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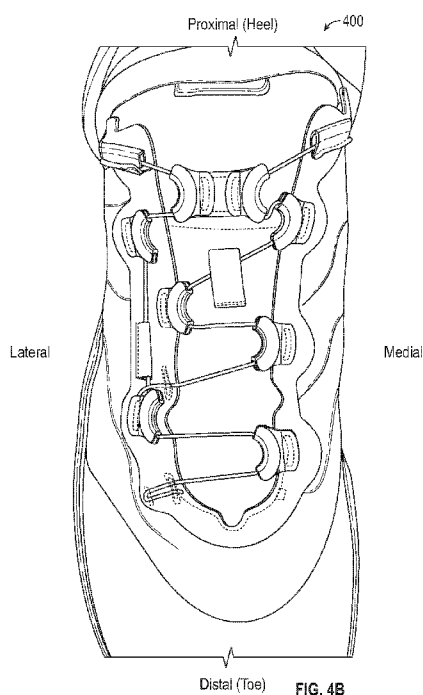
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## (54) Title: LACING ARCHITECTURE FOR AUTOMATED FOOTWEAR PLATFORM



(57) Abstract: Systems and apparatus related to an automated footwear platform including an actuator assembly for controlling a footwear lacing apparatus are discussed. In an example, an Lacing architectures for automated footwear assemblies are discussed. In an example, a footwear assembly can include a floating tongue within an upper assembly. The lacing architecture can include a first plurality of lace guides forming a first lacing zone and a second plurality of lace guides forming a second lacing zone. The lacing architecture can also include a tongue lace guide assembly secure to a proximal portion of the floating tongue.



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## LACING ARCHITECTURE FOR AUTOMATED FOOTWEAR PLATFORM

5 [0001] The following specification describes various aspects of a footwear assembly involving a lacing system including a motorized or non-motorized lacing engine, footwear components related to the lacing engines, automated lacing footwear platforms, and lacing architectures for use in an automated footwear platform. More specifically, much of the  
10 following specification describes various aspects of lacing architectures (configurations) for use in footwear including motorized or non-motorized lacing engines for centralized lace tightening.

### RELATED APPLICATIONS

15 [0002] This application claims the benefit of priority to U.S. Provisional Patent Application Serial No. 62/634,358, filed February 23, 2018 and U.S. Provisional Patent Application Serial No. 62/574,940, filed October 20, 2017, the contents of both which are hereby incorporated by reference in their entireties.

### BRIEF DESCRIPTION OF THE DRAWINGS

20 [0003] In the drawings, which are not necessarily drawn to scale, like numerals may describe similar components in different views. Like numerals having different letter suffixes may represent different instances of similar components. The drawings illustrate generally, by way of example, but not by way of limitation, various embodiments discussed  
25 in the present document.

[0004] FIG. 1 is an exploded view illustration of components of a portion of a footwear assembly with a motorized lacing system, according to some example embodiments.

[0005] FIGS. 2A-2C are illustrations of a fully assembled footwear assembly  
30 including automated lace tightening, according to some example embodiments.

[0006] FIGS. 3A-3B are top-view diagrams illustrating a lacing architecture for use with footwear assemblies including a motorized lacing engine, according to some example embodiments.

[0007] FIG. 4A is a top-view diagram illustrating a two-zone lacing architecture for use with footwear assemblies including a motorized or non-motorized lacing engine, according to some example embodiments.

[0008] FIG. 4B is a photographic image of a footwear assembly utilizing a two-zone lacing architecture, according to some example embodiments.

[0009] FIGS. 5A - 5F are diagrams illustrating a lacing guide for use in certain lacing architectures, according to some example embodiments.

[0010] Any headings provided herein are merely for convenience and do not necessarily affect the scope or meaning of the terms used or discussion under the heading.

#### DETAILED DESCRIPTION

[0011] The concept of self-tightening shoe laces was first widely popularized by the fictitious power-laced Nike® sneakers worn by Marty McFly in the movie Back to the Future II, which was released back in 1989. While Nike© has since released at least one version of power-laced sneakers similar in appearance to the movie prop version from Back to the Future II, the internal mechanical systems and surrounding footwear platform employed do not necessarily lend themselves to mass production or daily use. Additionally, other previous designs for motorized lacing systems comparatively suffered from problems such as high cost of manufacture, complexity, assembly challenges, and poor serviceability. The present inventors have developed a lacing architecture for use on a modular footwear platform to accommodate motorized and non-motorized lacing engines that assists in solving some or all of the problems discussed above, among others. The lacing architectures and lace guides discussed herein also focus on improving fit and comfort when used in conjunction with an automated lacing engine. In order to fully leverage the modular lacing engine discussed briefly below and in greater detail in co-pending Application Serial Number 15/452,636, titled "LACING ENGINE FOR

AUTOMATED FOOTWEAR PLATFORM," which is hereby incorporated by reference in its entirety, the present inventors developed lacing architectures discussed herein. The lacing architectures and lace guides discussed herein can solve various problems experienced with centralized lace tightening mechanisms, such as uneven tightening, fit, comfort, and performance. One aspect of enhanced comfort involves a lacing architecture that reduces pressure across the top of the foot. Example lacing architectures can also enhance fit and performance by manipulating lace tension in both a medial-lateral direction as well as in an anterior-posterior (front to back) direction. Another example lacing architecture discussed below splits the lacing system into two zones to provide better fit, performance and comfort by separating the toe (forefoot) area from the mid-foot area. Various other benefits of the components described below will be evident to persons of skill in the relevant arts.

[0012] The lacing architectures discussed were developed specifically to interface with a modular lacing engine positioned within a mid-sole portion of a footwear assembly. However, the concepts could also be applied to motorized and manual lacing mechanisms disposed in various locations around the footwear, such as in the heel or even the toe portion of the footwear platform. The lacing architectures discussed include use of lace guides that can be formed from tubular plastic, metal clip, fabric loops or channels, plastic clips, and open u-shaped channels, among other shapes and materials. In some examples, various different types of lacing guides can be mixed to perform specific lace routing functions within the lacing architecture. Certain examples of specific lace guide configurations are discussed in detail below.

[0013] The motorized lacing engine discussed below was developed from the ground up to provide a robust, serviceable, and inter-changeable component of an automated lacing footwear platform. The lacing engine includes unique design elements that enable retail-level final assembly into a modular footwear platform. The lacing engine design allows for the majority of the footwear assembly process to leverage known assembly technologies, with unique adaptations to standard assembly processes still being able to leverage current assembly resources.

[0014] In an example, the modular automated lacing footwear platform includes a mid-sole plate secured to the mid-sole for receiving a lacing engine. The design of the mid-sole plate allows a lacing engine to be dropped into the footwear platform as late as at a point of purchase. The mid-sole plate, and other aspects of the modular automated  
5 footwear platform, allow for different types of lacing engines to be used interchangeably. For example, the motorized lacing engine discussed below could be changed out for a human-powered lacing engine. Alternatively, a fully automatic motorized lacing engine with foot presence sensing or other optional features could be accommodated within the standard mid-sole plate. The lacing architectures are specifically designed to assist in  
10 interfacing a lace cable (or similar lacing element) with a lacing engine.

[0015] Utilizing motorized or non-motorized centralized lacing engines to tighten athletic footwear presents some challenges in providing sufficient performance without sacrificing some amount of comfort. Lacing architectures discussed herein have been designed specifically for use with centralized lacing engines, and are designed to enable  
15 various footwear designs from casual to high-performance.

[0016] Footwear terminology used in this disclosure includes terms such as floating textile layer, outer layer, shoe upper, bonding material, and eyestay, which are all further defined in a co-pending Application Serial Number 15/459,932, titled "SHOE UPPER WITH FLOATING LAYER", that is hereby incorporated by reference in its entirety. The  
20 floating textile layer is a term used, in an example, to describe an inner sock-like structure that essentially floats within an outer layer of an upper portion of a footwear assembly. The floating textile layer can be attached to the mid-sole of the footwear assembly and may be minimally attached at select places to portions of an upper portion as well. In certain examples, the floating textile layer can be made from material with no-stretch or limited  
25 stretch properties. In some examples, the material of the floating textile layer is a quad-axial, tri-axial, or non-woven material.

[0017] The outer layer is a second layer of a footwear upper (or shoe upper) that covers the floating textile layer and substantially accounts for the outside shell of the shoe upper. In some examples, the outer layer is an outer knit shell. The outer layer can also be

made in whole or in part from polyurethane, leather, cast urethane, or digitally printed urethane as well as knit, woven, braided, or non-woven materials.

[0018] A bonding material is typically used to reinforce portions of a footwear assembly, such as edges of the outer layer or floating textile layer, among others. The  
5 eyestay is a term used, in some examples, to describe an area on the footwear upper adapted to receive eyelets or lace guides. In some examples, the eyestay area can be reinforced with bonding or similar materials.

[0019] This initial overview is intended to introduce the subject matter of the present patent application. It is not intended to provide an exclusive or exhaustive explanation of  
10 the various inventions disclosed in the following more detailed description.

#### AUTOMATED FOOTWEAR PLATFORM

[0020] The following discusses various components of the automated footwear platform including a motorized lacing engine, a mid-sole plate, and various other  
15 components of the platform. While much of this disclosure focuses on lacing architectures for use with a motorized lacing engine, the discussed designs are applicable to a human-powered lacing engine or other motorized lacing engines with additional or fewer capabilities. Accordingly, the term "automated" as used in "automated footwear platform" is not intended to only cover a system that operates without user input. Rather, the term  
20 "automated footwear platform" includes various electrically powered and human-powered, automatically activated and human activated mechanisms for tightening a lacing or retention system of the footwear.

[0021] FIG. 1 is an exploded view illustration of components of a motorized lacing system for footwear, according to some example embodiments. The motorized lacing  
25 system 1 illustrated in FIG. 1 includes a lacing engine 10, a lid 20, an actuator 30, a mid-sole plate 40, a mid-sole 50, and an outsole 60. FIG. 1 illustrates the basic assembly sequence of components of an automated lacing footwear platform. The motorized lacing system 1 starts with the mid-sole plate 40 being secured within the mid-sole. Next, the actuator 30 is inserted into an opening in the lateral side of the mid-sole plate opposite to

interface buttons that can be embedded in the outsole 60. Next, the lacing engine 10 is dropped into the mid-sole plate 40. In an example, the lacing system 1 is inserted under a continuous loop of lacing cable and the lacing cable is aligned with a spool in the lacing engine 10 (discussed below). Finally, the lid 20 is inserted into grooves in the mid-sole plate 40, secured into a closed position, and latched into a recess in the mid-sole plate 40. The lid 20 can capture the lacing engine 10 and can assist in maintaining alignment of a lacing cable during operation.

[0022] In an example, the footwear article or the motorized lacing system 1 includes or is configured to interface with one or more sensors that can monitor or determine a foot presence characteristic. Based on information from one or more foot presence sensors, the footwear including the motorized lacing system 1 can be configured to perform various functions. For example, a foot presence sensor can be configured to provide binary information about whether a foot is present or not present in the footwear. If a binary signal from the foot presence sensor indicates that a foot is present, then the motorized lacing system 1 can be activated, such as to automatically tighten or relax (i.e., loosen) a footwear lacing cable. In an example, the footwear article includes a processor circuit that can receive or interpret signals from a foot presence sensor. The processor circuit can optionally be embedded in or with the lacing engine 10, such as in a sole of the footwear article.

## FOOTWEAR ASSEMBLY

[0023] FIGS. 2A-2C are illustrations of a fully assembled footwear assembly including automated lace tightening, according to some example embodiments. In the example illustrated in FIG. 2A, the footwear assembly 200 includes a mid-sole 211, an outsole 212, a mid-sole plate 213, actuator buttons 214, a footwear upper including an outer layer 215 and a floating textile layer 216, a heel pull 217, a tongue pull 218, and a foot opening 219. In this example, only an upper edge of the floating textile layer 216 is visible, but the floating textile layer essentially lines the inside of the outer layer 215. However, as implied by the "floating" term, the floating textile layer 216 is only secured to



the outer layer 215 minimally along certain locations, such as along an eyestay, a central throat portion, or around lace guide attachment points. In some examples, the floating textile layer 216 is also (or alternatively) attached to the inside along a periphery of the mid-sole 211. Details of an example footwear construction technique that could be used to produce the footwear assembly illustrated in FIGS. 2A-2C is disclosed in the co-pending application mentioned above, Application Serial Number 15/459,932, and will not be repeated here.

[0024] In this example, a small outer portion of the mid-sole plate 213 is exposed through a cut-out in the mid-sole 211. In other examples, only the actuator buttons 214 may be exposed through the side of the mid-sole 211. The mid-sole plate 213 is adapted to retain and protect a lacing engine within the mid-sole 211 of the footwear assembly 200.

[0025] FIG. 2B illustrates a medial view of footwear assembly 200. In this example, the footwear assembly 200 is depicted as including out-sole 212, mid-sole 211, outer layer 215, heel pull 217, tongue pull 218, and foot opening 219. The outer layer 215, in this example, is a knit outer shell covering the floating textile layer 216 and all lacing components, such as the lacing components discussed in reference to FIGS. 3A-3B below.

[0026] FIG. 2C illustrates a top view of footwear assembly 200, which includes illustration of outer layer 215, floating textile layer 216, heel pull 217, foot opening 219, and a floating tongue 220. In this example, the floating tongue 220 can be attached only at a distal end or only at a distal end and a proximal end adjacent the foot opening 219.

## LACING ARCHITECTURES

[0027] FIGS. 3A-3B are top-view diagrams illustrating a lacing architecture for use with footwear assemblies including a motorized lacing engine, according to some example embodiments. FIG. 3A is a top-view diagram illustrating a flattened footwear upper with a lacing architecture for use with a lacing engine, according to some example embodiments. In this example, the footwear upper 300 has a medial side 303 and a lateral side 303, as well as a distal end and a proximal end. The distal end includes a toe box section 307 and the proximal end includes a heel portion. The footwear upper 300 also includes a floating

textile layer 301, an outer layer 302, and a floating tongue 305. The floating tongue 305 extends out of the foot opening 309 of the outer layer 302 proximate a throat portion 311 formed from a U-shaped cut-out in at least the outer layer 302. In other examples, the throat portion 311 can be integrated into a covered layer of the outer layer 302, so the throat portion 311 and the lacing architecture is concealed from external view. In some examples, the throat portion 311 is also cut-out of the floating textile layer 301. In this example, the outer layer 302 can include an outer layer border 320. The outer layer border 320 can be a bonding material or some similar reinforcing structure. In some examples, the knit outer shell outer layer can be bonded directly to the mid-sole without an outer layer border.

[0028] In this example, the lacing architecture comprises a series of lace guides 310 that route a lace cable 319 in a crisscross pattern over the throat portion 311. A crisscross lacing pattern is one that alternates between medial and lateral side lace guides across a centerline of the footwear assembly. The lace cable 319 can be fixed at a medial lace termination 316 and a lateral lace termination 317, which creates a lace loop that is routed by the lacing architecture to engage a lacing engine housed within a mid-sole of the footwear assembly. The lacing engine can be located in various locations throughout the footwear assembly, but is discussed for exemplary purposes only as being more or less centered under the arch within the mid-sole.

[0029] In this example, the lacing architecture includes a tongue lace guide assembly 315 (or simply a tongue lace guide 315). The tongue lace guide 315 can include a medial facing lace guide and a lateral facing lace guide. The medial facing lace guide and the lateral facing lace guide can be molded or formed from a single piece of material or be separate structures coupled together in some manner. In certain examples, the medial facing lace guide and the lateral facing lace guide can be coupled together with an elastic member that allows for some separation between the lace guides upon application of tension on the lace cable 319. In certain examples, the medial facing lace guide and the lateral facing lace guide can be adhered to a tongue lace guide reinforcement 306. In yet other examples, the medial facing lace guide and the lateral facing lace guide are disposed

on, wrapped in, or otherwise connected via a webbing material. The tongue lace guide reinforcement can be a no-stretch or limited-stretch material, a rigid material, or an elastic material. The tongue lace guide reinforcement 306 can be adhered, stitched, or similarly affixed to the floating tongue 305. In some examples, the tongue lace guide reinforcement  
5 306 be padded or similarly constructed to distribute forces applied to the tongue lace guide across a wider area to avoid hot-spots for a user.

[0030] The lacing architecture can include multiple lace guides 310 distributed around a periphery of the throat portion 311 and affixed to an eyestay 308. The eyestay 308 can be a reinforced portion of the outer layer 302 or a separate structure affixed to the  
10 outer layer 302. The eyestay 308 can be a bonding material, as noted above. The lace guides 310 can be stitched, adhered, or otherwise affixed to the eyestay 308. The eyestay 308 can include enlarged areas to receive a lace guide 310, as illustrated in FIG. 3A. An example lace guide structure is discussed below in reference to FIGS. 4A-4F.

[0031] In the illustrated lacing architecture example, the lace guides 310 route the  
15 lace cable 319 proximally along a periphery of the throat portion 311 in a crisscross fashion. From the lace guides 310, the lace cable 319 is routed into the tongue lace guide 315, which in turn routes the lace cable 319 medially and laterally into heel lace guides 312. The heel lace guides 312 can be adhered or affixed to a heel counter as well as connected to a heel counter with an elastic connection or inelastic connection to distribute  
20 lace cable forces around a heel portion of the footwear assembly. From the heel lace guides 312 the lace cable 319 is routed into either a medial lace exit 318 or a lateral lace exit 319. The medial lace exit 318 and the lateral lace exit 319 route the lace cable 319 into a position to engage a lacing engine disposed in the mid-sole of the footwear assembly. The medial lace exit 318 and lateral lace exit 319 can be a molded lace guide, a fabric lace  
25 guide, a tubular lace guide, a channel molded into the mid-sole, or some similar structure capable of guiding the lace cable 319.

[0032] FIG. 3B is a diagram illustrating a floating tongue, according to an example embodiment. The floating tongue 305 includes a proximal end (top of figure) and a distal end (bottom of figure) as well as a medial side and a lateral side. In this example, the

floating tongue 305 includes a tongue outer layer 351 and a tongue inner layer 352. The tongue outer layer 351 can be a similar material to the outer layer 302 of the footwear upper 300. The tongue inner layer 352 can be a similar material to the floating textile layer 301 of the footwear upper 300. In other examples, the tongue outer layer 351 and tongue inner layer 352 can be alternative materials and include padding or other features designed to enhance user comfort.

[0033] FIG. 4A is a top-view diagram illustrating a flattened footwear upper 400 with a lacing architecture for use with a lacing engine, according to some example embodiments. FIG. 4B is a picture of an example footwear assembly utilizing the two-zone lacing architecture discussed in reference to FIG. 4A. In this example, the footwear upper 400 has a medial side 403 and a lateral side 404, as well as a distal (toe) end and a proximal (heel) end. The distal end includes a toe box section 407 and the proximal end includes a heel portion 406. The footwear upper 400 can also include a floating textile layer (optional, not illustrated), an outer layer 402, and a floating tongue 405. The floating tongue 405 extends out of the foot opening 409 of the outer layer 402 proximate a throat portion 411 (also referred to as a throat section) formed from a U-shaped cut-out in at least the outer layer 402. In some examples, the throat portion 411 varies in configuration, including various cut-out shapes or alternative material sections. All throat portions allow for portions of the lateral and medial sides of the footwear assembly to move in reference to each other. In other examples, the throat portion 411 can be integrated into a covered layer of the outer layer 402, so the throat portion 411 and the lacing architecture is concealed from external view. In some examples, the throat portion 411 is also cut-out of the floating textile layer. The footwear upper 400 can include some or all of the structures discussed in reference to footwear upper 300, but is illustrated in a more simplistic fashion to emphasize the two-zone lacing architecture.

[0034] In this example, the lacing architecture is split into two different zones. The first zone interacts with the toe or forefoot area of the footwear upper 400. The second zone interacts with the mid-foot area of the footwear upper 400. The first lacing zone lace cable is illustrated as a solid dark grey line, and the second lacing zone lace cable

illustrated as a dotted black line. These differences are merely for illustrative purposes to assist in distinguishing the different lace cable paths, the lace cable in these details is a single cable running from termination 420 to termination 421 (terminations also referred to as anchor locations or anchor points). Alternatively, even in designs where the first lacing zone and the second lacing zone utilize different lace cables, the material used **will** typically be common between the different zones. The first lacing zone can include lace guides guiding **the** lace cable **410** from a first lace termination 420. In this example, **the** first lace termination 420 is located on a distal-lateral portion of **eyestay** 408. The lace cable **410** is routed from the first lace termination 420 across a distal end of throat portion **411** and through a first medial lace guide 440. From **the** first medial lace guide 440 the lace cable 410 is routed back over **the** throat portion **411** and through a first lateral lace guide 430. From the first lateral lace guide 430, the lace cable **410** is routed past a second lateral lace guide 431 and through a third lateral lace guide 432. The lace guides are labeled first, second, third, etc. . . **to** signify an order running **proximally** from the distal end of **the** throat portion 411 towards **the foot** opening 409. Optionally, **the** lace cable 410 can route through a material guide 422 **enroute** from the first lateral lace guide 430 **to** the third lateral lace guide 432. From the third lateral lace guide 432, the lace cable 410 is routed through a lateral facing tongue lace guide 417 and down to a lateral heel lace guide 451 through an optional material guide 422. The lateral heel lace guide 451 routes the lace cable 410 **into** a mid-sole plate via lateral lace exit 419.

**[0035]** The second lacing zone includes a set of lace guides routing the lace cable 410 from the second termination 421 to the medial lace exit 418. **In** this example, the lace cable 410 is routed from the second termination 421 on the lateral side of eyestay 408 over the throat portion 411 to the second medial lace guide 441. From the second medial lace guide 441 the lace cable 410 is routed back over the throat portion 411 to the second lateral lace guide 431. The lace cable 410 then routes through the second lateral lace guide 431 back over the throat portion 411 for a third time and through the third medial lace guide 442. The third medial lace guide 442 routes the lace cable 410 on to the medial facing tongue lace guide 416, which routes the lace cable on towards **the** medial heel lace guide 450.

Enroute to the medial heel lace guide 450 the lace cable can optionally be routed through a material lace guide 424. From the medial heel lace guide 450 the lace cable 410 is routed into the mid-sole plate via the medial lace exit 418.

[0036] The two-zone lacing architecture enables an uneven distribution of the lace cable tension between the distal end of the throat portion 411 and the proximal end. The first lacing zone applies the same lace cable tension across fewer lace guides, resulting the tension being distributed across a smaller area. The second lacing zone distributes the lace cable tension over a larger area with more lace guides. The user experiences a tighter, higher performance fit in the toe (forefoot) area of the footwear with the two-zone lacing architecture. Other multi-zone lacing architectures can be utilized to vary the distribution of lace cable tension as desired for a particular footwear application.

[0037]

#### EXAMPLE LACE GUIDES

[0038] FIGs. 5A - 5F are diagrams illustrating an example lacing guide 800 for use in certain lacing architectures, according to some example embodiments. In this example, an alternative lace guide with an open lace channel is illustrated. The lacing guide 800 described below can be substituted into any of the lacing architectures discussed above in reference to lace guide 810, heel lace guide 610, or even the medial exit guide 835. All of the various configurations discussed above will not be repeated here for the sake of brevity. The lacing guide 800 includes a guide tab 805, a stitch opening 810, a guide superior surface 815, a lace retainer 820, a lace channel 825, a channel radius 830, a lace access opening 840, a guide inferior surface 845, and a guide radius 850. Advantages of an open channel lace guide, such as lacing guide 800, include the ability to easily route the lace cable after installation of the lace guides on the footwear upper. With tubular lace guides as illustrated in many of the lace architecture examples discussed above, routing the lace cable through the lace guides is most easily accomplish before adhering the lace guides to the footwear upper (not to say it cannot be accomplished later). Open channel lace guides facilitate simple lace routing by allowing the lace cable to simply be pushed pass the lace

retainer 820 after the lace guides 800 are positioned on the footwear upper. The lacmg guide 800 can be fabricated from various materials including metal or plastics.

[0039] In this example, the lacmg guide 800 can be initially attached to a footwear upper through stitching or adhesives. The illustrated design includes a stitch opening 810 that is configured to enable easy manual or automated stitching of lacing guide 800 onto a footwear upper (or similar material). Once lacing guide 800 is attached to the footwear upper, lace cable can be routed by simply pulling a loop of lace cable into the lace channel 825. The lace access opening 840 extends through the inferior surface 845 to provide a relief recess for the lace cable to get around the lace retainer 820. In some examples, the lace retainer 820 can be different dimensions or even be split into multiple smaller protrusions. In an example, the lace retainer 820 can be narrower in width, but extend further towards or even into access opening 840. In some examples, the access opening 840 can also be different dimensions, and will usually somewhat mirror the shape of lace retainer 820 (as illustrated in FIG. 5F). In this example, the channel radius 830 is designed to correspond to, or be slightly larger than, the diameter of the lace cable. The channel radius 830 is one of the parameters of the lacing guide 800 that can control the amount of friction experienced by the lace cable running through the lacing guide 800. Another parameter of lacmg guide 800 that impacts friction experienced by the lace cable includes guide radius 850. The guide radius 850 also may impact the frequency or spacing of lace guides positioned on a footwear upper.

[0040] FIG. 5G is a diagram illustrating a portion of footwear upper 805 with a lacing architecture 890 using lacing guides 800, according to some example embodiments. In this example, multiple lacing guides 800 are arranged on a lateral side of footwear upper 805 to form half of the lacing architecture 890. Similar to lacing architectures discussed above, lacing architecture 890 uses lacing guides 800 to form a wave pattern or parachute lacing pattern to route the lace cable. One of the benefits of this type of lacing architecture is that lace tightening can produce both later-medial tightening as well as anterior-posterior tightening of the footwear upper 805.

[0041] In this example, lacmg guides 800 are at least initially adhered to upper 805

through stitching 860. The stitching 860 is shown over or engaging stitch opening 810. One of the lacing guide 800 is also depicted with a reinforcement 870 covering the lacing guide. Such reinforcements can be positioned individually over each of the lacing guides 800. Alternatively, larger reinforcements could be used to cover multiple lacing guides.

5 Similar to the reinforcements discussed above, reinforcement 870 can be adhered through adhesives, heat-activated adhesives, and/or stitching. In some examples, reinforcement 870 can be adhered using adhesives (heat-activated or not) and a vacuum bagging process that uniformly compresses the reinforcement over the lacing guide. A similar vacuum bagging process can also be used with reinforcements and lacing guides discussed above. In other  
10 examples, mechanical presses or similar machines can be used to assist with adhering reinforcements over lacing guides.

[0042] Once all of the lacing guides 800 are initially positioned and attached to footwear upper 805, the lace cable can be routed through the lacing guides. Lace cable routing can begin with anchoring a first end of the lace cable at lateral anchor point 870.

15 The lace cable can then be pulled into each lace channel 825 starting with the anterior most lacing guide and working posteriorly towards the heel of upper 805. Once the lace cable is routed through all lacing guides 800, reinforcements 870 can be optionally adhered over each of the lacing guides 800 to secure both the lacing guides and the lace cable.

## 20 EXAMPLES

[0043] The present inventors have recognized, among other things, a need for an improved lacing architecture for automated and semi-automated tightening of shoe laces. This document describes, among other things, example lacing architectures and example lace guides used in the lacing architectures. The following examples provide some non-  
25 limiting examples of the actuator and footwear assembly discussed herein.

[0044] Example 1 describes subject matter including a footwear assembly with a lacing architecture to facilitate automated tightening. In this example, the footwear assembly can include a footwear upper assembly, a lace cable, a plurality of lace guides, a tongue lace guide, a medial heel lace guide, a lateral heel lace guide, as well as a medial



and lateral lace exit. The footwear **upper** assembly can include an outer layer, a floating textile layer, and a floating tongue, the footwear upper assembly including a toe box section, a medial side, a lateral side, a heel section, and a central throat section. The footwear assembly can also include a lace cable running through a plurality of lace guides.

5 The lace cable can include a first end anchored to the upper assembly adjacent a distal medial portion of the central throat and a second end anchored to the upper assembly adjacent a distal lateral portion of **the** central throat. The plurality **of** lace guides can be distributed on the upper assembly along **the** medial side and **the** lateral side of **the** central throat, each lace guide **of** the plurality of lace guides adapted to receive a length of the lace  
10 cable. In **this** example, the lace cable can extend through each **of** the plurality of lace guides and into the tongue lace guide assembly. The tongue lace guide assembly can be secured **to** a proximal portion **of** the floating tongue, **the** tongue lace guide **assembly** adapted **to** receive lace cable from both **the** medial side and the lateral side. The medial heel guides can be positioned **to** receive the lace cable from the tongue lace guide along **the**  
15 medial side of the upper assembly. The lateral heel lace guide can **be** positioned to receive the lace cable from the tongue lace guide along the lateral side of **the** upper assembly. The medial lace **exit** can route the lace cable from the medial heel lace guide into a position allowing the lace cable to engage a lacing engine disposed within a mid-sole portion of the footwear assembly. The lateral lace **exit** can route the lace cable from the lateral heel lace  
20 guide into a position to engage the lacing engine.

[0045] In example 2, the subject matter **of** example 1 can optionally include **the** tongue lace guide assembly having a medial facing lace guide opposite a lateral facing lace guide.

[0046] In example 3, the subject matter of example 2 can optionally include the  
25 tongue lace guide assembly having an elastic member coupling the medial facing lace guide to the lateral facing lace guide.

[0047] In example 4, the subject matter of example 2 can optionally include the tongue lace guide assembly being a single structure with a rigid connection between the medial facing lace guide and the lateral facing lace guide.

[0048] In example 5, the subject matter of any one of examples 1 to 4 can optionally include the tongue lace guide assembly being fused to a reinforcement material that is stitched to the floating tongue.

[0049] In example 6, the subject matter of any one of examples 1 to 5 can optionally include the floating tongue being secured to the upper assembly adjacent to a distal end of the central throat.

[0050] In example 7, the subject matter of example 6 can optionally include the floating tongue being additionally secured to the upper assembly adjacent a proximal end of the central throat.

[0051] In example 8, the subject matter of example 7 can optionally include the floating tongue having an elastic coupling to the upper assembly.

[0052] In example 9, the subject matter of any one of examples 1 to 8 can optionally include the lace cable forming a crisscross pattern across at least a length of the central throat connecting the medial side the lateral side of the upper assembly.

[0053] In example 10, the subject matter of example 9 can optionally include the crisscross pattern being created by routing the lace cable in an alternating pattern between lace guides on the medial side and lace guides on the lateral side of the upper assembly.

[0054] In example 11, the subject matter of any one of examples 1 to 10 can optionally include the medial heel lace guide and the lateral heel lace guide being coupled, via a heel coupling, to a heel counter within the heel section of the upper assembly.

[0055] In example 12, the subject matter of example 11 can optionally include at least one of the heel counter or the heel coupling being an elastic member.

[0056] In example 13, the subject matter of any one of examples 1 to 12 can optionally include each lace guide of the plurality of lace guides forming a u-shaped channel to retain the lace cable.

[0057] In example 14, the subject matter of example 13 can optionally include the u-shaped channel in each lace guide being an open channel allowing a lace loop to be pulled into the lace guide.

[0058] In example 15, the subject matter of any one of examples 1 to 14 can

optionally include each lace guide of the plurality of lace guides being at least secured to the upper assembly by stitching.

[0059] In example 16, the subject matter of example 15 can optionally include each lace guide of the plurality of lace guides being further secured to the upper assembly with an overlay including heat-activated adhesive compressed over each lace guide.

[0060] Example 17 describes subject matter including a lacing architecture for an automated footwear platform. In this example, the lacing architecture for an automated footwear platform can include a lace cable routed through a plurality of medial lace guides and a plurality of lateral guides into a tongue lace guide. For the tongue lace guide the lace cable can be routed into a medial heel lace guide and/or a lateral heel lace guide, which then leads to either a medial lace exit or a lateral lace exit. The lace cable can include a first end anchored to an upper assembly adjacent a distal medial portion of a central throat and a second end anchored to the upper assembly adjacent a distal lateral portion of the central throat. The plurality of medial lace guides can be distributed on the upper assembly adjacent to a medial side of the central throat. The tongue lace guide can be secured to a proximal portion of a floating tongue, with the tongue lace guide assembly adapted to receive lace cable from a medial lace guide of the plurality of medial lace guides and a lateral lace guide of the plurality of lateral lace guides. The medial heel lace guide can be positioned to receive the lace cable from the tongue lace guide along a medial side of the upper assembly. While, the lateral heel lace guide can be positioned to receive the lace cable from the tongue lace guide along a lateral side of the upper assembly. The medial lace exit can route the lace cable from the medial heel lace guide into a position allowing the lace cable to engage a lacing engine disposed within a mid-sole portion of the footwear platform. While the lateral lace exit routes the lace cable from the lateral heel lace guide into a position to engage the lacing engine.

[0061] In example 18, the subject matter of example 17 can optionally include the tongue lace guide having a medial facing lace guide opposite a lateral facing lace guide.

[0062] In example 19, the subject matter of example 18 can optionally include the tongue lace guide including an elastic member coupling the medial facing lace guide to the

lateral facing lace guide.

[0063] In example 20, the subject matter of example 18 can optionally include the tongue lace guide assembly being a single structure with a rigid connection between the medial facing lace guide and the lateral facing lace guide.

5 [0064] In example 21, the subject matter of example 17 can optionally include the tongue lace guide being fused to a reinforcement material that is stitched to a floating tongue.

[0065] Example 22 describes subject matter including a footwear assembly with a lacing architecture to facilitate automated tightening. In this example, the footwear  
10 assembly can include a footwear upper assembly, a lace cable, a plurality of lace guides, a tongue lace guide, a medial heel lace guide, a lateral heel lace guide, as well as a medial and lateral lace exit. The lace cable can include a first end anchored to the upper assembly in a first anchor location and a second end anchored to the upper assembly in a second anchor location. A first plurality of lace guides can form a first lacing zone routing a first  
15 portion of the lace cable to tension a forefoot region of the footwear assembly. A second plurality of lace guides can form a second lacing zone routing a second portion of the lace cable to tension a mid-foot region of the footwear assembly. A tongue lace guide assembly can be secured to a proximal portion of the floating tongue, the tongue lace guide assembly adapted to receive lace cable from both the medial side and the lateral side. The medial  
20 heel lace guide can be positioned to receive the lace cable from the tongue lace guide along the medial side of the upper assembly. The lateral heel lace guide can be positioned to receive the lace cable from the tongue lace guide along the lateral side of the upper assembly. The medial lace exit can route the lace cable from the medial heel lace guide into a position allowing the lace cable to engage a lacing engine disposed within a mid-sole  
25 portion of the footwear assembly. The lateral lace exit can route the lace cable from the lateral heel lace guide into a position to engage the lacing engine.

[0066] In Example 23, the subject matter of Example 22 can optionally include the second plurality of lace guides having a greater number of lace guides than the first plurality of lace guides.

[0067] In Example 24, the subject matter of any one of Examples 22 and 23 can optionally include the second plurality of lace guides distributing lace cable tension across a larger area of the footwear assembly than the first plurality of lace guides.

[0068] In Example 25, the subject matter of any one of Examples 1 to 3 can optionally include the first plurality of lace guides including a medial lace guide on the medial side of the central throat section and two lateral lace guides on the lateral side of the central throat section.

[0069] In Example 26, the subject matter of Example 25 can optionally include the first lateral lace guide of the two lateral lace guides being located towards a distal end of the central throat section and the second lateral lace guide of the two lateral lace guides being located towards a proximal end of the central throat section.

[0070] In Example 27, the subject matter of Example 26 can optionally include the lace cable path for the first lacing zone including the path segments such as: the first anchor location to the medial lace guide; the medial lace guide to the first lateral lace guide; and the first lateral lace guide to the second lateral lace guide.

[0071] In Example 28, the subject matter of Example 27 can optionally include the lace cable path for the first lacing zone continuing from the first second lateral lace guide to a lateral facing lace guide in the tongue lace guide assembly.

[0072] In Example 29, the subject matter of Example 28 can optionally include the lace cable path for the first lacing zone continuing from the lateral facing lace guide to the lateral heel lace guide.

[0073] In Example 30, the subject matter of any one of Examples 22 to 29 can optionally include the second plurality of lace guides forming the second lacing zone including a first lateral lace guide disposed along a central portion of a lateral side of the central throat section and a plurality of medial lace guides distributed along a length of a medial side of the central throat section.

[0074] In Example 31, the subject matter of Example 30 can optionally include the lace cable path for the second lacing zone including the path segments such as: the second anchor location to a first medial lace guide of the plurality of medial lace guides; the first

medial lace guide to the first lateral lace guide; the first lateral lace guide to a second medial lace guide of the plurality of medial lace guides.

[0075] In Example 32, the subject matter of Example 31 can optionally include the second anchor location is located on a lateral side of the central throat section proximal at least one lace guide from the first lacing zone.

[0076] In Example 33, the subject matter of any one of Example 30 and 31 can optionally include the lace cable path for the second lacing zone further including a path segment running from the second medial lace guide to a medial facing lace guide within the tongue lace guide assembly.

[0077] In Example 34, the subject matter of Example 33 can optionally include the lace cable path for the second lacing zone continuing from the lateral facing lace guide to the lateral heel lace guide.

[0078] In Example 35, the subject matter of any one of Examples 22 to 34 can optionally include the first anchor location being on the lateral side distal of the central throat section, and the second anchor location being on the lateral side adjacent to a first lateral lace guide.

[0079] In Example 36, the subject matter of any one of Examples 22 to 35 can optionally include the tongue lace guide assembly having a medial facing lace guide opposite a lateral facing lace guide.

[0080] In Example 37, the subject matter of Example 36 can optionally include the tongue lace guide assembly having an elastic member coupling the medial facing lace guide to the lateral facing lace guide.

[0081] In Example 38, the subject matter of Example 36 can optionally include the tongue lace guide assembly is a single structure with a rigid connection between the medial facing lace guide and the lateral facing lace guide.

[0082] In Example 39, the subject matter of Example 38 can optionally include the tongue lace guide assembly being fused to a reinforcement material that is stitched to the floating tongue.

[0083] In Example 40, the subject matter of any one of Examples 22 to 39 can

optionally include the medial heel lace guide and the lateral heel lace guide being coupled, via a heel coupling, to a heel counter within the heel section of the upper assembly.

[0084] In Example 41, the subject matter of Example 40 can optionally include at least one of the heel counter or the heel coupling being an elastic member.

[0085] Example 42 describes subject matter including a lacing architecture for an automated footwear platform. In this example, the lacing architecture can include a lace cable, a first lacing zone and a second lacing zone. The lace cable can include a first end anchored to an upper footwear assembly adjacent a distal lateral portion of a central throat and a second end anchored to the upper assembly adjacent a first lateral lace guide on a lateral portion of the central throat. The first lacing zone can include a first portion of the lace cable running from the first end over the central throat to a first medial lace guide back over the central throat to a first lateral lace guide proximal along a lateral side of the central throat to a third lateral lace guide proximal to a lateral facing lace guide within a tongue lace guide assembly laterally to a lateral heel lace guide and on to a lateral lace exit along a lateral edge of the footwear upper. The second lacing zone can include a second portion of the lace cable running from the second end over the central throat to a second medial lace guide back over the central throat to a second lateral lace guide back over the central throat to a third medial lace guide proximally to a medial facing lace guide within the tongue lace guide assembly medially to a medial heel lace guide and on to a medial lace exit along a medial edge of the footwear upper.

#### ADDITIONAL NOTES

[0086] Throughout this specification, plural instances may implement components, operations, or structures described as a single instance. Although individual operations of one or more methods are illustrated and described as separate operations, one or more of the individual operations may be performed concurrently, and nothing requires that the operations be performed in the order illustrated. Structures and functionality presented as separate components in example configurations may be implemented as a combined structure or component. Similarly, structures and functionality presented as a single

component may be implemented as separate components. These and other variations, modifications, additions, and improvements fall within the scope of the subject matter herein.

[0087] Although an overview of the inventive subject matter has been described with reference to specific example embodiments, various modifications and changes may be made to these embodiments without departing from the broader scope of embodiments of **the** present disclosure. Such embodiments of the inventive subject matter may be referred to herein, individually **or** collectively, by the term "invention" merely for convenience and without intending to voluntarily **limit the** scope of this application to any single disclosure or inventive concept if more than one is, in **fact**, disclosed.

[0088] The embodiments illustrated herein are described in sufficient detail **to** enable those skilled **in** the art to practice the teachings disclosed. Other embodiments may be used and derived therefrom, such that structural and logical substitutions and changes may be made without departing from **the** scope **of this** disclosure. The disclosure, therefore, is **not** **to** be taken **in** a limiting sense, and **the** scope of various embodiments includes **the full** range of equivalents **to** which **the** disclosed subject matter is entitled.

[0089] As used herein, **the** term "or" may be construed **in** either an inclusive or exclusive sense. Moreover, plural instances may be provided for resources, operations, or structures described herein as a single instance. Additionally, boundaries between various resources, operations, modules, engines, and data stores are somewhat arbitrary, and particular operations are illustrated in a context **of** specific illustrative configurations. Other allocations of functionality are envisioned and may fall within a scope of various embodiments of the present disclosure. **In** general, structures and functionality presented as separate resources **in** the example configurations may be implemented as a combined structure or resource. Similarly, structures and functionality presented as a single resource may **be** implemented as separate resources. These and other variations, modifications, additions, and improvements fall within a scope of embodiments of the present disclosure as represented by the appended claims. The specification and drawings are, accordingly, to be regarded **in** an illustrative rather than a restrictive sense.



[0090] Each of these non-limiting examples can stand on its own, or can be combined in various permutations or combinations with one or more of the other examples.

[0091] The above detailed description includes references to the accompanying drawings, which form a part of the detailed description. The drawings show, by way of

5 illustration, specific embodiments in which the invention can be practiced. These embodiments are also referred to herein as "examples." Such examples can include elements in addition to those shown or described. However, the present inventors also contemplate examples in which only those elements shown or described are provided. Moreover, the present inventors also contemplate examples using any combination or  
10 permutation of those elements shown or described (or one or more aspects thereof), either with respect to a particular example (or one or more aspects thereof), or with respect to other examples (or one or more aspects thereof) shown or described herein.

[0092] In the event of inconsistent usages between this document and any documents so incorporated by reference, the usage in this document controls.

15 [0093] In this document, the terms "a" or "an" are used, as is common in patent documents, to include one or more than one, independent of any other instances or usages of "at least one" or "one or more." In this document, the term "or" is used to refer to a nonexclusive or, such that "A or B" includes "A but not B," "B but not A," and "A and B," unless otherwise indicated. In this document, the terms "including" and "in which" are  
20 used as the plain-English equivalents of the respective terms "comprising" and "wherein." Also, in the following claims, the terms "including" and "comprising" are open-ended, that is, a system, device, article, composition, formulation, or process that includes elements in addition to those listed after such a term in a claim are still deemed to fall within the scope of that claim. Moreover, in the following claims, the terms "first," "second," and "third,"  
25 etc. are used merely as labels, and are not intended to impose numerical requirements on their objects.

[0094] The above description is intended to be illustrative, and not restrictive. For example, the above-described examples (or one or more aspects thereof) may be used in combination with each other. Other embodiments can be used, such as by one of ordinary

skill in the art upon reviewing the above description. An Abstract, if provided, is included to comply with 37 C.F.R. §1.72(b), to allow the reader to quickly ascertain the nature of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. Also, in the above Description, various features may be grouped together to streamline the disclosure. This should not be interpreted as intending that an unclaimed disclosed feature is essential to any claim. Rather, inventive subject matter may lie in less than all features of a particular disclosed embodiment. Thus, the following claims are hereby incorporated into the Detailed Description as examples or embodiments, with each claim standing on its own as a separate embodiment, and it is contemplated that such embodiments can be combined with each other in various combinations or permutations. The scope of the invention should be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled.

CLAIMS:

The claimed invention includes:

- 5 1. A footwear assembly comprising:
- a footwear upper assembly comprising an outer layer and a floating tongue, the footwear upper assembly including a toe box section, a medial side, a lateral side, a heel section, and a central throat section;
- a lace cable with a first end anchored to the upper assembly in a first anchor
- 10 location and a second end anchored to the upper assembly in a second anchor location;
- a first plurality of lace guides forming a first lacing zone routing a first portion of the lace cable to tension a forefoot region of the footwear assembly;
- a second plurality of lace guides forming a second lacing zone routing a second portion of the lace cable to tension a mid-foot region of the footwear assembly;
- 15 a tongue lace guide assembly secured to a proximal portion of the floating tongue, the tongue lace guide assembly adapted to receive lace cable from both the medial side and the lateral side;
- a medial heel lace guide positioned to receive the lace cable from the tongue lace guide along the medial side of the upper assembly;
- 20 a lateral heel lace guide positioned to receive the lace cable from the tongue lace guide along the lateral side of the upper assembly;
- a medial lace exit routing the lace cable from the medial heel lace guide into a position allowing the lace cable to engage a lacing engine disposed within a mid-sole portion of the footwear assembly; and
- 25 a lateral lace exit to route the lace cable from the lateral heel lace guide into a position to engage the lacing engine.

2. The footwear assembly of claim 1, wherein the second plurality of lace guides distributes lace cable tension across a larger area of the footwear assembly than the first plurality of lace guides.

3. The footwear assembly of claim 1, wherein the first plurality of lace guides includes a medial lace guide on the medial side of the central throat section and two lateral lace guides on the lateral side of the central throat section.

4. The footwear assembly of claim 3, wherein the first lateral lace guide of the two lateral lace guides is located towards a distal end of the central throat section and the second lateral lace guide of the two lateral lace guides is located towards a proximal end of the central throat section.

5. The footwear assembly of claim 4, wherein the lace cable path for the first lacing zone includes the following path segments:  
the first anchor location to the medial lace guide;  
the medial lace guide to the first lateral lace guide; and  
the first lateral lace guide to the second lateral lace guide.

6. The footwear assembly of claim 5, wherein the lace cable path for the first lacing zone continues from the first second lateral lace guide to a lateral facing lace guide in the tongue lace guide assembly.

7. The footwear assembly of claim 6, wherein the lace cable path for the first lacing zone continues from the lateral facing lace guide to the lateral heel lace guide.

8. The footwear assembly of claim 1, wherein the second plurality of lace guides includes a first lateral lace guide disposed along a central portion of a lateral side of the

central throat section and a plurality of medial lace guides distributed along a length of a medial side of the central throat section.

9. The footwear assembly of claim 8, **wherein** the lace cable path for the second lacing zone includes the following path segments:

the second anchor location to a first medial lace guide of the plurality of medial lace guides;

the first medial lace guide to **the** first lateral lace guide;

the first lateral lace guide **to** a second medial lace guide **of** the plurality of medial lace guides.

10. The footwear assembly **of** claim 9, wherein the lace cable path for the second lacing zone further includes a path segment running from the second medial lace guide **to** a medial facing lace guide within the tongue lace guide assembly.

11. The footwear assembly of claim 10, wherein the lace cable path **for the** second lacing zone continues from the lateral facing lace guide to the lateral heel lace guide.

12. The footwear assembly of claim 1, wherein the first anchor location is on the lateral side distal of the central throat section, and the second anchor location is on the lateral side adjacent to a first lateral lace guide.

13. A lacing architecture for an automated footwear platform, the lacing architecture comprising:

a lace cable with a first end anchored to an upper assembly adjacent a distal lateral portion of a central throat and a second end anchored to the upper assembly adjacent a first lateral lace guide on a lateral portion of the central throat;

a first lacing zone including a first portion of the lace cable running from the first end over **the** central throat to a first medial lace guide back over the central throat to a first

lateral lace guide proximal along a lateral side of the central throat to a third lateral lace guide proximal to a lateral facing lace guide within a tongue lace guide assembly laterally to a lateral heel lace guide and on to a lateral lace exit along a lateral edge of the footwear upper;

5 a second lacing zone including a second portion of the lace cable running from the second end over the central throat to a second medial lace guide back over the central throat to a second lateral lace guide back over the central throat to a third medial lace guide proximally to a medial facing lace guide within the tongue lace guide assembly medially to a medial heel lace guide and on to a medial lace exit along a medial edge of the footwear  
10 upper.

14. A footwear assembly comprising:

a footwear upper assembly comprising an outer layer, a floating textile layer, and a floating tongue, the footwear upper assembly including a toe box section, a medial side, a  
15 lateral side, a heel section, and a central throat section;

a lace cable with a first end anchored to the upper assembly adjacent a distal medial portion of the central throat and a second end anchored to the upper assembly adjacent a distal lateral portion of the central throat;

20 a plurality of lace guides distributed on the upper assembly along the medial side and the lateral side of the central throat, each lace guide of the plurality of lace guides adapted to receive a length of the lace cable;

a tongue lace guide assembly secured to a proximal portion of the floating tongue, the tongue lace guide assembly adapted to receive lace cable from both the medial side and the lateral side;

25 a medial heel lace guide positioned to receive the lace cable from the tongue lace guide along the medial side of the upper assembly;

a lateral heel lace guide positioned to receive the lace cable from the tongue lace guide along the lateral side of the upper assembly;

a medial lace exit routing the lace cable from the medial heel lace guide into a position allowing the lace cable to engage a lacing engine disposed within a mid-sole portion of the footwear assembly; and

a lateral lace exit to route the lace cable from the lateral heel lace guide into a position to engage the lacing engine.

15. The footwear assembly of claim 14, wherein the tongue lace guide assembly includes a medial facing lace guide opposite a lateral facing lace guide.

16. The footwear assembly of claim 15, wherein the tongue lace guide assembly include an elastic member coupling the medial facing lace guide to the lateral facing lace guide.

17. The footwear assembly of claim 15, wherein the tongue lace guide assembly is a single structure with a rigid connection between the medial facing lace guide and the lateral facing lace guide.

18. The footwear assembly of claim 17, wherein the tongue lace guide assembly is fused to a reinforcement material that is stitched to the floating tongue.

19. The footwear assembly of claim 14, wherein the medial heel lace guide and the lateral heel lace guide coupled, via a heel coupling, to a heel counter within the heel section of the upper assembly.

20. The footwear assembly of claim 14, wherein the plurality of lace guides includes:  
a first plurality of lace guides forming a first lacing zone routing a first portion of the lace cable to tension a forefoot region of the footwear assembly; and  
a second plurality of lace guides forming a second lacing zone routing a second portion of the lace cable to tension a mid-foot region of the footwear assembly.

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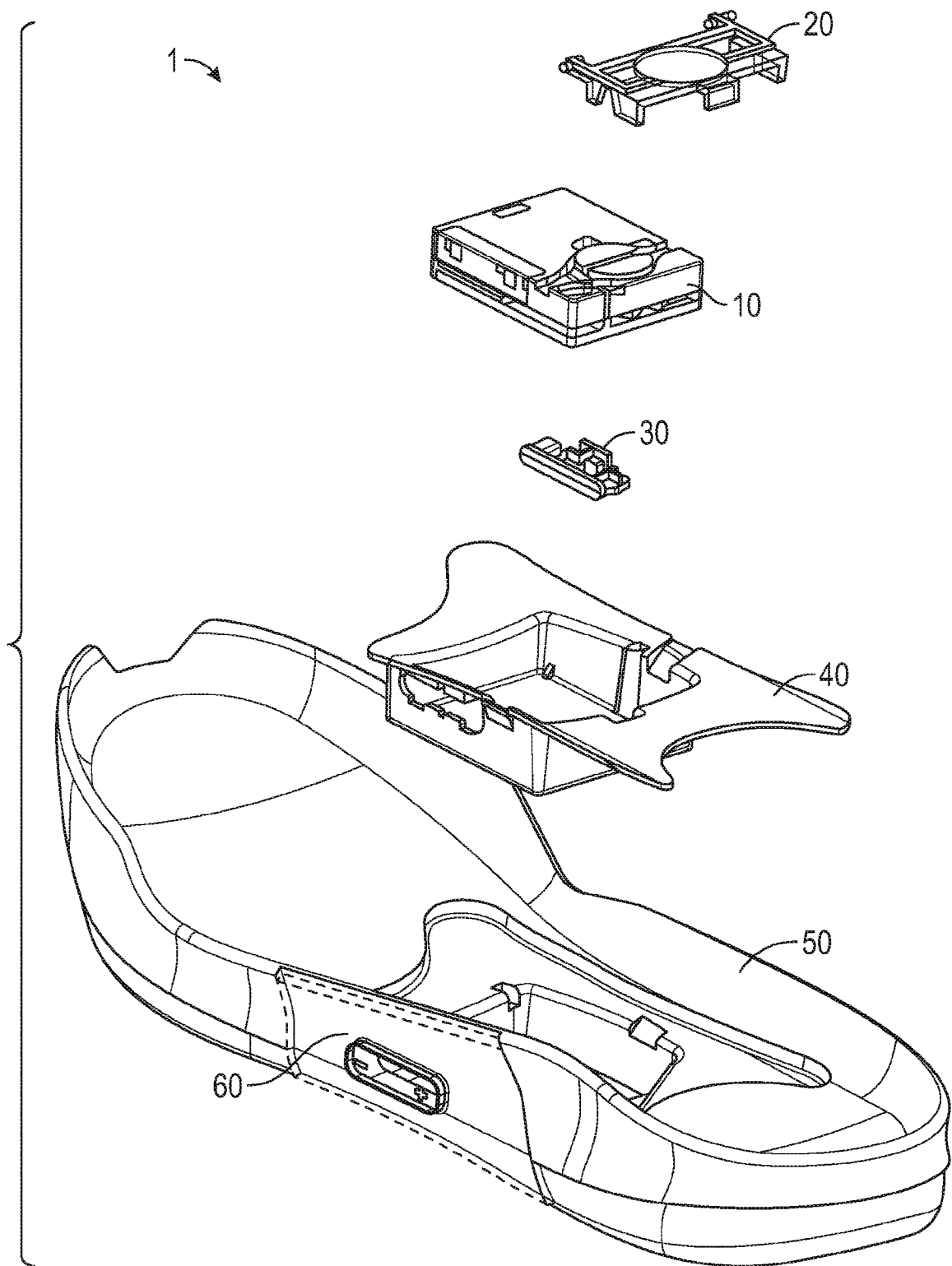


FIG. 1



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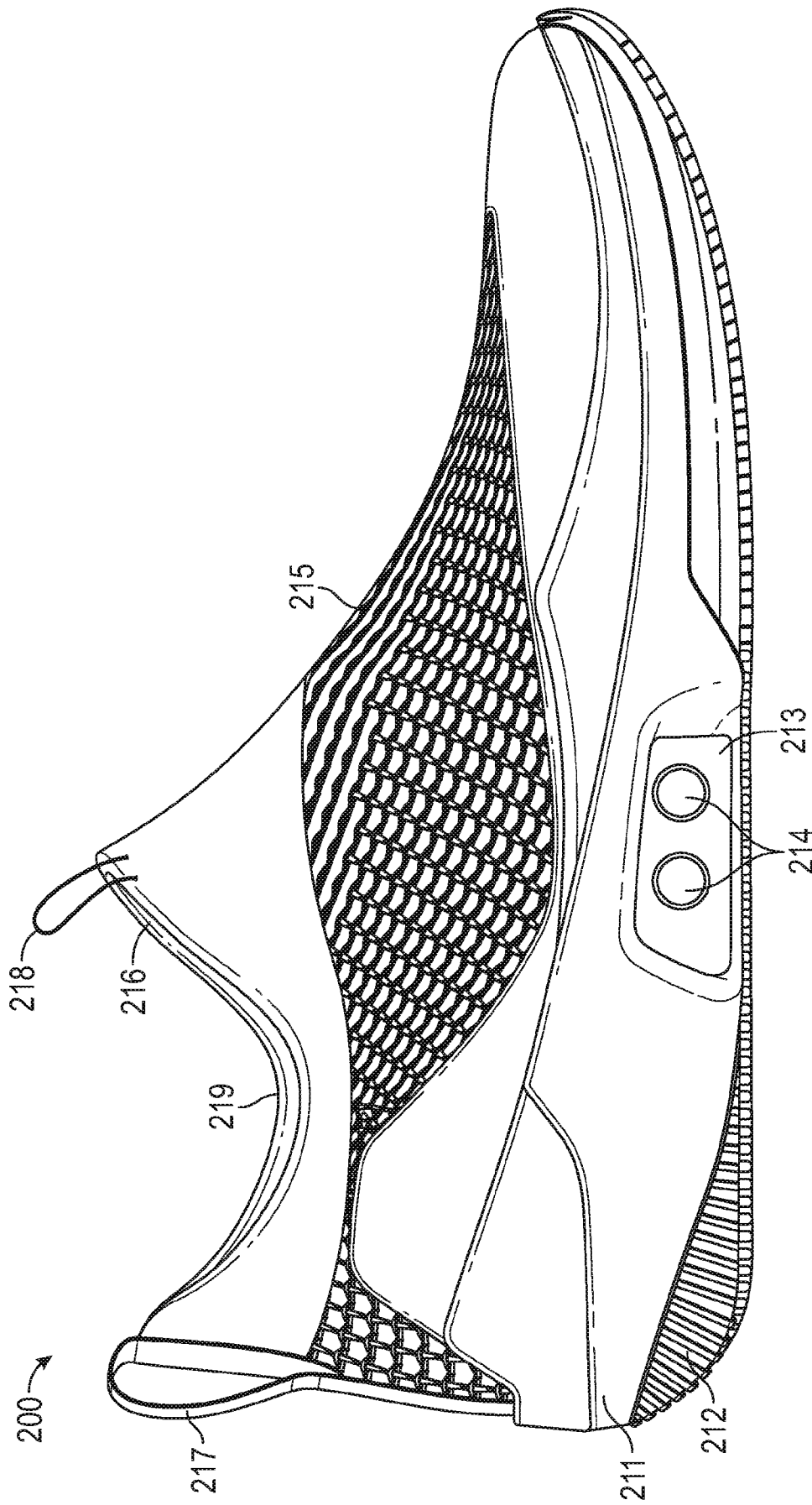


FIG. 2A

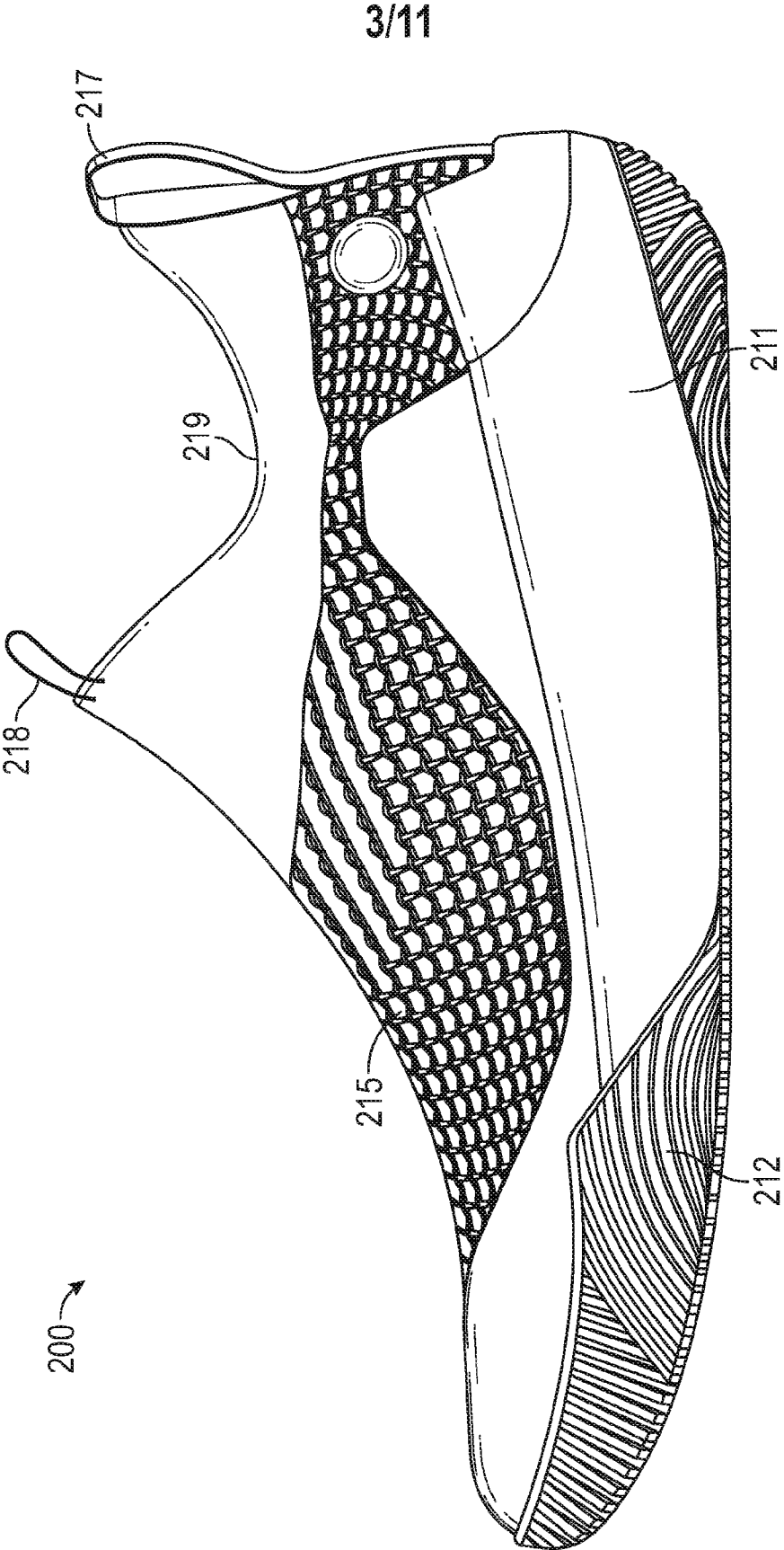
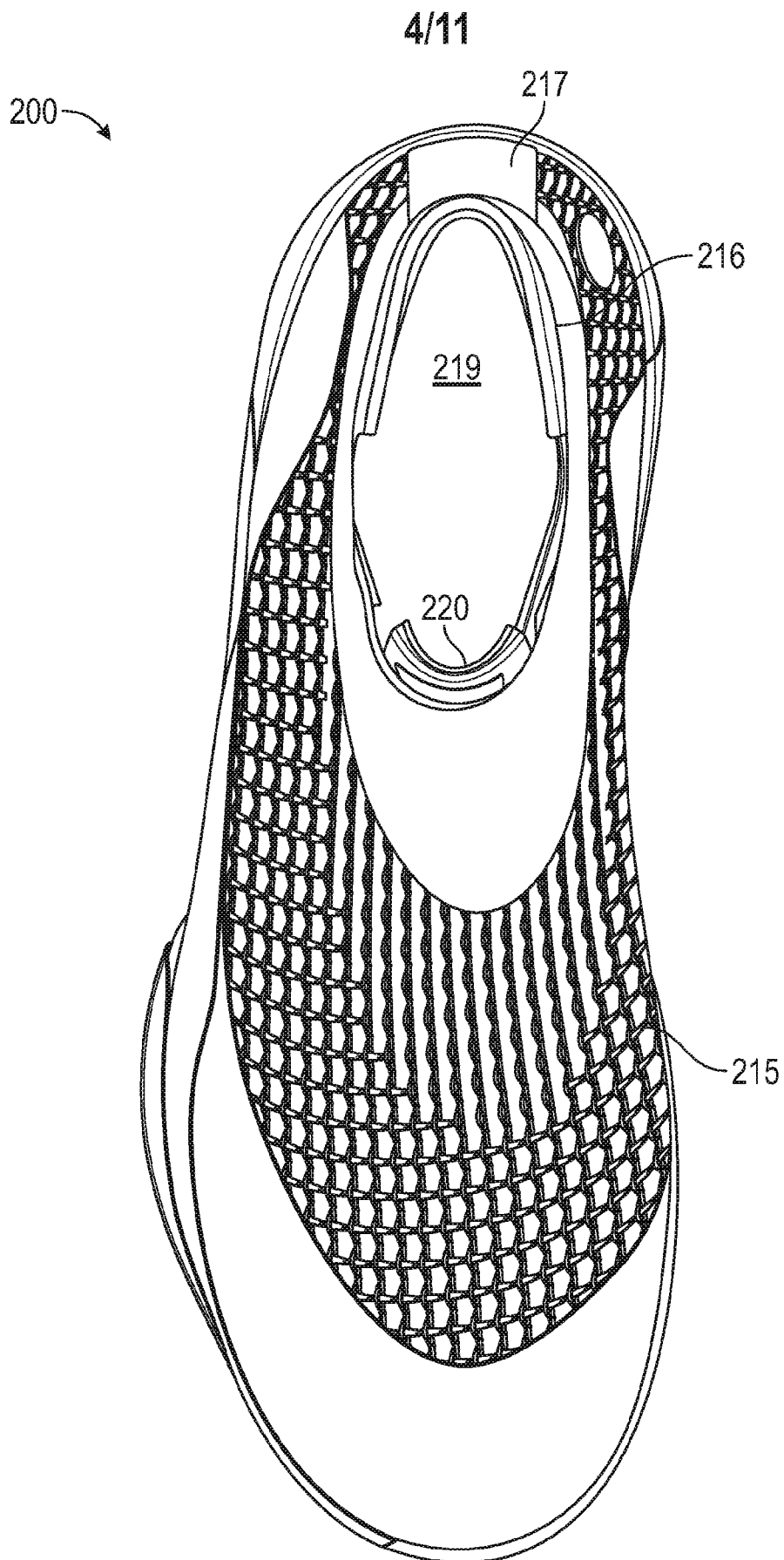
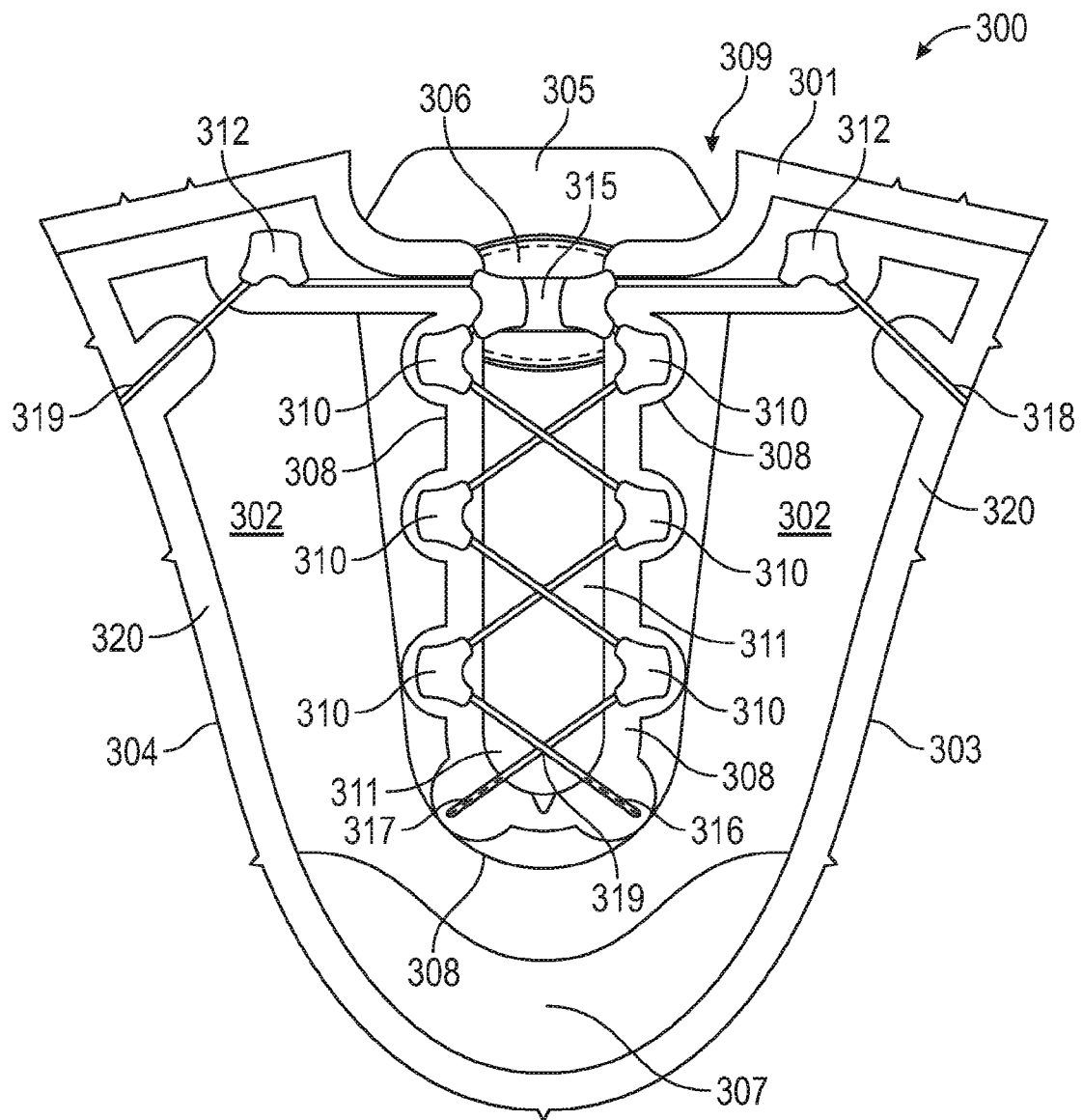


FIG. 2B



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**FIG. 3A**

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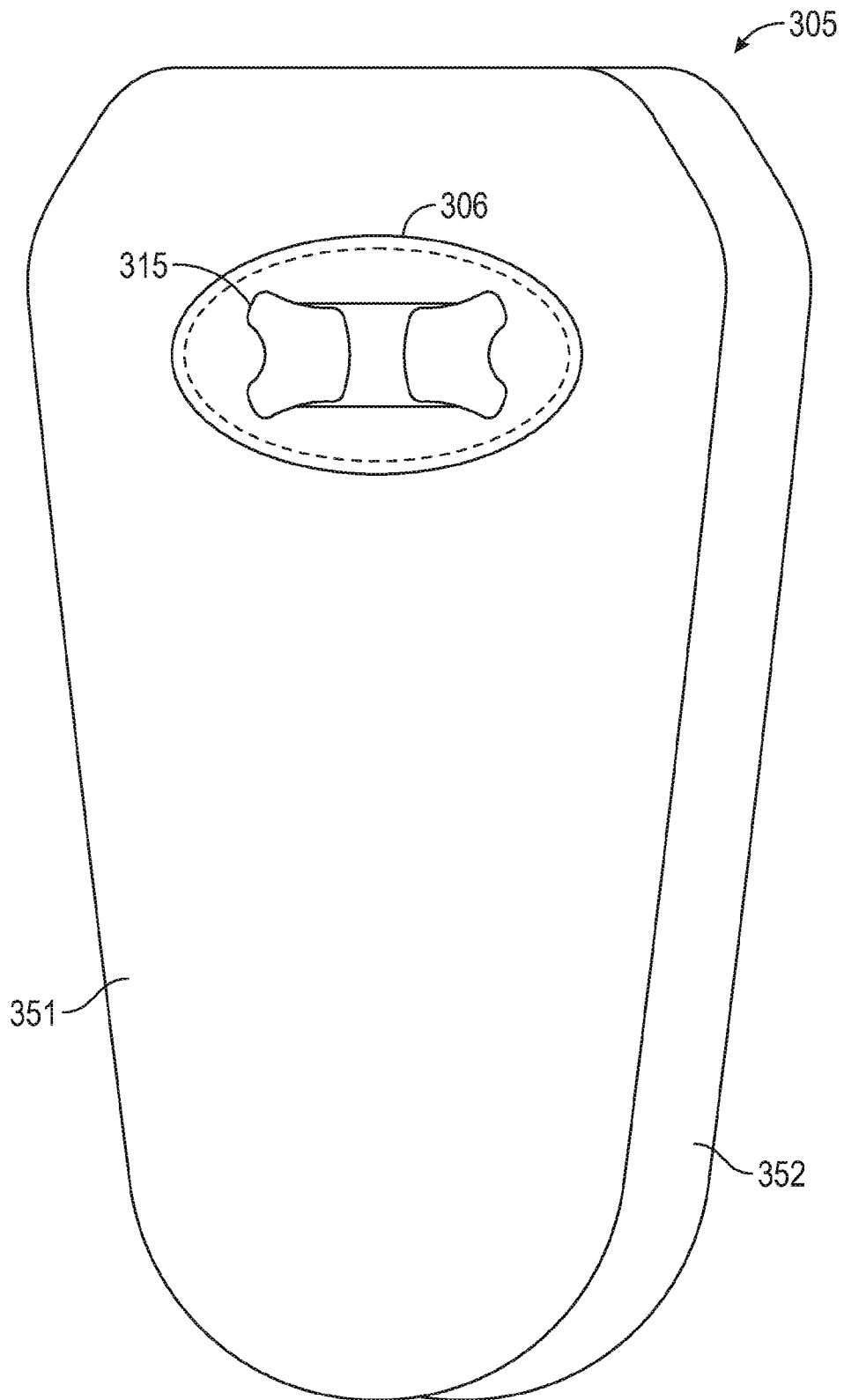
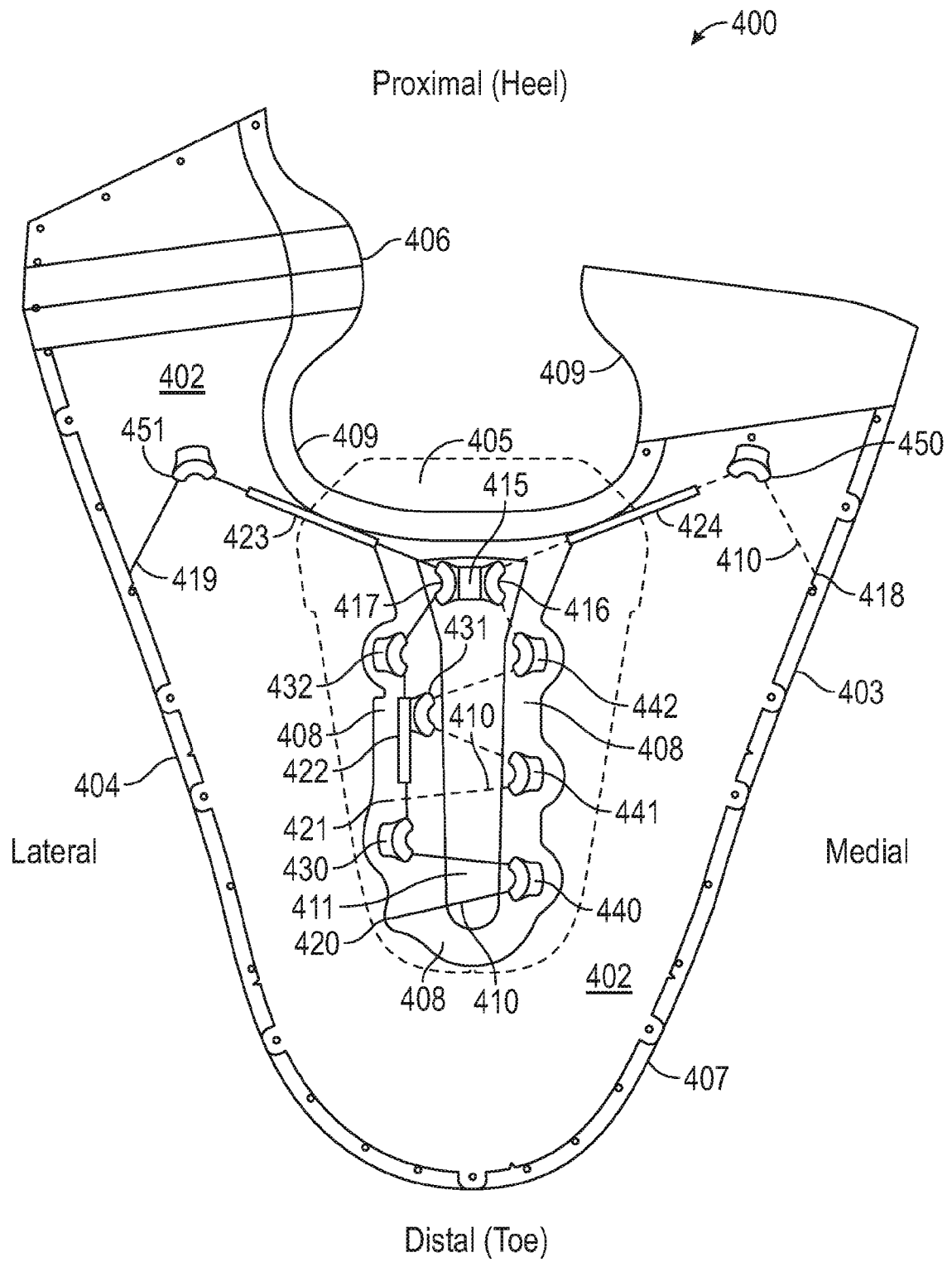
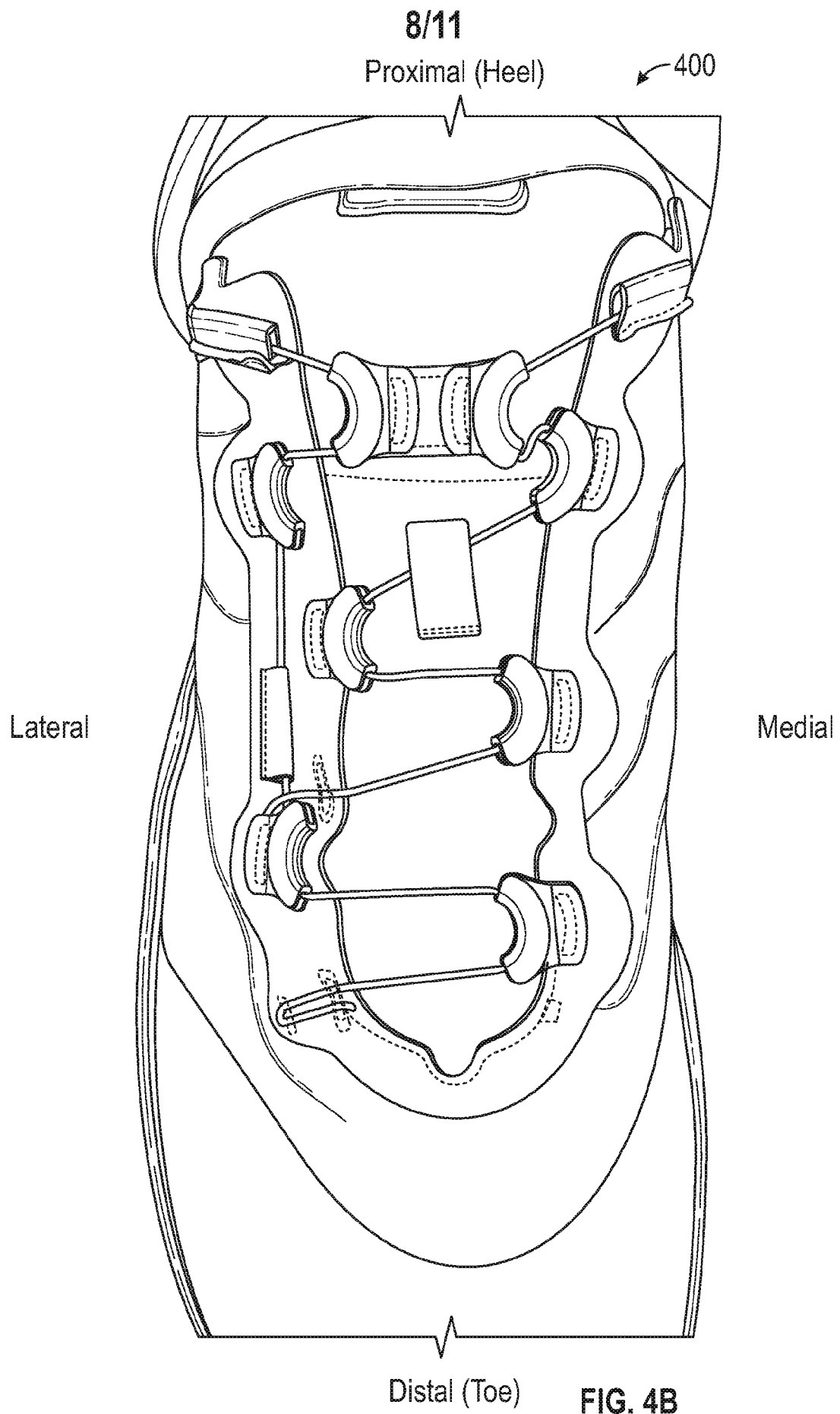


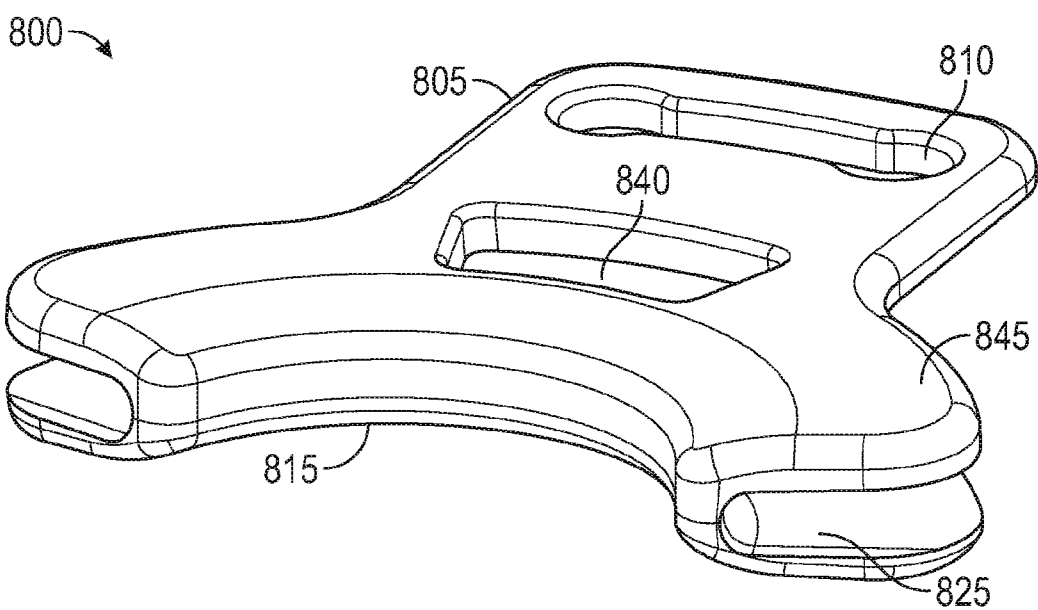
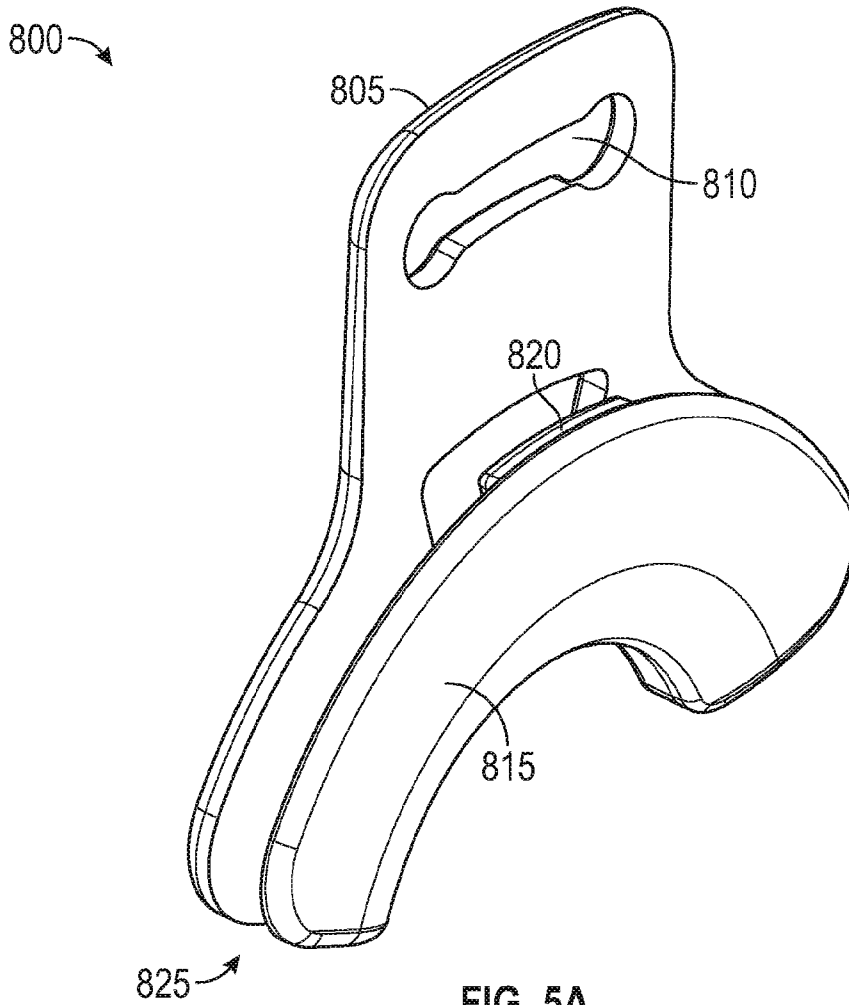
FIG. 3B

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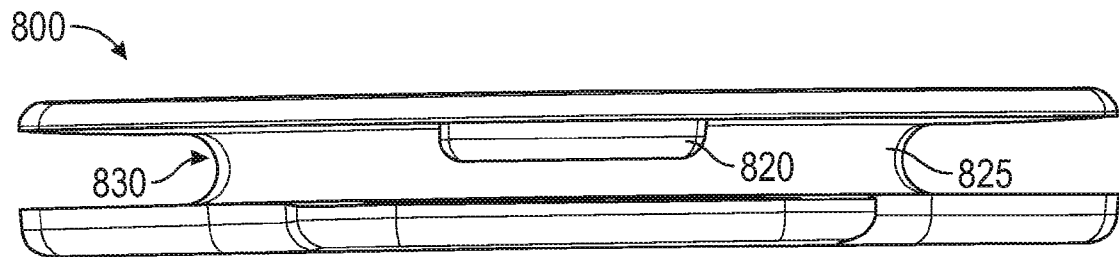


FIG. 5C

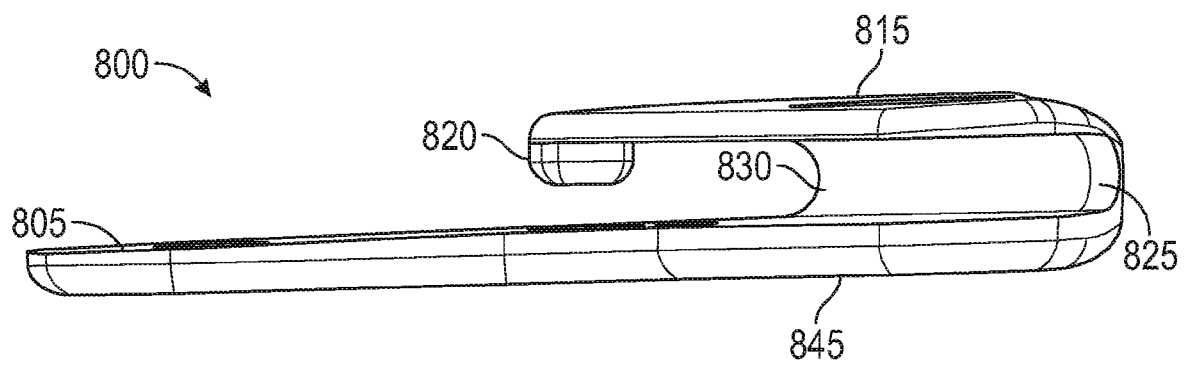


FIG. 5D

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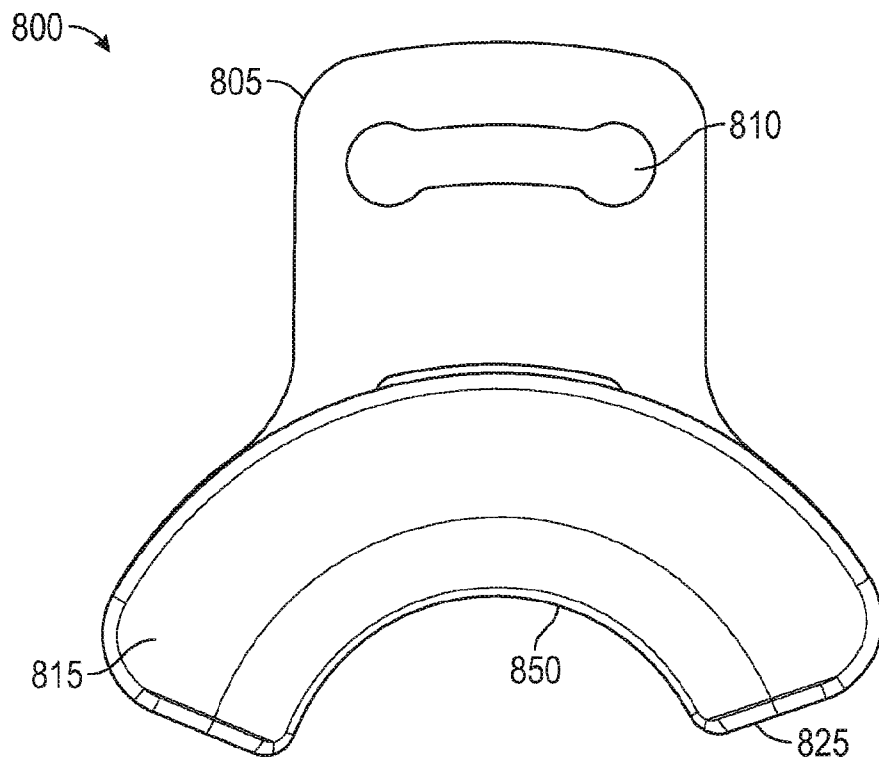


FIG. 5E

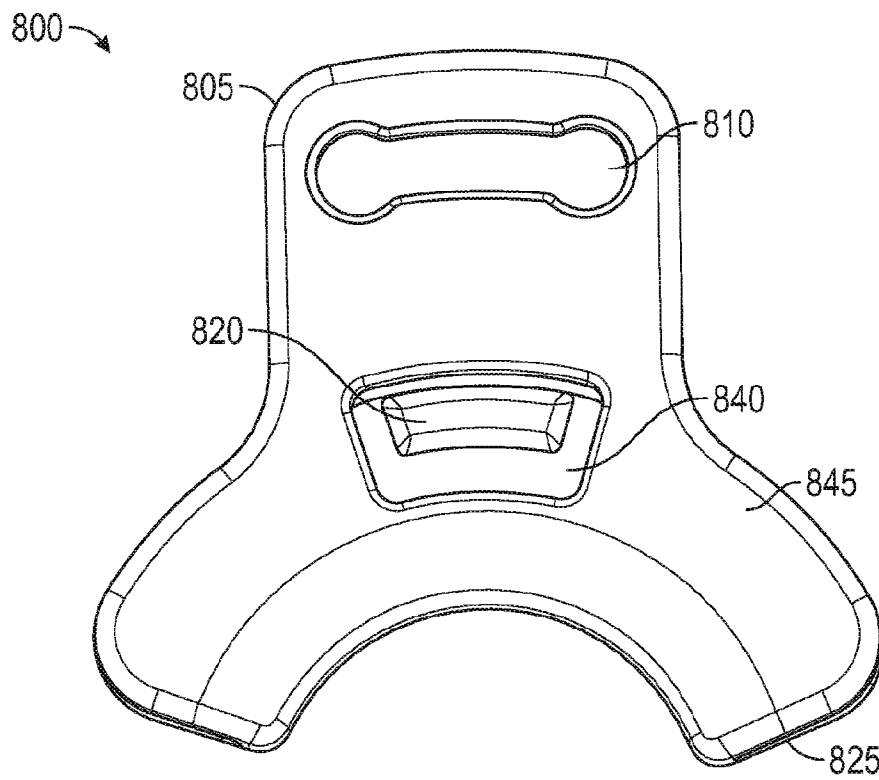


FIG. 5F

## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2018/056631****A. CLASSIFICATION OF SUBJECT MATTER****A43C 7/08(2006.01)i, A43C 11/16(2006.01)i, A43C 11/08(2006.01)i**

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

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

A43C 7/08; A43B 11/00; A43B 5/04; A43B 7/04; A43C 1/00; A43C 11/00; A43C 11/16; A43C 11/08

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) &amp; Keywords: footwear, lace, cable, guide

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category' * | Citation of document, with indication, where appropriate, of the relevant passages                              | Relevant to claim No. |
|-------------|---|-----------------------|
| A           | US 2007-0068040 AI (YVES FARYS) 29 March 2007<br>See paragraphs [0036]- [0052] ; claims 1-15 ; and figures 1,2. | 1-20                  |
| A           | US 7752774 B2 (USSHER TIMOTHY JAMES) 13 July 2010<br>See column 2, lines 1-7 ; claim V, and figures 1,2.        | 1-20                  |
| A           | US 2017-0265593 AI (NIKE, INC.) 21 September 2017<br>See the whole document .                                   | 1-20                  |
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Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of mailing of the international search report

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

**PCT/US2018/056631**

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