general knitting machine, technical matters of Document 2, and the like, a person skilled in the art could have only appropriately arrived at the inventions according to claims 1 to 9 to achieve what is described in Document 1.

As a result, the inventions according to claims 1 to 9 should not be granted a patent under the provision of Patent Law Section 29(2) since they could have easily been made by a person skilled in the art based on the inventions of Documents 1 and 2.

- Claims 10 and 11
- Documents 1 to 3
- Remarks:

Document 3 describes particularly in [0001] and [0036] and Figs. 1 and 2 that a knitting pattern is provided with a modifiable field and the modified field is updated with data representing an alphanumeric character, and that a component with a knit structure of the alphanumeric character is knitted.

As a result, the inventions according to claims 10 and 11 should not be granted a patent under the provision of Patent Law Section 29(2) since they could have easily been made by a person skilled in the art based on the invention of Documents 1 to 3.

The List of Cited Document(s)

1. International Patent Application Publication No. WO 2011/043998
2. International Patent Application Publication No. WO 2010/080182
3. Japanese Unexamined Patent Publication No. 2008-291402

Record of the Result of Prior Art Search

- Technical field(s) searched: IPC A43B 1/00 to 23/30

This record is not a component of the reason(s) for refusal.

<Notes for amendments>

(1) When the specification and the claims are amended, the amended parts should be underlined (regulations under Patent Law, Form 13 Notes 6 and 7).

(2) An amendment should be made within the scope of the matters described in the translation of the specification or drawing(s) (limited to the description in the drawing(s)) of the international patent application on the international filing date of this application, in the translation of the claim(s) of the international application on the international filing date, or in the drawing(s) of the international patent application on the international filing date (except for the description in the drawing(s)) (in case a translation of the claim(s) amended under Patent Cooperation Treaty Article 19(1) was filed, this translation), or in the drawing(s) of the international patent application on the international filing date (except for the description in the drawing(s)) (hereinafter referred to as the translation and the like) (in case the specification, claim(s) or drawing(s) was amended by filing a mistranslation correction, the translation and the like, or these amended specification, claim(s) or drawing(s)). Further, please argue a reason(s) showing the amendment is legitimate with respect to each amended matter on a ground for appeal in an argument by clearly showing a part(s) of the supporting description of the translation and the like (in case the specification, claim(s) or drawing(s) was amended by filing a mistranslation correction, the translation and the like, or these amended specification, claim(s) or drawing(s)).

(3) When making an amendment on a claim, please be careful so as not to make an amendment infringing the provisions of Patent Law Section 17bis(4).

If you wish an inquiry on this notification or an interview with the Examiner on the application, please contact us at the following:

Second Patent Examination Department, Living related Machinery Division: Kenji TAKEI

Telephone: 03-3581-1101 Extension: 3332

Facsimile: 03-3501-0672

拒絶理由通知書

起案日 '16年6月30日

特許出願の番号	特願２０１４－５５７８６４
起案日	平成２８年　３月２９日
特許庁審査官	武井　健浩　　３２２４　３Ｋ００
特許出願人代理人	稲岡　耕作（外　３名）　様
適用条文	第２９条第２項

この出願は、次の理由によって拒絶をすべきものです。これについて意見がありましたら、この通知書の発送の日から３か月以内に意見書を提出してください。

理由

（進歩性）この出願の下記の請求項に係る発明は、その出願前に日本国内又は外国において、頒布された下記の刊行物に記載された発明又は電気通信回線を通じて公衆に利用可能となった発明に基いて、その出願前にその発明の属する技術の分野における通常の知識を有する者が容易に発明をすることができたものであるから、特許法第２９条第２項の規定により特許を受けることができない。

記　　（引用文献等については引用文献等一覧参照）

●理由について

・請求項　１－９
・引用文献等　１－２
・備考
引用文献１には、ベロ、ニット要素の第１の部分および第２部分、とを一体のニット構造で形成することが記載されている（引用文献１のパテントファミリーである特表２０１３－５０７１８３号公報の［００４１］、［図２３］－［図２４］も参照。）。
引用文献２には、部位毎に履物製品用のニット構成要素の材料や編み方を適宜変更し得ることが記載されている。（引用文献１のパテントファミリーである特表２０１２－５１２６９８号公報の［００１４］－［００１５］の記載も参照。）
また、例を示すまでもなく横編機は従来周知の機器であり、上記引用文献１に記載されたニット構造を製造するために使用することに格別の困難性はない。

そして、一般的な編み機の技術及び引用文献２に記載された技術事項等を踏まえてみれば、引用文献１に記載されたものとするにあたり、請求項１－９に係る発明のようにすることは、当業者であれば適宜なし得た事に過ぎない。

よって、請求項１－９に係る発明は、引用文献１－２に記載された発明に基づいて、当業者であれば容易になし得たものであるから、特許法第２９条第２項の規定により、特許を受けることができない。

・請求項　１０－１１
・引用文献等　１－３
・備考
引用文献３の特に、［０００１］、［００３６］、［図１］－［図２］には、編みパターンに変更可能なフィールドを与え、英数字を表すデータで変更可能なフィールドをアップデートすること、英数字のニット構造を有する構成要素を編むこと、が記載されている。

よって、請求項１０－１１に係る発明は、引用文献１－３に記載された発明に基づいて、当業者であれば容易になし得たものであるから、特許法第２９条第２項の規定により、特許を受けることができない。

＜引用文献等一覧＞
１.国際公開第２０１１／０４３９９８号（新たに引用された文献）
２.国際公開第２０１０／０８０１８２号
３.特開２００８－２９１４０２号公報

＜先行技術文献調査結果の記録＞

・調査した分野　　ＩＰＣ　Ａ４３Ｂ　１／００－２３／３０

この先行技術文献調査結果の記録は、拒絶理由を構成するものではありません。

＜補正をする際の注意＞
（１）明細書、特許請求の範囲について補正をする場合は、補正により記載を変更した個所に下線を引いてください（特許法施行規則様式第１３備考６、７）。
（２）補正は、この出願の国際出願日における国際特許出願の明細書若しくは図面（図面の中の説明に限る。）の翻訳文、国際出願日における国際特許出願の請

求の範囲の翻訳文（特許協力条約第１９条（１）の規定に基づく補正後の請求の範囲の翻訳文が提出された場合にあっては、当該翻訳文）又は国際出願日における国際特許出願の図面（図面の中の説明を除く。）（以下、翻訳文等という。）（誤訳訂正書を提出して明細書、特許請求の範囲又は図面について補正をした場合にあっては、翻訳文等又は当該補正後の明細書、特許請求の範囲若しくは図面）に記載した事項の範囲内で行わなければなりません。また、意見書で、各補正事項について補正が適法なものである理由を、根拠となる翻訳文等（誤訳訂正書を提出して明細書、特許請求の範囲又は図面について補正をした場合にあっては、翻訳文等又は当該補正後の明細書、特許請求の範囲若しくは図面）の記載箇所を明確に示したうえで主張してください。
（３）特許請求の範囲について補正をする際には、特許法第１７条の２第４項に違反する補正とならないよう、注意してください。

この拒絶理由通知の内容に関するお問合せ又は面接のご希望がありましたら次の連絡先までご連絡ください。

審査第二部生活機器　武井　健浩
ＴＥＬ．０３－３５８１－１１０１（内線３３３２）
ＦＡＸ．０３－３５０１－０６７２

OFFICE ACTION OF THE INTELLECTUAL PROPERTY OFFICE

(Translation)

Issuance Date: 9 December 2015

I. Applicant: NIKE INNOVATE C.V.

II. Attorney: C. V. Chen
Address: 7th Floor, No. 201, Tun Hua North Road, Taipei

SUMMARY:

After examination, the Intellectual Property Office (IPO) considers that ROC (Taiwan) Patent Application No. 103143383 has the defects indicated in EXPLANATION (A) below. The applicant is required to file a response in duplicate within three months from the day after receipt of this office action if any substantive counter-evidence or arguments are to be presented. If the applicant fails to act according to this office action by the deadline, the IPO will proceed with the examination based solely upon the materials on hand.

EXPLANATION:

(A) Upon examination, the IPO notes the following:

(1) With respect to the subject application, entitled "ARTICLE OF FOOTWEAR AND METHOD OF MANUFACTURING A KNITTED COMPONENT FOR AN ARTICLE OF FOOTWEAR," the applicant submitted the amendment to the IPO on 8 April 2015. It is found that the amendment does not go beyond the disclosure of the application documents submitted at the time of filing. The subject application was examined based on the amendment and the original documents. The subject application comprises 12 claims, among which Claims 1 and 7 are independent claims, and the rest are dependent ones.

(2) The claims of the subject application fail to comply with the Patent Act, Article 26, Paragraph 2.

1. Claim 7 states: "…the first knitted component is substantially identical to the second knitted component…" However, due to the term "substantially identical," Claim 7 cannot clearly define whether the first knitted component is identical to the second knitted component. Thus, Claim 7 is indefinite.

2. Claim 10 states: "…forming each stitch of the first knitted component with a type of knit structure that is substantially identical to the type of knit structure formed by each stitch in the second knitted component…" However, due to the term "substantially identical," Claim 10 cannot clearly define whether ach stitch of the first knitted component with a type of knit structure that is identical to the type of knit structure formed by each stitch in the second knitted component. Thus, Claim 10 is indefinite.

(3) The title of the subject application fails to comply with the Patent Act, Article 26, Paragraph 4.

The title of the subject application is "ARTICLE OF FOOTWEAR AND METHOD OF MANUFACTURING A KNITTED COMPONENT FOR AN ARTICLE OF FOOTWEAR." However, the "article of footwear" is not claimed. Thus, the title of the subject application fails to comply with the Patent Act, Article 26, Paragraph 4 and the Enforcement Rules of the Patent Act, Article 17, Paragraph 4.

(4) The examiner has not found reasons against the patentability of Claims 1-6, 8-9 and 11-12 at this time. The applicant will be further notified if any new reason for objection/rejection is found.

(B) If any amendments and/or corrections are to be made to the subject application, such amendments and/or corrections should be made according to the provisions of Article 43 and Paragraph 3 of Article 44 of the Patent Act and Articles 36-38 of the Enforcement Rules of the Patent Act; the application form(s) should be completed according to the regulations for amending and/or correcting patent applications.

(C) If the applicant wishes to appear before the IPO for a face-to-face demonstration or explanation, please explicitly indicate "Interview Requested" in the response and effect payment of a government fee of NT$1,000. The time and place of the interview will be arranged if the IPO considers an interview necessary.

(D) Attached is a search report of the subject application.

SEARCH REPORT
ROC (TAIWAN) PATENT APPLICATION NO. 103143383
(Translation)

1. FILING DATE: 19 February 2013		
2. PRIORITY DATE: 20 February 2012		
3. INTERNATIONAL PATENT CLASSIFICATION (IPC): D04B1/22 (2006.01), A43B23/02 (2006.01), A43B23/26 (2006.01)		
4. TECHNICAL FIELDS SEARCHED (IPC): D04B1/22 (2006.01), A43B23/02 (2006.01), A43B23/26 (2006.01)		
5. DATABASE SEARCHED (KEY WORDS): Domestic and Foreign Patent Database of TIPO, EPO		
Category	Cited documents, indicating relevant passages (if applicable)	Relevant to Claim(s)
A	1. US 6321574 B1 2001/11/27 Full Text	1-12
A	2. WO 2010/080182 A1 2010/07/15 Full Text	1-12
A	3. JP 2008-291402 A 2008/12/04 Full Text	1-12

CATEGORIES OF CITED DOCUMENTS

X: document of particular relevance, indicating lack of novelty or inventive step when taken alone

Y: document of particular relevance, indicating lack of inventive step when combined with one or more other documents of the same category

A: document indicating technological background and/or state of the art

D: document cited in the specification

E: patent document published on or after, but with priority date earlier than, the filing date of this application

O: document referring to a public use, sale or exhibition

P: document published on or after the declared priority date but before the filing date of this application

L: document cited for other reasons

DATE OF COMPLETION OF SEARCH: 1 December 2015

正本

檔　　號：
保存年限：

經濟部智慧財產局　審查意見通知函

機關地址：臺北市大安區辛亥路2段185號3樓
聯 絡 人：王建富
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105　　雙掛號
臺北市松山區敦化北路201號7樓

受 文 者：耐克創新有限合夥公司（代理人：陳長文　專利代理人）

發文日期：中華民國104年12月9日
發文字號：（104）智專一（六）05055字第10421674680號
速　　別：
密等及解密條件或保密期限：
附　　件：如文

1042167468001

主旨：第103143383號專利申請案經審查後認有如說明一所述情事，台端（貴公司）請於文到次日起3個月內提出申復說明(一式2份)或修正至局。逾期未復者，本局將依現有資料續行審查，請查照。

說明：

一、本案經審查認為：

(一)本案「鞋具及製作鞋具之編織組件的方法」，曾於104年04月08日提出修正頁到局，經查未超出申請時說明書或申請專利範圍及圖式所揭露範圍，本案係依說明書、申請專利範圍與圖式及該修正頁內容審查，請求項共計12項，其中第1、7項為獨立項，其餘為附屬項。

(二)本案申請專利範圍有下列情形不符專利法第26條第2項之規定。

GA-18-02
DEC 11 2015
LEE AND LI
ATTORNEYS-AT-LAW

1、請求項7第12行，其中「…該第一編織組件係與該第二編織組件大致相同」之敘述，該「大致相同」之表達無法明確得知該第一編織組件與該第二編織組件是否編織成相同織物，致申請專利範圍不明確。

2、請求項10第2~4行，其中「形成具有編織結構之一類型的該第一編織組件之各個組織，其中編織結構之該類型係與由在該第二編織組件之各個組織所形成之編織結構之該類型大致相同」之敘述，該「大致相同」之表達無法明確得知該第一編織組件之各個組織與該第二編織組件之各個組織是否為相同編織結構，致申請專利範圍不明確。

(三)本案說明書有下列情形不符專利法第26條第4項之規定：本案發明名稱為「鞋具及製作鞋具之編織組件的方法」，但請求項並無「鞋具」，故應簡明表示所申請發明之內容，不符專利法第26條第4項及施行細則第17條第4項之規定，應予修正。

(四)本案請求項1~6、8~9、11~12，於現在時點並未發現不予專利理由，如有發現新的不予專利理由時，會再予通知不予專利理由。

二、本案如有修正、訂正，應依專利法第43條、第44條第3項、專利法施行細則第36條至第38條之規定辦理，並請依專利修正申請書、專利誤譯訂正申請書之規定撰寫。

三、若希望來局當面示範或說明，請於申復說明書內註明「申請面詢」並繳交規費新臺幣1千元正，本局認為有必要時，將另行通知面詢地點及時間。

Exhibit 2001 - Page 2254 of 2330

四、檢送本案檢索報告1份。

正本：耐克創新有限合夥公司（代理人：陳長文　專利代理人）

副本：

經濟部智慧財產局



附件

第103143383號專利申請案檢索報告

1.申 請 日： 102年2月19日	
2.優先權日： 2012年2月20日	
3.本案國際專利分類號(IPC)：	***D04B1/22*** (2006.01) ， ***A43B23/02*** (2006.01) ***A43B23/26*** (2006.01)
4.檢索國際專利分類號(IPC)範圍：	D04B1/22 (2006.01), A43B23/02 (2006.01), A43B23/26 (2006.01)
5.檢索使用資料庫名稱(關鍵詞)：	TIPO國內外專利資料庫，EPO

關聯性代碼	引用文獻資料與相關段落處	相關聯請求項
A	1. US 6321574 B1 2001/11/27 全文	1~12
A	2. WO 2010/080182 A1 2010/07/15 全文	1~12
A	3. JP 2008-291402 A 2008/12/04 全文	1~12

關聯性代碼說明：

X：單獨引用即足以否定發明新穎性或進步性之特別相關的文獻。

Y：結合一或多篇其他文獻後足以否定發明進步性之特別相關的文獻。

A：一般技術水準之參考文獻。

D：說明書已記載之文獻。

E：申請在前、公開／公告在後之專利文獻。

O：公開使用、販賣或展覽陳列之文件。

P：申請日與優先權日間公開之文獻。

L：其他理由引用之文獻。

完成日： 104年12月1日

Reference Number: Dispatch Number: 415576 Dispatch Date: September 10, 2015

Notification of Reason(s) for Refusal

Patent Application Number	2014-557864
Drafting Date	September 4, 2015
Examiner of JPO	Kenji TAKEI 3224 3K00
Representative/Applicant	Kosaku INAOKA, et al.
Applied Provision	Patent Law Sections 29(1) and 29(2)

This application should be refused for the reason(s) mentioned below. If the applicant has any argument against the reason(s), such argument should be submitted within 3 months from the date on which this notification was dispatched.

Reason(s)

1. (Novelty) The invention(s) in the claim(s) listed below of the subject application should not be granted a patent under the provision of Patent Law Section 29(1)(iii) since it is described in the distributed publication(s) listed below or made available to the public through electric telecommunication lines in Japan or elsewhere prior to the filing of the subject application.

2. (Inventive step) The invention(s) in the claim(s) listed below of the subject application should not be granted a patent under the provision of Patent Law Section 29(2) since it could have easily been made by a person who has common knowledge in the technical field to which the invention(s) pertains, on the basis of the invention(s) described in the publication(s) listed below which was described in a distributed publication or made available to the public through electric telecommunication lines in Japan or elsewhere prior to the filing of the subject application.

Note (The list of cited document(s) etc. is shown below.)

With respect to reason 1 (novelty)

- Claims 1 to 3 and 5 to 8
- Document 1
- Remarks:

Document 1 describes one for manufacturing a knitted component for an article of footwear, comprising knitting a tongue with a knitting machine (weft knitting machine). (See also descriptions of [0012], [0013], [0028], [0035] and [0036] and Figs. 1, 2 and 6 in Japanese Unexamined Patent Publication No. 2012-512698 as a patent family of Document 1.)

In view of this, there is not any difference between the matters specifying the inventions according to present claims 1 to 3 and 5 to 8 and the matters specifying the invention of Document 1.

As a result, the invention according to claim 1 should not be granted a patent under the provision of Patent Law Section 29(1)(iii) since it is the invention of Document 1.

- Claims 10 and 11
- Document 2
- Remarks:

Document 2 describes particularly in [0001] and [0036] and Figs. 1 and 2 that a knitting pattern is provided with a modifiable field and the modified field is updated with data representing an alphanumeric character, and that a component with a knit structure of the alphanumeric character is knitted.

In view of this, there is not any difference between the matters specifying the inventions according to present claims 10 and 11 and the matters specifying the invention of Document 2.

As a result, the inventions according to claims 10 and 11 should not be granted a patent under the provision of Patent Law Section 29(1)(iii) since it is the invention of Document 2.

With respect to reason 2 (inventive step)

- Claims 1 to 3 and 5 to 8
- Document 1
- Remarks:

With respect to Document 1, see reason 1.

In view of this, the inventions according to present claims 1 to 3 and 5 to 8 should not be granted a patent under the provision of Patent Law Section 29(2) since they could have easily been made by a person skilled in the art based on the invention of Document 1.

- Claims 4 and 9
- Document 1
- Remarks:

Document 1 describes that a material and way of knitting of the knitted component can be appropriately changed per portion according to need. (See also descriptions in [0014] and [0015] in Japanese Unexamined Patent Publication No. 2012-512698 as a patent family of Document 1.)

Further, it is only a matter of design a person skilled in the art could have appropriately made to employ the material or way of knitting described in claims 4 and 9 with respect to the tongue of Document 1.

In view of this, the inventions according to present claims 4 and 9 should not be granted a patent under the provision of Patent Law Section 29(2) since they could have easily been made by a person skilled in the art based on the invention of Document 1.

- Claims 10 and 11
- Document 2
- Remarks:

With respect to Document 2, see reason 1.

In view of this, the inventions according to present claims 10 and 11 should not be granted a patent under the provision of Patent Law Section 29(2) since they could have easily been made by a person skilled in the art based on the invention of Document 2.

The List of Cited Document(s)

1. International Patent Application Publication No. WO 2010/080182
2. Japanese Unexamined Patent Publication No. 2008-291402

Record of the Result of Prior Art Search

- Technical field(s) searched: IPC A43B 1/00 to 23/30

This record is not a component of the reason(s) for refusal.

<Notes for amendments>

(1) When the specification and the claims are amended, the amended parts should be underlined (regulations under Patent Law, Form 13 Notes 6 and 7).
(2) An amendment should be made within the scope of matters described in the specification, claims or drawings of the present invention at the time of filing. Further, please argue a reason(s) showing the amendment is legitimate with respect to each amended matter in an argument by clearly showing a part(s) of the supporting description of the specification and the like at the time of filing.
(3) When making an amendment on a claim, please be careful so as not to make an amendment infringing the provisions of Patent Law Section 17bis(4).

If you wish an inquiry on this notification or an interview with the Examiner on the application, please contact us at the following:

Second Patent Examination Department, Living related Machinery Division: Kenji TAKEI

Telephone: 03-3581-1101 Extension: 3332
Facsimile: 03-3501-0672

拒絶理由通知書

発送日 15年12月10日

特許出願の番号	特願２０１４－５５７８６４
起案日	平成２７年　９月　４日
特許庁審査官	武井　健浩　　３２２４　３Ｋ００
特許出願人代理人	稲岡　耕作（外　３名）　様
適用条文	第２９条第１項、第２９条第２項

この出願は、次の理由によって拒絶をすべきものです。これについて意見がありましたら、この通知書の発送の日から３か月以内に意見書を提出してください。

理由

１．（新規性）この出願の下記の請求項に係る発明は、その出願前に日本国内又は外国において、頒布された下記の刊行物に記載された発明又は電気通信回線を通じて公衆に利用可能となった発明であるから、特許法第２９条第１項第３号に該当し、特許を受けることができない。

２．（進歩性）この出願の下記の請求項に係る発明は、その出願前に日本国内又は外国において、頒布された下記の刊行物に記載された発明又は電気通信回線を通じて公衆に利用可能となった発明に基いて、その出願前にその発明の属する技術の分野における通常の知識を有する者が容易に発明をすることができたものであるから、特許法第２９条第２項の規定により特許を受けることができない。

記　　（引用文献等については引用文献等一覧参照）

●理由１（新規性）について

・請求項　１－３、５－８
・引用文献等　１
・備考
引用文献１には、履物製品用のニット構成要素を製造するものであって、編み機（横編機）でベロを編むもの、が記載されている。（引用文献１のパテントファミリーである特表２０１２－５１２６９８号公報の［００１２］－［００１３］、［００２８］、［００３５］－［００３６］、［図１］－［図２］、［図６］の記載も参照。）

してみれば、この出願の請求項１－３、５－８に係る発明の発明特定事項と、引用文献１に記載された発明の発明特定事項との間に差異はない。

よって、請求項１に係る発明は、引用文献１に記載された発明であるから、特許法第２９条第１項第３号に該当し、特許を受けることができない。

・請求項　１０－１１
・引用文献等　２
・備考

引用文献２の特に、［０００１］、［００３６］、［図１］－［図２］には、編みパターンに変更可能なフィールドを与え、英数字を表すデータで変更可能なフィールドをアップデートすること、英数字のニット構造を有する構成要素を編むこと、が記載されている。

してみれば、この出願の請求項１０－１１に係る発明の発明特定事項と、引用文献２に記載された発明の発明特定事項との間に差異はない。

よって、請求項１０－１１に係る発明は、引用文献２に記載された発明であるから、特許法第２９条第１項第３号に該当し、特許を受けることができない。

●理由２（進歩性）について

・請求項　１－３、５－８
・引用文献等　１
・備考

引用文献１については、理由１を参照。

してみれば、請求項１－３、５－８に係る発明は、引用文献１に記載された発明に基づいて、当業者であれば容易になし得たものであるから、特許法第２９条第２項の規定により、特許を受けることができない。

・請求項　４、９
・引用文献等　１
・備考

引用文献１には、必要に応じて、部位毎にニット構成要素の材料や編み方を適宜変更し得ることが記載されている。（引用文献１のパテントファミリーである特表２０１２－５１２６９８号公報の［００１４］－［００１５］の記載も参照。）

そして、引用文献１に記載されたベロに関して、請求項４、９に記載された材料または編み方を採用することは、当業者であれば適宜なし得た設計事項に過ぎない。

してみれば、請求項４、９に係る発明は、引用文献１に記載された発明に基づ

いて、当業者であれば容易になし得たものであるから、特許法第２９条第２項の規定により、特許を受けることができない。

・請求項　１０－１１
・引用文献等　２
・備考
　引用文献２については、理由１を参照。
　してみれば、請求項１０－１１に係る発明は、引用文献２に記載された発明に基づいて、当業者であれば容易になし得たものであるから、特許法第２９条第２項の規定により、特許を受けることができない。

＜引用文献等一覧＞
１.国際公開第２０１０／０８０１８２号
２.特開２００８－２９１４０２号公報

＜先行技術文献調査結果の記録＞

・調査した分野　　ＩＰＣ　Ａ４３Ｂ　１／００－２３／３０

　この先行技術文献調査結果の記録は、拒絶理由を構成するものではありません。

＜補正をする際の注意＞
（１）明細書、特許請求の範囲について補正をする場合は、補正により記載を変更した箇所に下線を引いてください（特許法施行規則様式第１３備考６、７）。
（２）補正は、この出願の出願当初の明細書、特許請求の範囲又は図面に記載した事項の範囲内で行わなければなりません。また、意見書で、各補正事項について補正が適法なものである理由を、根拠となる出願当初の明細書等の記載箇所を明確に示したうえで主張してください。
（３）特許請求の範囲について補正をする際には、特許法第１７条の２第４項に違反する補正とならないよう、注意してください。

　この拒絶理由通知の内容に関するお問い合わせ又は面接のご希望がありましたら次の連絡先までご連絡ください。

審査第二部生活機器　武井　健浩
ＴＥＬ．０３－３５８１－１１０１（内線３３３２）
ＦＡＸ．０３－３５０１－０６７２

Lee International
IP & LAW GROUP

[TRANSLATION]

Delivery No.: 9-5-2015-070674477
Delivery Date: October 14, 2015
Response Deadline: December 14, 2015

OFFICE ACTION

Applicant(s): NIKE Innovate C.V. (Applicant Code: 520140298367)
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Attorney(s) for Applicant(s): Lee International IP & Law Group
Poongsan Bldg., 23 Chungjeongro, Seodaemun-gu, Seoul
KOREA

Inventor(s): TATLER, Daren, P.; PODHAJNY, Daniel, A.

Case: Patent Application No. 10-2014-7026058

Filing Date: September 18, 2014

Title: ARTICLE OF FOOTWEAR INCORPORATING A KNITTED COMPONENT WITH A TONGUE

1. The above-identified application has been examined and rejected on the following grounds and, as a result, this Office Action is hereby issued pursuant to Article 63 of the Patent Act. If the applicant would like to submit arguments or amendments to the application, the applicant may submit such arguments [Annexed Form No. 24 to the Enforcement Decree of the Patent Act] and/or amendments [Annexed Form No. 9 to the Enforcement Decree of the Patent Act] to this Office Action by the response deadline designated above.

2. This deadline may be extended upon request on a monthly basis for up to four (4) additional months. If necessary, an extension of time for two (2) to four (4) months can be requested at one time. To obtain an additional extension of time exceeding six (6) months after the issuance date of this Office Action, a request for the additional extension of time along with a written statement demonstrating good cause must be submitted (see the section [Good Cause for Additional Extension of Time] at the end of this Office Action).

EXAMINATION RESULTS

Examined Claims: Claims 1 through 11

Rejection:

No.	Rejected Claim(s)	Basis for Rejection
1	Claims 10 and 11	Article 29(2) of the Patent Act

		[Lack of Inventive Step]*
II	Claims 3, 4, 8 and 9	Article 42(4)(ii) of the Patent Act [Lack of Clarity in the Claims]*
III	All Claims	Article 45 of the Patent Act and Article 6(2) of the Enforcement Decree Thereof [Noncompliance with Unity of Invention Requirements]*

Patentable Claim(s): Claims 1, 2, 5, 6 and 7

※ The patentability of claims is determined based on the examination at the time the outstanding Office Action is issued and may be subject to change at a later time. All grounds for rejection must be overcome in order to receive a patent for the invention claimed in the subject application.

GROUND I
[Lack of Inventive Step]*

The invention defined in Claims 10 and 11 of the subject application could have been easily conceived by one of ordinary skill in the art prior to the filing of the subject application for the reasons set forth in the "Remarks" section below. Accordingly, the claimed invention cannot be patented pursuant to Article 29(2) of the Patent Act.

REMARKS

- Cited Reference: Japanese Unexamined Patent Publication No. 2008-291402 (December 4, 2008)

1. Claim 10 of the subject application is directed to a method of knitting comprising: providing a knitting pattern with a modifiable field; updating the modifiable field with data representing a first alphanumeric character; knitting a first component with a knit structure of the first alphanumeric character; updating the modifiable field with data representing a second alphanumeric character, the second alphanumeric character being different than the first alphanumeric character; and knitting a second component with a knit structure of the second alphanumeric character.

The Cited Reference relates to a method for producing a knitted fabric, comprising: providing an information display section that can be visually recognized in a part of a knitted fabric consisting of a knit organization and can be available for image recognition by a sensor; and forming a factory information section (31) expressed as a longitudinal character, wherein the information display section (31) includes character information specifying a production device, a production period, and a production lot.

Characters and numbers formed in the information display section in the Cited Reference are identical to the alphanumeric characters in Claim 1 of the subject application. Thus, it is obvious that a knitting pattern should be provided to a knitting machine to form characters and numbers. Further, it is also obvious that a modifiable field should be updated or changed to form a new alphanumeric character and a new number.

Accordingly, Claim 1 of the subject application merely recites the technical idea disclosed in the Cited Reference as a method. Further, it is not considered that the constitutions of the invention in Claim 1 of the subject application have technical difficulty or produces a remarkable effect. Accordingly, the invention in Claim 1 of the subject application could have been conceived from the Cited Reference.

2. The invention in Claim 11 of the subject application, which refers to Claim 10 of the subject application, recites that the second alphanumeric character is sequential from the first alphanumeric character.

However, the factory information part and the information display section in the Cited Reference are continuously formed. Thus, the invention in Claim 11 of the subject application could have been easily conceived from the Cited Reference.

GROUND II
[Lack of Clarity in the Claims]*

Claims 3, 4, 8 and 9 of the subject application are unclear for the reasons set forth in the "Remarks" section below. Accordingly, these claims cannot be allowed pursuant to Article 42(4)(ii) of the Patent Act.

REMARKS

1. Claim 3, which refers to Claim 1, recites "further including a step of knitting an expansion section following the step of knitting the tongue, wherein the step of knitting the first portion of the knit element includes unraveling the expansion section." However, Claim 1 recites, after knitting a tongue, holding the tongue on needles of the knitting machine and knitting the first portion of a knit element. Thus, the time-sequential relation between the step of knitting the expansion section and the step of knitting the first portion is unclear. Further, it is unclear which time-sequential relation the step of knitting the first portion, which includes unraveling the expansion section, has.

Thus, Claim 3 does not clearly and concisely define the invention.

2. Claim 4, which refers to Claim 1, recites that "the step of knitting the tongue includes forming a course of the tongue to include at least one of (a) a fusible yarn and (b) cross-tuck stitches." However, "(a) a fusible yarn" relates to a fabric material, whereas "(b) cross-tuck stitches" relates to an organization of a knitted fabric. Therefore, Claim 4 recites features that are not compatible with each other in a selective form, and thus, does not clearly and concisely define the invention.

3. Claims 8 and 9 recite the same content as in Claims 3 and 4. Thus, Claims 8 and 9 do not clearly and concisely define the invention for the same reason as stated in Grounds II.1 and II.2.

GROUND III
[Noncompliance with Unity of Invention Requirements]*

The subject application cannot be allowed pursuant to Article 45 of the Patent Act and Article 6(2) of the Enforcement Decree thereof for the reason set forth in the "Remarks" section below.

REMARKS

The claims of the subject application are classified into the following groups:

Group A (Claims 1 through 9): A method of manufacturing a knitted component for an article of footwear.

Group B (Claims 10 and 11): A method of forming an alphanumeric character during a knitting process.

The invention of Group is characterized by a method of knitting a tongue, a first portion of a knit element and a second portion of the knit element. The invention in Group B is characterized by a method of forming an alphanumeric character during a knitting process. Thus, there is no common feature shared by the two inventions. Accordingly, the subject application does not comply with the unity of invention requirements.

[Annexed Document]
Copy of Japanese Unexamined Patent Publication No. 2008-291402 (December 4, 2008)

This 14th day of October, 2015

Patent Examiner [SEAL]
Polymer & Textile Examination Division
Patent Examination Bureau 2
Korean Intellectual Property Office

* "[ ]" not in original; inserted by Lee International.

<NOTES>

1. The applicant may file an amendment to the specification, claims and/or drawings within the scope of the originally filed specification, claims and/or drawings pursuant to Article 47(2) of the Patent Act.

(Note: If the applicant wishes to file an amendment in response to a final notice of Office Action or within thirty (30) days from the date a notice of appeal of a final rejection is filed, such amendment must meet the requirements under Article 47(3), as well as Article 47(2) of the Patent Act.)

2. If an applicant submits a request for an additional extension of time exceeding six (6) months after the issuance date of an Office Action, accompanied by a written statement showing good cause for the additional extension of time, the examiner will review the statement in accordance with the conditions set forth below to determine whether good cause is shown for allowing an additional time extension. If the request is granted, the examiner will notify the applicant of the extended deadline.

[Good Cause for Additional Extension of Time]

(1) Where an applicant appoints an attorney(s) for the first time, or dismisses or changes all previously appointed attorneys within one month prior to the expiry of the final extension previously granted.

(2) Where a petition to change an applicant is submitted within one month prior to the expiry of the final extension previously granted.

(3) Where an amendment is filed to reflect examination results that are issued by foreign patent offices within two (2) months prior to the expiry of the final extension previously granted.

(4) Where the delivery of an Office Action is delayed by one or more months.

(5) Where a parent or divisional application is pending at trial or in litigation.

(6) Where an applicant requires more time to perform experiments or verify measurements.

(7) Other good causes such as the occurrence of unavoidable circumstances that are not attributable to the applicant as determined at the discretion of the examiner.

However, if a third party files a request for examination, no additional extensions of time will be allowed even in cases (1) to (5) above.

3. It is possible to request a review of a draft amendment and an interview with the examiner in order to discuss how to amend the specification and/or claims prior to filing the final version of the amendment. Such request must be submitted at least one (1) month prior to the (extended) due date for filing a response to an Office Action.

발송번호: 9-5-2015-070674477
발송일자: 2015.10.14.
제출기일: 2015.12.14.

수신 서울특별시 서대문구 충정로 23 (충정로3가, 풍산빌딩) 14층(리인터내셔널 특허법률사무소)
김태홍

03737

YOUR INVENTION PARTNER

특 허 청

의견제출통지서

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발명자 성명 포드하니 다니엘 에이
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출원번호 10-2014-7026058
출원일자 2014.09.18.
발명의 명칭 텅을 갖는 니트 구성요소가 통합된 신발류 물품

1. 이 출원에 대한 심사결과 다음과 같은 거절이유가 있어 특허법 제63조에 따라 이를 통지하오니 의견이 있거나 보정이 필요할 경우에는 상기 제출기일(2015.12.14.)까지 의견(답변, 소명)서[특허법시행규칙 별지 제24호서식] 또는/및 보정서[특허법시행규칙 별지 제9호서식]를 제출하여 주시기 바랍니다.

2. 상기 제출기일(2015.12.14.)을 연장하려는 경우에는 지정기간연장신청을 통해 그 제출기일을 4개월까지 연장할 수 있습니다. 이 경우 연장신청은 1개월 단위로 해야 하며, 필요 시 4개월을 초과하지 않는 범위에서 2개월 이상을 일괄하여 연장신청할 수 있습니다. 불가피한 사유의 발생(하단의 안내참조)으로 4개월을 초과하여 지정기간을 연장받고자 하는 때에는 그 사유를 기재한 소명서를 추가로 첨부해서 연장신청을 해야 합니다.

[심사결과]

□ 심사 대상 청구항 : 제1-11항

□ 이 출원의 거절이유가 있는 부분과 관련 법조항

순번	거절이유가 있는 부분	관련 법조항
1	청구항 제10항 내지 제11항	특허법 제29조제2항
2	청구항 제3항, 제4항, 제8항, 제9항	특허법 제42조제4항제2호
3	발명의 단일성	특허법 제45조 및 특허법 시행령 제6조제1호

□ 특허 가능한 청구항 : 제1-2, 5-7항

※ 위 특허 가능한 청구항은 의견제출통지시점에서의 심사의견이며 추후 변경될 수 있습니다. 이 출원이 특허결정을 받기 위해서는 이 출원에 대해 지적된 거절이유가 모두 해소되어야 합니다.

[구체적인 거절이유]

1. 이 출원의 특허청구범위의 청구항 제10항 내지 제11항에 기재된 발명은 아래와 같이 그 출원 전에 이 발명이 속하는 기술분야에서 통상의 지식을 가진 자가 용이하게 발명할 수 있는 것이므로 특허법 제29조제2항에 따라 특허를 받을 수 없습니다.

- 아 래 -

인용발명: 일본 공개특허공보 특개2008-291402호(2008.12.04.)

1-1. 제10항 발명은 니팅 방법에 관한 것으로 변경가능한 필드를 갖는 니팅 패턴을 제공하는 단계와, 제1의 알파뉴메릭(alphanumeric) 문자를 나타내는 데이터로 변경가능한 필드를 업데이트하는 단계와, 제1의 알파뉴메릭 문자의 니트 구조를 갖는 제1 구성요소를 니팅하는 단계와, 제2의 알파뉴메릭 문자를 나타내는 데이터로 변경가능한 필드를 업데이트하는 단계와, 제2의 알파뉴메릭 문자의 니트 구조를 갖는 제2 구성요소를 니팅하는 단계를 포함하며, 제2의 알파뉴메릭 문자는 제1의 알파뉴메릭 문자와 상이한 것을 특징으로 하고 있습니다.
이에 대응하는 인용발명은 편지의 제조방법에 관한 것으로 편성 조직으로 구성된 편지의 일부분에 시각적으로 구별될 뿐만 아니라 센서에 의한 화상 인식이 가능한 정보표시부를 구비하되 길이 방향의 문자로 표현된 공장 정보부(31)가 형성되며, 공장 정보부(31)외에 제조 장치, 제조 시기, 제조 로트 등을 특정하는 문자 정보를 포함한 정보표시부가 형성되는 구성이 기재되어 있습니다.
여기에서 인용발명의 정보표시부에 형성된 문자 및 숫자는 제1항 발명의 알파뉴메릭 문자와 동일한 것으로 이를 형성하기 위하여 편성기에 니팅 패턴을 제공해야하는 것은 자명하며, 새로운 알파뉴메릭 문자 및 숫자를 변경하기 위하여 변경 가능한 필드를 업데이트하거나 변경하는 것 역시 자명한 것입니다.
따라서 제1항 발명은 인용발명에 기재된 기술적 사상을 단순히 방법적으로 기재한 것에 불과하며, 구성의 곤란성이나 이로 인한 예측할 수 없는 현저한 상승효과가 있다고 볼 수 없으므로 인용발명에 의해 용이하게 발명할 수 있는 것입니다.

1-2. 제11항 발명은 제10항을 인용하면서 제2의 알파뉴메릭 문자는 제1의 알파뉴메릭 문자로부터 연속되는 것을 특징으로 하고 있습니다.
그러나 인용발명의 공장 정보부와 정보 표시부는 연속적으로 형성되어 동일하므로 인용발명에 의해 용이하게 발명할 수 있는 것입니다.

2. 이 출원은 특허청구범위의 청구항 제3항, 제4항, 제8항, 제9항의 기재가 아래에 지적한 바와 같이 불비하여 특허법 제42조제4항제2호에 따른 요건을 충족하지 못하므로 특허를 받을 수 없습니다.

- 아 래 -

2-1. 청구항 제3항은 제1항을 인용하면서 “상기 텅을 니팅하는 단계 이후에 확장부를 니팅하는 단계를 더 포함하며, 상기 니트 요소의 제1 부분을 니팅하는 단계는 상기 확장부를 푸는 단계를 포함”한다고 기재하고 있으나, 제1항에는 텅을 니팅하는 단계 이후에 텅을 니들 기계의 니들에 유지시키면서 니트 요소의 제1 부분을 니팅한다고 기재하고 있어 확장부와 제1 부분을 니팅하는 시계열적 순서가 불명확하며, 제1 부분을 니팅하면서 확장부를 푸는 것이 어떠한 시계열적 관계가 있는 것인지도 불명확하여 발명의 구성이 명확하게 기재되어 있지 않습니다.

2-2. 청구항 제4항은 제1항을 인용하면서 “상기 텅을 니팅하는 단계는, (a) 가융성 얀과 (b) 크로스-턱 스티치(cross-tuck stitch) 중 적어도 하나를 포함하도록 상기 텅의 코스를 형성하는 단계를 포함”한다고 기재하고 있으나, “(a) 가융성 얀”은 섬유의 재질에 관련된 사항인 반면 “(b) 크로스-턱 스티치(cross-tuck stitch)”는 편성의 조직에 관련된 사항이므로 서로 양립하지 않는 구성요소들을 택일적으로 기재하고 있어 발명의 구성이 명확하게 기재되어 있지 않습니다.

2-3. 청구항 제8항과 제9항은 제3항과 제4항에 기재된 내용을 동일하게 기재하고 있어 상기 거절이유 2-1.과 2-2.가 동일하게 적용되어 발명의 구성이 명확하게 기재되어 있지 않습니다.

3. 이 출원은 아래에 지적한 바와 같이 특허법 제45조 및 특허법 시행령 제6조제1호에 따른 요건을 충족하지 못하므로 특허를 받을 수 없습니다.

- 아 래 -

출원발명은 아래와 같이 구분될 수 있습니다.

○ 제1발명(청구항 제1항 내지 제9항): 신발류 물품용 니트 구성요소를 제조하는 방법
○ 제2발명(청구항 제10항 내지 제11항): 니팅 과정에서 알파뉴메릭 문자를 형성하는 방법

상기의 기재로부터 제1발명은 텅과 니트 요소의 제1 부분과 제2 부분을 니팅하는 방법에 특징이 있는 반면 제2발명은 니팅 과정에서 알파뉴메릭 문자를 형성하는 방법에 특징이 있으므로 청구된 발명들 간에 기술적 상호 관련성이 없으므로 출원발명은 하나의 총괄적 발명의 개념을 형성하는 1군의 발명으로 볼 수 없습니다.

[첨 부]
첨부1 일본 공개특허공보 특개2008-291402호(2008.12.04.) 1부. 끝.

2015.10.14.

특허청 특허심사2국

고분자섬유심사과 심사관 조호정 조호정

<< 안내 >>

1. 특허법 제47조제2항에 따라 특허출원서에 최초로 첨부된 명세서 또는 도면에 기재된 사항의 범위 안에서 명세서 또는 도면을 보정할 수 있음을 알려드립니다.
(참고 : 최후거절이유통지 후 및 특허거절결정에 대한 심판 청구 후 30일내의 보정에 대해서는 특허법 제47조제2항 및 제3항의 규정이 추가로 적용됩니다.)

2. 보정료 납부안내
o 명세서 또는 도면을 보정하기 위하여 명세서등 보정서를 전자문서로 제출할 경우 매건 4,000원, 서면으로 제출할 경우 매건 14,000원의 보정료를 납부하여야 합니다.
o 보정료는 접수번호를 부여받아 이를 납부자번호로 "특허료등의 징수규칙" 별지 제1호서식에 기재하여, 접수번호를 부여받은 날의 다음 날까지 납부하여야 합니다. 다만, 납부일이 공휴일(토요휴무일을 포함한다)에 해당하는 경우에는 그날 이후의 첫 번째 근무일까지 납부하여야 합니다.
o 보정료는 국고수납은행(대부분의 시중은행)에 납부하거나, 인터넷지로(www.giro.or.kr)로 납부할 수 있습니다. 다만, 보정서를 우편으로 제출하는 경우에는 보정료에 상응하는 통상환을 동봉하여 제출하시면 특허청에서 납부해드립니다.

3. 지정기간연장 안내 : 연장가능기간(4개월)을 초과하여 지정기간을 연장하고자 소명서를 첨부하여 지정기간연장신청서를 제출한 경우 심사관은 아래의 사유에 해당되는지를 판단하여 지정기간연장의 승인 여부 및 연장할 수 있는 기간을 정하여 통지합니다.
【4개월을 초과하여 지정기간연장을 할 수 있는 사유】
① 기간만료 전 1개월 이내에 최초로 대리인을 선임하거나 선임된 대리인 모두를 해임·변경한 경우
② 기간만료 전 1개월 이내에 출원인변경신고서를 제출한 경우
③ 기간만료 전 2개월 이내에 외국특허청의 심사결과를 받은 경우로서 동 심사결과를 보정서에 반영하고자 하는 경우(이 경우 신청서 제출 시 해당 심사결과 사본 및 그 기초가 된 청구범위 사본도 같이 제출해야 함)
④ 의견제출통지서의 송달이 1개월 이상 지연된 경우(1개월 추가 연장 가능)
⑤ 원출원 또는 분할출원이 심판이나 소송에 계류 중인 경우
⑥ 거절이유와 관련된 시험 및 결과측정에 기간이 더 필요한 경우
⑦ 기타 불가피하게 기간연장이 필요하다고 인정되는 경우
단, 제3자가 심사청구한 때에는 ①~⑤의 경우라도 불승인

4. 보정안 리뷰(사전검토) 서비스 안내
o 보정서 제출기간 만료일 1개월 이전에 보정안을 제출하고 보정안 리뷰를 신청할 경우 면담을 통해 거절이유 해소 여부 등 보정안에 대한 심사관의 사전검토 서비스를 받을 수 있습니다.
※ 보정안은 보정서 또는 의견서의 형태로 보정안 리뷰 신청 전에 제출하여야 합니다.
o 보정안 리뷰 서비스는 특허로 홈페이지(www.patent.go.kr)의 '출원신청 - 보정안리뷰 신청' 메뉴를 통해 신청할 수 있습니다.

※「특허로」고객센터에서 알림서비스를 신청하시면 담당 심사관 지정 알림, 마감기한 알림 등 각종 민원처리 사항을 이메일과 휴대폰(SMS)로 받아 보실 수 있습니다.

※ 이 통지서의 내용에 대해 문의사항이 있으시면 특허청 ☎ 042-481-5587(담당심사관 조호정)로, 서식 또는 절차에 대하여는 특허고객상담센터 ☎1544-8080로 문의하시기 바랍니다.

※ 우 35208 대전광역시 서구 청사로 189, 4동 (둔산동, 정부대전청사)

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/869,398	04/24/2013	Daren P. Tatler	120188US04/15571-47	5174

133691 7590 02/29/2016

NIKE, Inc./BGL
P.O. Box 10395
Chicago, IL 60610

EXAMINER	
WORRELL JR, LARRY D	

ART UNIT	PAPER NUMBER
3765	

MAIL DATE	DELIVERY MODE
02/29/2016	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 13/869,398	Applicant(s) TATLER ET AL.	
	Examiner DANNY WORRELL	Art Unit 3765	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) 1-20 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☒ Claim(s) 1-14 is/are allowed.

7)☒ Claim(s) 15-20 is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *See Continuation Sheet*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

Continuation of Attachment(s) 2). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :6/25/15, 12/2/14, 9/30/14, 8/12/14, 8/1/14, 3/5/14, 9/30/13, 5/23/13.

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 15 and 16 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Coble (US 4,843,653).

Coble teaches the invention as claimed including providing a knitting pattern with a modifiable field (the pattern forming welts 20), the knitting pattern including data associated with forming a knitted component using a knitting machine (plain knit); updating the modifiable field with data representing a first alphanumeric character (40, "A") for knitting a first knitted component (upper portion 20); knitting the first knitted component with the knitting machine, the first knitted component incorporating a first knit structure with the first alphanumeric character; updating the modifiable field with data representing a second alphanumeric (40, "B") character for knitting a second knitted component (lower portion 20); knitting the second knitted

component with the knitting machine, the second knitted component incorporating a second knit structure with the second alphanumeric character; and wherein the first knitted component is substantially identical to the second knitted component as seen at least in figure 1.

Claim Rejections - 35 USC § 103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 17-20 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Coble (US 4,843,653) in view of Marker et al. (US 6,321,574), henceforth known as Marker.

Coble teaches the invention substantially as claimed including providing a knitting pattern with a modifiable field (the pattern forming welts 20), the knitting pattern including data associated with forming a knitted component (plain knit); updating the modifiable field with data representing a first alphanumeric character (40, "A") for knitting a first knitted component (upper portion 20); knitting the first knitted component, the first knitted component incorporating a first knit structure with the first alphanumeric character; updating the modifiable field with data

representing a second alphanumeric (40, "B") character for knitting a second knitted component (lower portion 20); knitting the second knitted component, the second knitted component incorporating a second knit structure with the second alphanumeric character; and wherein the first knitted component is substantially identical to the second knitted component as seen at least in figure 1. However, Coble does not expressly set forth that the component is formed on a knitting machine. Marker sets forth a knitting machine for forming components via knit data. It would have been obvious at the time the invention was made to form the knit structure of Coble with a knitting machine as shown by Marker in order to automate and optimize the formation of the knit structure. Regarding claim 16, the data associated with forming the knitted component of Coble comprises at least: (1) yarns utilized for each stitch associated with the knitted component, and (2) a type of knit structure formed by each stitch associated with the knitted component. Regarding claim 17 and 18, Marker teaches that alpha numeric characters are typically formed of different colored yarns. Regarding claim 19 and 20, Coble's second alphanumeric character (B) is sequential from the first alphanumeric character (A) and the modifiable field of the knitting pattern is updated for a plurality of successive knitted components with sequential alphanumeric characters having a sequential alphanumeric character.

Allowable Subject Matter

Claims 1-14 are allowed.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Applicant is reminded that all business with the Patent and Trademark Office should be transacted in writing. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt. 37 C.F.R. 1.2

Further it is noted that a complete response must satisfy the requirements of 37 C.F.R. 1.111, including:

-The reply must present arguments pointing out the specific distinctions believed to render the claims, including any newly presented claims, patentable over any applied references.

-A general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references does not comply with the requirements of this section.

-Moreover, The prompt development of a clear issue requires that the replies of the applicant meet the objections to and rejections of the claims. Applicant should also specifically point out the support for any amendments made to the disclosure. See MPEP 2163.06, MPEP 714.02. The "disclosure" includes the claims, the specification and the drawings.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANNY WORRELL whose telephone number is (571)272-4997. The examiner can normally be reached on MONDAY and WEDNESDAY-FRIDAY.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Khoa Huynh can be reached on 571/272-4888. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DANNY WORRELL/
Primary Examiner
Art Unit 3765

ldw

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PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:
Gibson, Eric M.
PLUMSEA LAW GROUP, LLC
10411 Motor City Drive, Suite 320
Bethesda, MD 20817
ETATS-UNIS D'AMERIQUE

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(PCT Article 17(3)(a) and Rule 40.1 and 40.2(e))

Date of mailing *(day/month/year)*	6 August 2013 (06-08-2013) ✓
Applicant's or agent's file reference 51-3178	**PAYMENT DUE** within **ONE MONTH** from ✓ the above date of mailing
International application No. PCT/US2013/026618 ✓	International filing date *(day/month/year)* 19 February 2013 (19-02-2013) ✓

Applicant

NIKE INTERNATIONAL LTD.

1. This International Searching Authority

(i) considers that there are 2 *(number of)* inventions claimed in the international application covered by the claims indicated on an extra sheet:

(ii) therefore considers that **the international application does not comply with the requirements of unity of invention** (Rules 13.1, 13.2 and 13.3) for the reasons indicated on an extra sheet:

(iii) [X] has carried out a partial international search (see Annex) [ ] will establish the international search report on those parts of the international application which relate to the invention first mentioned in claims Nos.:

see extra sheet

(iv) will establish the international search report on the other parts of the international application only if, and to the extent to which, additional fees are paid.

2. Consequently, the applicant is hereby **invited to pay,** within the time limit indicated above, the amount indicated below:

EUR 1.875,00	x	1	=	EUR 1.875,00
Fee per additional invention		number of additional inventions		currency/total amount of additional fees

3. The applicant is informed that, according to Rule 40.2(c), **the payment of any additional fee may be made under protest,** i.e., a reasoned statement to the effect that the international application complies with the requirement of unity of invention or that the amount of the required additional fee is excessive, where applicable, subject to the payment of a protest fee.

Where the applicant pays additional fees under protest, the applicant is hereby invited, within the time limit indicated above, to pay a protest fee (Rule 40.2(e)) in the amount of EUR 830,00 *(currency/amount)*

Where the applicant has not, within the time limit indicated above, paid the required protest fee, the protest will be considered not to have been made and the International Searching Authority will so declare.

4. [ ] Claim(s) Nos. _____ have been found to be unsearchable under Article 17(2)(b) because of defects under Article 17(2)(a) and therefore have not been included with any invention.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	SMYTH-WALKER, Lisa Tel: +49 (0)89 2399-6947

Form PCT/ISA/206 (April 2005)

Registered Mail

INVITATION TO PAY ADDITIONAL FEES

International application No.
PCT/US2013/026618

COPY

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-9

A method of knitting an article of footwear comprising a tongue, a first and a second portion.

---

2. claims: 10, 11

A method of knitting a knitting pattern with a modifiable field.

This Authority considers that the application does not meet the requirements of unity of invention and that there are two inventions covered by the claims.
The only technical features those two inventions have in common is that they both refer to a method of knitting which as such is known without question. Hence, the two inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT.

Annex to Form PCT/ISA/206
COMMUNICATION RELATING TO THE RESULTS OF THE PARTIAL INTERNATIONAL SEARCH

International Application No
PCT/US2013/026618

COPY

1. The present communication is an Annex to the invitation to pay additional fees (Form PCT/ISA/206). It shows the results of the international search established on the parts of the international application which relate to the invention first mentioned in claims Nos.:
see 'Invitation to pay additional fees'
2. This communication is not the international search report which will be established according to Article 18 and Rule 43.

3. If the applicant does not pay any additional search fees, the information appearing in this communication will be considered as the result of the international search and will be included as such in the international search report.

4. If the applicant pays additional fees, the international search report will contain both the information appearing in this communication and the results of the international search on other parts of the international application for which such fees will have been paid.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00/30480 A1 (KUNERT GES MBH [AT]) 2 June 2000 (2000-06-02) claim 1; figure 1	1,2,5-7
A	DE 297 00 546 U1 (JAKUT MURAT [DE]) 15 May 1997 (1997-05-15) claim 1; figure 1	1-9
A	WO 2011/043998 A2 (NIKE INTERNATIONAL LTD; GREENE PAMELA S [US]; AVENI MICHAEL A [US]; LY) 14 April 2011 (2011-04-14) paragraph [0044] - paragraph [0063]; figures 6-12	1-9
A	WO 94/00033 A1 (DAHLGREN RAYMOND E [US]) 6 January 1994 (1994-01-06) abstract; figure 4	1-9

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

1

Form PCT/ISA/206 (Annex, first sheet) (July 1992; reprint January 2004)

Patent Family Annex

Information on patent family members

International Application No
PCT/US2013/026618

COPY

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0030480 A1	02-06-2000	AT 2872 U2	25-06-1999
		WO 0030480 A1	02-06-2000
DE 29700546 U1	15-05-1997	NONE	
WO 2011043998 A2	14-04-2011	CN 102655776 A	05-09-2012
		EP 2485619 A2	15-08-2012
		JP 2013507183 A	04-03-2013
		KR 20120091112 A	17-08-2012
		US 2011078921 A1	07-04-2011
		WO 2011043998 A2	14-04-2011
WO 9400033 A1	06-01-1994	AU 4533593 A	24-01-1994
		DE 69305079 D1	31-10-1996
		DE 69305079 T2	15-05-1997
		EP 0649286 A1	26-04-1995
		ES 2096932 T3	16-03-1997
		US 5365677 A	22-11-1994
		US 5511323 A	30-04-1996
		WO 9400033 A1	06-01-1994

COPY

European Patent Organisation

Account details

N° 3 338 800 00 (BLZ 700 800 00)
Commerzbank
Promenadeplatz 7
D-80273 München
SWIFT Code: DRESDEFF700
IBAN: DE20 7008 0000 0333 880000
BIC: DRESDEFF

PATENT COOPERATION TREATY

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LBK
OCT 21 2013
PCT PLUMSEA LAW GROUP

From the INTERNATIONAL SEARCHING AUTHORITY

To:
Gibson, Eric M.
PLUMSEA LAW GROUP, LLC
10411 Motor City Drive, Suite 320
Bethesda, MD 20817
ETATS-UNIS D'AMERIQUE

DOCKETED
PDF XG/YMT
OCT 22 2013
LR

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 51-3178	Date of mailing *(day/month/year)* 15 October 2013 (15-10-2013) **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US2013/026618 ✓	International filing date *(day/month/year)* 19 February 2013 (19-02-2013) ✓
Applicant NIKE INTERNATIONAL LTD.	

1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 338.82.70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 - 9.011.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	Authorized officer NYSTRÖM-HANNACK, Anette Tel: +49 (0)89 2399-6933

Form PCT/ISA/220 (July 2010)

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
51-3178		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2013/026618	19 February 2013 (19-02-2013)	20 February 2012 (20-02-2012)

Applicant

NIKE INTERNATIONAL LTD.

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☒ **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**

☒ the text is approved as submitted by the applicant

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

☒ the text is approved as submitted by the applicant

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**

a. the figure of the **drawings** to be published with the abstract is Figure No. 36E

☒ as suggested by the applicant

☐ as selected by this Authority, because the applicant failed to suggest a figure

☐ as selected by this Authority, because this figure better characterizes the invention

b. ☐ none of the figures is to be published with the abstract

COPY

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/026618

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-9

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No. PCT/US2013/026618

COPY

A. CLASSIFICATION OF SUBJECT MATTER
INV. D04B7/04 A43B23/02 A43B23/26
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D04B A43B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00/30480 A1 (KUNERT GES MBH [AT]) 2 June 2000 (2000-06-02) claim 1; figure 1	1,2,5-7
A	DE 297 00 546 U1 (JAKUT MURAT [DE]) 15 May 1997 (1997-05-15) claim 1; figure 1	1-9
A	WO 2011/043998 A2 (NIKE INTERNATIONAL LTD; GREENE PAMELA S [US]; AVENI MICHAEL A [US]; LY) 14 April 2011 (2011-04-14) paragraph [0044] - paragraph [0063]; figures 6-12	1-9
A	WO 94/00033 A1 (DAHLGREN RAYMOND E [US]) 6 January 1994 (1994-01-06) abstract; figure 4	1-9

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 July 2013	15/10/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Zirkler, Stefanie

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No. PCT/US2013/026618

COPY

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0030480 A1	02-06-2000	AT 2872 U2	25-06-1999
		WO 0030480 A1	02-06-2000
DE 29700546 U1	15-05-1997	NONE	
WO 2011043998 A2	14-04-2011	CN 102655776 A	05-09-2012
		EP 2485619 A2	15-08-2012
		JP 2013507183 A	04-03-2013
		KR 20120091112 A	17-08-2012
		US 2011078921 A1	07-04-2011
		WO 2011043998 A2	14-04-2011
WO 9400033 A1	06-01-1994	AU 4533593 A	24-01-1994
		DE 69305079 D1	31-10-1996
		DE 69305079 T2	15-05-1997
		EP 0649286 A1	26-04-1995
		ES 2096932 T3	16-03-1997
		US 5365677 A	22-11-1994
		US 5511323 A	30-04-1996
		WO 9400033 A1	06-01-1994

COPY

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-9

A method of knitting an article of footwear comprising a tongue, a first and a second portion.

---

2. claims: 10, 11

A method of knitting a knitting pattern with a modifiable field.

PATENT COOPERATION TREATY

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PCT SEA LAW GROUP

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

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OCT 22 2013
I S R

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2013/026618	19.02.2013	20.02.2012

International Patent Classification (IPC) or both national classification and IPC
INV. D04B7/04 A43B23/02 A43B23/26

Applicant
NIKE INTERNATIONAL LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Zirkler, Stefanie Telephone No. +49 89 2399-2056

Form PCT/ISA/237 (Cover Sheet) (July 2009)

COPY

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/026618

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

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Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

☐ the entire international application

☒ claims Nos. 10, 11

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international search *(specify)*:

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*:

☒ no international search report has been established for the whole application or for said claims Nos. 10, 11

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

- ☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
- ☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
- ☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13*ter*.1(a) or (b).

☐ See Supplemental Box for further details

COPY

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:

   ☐ paid additional fees

   ☐ paid additional fees under protest and, where applicable, the protest fee

   ☐ paid additional fees under protest but the applicable protest fee was not paid

   ☒ not paid additional fees

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

   ☐ complied with

   ☒ not complied with for the following reasons:

   see separate sheet

4. Consequently, this report has been established in respect of the following parts of the international application:

   ☐ all parts.

   ☒ the parts relating to claims Nos. 1-9

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2-4, 7-9
	No:	Claims	1, 5, 6
Inventive step (IS)	Yes:	Claims	3, 4, 8, 9
	No:	Claims	1, 2, 5-7
Industrial applicability (IA)	Yes:	Claims	1-9
	No:	Claims	

2. Citations and explanations

see separate sheet

COPY

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item IV

Lack of unity of invention

This Authority considers that the application does not meet the requirements of unity of invention and that there are two inventions covered by the claims indicated as follows:

1. invention: claims 1 to 9

A method of knitting an article of footwear comprising a tongue, a first and a second portion.

2. invention: claims 10, 11

A method of knitting a knitting pattern with a modifiable field.

The only technical features those two inventions have in common is that they both refer to a method of knitting which as such is known without question. Hence, the two inventions are not so linked as to form a single general inventive concept, as required by **Rule 13.1 PCT**.

Re Item VIII

Certain observations on the international application

Claim 5 is not clear, because it does not clearly state to what part of the footwear the tongue is joined. Referring to claim 1 what seems to meant is the following: "...*joining the tongue to the first portion of the knit element*..."

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:

D1 WO 00/30480 A1

1 The present application does not meet the criteria of Article 33(1) PCT for the following reasons:

1.1 Document D1 discloses (the references in parentheses applying to document D1) a method of knitting an article of footwear, in particular a sock liner (Fig. 1), the method comprising knitting an instep portion, or tongue, holding the instep portion on needles, knitting a sole portion, or first portion, while the the instep portion is held on the needles, joining the instep portion to the sole portion (Fig. 1 (1)) and knitting a heel portion, or second portion.

Hence, due to a broad wording of claim 1, its subject-matter is not new (Article 33(1) and 33(2) PCT).

1.2 The subject-matter of **claim 6** correspond in substance to that of claim 1 and is as such also not new **(Article 33(1) and 33(2) PCT)**.

1.3 Document D1 is also novelty-destroying for the subject-matter of dependent **claim 5 (Article 33(1) and 33(2) PCT)**.

1.4 Dependent **claims 2, 4, 7 and 9** do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step **(Article 33(1), 33(2) and 33(3) PCT)**.

2 The combination of the features of dependent **claims 3 and 8** is neither known from, nor rendered obvious by, the available prior art.

Re Item VII

Certain defects in the international application

3 Contrary to the requirements of **Rule 5.1(a)(ii) PCT**, the relevant background art disclosed in D1 is not mentioned in the description, nor is this document identified therein.

4 Independent claims 1 and 6 are not in the two-part form in accordance with **Rule 6.3(b) PCT**, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

133691 7590 08/05/2016

NIKE, Inc./BGL
P.O. Box 10395
Chicago, IL 60610

EXAMINER
WORRELL JR, LARRY D

ART UNIT	PAPER NUMBER
3765	

DATE MAILED: 08/05/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/781,525	02/28/2013	Bhupesh Dua	130056US01/15571-75	7689

TITLE OF INVENTION: ARTICLE OF FOOTWEAR INCORPORATING A KNITTED COMPONENT WITH AN INTEGRAL KNIT TONGUE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	11/07/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

133691 7590 08/05/2016
NIKE, Inc./BGL
P.O. Box 10395
Chicago, IL 60610

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/781,525	02/28/2013	Bhupesh Dua	130056US01/15571-75	7689

TITLE OF INVENTION: ARTICLE OF FOOTWEAR INCORPORATING A KNITTED COMPONENT WITH AN INTEGRAL KNIT TONGUE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	11/07/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
WORRELL JR, LARRY D	3765	066-170000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/781,525	02/28/2013	Bhupesh Dua	130056US01/15571-75	7689

133691 7590 08/05/2016

NIKE, Inc./BGL
P.O. Box 10395
Chicago, IL 60610

EXAMINER	
WORRELL JR, LARRY D	

ART UNIT	PAPER NUMBER
3765	

DATE MAILED: 08/05/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/781,525	Applicant(s) DUA ET AL.	
	Examiner DANNY WORRELL	Art Unit 3765	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *RCE filed 7/21/16*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-27*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 7/21/16
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/DANNY WORRELL/
Primary Examiner, Art Unit 3765

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: July 21, 2016 Name: Christopher J. Gerardot (Reg. No. 73,644) Signature: /Christopher J. Gerardot/

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	Bhupesh Dua et al.		
Appln. No.:	13/781,525	Examiner:	Worrell Jr., Larry D.
Filed:	February 28, 2013	Art Unit:	3765
For:	ARTICLE OF FOOTWEAR INCORPORATING A KNITTED COMPONENT WITH AN INTEGRAL KNIT TONGUE	Conf. No.:	7689
Attorney Docket No.:	15571-75/130056US01		

EIGHTH SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT WITH REQUEST FOR CONTINUED EXAMINATION

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

In accordance with the duty of disclosure, Applicants hereby cite the following references:

US PATENT REFERENCES

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	NAME
	J1	2,994,322	08/01/1961	Cullen et al.
	J2	4,232,458	11/11/1980	Bartels
	J3	4,258,480	03/31/1981	Famolare, Jr.
	J4	5,031,423	07/16/1991	Ikenaga
	J5	5,117,567	06/02/1992	Berger
	J6	5,371,957	12/13/1994	Gaudio
	J7	5,623,840	04/29/1997	Roell
	J8	5,765,296	06/16/1998	Ludemann et al.
	J9	5,884,419	03/23/1999	Davidowitz et al.
	J10	5,996,189	12/07/1999	Wang
	J11	6,029,376	02/29/2000	Cass
	J12	6,032,387	03/07/2000	Johnson
	J13	6,052,921	04/25/2000	Oreck
	J14	6,088,936	07/18/2000	Bahl
	J15	6,151,802	11/28/2000	Reynolds
	J16	6,170,175	01/19/2001	Funk
	J17	6,754,983	06/29/2004	Hatfield et al.
	J18	2004/0181972 A1	09/23/2004	Csorba
	J19	6,922,917	08/02/2005	Kerns et al.
	J20	2005/0273988 A1	12/15/2005	Christy
	J21	D517297	03/21/2006	Jones et al.
	J22	2006/0059715 A1	03/23/2006	Aveni
	J23	2006/0162187 A1	07/27/2006	Byrnes et al.
	J24	2007/0022627 A1	02/01/2007	Sokolowski et al.
	J25	2008/0078102 A1	04/03/2008	Kilgore et al.
	J26	7,543,397	06/09/2009	Kilgore et al.

Examiner Signature	/DANNY WORRELL/ (07/27/2016)	Date Considered	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /DW/

Information Disclosure Statement

Application No. 13/781,525 Attorney Docket No. 15571-75/130056US01

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	NAME
	J27	7,568,298	08/04/2009	Kerns
	J28	2011/0030244 A1	02/10/2011	Motawi et al.
	J29	8,448,474	05/28/2013	Tatler et al.
	J30	8,490,299	07/23/2013	Dua et al.
	J31	2013/0239625 A1	09/19/2013	Meir et al.
	J32	8,650,916	02/18/2014	Dua et al.
	J33	8,745,895	06/10/2014	Sokolowski et al.
	J34	8,800,172	08/12/2014	Dua et al.
	J35	2014/0245545 A1	09/04/2014	Meir et al.

FOREIGN PATENT REFERENCES

EXAMINER INITIAL		DOCUMENT NUMBER Number-Kind Code (if known)	DATE	COUNTRY	TRANSLATION YES OR NO
	J36	DE29700546	05/15/1997	Germany	Abstract
	J37	EP0279950	08/31/1988	Europe	Abstract
	J38	EP0898002	02/24/1999	Europe	
	J39	EP1437057	07/14/2004	Europe	
	J40	EP1602762	12/07/2005	Europe	
	J41	EP1972706	09/24/2008	Europe	
	J42	GB2018837	10/24/1979	United Kingdom	
	J43	JP 2008-291402 A	12/04/2008	Japan	Abstract
	J44	JP 2012-512698 A	06/07/2012	Japan	Abstract
	J45	WO94/00033	01/06/1994	WIPO	
	J46	WO 2010/080182 A1	07/15/2010	WIPO	
	J47	WO 2011/043998	04/14/2011	WIPO	

OTHER ART – NON PATENT LITERATURE DOCUMENTS

EXAMINER INITIAL		Include name of author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
	J48	International Search Report and Written Opinion in connection with PCT/US2009/056795 mailed on Apr. 20, 2010, 16 pages.
	J49	International Search Report and Written Opinion in connection with PCT/US2012/028576 mailed on Oct. 1, 2012, 12 pages.
	J50	International Search Report and Written Opinion in connection with PCT/US2012/028559 mailed on Oct. 19, 2012, 11 pages.
	J51	International Search Report and Written Opinion in connection with PCT/US2012/028534 mailed on Oct. 17, 2012, 16 pages.
	J52	International Preliminary Report on Patentability in connection with PCT/US2012/028576 mailed Sep. 17, 2013, 7 pages.
	J53	Office Action in corresponding European Application No. 14717892.5, dated October 6, 2015, 2 pages.
	J54	International Preliminary Report on Patentability in connection with PCT/US2012/028534 mailed on 17 September 2013, 8 pages
	J55	Office Action, and English language translation therein, in corresponding Japanese Application No. 2014-557864, dated March 31, 2016, 6 pages.
	J56	Office Action and Search Report, and English language translation therein, in corresponding Taiwanese Application No. 103143383, dated December 9, 2015, 7 pages.
	J57	Office Action and Search Report, and English language translation therein, in corresponding Japanese Application No. 2014-557864, dated September 10, 2015, 7 pages.

Examiner Signature	/DANNY WORRELL/ (07/27/2016)	Date Considered	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /DW/

Information Disclosure Statement

Application No. 13/781,525 Attorney Docket No. 15571-75/130056US01

EXAMINER INITIAL	Include name of author, title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	
	J58	Office Action and Search Report, and English language translation therein, in corresponding Korean Application No. 10-2014-7026058, dated February 29, 2016, 8 pages.
	J59	Office Action in corresponding U.S. Patent Application No. 13/869,398, dated February 29, 2016, 8 pages
	J60	Invitation to Pay Additional Fees, And, Where Applicable, Protest Fee (with Search Report) mailed August 6, 2013 in PCT Application Number PCT/US2013/026618, 5 pages.
	J61	International Search Report and the Written Opinion mailed October 15, 2013 in PCT Application Number PCT/US2013/026618, 13 pages.

1. PRIORITY INFORMATION:

☐ This application claims priority under 35 USC §120 to the following United States patent application(s): _____. In accordance with 37 CFR §1.98(d), copies of the references cited herein which were submitted to, or cited by, the office, in compliance with 37 CFR §1.98(a)-(c) in the earlier application are not provided herewith. The Examiner is directed to those references cited in all Information Disclosure Statements filed in the priority United States patent application(s) cited above in addition to the references cited herein.

2. CERTIFICATIONS: (CHECK ALL THAT APPLY)

A. Certifications For 37 CFR §1.97(c) or 37 CFR §1.97(d):

☐ Applicant hereby certifies pursuant to 37 CFR §1.97(e)(1) that each item of information in this Information Disclosure Statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement.

☐ Applicant hereby certifies pursuant to 37 CFR §1.97(e)(2) that no item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this Statement was known to any individual designated in 37 CFR §1.56(c), more than three months prior to the filing of this Information Disclosure Statement.

B. For Patent Term Adjustment Purposes:

☐ For purposes of 37 CFR §1.704(d)(i) or 37 CFR §1.704(d)(ii), Applicant hereby certifies that each item of information contained in this Information Disclosure Statement was first cited in any communication from a patent office in a counterpart foreign or international application or from the Office or is a communication that was issued by a patent office in a counterpart foreign or international application or by the Office, and that this communication was not received by any individual designated in 37 CFR §1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement.

3. FEE INFORMATION: (CHECK IF FEE REQUIRED)

☐ Applicant has calculated a processing fee in the amount of _____ to be due under 37 CFR §1.17(p) in connection with the filing of this Information Disclosure Statement. Applicant authorizes charging the fee to Deposit Account _____.

☒ The Director is hereby authorized to charge any fee deficiency associated with the filing of this Information Disclosure Statement to Deposit Account 23-1925.

Pursuant to the undersigned attorney's obligation and duties under 37 CFR §§ 1.56 and 1.98(a)(3) and (c), either English language abstracts, partial translations, or full translations are included for patent documents which are not in English for the express purpose of providing a concise explanation of the references to the

Examiner Signature	/DANNY WORRELL/ (07/27/2016)	Date Considered	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /DW/

Information Disclosure Statement

Application No. 13/781,525 Attorney Docket No. 15571-75/130056US01

Patent and Trademark Office with the opportunity to evaluate the same. Applicant respectfully requests the Examiner's consideration of the above reference(s) and entry thereof into the record of this application.

By submitting this Statement, Applicant is attempting to fully comply with the duty of candor and good faith mandated by 37 CFR §1.56. As such, this Statement is not intended to constitute an admission that any of the enclosed references, or other information referred to therein, constitutes "prior art" or is otherwise "material to patentability," as that phrase is defined in 37 CFR §1.56(a).

Respectfully submitted,

July 21, 2016
Date

/Christopher J. Gerardot/
Christopher J. Gerardot (Reg. No. 73,644)

Examiner Signature	/DANNY WORRELL/ (07/27/2016)	Date Considered	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /DW/

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13781525	DUA ET AL.
	Examiner	Art Unit
	LARRY WORRELL JR	3765

CPC- SEARCHED		
Symbol	Date	Examiner
D04B 1/126, 1/22, 1/24, 7/24, 15/56	9/30/2015	/dw/

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
Review related appications	9/30/2015	/dw/
update search	4/17/2016	/dw/

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
D04B	D04B 1/126, 1/22, 1/24, 7/24, 15/56	4/17/2016	/dw/

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13781525	DUA ET AL.
	Examiner	**Art Unit**
	LARRY WORRELL JR	3765

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	04/17/2016	07/27/2016							
	1	=	=							
	2	=	=							
	3	=	=							
	4	=	=							
	5	=	=							
	6	=	=							
	7	=	=							
	8	=	=							
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	22	=	=							
	23	=	=							
	24	=	=							
	25	=	=							
	26	=	=							
	27	=	=							

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13781525	DUA ET AL.
	Examiner	**Art Unit**
	LARRY WORRELL JR	3765

CPC								
Symbol							**Type**	**Version**
A43B	/	1	/	04			F	2013-01-01
A43B	/	23	/	0245			I	2013-01-01
A43B	/	23	/	0265			I	2013-01-01
A43B	/	23	/	26			I	2013-01-01
D04B	/	1	/	22			I	2013-01-01
D04B	/	15	/	56			I	2013-01-01
D10B	/	2403	/	02411			A	2013-01-01
D10B	/	2403	/	032			A	2013-01-01
D10B	/	2501	/	043			A	2013-01-01
A43B	/	23	/	0205			I	2013-01-01
D04B	/	1	/	24			I	2013-01-01
D04B	/	7	/	28			I	2013-01-01
D10B	/	2403	/	0113			A	2013-01-01
D10B	/	2403	/	0243			A	2013-01-01

CPC Combination Sets								
Symbol							**Type**	**Set**	**Ranking**	**Version**

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	27	
/DANNY WORRELL/ Primary Examiner.Art Unit 3765	04/19/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	16

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13781525	DUA ET AL.
	Examiner	**Art Unit**
	LARRY WORRELL JR	3765

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
		D	0	4	B	1 / 22						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	27	
/DANNY WORRELL/ Primary Examiner.Art Unit 3765	04/19/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	16

U.S. Patent and Trademark Office

Part of Paper No. 20160417

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13781525	DUA ET AL.
	Examiner	**Art Unit**
	LARRY WORRELL JR	3765

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 27	
/DANNY WORRELL/ Primary Examiner.Art Unit 3765 (Primary Examiner)	04/19/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 16

U.S. Patent and Trademark Office

Part of Paper No. 20160417

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

133691 7590 08/05/2016
NIKE, Inc./BGL
P.O. Box 10395
Chicago, IL 60610

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee Transmittal is being transmitted to the United States Patent and Trademark Office via EFS Transmission under 37 CFR 1.8, on the date indicated below:

Christopher J. Gerardot, Reg. No. 73,644	(Depositor's name)
/Christopher J. Gerardot/	(Signature)
November 2, 2016	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/781,525	02/28/2013	Bhupesh Dua	130056US01/15571-75	7689

TITLE OF INVENTION: ARTICLE OF FOOTWEAR INCORPORATING A KNITTED COMPONENT WITH AN INTEGRAL KNIT TONGUE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	11/07/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
WORRELL JR, LARRY D	3765	066-170000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Brinks Gilson & Lione
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: NIKE, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Beaverton, Oregon

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

☒ Issue Fee

☐ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

☐ A check is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 23-1925 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

☐ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Christopher J. Gerardot/ Date November 2, 2016

Typed or printed name Christopher J. Gerardot Registration No. 73,644

Electronic Patent Application Fee Transmittal

Application Number:	13781525
Filing Date:	28-Feb-2013
Title of Invention:	ARTICLE OF FOOTWEAR INCORPORATING A KNITTED COMPONENT WITH AN INTEGRAL KNIT TONGUE
First Named Inventor/Applicant Name:	Bhupesh Dua
Filer:	Christopher J. Gerardot/Lori Peterson
Attorney Docket Number:	130056US01/15571-75

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt	
EFS ID:	27381443
Application Number:	13781525
International Application Number:	
Confirmation Number:	7689
Title of Invention:	ARTICLE OF FOOTWEAR INCORPORATING A KNITTED COMPONENT WITH AN INTEGRAL KNIT TONGUE
First Named Inventor/Applicant Name:	Bhupesh Dua
Customer Number:	133691
Filer:	Christopher J. Gerardot/Zachary Castillo
Filer Authorized By:	Christopher J. Gerardot
Attorney Docket Number:	130056US01/15571-75
Receipt Date:	02-NOV-2016
Filing Date:	28-FEB-2013
Time Stamp:	12:05:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$960
RAM confirmation Number	110216INTEFSW00008765231925
Deposit Account	231925
Authorized User	Christopher Gerardot
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	1557175TL.pdf	44968 334b22437d41200a6b917a1ca95b7ef233ddf09b	no	1
Warnings:					
Information:					
2	Issue Fee Payment (PTO-85B)	1557175if.pdf	177341 9433d20e776948e2eab4754911240f9be755e619	no	1
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30846 709f8e4cdb9a83c59036feceae58543b80b6fcb7	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	253155		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF EFS FILING UNDER 37 CFR §1.8

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office, Commissioner for Patents, via the EFS pursuant to 37 CFR §1.8 on the below date:

Date: November 2, 2016 Name: Christopher J. Gerardot, Reg. No. 73,644 Signature: /Christopher J. Gerardot/

BRINKS GILSON & LIONE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	DUA et al.	
Appln. No:	13/781,525	Examiner: Worrell, Larry D., Jr.
Filed:	February 28, 2013	Art Unit: 3765
For:	ARTICLE OF FOOTWEAR INCORPORATING A KNITTED COMPONENT WITH AN INTEGRAL KNIT TONGUE	Conf. No.: 7689
Attorney Docket No.:	15571-75/130056US01	

TRANSMITTAL

Mail Stop Issue Fee
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Attached are:

☒ Transmittal; Issue Fee Transmittal (Part B).

Fee calculation:

☐ No additional fee is required.

☐ Per 37 CFR §1.27, ☐ Applicant is small entity ☐ Applicant is micro entity.

☐ An extension fee in an amount of $_____ for a _____-month extension of time under 37 CFR § 1.136(a).

☐ A petition or processing fee in an amount of $_____ under 37 CFR § 1.17(_____).

☐ An additional filing fee has been calculated as shown below:

					Fee		Small Entity Fee		Micro Entity Fee	
	Claims Remaining After Amendment		Highest No. Previously Paid	Present Extra	Rate	Add'l Fee	Rate	Add'l Fee	Rate	Add'l Fee
Total		Minus			x $ 80 =	$	x $ 40 =	$	x $20 =	$
Independent		Minus			x $420 =	$	x $210 =	$	x $105 =	$
First Presentation of Multiple Dep. Claim					+ $780 =	$	+ $390 =	$	+ $195 =	$
					Total	$	Total	$	Total	$

Fee payment:

☒ Please charge Deposit Account No. 23-1925 in the amount of $960.00 for the Issue Fee.

☒ The Director is hereby authorized to charge payment of any additional filing fees required under 37 CFR § 1.16 and any patent application processing fees under 37 CFR § 1.17 (including any extension fee required to ensure that this paper is timely filed), or to credit any overpayment, to Deposit Account No. 23-1925.

Respectfully submitted,

November 2, 2016
Date

/Christopher J. Gerardot/
Christopher J. Gerardot (Reg. No. 73,644)

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	13781525
	Filing Date	2013-02-28
	First Named Inventor	Bhupesh Dua
	Art Unit	3765
	Examiner Name	Larry D. Worrell Jr.
	Attorney Docket Number	51-3209

	9	6333105		2001-12-25	Tanaka et al.	
Change(s) applied to document, /J.M./ 5/3/2016	10	3583081		~~1974-06-08~~ 06/1971	Hayashi	
	11	4447967		1984-05-15	~~Mortara~~ Zaino	
Change(s) applied to document, /J.M./ 5/3/2016	12	4813158		1989-03-21	Brown	
	13	4756098		1988-07-12	Boggia	
	14	5345638		1994-09-13	Nishida	
	15	4785558		1988-11-22	Shiomura	

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020148258		2002-10-17	Cole et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /DW/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	13781525
Filing Date	2013-02-28
First Named Inventor	Dua
Art Unit	3765
Examiner Name	TBD
Attorney Docket Number	51-3209

	42	5575090	A	1996-11-19	Condini	
	43	5729918		1998-03-24	Smets	
	44	5735145	A	1998-04-07	Pernick	
	45	5746013	A	1998-05-05	Fay	
	46	5823012	A	1998-10-20	Hacskaylo	
	47	6308438	B1	2001-10-30	Throneburg	
	48	6321574	B1	2001-11-27	Marker	
	49	6401364	B1	2002-06-11	Burt	
	50	6558784	B1	2003-05-06	Norton	
	51	6588237		2003-07-08	Cole	
	52	6910288	B2	~~2006-06-28~~ 06/2005	Dua	

Change(s) applied to document,
/JM/
5/3/2016

EFS-Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /DW/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	13781525
Filing Date	2013-02-28
First Named Inventor	Dua
Art Unit	3765
Examiner Name	TBD
Attorney Docket Number	51-3209

	20	3972086		1976-08-03	Belli	
	21	4027402		1977-06-07	Liu	
	22	4031586		1977-06-28	Von den Benken	
	23	4211806	A	1980-07-08	Civardi	
	24	4255949	A	1981-03-17	Thorneburg	
	25	4317292	A	1982-03-02	Melton	
	26	4373361	A	1983-02-15	Thorneburg	
	27	4447967	A	1984-05-15	Zaino	
	28	4465448		1984-08-14	Aldridge	
	29	4499741	A	1985-02-19	Harris	
	30	4607439	A	1986-08-26	~~Harada~~ Sogabe et al.	

Change(s) applied to document,
/J.M./
5/3/2016

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /DW/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/781,525	12/06/2016	9510636	130056US01/15571-75	7689

133691 7590 11/16/2016

NIKE, Inc./BGL
P.O. Box 10395
Chicago, IL 60610

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 703 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Bhupesh Dua, Portland, OR;
Bruce Huffa, Encino, CA;
Adrian Meir, Portland, OR;
Benjamin A. Shaffer, Portland, OR;
NIKE, INC., Beaverton, OR

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	13/781525
Filing Date	2013-02-28
First Named Inventor	Bhupesh Dua
Title	Article Of Footwear Incorporating A Knitted Component With An Integral Knit Tongue
Art Unit	
Examiner Name	
Attorney Docket Number	130056US01

SIGNATURE of Applicant or Patent Practitioner

Signature	/CORY W. FISHER/	Date (Optional)	
Name	Cory W. Fisher	Registration Number	59,366
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 01/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

[X] I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 78342

OR

[ ] I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

[X] The address associated with the above-mentioned Customer Number

OR

[ ] The address associated with Customer Number:

OR

[ ] Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

NIKE, Inc.

[ ] Inventor or Joint Inventor (title not required below)

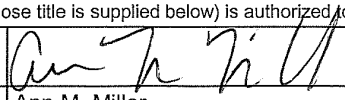
[ ] Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

[X] Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

[ ] Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Ann M. Miller		
Title	Secretary, NIKE, Inc.		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

[ ] Total of _____ forms are submitted.

NF_17710751_1 (FOOTWEAR)

Electronic Acknowledgement Receipt

EFS ID:	41967552
Application Number:	13781525
International Application Number:	
Confirmation Number:	7689
Title of Invention:	ARTICLE OF FOOTWEAR INCORPORATING A KNITTED COMPONENT WITH AN INTEGRAL KNIT TONGUE
First Named Inventor/Applicant Name:	Bhupesh Dua
Customer Number:	133691
Filer:	Cory Wayne Fisher/Taylor Parker
Filer Authorized By:	Cory Wayne Fisher
Attorney Docket Number:	130056US01/15571-75
Receipt Date:	19-FEB-2021
Filing Date:	28-FEB-2013
Time Stamp:	12:37:13
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	130056US01-POA.pdf	225767 0c5cbc3c4f1e4a6277f2d27912ac105f083c4660	no	2

Warnings:

Information:	
Total Files Size (in bytes):	225767

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/781,525	02/28/2013	Bhupesh Dua	130056US01

CONFIRMATION NO. 7689

78342
Shook Hardy & Bacon LLP (NIKE, Inc.)
2555 Grand Boulevard
Kansas City, MO 64108

POA ACCEPTANCE LETTER

OC000000123586574

Date Mailed: 02/25/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/19/2021.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/zabraha/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/781,525	02/28/2013	Bhupesh Dua	130056US01/15571-75

CONFIRMATION NO. 7689

133691
NIKE, Inc./BGL
P.O. Box 10395
Chicago, IL 60610

POWER OF ATTORNEY NOTICE

OC000000123586541

Date Mailed: 02/25/2021

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/19/2021.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/zabraha/

To: shbdocketing@shb.com,ipdocket@shb.com,nike_docketing@cardinal-ip.com
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 78342

Feb 25, 2021 03:46:09 AM

Dear PAIR Customer:

Shook Hardy & Bacon LLP (NIKE, Inc.)
2555 Grand Boulevard
Kansas City, MO 64108
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 78342 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
13781525	N570	02/25/2021	130056US01
	N570	02/25/2021	130056US01

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

AO 120 (Rev. 08/10)

TO:	**Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313–1450**	**REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK**

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. 1116, you are hereby advised that a court action has been filed in the U.S. District Court for the District of Oregon on the following

☐ Trademarks or ☑ Patents (☐ the patent action involves 35 U.S.C. § 292):

DOCKET NO. 3:21–cv–01780–YY	DATE FILED 12/8/2021	U.S. DISTRICT COURT District of Oregon
PLAINTIFF Nike, Inc.		DEFENDANT adidas AG, a foreign corporation

PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,814,598	10/19/2010	Nike
2 8,266,749	9/18/2012	Nike
3 8,898,932	12/2/2014	Nike
4 9,060,562	6/23/2015	Nike
5 9,510,636	12/6/2016	Nike

In the above–entitled case, the following patent(s)/trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 9,743,705	8/29/2017	Nike
2 9,907,350	3/18/2018	Nike
3 9,918,511	3/20/2018	Nike
4 9,924,758	3/27/2018	Nike
5		

In the above–entitled case, the following decision has been rendered or judgment issued:

DECISION/JUDGMENT		
CLERK MARY L. MORAN	(BY) DEPUTY CLERK E. Potter	DATE 12/9/2021

Copy 1 Upon initiation of action, mail this copy to Director Copy 3 Upon termination of action, mail this copy to Director
Copy 2 Upon filing document adding patent(s), mail this copy to Director Copy 4 Case file copy