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(71) Applicant: **Wolverine World Wide, Inc.**
Rockford, Michigan 49351 (US)

(72) Inventors:
- **Andersen, Deborah H.**
  Prevost
  Quebec J0R 1T0 (CA)
- **Urie, Grant A.**
  Shelburne
  Vermont 05482 (US)
- **Elmo, Federica**
  Rome 00123 (IT)

(74) Representative: **Ruhrmann, Andrea Elizabeth et al**
Kilburn & Strode
20 Red Lion Street
London WC1R 4PJ (GB)

(54) Modular shoe construction

(57) A modular footwear construction includes an upper (14) with a removable outsole (12). The upper and the outsole both include bottoms having tread surfaces. A removable footbed fits inside the upper, and includes both a cushioning midsole (16) and a structural plate (18). The outsole is removably secured to the upper without adhesives. In one embodiment, the midsole and the plate each have structure that enables a mechanical interlock therebetween. In another embodiment, a heel strap (64) extends from the outsole and fits over a protrusion on the upper to removably secure the outsole to the upper.

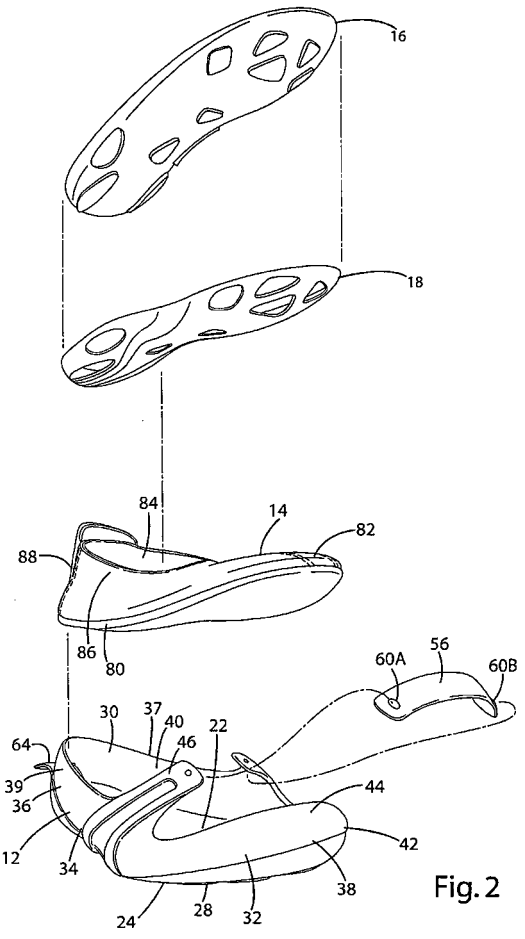

Fig. 2

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to footwear, and more particularly to an environmentally friendly modular footwear construction.

[0002] It is well known that issues arise with footwear when it gets dirty, especially when a wearer travels indoors after participating in outdoor activities such as hiking and trail running. These activities typically result in dirt or mud collecting on the outsole of the footwear, and often force the wearer to remove the footwear before stepping indoors. This removal of footwear can be undesirable for the wearer, as they will either have to come prepared with a second set of footwear or proceed without any footwear at all.

[0003] In addition to the above-noted issues, in recent years, there has been an increased focus on developing environmentally friendly footwear constructions. For instance, the leather used in constructing footwear uppers is now often selected based on the environmental footprint of its tanning process. And some outsoles are now produced from recycled rubber materials, such as reground waste rubber that was cut away during a molding process (flashing) or recycled crumb rubber from industrial sources, like old tires.

[0004] Other environmental aspects of footwear have not yet been addressed in great detail, including the processes for attaching the upper, outsole and midsole. Footwear including a midsole typically is constructed with a process in which the midsole is "direct attached" to the upper in a mold. To complete the footwear construction, an outsole is glued to the midsole, opposite the upper. Other attachment methods include various combinations of stitching and adhesive between one or more of the upper, outsole and midsole. Many of these methods are longstanding, but some concerns have been raised with regard to their environmental impact, particularly with regard to the nature of the adhesives that are commonly used.

SUMMARY OF THE INVENTION

[0005] The present invention provides a modular footwear construction including an upper and a removable outsole that can be secured together without adhesives.

[0006] In one embodiment, the present invention is directed to a footwear construction including an upper, a removable outsole and a removable footbed. The upper includes a bottom having a tread surface. The outsole includes a bottom that extends underneath the bottom of the upper and also includes tread surface. The footbed fits inside the upper and includes both a cushioning midsole and a structural plate. The midsole and the plate each have structure that enables a mechanical interlock therebetween.

[0007] In another embodiment, the footwear construction includes an attachment mechanism for removably attaching the outsole to the upper. The attachment mechanism includes a first position in which the outsole is secured to the upper and a second position in which the outsole can be manually removed from the upper by the wearer. The attachment mechanism may be a heel strap that extends between the outsole and the upper and interfits with a protrusion on the upper. In another embodiment, the attachment mechanism includes a toe cap on the outsole that extends over a toe portion of the upper, and a forefoot strap on the outsole that extends over a forefoot portion of the upper.

[0008] The removable outsole allows the wearer to convert back-and-forth between a rugged, outdoor shoe with the outsole attached, and a slipper-like, indoor shoe with the outsole removed. The tread surface on the bottom of the upper provides an attractive, functional and clean, article of footwear for the wearer to wear while indoors. In addition, the mechanical interlock between the midsole and the structural plate, and the attachment mechanism between the upper and the outsole provide a glueless, and therefore environmentally friendly, footwear construction.

[0009] These and other objects, advantages, and features of the invention will be readily understood and appreciated by reference to the detailed description of the current embodiment and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1 is a perspective view of one embodiment of the present invention.
Fig. 2 is an exploded view thereof;
Fig. 3 is a side view of the one embodiment;
Fig. 4 is a top view of the one embodiment;
Fig. 5 is a rear view of the one embodiment;
Fig. 6 is a side view of the upper according to one embodiment;
Fig. 7 is top view thereof;
Fig. 8 is a rear view thereof;
Fig. 9 is a bottom view thereof;
Fig. 10 is a side view of the outsole according to one embodiment;
Fig. 11 is a top view thereof;
Fig. 12 is rear view thereof;
Fig. 13 is a bottom view of the midsole according to one embodiment;
Fig. 14 is a bottom view of the plate according to one embodiment;
Fig. 15 is a bottom view of the interlocked midsole and plate;
Fig. 16 is a cross sectional view of the interlocked midsole and plate taken along line 16-16 in Fig. 15;
Fig. 17 is a side view of the footbed partially inserted into the upper;
Fig. 18 is a side view of the upper partially inserted

into the outsole;

Fig. 19 is a close-up rear perspective view of the heel strap in an attached position, with the heel strap shown in an unattached position in phantom lines;

Fig. 20 is a top close-up view of the forefoot strap;

Fig. 21 is a perspective view of a second embodiment;

Fig. 22 is a perspective view of a third embodiment.

DETAILED DESCRIPTION OF THE CURRENT EMBODIMENTS

[0011] One embodiment of the present invention is shown in Fig. 1 and is generally designated 10. Referring to Figs. 1 and 2, the invention generally includes an outsole 12, an upper 14, a midsole 16 and a plate 18. The components are capable of fitting together in a glueless arrangement, with the upper 14 being removable from the outsole 12.

[0012] The outsole 12 may be manufactured from a wide variety of conventional sole materials, such as natural and synthetic rubbers, leather, PVC, EVA and polyurethane. In one embodiment, the outsole 12 is formed by injection molding, but it may be formed by a variety of methods. As shown in Figs. 10-12, the outsole 12 includes a bottom 20 having an upper surface 22 and a lower, ground engaging surface 24. The ground engaging surface may include one of a wide variety of tread patterns, including grooves 26 and raised protrusions 28. A sidewall 30 extends upwardly from the upper surface 22 of the bottom 20. The sidewall 30 may include a forefoot portion 32, an arch portion 34, a heel portion 36, an inner surface 37 and an outer surface 39. In the illustrated embodiment, the sidewall extends around the entire outsole 12. In alternative embodiments, the sidewall 30 may extend upwardly from only selected portions of the bottom 20. As illustrated, the sidewall 30 includes an upper edge 40, and the sidewall gradually curves inwardly as it approaches the edge 40. In addition, the sidewall may include a toe portion 38 having an upwardly extending part 42, and an inwardly extending part 44 that wraps the sidewall 30 over a portion of the upper (as described below) and the users' toes.

[0013] In one embodiment, the outsole 12 includes a strap 46 that extends from the upper edge 40 of the sidewall 30 over the top of the user's foot in the forefoot portion 32 of the outsole 12. As illustrated in Fig. 20, the strap 46 is comprised of a pair of extensions 48, 50 that extend from opposite sides of the upper edge 40. The extensions 48, 50 may be formed integrally with the outsole 12, for instance, by molding them integrally with the outsole 12. In the illustrated embodiment, the extensions 48, 50 each include an end 52, 54, and the ends 52, 54 are joined by an elastic connector 56. As illustrated, the elastic connector 56 includes a pair of protrusions 60a-b that extend through holes in the ends 52, 54 of the extensions 48, 50 to attach the connector 56 to the extensions 48, 50. Alternatively, the connector 56 may be attached to the extensions by another method, such as stitching. The connector 56 may otherwise be eliminated, such that the extensions 48, 50 are a single piece that extends over the forefoot.

[0014] The outsole 12 may also include connector for connecting the outsole 12 to the upper (described in more detail below). As shown in Fig. 19, in one embodiment, the connector is a heel strap 64 may be a narrow strip of flexible material that extends from the heel portion 36 of the outsole 12. In one embodiment, the heel strap 64 is comprised of fabric, which may be the same fabric as the upper 14 to give the appearance that the strap 64 extends from the upper 14. As illustrated, the heel strap 64 includes a first end 66 (shown in Fig. 11) that is stitched to the inner surface 37 of the sidewall 30. In this embodiment, the sidewall 30 includes a hole 68 in the heel portion 36, and the heel strap includes a second end 70 that extends though the hole 68. The second end 70 is capable of attaching to another portion of the shoe 10, such as the upper 14, by a conventional method. In the illustrated embodiment, the second end 70 includes a plastic insert 72 connected to the fabric, the insert includes a hole 74 and a slit 76 for receiving a protrusion 96 on the component that the strap 64 will attach to. As shown in Fig. 19, the heel strap 64 is movable between an attached position (shown in solid lines) wherein the protrusion 96 is received in the hole 74 to secure the upper 14 to the outsole 12, and an unattached position (shown in phantom lines) wherein the strap 64 is removed from the protrusion 96 to allow the upper to be removed from the outsole 12. Alternatively, the strap 64 may include a snap fastener, Velcro®, or another attachment mechanism.

[0015] In one embodiment, the upper 14 includes a bottom 80, vamp 82, quarters 84, 86, and a heel panel 88. The upper 14 may be comprised of a wide variety of materials, such as fabric, leather, vinyl, and other known materials, and is generally sized to fit snugly within the sidewall 30 of the outsole 12. The bottom 80 of the upper 14 includes an upper surface 90 (shown in Fig. 7) and a lower surface 92 (shown in Fig. 9). The lower surface 92 may be designed to be a ground engaging surface, for instance, by including a grip material 94 attached to the lower surface 92 in a desired pattern. In one embodiment, shown in detail in Fig. 19, the heel panel 88 includes an outwardly extending protrusion 96. The protrusion 96 includes a shaft 98 with a knob 100 at the end, such that the protrusion 96 can be inserted through the hole 74 in the heel strap 64 on the outsole 12. Alternatively, the heel panel 88 may include another mechanical fastening mechanism for attaching to the outsole 12.

[0016] The midsole 16 and the plate 18 fit inside the upper 14 to form a cushioned, stabilizing footbed. In one embodiment, the midsole 16 is formed from EVA or another cushioning material, and includes a peripheral edge 102 having the general shape of the bottom 80 of the upper 14. The midsole 16 further includes an upper surface 104, a lower surface 106, a heel portion 108, an arch portion 110 and a forefoot portion 112. In one em-

bodiment, a sock liner (not shown) is attached to the upper surface 104. The sock liner may be comprised of fabric, and may be attached to the upper surface 104 by one of a variety of conventional methods, such as an adhesive, or by direct attach molding the midsole 16 to the sock liner 114. As shown in Fig. 13, the lower surface 106 of the midsole 16 includes a plurality of protrusions 116 for forming a mechanical interlock with the plate 18. In the illustrated embodiment, the midsole 16 includes two protrusions 116a-b in the heel portion 108, three protrusions 116c-e in the arch portion 110, and six protrusions 116f-k in the forefoot portion. In an alternative, embodiment, the midsole 16 may include more or less protrusions 116 and the protrusions 116 may be placed in different locations, for instance, the protrusions 116c-e in the arch portion 110 may be eliminated. Referring to Fig. 16, in one embodiment, each said protrusion 116 is shaped to interlock with portions of the plate 18. For instance, in the illustrated embodiment, each protrusion 116 is undercut with angled edges 121, such that its cross-section increases as it approaches an outer edge 118. Alternatively, the protrusions may have a different cross-sectional shape.

[0017] The plate 18 fits within the upper 14 between the midsole 16 and the bottom 80 if the upper 14. In one embodiment, the plate 18 is comprised of a rigid or semi-rigid material to add a degree of stiffness to the upper 14 and midsole 16. For example, the plate 18 may be injection molded from TPU, TPR or PVC. The plate 18 may alternatively be manufactured from other materials, such as nylon, rubber, synthetic rubber or silicone, but it is likely that the insert 16 would not be manufactured by injection molding if any of these alternative materials was used. In one embodiment, the plate 18 includes an upper surface 117, a lower surface 119, a forefoot portion 120, an arch portion 122 and a heel portion 124, and is generally shaped to correspond to the shape of the midsole 16. Alternatively, the plate 18 could be smaller than the midsole, for instance, by not extending into the forefoot portion 120.

[0018] In one embodiment, the plate 18 is designed to mechanically interlock with the midsole 16. This allows the midsole 16 and plate 18 to be connected, if desired, without the use of adhesives. As illustrated, the plate 18 includes a plurality of holes 123 that align with the protrusions 116 on the midsole 16, such that each hole 123 can receive a protrusion 116 to interlock the midsole 16 and the plate 18. As shown in Fig. 16, each hole 123 may be cut to have a cross-sectional shape that increases the interlock with the midsole 16. In the illustrated embodiment, shown in Fig. 25, each hole 123 is cut from the plate 18 with an angular cut so that the cross-section of the hole 123 narrows from the lower surface 119 to the upper surface 117, creating an interference fit between each undercut protrusion 116 and each hole 123. In another embodiment, the cross-sectional shape of the holes 123 may be varied to correspond to different cross-sections of the protrusions 116.

[0019] Manufacture of the shoe construction 10 includes forming each of the outsole 12, upper 14, midsole 16 and plate 18 separately, and then assembling the components together. In one embodiment, the components may be assembled into the shoe construction 10 without the use of glue. In this embodiment, the midsole 16 and plate 18 are mechanically interlocked, for instance, by fitting the protrusions 116 on the midsole 16 into corresponding holes 123 on the plate 18 (shown in Fig. 15). The interlocked midsole 16 and plate 18 are then inserted into the upper 14 (see Fig. 17), so that the bottom surface 119 of the plate 18 engages the upper surface 90 of the bottom 80 of the upper 14. The upper 14 is then inserted into the outsole 12 (see Fig. 18), such that the vamp 82 extends under the strap 46 of the outsole and the lower surface 92 of the bottom 80 of the upper 14 engages the upper surface 22 of the outsole 12. The rigidity of the plate 18 helps to wedge the upper 14 against the sidewall 30 of the outsole to hold the upper 12 in the outsole 12. The heel strap 64 is then moved to the attached position by fastening it to the protrusion 96 to secure the outsole 12 to the upper 14. In use, a user can remove the outsole 12 without taking off the shoe 10 by unfastening the heel strap 64 and pulling the outsole 12 from the upper 14.

[0020] Figs. 21 and 22 show two alternative embodiments of the upper 14' and 14", wherein the vamp, quarters, and heel portion are varied. For instance, Fig. 22 shows a lace-up style upper, and Fig. 21 shows a boot style upper.

[0021] The above description is that of the current embodiment of the invention. Various alterations and changes can be made without departing from the spirit and broader aspects of the invention as defined in the appended claims, which are to be interpreted in accordance with the principles of patent law including the doctrine of equivalents. Any reference to claim elements in the singular, for example, using the articles "a," "an," "the" or "said," is not to be construed as limiting the element to the singular.

[0022] The embodiments of the invention in which an exclusive property of privilege is claimed are defined as follows:

Claims

1. A modular footwear construction comprising:

an upper having a bottom, said bottom having a tread surface;

a removable outsole having a bottom, said bottom of said outsole extending underneath said bottom of said upper, said bottom of said outsole including a tread surface;

a removable footbed inside said upper, said removable footbed including a midsole and a plate, said midsole and said plate each including

structure to form a mechanical interlock between said midsole and said plate;
a connector extending from said upper; and
a strap extending from said outsole, said strap capable of interfitting with said connector to secure said outsole to said upper.

2. The modular footwear construction of claim 1 wherein one of said midsole and said plate includes a protrusion and the other one of said midsole and said plate includes a cutout sized to receive said protrusion, said protrusion inserted in said cutout to mechanically interlock said midsole and said plate.

3. The modular footwear construction of claim 2 wherein each said protrusion is undercut, and wherein each cutout is defined by an angular cut wall that interfits with said undercut of said protrusion.

4. The modular footwear construction of claim 3 wherein said one of said midsole and said plate includes a heel portion and a forefoot portion, and wherein said one of said midsole and said plate includes a plurality of said protrusions, at least one of said protrusions located in said heel portion and at least one of said protrusions located in said forefoot portion.

5. The modular footwear construction of claim 4 wherein said midsole is formed from a cushioning material and wherein said plate is formed from a rigid or semi-rigid material.

6. The modular footwear construction of claim 5 wherein said midsole is formed from EVA and wherein said plate is formed from one of TPU, TPR and PVC.

7. The modular footwear construction of claim 6 wherein said strap is a heel strap for removably connecting said outsole and said upper, said heel strap having an attached position in which a portion of said heel strap interfits with a portion of said upper and an unattached position in which said outsole can be separated from said upper.

8. A modular footwear construction comprising:

an upper having a bottom, said bottom including a tread surface;
an outsole covering at least a portion of said upper, said outsole including a tread surface;
attachment means extending from said outsole for removably attaching said upper to said outsole, said attachment means having an attached position wherein said upper is secured to said outsole and an unattached position wherein said upper is unattached from said outsole, such that said outsole can be manually removed from said upper to expose said bottom of said upper; and
a footbed positioned inside said upper.

9. The modular footwear construction of claim 8 wherein said attachment means includes a heel strap extending from one of said outsole and said upper and a connector extending from the other of said outsole and said upper, said heel strap fastened to said connector when said attachment means is in said attachment position, said heel strap not fastened to said connector when said attachment means is in said unattached position.

10. The modular footwear construction of claim 9 wherein said heel strap includes a first end connected to said outsole and a second end defining a hole, said connector comprising a protrusion extending from said upper, said protrusion extending through said hole when said attachment means is in said attached position.

11. The modular footwear construction of claim 10 wherein said upper and said outsole each include a heel portion, said first end of said heel strap connected to said heel portion of said outsole, said protrusion extending from said heel portion of said upper.

12. The modular footwear construction of claim 11 wherein said upper includes a forefoot portion and a toe portion, and said outsole includes a forefoot strap extending over said forefoot portion and a toe cap extending over said toe portion.

13. The modular footwear construction of claim 12 wherein said removable footbed includes a cushioned midsole and a structural plate, one of said midsole and said plate including a plurality of protrusions and the other of said midsole and said plate including a plurality of holes aligned with said protrusion, said protrusions extending into said holes to mechanically interlock said midsole and said plate.

14. A modular footwear construction comprising:

an upper having sides and a bottom;
an outsole including a bottom and a sidewall extending upwardly from said bottom, said bottom and said sidewall of said outsole cooperating to enclose at least a portion of said upper;
an attachment mechanism removably attaching said outsole and said upper, said attachment mechanism having a first connector attached to said outsole and a second connector attached to said upper, said first and second connectors interfitting with each other to secure said outsole to said upper, said first and second connectors capable of being manually separated to allow said outsole to be removed from said upper to expose said bottom of said upper; and

a removable footbed within said upper, said footbed including a cushioned midsole and a structural plate, said midsole and said plate including structure to mechanically interlock said midsole and said plate.

15. The modular footwear construction of claim 14 wherein said bottom of said upper includes a first tread surface and wherein said bottom of said outsole includes a second tread surface.

16. The modular footwear construction of claim 14 wherein said footwear construction includes a heel region, and wherein said first connector is a heel strap extending from said outsole in said heel region, wherein said second connector is a protrusion extending from said upper in said heel region.

17. The modular footwear construction of claim 16 wherein said outsole is formed from a first material, and wherein said upper and said heel strap are formed from a second material different from said first material.

18. The modular footwear construction of claim 14 wherein one of said midsole and said plate includes a plurality of protrusions and the other of said midsole and said plate includes a plurality of holes aligned with said protrusions, said protrusions extending into said holes to interlock said midsole and said plate.

19. The modular footwear construction of claim 14 wherein said upper includes a forefoot portion, said attachment mechanism including a forefoot strap attached to said outsole and extending over said forefoot portion of said upper.

20. The modular footwear construction of claim 19 wherein said upper includes a toe portion, said outsole including a toe cap extending over said toe portion of said upper.

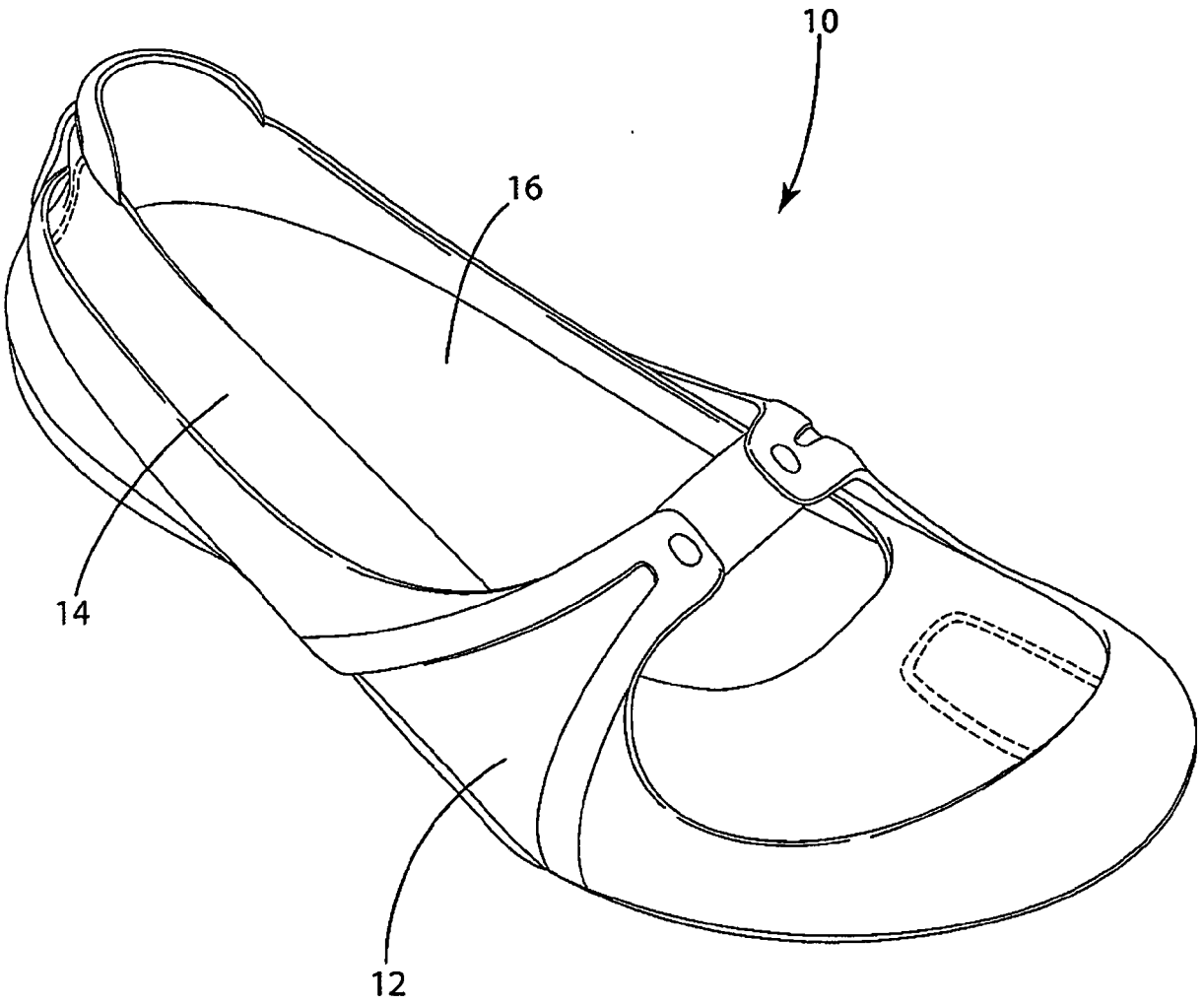

Fig. 1

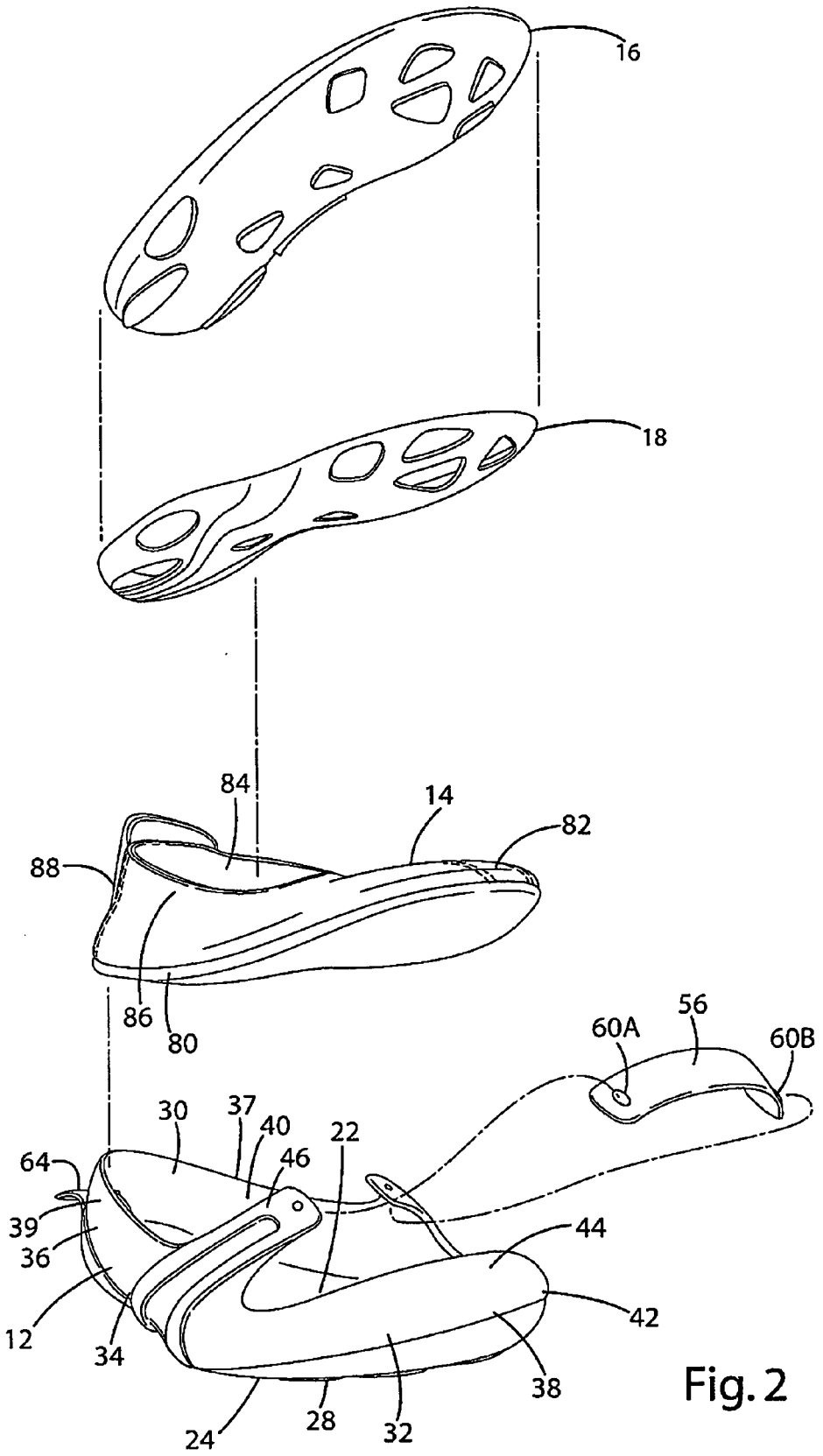
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Fig. 2

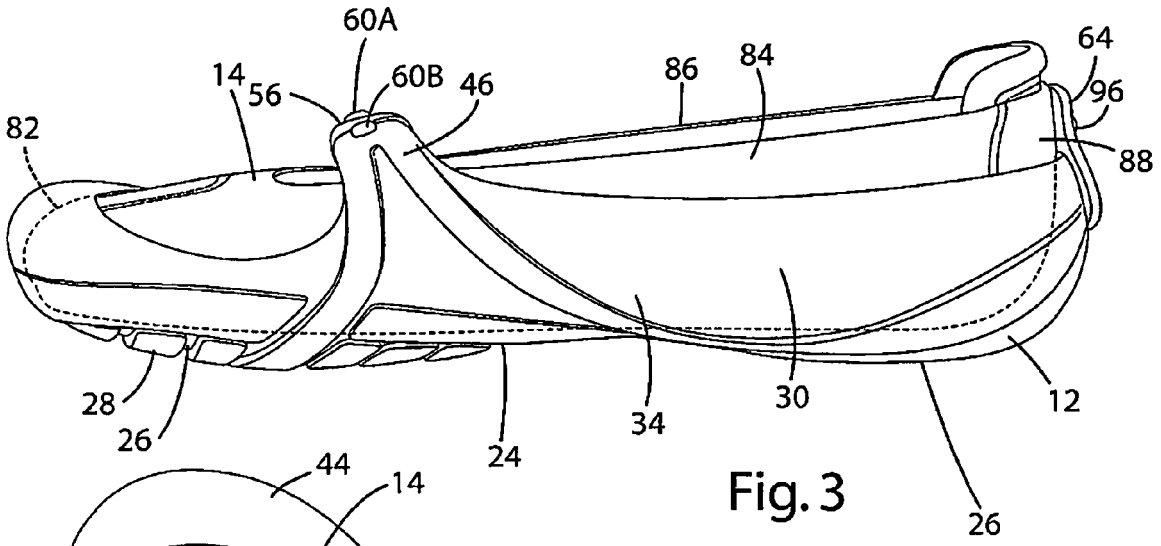

Fig. 3

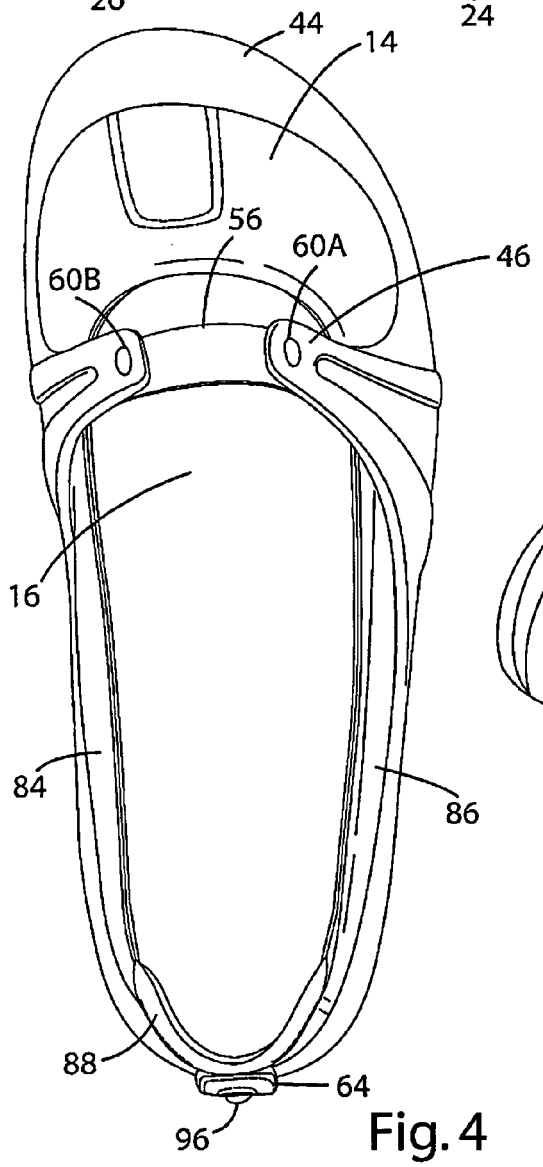

Fig. 4

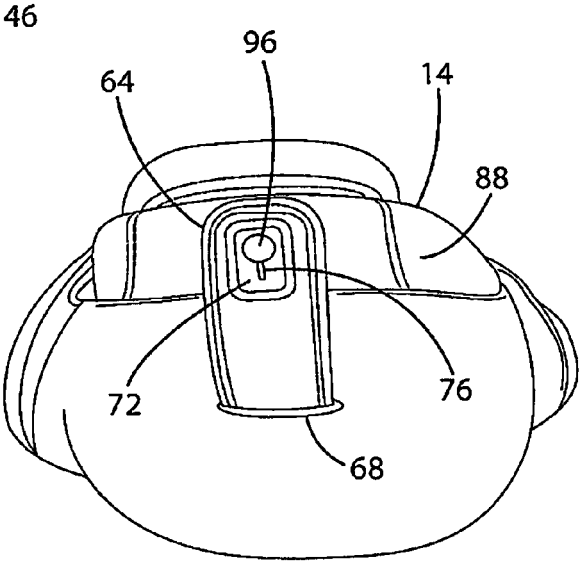

Fig. 5

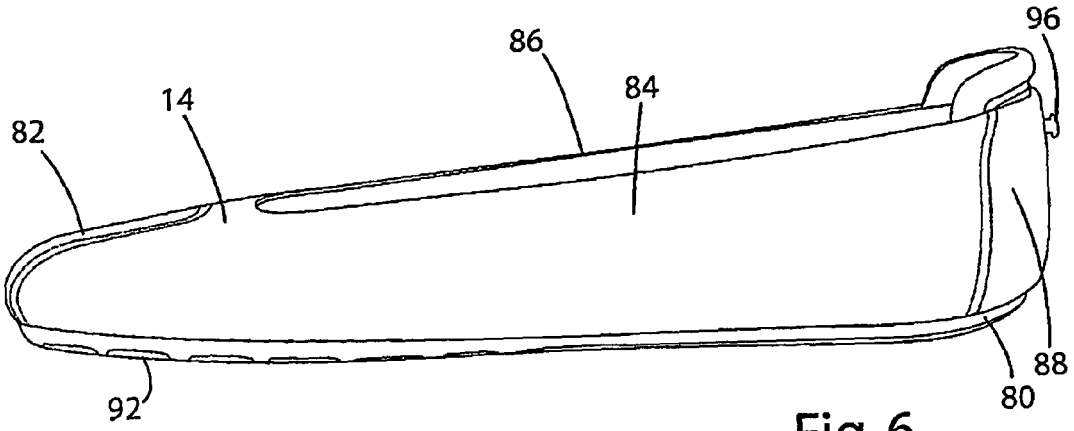

Fig. 6

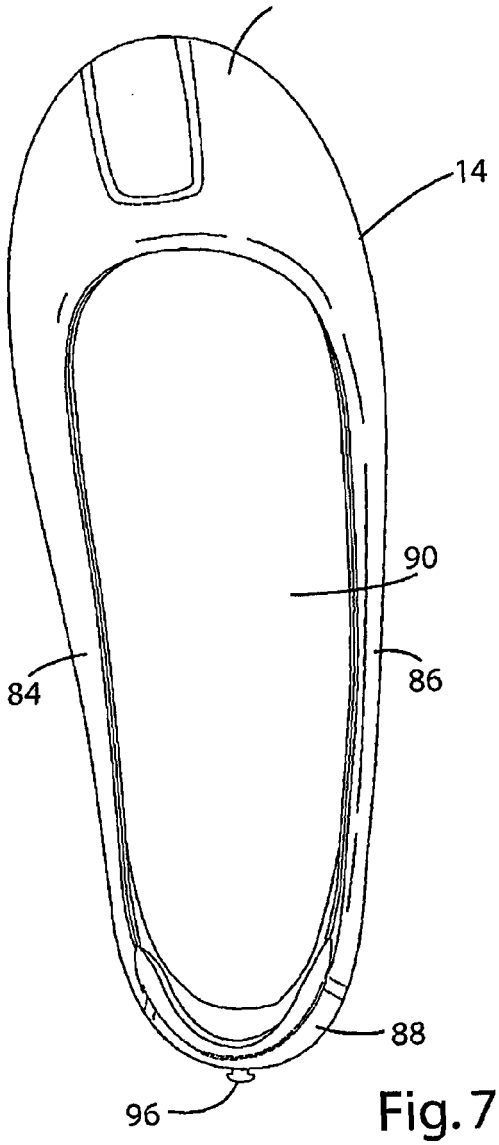

Fig. 7

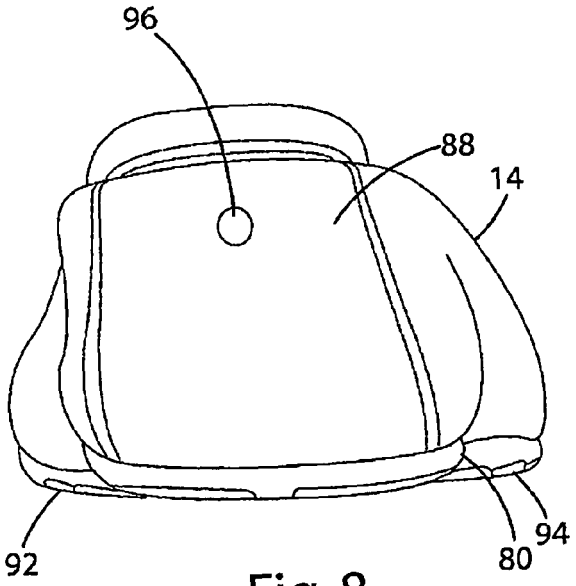

Fig. 8

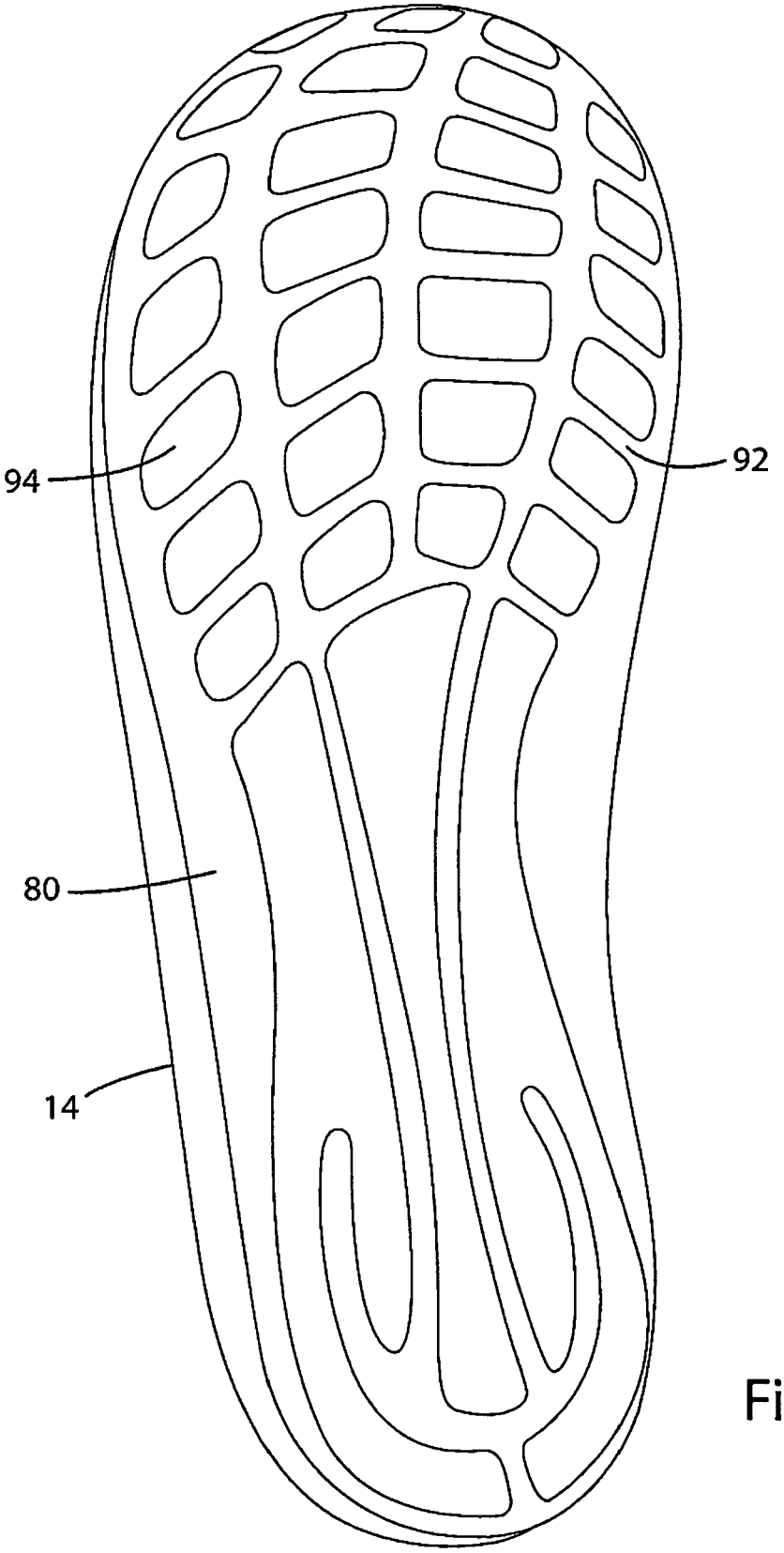

Fig. 9

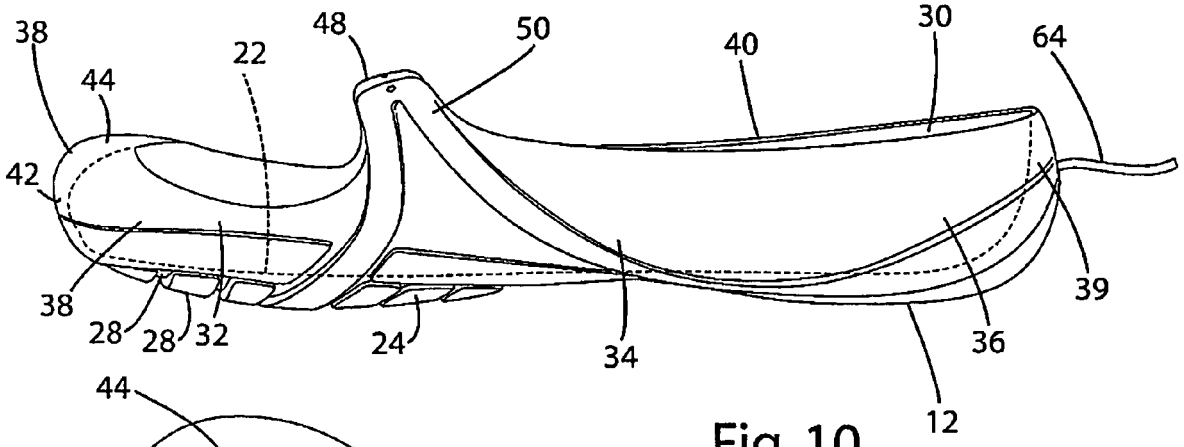

Fig. 10

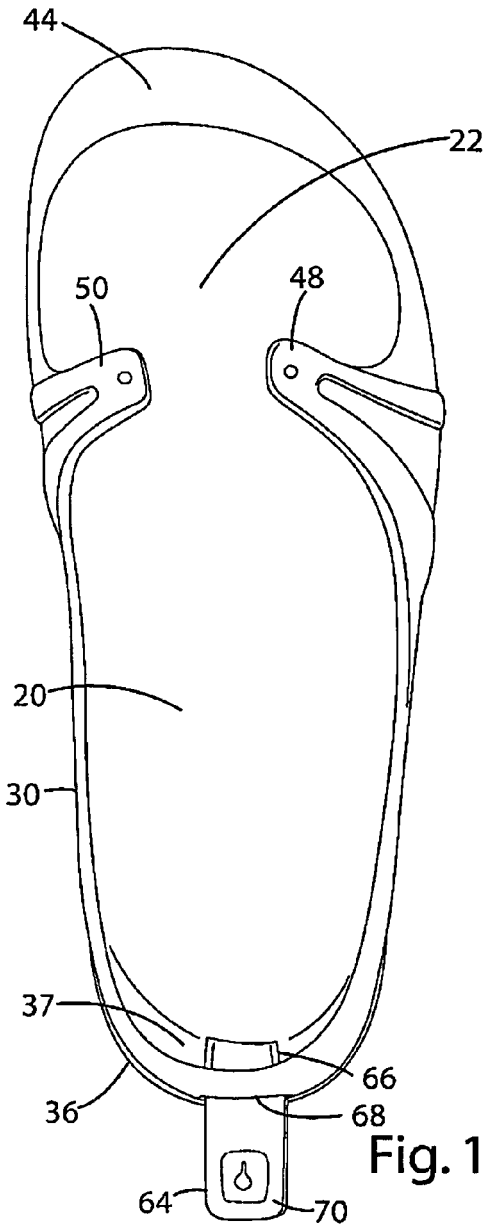

Fig. 11

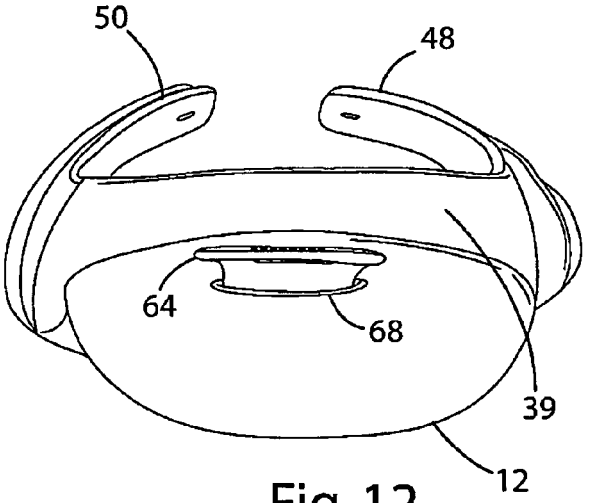

Fig. 12

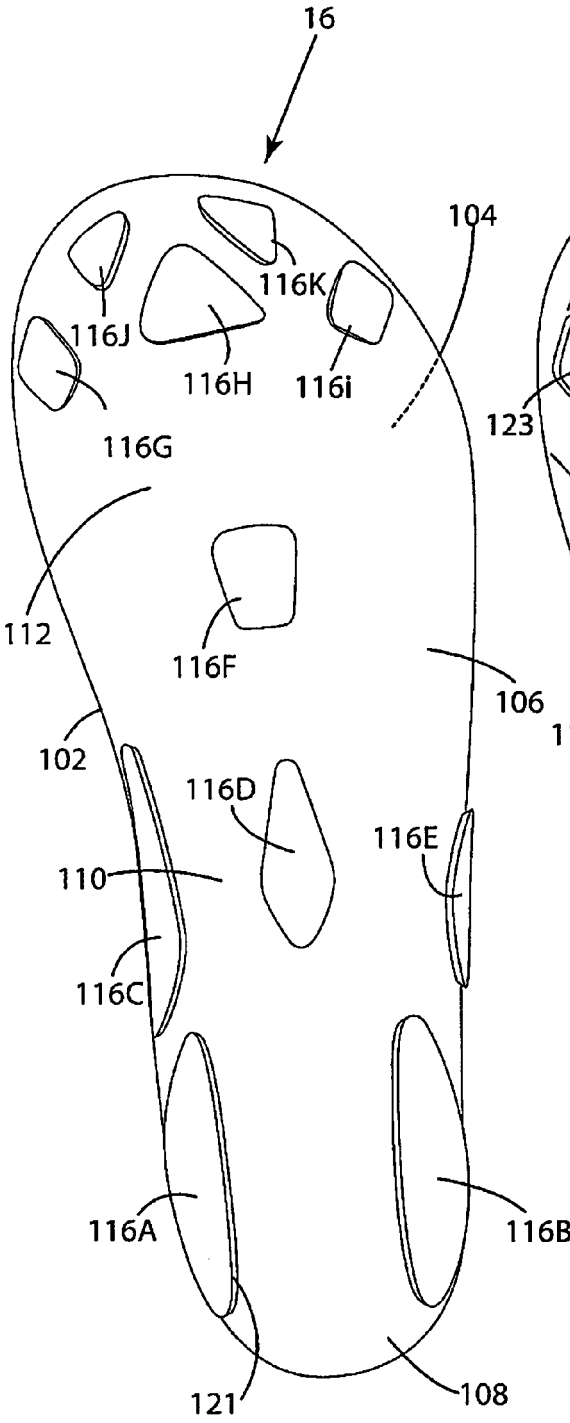
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Fig. 13

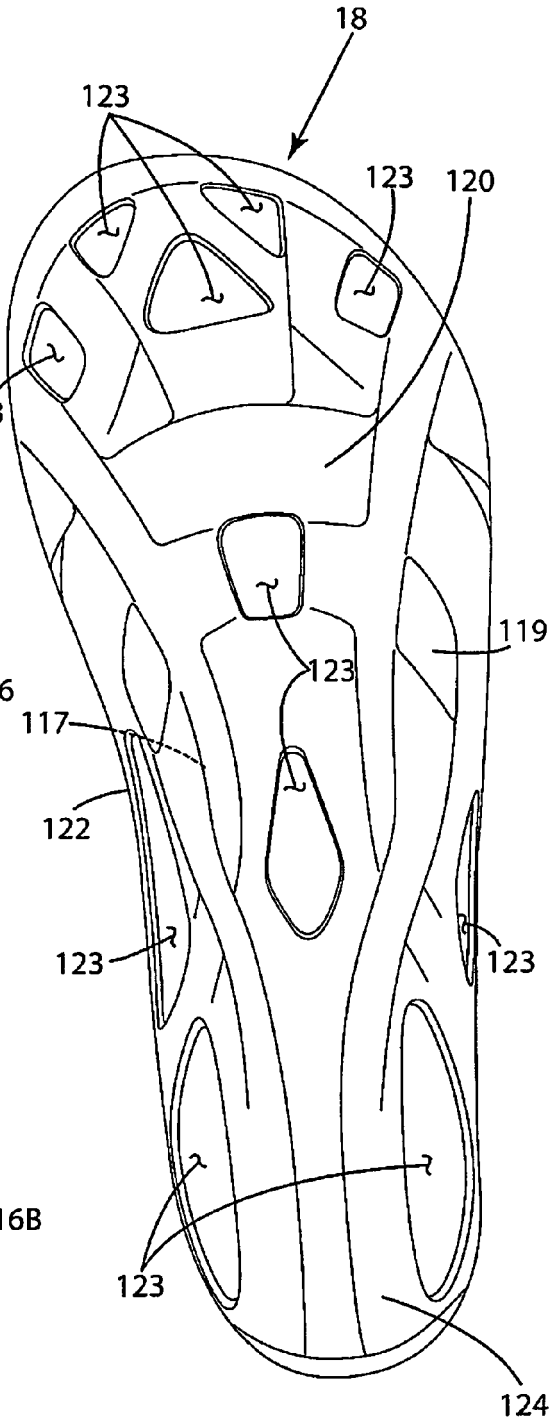
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Fig. 14

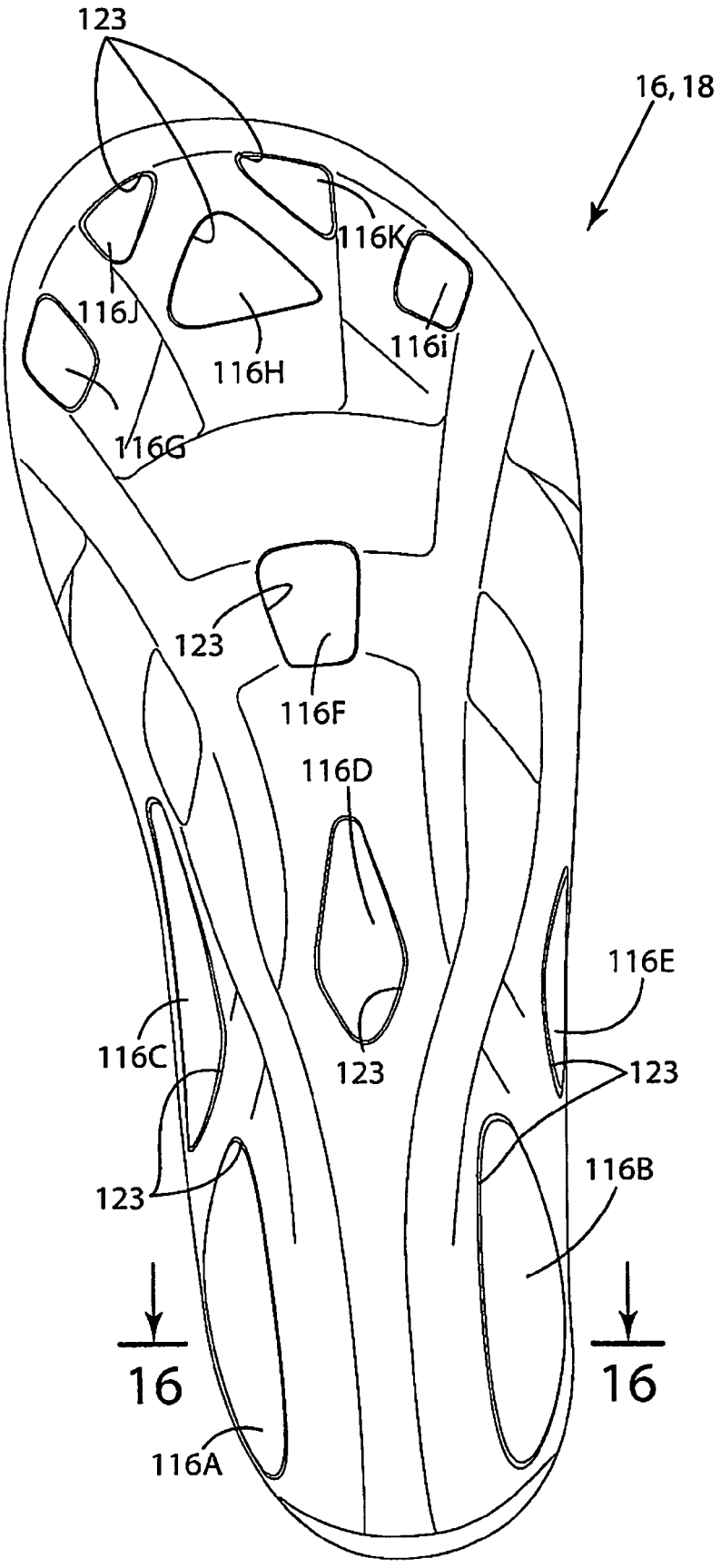
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Fig. 15

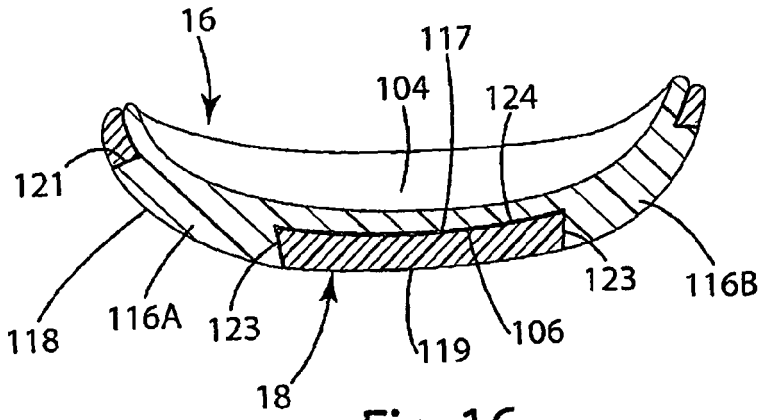

Fig. 16

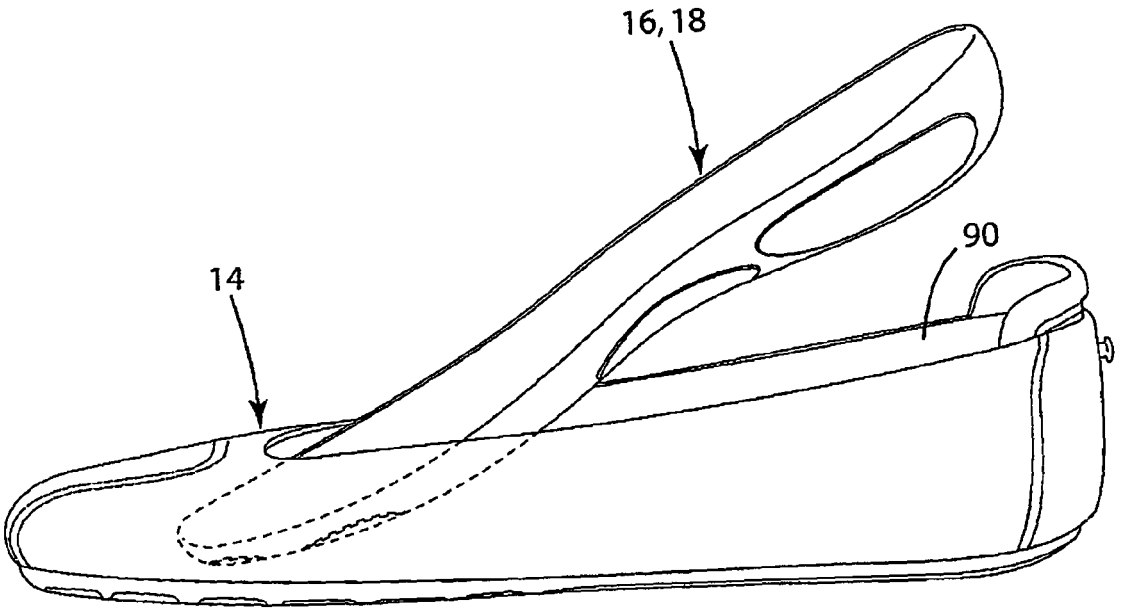

Fig. 17

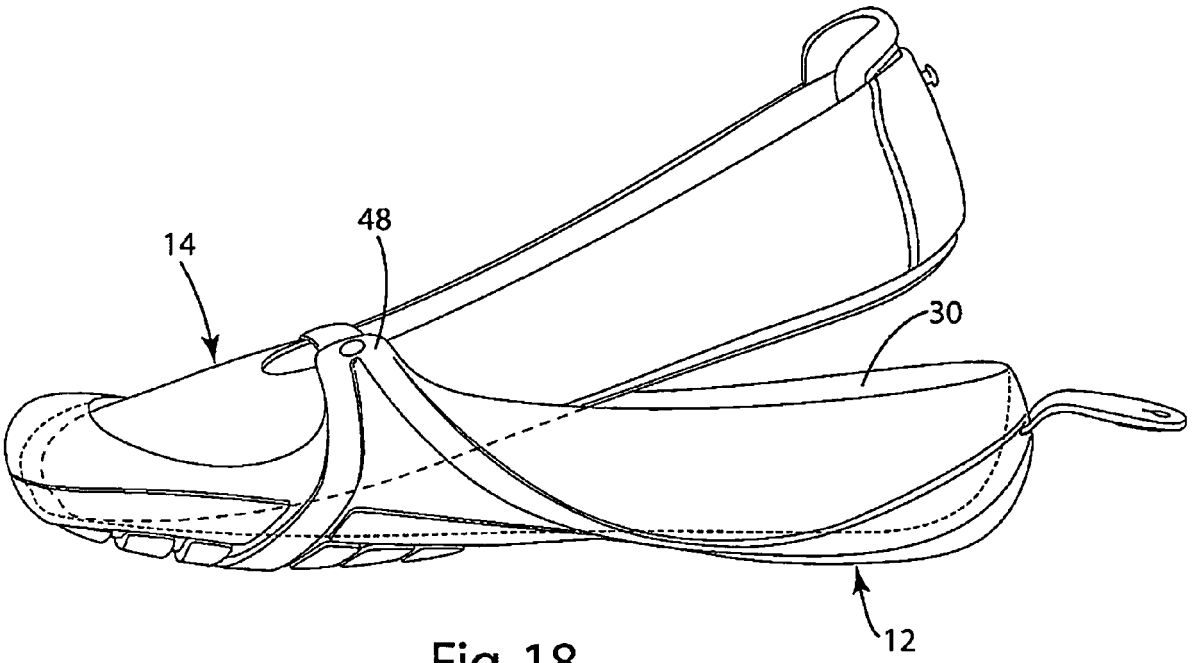

Fig. 18

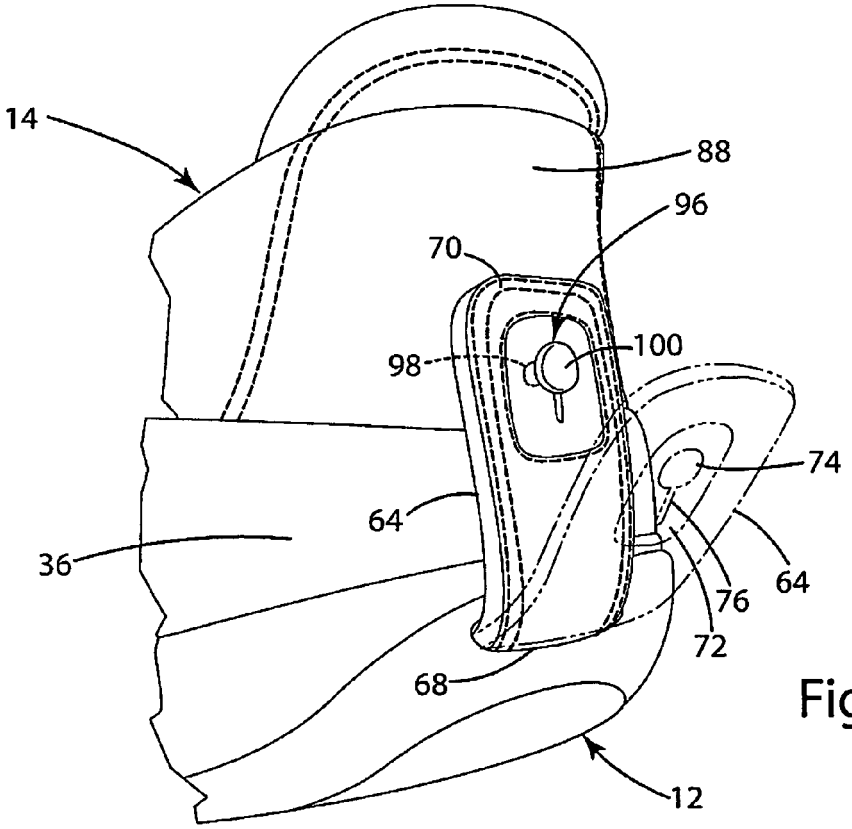

Fig. 19

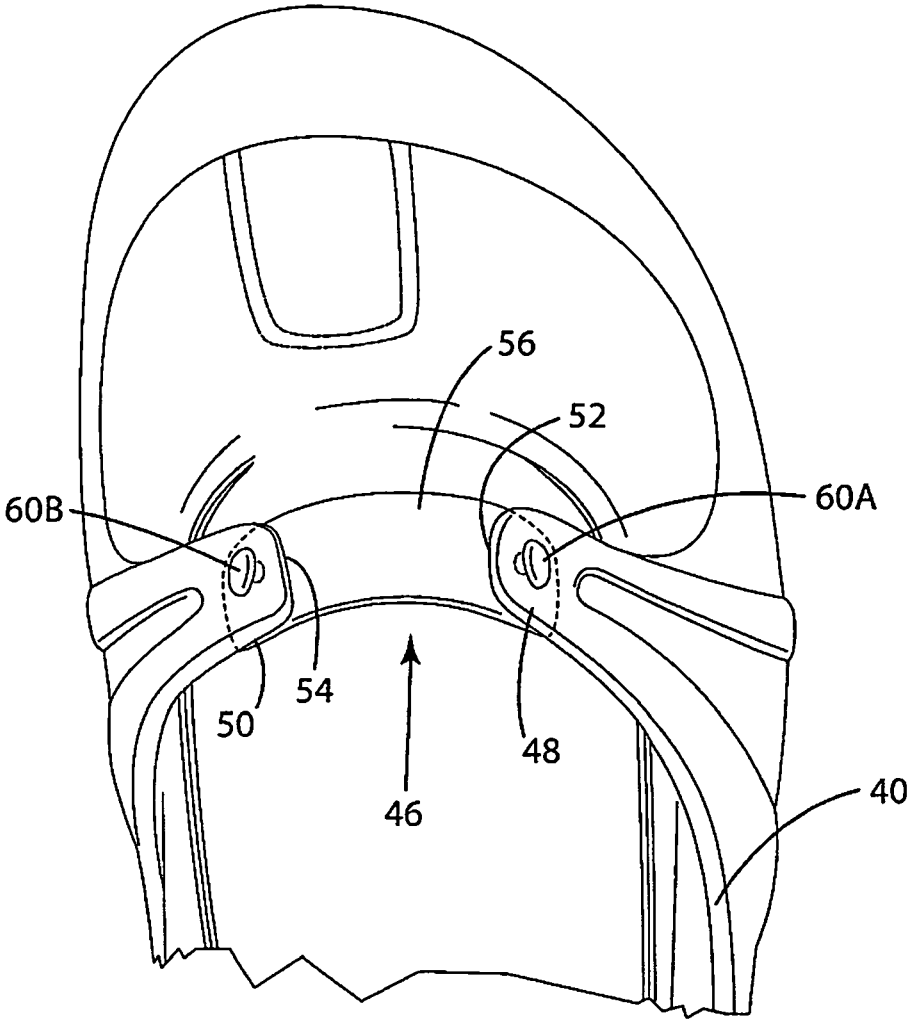

Fig. 20

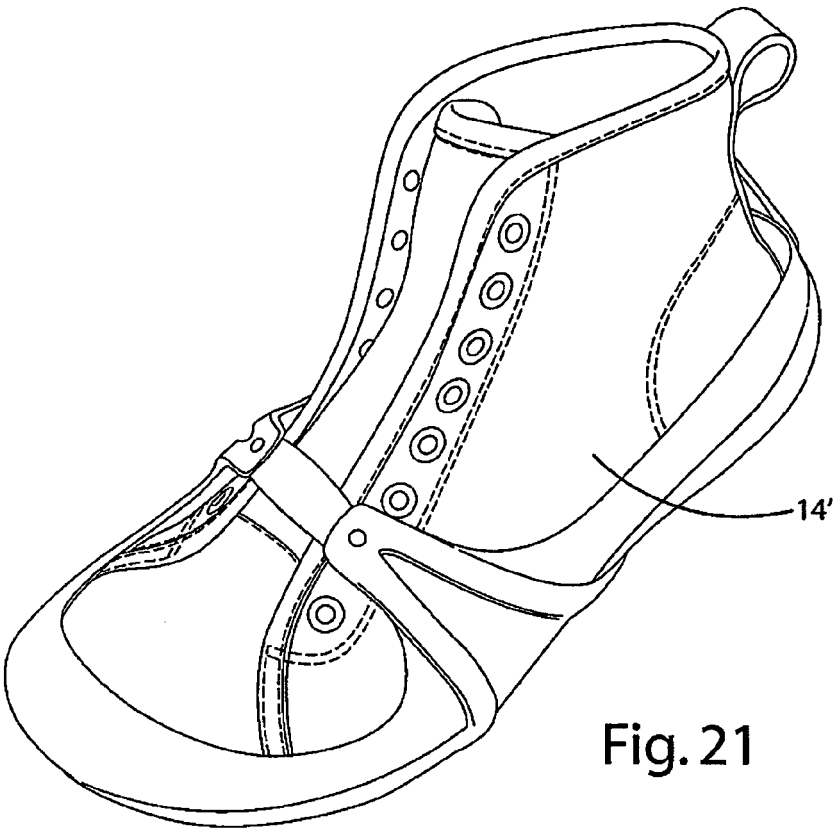

Fig. 21

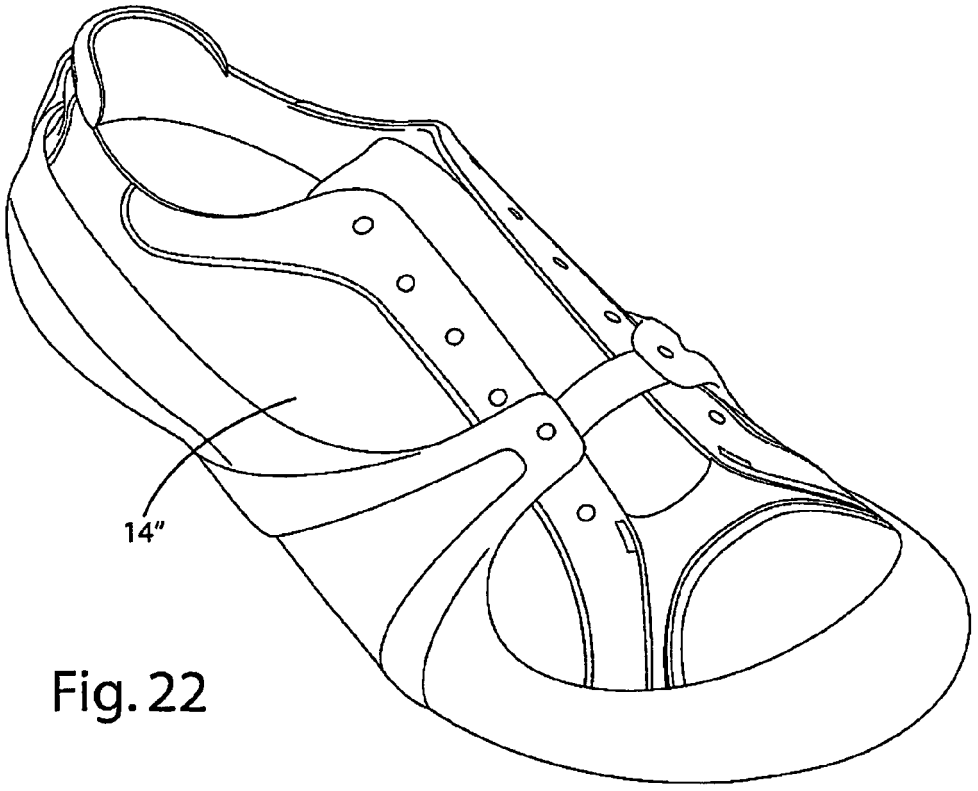

Fig. 22

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 May 2008	Vesin, Stéphane

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