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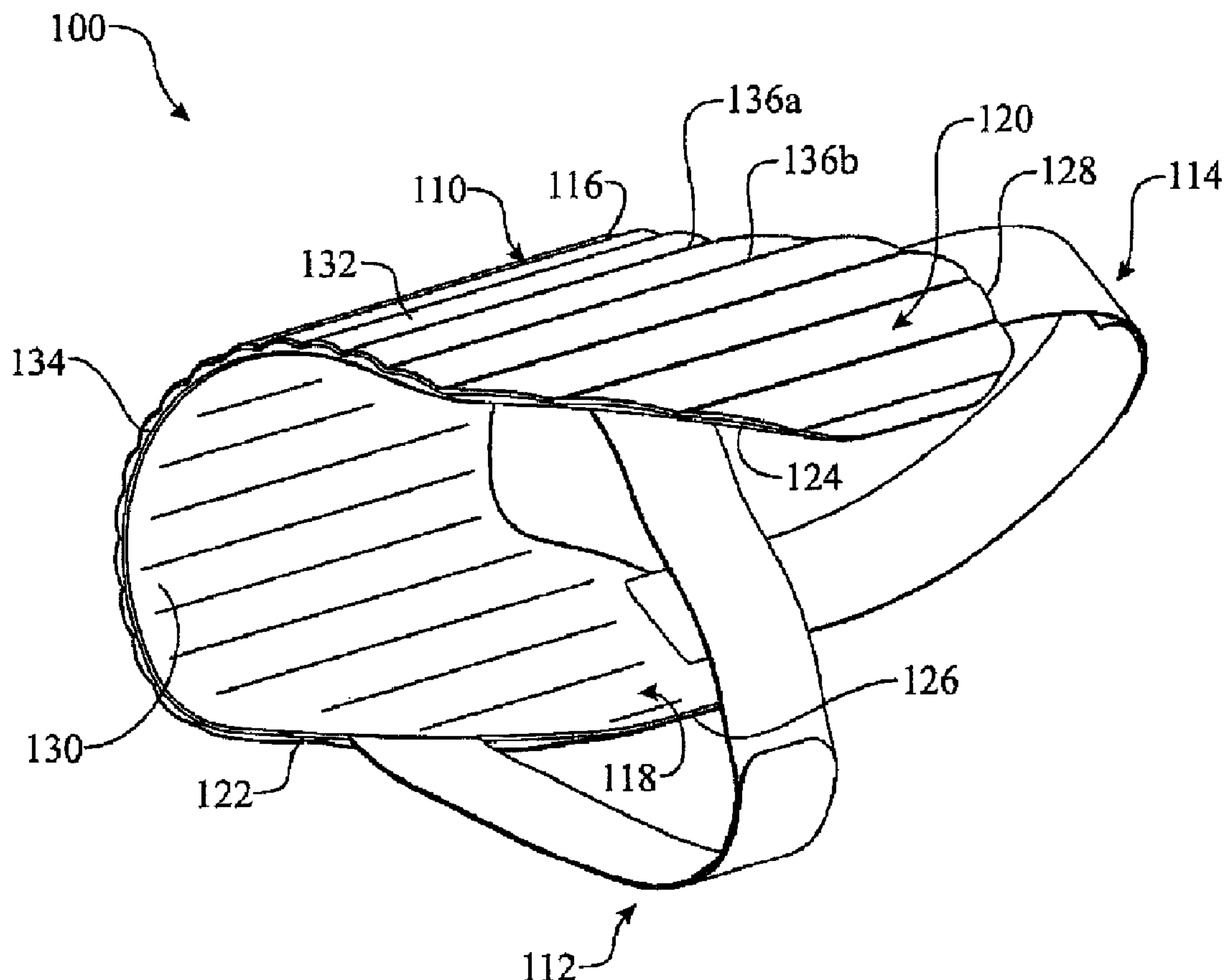
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(54) **Titre : DISPOSITIF DE PROTECTION D'ATHLETE**

(54) **Title: ATHLETE PROTECTION APPARATUS**



(57) **Abrégé/Abstract:**

A shot blocker apparatus comprising a flexible guard and a front strap and a rear strap. The guard includes a flexible base fabric layer and a first cover layer affixed thereto to define a plurality of longitudinally extending channels therebetween. A relatively rigid

(57) Abrégé(suite)/Abstract(continued):

plate and a relatively flexible plate are disposed within each of the plurality of longitudinally extending channels. The guard includes a main guard body and right and left guard wings extending from the main guard body. A second cover layer is applied over the first cover layer to define a second set of longitudinally extending channels for receipt of relatively rigid and/or relatively flexible plates. A kneepad assembly and method of construction are provided and include a sleeve having a ribbed upper cover layer and a flat base layer. The ribbed upper cover layer and flat base layer define an interior pocket therebetween.

ATHLETE PROTECTION APPARATUS

ABSTRACT

A shot blocker apparatus comprising a flexible guard and a front strap and a rear strap. The guard includes a flexible base fabric layer and a first cover layer affixed thereto to define a plurality of longitudinally extending channels therebetween. A relatively rigid plate and a relatively flexible plate are disposed within each of the plurality of longitudinally extending channels. The guard includes a main guard body and right and left guard wings extending from the main guard body. A second cover layer is applied over the first cover layer to define a second set of longitudinally extending channels for receipt of relatively rigid and/or relatively flexible plates. A kneepad assembly and method of construction are provided and include a sleeve having a ribbed upper cover layer and a flat base layer. The ribbed upper cover layer and flat base layer define an interior pocket therebetween.

ATHLETE PROTECTION APPARATUS

Cross Reference to Related Applications

[0001] This application is a U.S. non-provisional utility patent application, which claims the benefit of co-pending U.S. provisional patent application Serial No. 61/860,019, filed on July 30, 2013 and co-pending U.S. provisional patent application Serial No. 61/985,046, filed on April 28, 2014, both of which are incorporated by reference herein in their entireties.

Field of the Invention

[0002] The present invention relates generally to protective gear worn by athletes during a sporting activity. More particularly, the invention pertains to a wearable apparatus constructed for absorbing the impact of an object striking the body of player during a sporting activity, such as the impact of a hockey puck.

Background of the Invention

[0003] Many sporting activities incorporate the use of an object intentionally thrown or struck by a player at an extremely high rate of speed. Absent protective gear, such objects function as high-speed projectiles likely to cause severe bodily injury. Even with conventional protective gear, bodily injury is a common occurrence. An extreme example is the game of ice hockey, during which a hockey puck constructed from solid vulcanized rubber can easily reach speeds of 80-100 miles per hour. In fact, slap shots by professional hockey players have been known to exceed 100 miles per hour. Furthermore, sporting injuries can occur just as readily from the blow of another player's equipment, such as a hockey stick.

[0004] During play, it is not uncommon for a hockey player to intentionally position body parts in harm's way to prevent an opponent from scoring, or even advancing the puck. With the trend of foot and ankle injuries increasingly significantly over the past few years, there has been

an increasing utilization of so-called “shot blockers;” protective guards worn about the exterior of a player’s skate to resist or dampen the blow caused by impact with a puck. Likewise, similar protective articles are commonly worn to protect a player’s shins and knees.

[0005] Most shot blocking products are formed of a monolithic structure molded to conform to the shape of a player’s foot or skate. For example, rigid lightweight materials, such as polypropylene-graphite composites, are commonly used. While such devices are effective at dampening the impact of a blow, they have a number of inherent limitations, drawbacks and disadvantages. In addition to being very costly, the rigid molded structure of most shot blockers tends to make them uncomfortable to wear while skating. In addition to causing discomfort to the wearer, they often tend to shift -- making them clunky and, in some instances, limiting a player’s movement on the ice. Generally, conventional devices are expensive and they lack the flexibility necessary for a player to perform at his or her potential.

[0006] Another drawback of conventional shot blocker designs is that the aforementioned inflexibility limits their reuse on skates of varying shapes and sizes. For younger hockey players, still growing physically, this means having to continuously repurchase such devices as their feet grow. In particular, for youth and adolescent players whose feet are constantly growing, this means the purchase of new protective gear every year. Accordingly, with each new pair of skates, a new pair of molded guards must be purchased.

[0007] More flexible devices are known, however, because they are not molded to conform to the particular shape of a particular player’s skate, these generic devices tend to be clunky, resulting in a bulky skate. In the game of hockey, a bulky skate will limit a player’s turning radius and speed, which can be very costly, in terms of the outcome of the game. Additionally, the known devices often require attachment using the skate shoe laces. This can prevent a player from cinching his skate up tight enough to be secure about his foot.

[0008] Also, most of the known devices cannot be customized to an individual player or team. This is particularly important when the device is designed for use in youth sports where it is desirable to incorporate a team logo on the device and/or identifying indicia of an individual player.

[0009] Accordingly, there remains a need in the art for a protective apparatus construction that is adaptable for a variety of uses, including, for example, hockey skate and pad shot blocking devices, which is very flexible in order to comfortably readily conform to skates of varying sizes and shapes, be integrated with existing leg and other padding, while still maintaining the rigidity required to protect a player's foot and other body parts. It would be highly desirable to provide such an apparatus that is inexpensive and easily customizable to an individual team or player.

Summary of the Invention

[0010] The present invention overcomes the deficiencies of the known art and the problems that remain unsolved by providing a method and respective apparatus for blocking the impact of a sporting object against a foot or other body part of a user.

[0011] In accordance with one exemplary implementation, a shot blocker apparatus is provided comprising:

a guard having guard body and a pair of selectively securable straps extending therefrom, the guard body including a flexible base fabric layer and a first cover layer affixed to said flexible base fabric layer to define a plurality of longitudinally extending channels therebetween; and

a relatively rigid plate and a relatively flexible plate disposed within each of the plurality of longitudinally extending channels.

[0012] In another aspect, the guard body includes a main guard body and right and left guard wings extending from the main guard body to protect the ankles of the user.

[0013] In another aspect, the first cover layer is stitched to the base fabric layer to define the longitudinally extending channels.

[0014] In another aspect, the first cover layer is formed from a flexible fabric suitable for receiving printing.

[0015] In yet another aspect, a set of transition stitching lines are formed between the main guard body and the right and left guard wings to define additional channels in the right and left guard wings independent of the channels formed in the main guard body.

[0016] In yet another aspect, the plurality of longitudinally extending channels defines a first set of longitudinally extending channels, and an additional second cover layer is affixed over the first cover layer and stitched thereto to define a second set of longitudinally extending channels for receipt of rigid and/or flexible plates.

[0017] In yet another aspect, the first set of longitudinally extending channels is staggered with respect to the second set of longitudinally extending channels.

[0018] In yet another aspect, the second set of longitudinally extending channels includes a gap therebetween.

[0019] In yet another aspect, there is provided a method of use, comprising the steps of:

providing a flexible shot blocker guard having a main guard body including a plurality of longitudinally extending channels;

inserting a rigid and a flexible plate into each of the plurality of longitudinally extending channels within the main guard body; and

affixing the main guard body of the flexible shot blocker over laces provided on the skate of a user.

[0020] In another exemplary implementation, a knee pad assembly and corresponding method of construction is provided for protecting lateral and posterior areas of a player's leg from impact-related injury.

[0021] In accordance with one implementation, the knee pad assembly comprises:

a sleeve defining an interior pocket, the sleeve including:

a first base layer and a ribbed upper cover layer, and

an arcuate support pad having an arcuate attachment structure and a straight support pad having a straight support pad; and

a first layer of rigid material positioned in the interior pocket and a second layer of flexible material positioned in the interior pocket of said sleeve.

[0022] In an aspect, the arcuate attachment structure includes an arcuate length of hook-and-loop selective closure material.

[0023] In another aspect, the straight attachment structure includes a straight length of hook and loop closure material

[0024] In another aspect, the first base layer, the ribbed upper cover layer, the arcuate support pad and the straight support pad are integrally formed.

[0025] In another aspect, the first rigid layer of material is formed from a polymer composite.

[0026] In another aspect, the first rigid layer of material is formed as a series of elongated rigid plates.

[0027] In another aspect, the first rigid layer of material is formed as a series of elongated rigid plates having semi-spherical cross sections.

[0028] In another aspect, the second flexible layer of material is formed from a polymer composite.

[0029] In another aspect, the second flexible layer of material is formed as a series of elongated flexible plates.

[0030] In another aspect, the elongate rigid plates of the first rigid layer of material are positioned atop and intermediate of the individual flexible plates of the second flexible layer of material.

[0031] These and other aspects, features, and advantages of the present invention will become more readily apparent from the attached drawings and the detailed description of the preferred embodiments, which follow.

Brief Description of the Drawings

[0032] The preferred embodiments of the invention will hereinafter be described in conjunction with the appended drawings provided to illustrate and not to limit the invention, in which:

[0033] FIG. 1 presents a bottom isometric view of a shot blocker apparatus;

[0034] FIG. 2 presents a top isometric view of the shot blocker apparatus, originally introduced in FIG. 1;

[0035] FIG. 3 presents a sectional view of the shot blocker apparatus, originally introduced in FIG. 1, taken along line 3-3 of FIG. 2, showing inner components;

[0036] FIG. 4 presents a top plan view of an alternative embodiment of a shot blocker apparatus;

[0037] FIG. 5 presents a sectional view of the alternate embodiment shot blocker apparatus, originally introduced in FIG. 4, taken along line 5-5 of FIG. 4;

[0038] FIG. 6 presents a top isometric view of the shot blocker apparatus, originally introduced in FIG. 1, being strapped to a skate;

[0039] FIG. 7 presents a top isometric view of the shot blocker apparatus, originally introduced in FIG. 1, strapped to the skate;

[0040] FIG. 8 presents an isometric view of an exemplary knee pad assembly;

[0041] FIG. 9 presents a cross-sectional view of the knee pad assembly originally introduced in FIG. 8, wherein the section is taken along section line 9--9 of FIG. 8;

[0042] FIG. 10 presents an end view of the knee pad assembly originally introduced in FIG. 8;

[0043] FIG. 11 presents an isometric front view of the knee pad assembly originally introduced in FIG. 8, shown in a curved configuration;

[0044] FIG. 12 presents an isometric view of the knee pad assembly originally introduced in FIG. 1 and an existing hockey knee wear or leg protector, immediately prior to assembly;

[0045] FIG. 13 presents an alternative isometric view of the knee pad assembly and the existing hockey leg protector originally introduced in FIG. 12; and

[0046] FIG. 14 presents an isometric view showing the knee pad assembly and the existing hockey leg protector originally introduced in FIG. 12, in an assembled condition.

[0047] Like reference numerals refer to like parts throughout the several views of the drawings.

DETAILED DESCRIPTION

[0048] The following detailed description is merely exemplary in nature and is not intended to limit the described embodiments or the application and uses of the described embodiments. As used herein, the word “exemplary” or “illustrative” means “serving as an example, instance, or illustration.” Any implementation described herein as “exemplary” or “illustrative” is not necessarily to be construed as preferred or advantageous over other implementations. All of the implementations described below are exemplary implementations provided to enable persons skilled in the art to make or use the embodiments of the disclosure and are not intended to limit the scope of the disclosure, which is defined by the claims. For purposes of description herein, the terms “upper”, “lower”, “left”, “rear”, “right”, “front”, “vertical”, “horizontal”, and derivatives thereof shall relate to the invention as oriented in FIG. 1. Furthermore, there is no intention to be bound by any expressed or implied theory presented in the preceding technical field, background, brief summary or the following detailed description. It is also to be

understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification, are simply exemplary embodiments of the inventive concepts defined in the appended claims. Hence, specific dimensions and other physical characteristics relating to the embodiments disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.

[0049] A first exemplary implementation of the invention, in the form of a hockey puck shot blocking apparatus, shown generally as reference numeral 100, is presented in various configurations in FIGS. 1 through 3. Referring initially to FIGS. 1 and 2, the shot blocker apparatus 100 includes a guard 110, for protecting a wearer's foot from impact with a hockey puck, hockey stick and the like. Front and rear strap sets, 112 and 114, respectively, are provided for securing the shot blocker apparatus 100 to the wearer's skate as described in more detail hereinbelow. The guard 110 includes a main guard body 116 and right and left guard wings 118 and 120, respectively, extending rearwardly from the main guard body 116. The front straps 112 extends from outer side edges 122 and 124 of the main guard body 116, while the rear strap 114 extends from rear edges 126 and 128 of the right and left guard wings 118 and 120, respectively.

[0050] The guard 110 generally includes a base fabric layer 130 and a first cover layer 132. The first cover layer 132 defines a first set of longitudinally extending pockets or channels 134. The base fabric layer 130 and the first cover layer 132 are formed from a shock-absorbing material similar to that used in forming shoulder pads and other protective garments. Additionally, the first cover layer 132 is formed from a material that can be colored and readily accepts printing. This allows the first cover layer 132 to be printed upon with images and indicia relating to a team color, team name and logo, and the like. Furthermore, it allows the first cover layer 132 to be easily customized to an individual by incorporating the individual's player number or other identification, such as, for example, a player's name, on the first cover layer 132.

[0051] Referring particularly to FIG. 3, the first set of channels 134 are formed by securing or adhering the first cover layer 132 to a second cover layer 170, described in more detail hereinbelow, along longitudinally extending lines of attachment 136, such as, for example, lines of attachment 136a and 136b. The first cover layer 132 may be affixed to the second cover layer 170 using any of myriad means of attachment, including stitching, chemical adhesive, welding,

heat sealing, securely bonding the first cover layer 132 to the second cover layer 170. In a preferred embodiment, the first cover layer 132 is affixed to the second cover layer 170 by stitching in lines of attachment 136a, 136b, etc. to form and define the channels 134.

[0052] As best shown in FIG. 2, the front strap 112 includes a right front segment 138 and a left front segment 140. Likewise the rear strap 114 includes a right rear segment 142 and a left rear segment 144. The right front segment 138 extends from the outer side edge 122 of the main guard body 116 and the left front segment 140 extends from the outer side edge 124 of the main guard body 116. The right rear segment 142 extends from the rear edge 126 of the right guard wing 118 and the left rear segment 144 extends from the rear edge 128 of the left guard wing 120.

[0053] The right front segment 138 of the front strap 112 preferably includes attachment structure, such as, a strip of securing material 146 at a free end 148 of the right front segment 138, which cooperates with a complimentary strip of material (not shown) on a free end 150 of the left front segment 140. Similarly, the right rear segment 142 of the rear strap 114 includes a strip of securing material 152 at a free end 154, which cooperates with a corresponding strip of securing material (not shown) at a free end 156 of the left rear segment 144. The strips of securing material 146 and 152 may be formed from a variety of securing structures and materials, such as, for example hook-and-loop material, snaps, adhesive strips and the like. In a preferred embodiment, the strips of securing material 146 and 152 are formed from hook-and-loop-fastener system to providing greater adjustment flexibility.

[0054] The channels 134 may have equal or varying lengths. For example, the channels 134a-134e adjacent the outer side edge 124 of the main guard body 116 and the channels 134p - 134t adjacent the outer side edge 122 of the main guard body 116 may have varying lengths, while the channels 134f-134o of the main guard body 116 have equal lengths. The lengths and shapes of each of the channels 134a-134o define the shape, or peripheral edge, of the guard 110. In the exemplary implementation, as best illustrated in FIG. 2, the shape of the guard 110 is defined by a trapezoidal main guard body 116 with right and left guard wings 118 and 120 extending rearwardly from the main guard body 116. It is understood that the guard 110 may be

implemented in a multitude of shapes and geometries, which allow the guard 110 to conform to the shape of a skate 200, without departing from the scope of the invention.

[0055] A first transition line 158 can be provided between the main guard body 116 and the right guard wing 118, and a second transition line 160 can be provided between the main guard body 116 and the left guard wing 120. Preferably, the transition lines 158 and 160 are formed by stitching and provide a greater range of movement and flexibility between the main guard body 116 and the right and left guard wings 118 and 120, respectively. This also results separate sets of right guard channels 162 and a left guard channels 164, which are independent of the channels 134 of the main guard body 116.

[0056] Referring now specifically to FIG. 3, a partial cross-section of a portion of the main guard body 116 of the guard 110 is shown illustrating some of the channels 134 such as, for example, the channels 134f-134h. In order to provide protection against the impact of hard structures, such as hockey pucks, the channels 134 contain longitudinally extending rigid plates 166. The rigid plates 166 may be generally rectangular and formed from a lightweight composite. Additionally, to provide cushioning from the impact of a fast moving hockey puck, the channels 134 additionally include longitudinally extending flexible plates 168. The flexible plates 168 are also preferably rectangular and formed from a lightweight composite. The flexible plates 168 are located adjacent the second cover layer 170, while the rigid plates 166 are positioned over the flexible plates 168 and adjacent the first cover layer 132. The rigid plates 166 and the flexible plates 168 may be formed from a variety of materials, such as various polymer composites, including but not limited to Kevlar ® and plastic, having the required rigidity and/or flexible/resilient characteristics.

[0057] While the disclosed embodiment illustrates a single rigid plate 166 and a single flexible plate 168 within each of the channels 134, it is contemplated that a combination of three or more stacked plates may be provided within each of the channels 134.

[0058] The second cover layer 170 is affixed to the base fabric layer 130 along a second set of lines of attachment 172 to define a second set of channels 174, such as, for example, channels 174f-174i, to receive additional rigid and flexible plates 166 and 168, respectively. As shown,

the flexible plates 168 are positioned adjacent the base fabric layer 130 while the rigid plates 166 are positioned above the flexible plates 168 and beneath the lines of attachment 136 between channels 134. This provides greater protection to a wearer's foot while maintaining a high degree of flexibility of the guard 110. As shown, the second set of attachment lines 172 are affixed intermediate the first attachment lines 136. This positions and offsets the rigid and the flexible plates, 166 and 168, contained in the first set of channels 134, from the rigid and the flexible plates, 166 and 168, contained in the second set of channels 174. Thus, the area at the junction of the second set of lines of attachment 172 with base fabric layer 130 is further protected with the rigid and the flexible plates 166 and 168 contained in the channels 174 to prevent injury to the user.

[0059] Turning now to FIGS. 4-5, in a further exemplary implementation a modified structure of the shot blocker apparatus is shown generally as reference numeral 200. Shot block apparatus 200 includes a guard 210 for absorbing the impact of a blocked puck, thereby substantially reducing the corresponding impact of the shot transferred to the player's foot. In this implementation, for the purpose of clarity, like features of the shot guard apparatus 200 and shot guard apparatus 100 are numbered the same, with the exception that, where possible, similar/corresponding components are preceded by a "2" in place of a "1" when referring to apparatus 200.

[0060] In a similar fashion to guard 110 previously described, guard 210 preferably incorporates a base fabric layer 230 and a first, outermost, cover layer 232 defining a first set of longitudinally extending channels 234. Rigid and flexible plates 266 and 268, respectively, are positioned, preferably stacked as shown, within the first set of channels 234, as illustrated in a select subset of channels 234i through 234k (FIG. 5). As should be apparent to those skilled in the art there is some significance to providing the rigid plates 266 above the flexible plates. For example, the rigid plates function to absorb a substantial degree of the blow caused by impact with the puck, which impact is distributed over the area of the rigid plate and further dampened upon transfer of the resulting force to the underlying flexible plate.

[0061] The guard 210 additionally includes a second cover layer 270, which is affixed directly to the base fabric layer 230 along lines of attachment 272 and defines a second set of

longitudinally extending channels 274 (shown are the channels 274f-274i). As with the first set of channels 234, rigid and flexible plates 266 and 268, respectively, are positioned within the second set of channels 274.

[0062] Unlike the prior embodiment, in this embodiment, the first cover layer 232 is affixed to the second cover layer along two separate lines of attachment 236 and 238 between the adjacent channels 234. This creates a staggered configuration for the channels 234 leaving a gap 280 between adjacent channels 234, for example, the adjacent channels 234i and 234j. The gap 280 permits a thinner overall cross-section of the guard 210 for increased flexibility and comfort.

[0063] Turning now to FIGS. 5 and 6, the use and application of the shot guard 100 to an underlying skate 300 will now be described. The skate 300 generally includes a foot or body portion 310 and a blade 312 extending from an underside 314 of the body portion 310. The body portion 310 includes a central foot pocket 316, a heel pocket 318 and a toe pocket 320. The body portion 310 additionally includes an ankle portion 322 and a flexible tongue 324 extending up through the central foot pocket 316. A rear portion or shin riser 326 supports the shin of the user while laces 328 are provided to cinch the central foot pocket 316 tight about the foot of the user for maximum support.

[0064] In use, a user inserts a foot (not shown) into the body portion 310 of the skate 300 and the laces 328 are tightened to secure the foot within the skate 300. Thereafter, the shot blocker apparatus 100 is applied to the skate 300 by initially overlaying the central foot pocket 316 of the skate 300 with the main guard body 116 of the shot blocker 100. As noted above, the free end 148 of the right front half 138 of the front strap 112 includes the strip of securing material 146 and the free end 154 of the right rear half 142 of the rear strap 114 includes the strip of securing material 152.

[0065] After the shot blocker 100 is placed over the central foot pocket 316, a mating strip of securing material 176 on the free end 150 of the left front half 140 of the front strap 112 is wrapped around the foot pocket 316 and is secured to the strip of securing material 146 on the right front half 138 of the front strap 112. Likewise, a mating strip of securing material 178 provided on the free end 156 of the left rear half 144 is secured around the heel pocket 218 of the

skate 300 to the strip of securing material 152 on the right rear half 142 to thereby secure the shot blocker 100 to the skate 300. The right and left guard wings 118 and 120 of the guard 110 protect the ankle portions 322 of the skate 300 while the main guard body 116 protects the central foot pocket 316 of the skate 300.

[0066] It should be noted that, the shot blocker 100 is applied after the laces 328 of the skate have been cinched up and in no way interferes with the tightening of the central foot pocket 316 about the foot of a user. It is understood that the apparatus and method of the present invention is not limited to a foot guard. The invention can be implemented as a wrist guard or knee guard, for example, to protect any number of body parts that may be injured during a sporting game.

[0067] As will be apparent to those skilled in the art, the unique construction of the invention lends itself to a host of sports-related equipment utilized in a variety of sports. Accordingly, while the exemplary implementations described and shown herein deal primarily with hockey-related applications, the application is not intended to be so limiting. For example, body protection devices, padding and the like, are used in baseball, lacrosse and a host of other sports.

[0068] In that regard, in another implementation the invention is shown and described incorporated or integrated into a hockey knee pad assembly 400, along with an exemplary method of construction, in FIGS. 8 through 14. Referring initially to FIGS. 8 and 9, the knee pad assembly, shown generally as reference numeral 400, is provided to protect the sides and the popliteal or rear area of the leg located behind the knee of a user. The knee pad assembly 400 includes a generally "D" shaped sleeve 410 defining an interior pocket 412, and having a flat base layer 414 beneath a ribbed upper cover layer 416. The sleeve 410 has an arcuate first edge 418, an opposite straight second edge 420 and first and second side edges, 422 and 424, respectively, extending between the arcuate first edge 418 and the straight second edge 420. The first and second side edges 422 and 424 include first and second upper side edges 426 and 428 on the ribbed upper cover layer 416 and first and second lower side edges 430 and 432 on the flat base layer 414.

[0069] The knee pad assembly 400 additionally includes an arcuate support pad 434 extending from the arcuate first edge 418 and a straight support pad 436 extending from the

straight second edge 420. The arcuate support pad 434 and the straight support pad 436 are provided to support and retain respective arcuate and straight attachment structures 438 and 440 for use in connecting the knee pad assembly 400 to other protective gear of a player, as described in more detail below. The arcuate and straight attachment structures 438 and 440 may include adhesive strips, buckles, snap closures or any other commonly available fastener structure. In the disclosed embodiment, the arcuate and straight attachment structures 438 and 440 include respective arcuate and straight lengths of hook-and-loop closure material 442 and 444 affixed to upper surfaces 446 and 448 of the arcuate and straight support pads 434 and 436.

[0070] The sleeve 410 may be formed from a variety of relatively flexible materials such as, for example, polymers, fabrics and foams, to name just a few. The ribbed contour of the upper cover layer 416 is most easily maintained by forming the sleeve 410, or at least the ribbed upper cover layer 416, of a foam or polymeric material. Additionally, in an exemplary implementation, the arcuate support pad 434 and the straight support pad 436 are formed integrally with the sleeve 410. Thus, the use of a foam or polymeric material for the arcuate and straight support pads 434 and 436 provide a solid base for the arcuate and straight attachment structures 438 and 440.

[0071] Referring now specifically to FIG. 9, in order to protect the user against impact injury, the knee pad assembly 400 includes a first rigid layer 450 which may be constructed from, for example, a strong and rigid polymer composite material and a second flexible layer 452, constructed from a strong, but relatively flexible, polymer composite material. The first rigid layer 450 and the second flexible layer 452 are positioned within the interior pocket 412 of the sleeve 410. The first rigid layer 450 is positioned adjacent to and beneath the ribbed upper cover layer 416 while the second flexible layer 452 is positioned between the first rigid layer 450 and the flat base layer 414. By positioning the first rigid layer 450 above the second flexible layer 450, any impact against the knee pad assembly is initially absorbed by the first rigid layer 450, and any additional impact energy cushioned and absorbed by the second flexible layer 452 to prevent injury to the user.

[0072] In an exemplary embodiment, the first rigid layer 450 consists of a series of longitudinally extending rigid plates 454, such as rigid plates 454a-454j, which are semi-

spherical in cross section, and the second flexible layer 452 consists of a series of longitudinally extending flexible plates 456, such as flexible plates 456a-456k, which are also semi-spherical in cross section. Each of the rigid plates 454 is positioned above and between adjoining flexible plates 456. For example, the rigid plate 454i is positioned above and between or intermediate of the adjoining flexible plates 456i and 456j located below the rigid plate 454i. By positioning and constructing the knee pad assembly 400 with the rigid plates 454 between the adjoining areas of the flexible plates 456, the flexibility of the knee pad assembly 400 is enhanced. As shown, the ribbed upper cover layer 416 defines a series of longitudinally extending pockets or channels 458 which receive and overlie the semi-circular rigid plates 454.

[0073] While not specifically shown, in an alternative embodiment, an intermediate support layer may be positioned between the rigid plates 454 and 456 and extend across the interior pocket 412 in the sleeve 410 to better separate and cushion the impact transferred from the rigid plates 454 to the flexible plates 456. Additionally, the longitudinally extending pockets 458, formed beneath the ribbed upper cover layer 416 may be constructed by stitching or otherwise securing the ribbed upper cover layer 416 to the intermediate layer along longitudinally extending lines of attachment to form individual pockets or channels for receipt of the individual rigid plates 454a-454i.

[0074] In a still further alternative implementation, the individual rigid plates 454a-454i may be integrally formed and joined together along their edges by living hinges. Similarly, the individual flexible plates 456a-456j may be integrally formed and joined along their adjacent edges by living hinges. This enhances the structural integrity of the first rigid layer 450 and second flexible layer 452 while maintaining flexibility between individual, adjoining plates.

[0075] Turning now to FIGS. 10 and 11, as shown, in an exemplary embodiment, the knee pad assembly 400 is formed with a pre-curved shape to better conform to the leg of the user and facilitate attachment to another protective structure as described in more detail herein below. Thus, the relatively flat base layer 414 has an arcuate or concave shape and the ribbed upper cover layer 416 also has an arcuate shape.

[0076] Referring generally to FIGS. 12-14, and initially primarily to FIG. 12, the knee pad assembly 400 is designed to be used with an existing protective structure such as, for example, an existing knee wear or leg protector 500. It should be noted that the knee pad assembly 400 and its method of construction is suitable for use alone with the addition of a securing strap (not shown) which can be connected to the arcuate and straight attachment structures 438 and 440 to protect a limb or joint of a user.

[0077] In general, existing leg protector 500 includes molded, forward facing, elongate pad 502 having a lower section 504 to protect a shin of a user, a center section 506 to protect the anterior side of the knee of the user and an upper section 508 to protect a lower portion of a thigh immediately adjacent the knee of the user. A tab 510 projects from an upper edge 512 of the upper section 508 to aid the user in attaching the existing leg protector 500 to the user's leg. The existing leg protector 500 further includes upper and lower securing straps 514 and 516, formed as connectable strap halves 514a, 514b and 516a and 516b, to secure the existing leg protector 500 to the leg of the user.

[0078] When used in conjunction with the knee pad assembly 400, the existing leg protector 500 additionally includes a first knee wear strap or securing structure 518 extending rearwardly from a first edge 520 of the center section 508 of the existing leg protector and a second knee wear strap or securing structure 522 extending rearwardly from a second edge 524 of the center section 508. In the embodiment of the knee pad assembly 400 where the arcuate and straight attachment structures 438 and 440 consist of the arcuate and straight lengths of hook and loop closure materials 442 and 444, the first and second securing structures 518 and 522 of the existing leg protector 500 include complimentary first and second lengths of hook and loop closure materials 526 and 528. It should be noted that where the arcuate and straight attachment structures 438 and 440 of the knee pad assembly 400 are other than hook and loop closure material, the first and second securing structures 518 and 522 will include complimentary structures.

[0079] Referring now primarily to FIGS. 13 and 14, the assembly of the knee pad assembly 400 to the existing leg protector 500 will now be described. While not specifically shown, initially, the existing leg protector 500 is positioned on a front of a user's leg with the center

section 506 located over the anterior area of the knee of the user. The existing leg protector 500 is then secured to the leg of a user by use of the upper and lower securing straps 514 and 516. Thereafter, the knee pad assembly 400 is positioned adjacent a posterior aspect or popliteal area of the knee of the user and the knee pad assembly 400 is affixed to the existing leg protector 500.

[0080] Specifically, the straight length of hook and loop closure material 442 of the straight attachment structure 440 is connected and affixed to the first length of hook and loop closure material 526 on the existing leg protector 500 and the knee pad assembly 400 wrapped around the posterior area of the knee of the user. Thereafter, the arcuate attachment structure 438 of the knee pad assembly 400, and specifically the arcuate length of hook and loop closure material 442, is affixed to the second length of hook and loop closure material 528 on the second securing structure 522 of the existing leg protector 500.

[0081] Alternatively, the arcuate length of hook and loop closure material 442 on the knee pad assembly 400 may be first attached to the second securing structure 522 on the existing leg protector 500 and subsequently the straight length of hook and loop closure material 444 attached to the first securing structure 518.

[0082] In this manner, the knee pad assembly 400, including its method of construction, provides a simple and useful device to protect the posterior or popliteal area of the knee of a user. Additionally, the knee pad assembly 400 provides an auxiliary protective device for use with the existing leg protector 500.

[0083] The above-described embodiments are merely exemplary illustrations of implementations set forth for a clear understanding of the principles of the invention. Many variations, combinations, modifications or equivalents may be substituted for elements thereof without departing from the scope of the invention. Therefore, it is intended that the invention not be limited to the particular embodiments disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all the embodiments falling within the scope of the appended claims.

What is claimed is:**1. A shot blocker apparatus, comprising:**

a guard having guard body and a pair of selectively securable straps extending therefrom, the guard body including a flexible base fabric layer and a first cover layer affixed to said flexible base fabric layer to define a plurality of longitudinally extending channels therebetween; and

a relatively rigid plate adjacent to a relatively flexible plate disposed within each of said plurality of longitudinally extending channels.

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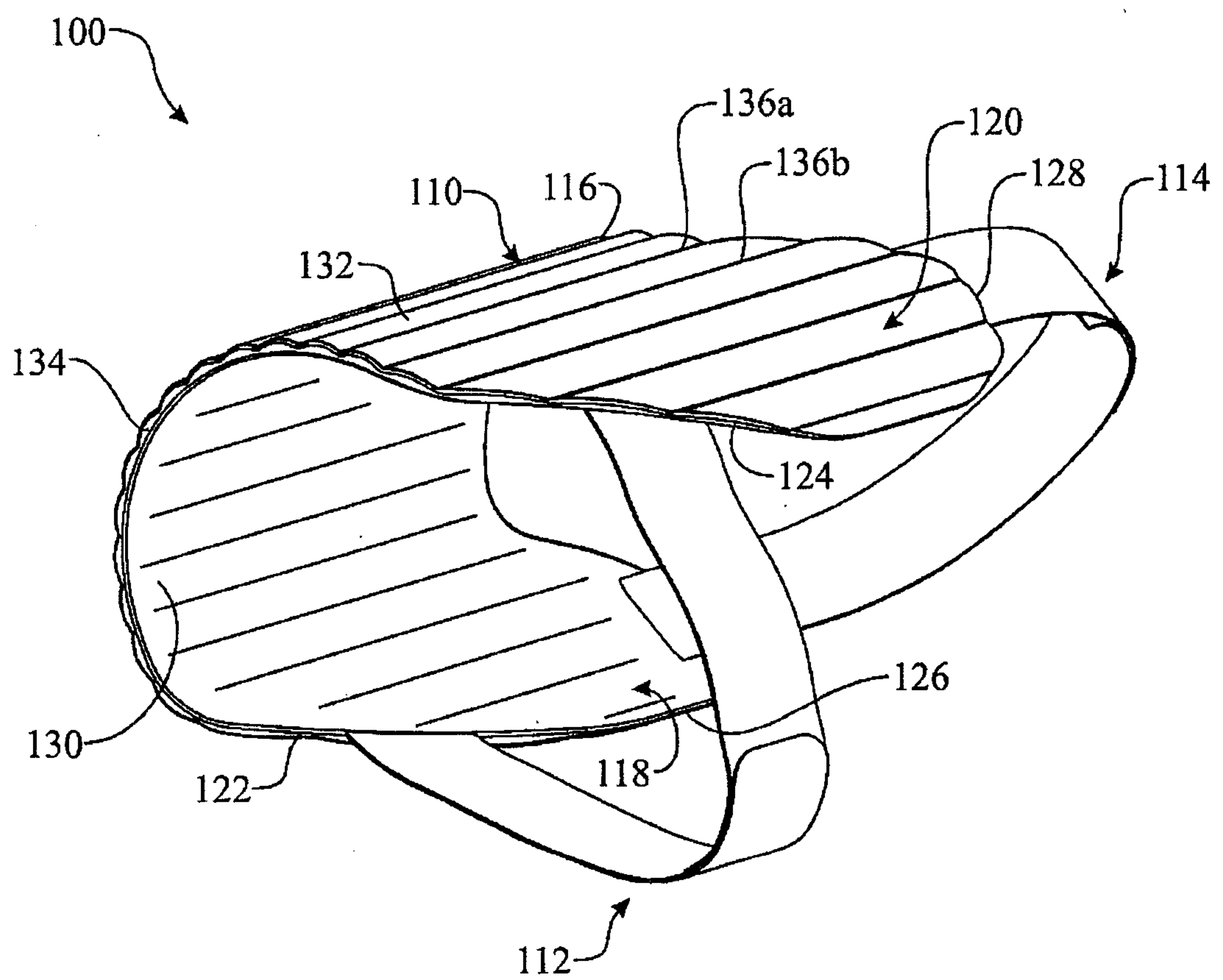


FIG. 1

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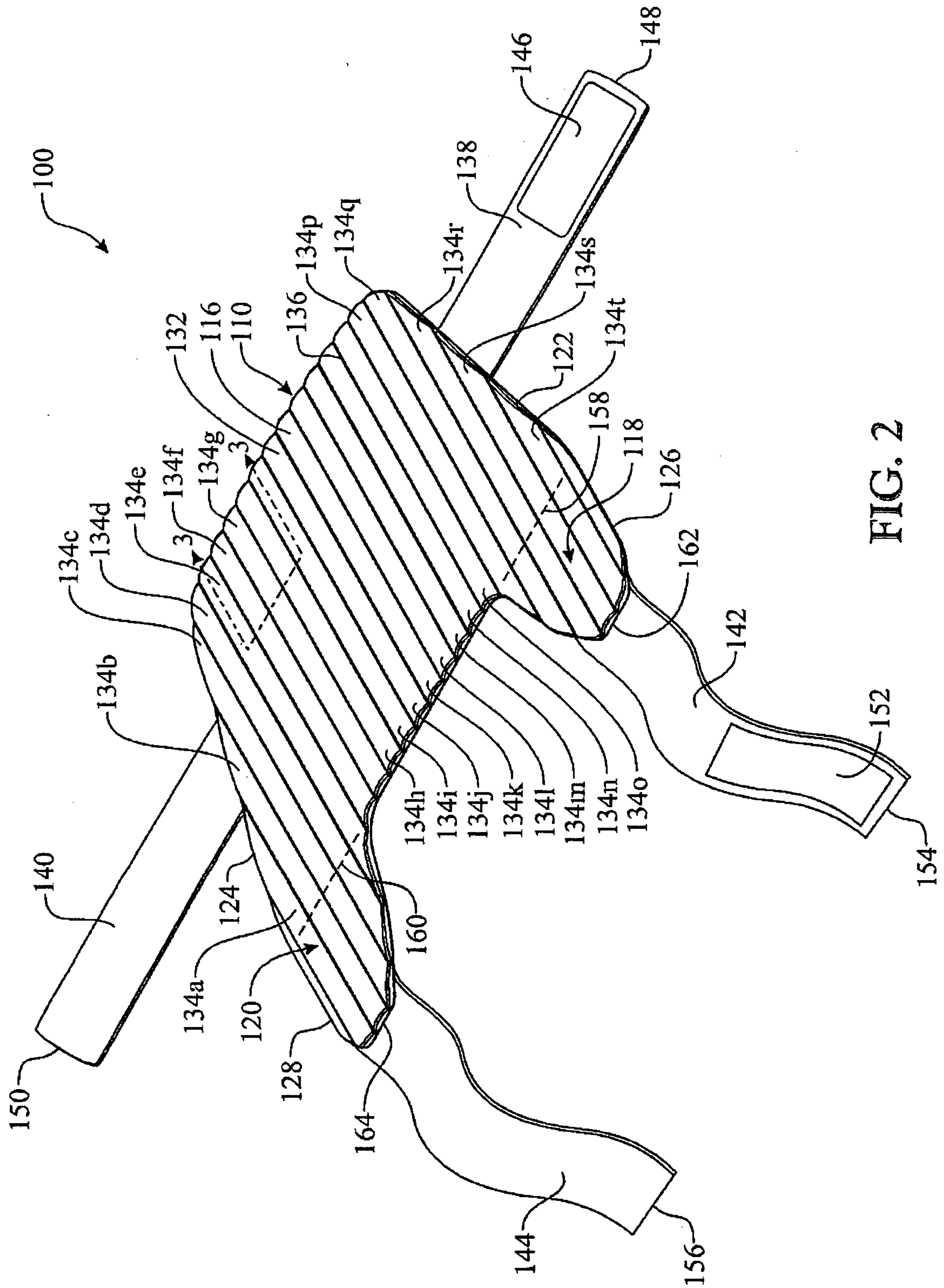


FIG. 2

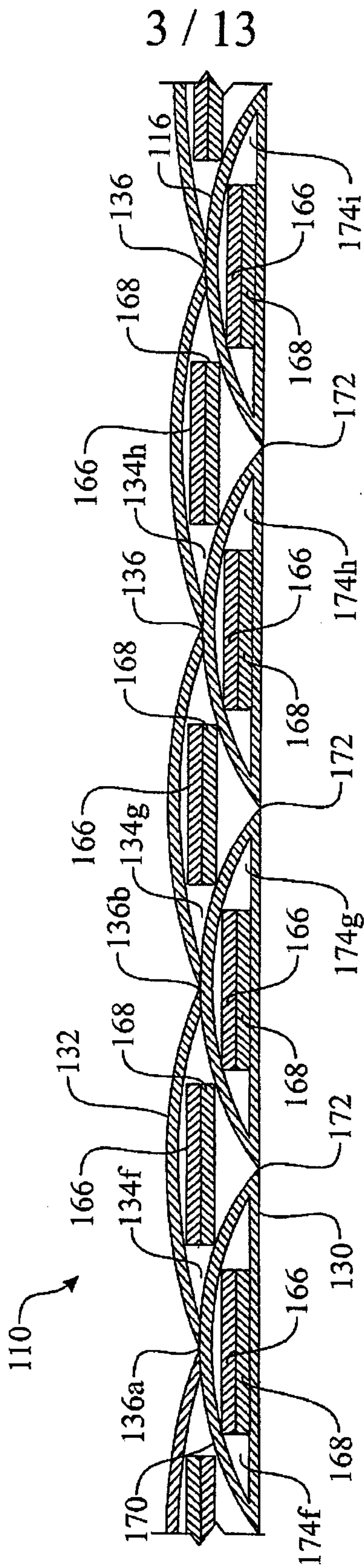


FIG. 3

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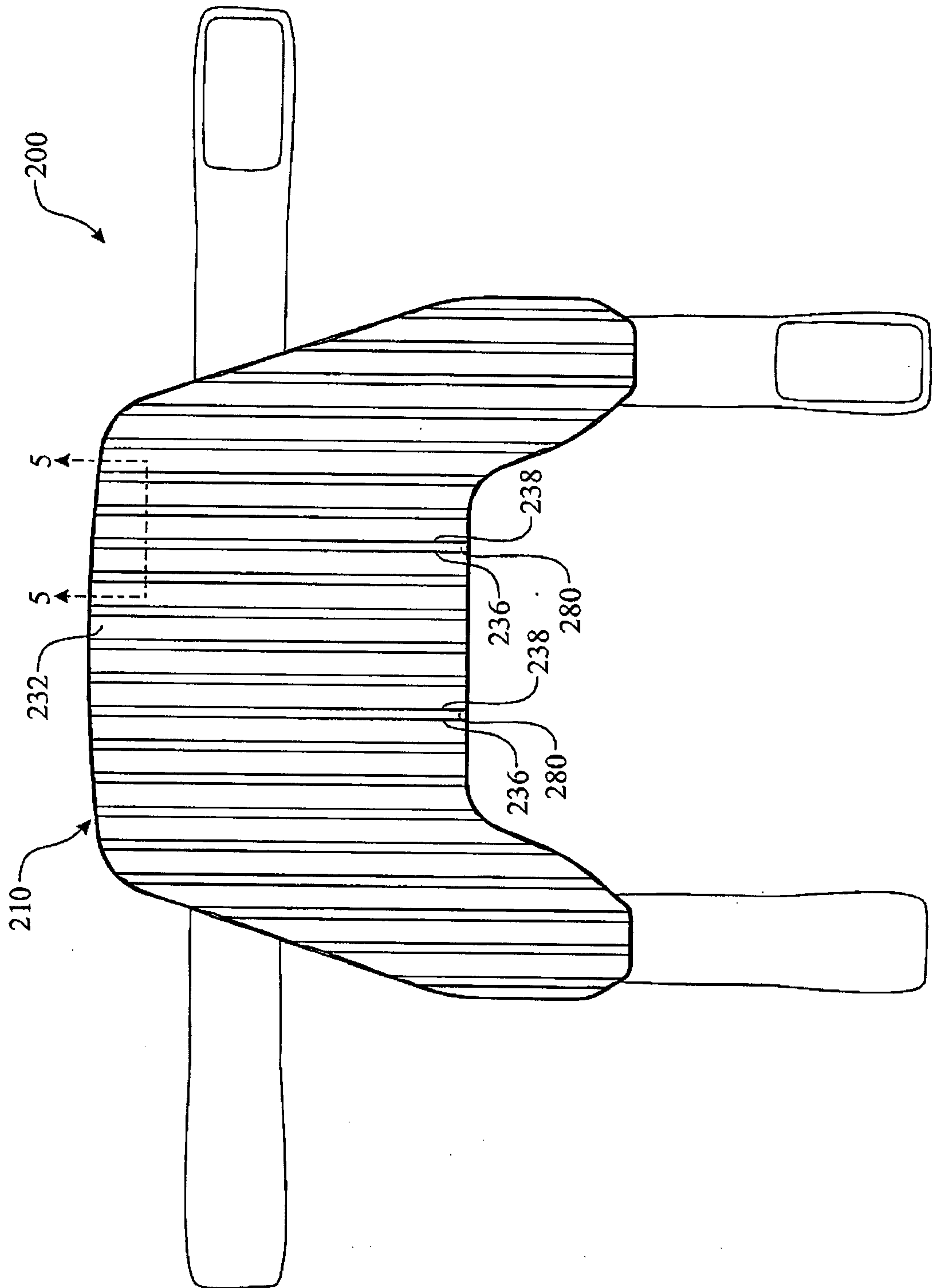


FIG. 4

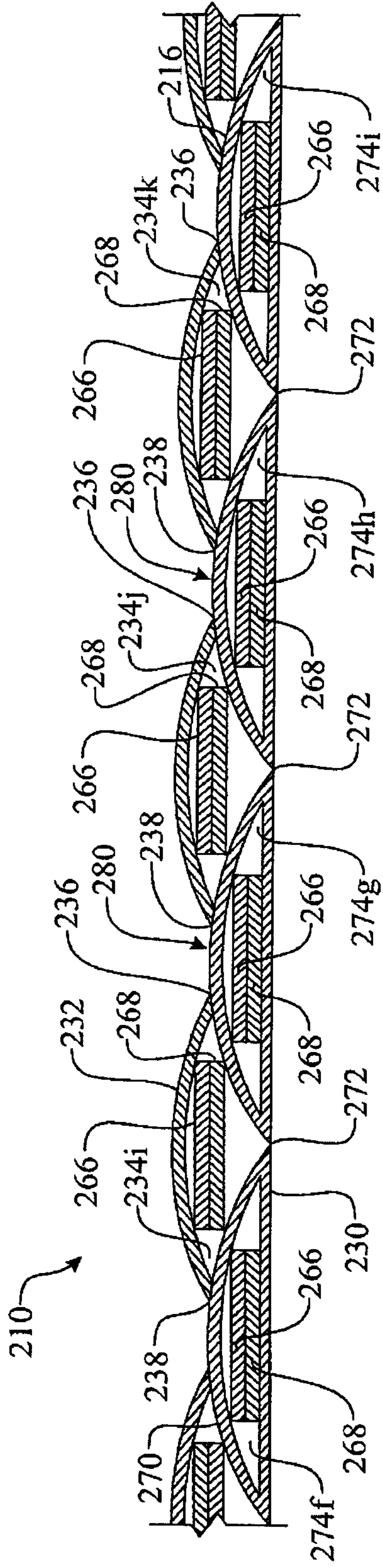


FIG. 5

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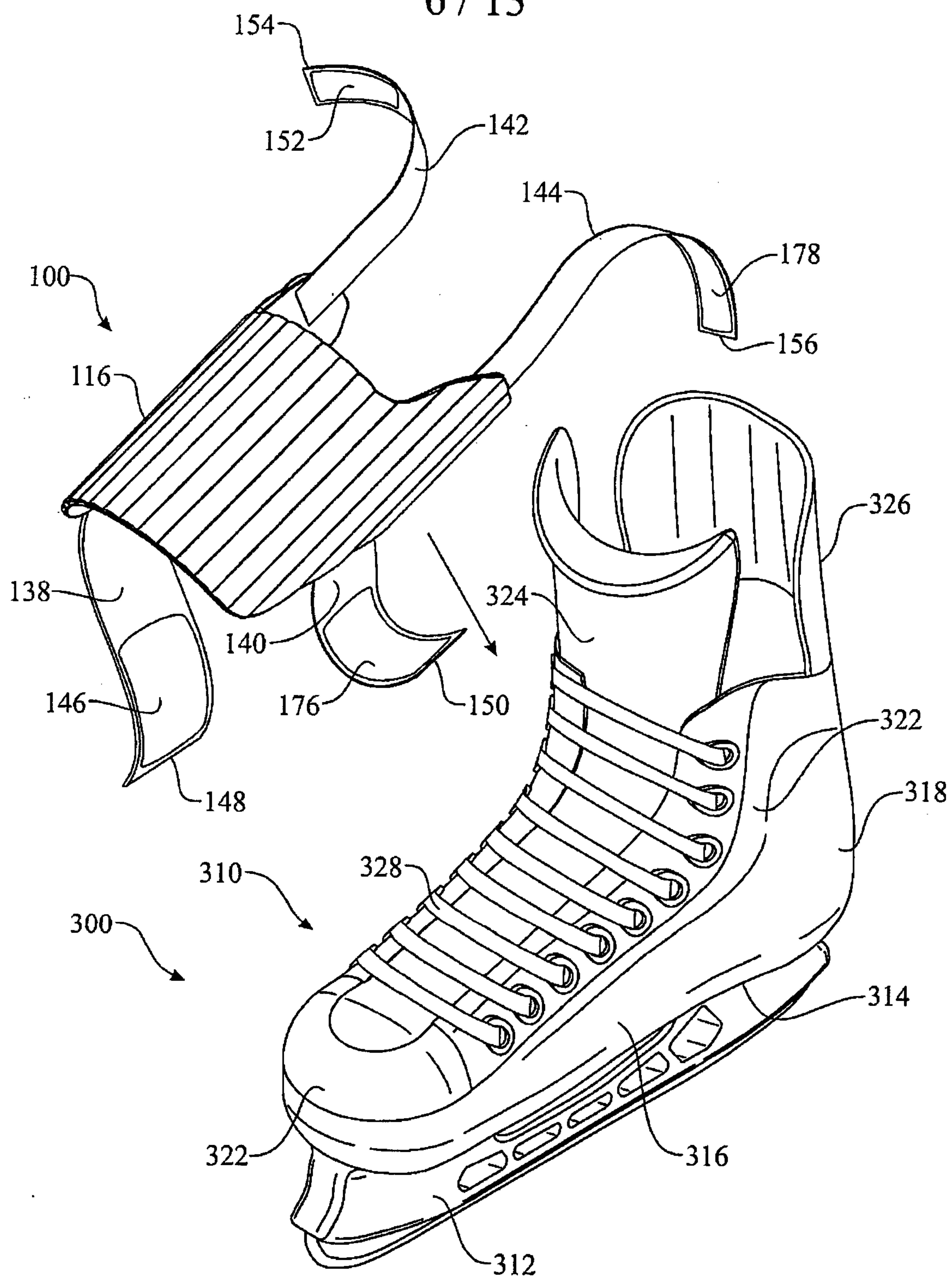


FIG. 6

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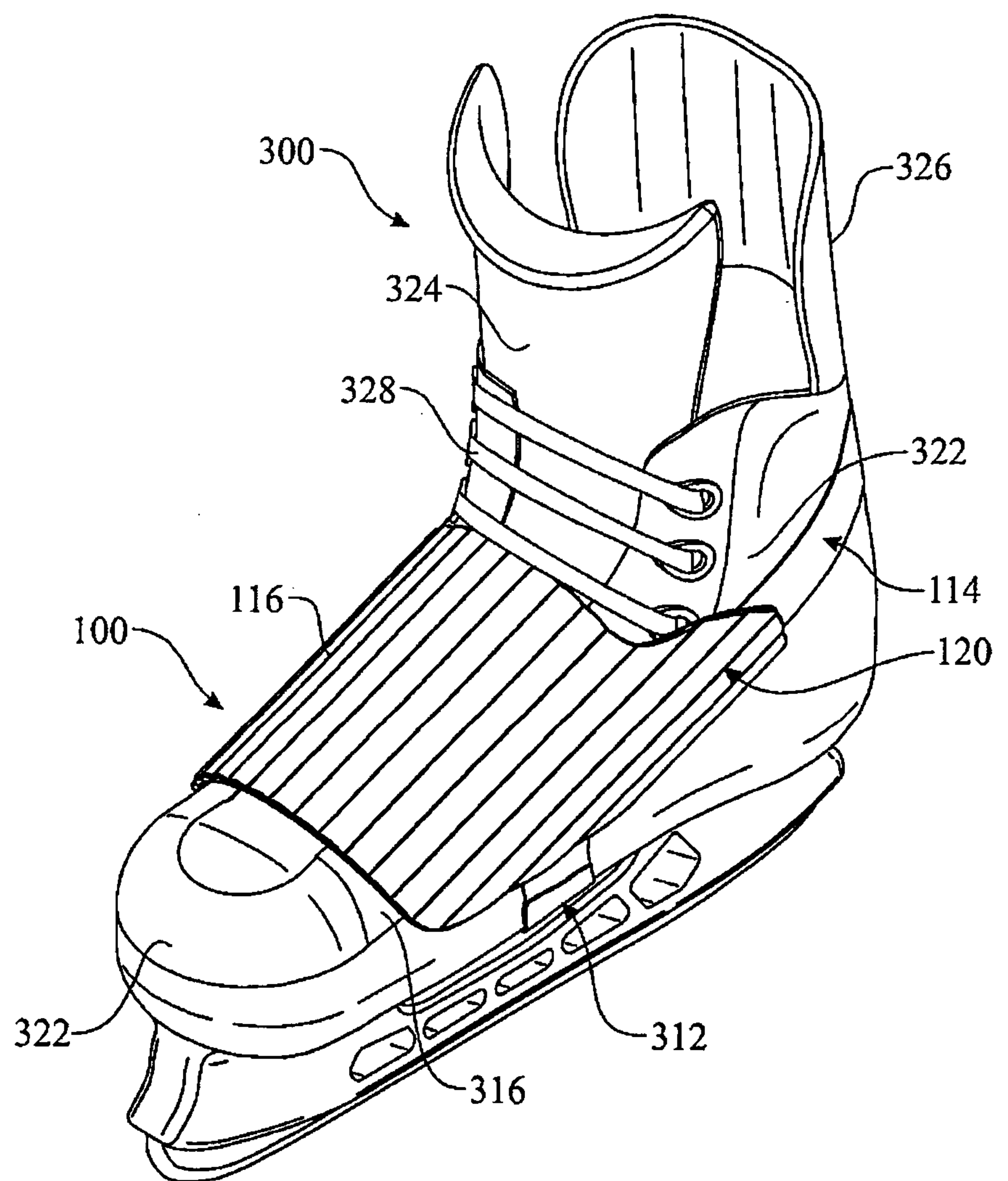


FIG. 7

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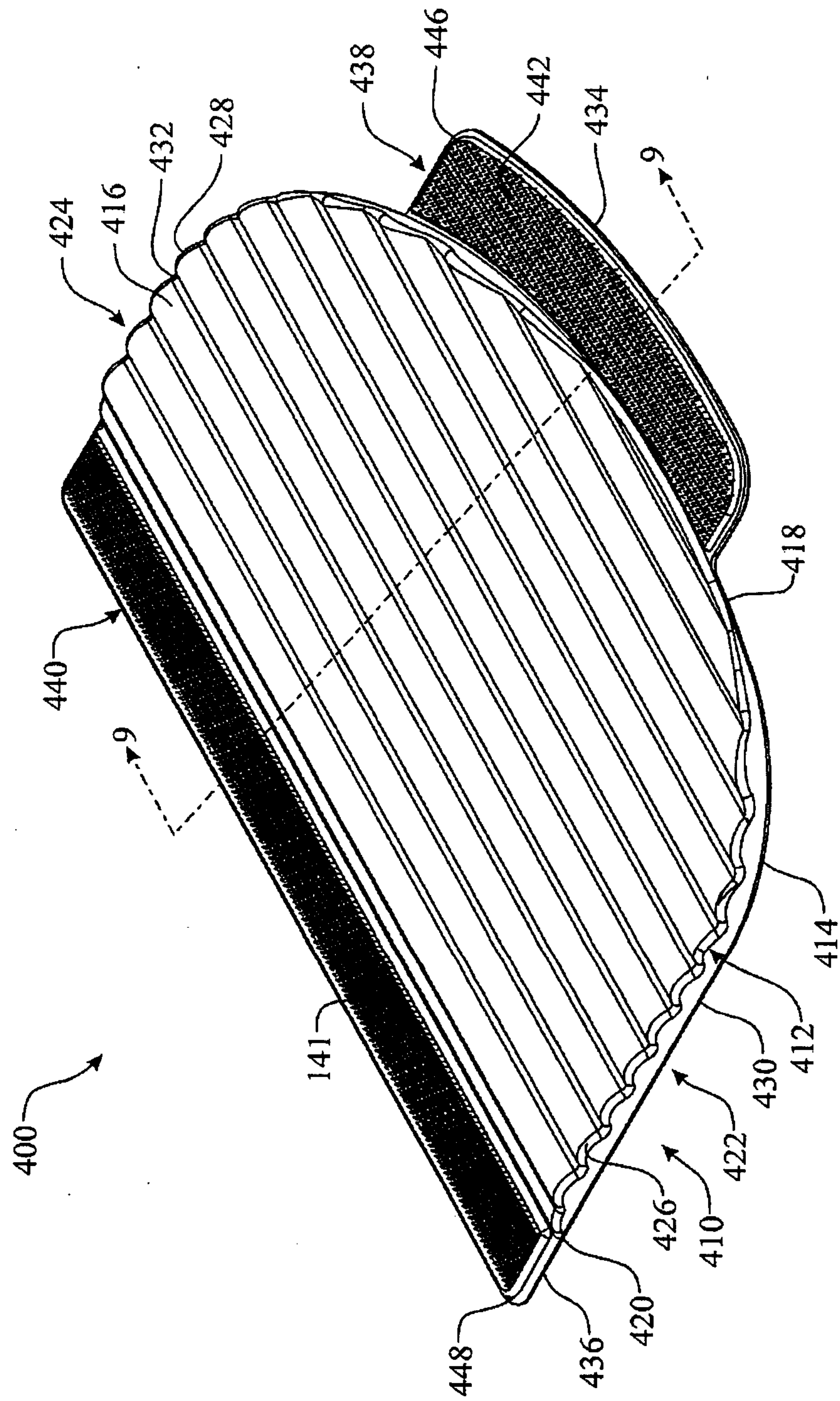


FIG. 8

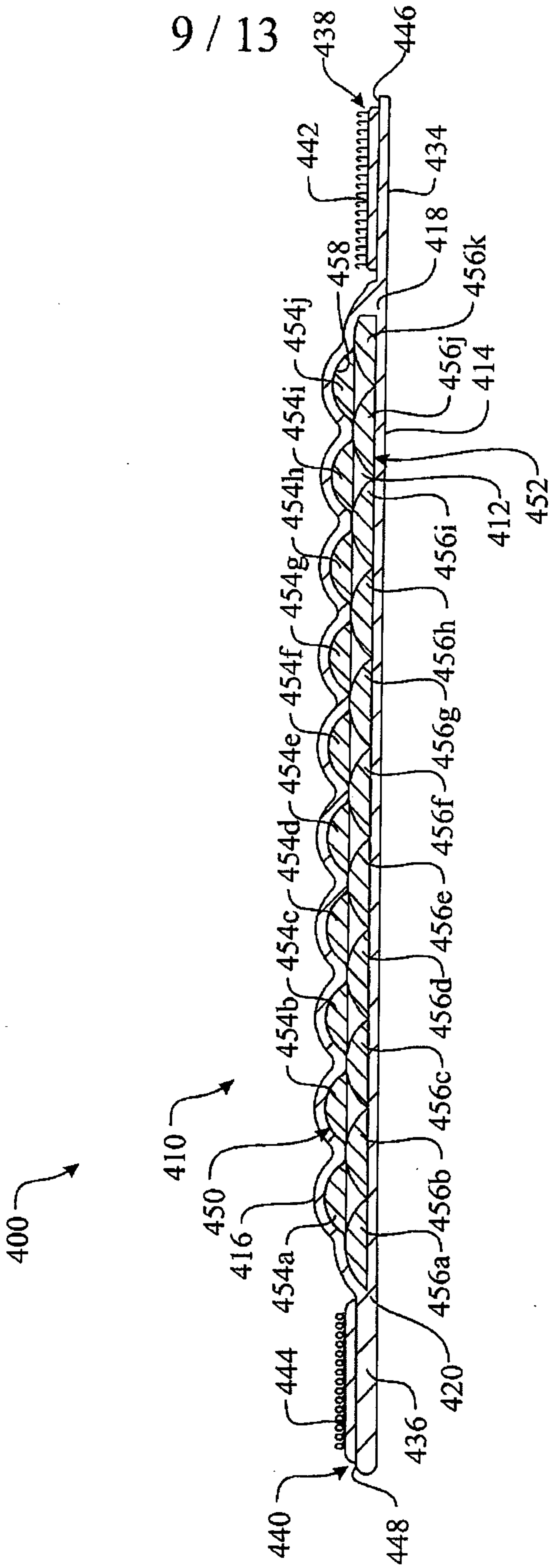


FIG. 9

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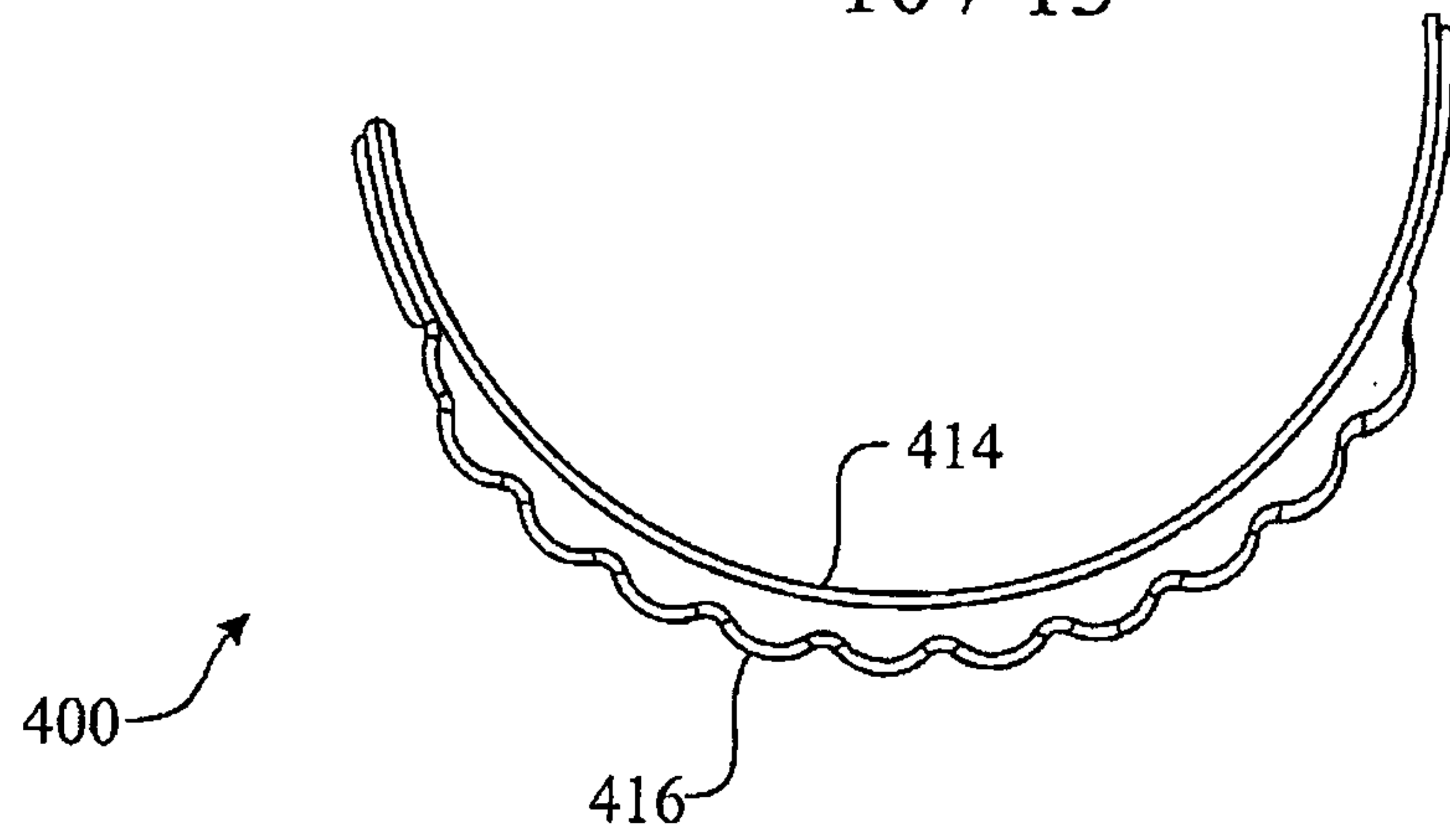


FIG. 10

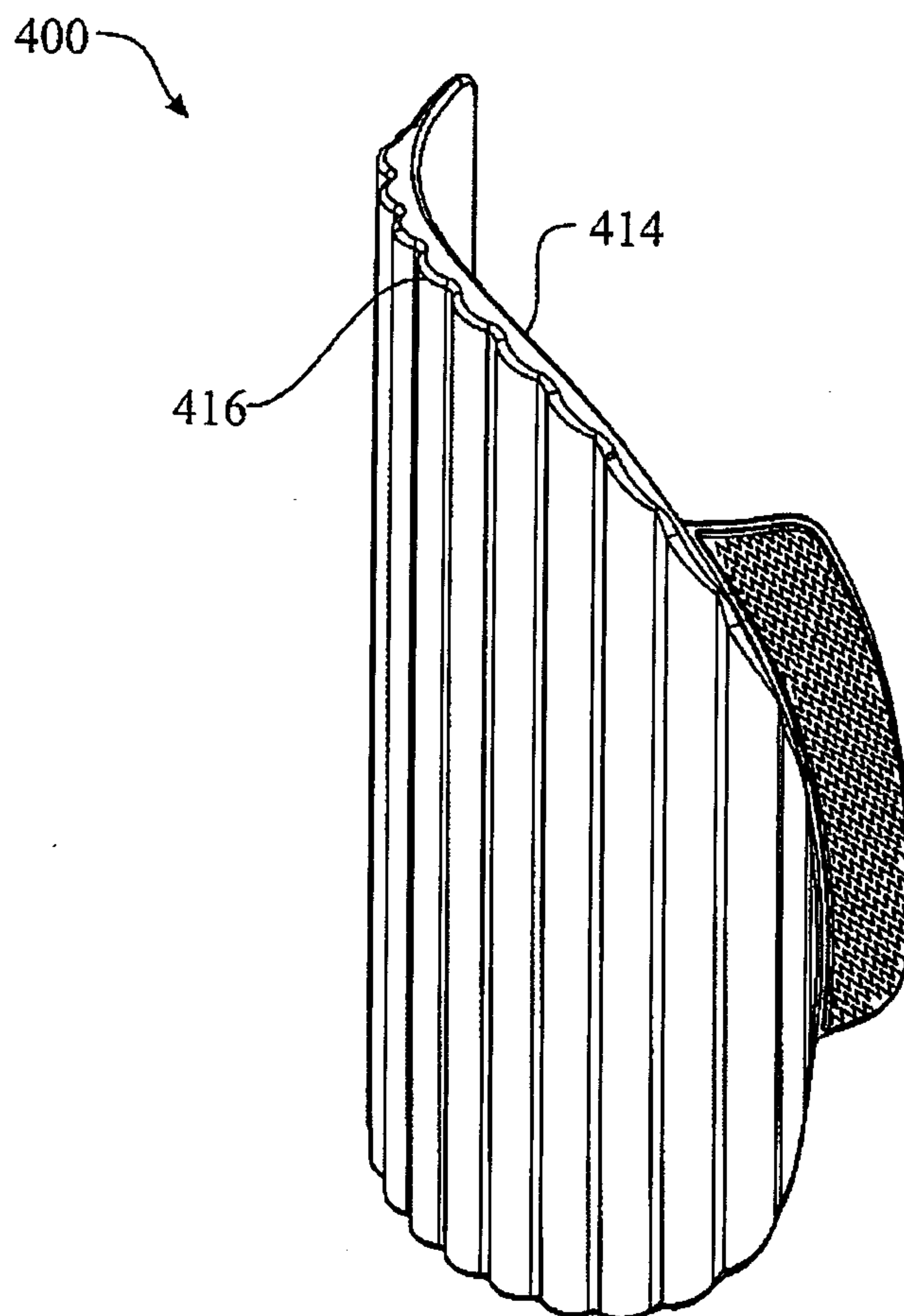


FIG. 11

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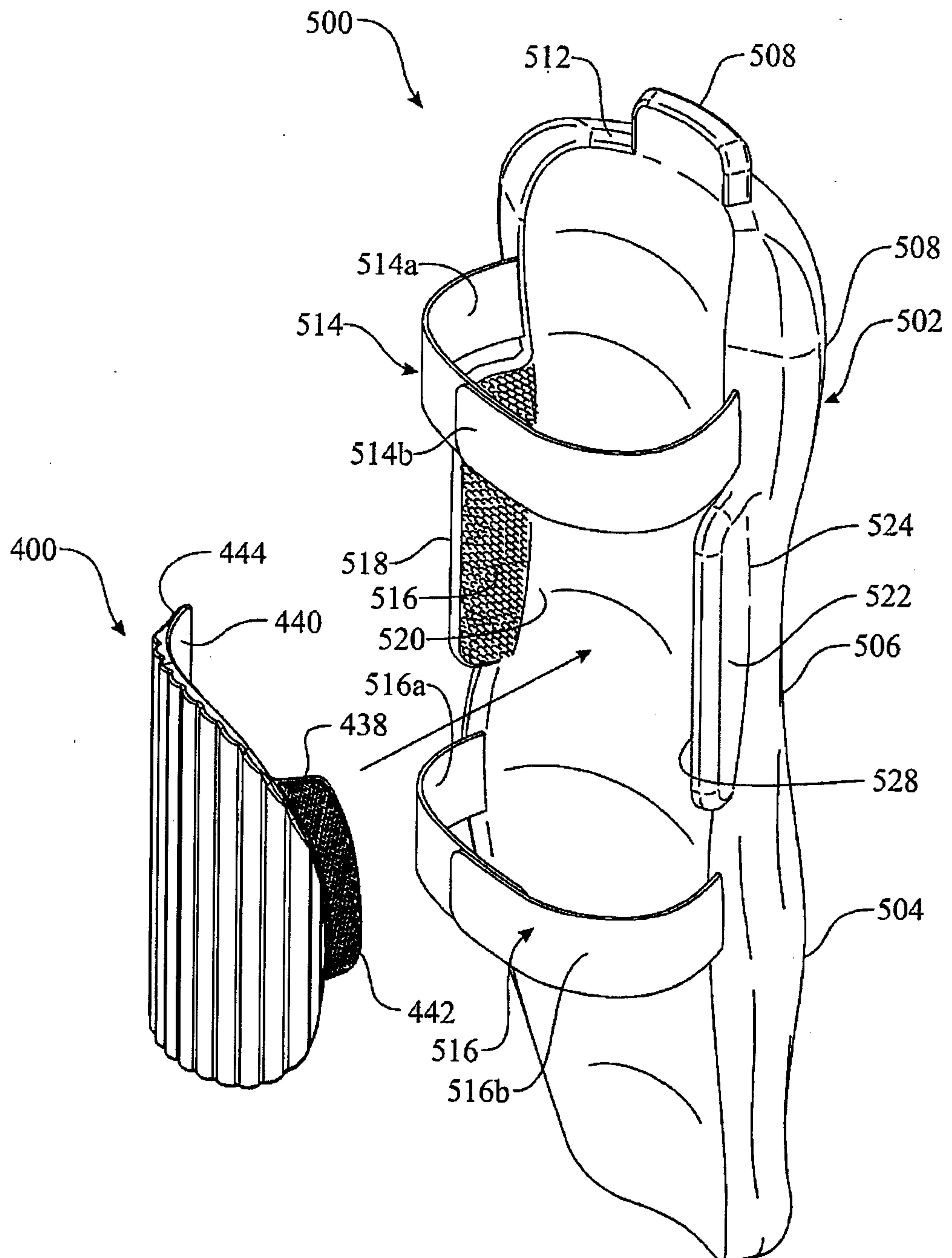


FIG. 12

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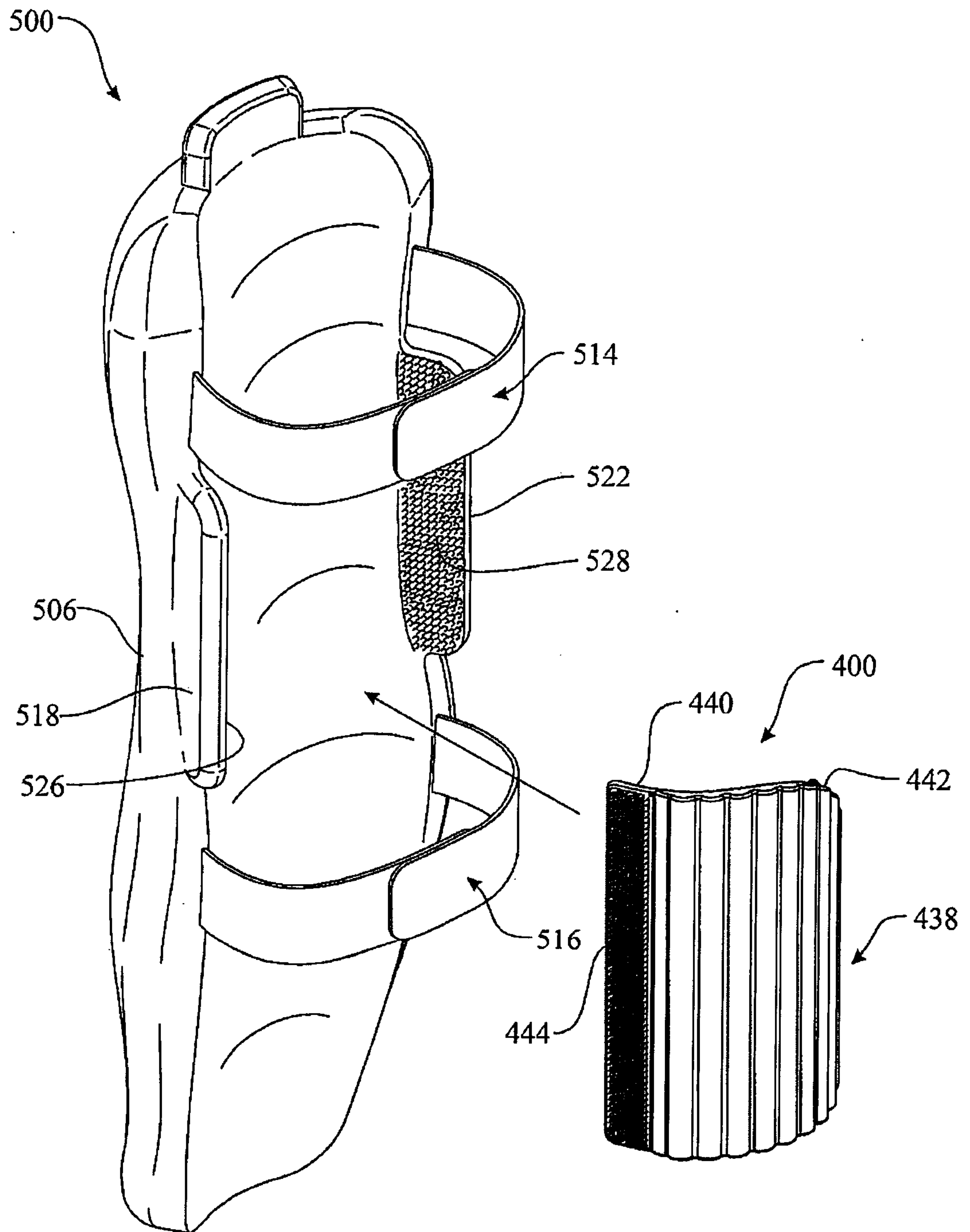


FIG. 13

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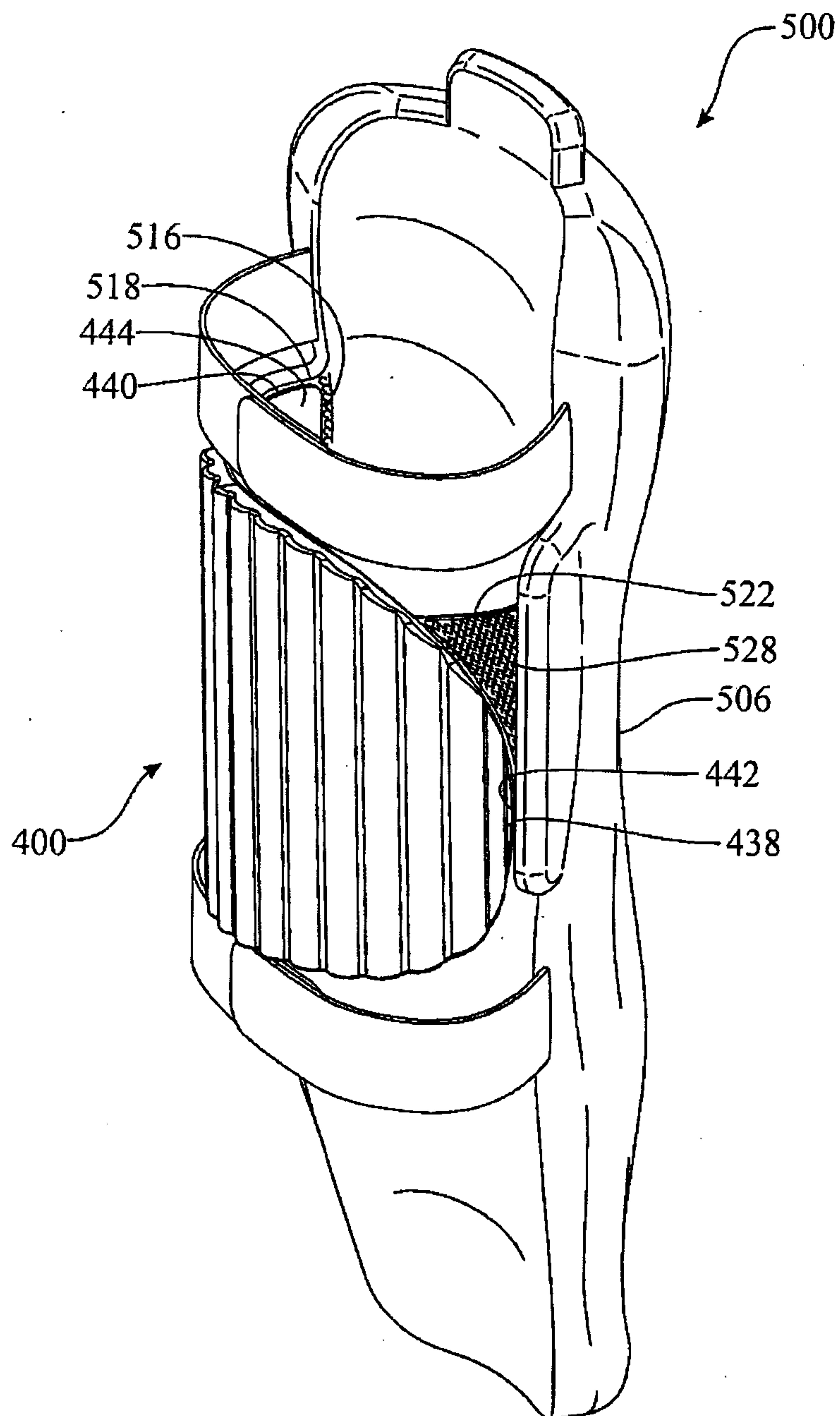


FIG. 14

