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(54) **SHOE HAVING PLURALITIES OF LUGS**

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(57) **ABSTRACT**

A shoe comprising a sole and an upper secured to the sole. The sole has a sole bottom surface, a plurality of first lugs projecting generally downwardly from the sole bottom surface, and a plurality of second lugs projecting generally downwardly from the sole bottom surface. Each lug of the first plurality of lugs has a distal end surface facing a first direction which is oblique relative to the longitudinal axis of such each first lug. Each lug of the second plurality of lugs has a distal end surface facing a second direction which is oblique relative to the longitudinal axis of such each second lug, and wherein the second direction is different than the first direction.
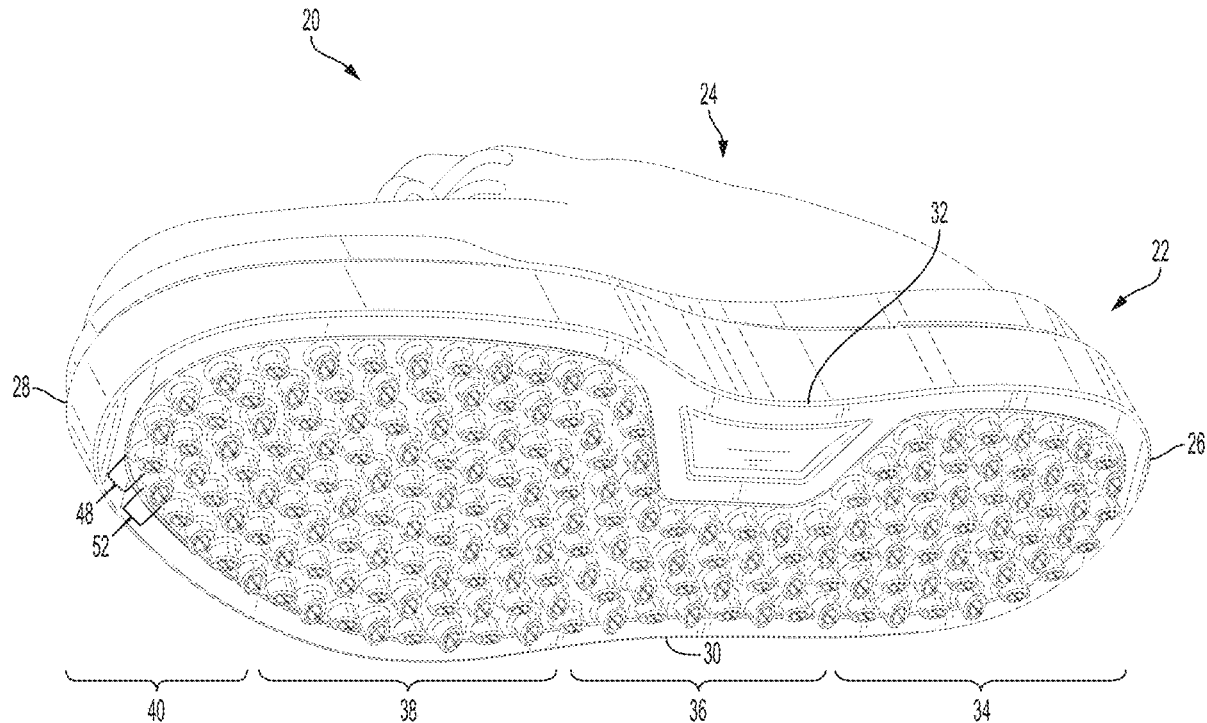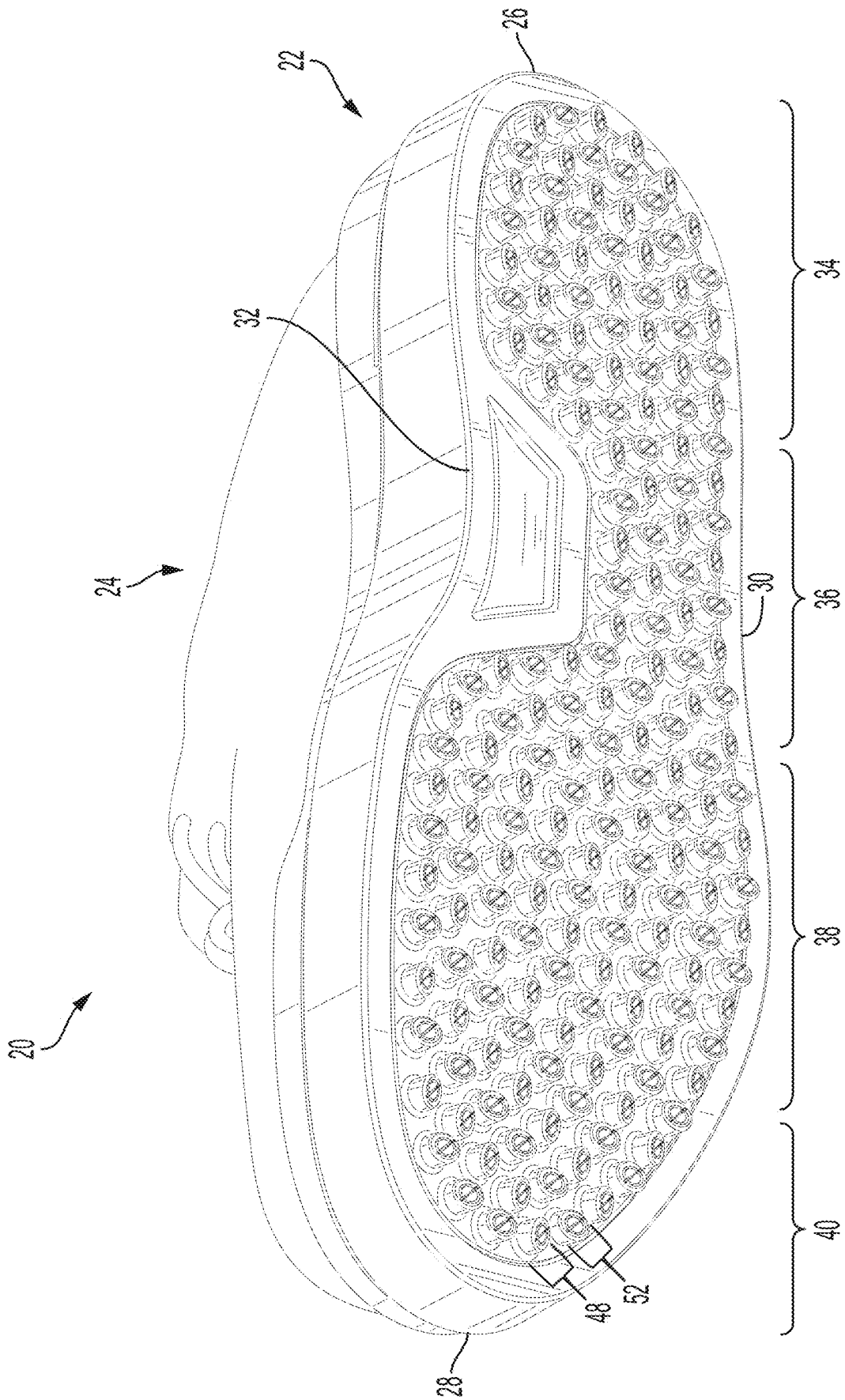
FIG. 1

FIG. 2

FIG. 3

FIG. 4

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28

30

FIG. 5

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22

32

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FIG. 6

FIG. 7

FIG. 8

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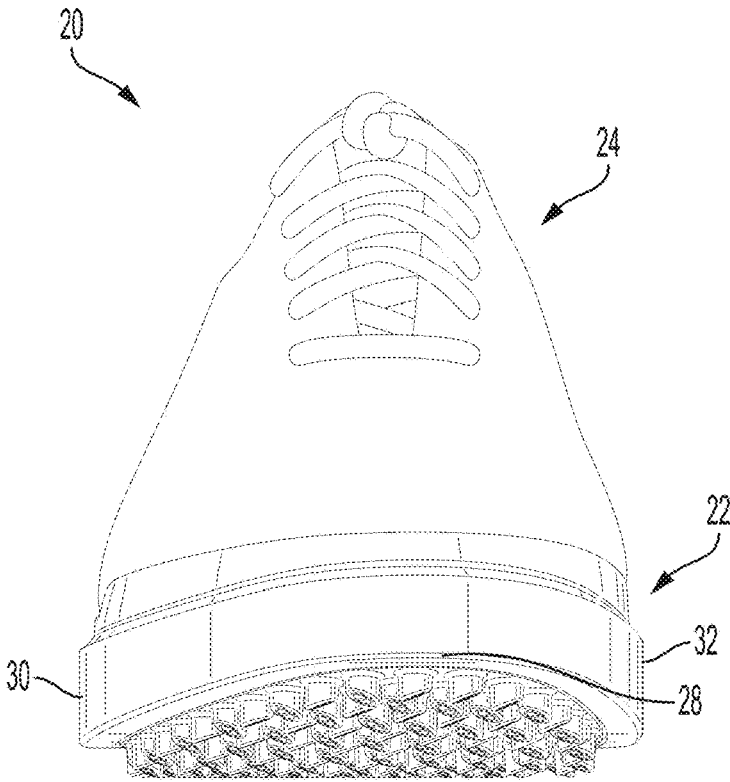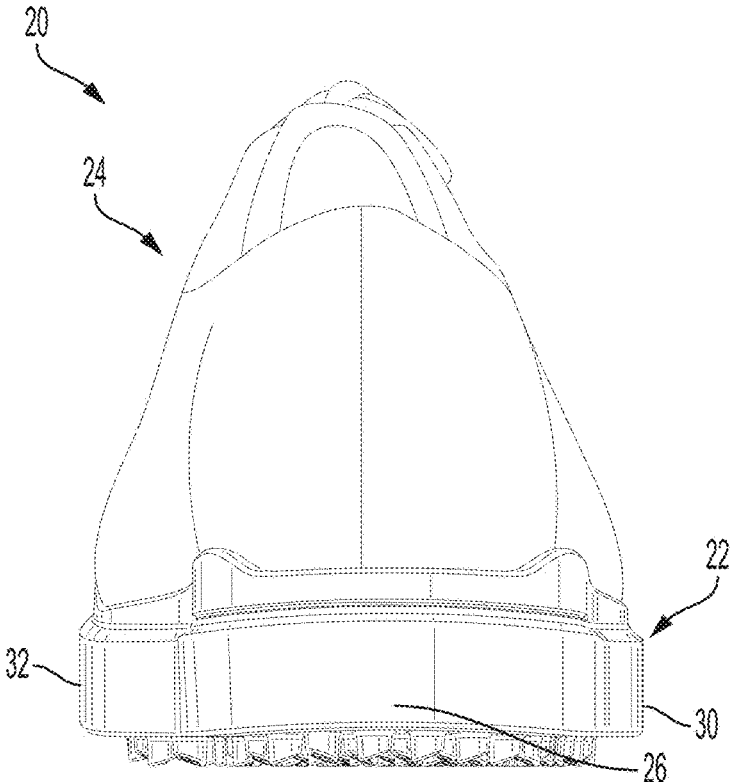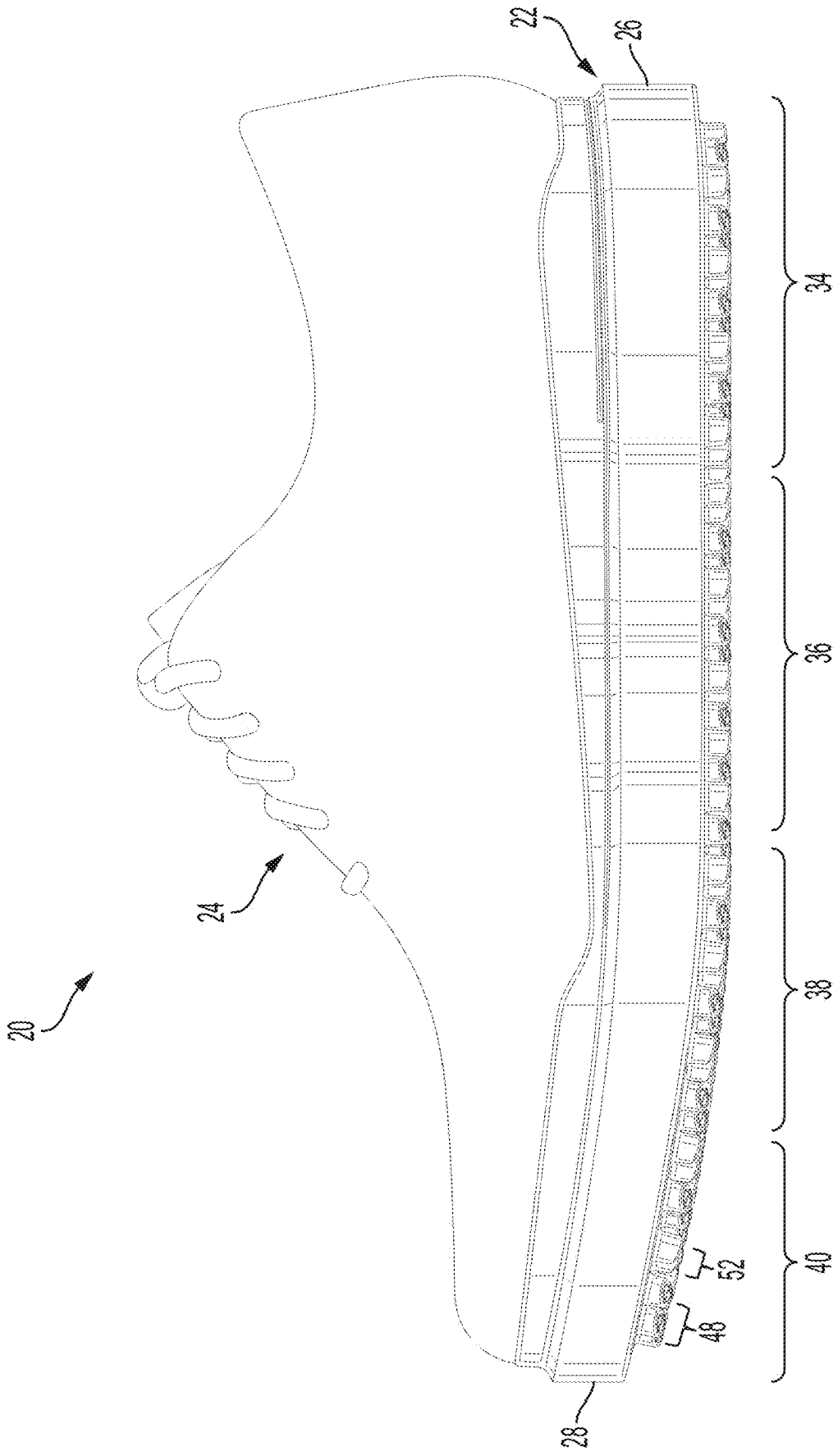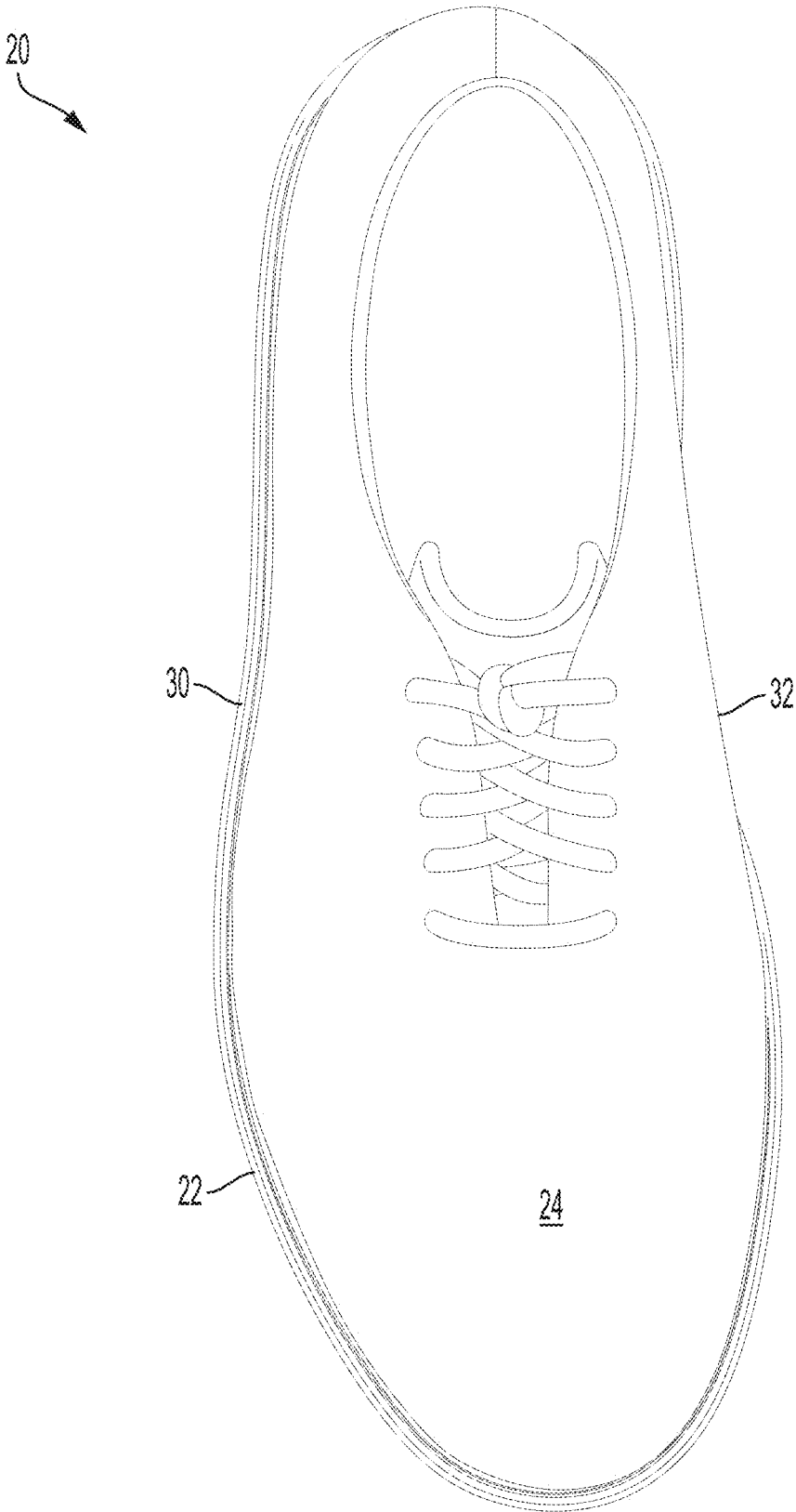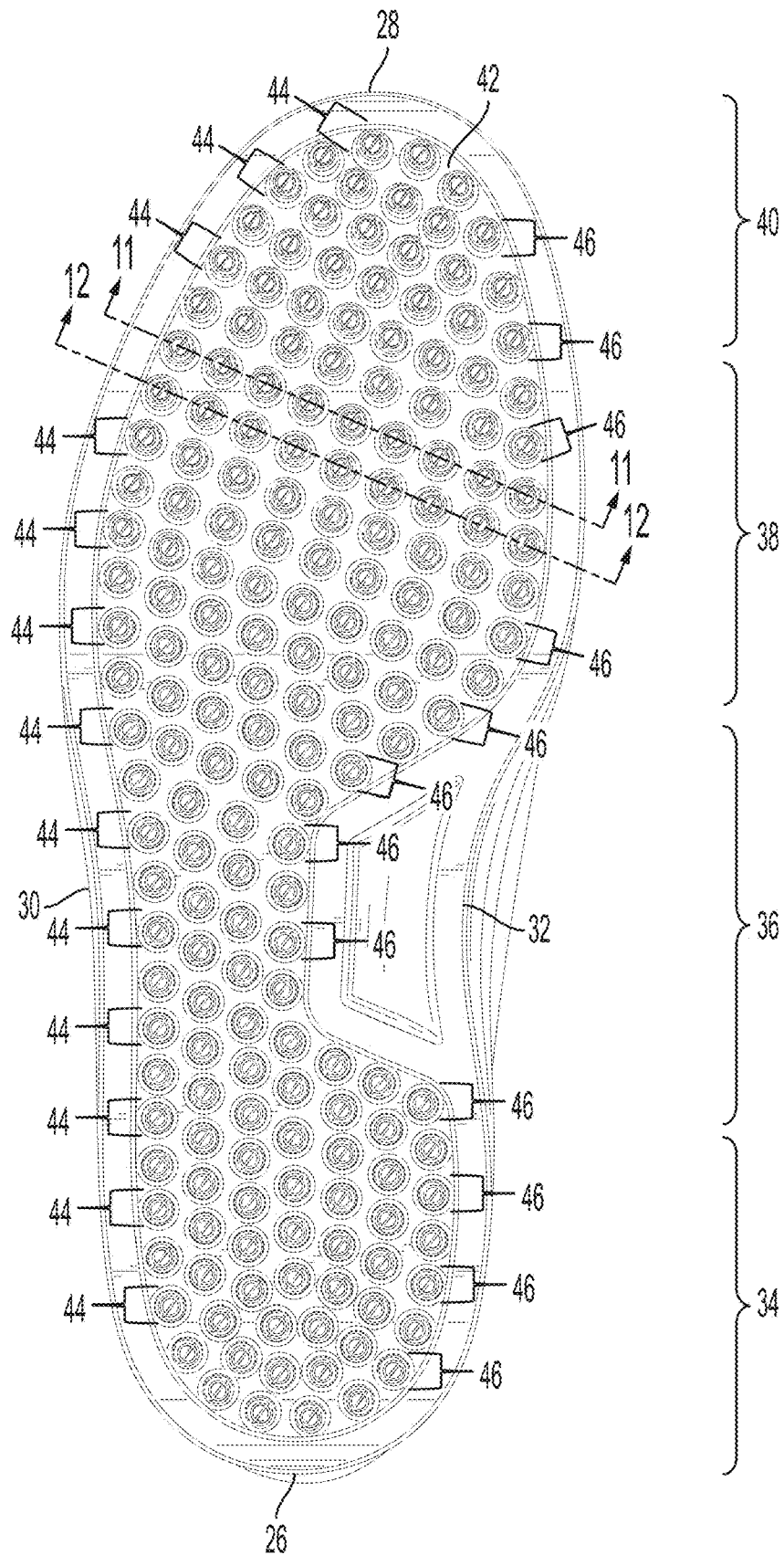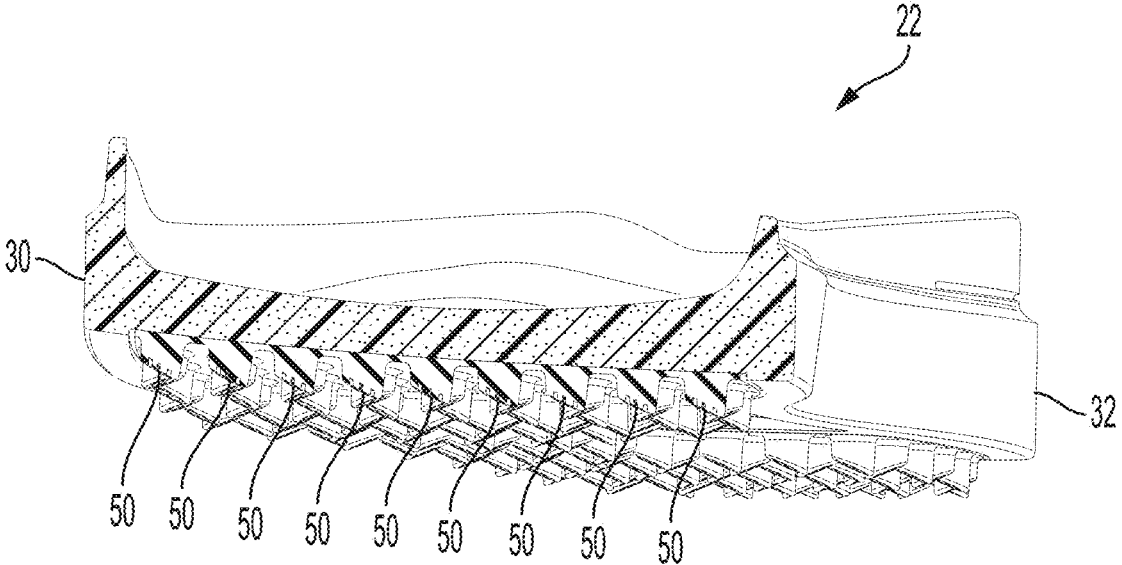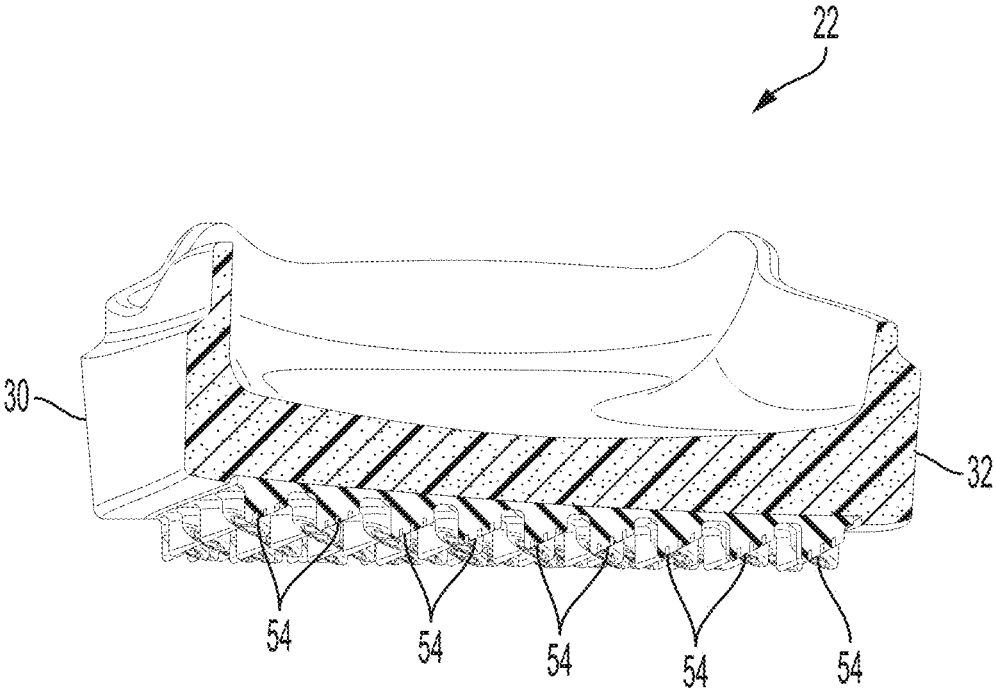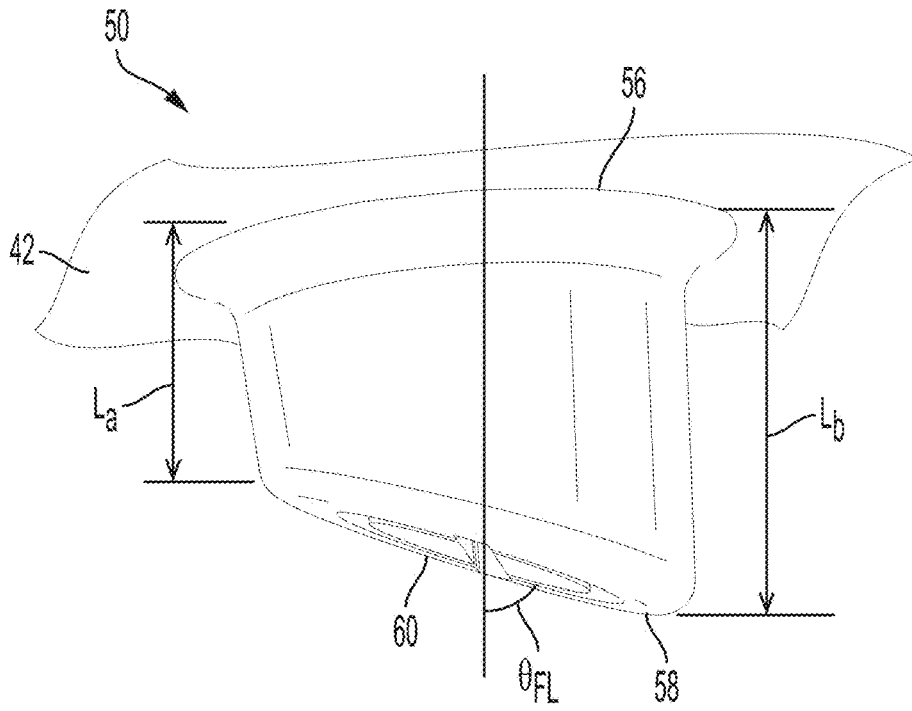
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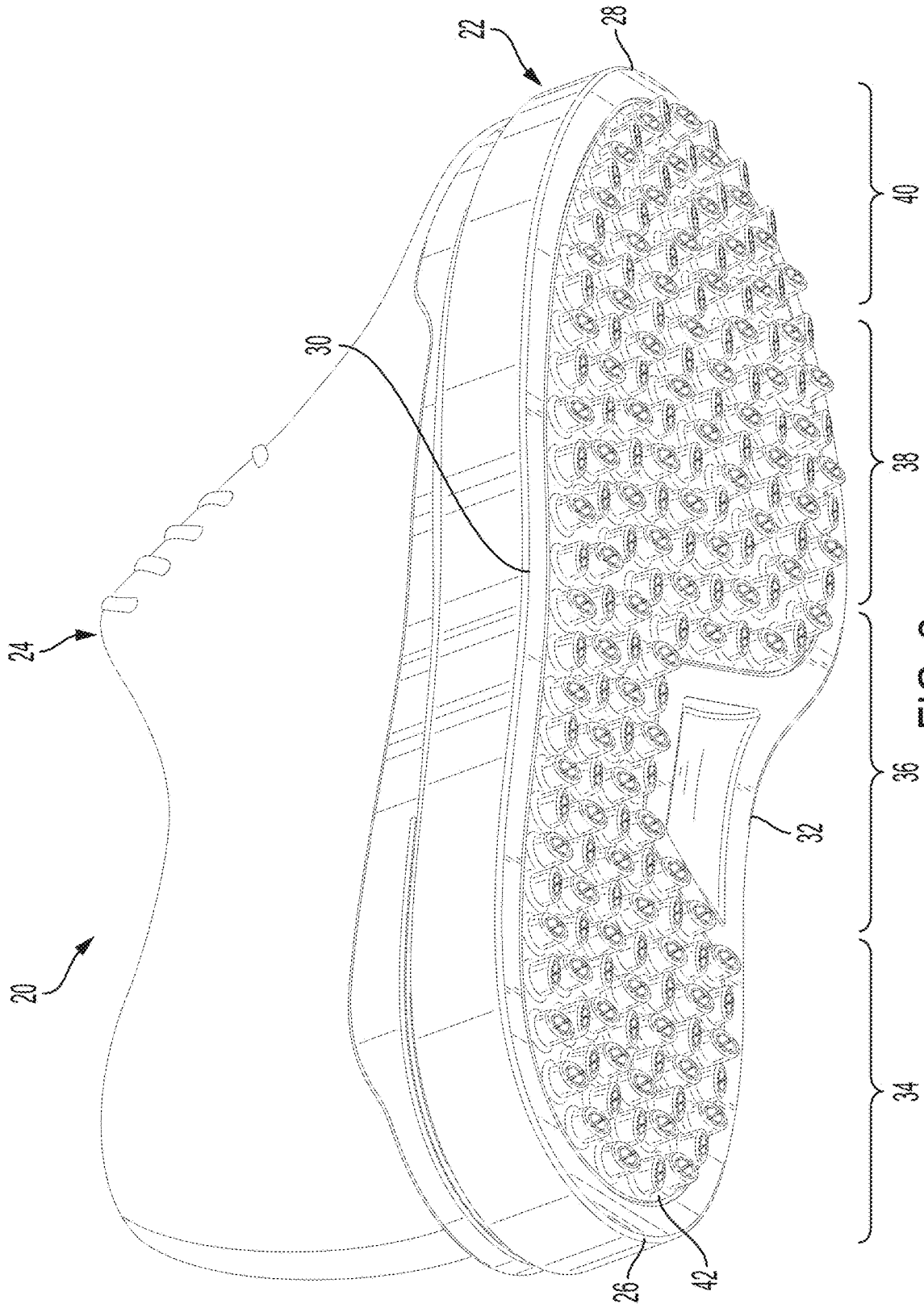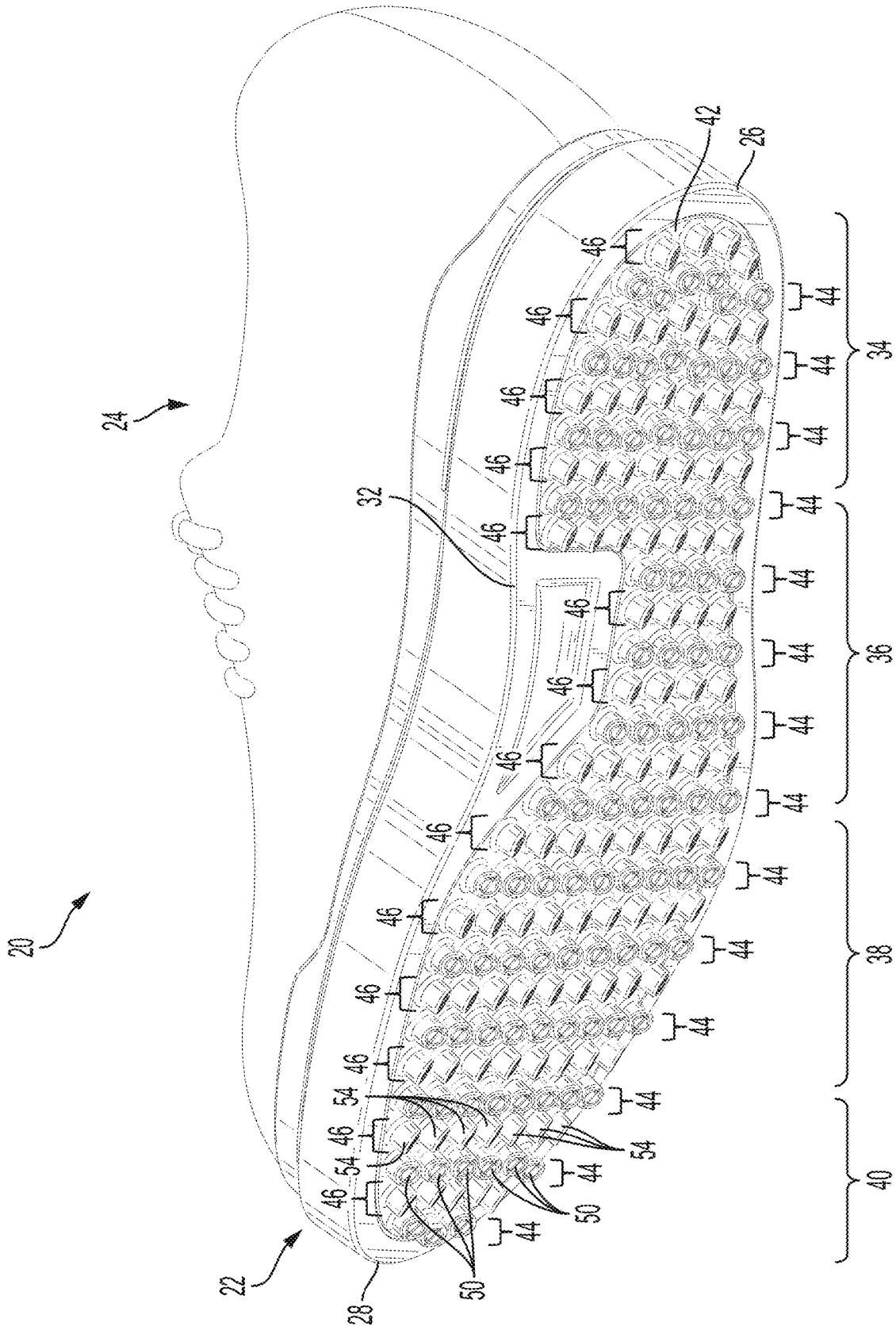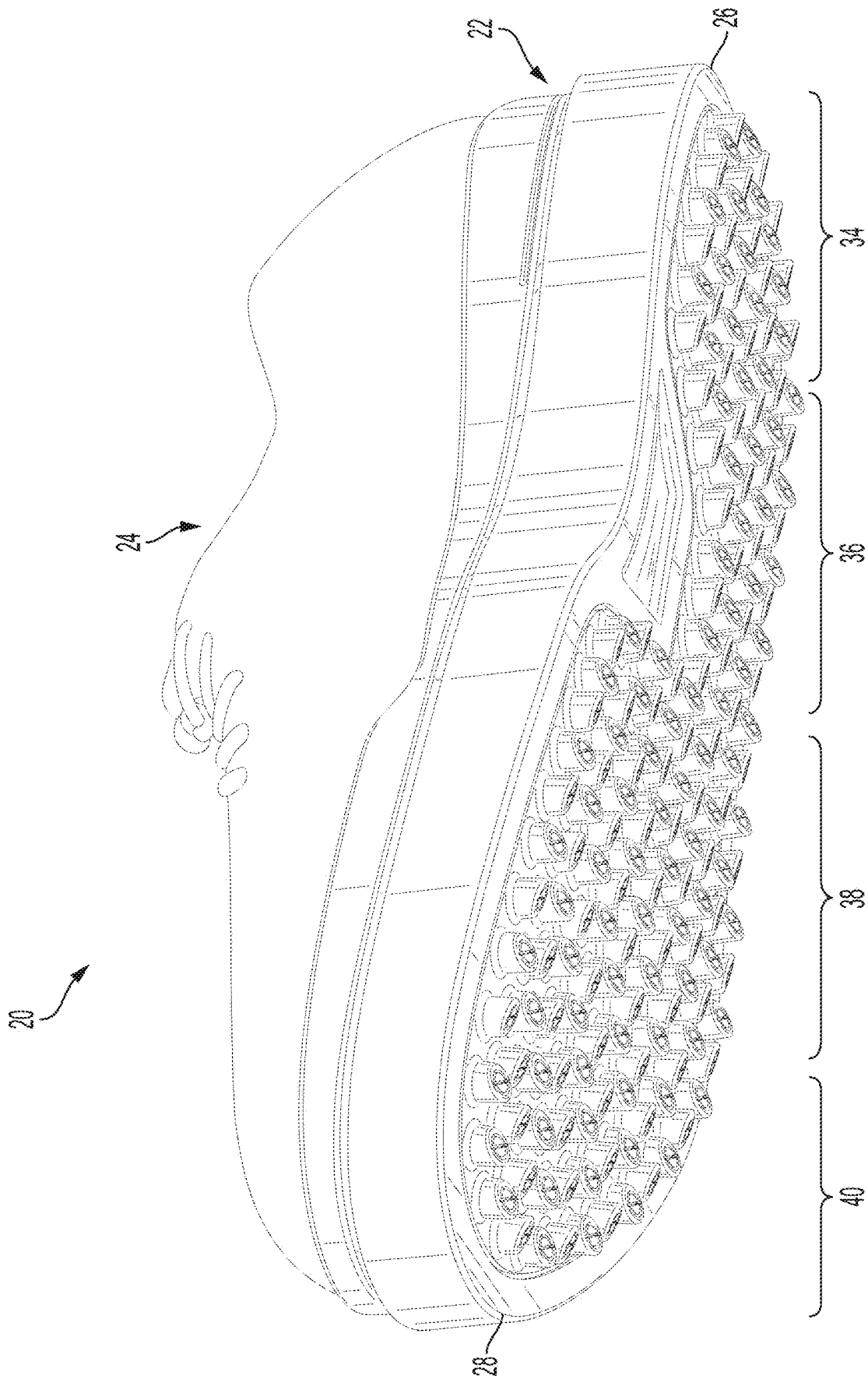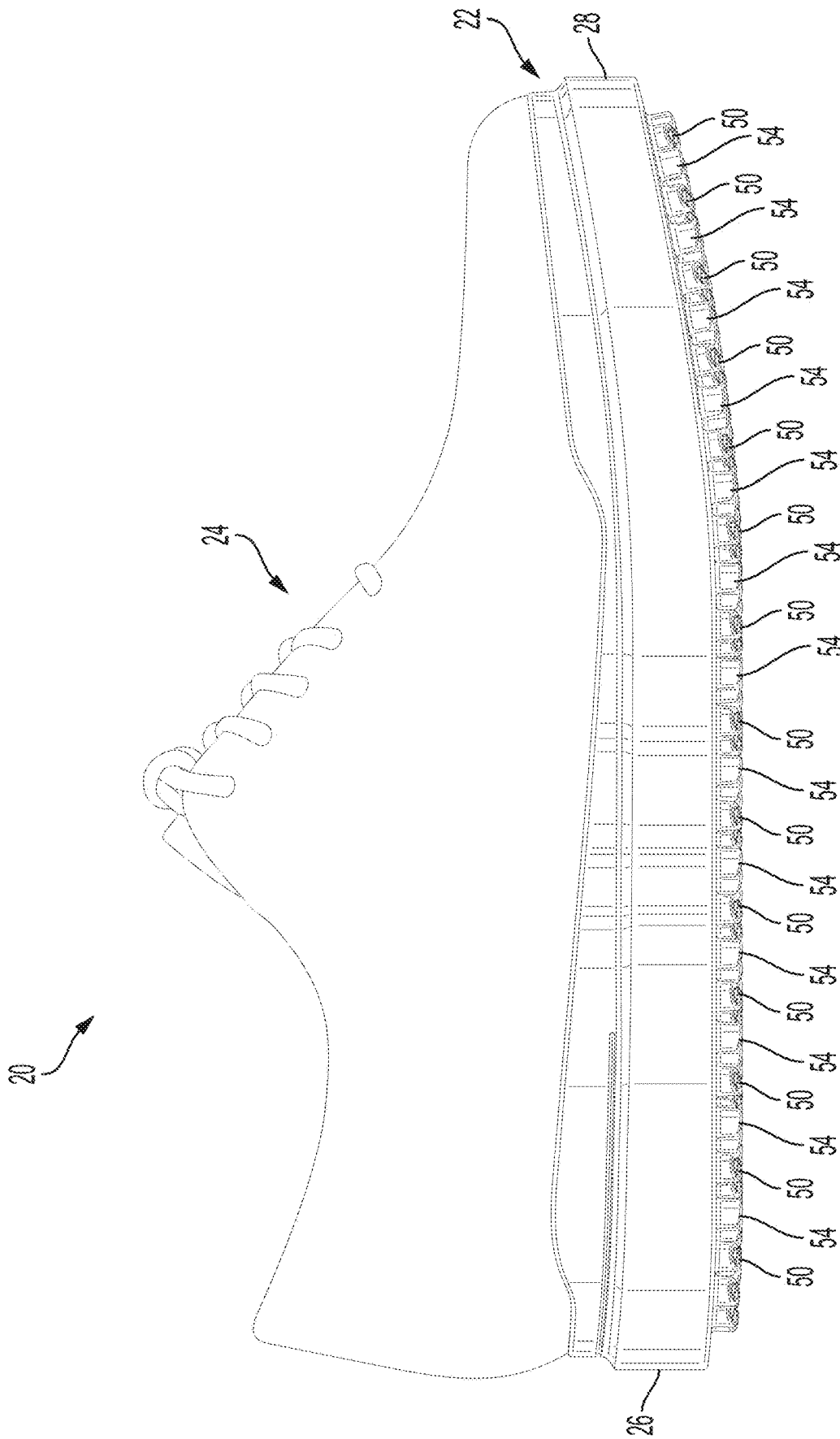
FIG. 9

FIG. 10
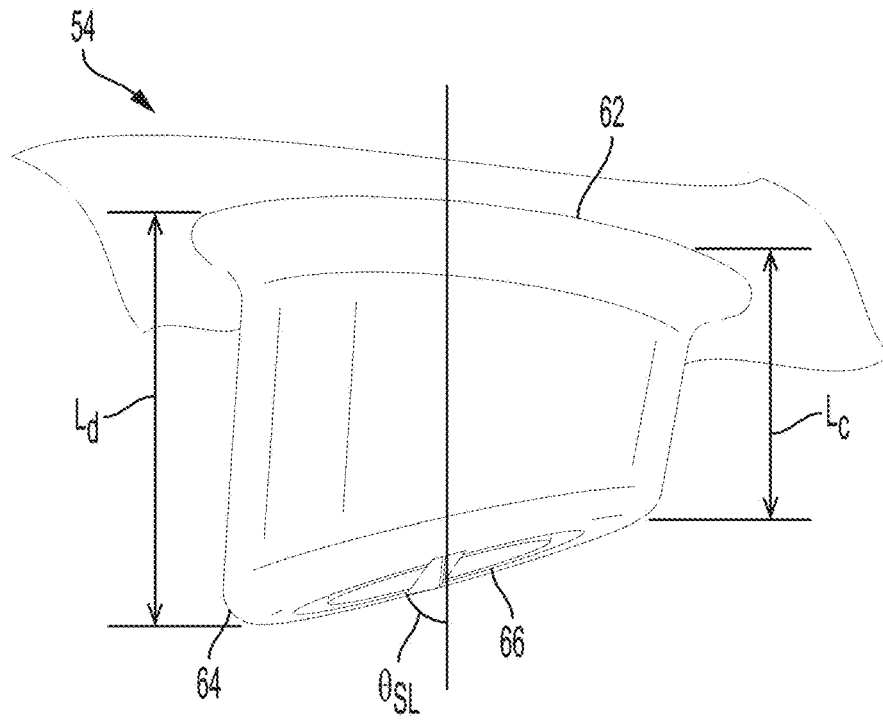
FIG. 11

FIG. 12

FIG. 13

FIG. 14

SHOE HAVING PLURALITIES OF LUGS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001]   Not Applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002]   Not Applicable.

APPENDIX

[0003]   Not Applicable.

BACKGROUND OF THE INVENTION

Field of the Invention

[0004]   The present invention pertains to a shoe having pluralities of lugs.

SUMMARY

[0005]   One aspect of the disclosure is a shoe comprising a sole and an upper secured to the sole. The sole has a sole heel end and a sole toe end, and the sole extends along a shoe axis from the sole heel end to the sole toe end. The sole has a lateral side extending from the sole heel end to the sole toe end and a medial side extending from the sole heel end to the sole toe end. The sole extends transversely from the lateral side to the medial side. The sole includes a sole heel region, a sole midfoot region, a sole forefoot region, and a sole toe region. The sole heel region extends longitudinally from the sole heel end to the sole midfoot region. The sole midfoot region extends longitudinally from the sole heel region to the sole forefoot region. The sole forefoot region extends longitudinally from the sole midfoot region to the sole toe region. The sole toe region extends longitudinally from the sole forefoot region to the sole toe end. The sole has a bottom surface, a plurality of first lugs projecting downwardly from the sole bottom surface, and a plurality of second lugs projecting downwardly from the sole bottom surface. Each lug of the plurality of first lugs projects perpendicularly from the sole bottom surface along a longitudinal axis of such each first lug. Each first lugs has a proximal end at the sole bottom surface and a distal end opposite the proximal end. The distal end of each first lug has a distal end surface spaced from the sole bottom surface. The distal end surface of each first lug faces a first direction which is oblique relative to the longitudinal axis of such each first lug. Each second lug of the plurality of second lugs projects perpendicularly from the sole bottom surface along a longitudinal axis of such each second lug. Each second lug has a proximal end at the sole bottom surface and a distal end opposite the proximal end. The distal end of each second lug has a distal end surface spaced from the sole bottom surface. The distal end of each second lug faces a second direction which is oblique relative to the longitudinal axis of such each second lug, and the second direction is different from the first direction.

[0006]   Further features and advantages, as well as the operation, are described in detail below with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007]   FIG. 1 is a perspective view of the medial side of the sole of a shoe having pluralities of lugs.
[0008]   FIG. 2 is a perspective view of the lateral side of the sole of the shoe shown in FIG. 1.
[0009]   FIG. 3 is a perspective view of the medial side of the sole of the shoe shown in FIG. 1.
[0010]   FIG. 4 is a perspective view of the medial side of the sole of the shoe shown in FIG. 1.
[0011]   FIG. 5 is a front perspective view of the shoe shown in FIG. 1.
[0012]   FIG. 6 is a rear perspective view of the shoe shown in FIG. 1.
[0013]   FIG. 7 is a perspective view showing the lateral side of the shoe shown in FIG. 1.
[0014]   FIG. 8 is a perspective view showing the medial side of the shoe shown in FIG. 1.
[0015]   FIG. 9 is a top perspective view of the shoe shown in FIG. 1.
[0016]   FIG. 10 is a bottom view of the show shown in FIG. 1.
[0017]   FIG. 11 is a cross-sectional view taken along the plane of line 11-11 of FIG. 10.
[0018]   FIG. 12 is a cross-sectional view taken along the plane of line 12-12 of FIG. 10.
[0019]   FIG. 13 is a magnified perspective view of one of the first pluralities of lugs from the shoe shown in FIG. 1.
[0020]   FIG. 14 is a magnified perspective view of one of the second pluralities of lugs from the show shown in FIG. 1.
[0021]   Reference numerals in the written specification and in the figures indicate corresponding items.

DETAILED DESCRIPTION

[0022]   An embodiment of a shoe, generally indicated by the reference number 20, is shown in FIGS. 1-10. The shoe 20 comprises a sole 22 and an upper 24, which is secured to the sole 22.
[0023]   The sole 22 has a sole heel end 26 and a sole toe end 28. The sole 22 extends along a shoe axis from the sole heel end 26 to the sole toe end 28. The sole 22 has a lateral side 30 extending from the sole heel end 26 to the sole toe end 28, and a medial side 32 extending from the sole heel end 26 to the sole toe end 28. The sole 22 extends transversely from the lateral side 30 to the medial side 32. The sole 22 includes a sole heel region 34, a sole midfoot region 36, a sole forefoot region 38, and a sole toe region 40. The sole heel region 34 extends longitudinally from the sole heel end 26 to the sole midfoot region 36. The sole midfoot region 36 extends longitudinally from the sole heel region 34 to the sole forefoot region 38. The sole forefoot region 38 extends longitudinally from the sole midfoot region 36 to the sole toe region 40. The sole toe region 40 extends from the sole forefoot region 38 to the sole toe end 28.
[0024]   The sole 22 has a sole bottom surface 42. As shown in FIG. 3, the sole bottom surface 42 has a plurality of first rows 44 and a plurality of second rows 46. Each row of the plurality of first rows 44 may be a first row 48 comprised of a plurality of first lugs 50, which project generally downwardly from the sole bottom surface 42. Each of the plurality of first lugs 50 projects perpendicularly from the sole bottom surface 42 along a longitudinal axis of such each first lug. Similarly, each row of the plurality of second rows 46 may

be a second row **52** comprised of a plurality of second lugs **54**, which project generally downwardly from the sole bottom surface **42**. Each of the plurality of second lugs **54** projects perpendicularly from the sole bottom surface along a longitudinal axis of such each second lug.

[0025] Each first row **48** is comprised of at least three of the plurality of first lugs **50**, and may be devoid of any of the plurality of second lugs **54**. Similarly, each second row **52** is comprised of at least three of the plurality of second lugs **54**, and may be devoid of any of the plurality of first lugs **50**. In the embodiment of FIGS. **1-10**, except for the rows in the sole midfoot region **36**, each first row **40** extends from adjacent the lateral side **30** to adjacent the medial side **32** and each second row **42** extends from adjacent the lateral side **30** to adjacent the medial side **32**. As described in greater detail below, each lug of the plurality of first lugs **50** may be slanted in a first direction (e.g., toward the medial side **32** of the sole **22**), and each lug of the plurality of second lugs **54** may be slanted in a second direction, which is different from the first direction (e.g., toward the lateral side **30** of the sole **22**).

[0026] Each first row **48** may be adjacent at least one second row **52**. As shown in FIGS. **1-3** and **10**, in some embodiments no two first rows **48** are adjacent one another, and no two second rows **52** are adjacent one another. Each first row **48** and second row **52** may be diagonal relative to the shoe axis. Additionally, each first row **48** may be generally parallel with each second row **52**.

[0027] The sole heel region **34** may include at least three lugs of the plurality of first lugs **50**, and may also include at least three lugs of the plurality of second lugs **54**. The sole midfoot region **36** may include at least three lugs of the plurality of first lugs **50**, and may also include at least three lugs of the plurality of second lugs **54**. The sole forefoot region **38** may include at least three lugs of the plurality of first lugs **50**, and may also include at least three lugs of the plurality of second lugs **54**. The sole toe region **40** may include at least three lugs of the plurality of first lugs **50**, and may also include at least three lugs of the plurality of second lugs **54**. The shoe **20** preferably has at least fifty lugs, more preferably has at least one hundred lugs, more preferably has at least one hundred fifty lugs, and more preferably has at least one hundred seventy five (175) lugs. Preferably, the number of first lugs **50** is the same as the number of second lugs **54**, plus or minus 20 percent.

[0028] As shown in FIGS. **11-14**, each lug of the plurality of first lugs **50** has a proximal end **56** at the sole bottom surface **42** and a distal end **58** opposite the proximal end **56**. The distal end **58** of each of the plurality of first lugs **50** has a distal end surface **60** spaced from the sole bottom surface **42**. The distal end surface **60** of each of the plurality of first lugs **50** faces a first direction which is oblique relative to the longitudinal axis of such each first lug.

[0029] Each distal end surface **60** of the plurality of first lugs **50** may have a first lug minimum length La and a first lug maximum length L_b The first lug minimum length La corresponds to the distance from the sole bottom surface **42** to a point on the distal end surface **60** closest to the sole bottom surface **42**. The first lug maximum length L_b corresponds to the distance from the sole bottom surface **42** to a point on the distal end surface **60** farthest from the sole bottom surface **42**. The first lug minimum length La is between 30% and 80% of the first lug maximum length L_b.

[0030] The distal end surfaces **60** of each of the plurality of first lugs **50** may be sloped at an angle θ_{FL} between 20° and 80° relative to the longitudinal axis of such each first lug, and are preferably sloped at an angle θ_{FL} between 45° and 75° relative to the longitudinal axis of such each first lug. More preferably, the distal end surfaces **60** of each of the plurality of first lugs **50** may be sloped at an angle θ_{FL} between 55° and 65° relative to the longitudinal axis of such each first lug.

[0031] Each of the plurality of first lugs **50** may be cylindrical in shape, with each cylinder being a circular cylinder, an oval cylinder, or a polygonal cylinder. Additionally, each of the plurality of first lugs **50** may be of a circular shape in a cross-section taken through such each first lug and perpendicular to the longitudinal axis of such each first lug, with the diameter changing from the proximal end to the distal end. It should be understood that each of the plurality of first lugs **50** may have a variety of cross-sectional shapes, such as a triangle, square, rectangle, or octagon.

[0032] Each lug of the plurality of second lugs **54** has a proximal end **62** at the sole bottom surface **42** and a distal end **64** opposite the proximal end **62**. The distal end **64** of each second lug has a distal end surface **66** spaced from the sole bottom surface **42**. The distal end surface **66** of each of the plurality of second lugs **54** faces a second direction which is oblique relative to the longitudinal axis of such each second lug, and the second direction is different than the first direction.

[0033] Each of the plurality of second lugs **54** may be cylindrical in shape, with each cylinder being a circular cylinder, an oval cylinder, or a polygonal cylinder. Additionally, each of the plurality of second lugs **54** may be of a circular shape in a cross-section taken through such each second lug and perpendicular to the longitudinal axis of such each second lug, with the diameter changing from the proximal end to the distal end. It should be understood that each of the plurality of second lugs **54** may have a variety of cross-sectional shapes, such as a triangle, square, rectangle, or octagon.

[0034] Each distal end surface **66** of the plurality of second lugs **54** may have a second lug minimum length L_c and a second lug maximum length L_d. The second lug minimum length L_c corresponds to the distance from the sole bottom surface **42** to a point on the distal end surface **66** closest to the sole bottom surface **42**. The second lug maximum length L_d corresponds to the distance from the sole bottom surface **42** to a point on the distal end surface **66** farthest from the sole bottom surface **42**. The second lug minimum length L_c is between 30% and 80% of the second lug maximum length L_d.

[0035] The first lug minimum length La may be on the medial side of the first plurality of lugs **50**, and the second lug minimum length L_c may be on the lateral side of the second plurality of lugs **54**. Additionally, the first lug maximum length L_b may be on the lateral side of the first plurality of lugs **50**, and the second lug maximum length L_d may be on the medial side of the second plurality of lugs **54**.

[0036] The distal end surfaces **66** of the plurality of second lugs **54** may be sloped at an angle θ_{SL} between 20° and 80° relative to the longitudinal axis of such each second lug, and are preferably sloped at an angle θ_{SL} between 45° and 75° relative to the longitudinal axis of such each second lug. More preferably, the distal end surfaces **66** of each of the

plurality of second lugs **54** may be sloped at an angle θ_{SL} between 55° and 65° relative to the longitudinal axis of such each second lug.

[0037] In view of the foregoing, it should be appreciated that the invention has several advantages over the prior art.

[0038] It should also be understood that when introducing elements of the present invention in the claims or in the above description of exemplary embodiments of the invention, the terms "comprising," "including," and "having" are intended to be open-ended and mean that there may be additional elements other than the listed elements. Additionally, the term "portion" should be construed as meaning some or all of the item or element that it qualifies. Moreover, use of identifiers such as first, second, and third should not be construed in a manner imposing any relative position or time sequence between limitations.

[0039] As various modifications could be made in the constructions and methods herein described and illustrated without departing from the scope of the invention, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative rather than limiting. Thus, the breadth and scope of the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims appended hereto and their equivalents.

What is claimed is:

1. A shoe comprising:

a sole; and

an upper secured to the sole;

the sole having a sole heel end and a sole toe end, the sole extending along a shoe axis from the sole heel end to the sole toe end, the sole having a lateral side extending from the sole heel end to the sole toe end and a medial side extending from the sole heel end to the sole toe end, the sole extending transversely from the lateral side to the medial side, the sole including a sole heel region, a sole midfoot region, a sole forefoot region, and a sole toe region, the sole heel region extending longitudinally from the sole heel end to the sole midfoot region, the sole midfoot region extending longitudinally from the sole heel region to the sole forefoot region, the sole forefoot region extending longitudinally from the sole midfoot region to the sole toe region, the sole toe region extending longitudinally from the sole forefoot region to the sole toe end;

the sole having a sole bottom surface, a plurality of first lugs projecting generally downwardly from the sole bottom surface, and a plurality of second lugs projecting generally downwardly from the sole bottom surface;

each first lug of the plurality of first lugs projecting perpendicularly from the sole bottom surface along a longitudinal axis of such each first lug, each first lug having a proximal end at the sole bottom surface and a distal end opposite the proximal end, the distal end of each first lug having a distal end surface spaced from the sole bottom surface, the distal end surface of each first lug facing a first direction which is oblique relative to the longitudinal axis of such each first lug;

each second lug of the plurality of second lugs projecting perpendicularly from the sole bottom surface along a longitudinal axis of such each second lug, each second lug having a proximal end at the sole bottom surface

and a distal end opposite the proximal end, the distal end of each second lug having a distal end surface spaced from the sole bottom surface, the distal end surface of each second lug facing a second direction which is oblique relative to the longitudinal axis of such each second lug;

the second direction being different from the first direction.

2. The shoe of claim **1** wherein each first lug is cylindrical in shape.

3. The shoe of claim **2** wherein each first lug is of a circular shape in a cross-section taken through such each first lug and perpendicular to the longitudinal axis of such each first lug, and wherein each second lug is of a circular shape in a cross-section taken through sech each second lug and perpendicular to the longitudinal axis of such each second lug.

4. The shoe of claim **1** wherein each first lug is of a circular shape in a cross-section taken through such each first lug and perpendicular to the longitudinal axis of such each first lug, and wherein each second lug is of a circular shape in a cross-section taken through sech each second lug and perpendicular to the longitudinal axis of such each second lug.

5. The shoe of claim **1** wherein the first plurality of lugs are arranged in a first row, and wherein the second plurality of lugs are arranged in a second row adjacent the first row.

6. The shoe of claim **5** wherein the first row is diagonal relative to the shoe axis, and wherein the second row is diagonal relative to the shoe axis.

7. The shoe of claim **6** wherein the first row is generally parallel to the second row.

8. The shoe of claim **7** wherein the first row is devoid of any of the second lugs.

9. The shoe of claim **8** wherein the second row is devoid of any of the first lugs.

10. The shoe of claim **1** wherein the first plurality of lugs are arranged in a plurality of first rows, and wherein the second plurality of lugs are arranged in a plurality of second rows, each row of the plurality of first rows having at least three first lugs, each row of the plurality of second rows having at least three second lugs, each row of the plurality of first rows being adjacent at least one row of the plurality of second rows.

11. The shoe of claim **10** wherein no two first rows are adjacent one another.

12. The shoe of claim **11** wherein no two second rows are adjacent one another.

13. The shoe of claim **10** wherein each of the plurality of first rows is diagonal relative to the shoe axis, and wherein each of the plurality of second rows is diagonal relative to the shoe axis.

14. The shoe of claim **10** wherein each row of the plurality of first rows is devoid of any of the second lugs, and wherein each row of the plurality of second rows is devoid of any of the first lugs.

15. The shoe of claim **1** wherein each distal end of the plurality of first lugs has a first lug minimum length and a first lug maximum length, the first lug minimum length corresponding to the distance from the sole bottom surface to a point on the distal end surface closest to the sole bottom surface, the first lug maximum length corresponding to the distance from the sole bottom surface to a point on the distal end surface farthest from the sole bottom surface, the first

lug minimum length being between 30% and 80% of the first lug maximum length, and wherein each distal end of the plurality of second lugs have a second lug minimum length and a second lug maximum length, the second lug minimum length corresponding to the distance from the sole bottom surface to a point on the distal end surface closest to the sole bottom surface, the second lug maximum length corresponding to the distance from the sole bottom surface to a point on the distal end surface farthest from the sole bottom surface, the second lug minimum length being between 30% and 80% of the second lug maximum length.

16. The shoe of claim **15** wherein the first lug minimum length is on the medial side of the first plurality of lugs, and wherein the second lug minimum length is on the lateral side of the second plurality of lugs.

17. The shoe of claim **16** wherein the first lug maximum length is on the lateral side of the first plurality of lugs, and the second lug maximum length is on the medial side of the second plurality of lugs.

18. The shoe of claim **1** wherein the distal end surfaces of each of the plurality of first lugs is sloped at an angle

between 20° and 80° relative to the longitudinal axis of such each first lug, and wherein the distal end surfaces of each of the plurality of second lugs is sloped at an angle between 20° and 80° relative to the longitudinal axis of such each second lug.

19. The shoe of claim **1** wherein the distal end surfaces of each of the plurality of first lugs is sloped at an angle between 45° and 75° relative to the longitudinal axis of such each first lug, and wherein the distal end surfaces of each of the plurality of second lugs is sloped at an angle between 45° and 75° relative to the longitudinal axis of such each second lug.

20. The shoe of claim **1** wherein the distal end surfaces of each of the plurality of first lugs is sloped at an angle between 55° and 65° relative to the longitudinal axis of such each first lug, and wherein the distal end surfaces of each of the plurality of second lugs is sloped at an angle between 55° and 65° relative to the longitudinal axis of such each second lug.

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