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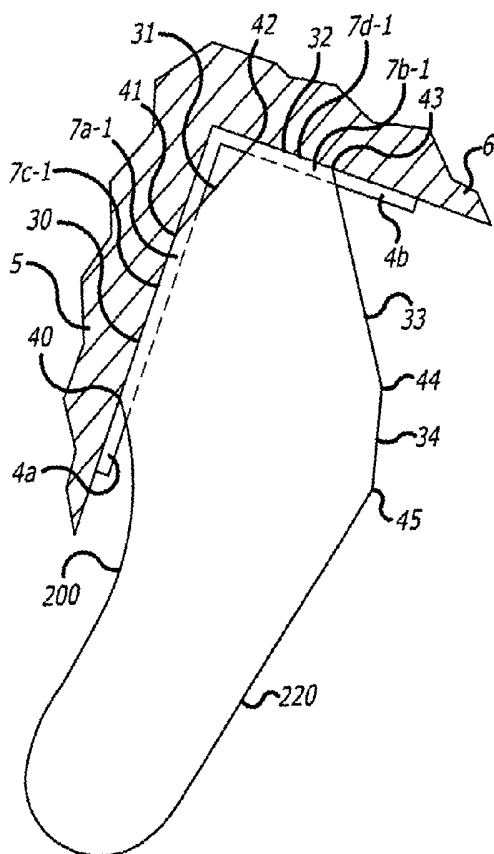
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(54) Title: SURFACE CONTACT MAXIMIZING SHOE, OUTSOLE AND RAND



(57) Abstract: The present invention provides for multiple portions of a shoe structure and the method of making these portions wherein one or more of the portions comprise two or more flat perimeter edges. The present invention further provides faceted lasts for making faceted shoe portions. An exemplary embodiment (Fig. 9) of a shoe having a faceted outsole, rand, and shoe upper of the present invention features five separate straight-line facets (30-34) and six angled corners (40-45). Alternative degrees of the angle formed by the intersection of the various straight-line facets, and the number of the various straight-line facets, can be varied for different types of foot structures. For example, the angle degrees and number of outsole facets may vary as between shoes for adult males and for women and children's feet. Facet (30) and facet (32) contact exemplary edge formations (4a, 4b) respectively with outsole contact areas (7a-1, 7b-1). Further, facets (30, 32) contact exemplary rock wall faces (5, 6) respectively with rand surface area (7c-1, 7d-1).

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1 SURFACE CONTACT MAXIMIZING SHOE, OUTSOLE AND RAND

3 FIELD OF THE INVENTION

4 The field of the present invention is shoes, and specifically shoes for contact with steeper
5 than horizontal surfaces.

6 CROSS REFERENCE TO RELATED APPLICATIONS

7 Priority is claimed to U.S. Provisional Patent Application Serial No. 60/290,308, entitled
8 "Surface Contact Maximizing Shoe, Outsole and Rand", filed on May 10, 2001, the disclosure
9 of which is incorporated for all purposes herein in full by reference as if stated in full herein.

10 BACKGROUND OF THE INVENTION

11 Climbers, mountaineers and other sports enthusiasts often use shoes specifically
12 designed for heightened traction, such as for "edging" on rock and steep terrain. Rock climbing
13 (including ice-climbing), approach shoes, canyoneering, fly-fishing, river walking, and
14 mountaineering shoes are among the types of shoes for which heightened traction can be
15 important.

16 Conventional climbing shoes have outsoles and uppers, the external perimeters of which
17 express a round, non-angular curvature. Sometimes there is a rand surrounding a portion of the
18 lower external surface portion of the shoe upper. In the case of such conventional climbing
19 shoes, the entire external perimeter of the outsole and the upper/rand is rounded – that is, there
20 are no flat, or straight-lined edges. FIG. 1a is a bottom view of an exemplary conventional
21 rounded-perimeter outsole 1. Although the particular outline of the footprint of a conventional
22 climbing shoe varies in length, width and curvature according to the size of the particular shoe,
23 such shoes leave a rounded, non-angular footprint similar to the outline of the bottom view of an
24 exemplary conventional outsole as depicted in FIG. 1a.

25 FIGS. 1b and 1c are side and top views respectively of an exemplary conventional
26 rounded-perimeter shoe upper 21 and rounded-perimeter shoe rand (sometimes referred to as a
27 "foxing" on some types of shoes) 20. As is depicted in FIGS. 1b and 1c, the rand/foxing 20 is
28 attached to a bottom portion 22 of the shoe upper 21.

29 Conventional climbing shoes are often made using "lasts" with rounded forefront and
30 heels. A "last" is an object that approximates the dimensions of a human foot of a particular
31 size and shape. A last is used in the shoemaking process as a mold around which the outer shoe
32 is formed. That is, a particular last is used to create the shape of the inside of a shoe of a
33 particular size and shape. Lasts are often made of nylon, aluminum, or wood. FIGS. 2a through

2c depict a three-quarter view, a side view, and a top view, respectively, of an exemplary conventional rounded-perimeter last 130. As depicted in FIGS. 2a through 2c, a conventional last 130 provides a rounded perimeter 131.

In climbing, there are drawbacks to shoes with rounded outsole perimeter curvature. When a climber encounters an edge, the climber needs to maximize the contact surface with the edge. An edge is a climbing surface, often of small dimension, that forms an angle with one or more rock walls. Exemplary edges are depicted in FIGS. 3, 4 and 5.

FIG. 3 depicts a top view of an exemplary edge formation 2a formed at an angle with a single rock wall 3. If a climber wearing exemplary conventional climbing shoes with a rounded-perimeter outsole 1 attempted contact with the edge formation 2a, then, as depicted in FIG. 3, only a small contact surface 2b would be formed between a small portion 2d of the rounded outsole 1 that contacts the edge 2a; the rounded upper or rand of the shoe would make contact 2c at only a small portion of the rounded surface of the upper or rand.

FIG. 4 depicts a top view of exemplary edge formations 4a and 4b formed along two opposing rock walls 5 and 6. If a climber wearing exemplary conventional climbing shoes with a rounded-perimeter outsole 1 attempted contact with the edge formations 4a and 4b, then, as depicted in FIG. 4, only small contact surfaces 7a and 7b would be formed between those small portions 7e and 7f respectively of the rounded outsole 1 that make contact with the edges 4a and 4b respectively; the rounded upper or rand of the shoe would make contact 7c and 7d respectively at only small portions of the rounded surface of the upper or rand.

FIG. 5 depicts a top view of an exemplary edge formation 8a formed between two opposing rock walls 5 and 6. FIG. 6 is a perspective view of the exemplary edge formation 8 formed between the two opposing rock walls 5 and 6. As depicted in FIG. 5, the rounded outsole 1 makes no contact with the edge 8a; the rounded upper or rand of the shoe would make contact 8b and 8c at only a small portion of the rounded surface of the upper or rand.

The exemplary climbing edges 2a (FIG. 3), 4a-4b (FIG. 4), and 8a (FIG. 5) are depicted as being more or less horizontal with the ground; the rock walls 3 (FIG. 3), and 5 through 6 (FIGS. 4, 5 and 6) are depicted as being more or less perpendicular with the ground. However, that is not always the case. FIGS. 7a and 7b depict side and frontal views respectively of an exemplary edge formation 9 formed between two opposing rock walls 10 and 11 where the intersection 12 of the outer faces of rock walls 10 and 11 forms an obtuse angle with horizontal ground level and where the edge 9 formed between the two rock walls is not horizontal with ground level. In such a case, the rand, or if no rand, the upper, of the shoe of a rock climber

1 attempting to use the edge would have the opportunity to make contact with the rock walls 10
2 and 11. Just as is the case for a rounded outsole, a rounded rand or upper will make contact with
3 such rock wall surfaces at only a small portion of the rounded surface of the upper or the rand
4 (as depicted above in elements 2c (FIG. 3), 7c and 7d (FIG. 4) and 8b and 8c (FIG. 5). In an
5 angled edge/wall face formation, such as the exemplary formation depicted in FIGS. 7a and 7b,
6 greater rand contact surface would provide increased climbing traction and leverage.

7 In nature, there are infinite variations of edge formations. It will be understood by
8 someone with ordinary skill in the art that the edges depicted in FIGS. 3 through 7a, and 7b are
9 exemplary for purposes of illustration only. Even if an edge is two or three inches long, a
10 climber wearing shoes having a curved outsole perimeter will often not be able to make contact
11 (such as depicted in FIG. 5), or in some cases, will be able to make only minimal contact (such
12 as depicted in FIGS. 3 and 4), with the particular target edge(s). Surface contact insufficiency is
13 sometimes exacerbated by a tendency of a rounded shoe outsole to curl away from rock wall
14 surfaces, *e.g.*, 5 and 6 as depicted in FIGS. 4 and 5.

15 Mountain climbing, rock climbing, and similar "extreme sport" athletes perform their
16 sports in dangerous environmental conditions, often thousands of feet above ground level.
17 Maximizing climbing surface contact gives this type of athlete greater safety and performance.

18 Conventional wisdom in making and fitting rock climbing shoes in order to increase a
19 climber's ability to make greater contact with rock climbing surfaces has been to make the shoe
20 very, very stiff and/or to fit the shoe very, very tight. There are drawbacks to these two
21 approaches. Stiff shoes detract from a climbers' ability to feel rock and rock edges. Tight
22 fitting shoes are painful for the wearer.

23 A better way is needed to maximize outsole and rand surface contact with climbing
24 edges and rock wall surfaces.

25 SUMMARY OF THE INVENTION

26 The present invention provides outsoles, shoes with outsoles, and methods of making
27 shoes with outsoles, wherein the outsoles comprise two or more flat perimeter edges. The flat
28 external perimeter outsole edges are referred to herein as outsole "facets". In the exemplary
29 embodiments depicted and disclosed herein, these flat edge outsole facets intersect and form
30 angled corners. In alternative embodiments, one or more of the flat outsole edges do not
31 intersect with other flat outsole edges.

32 The present invention further provides rands, shoes with rands, and methods of making
33 shoes with rands, wherein the rands comprise two or more relatively flat surfaces around the

1 rand perimeter. The relatively flat rand surfaces are referred to herein as rand “facets”. In the
2 exemplary embodiments depicted and disclosed herein, these relatively flat rand surface facets
3 intersect and form angled corners. In alternative embodiments, one or more of the relatively flat
4 rand surfaces do not intersect with other flat rand surfaces.

5 The present invention further provides shoe uppers, shoes with uppers, and methods of
6 making shoes with uppers, wherein the shoe uppers comprise two or more relatively flat
7 surfaces around the shoe upper perimeter. The relatively flat shoe upper surfaces are referred to
8 herein as shoe upper “facets”. In the exemplary embodiments depicted and disclosed herein,
9 these relatively flat shoe upper surface facets intersect and form angled corners. In alternative
10 embodiments, one or more of the relatively flat shoe upper surfaces do not intersect with other
11 flat shoe upper surfaces.

12 The present invention further provides faceted lasts for making faceted shoe uppers,
13 faceted rands, faceted outsoles, shoes with faceted shoe uppers, shoes with faceted rands and
14 shoes with faceted outsoles.

15 BRIEF DESCRIPTION OF THE DRAWINGS

16 These and other features of the present invention are more fully set forth in the following
17 description of exemplary embodiments of the invention. The description is presented with
18 reference to the accompanying drawings in which:

19 FIG. 1a is a bottom view of an exemplary conventional rounded-perimeter outsole;

20 FIGS. 1b and 1c are side and top views respectively of an exemplary conventional
21 rounded perimeter shoe upper and an exemplary rounded perimeter shoe rand;

22 FIGS. 2a through 2c depict a three-quarter view, a side view, and a top view,
23 respectively, of an exemplary conventional rounded-perimeter last;

24 FIG. 3 depicts a top view of an exemplary edge formation formed at an angle with a
25 single rock wall;

26 FIG. 4 depicts a top view of exemplary edge formations formed along two opposing rock
27 walls;

28 FIG. 5 depicts a top view of an exemplary edge formation formed between two opposing
29 rock walls;

30 FIG. 6 is a perspective view of the exemplary edge formation depicted in FIG. 5 formed
31 between the two opposing rock walls;

32 FIGS. 7a and 7b depict side and frontal views respectively of an exemplary edge
33 formation formed between two opposing rock walls where the intersection of the outer faces of

1 the two rock walls forms an obtuse angle with horizontal ground level;

2 FIGS. 8, 9 and 10 depict top views of an exemplary embodiment of the outsole facet
3 feature of the present invention in relation to various edge formations;

4 FIG. 11 is a top view showing the outline of a foot under a compression fit in a faceted
5 shoe;

6 FIG. 12 is a top view of a faceted shoe having a faceted shoe upper 111, a faceted rand
7 110 and a faceted outsole (not shown);

8 FIGS. 13a through 13c depict a perspective view, a side view and a top view respectively
9 of a faceted last;

10 FIG. 14 is a perspective view of an exemplary unfaceted, untrimmed outsole attached to
11 an exemplary shoe upper that has been placed over an exemplary faceted last of the present
12 invention;

13 FIG. 15 is a perspective view of an exemplary molded faceted outsole attached to an
14 exemplary shoe upper that has been placed over an exemplary faceted last of the present
15 invention; and

16 FIG. 16 is a perspective view of an exemplary faceted outsole attached to an exemplary
17 sock shoe upper that has been slipped onto an exemplary faceted last of the present invention.
18

19 DETAILED DESCRIPTION OF THE INVENTION

20 As further described below, in one exemplary embodiment of the invention, each shoe
21 outsole has multiple straight-line “facets” generally aligning with the bone structure of the foot.
22 In the exemplary embodiment, these straight-line facets intersect at sharp angles.

23 FIGS. 8, 9 and 10 depict top views of an exemplary embodiment of the outsole, rand,
24 and shoe upper facet features of the present invention in relation to various edge and rock face
25 formations. In the exemplary embodiment depicted in FIGS. 8 through 10, there are five
26 separate straight-line facets 30-34 and six angled corners 40 through 45. Alternative degrees of
27 the angles formed by the intersection of the various straight-line facets, and the number of the
28 various straight-line facets, can be varied for different types of foot structures. For example, the
29 angle degrees and number of outsole facets can be varied as between shoes for adult males and
30 for women and children’s feet.

31 Different types of rock form different types of formations. For example, granite often
32 forms relatively linear straight-line edges as shown in FIGS. 8 through 10. Granite also has a
33 tendency to form clean corners such as those depicted in FIGS. 9 and 10. Limestone on the

1 other hand sometimes forms small round pockets (not shown), such as the size of a single finger
2 (1 – 2 cm in diameter).

3 A faceted shoe generally increases the contact surface area with rock, greatly increasing
4 the ability to climb. For example, angled corners can enter small limestone pockets more easily,
5 more deeply, and more securely than a round-perimeter shoe. Further, when climbing granite
6 formations, faceted shoes, outsoles and rands increase the contact surface areas with edge
7 formations and rock wall faces.

8 For example, as depicted in FIG. 8, facet 32 contacts an exemplary edge formation 2a
9 with outsole contact area 2b-1. As depicted in FIGS. 8 and 3, the size of outsole contact area
10 2b-1 between the facet 32 and the edge formation 2a depicted in FIG. 8 is substantially
11 increased as compared to the size of outsole contact area 2b between the rounded-perimeter
12 outsole 1 and the edge formation 2a as depicted in FIG. 3. Further, as depicted in FIG. 8, facet
13 32 contacts an exemplary rock face 3 with rand surface area (and/or shoe upper surface area) 2c-
14 1. As depicted in FIGS. 8 and 3, the size of rand surface area (and/or shoe upper surface area)
15 2c-1 contacted between the facet 32 and the rock face 3 as depicted in FIG. 8 is substantially
16 increased as compared to the size of rock wall contact surface area 2c of the rounded perimeter
17 shoe 1 as depicted in FIG. 3.

18 As depicted in FIG. 9, facet 30 and facet 32 contact exemplary edge formations 4a and
19 4b respectively with outsole contact areas 7a-1 and 7b-1. As depicted in FIGS. 9 and 4, the size
20 of outsole contact areas 7a-1 and 7b-1 between facet 30 and facet 32 and the edge formations 4a
21 and 4b respectively depicted in FIG. 9 is substantially increased as compared to the size of
22 outsole contact areas 7a and 7b between the rounded-perimeter outsole 1 and the edge
23 formations 4a and 4b as depicted in FIG. 4. Further, as depicted in FIG. 9, facets 30 and 32
24 contact exemplary rock wall faces 5 and 6 respectively with rand surface areas (and/or shoe
25 upper surface areas) 7c-1 and 7d-1. As depicted in FIGS. 9 and 4, the size of rand surface areas
26 (and/or shoe upper surface areas) 7c-1 and 7d-1 contacted between facets 30 and 32 and rock
27 wall faces 5 and 6 respectively as depicted in FIG. 9 is substantially increased as compared to
28 the size of rock wall contact surface areas 7c and 7d between the rounded-perimeter shoe 1 and
29 rock wall faces 5 and 6 as depicted in FIG. 4.

30 Similarly, as depicted in FIG. 10, the exemplary faceted shoe provides a corner at angle
31 42 formed by the intersection of facets 31 and 32 with which a contact surface area 15 can be
32 made with exemplary edge formation 8a. In contrast, the rounded perimeter shoe depicted in
33 FIG. 5 provided no contact surface area with edge formation 8a. In addition, it can be seen in

FIG. 10, that, depending on the angles of the rock walls 5 and 6, the climber can choose to make contact surface areas with either rock wall 5 using facet 31 (contact surface area 8b-1), or with rock wall 6 using facet 32 (contact surface not shown).

The outsole, rand and shoe upper facets and angles of the exemplary embodiment of the invention can be adjusted to fit different types of foot structures. FIG. 11 is a top view showing the outline of a foot under a compression-fit in a faceted shoe. As depicted in FIG. 11, under shoe-fitting compression, the outline of the foot, forward of the arch 200, forms a series of five roughly straight lines 201 through 205 that relate to, or form-fit within, straight-line facets 30 through 34, intersecting at six angles 40 through 45.

As will be understood by someone with ordinary skill in the art, the human foot has an arch. Reference herein to the arch of an outsole refers to the indented curvature of the outsole that mimics the arch of the human foot.

As depicted in FIG. 11 and as discussed further below, the lines 201 through 205 of a shoe-compressed foot 210 fit into the straight-lined facets, e.g., 30 through 34, of a faceted shoe upper 220. That is because the human foot is made of many small bones that have play between them and because toes curl and line up.

As depicted in FIG. 11, the straight-line facet 30 between angles 40 and 41 of the exemplary faceted shoe 220 corresponds to a roughly straight-lined area 201 of the shoe-compressed foot between the ball 100 of the foot out to the first knuckle 101 of the large toe. The straight-lined area 201 of the shoe-compressed foot 210 form-fits under shoe-fitting compression to the straight-line facet 30.

Continuing with FIG. 11, the straight-line facet 31 between angles 41 and 42 corresponds to a roughly straight-lined area 202 of the shoe-compressed foot between the knuckle 101 and an inner tip 102 of the big toe. The straight-lined area 202 of the shoe-compressed foot 210 form-fits under shoe-fitting compression to the straight-line facet 31.

The straight-line facet 32 between angles 42 and 43 relates to a roughly straight line 203 between the inner tip 102 of the big toe over to the outer tip 103 of the second toe. The straight line 203 formed by the inner tip 102 of the big toe over to the outer tip 103 of the second toe form-fits under shoe-fitting compression to the straight-line facet 32.

In the exemplary embodiment, angle 43 is provided to accommodate what is known as "Mortons toe" (a longer second toe). In an alternative embodiment, a shoe for foot structures without a Mortons toe would not include angle 43, or alternatively, angle 43 would be of greater degree.

1 The straight-line facet 33 between angles 43 and 44 relates to a roughly straight line 204
2 between the second toe outer tip 103 and the outer knuckle tip 104 of the fifth toe. The straight
3 line 204 between the second toe outer tip 103 and the outer knuckle tip 104 of the fifth toe form-
4 fits under shoe-fitting compression to the straight-line facet 33.

5 The straight-line facet 34 between angles 44 and 45 relates to a roughly straight-lined
6 area 205 between the fifth toe outer knuckle tip 104, to the ball 105 of the pinky/fifth toe. The
7 straight line 205 between the fifth toe outer knuckle tip 104, to the ball 105 of the pinky/fifth toe
8 form-fits under shoe-fitting compression to the straight-line facet 34.

9 As depicted in FIG. 11, toes fit under compression may align with the inner shoe upper
10 facets by curling slightly.

11 FIG. 12 is a top view of a faceted shoe having a faceted shoe upper 111, a faceted rand
12 110 and a faceted outsole (not shown). In alternative embodiments of the invention, facets
13 would be further provided in the heel section of the shoe upper, rand and outsole.

14 The invention provides several methods of making faceted shoes. Two of the methods
15 use a faceted last 150 such as depicted in FIGS. 13a through 13c. FIGS. 13a through 13c depict
16 a perspective view, a side view and a top view respectively of a faceted last 150. As depicted in
17 FIGS. 13a through 13c, instead of a rounded perimeter 131 as with a conventional last 130 (as
18 depicted in FIGS. 2a through 2c), a faceted last 150 provided last facets, such as 151 through
19 157.

20 As will be understood by someone with ordinary skill in the art, there are a number of
21 ways of making shoes using a last. One method of making shoes with a last comprises grinding
22 an outsole attached to a shoe upper that has been placed over a last. Another method of making
23 shoes with a last comprises attaching a molded outsole to a shoe upper that has been placed over
24 a last. Yet another method of making shoes with a last involves a process known as sock
25 lasting, or cement lasting. The sock lasting method of making shoes comprises pulling a sewn
26 upper over the last (like pulling a sock over a foot). Any necessary midsole is glued or
27 otherwise attached onto the bottom of the shoe upper on the last. A rand (such as a rubber rand)
28 can optionally be glued or otherwise attached around the lower surface perimeter of the upper.

29 One method of making faceted shoes is depicted in FIG. 14 wherein an unfaceted,
30 untrimmed outsole 300 would be attached to a shoe upper 301 that is placed over a faceted last
31 150. The outer perimeter of the outsole 300 would then be shaped by grinding the outer
32 perimeter of the outsole 300 to conform in position and shape the facets 151, 152, 154 through
33 157 of the faceted last 150.

1 Another method of making faceted shoes is depicted in FIG. 15 wherein a molded
2 faceted outsole 310 would be attached to a shoe upper 301 that is placed over a faceted last 150.
3 In this method, the molded faceted outsole 310 has facets, e.g., 311 through 314 shown, that
4 conform in position and shape to the facets 151 through 157 of the faceted shape of the faceted
5 last 150.

6 Yet another way of making a faceted shoe on a faceted last using sock lasting is depicted
7 in FIG. 16. The sock lasting method of making shoes with faceted shoe uppers, faceted rands
8 and/or faceted outsoles comprises pulling a sewn shoe upper 320 over the faceted last 150 (like
9 pulling a sock over a foot). Any necessary midsole (not shown) would be glued or otherwise
10 attached onto the bottom of the shoe upper 320 that has been slipped over the faceted last 150.
11 A rand 340 (such as a rubber rand), such as a molded rand with facets, e.g. 341 through 344, can
12 optionally be glued or otherwise attached around the lower surface perimeter of the shoe upper
13 320 such that the facets, e.g., 341 through 344 shown, conform in position and shape with the
14 facets 151 through 157 of the faceted last 150. A faceted outsole e.g., 330, such as one having
15 facets, e.g., 331 through 334 shown, would then be fastened, such as by gluing, to the bottom
16 surface of the shoe sock-midsole-rand assembly. If the outsole has not been previously molded
17 to have facets, the outsole would be trimmed to have facets, e.g., 331 through 334 shown. The
18 trimming operation could be done for example on a sanding wheel.

19 In the exemplary embodiment depicted in, e.g., FIGS. 11 and 12, a molded rand with
20 facets would be attached to the bottom of the shoe. It should be noted that the facets of a rand
21 and/or the shoe upper, even to some extent, a molded rand, may, once the finished shoe is
22 removed from the faceted last, express some slight curvature to the straight-lined facets.
23 Accordingly, it will be understood by someone of ordinary skill in the art that reference herein
24 to a relatively flat edge on the perimeter of a shoe rand and/or a shoe upper refers to a faceted
25 edge that may express a mild degree of curvature.

26 Another method of making a shoe with a faceted shoe upper, faceted foxing/rand, and/or
27 a faceted outsole would be to use a vulcanization process using a faceted last. The term
28 “foxing” is used for a vulcanized rand. Using the vulcanization process, the upper and midsole
29 would be placed on the faceted last. The foxing/rand would be attached to the upper and
30 midsole and would then be baked (vulcanized) so that it takes the shape of the faceted last.

31 Another method of making a shoe on a faceted last would be to use a “board lasting”
32 approach. The board lasting method comprises stapling a midsole directly to the last. An upper
33 with no bottom would then be placed on the last and glued to the midsole, thus forming a

1 complete upper in the shape of the last. The completion of the shoe would be similar to the
2 above-described sock lasting method starting with the application of the rand.

3 It should be understood by someone with ordinary skill in the art that a faceted outsole
4 can be sewn, glued, or otherwise attached to the bottom of a shoe with a round-perimeter shoe
5 upper. Sometimes, stiff shoes (as with heavy duty mountaineering shoes) are made with a
6 welted construction method. In the welted construction method, the outsole shape is not
7 dependent upon the last shape. Using this method, an outsole having facets according to the
8 invention would be sewn or attached to an upper of different curvature, such as a round-
9 perimeter shoe upper. In an exemplary embodiment of this feature of the invention, the outsole
10 would be constructed of material that is very stiff so that angles extending beyond the perimeter
11 of the last would not flex upward when contacting edge formations. The method would be
12 useful for plastic injection mountaineering boots for two reasons: 1.) It allows re-use of
13 expensive round-lasting shoe upper molds; and 2.) the stiffness of a plastic injection boot allows
14 a boot/outsole shape mismatch – that is, any shaped outsole can be attached to a stiff plastic
15 boot.

16 ILLUSTRATIVE EMBODIMENTS

17 Although the present invention has been described in certain specific embodiments,
18 many additional modifications and variations would be apparent to those skilled in the art. It is,
19 therefore, to be understood that this invention may be practiced otherwise than as specifically
20 described. Thus, the embodiments of the present invention described herein should be
21 considered in all respects as illustrative and not restrictive, the scope of the invention to be
22 determined by the appended claims and their equivalents rather than the foregoing description.

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1 WHAT IS CLAIMED IS:

2

3 1. A shoe outsole having an arch and a perimeter, said shoe outsole comprising:
4 at least two flat edges on the perimeter of the outsole.

5

6 2. The shoe outsole of Claim 1, said shoe outsole further comprising:
7 at least one angled corner on the perimeter of the outsole, said angled corner formed by
8 an intersection of a first flat edge of the perimeter of the outsole with a second flat edge of the
9 perimeter of the outsole.

10

11 3. The shoe outsole of Claim 2 wherein each of said flat edges is forward of the
12 arch of the outsole.

13

14 4. A shoe upper having an arch and a perimeter, said shoe upper comprising:
15 at least two relatively flat edges on the perimeter of the shoe upper.

16

17 5. The shoe upper of Claim 4, said shoe outsole further comprising:
18 at least one angled corner on the perimeter of the shoe upper, said angled corner formed
19 by an intersection of a first relatively flat edge of the perimeter of the shoe upper with a second
20 relatively flat edge of the perimeter of the shoe upper.

21

22 6. The shoe upper of Claim 5 wherein each of said relatively flat edges is forward of
23 the arch of the shoe upper.

24

25 7. A shoe rand having a perimeter, said shoe rand comprising:
26 at least two relatively flat edges on the perimeter of the shoe rand.

27

28 8. The shoe rand of Claim 4, said shoe rand further comprising:
29 at least one angled corner on the perimeter of the shoe rand, said angled corner formed
30 by an intersection of a first relatively flat edge of the perimeter of the shoe rand with a second
31 relatively flat edge of the perimeter of the shoe rand.

32

1 9. The shoe rand of Claim 5 wherein the shoe rand is fastened to a bottom portion
2 of a shoe upper having an arch, said shoe rand fastened to said bottom portion of the shoe upper
3 forward of said arch.

4

5 10. A shoe last having an arch and a perimeter, said shoe last comprising:
6 at least two flat edges on the perimeter of the shoe last.

7

8 11. The shoe last of Claim 10, said shoe last further comprising:
9 at least one angled corner on the perimeter of the shoe last, said angled corner formed by
10 an intersection of a first flat edge of the perimeter of the shoe last with a second flat edge of the
11 perimeter of the shoe last.

12

13 12. The shoe last of Claim 11 wherein each of said flat edges is forward of the arch
14 of the shoe last.

15

16 13. A shoe, said shoe comprising:
17 a shoe upper having a bottom; and
18 an outsole attached to the bottom of the shoe upper, said outsole comprising an arch, a
19 perimeter, and at least two flat edges on the perimeter of the outsole.

20

21 14. The shoe of Claim 13, said outsole further comprising:
22 at least one angled corner on the perimeter of the outsole, said angled corner formed by
23 an intersection of a first flat edge of the perimeter of the outsole with a second flat edge of the
24 perimeter of the outsole.

25

26 15. The shoe of Claim 14 wherein each of said flat edges of said outsole is forward
27 of the arch of the outsole.

28

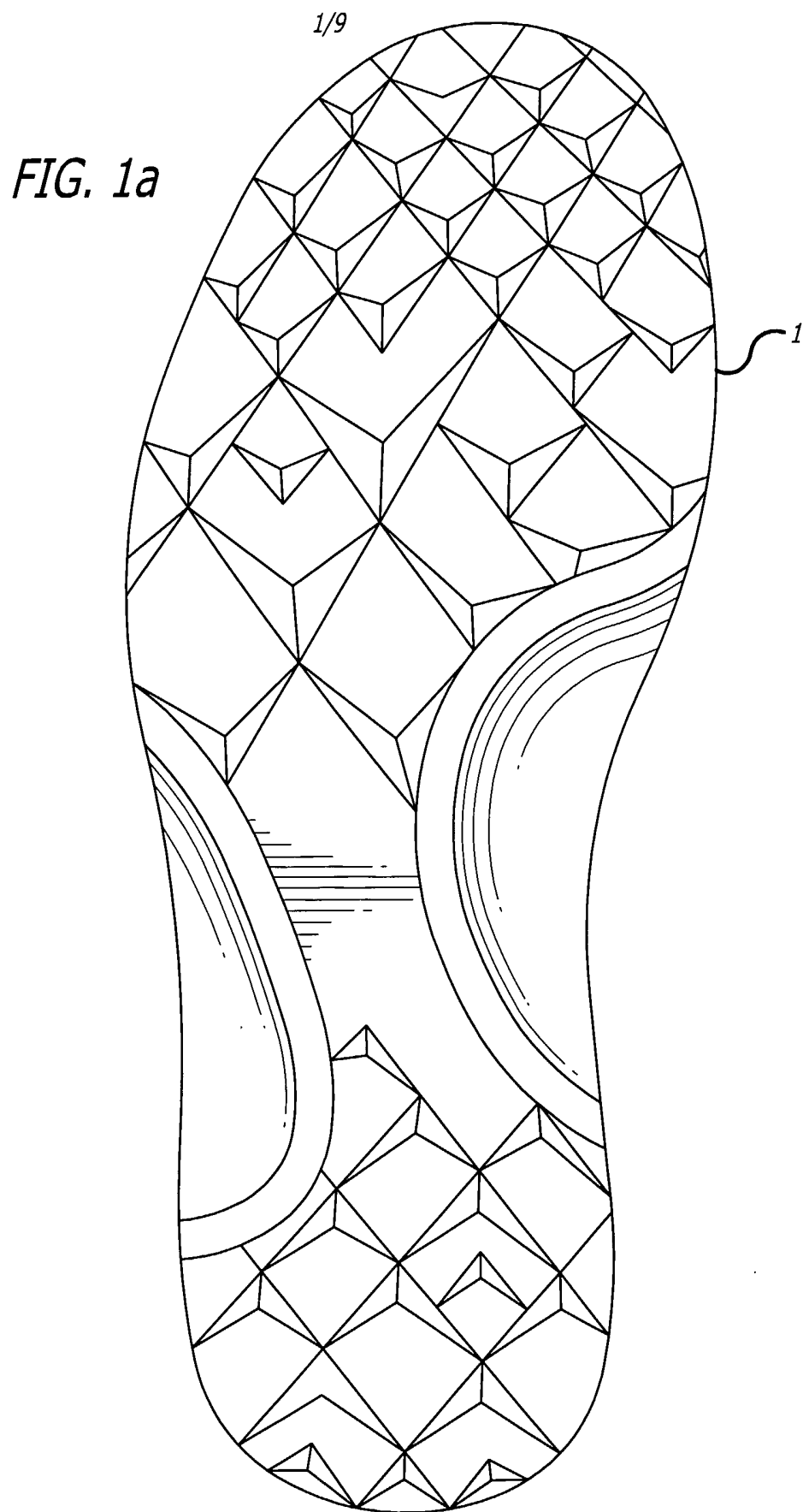
29 16. A method of making a shoe having a faceted outsole, said method comprising:
30 pulling over a faceted last a shoe upper having an upper portion, a lower portion and a
31 bottom, said faceted last having a contoured perimeter, said contoured perimeter having at least
32 two flat edges; and
33 attaching a midsole to the bottom of the shoe upper.

1 17. The method of Claim 16, said method further comprising:
2 attaching an outsole to the bottom of the midsole; and
3 trimming the outsole to match the contoured perimeter of the faceted last.
4

5 18. The method of Claim 16, said method further comprising:
6 attaching a rand to the lower portion of the shoe upper over the faceted last;
7 attaching an outsole to the bottom of the midsole; and
8 trimming the outsole to match the contoured perimeter of the faceted last.
9

10 19. The method of Claim 16, said method further comprising:
11 attaching a molded rand to the lower portion of the shoe upper over the faceted last.
12

13 20. The method of Claim 16, said method further comprising:
14 vulcanizing a rand over the bottom portion of the shoe upper over the faceted last.
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FIG. 1b

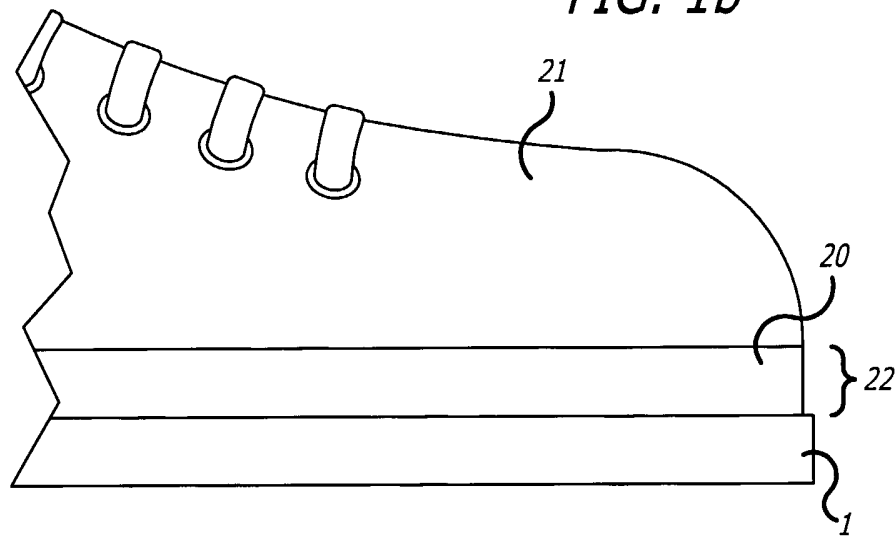
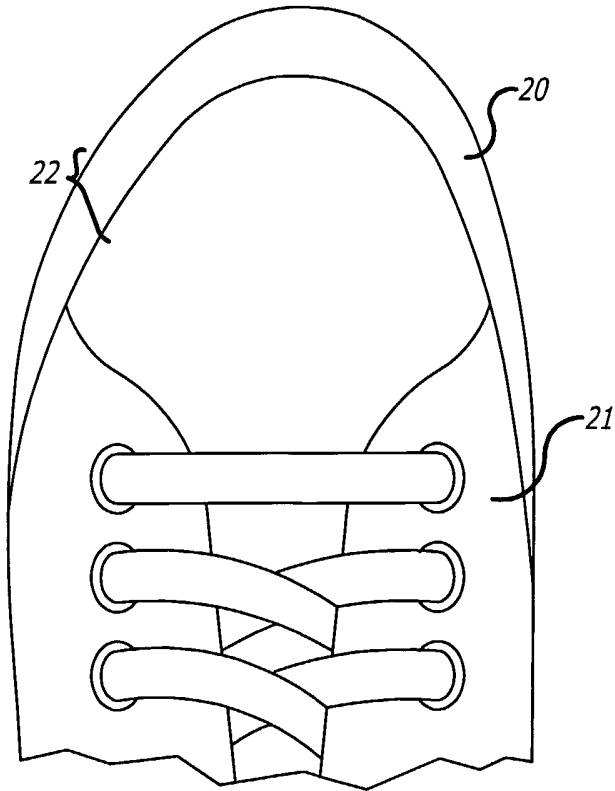


FIG. 1c



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FIG. 2a

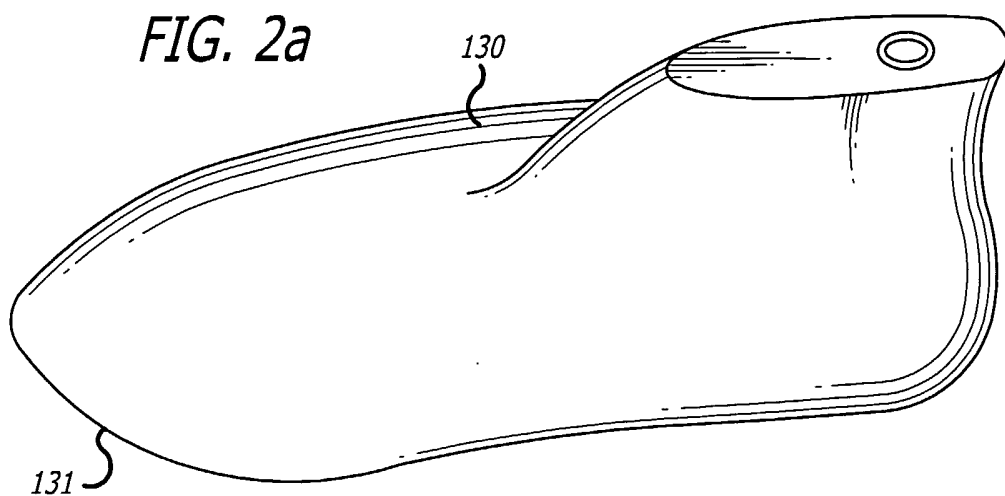


FIG. 2b

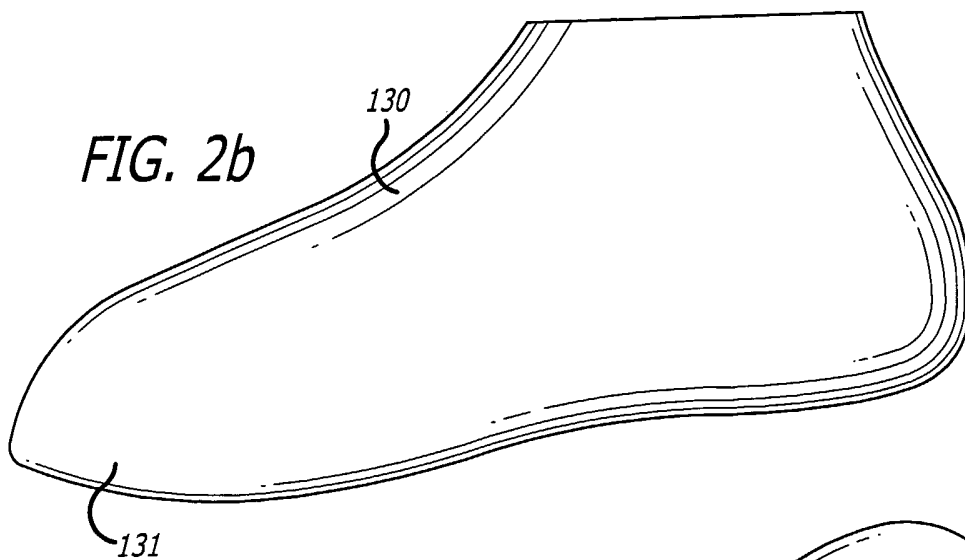
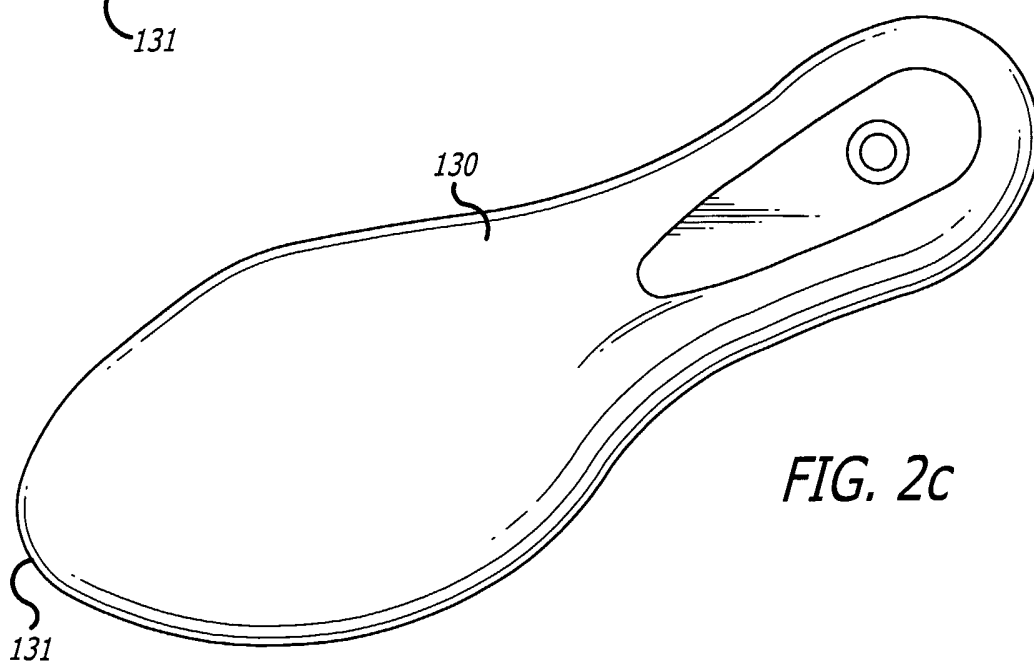
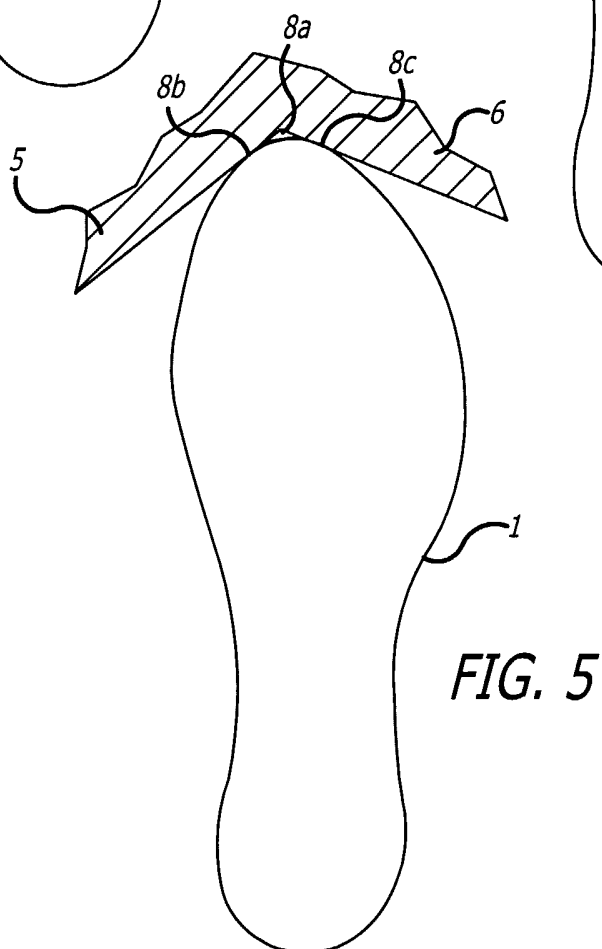
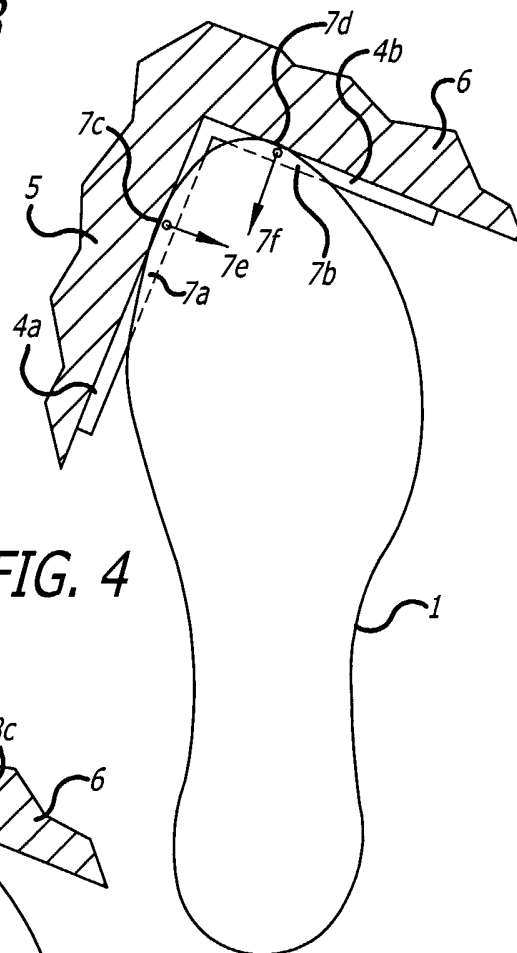
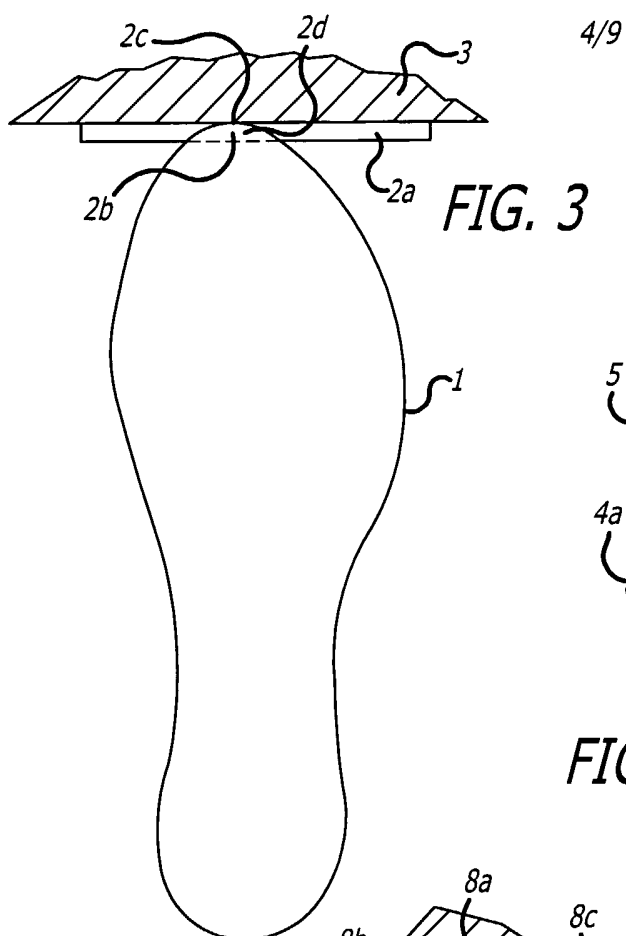


FIG. 2c





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FIG. 6

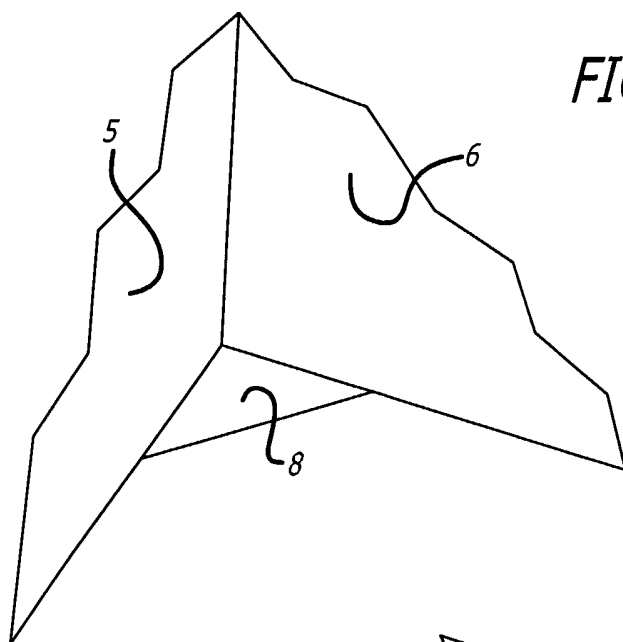


FIG. 7a

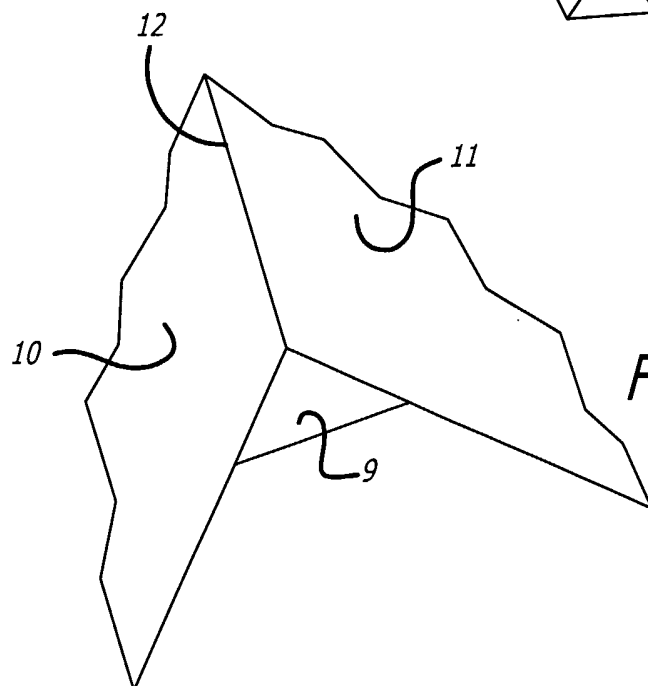
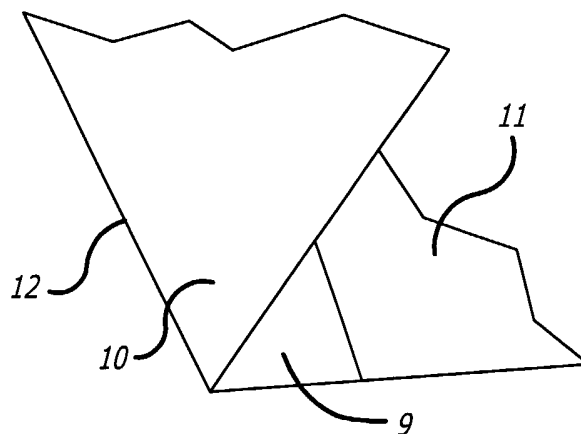
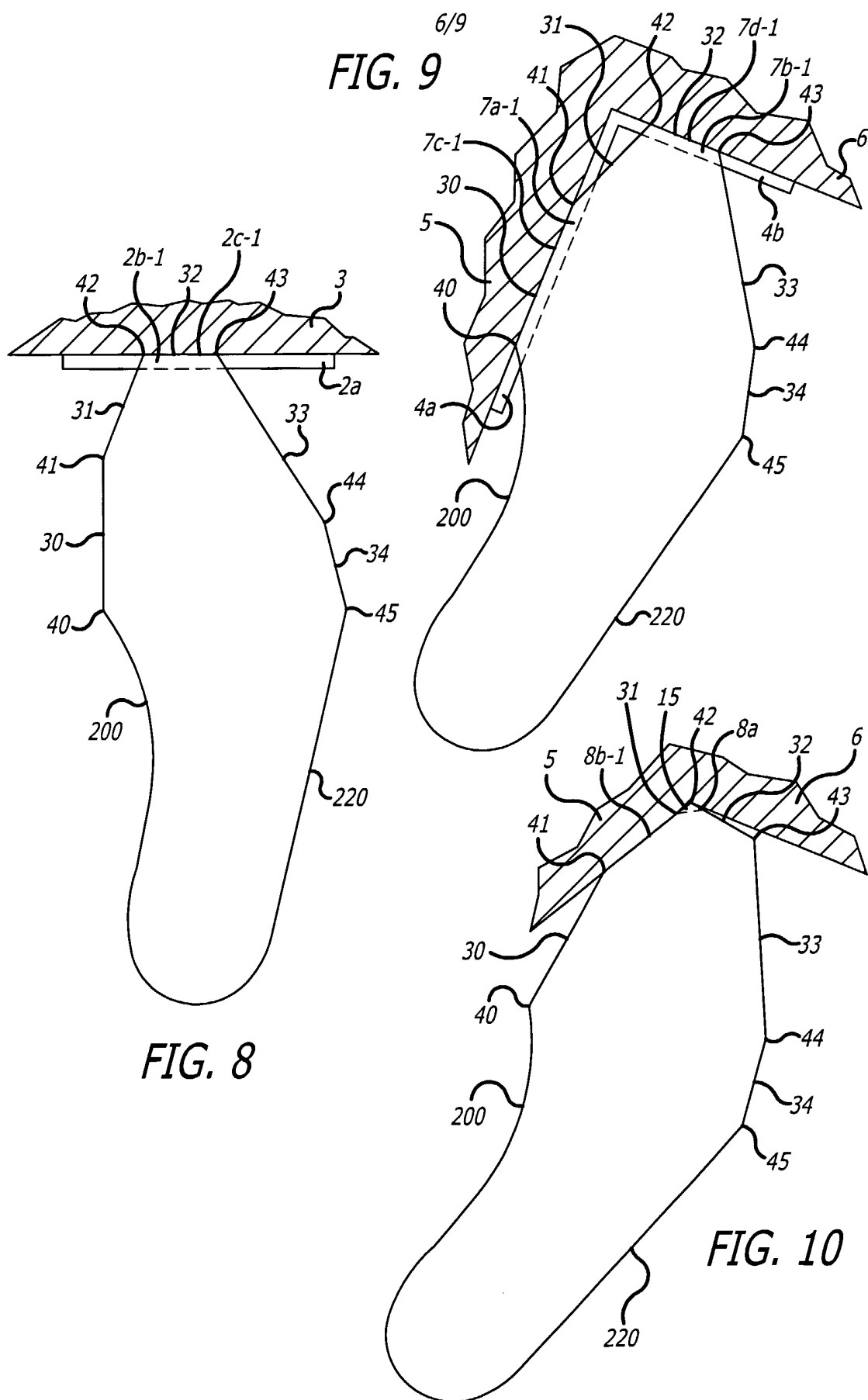


FIG. 7b



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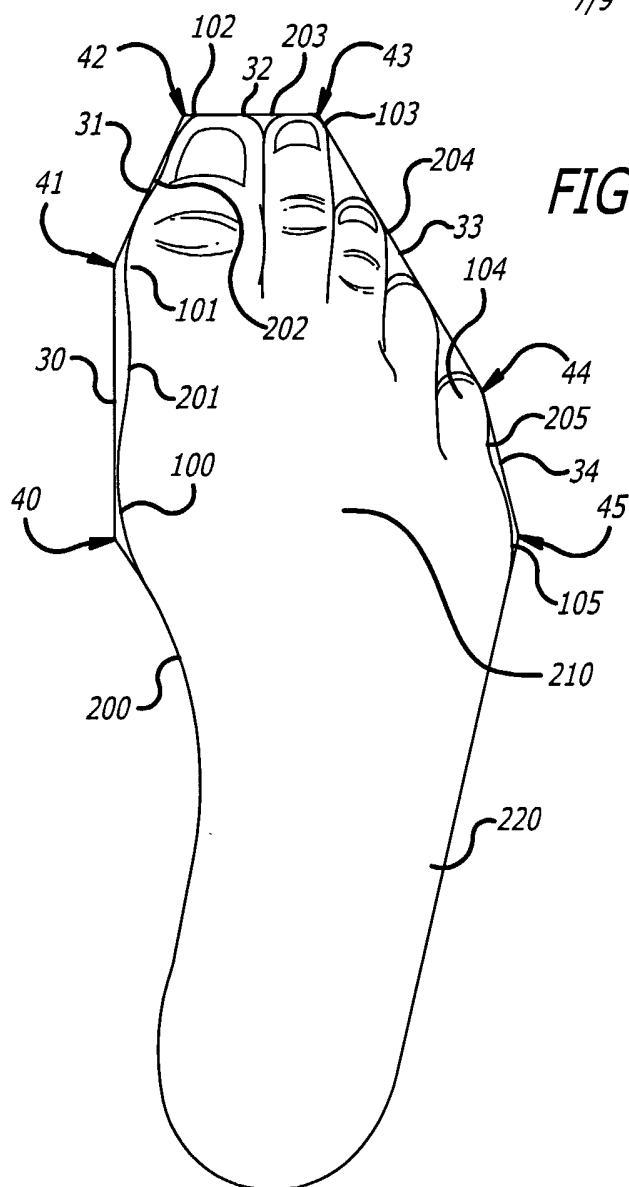


FIG. 11

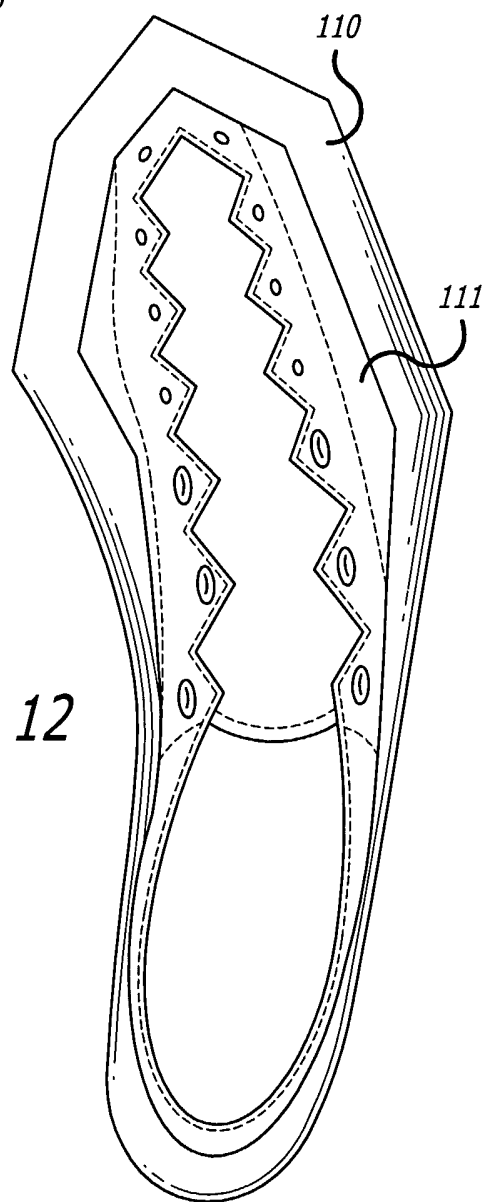


FIG. 12

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FIG. 13a

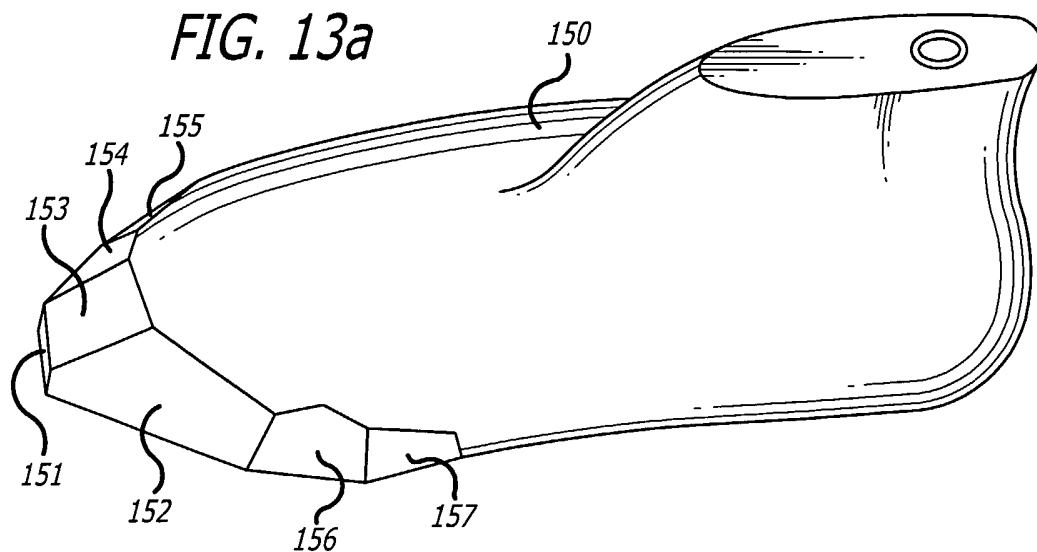


FIG. 13b

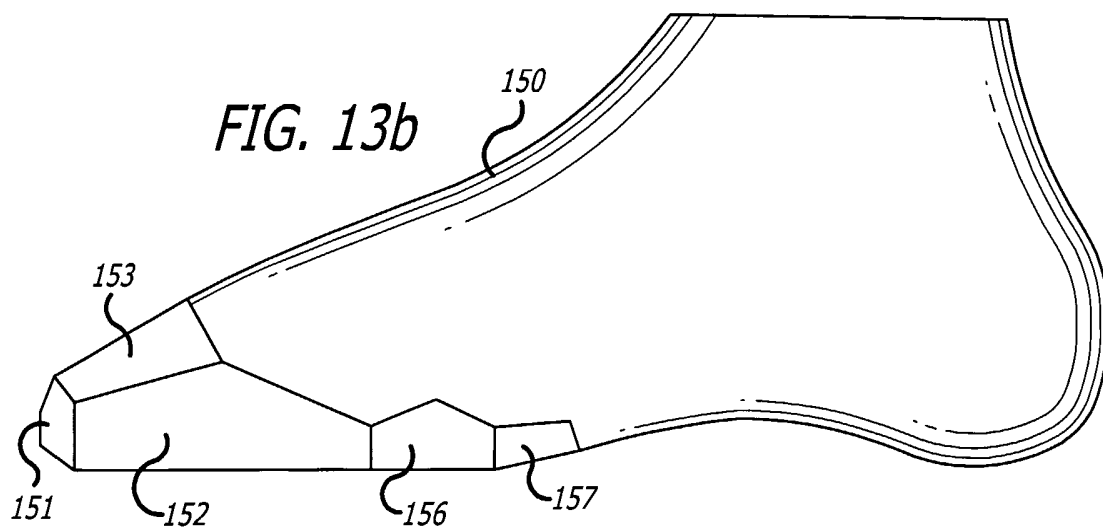
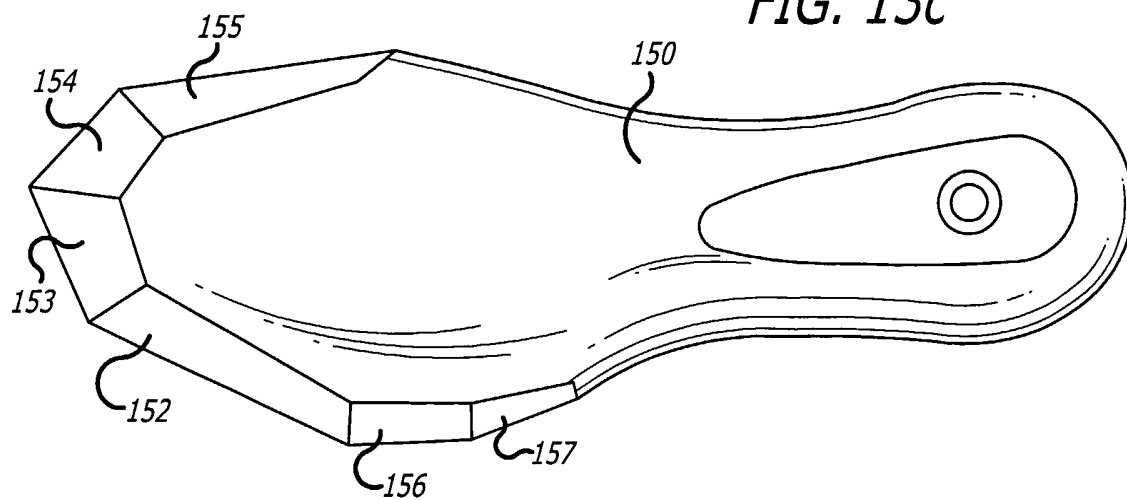
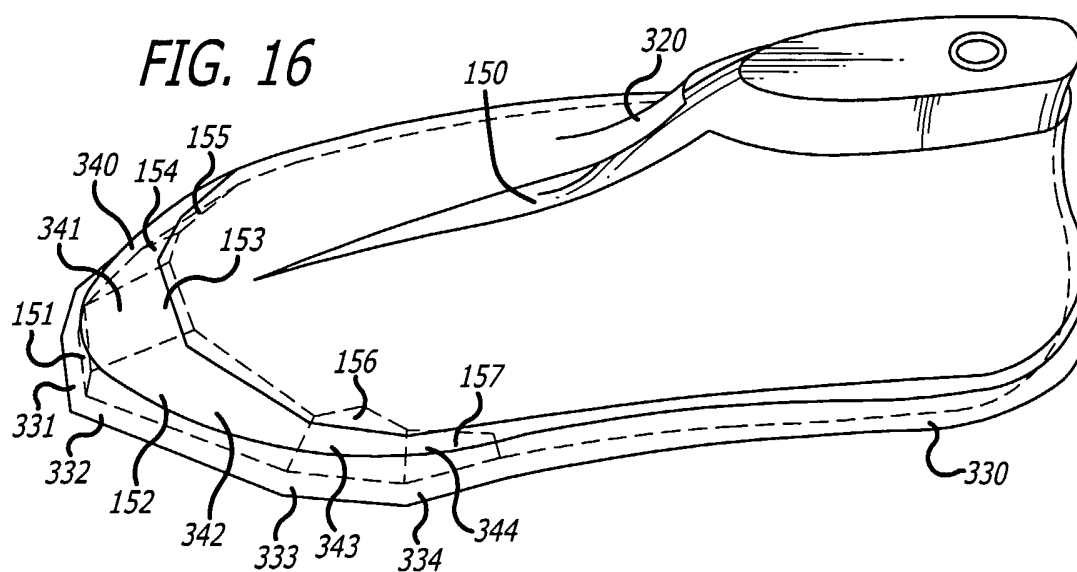
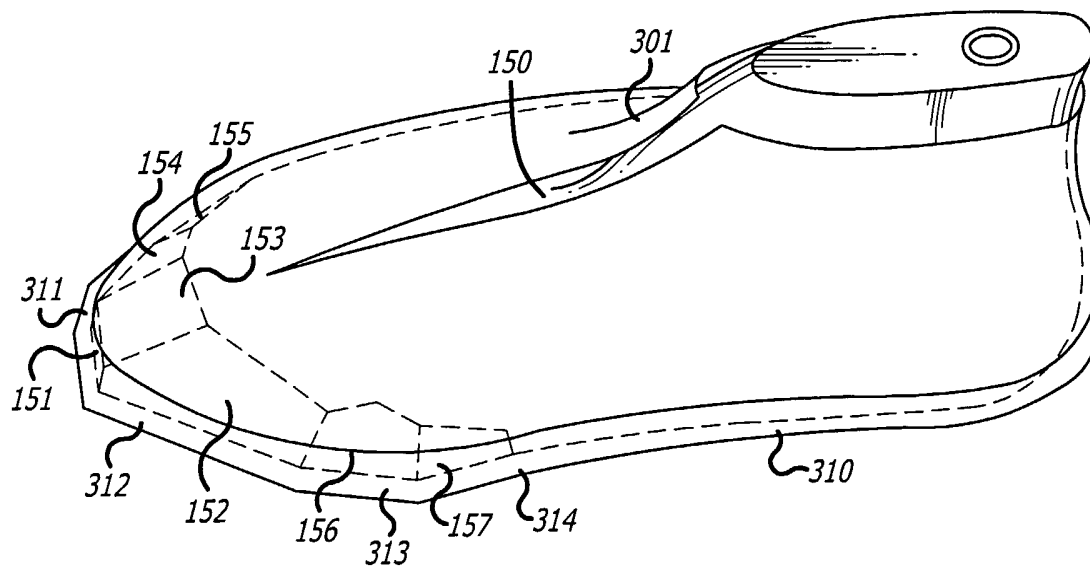
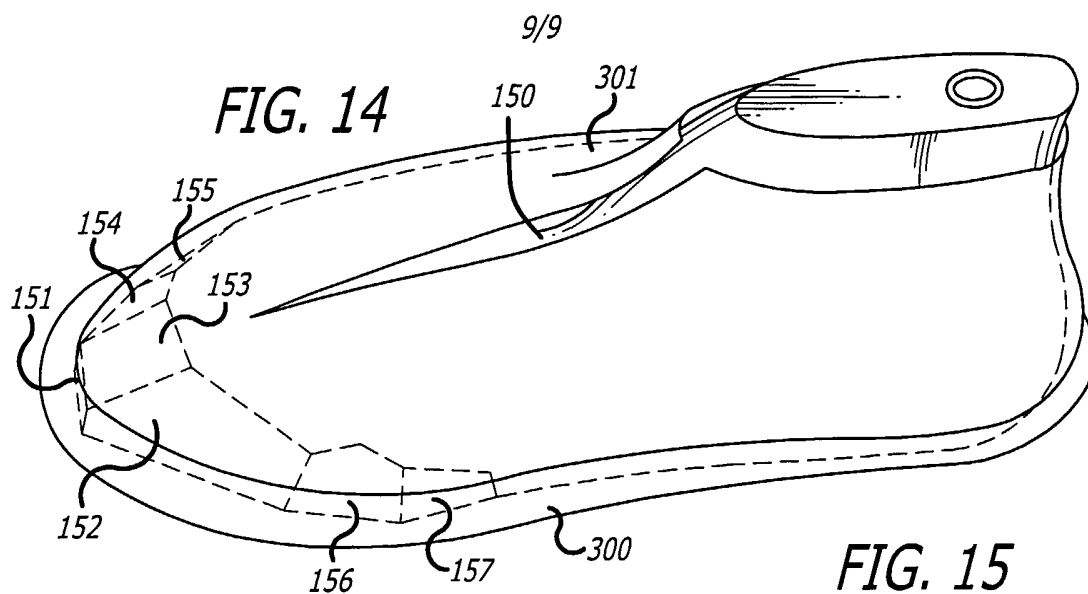


FIG. 13c





INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/14744

A. CLASSIFICATION OF SUBJECT MATTER IPC(7) : A43B 13/00, 23/00, 5/00 US CL : 36/25R, 45, 114 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) U.S. : 36/25R, 45, 114, 128, 117.1, 117.3, 8.3 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)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,937,954 A (CLEMENT) 03 July 1990, whole document	1-3 and 13-15
X	US 5,507,106 A (FOX) 13 April 1996, whole document	1-3, 13-15
X	US 3,074,184 A (LITAK) 22 January 1963, whole document	1-3, 13-15
X	US Des. 99,255 S (TROY) 07 April 1936, whole document	1-6, 13-15
X	US 3,406,469 A (DANI) 22 October 1968, whole document	1-6, 13-15
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> 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 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 25 July 2002 (25.07.2002)		Date of mailing of the international search report 09 AUG 2002
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230		Authorized officer Anthony D Stashick Telephone No. 703-308-1148 Special Agent Patent Specialist 09 AUG 2002

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/14744

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

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

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim 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. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation 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 fee, this Authority did not invite payment of any additional fee.
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.: 1-6 and 13-15

Remark on Protest

☐
☐

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

PCT/US02/14744

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

Group I: Claims 1-6, 13-15, drawn to a shoe sole with flat edges on the perimeter.

Group II: Claims 7-9 drawn to a shoe rand with flat edges on the perimeter.

Group III: Claims 10-12 drawn to a shoe last with flat edges on the perimeter.

Group IV: Claims 16-20 drawn to a method of making a faceted shoe last with flat edges and pulling an upper over the last.

The inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: a sole or rand having a flat edge is known in the art as most soles have a flat edge as the perimeter of the sole, i.e. the outer perimeter of the sole in a shoe is typically flat with respect to the vertical height or thickness of the sole. Therefore, since the idea of a sole, rand, or last having a flat edge is not an inventive concept, unity is lacking.