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(54) Title: MATERIAL FOR ENHANCING THE EFFECTS OF EXERCISE

(57) Abstract: A compressible material is provided for use with athletic equipment and apparel for enhancing the effects of physical exercise for a person. The material can include one or more compression members that extend from shoes, insoles for shoes, exercise gloves, wraps for exercise equipment, exercise mat or floor covering, headbands, socks, exercise garments, free weights and sports helmets. The compression members can be made of one or more of rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer. Positioning the compressible material such that it is between the user and any surface for example when exercising, requires the person to maintain balance while performing the exercise by using other muscles that would not ordinarily be used during the exercise, and provides proprioceptive feedback to the person's central nervous system.



TITLE: MATERIAL FOR ENHANCING THE EFFECTS OF EXERCISE**CROSS-REFERENCE TO RELATED APPLICATIONS:**

[0001] This application claims priority of United States provisional patent applications serial no. 62/365,662 filed July 20, 2016; serial no. 62/371,204 filed August 4, 2016; serial no. 62/449,520 filed January 23, 2017; and serial no. 62/516,937 filed June 8, 2017, which are all incorporated by reference into this application in their entirety.

TECHNICAL FIELD:

[0002] The present disclosure is related to the field of materials for enhancing physical exercise, in particular, compressible materials that can be incorporated into athletic footwear, apparel and equipment and provide a proprioceptive effect on a person when worn during physical exercise.

BACKGROUND:

[0003] It is often difficult for people who are not in the best of physical shape to improve their physical well-being and health. Also, those who were more physically active and fit when they were younger have a tendency to become more sedentary as they age, and their physical well-being and health can decline. In addition, those who have suffered a physical injury, notwithstanding that they may have been physically fit and healthy prior to the injury, may find it difficult to continue exercising as they could prior to their injury. In all of these cases, there is a need for improved physical fitness footwear, apparel and equipment that can enable anyone to enhance their exercise regime by causing them to use additional muscles to maintain their balance while exercise while lowering the amount of weight or force required so as to not overtax the person's joints and muscles and improve proprioception, especially if they had been previously sedentary or are recovering from an injury.

[0004] In *The Role of Proprioception in the Management and Rehabilitation of Athletic Injuries* (SM Lephart et al., The American Journal of Sports Medicine, Vol. 25, No. 1) proprioception is defined as a specialized sensory modality of touch and encompasses the sensations of joint movement and joint position. Proprioception contributes to motor programming for neuromuscular control required for precision movements and also contributes to muscle reflexes, providing dynamic joint stability. Proprioceptive receptors found in the skin, muscles and joints provide

input to the central nervous system ("CNS") and, along with visual and vestibular centres, contributes afferent information to the CNS regarding body position and balance. A sports injury or other musculoskeletal trauma can lead to proprioceptive defects. Proprioceptive rehabilitation seeks to retrain altered afferent pathways to enhance sensation of joint movement. There is a need for improved physical fitness footwear, apparel and equipment that can enable anyone to train or retrain afferent pathways to improve functional stability of the person's joints and body.

[0005] It is, therefore, desirable to provide compressible materials that can be incorporated into athletic footwear, apparel and equipment to enhance the effects of physical exercise.

SUMMARY:

[0006] A compressible material for athletic footwear, apparel and equipment is provided to enhance the effects of physical exercise. In embodiments, compressible protrusions can be added to the anterior (palm) or dorsal (top) region as well as on the phalange region of gloves used for exercising, weight lifting or running, to the soles, toes or instep of shoes used for exercising, weight lifting or running, to the soles of galoshes that can be slipped onto regular shoes, to the soles of insoles for shoes, to the bottom of exercise mats, to the equipment side of barbell wraps, to the outside of joint wraps for use with elbows or knees, athletic apparel such as pants, tights, leggings, shirts, hoodies or one-piece exercise clothing, to footwear such as socks, shoes, or shoe covers, and to fitness or gym flooring. The addition of the compressible protrusions can operate similarly to exercise equipment that comprise compressible spheres or hemispheres, such as used in Pilates and in other forms of exercising. The compressible hemispheres can also cause the user to actively hold the muscles, joints and body in a proper alignment providing proprioceptive feedback to the CNS. These voluntary movements can be repeated and stored as central commands. This patterning of the brain allows various skills to be performed without continuous without continuous reference to consciousness and can increase the conscious and unconscious awareness of the joint or limb in motion.

[0007] The placement of compressible protrusions on the bottom of weight lifting shoes on a person lifting weights, as an example, requires the person hold the body in proper alignment, adding proprioceptive elements to the exercise to assist in proper patterning of the CNS and to exert additional effort and use other muscles, such as their core muscles, to maintain balance in

addition to the weight lifting exercise they are carrying out, such as bicep curls, front and side dumbbell lateral raises and the like. In such shoes, the sole can have one or more different sized compressible hemispheres, such as larger diameter hemispheres under the ball or heel of the shoe, and smaller diameter hemispheres disposed between and around the larger hemispheres. In some embodiments, a running shoe can comprise one or more compressible hemispheres disposed on the sole, facing downwards. In some embodiments, compressible hemispheres can be placed on the bottom of galoshes, which can be slipped onto regular shoes. In other embodiments, an insole having compressible hemispheres on the bottom thereof, facing downwards, can be used in regular shoes to similar effect.

[0008] In some embodiments, exercise equipment can comprise such compressible hemispheres. In one example, bar wraps can have one or more such compressible hemispheres disposed on one side of the wrap, the side that faces outwardly towards the user such that the user contacts the compressible hemispheres directly when grabbing the bar. In other embodiments, a workout mat or floor covering can comprise one or more compressible hemispheres extending upwards from the floor when the mat or floor covering is laid out for use on the floor. In some embodiments, a joint wrap for elbows or knees can comprise one or more compressible hemispheres extending outwardly from the wrap. The joint wrap can be comprised of an elastic tube that can stretch and slip onto a person's arm or leg. The placement of the compressible hemispheres can enable the user to perform exercises where contact by the elbows or knees to a hard surface, such as a floor or wall, via the compressible hemispheres.

[0009] In some embodiments, athletic apparel such as pants, tights, leggings, shirts, hoodies or one-piece exercise clothing can comprise one or more compressible hemispheres extending outwardly from the apparel. The compressible hemispheres can be affixed to the apparel. In some embodiments the compressible hemispheres can be removably attached to the apparel. In some embodiments the apparel can comprise pockets for removably attaching the compressible hemispheres at the desired locations. In other embodiments the compressible hemispheres can be attached using Velcro™, hooks, buttons, snaps, straps or other suitable removable attachment as well known to those skilled in the art. The placement of

the compressible hemispheres can enable the user to perform exercises where there can be contact by the elbows, knees or other body part to a hard surface, such as a floor or wall, via the compressible hemispheres.

[0010] In some embodiments, a sock, shoe cover, or other foot covering can comprise one or more compressible hemispheres disposed on the sole, the toe portion, the heel portion, the leg portion or elsewhere on the foot covering, protruding outward.

[0011] In some embodiments, compressible material can be positioned so as to be between the toes. The compressible material between the toes can activate the nerves in the toes and provide proprioceptive feedback to the CNS.

[0012] In some embodiments, the compressible hemispheres can be comprised of an elastomeric material, as well known to those skilled in the art. In some embodiments, the elastomeric material can comprise one or more of a group comprising of rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer. In further embodiments, the exterior of the compressible hemisphere can be composed of a durable material, such as plastic or synthetic fiber and the interior of the compressible protrusion can comprise one or more of a liquid, a gel and a gas, such as air or combinations thereof.

[0013] Broadly stated, in some embodiments, a sheet material can be provided for enhancing the effects of physical exercise for a person, the sheet material comprising: a sheet of planar material comprising a first elastomeric material; and at least one protrusion extending from a first side of the sheet of planar material, the at least one protrusion comprising one or both of the first elastomeric material and a second elastomeric material, wherein the sheet material is configured to be disposed between the person and a piece of exercise equipment or a hard surface.

[0014] Broadly stated, in some embodiments, a glove can be provided for enhancing the effects of physical exercise for a person, the glove comprising at least one compressible protrusion disposed on the glove extending outwardly from the glove.

[0015] Broadly stated, in some embodiments, the glove can comprise an anterior region and the at least one compressible protrusion can extend outwardly from the anterior region.

[0016] Broadly stated, in some embodiments, the glove can comprise a dorsal region and the at least one compressible protrusion can extend outwardly from the dorsal region.

[0017] Broadly stated, in some embodiments, the glove can comprise a plurality of phalange regions and the at least one compressible protrusion can extend outwardly from at least one of the plurality of phalanges regions.

[0018] Broadly stated, in some embodiments, each of the plurality of phalange regions can comprise a fingertip region and the at least one compressible protrusion can extend outwardly from at least one of the fingertip regions of the plurality of phalanges regions.

[0019] Broadly stated, in some embodiments, each of the plurality of phalange regions can comprise an anterior phalange region and the at least one compressible protrusion can comprise a first anterior compressible protrusion and a second anterior compressible protrusion each can extend outwardly from at least one of the anterior phalange regions of the plurality of phalanges regions.

[0020] Broadly stated, in some embodiments, the first anterior compressible protrusion and the second anterior compressible protrusion can be connected by an anterior connecting material.

[0021] Broadly stated, in some embodiments, each of the plurality of phalange regions can comprise an dorsal phalange region and the at least one compressible protrusion can comprise a first dorsal compressible protrusion and a second dorsal compressible protrusion each can extend outwardly from at least one of the dorsal phalange regions of the plurality of phalanges regions.

[0022] Broadly stated, in some embodiments, the first dorsal compressible protrusion and the second dorsal compressible protrusion can be connected by a dorsal connecting material.

[0023] Broadly stated, in some embodiments, the at least one compressible protrusion can comprise one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.

[0024] Broadly stated, in some embodiments, the glove can comprise at least one pressure sensor which can be disposed between the glove and the at least one compressible protrusion.

[0025] Broadly stated, in some embodiments, the glove can comprise a microcontroller, the microcontroller can comprise: a processor; at least one memory module; at least one

communication module; an analog to digital converter; and a power supply, wherein the at least one pressure sensor can be operatively coupled to the analog to digital converter.

[0026] Broadly stated, in some embodiments, the glove can further comprise further comprising weights disposed on one or both of a back of the glove and a backside of one or more digits of the glove.

[0027] Broadly stated, in some embodiments, a shoe can be provided for enhancing the effects of physical exercise for a person, the shoe can comprise at least one compressible protrusion which can be disposed on the shoe extending outwardly from the shoe.

[0028] Broadly stated, in some embodiments, the shoe can comprise a sole region and the at least one compressible protrusion can extend outwardly from the sole region.

[0029] Broadly stated, in some embodiments, the shoe can comprise an instep region and the at least one compressible protrusion can extend outwardly from the instep region.

[0030] Broadly stated, in some embodiments, the shoe can comprise a plurality of toe regions and the at least one compressible protrusion can extend outwardly from at least one of the plurality of toe regions.

[0031] Broadly stated, in some embodiments, each of the plurality of toe regions can comprise a tiptoe region and the at least one compressible protrusion can extend outwardly from at least one of the tiptoe regions of the plurality of toe regions.

[0032] Broadly stated, in some embodiments, each of the plurality of toe regions can comprise a sole toe region and the at least one compressible protrusion can comprise a first sole toe compressible protrusion and a second sole toe compressible protrusion each can extend outwardly from at least one of the sole toe regions of the plurality of toe regions.

[0033] Broadly stated, in some embodiments, the first sole toe compressible protrusion and the second sole toe compressible protrusion can be connected by a sole toe connecting material.

[0034] Broadly stated, in some embodiments, each of the plurality of toe regions can comprise an posterior toe region and the at least one compressible protrusion can comprise a first posterior toe compressible protrusion and a second posterior toe compressible protrusion each can extend outwardly from at least one of the posterior toe regions of the plurality of toe regions.

[0035] Broadly stated, in some embodiments, the first posterior toe compressible protrusion and the second posterior toe compressible protrusion can be connected by a posterior toe connecting material.

[0036] Broadly stated, in some embodiments, the at least one compressible protrusion can comprise one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.

[0037] Broadly stated, in some embodiments, the shoe can comprise at least one pressure sensor can be disposed between the shoe and the at least one compressible protrusion.

[0038] Broadly stated, in some embodiments, the shoe can comprise a microcontroller, the microcontroller can comprise: a processor; at least one memory module; at least one communication module; an analog to digital converter; and a power supply, wherein the at least one pressure sensor can be operatively coupled to the analog to digital converter.

[0039] Broadly stated, in some embodiments, a shoe can be provided for enhancing the effects of physical exercise for a person, the shoe comprising a sole further comprising a ball portion, a heel portion and a remainder portion, the improvement comprising: at least one first compressible protrusion disposed on one or both of the ball portion and the heel portion, extending downwardly therefrom; and at least one second compressible protrusion disposed on the remainder portion, extending downwardly therefrom.

[0040] Broadly stated, in some embodiments, the at least one first compressible protrusion can be larger in volume than the at least one second compressible protrusion.

[0041] Broadly stated, in some embodiments, the weight lifting shoe can comprise at least one third compressible protrusion, extending downwardly therefrom.

[0042] Broadly stated, in some embodiments, the at least one third compressible protrusion can be substantially hemispherical in configuration, and can further be smaller in diameter than one or both of the at least one first compressible protrusion and the at least one second compressible protrusion.

[0043] Broadly stated, in some embodiments, the shoe can be a cycling shoe and the sole region can further comprise a ball portion and the at least one compressible protrusion can comprise at least one first compressible protrusion disposed on the ball portion, extending

downwardly therefrom, the at least one first compressible protrusion can be configured to contact the pedal of a bicycle.

[0044] Broadly stated, in some embodiments, the ball portion can further comprise a cleat for use with a clipless pedal system and the at least one first compressible protrusion can be positioned around the cleat such that the at least one first compressible protrusion contacts a pedal of the clipless pedal system when the cleat is engaged with the pedal.

[0045] Broadly stated, in some embodiments, an improved insole can be provided for a shoe for enhancing the effects of physical exercise for a person, the insole comprising an upward-facing surface and a downward-facing surface, the improvement comprising at least one compression member disposed on the downward-facing surface, extending downwardly therefrom.

[0046] Broadly stated, in some embodiments, an improved workout mat can be provided for enhancing the effects of physical exercise for a person, the mat comprising an upward-facing surface and a downward-facing surface, the improvement comprising: at least one first compression member disposed on the upward-facing surface, extending upwardly therefrom; and at least one second compression member disposed on the upward-facing surface, extending upwardly therefrom.

[0047] Broadly stated, in some embodiments, an improved bar wrap can be provided for use with free weights or exercise equipment comprising a bar or a handle, the improved bar wrap for enhancing the effects of physical exercise for a person, the improved bar wrap comprising an equipment side for contacting the bar or handle and a user side for the person to grip once the wrap has been wrapped onto the bar or the handle, the improvement comprising: at least one first compression member disposed on the downward-facing surface, extending downwardly therefrom; and at least one second compression member disposed on the downward-facing surface, extending downwardly therefrom.

[0048] Broadly stated, in some embodiments, an improved joint wrap can be provided for enhancing the effects of physical exercise for a person, the wrap comprising an elastic tube configured for placement on an elbow or a knee of the person, the improvement comprising at least one compression member disposed on the elastic tube, extending outwardly therefrom.

[0049] Broadly stated, in some embodiments, an improved workout garment can be provided for enhancing the effects of physical exercise for a person, the workout garment comprising an inner surface and an outer surface, the improvement comprising at least one compression member disposed on the outer surface, extending outwardly therefrom.

[0050] Broadly stated, in some embodiments the garment can be configured as a suit covering both an upper body portion and a lower body portion of a person.

[0051] Broadly stated, in some embodiments, the at least one first compression member can be substantially hemispherical in configuration.

[0052] Broadly stated, in some embodiments, the at least one compression member can be removably attached to the outer surface.

[0053] Broadly stated, in some embodiments, the improved workout garment can comprise at least one pocket on the outer surface wherein the at least one compression member can be removably attached to the outer surface by inserting the at least one compression member into the pocket.

[0054] Broadly stated, in some embodiments, the garment can be fitted to a lower body portion of the person.

[0055] Broadly stated, in some embodiments, the garment can be fitted to an upper body portion of the person.

[0056] Broadly stated, in some embodiments, the inner surface and the outer surface can further comprise a hood portion wherein the at least one compression member is disposed on the hood portion.

[0057] Broadly stated, in some embodiments, the at least one compressible member can removably attached to the inner surface and extends downward along the inner surface so as to be positioned along the intergluteal cleft of the person.

[0058] Broadly stated, in some embodiments, the at least one first compression member can comprise one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.

[0059] Broadly stated, in some embodiments, the garment can further comprise weights disposed thereon.

[0060] Broadly stated, in some embodiments, the weights can be disposed on a limb portion of the garment.

[0061] Broadly stated, in some embodiments, an improved workout sock can be provided for enhancing the effects of physical exercise for a person, the foot covering comprising an inner surface and an outer surface, the improvement comprising at least one compression member disposed on the outer surface, extending outwardly therefrom.

[0062] Broadly stated, in some embodiments, the at least one first compression member can be substantially hemispherical in configuration.

[0063] Broadly stated, in some embodiments, one or both of the at least one first compression member and the at least one second compression member can comprise one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.

[0064] Broadly stated, in some embodiments, an improved shoe cover can be provided for enhancing the effects of physical exercise for a person, the foot covering comprising an inner surface and an outer surface, the improvement comprising at least one compression member disposed on the outer surface, extending outwardly therefrom.

[0065] Broadly stated, in some embodiments, the at least one first compression member can be substantially hemispherical in configuration.

[0066] Broadly stated, in some embodiments, one or both of the at least one first compression member and the at least one second compression member can comprise one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.

[0067] Broadly stated, in some embodiments, an improved floor covering can be provided for enhancing the effects of physical exercise for a person, the floor covering comprising an upward-facing surface and a downward-facing surface, the improvement comprising at least one first compression member disposed on the upward-facing surface, extending upwardly

therefrom; and at least one second compression member disposed on the upward-facing surface, extending upwardly therefrom.

[0068] Broadly stated, in some embodiments, one or both of the at least one first compression member and the at least one second compression member can be substantially hemispherical in configuration.

[0069] Broadly stated, in some embodiments, the at least one first compression member can be larger in volume than the at least one second compression member.

[0070] Broadly stated, in some embodiments, one or both of the at least one first compression member and the at least one second compression member can comprise one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.

[0071] Broadly stated, in some embodiments, a shoe can be provided for enhancing proprioceptive feedback to a person, the shoe can comprise: a sole portion which can comprise a sole inner surface, a toe region and one or more inter-toe compressible members; and an upper portion which can comprise an upper inner surface, the sole inner surface and the upper inner surface can define a foot cavity for receiving the foot of the user, and the one or more inter-toe compressible members can be coupled to and extend upwards from the inner surface of toe region of the sole to the inner surface of the upper, the one or more inter-toe compressible members can be configured to fit between the toes of the person when the person's foot is placed inside the shoe.

[0072] Broadly stated, in some embodiments, an insole can be provided for enhancing proprioceptive feedback to a person, the insole can be configured to fit inside a shoe, the insole can comprise: an upper surface; a toe region; and one or more inter-toe compressible members, the one or more inter-toe compressible members can be coupled to and extend upwards from the upper surface of toe region of the insole, the one or more inter-toe compressible members can be configured to fit between the toes of the person when the person's foot is placed inside the shoe containing the insole.

[0073] Broadly stated, in some embodiments, a sock can be provided for enhancing proprioceptive feedback to a person, the sock can comprise: an instep region; and two or more

toe regions which can be coupled to the instep region and configured to receive at least one toe of the person; and one or more inter-toe compressible members, the one or more inter-toe compressible members can be coupled to each of the adjacent two or more toe regions one or more inter-toe compressible members.

[0074] Broadly stated, in some embodiments, an improved pedal for a bicycle can be provided, the pedal can comprise a spindle; and a housing, the housing can comprise a platform, the improvement can comprise at least one compression member disposed on the platform, extending upwardly therefrom.

[0075] Broadly stated, in some embodiments, an insert for shoe can be provided for providing a proprioceptive effect on a person wearing the shoe, the insert comprising a loop of a compressible material that can be configured in the shape of a shoe insole so that the loop can be inserted and disposed around an interior perimeter within the shoe, the loop comprising: a toe perimeter portion; an outer perimeter portion; a heel portion; and an inner perimeter portion.

[0076] Broadly stated, in some embodiments, a shoe can be provided for providing a proprioceptive effect on a person wearing the shoe, the shoe comprising an insert further comprising a loop of a compressible material that can be configured in the shape of a shoe insole so that the loop can be inserted and disposed around an interior perimeter within the shoe, the loop comprising: a toe perimeter portion; an outer perimeter portion; a heel portion; and an inner perimeter portion.

[0077] Broadly stated, in some embodiments, the inner perimeter portion can further comprise an arch support.

[0078] Broadly stated, in some embodiments, the heel portion can further comprise an elevated heel support.

[0079] Broadly stated, in some embodiments, the insert can further comprise a toe cap disposed on the toe perimeter portion, wherein the toe cap is configured to cover at least a portion of at least one of the person's toes when wearing the shoe with the insert disposed therein.

[0080] Broadly stated, in some embodiments, the toe cap can further comprise at least one toe divider extending downwardly therefrom, and configured to separate at least one pair of toes of the person when wearing the shoe with the insert disposed therein.

[0081] Broadly stated, in some embodiments, the compressible material can be comprised of one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.

[0082] Broadly stated, in some embodiments, the shoe can further comprise at least one protrusion extending downwardly from a sole of the shoe, the at least one protrusion comprised of the compressible material.

[0083] Broadly stated, in some embodiments, the shoe can further comprise at least one pressure sensor disposed between the shoe and the at least one protrusion, or within the at least one protrusion.

[0084] Broadly stated, in some embodiments, the shoe can further comprise a microcontroller, the microcontroller comprising: a processor; at least one memory module; at least one communication module; an analog to digital converter; and a power supply, wherein the at least one pressure sensor is coupled to the analog to digital converter.

[0085] Broadly stated, in some embodiments a shoe can be provided for enhancing proprioceptive feedback to a person wearing the shoe, the shoe comprising a sole; an upper disposed on the sole; a strap comprising a first end and a second end, the first end operatively attached to a lateral edge of the sole, the strap configured to move from a first position wherein the strap wraps over the upper, wherein the second end comprises a fastener for fastening to the upper and wherein the second fastens to the upper, to a second position where the strap wraps under the sole, wherein the second end fastens to the upper; and a plurality of compressible members disposed on the strap.

[0086] Broadly stated, in some embodiments, the fastener on the shoe can comprise one or more of a group comprising of hook and loop fasteners, snaps, buttons and buckles.

[0087] Broadly stated, in some embodiments, the shoe can further comprise a heel compressible member configured for removably attaching to a heel of the shoe.

[0088] Broadly stated, in some embodiments, a sports helmet can be provided for providing proprioceptive feedback to a person's head when the person is wearing the helmet, the helmet comprising: an outer shell comprising a cavity therein; an inner liner disposed in the cavity and configured to receive the head; and at least one compressible member disposed on the inner liner, wherein the at least compressible member contacts the head when the person places the helmet on their head.

[0089] Broadly stated, in some embodiments, the at least one compressible member can be disposed on one or more of a forehead portion, a rear portion, a top portion and side portions of the liner.

[0090] Broadly stated, in some embodiments, an improved free weight comprising a pair of end weights and a handle disposed therebetween can be provided, the improvement comprising a plurality of compressible members disposed on an external surface of the handle.

[0091] Broadly stated, in some embodiments, the plurality of compressible members can be disposed on the handle in one or more arrangements comprising a circumferential arrangement around the handle, a spiral arrangement around the handle, and a cross-hatch pattern around the handle.

[0092] Broadly stated, in some embodiments, at least one of the plurality of compressible members can be hemispherical-shaped.

[0093] Broadly stated, in some embodiments, at least one of the plurality of compressible members can be comprised of one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer in any of the foregoing described embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS:

[0094] Figure 1 is a top plan view depicting one embodiment of a pair of weight lifting gloves with compressible hemispherical material on the palm and digits of the gloves.

[0095] Figure 2 is a perspective view depicting sections of a sphere of compressible material for use with the weight lifting gloves of Figure 1.

[0096] Figure 3 is a side elevation view depicting one embodiment of a weight lifting shoe with compressible hemispherical material on the sole of the shoe.

[0097] Figure 4 is a bottom plan view depicting the sole of the weight lifting shoe of Figure 3.

[0098] Figure 5 is a perspective view depicting sections of a sphere of compressible material for use with the weight lifting shoe of Figure 3.

[0099] Figure 6 is a perspective view depicting one embodiment of a galosh on a shoe, the galosh comprising compressible hemispherical material on the sole of the shoe.

[01 00] Figure 7 is a bottom plan view depicting the sole of the galosh of Figure 6.

[01 01] Figure 8 is a top plan view depicting one embodiment of a pair of running gloves with compressible hemispherical material on the palm and digits of the gloves.

[01 02] Figure 9 is a side elevation view depicting one embodiment of a running shoe with compressible hemispherical material on the sole of the shoe.

[01 03] Figure 10 is a bottom plan view depicting the sole of the shoe of Figure 9.

[01 04] Figure 11 is a bottom plan view depicting one embodiment of an insole with compressible hemispherical material on the sole thereof.

[01 05] Figure 12A is a top plan view depicting one embodiment of an exercise mat with compressible hemispherical material thereon.

[01 06] Figure 12B is a perspective view depicting a second embodiment of an exercise mat with compressible hemispherical material thereon.

[01 07] Figure 13 is a perspective view depicting one embodiment of a barbell wrap with compressible hemispherical material thereon, to be used with a dumbbell.

[01 08] Figure 14 is a perspective view depicting the barbell wrap of Figure 14 being used with a barbell.

[01 09] Figure 15 is a perspective view depicting one embodiment of a joint wrap having compressible hemispherical material extending therefrom.

[01 10] Figure 16 is an elevation view depicting the joint wrap of Figure 15 positioned on the elbows and knee of a person.

[01 11] Figure 17 is an elevation view depicting embodiments of workout garments worn by a person having compressible hemispherical material extending therefrom.

[01 12] Figure 18 is a perspective view depicting one embodiment of a workout sock comprising compressible hemispherical material extending outwardly therefrom.

[01 13] Figure 19 is a side elevation view depicting one embodiment of a shoe cover with compressible hemispherical material extending outwardly therefrom.

[01 14] Figure 20 is a rear elevation depicting the shoe cover of Figure 4.

[01 15] Figure 21 is a top plan view depicting one embodiment of a floor covering with compressible hemispherical material thereon.

[01 16] Figure 22 is a perspective view depicting one embodiment of a headband having compressible hemispherical material extending therefrom.

[01 17] Figure 23A is an elevation view depicting one embodiment of an exercise glove having compressible protrusions extending therefrom.

[01 18] Figure 23B is an elevation view depicting the exercise glove of Figure 23A.

[01 19] Figure 24 is an elevation view depicting one embodiment of an exercise glove having compressible inter-phalange compressible members.

[0120] Figure 25 is a block diagram depicting an embodiment of a microcontroller connected to pressure sensors.

[0121] Figure 26 is a flowchart depicting a method collecting data from pressure sensors.

[0122] Figure 27 is a perspective view depicting one embodiment of a pair of exercise shoes with compressible hemispherical protrusions on the instep and toes of the shoes.

[0123] Figure 28 is a perspective view depicting one embodiment of a pair of shoes with inter-toe compressible members.

[0124] Figure 29 is a perspective view depicting one embodiment of a pair of insoles with inter-toe compressible members.

[0125] Figure 30 is a perspective view depicting one embodiment of a pair of socks with inter-toe compressible members.

[0126] Figure 31A is a perspective view depicting one embodiment of a lower body workout garment with an intergluteal cleft compressible member.

[0127] Figure 31B is a top perspective view depicting the workout garment of Figure 31a with the compressible member inserted into a pocket on an interior surface of the garment.

[0128] Figure 31C is a top perspective view depicting the workout garment of Figure 31b with the compressible member removed from the pocket.

[0129] Figure 32 is a bottom plan view depicting the sole of a cycling shoe with compressible members protruding from a ball portion of the shoe, the compressible members positioned around a cleat of the cycling shoe.

[0130] Figure 33 is a perspective view depicting a bicycle pedal with compressible members protruding upwardly from the pedal.

[0131] Figure 34 is a top plan view depicting one embodiment of a pair of shoe inserts with compressible material disposed around its perimeter.

[0132] Figure 35 is a perspective view depicting the shoe inserts of Figure 34.

[0133] Figure 36 is a top plan view depicting a second embodiment of a pair of shoe inserts with compressible material disposed around its perimeter and a toe cap.

[0134] Figure 37 is a perspective view depicting the shoe inserts of Figure 36.

[0135] Figure 38 is a front perspective transparent view depicting a shoe with the shoe insert of Figure 36.

[0136] Figure 39 is a side perspective view depicting the shoe of Figure 38.

[0137] Figure 40 is a side elevation plan view depicting a pair of shoe with compressible protrusions disposed on the soles thereof.

[0138] Figure 41 is a front perspective view depicting another embodiment of a shoe insert having compressible members disposed at a toe and at a heel portions thereof.

[0139] Figure 42 is a side perspective view depicting the shoe insert of Figure 41.

[0140] Figure 43 is a top perspective view depicting the shoe insert of Figure 41.

[0141] Figure 44 is a front perspective view depicting one embodiment of a full-body workout suit with a plurality of compressible members disposed thereon.

[0142] Figure 45 is a rear perspective view depicting the full-body workout suit of Figure 44.

[0143] Figure 46 is a perspective view depicting a first embodiment of a dumbbell having compressible members disposed around the handle of the dumbbell.

[0144] Figure 47 is a perspective view depicting a second embodiment of a dumbbell having compressible members disposed around the handle of the dumbbell.

[0145] Figure 48 is a perspective view depicting a third embodiment of a dumbbell having compressible members disposed around the handle of the dumbbell.

[0146] Figure 49 is a perspective view depicting a fourth embodiment of a dumbbell having compressible members disposed around the handle of the dumbbell.

[0147] Figure 50 is a left side elevation view depicting one embodiment of a left convertible cross-training shoe having a movable strap with compressible members disposed thereon.

[0148] Figure 51 is a rear elevation view depicting the cross-training shoe of Figure 50.

[0149] Figure 52 is a right side elevation view depicting the cross-training shoe of Figure 50.

[0150] Figure 53 is a perspective view depicting an alternate embodiment of a pair of convertible cross-training shoes having a movable strap with compressible members and weights disposed thereon.

[0151] Figure 54 is a bottom plan view depicting a sport helmet having compressible members disposed therein.

DETAILED DESCRIPTION OF EMBODIMENTS:

[0152] In this description, references to "one embodiment", "an embodiment", or "embodiments" mean that the feature or features being referred to are included in at least one embodiment of the technology. Separate references to "one embodiment", "an embodiment", or "embodiments" in this description do not necessarily refer to the same embodiment and are also not mutually exclusive unless so stated and/or except as will be readily apparent to those skilled in the art from the description. For example, a feature, structure, act, etc. described in one embodiment may also be included in other embodiments, but is not necessarily included. Thus, the present technology can include a variety of combinations and/or integrations of the embodiments described herein.

[01 53] In some embodiments, a compressible protrusion can be provided. The compressible protrusion can comprise a planar surface and a protrusion from said planar surface. The compressible protrusion can be configured to be disposed between a person and a piece of exercise equipment or any hard surface. The compressible protrusion can be configured such that it can be attached to a shoe, glove, garment, sock, shoe cover or other exercise apparatus.

[01 54] In some embodiments, the compressible protrusion can comprise a suction cup or adhesive coupled to the planar surface. The compressible protrusion can then be fixed to a surface using the suction cup or adhesive.

[01 55] In some embodiments including those described herein, the compressible protrusions can improve the user's body positioning when performing exercises or other activities. The compressible protrusions can cause the user to actively hold the muscles, joints and body in a proper alignment providing proprioceptive feedback to the CNS. These voluntary movements can be repeated and stored as central commands. This patterning of the brain allows various skills to be performed without continuous without continuous reference to consciousness and can increase the conscious and unconscious awareness of the joint or limb in motion.

[01 56] In some embodiments, including those described herein, the compressible protrusions can be comprised of an elastomeric material that has physical properties that enable it to be compressed under force and to substantially return to its original shape when the force is released. Such materials can include rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin, thermoplastic elastomers and any other material having similar physical properties as well known to those skilled in the art. In further embodiments, the exterior of the compressible hemisphere can be composed of a durable material, such as plastic or synthetic fiber and the interior of the compressible protrusion can comprise one or more of a liquid, a gel and a gas, such as air.

[01 57] Though the compressible protrusions in this application are at times described as hemispheres, for the purposes of this specification and the claims herein, it shall be understood that any compressible protrusion described as a hemisphere or as being hemispherical can be substituted with other shapes such as a hemi-ovoid, hemi-ellipsoid, tetrahedron, trapezoidal

prism or other similarly curved or polyhedral surface, or other suitable shape as well known to those skilled in the art.

[01 58] Gloves can be provided which comprise at least one compressible protrusion. In configuring gloves in this manner, instability can be created when the protrusion is located between the users hand and a surface such as when gripping a barbell or dumbbell, or other like weight/resistance equipment, performing floor exercises or other stretching activities, or squeezing the protrusion with the fingers to enable exercise of muscles in the fingers and forearms while running or other lower body activity, which can allow additional muscles to be used during a weight lifting exercise without comprising the joints of the person lifting the weight. This can also cause the user to actively hold the muscles, joints and body in a proper alignment providing proprioceptive feedback to the CNS. These voluntary movements can be repeated and stored as central commands. This patterning of the brain allows various skills to be performed without continuous without continuous reference to consciousness and can increase the conscious and unconscious awareness of the joint or limb in motion.

[01 59] Referring to Figure 1, one embodiment of improved weight lifting glove 10 is shown. In some embodiments, glove 10 can be configured to cover portions of the anterior or palmar region and portions of the posterior or dorsum of the hand such as the metacarpus and one or more fingers and optionally anterior and posterior portions of the wrist of a user's hand. In this embodiment, glove 10 can comprise an anterior region 13 adapted to cover the front or palmar region of a user's hand. Anterior region 13 can comprise anterior compressible hemisphere A coupled to and positioned on the exterior surface of anterior region 13. Each phalange region 14, can extend outwardly from the anterior region 13 and can comprise an anterior phalange region 14 coupled to or integral with and extending outwardly from the anterior region 13 and can comprise one or more anterior phalange compressible hemisphere B coupled to and positioned on the exterior surface of anterior phalange region 14.

[0160] Referring to Figure 2, an example of how hemispheres A and B can be formed is shown by taking sections of sphere 12.

[0161] In configuring gloves 10 in this manner, instability can be created when gripping a barbell or dumbbell, or other like weight/resistance equipment, which can allow additional

muscles to be used during a weight lifting exercise without comprising the joints of the person lifting the weight. This can also cause the user to actively hold the muscles, joints and body in a proper alignment providing proprioceptive feedback to the CNS. These voluntary movements can be repeated and stored as central commands. This patterning of the brain allows various skills to be performed without continuous without continuous reference to consciousness and can increase the conscious and unconscious awareness of the joint or limb in motion.

[0162] Referring to Figure 8, one embodiment of improved running gloves 28 is shown. In some embodiments, palm 13 of gloves 28 can comprise compressible hemisphere A, and one or more compressible hemispheres B along digits 14 of gloves 28. Hemispheres A and B disposed on gloves 28 can be comprised of the elastomeric or other durable material discussed above. Gloves 28 can be worn while running such that the runner can squeeze the gloves to enable exercise of muscles in the fingers and forearms at the same time.

[0163] Referring to Figures 23A and 23B, a further embodiment of an exercise glove is shown. Glove 2300 can be configured to cover portions of the anterior or palmar region and portions of the posterior or dorsum of the hand such as the metacarpus and one or more fingers and optionally anterior and posterior portions of the wrist of a user's hand. In this embodiment, glove 2300 can comprise dorsal region 2302 adapted to cover the back or dorsum of a user's hand. Dorsal region 2302 can comprise dorsal protrusion 2320 coupled to and positioned on the exterior surface of dorsal region 2302. One or more phalange regions 2310, 2312, 2314, 2316, and 2318, configured to receive a finger of a hand can be coupled to or integral with the dorsal region 2302. In some embodiments, thumb phalange region 2310 can be configured to receive the thumb of a user, index phalange region 2312 can be configured to receive the index finger of a user, a middle phalange region 2314 can be configured to receive the middle finger of a user, a ring phalange region 2316 can be configured to receive the ring finger of a user, and a little phalange region 2318 can be configured to receive the little finger of a user.

[0164] Each phalange region 2310, 2312, 2314, 2316, and 2318, can comprise a posterior phalange region such as posterior thumb phalange region 2310A, posterior index phalange region 2312A, posterior middle phalange region 2314A, posterior ring phalange region 2316A, and posterior little phalange region 2318A, coupled to and extending outwardly from the dorsal

region 2302. Posterior thumb phalange region 231 0A can extend outwardly from the dorsal region 2302 and can comprise one or more posterior thumb phalange protrusions 2330 coupled to and positioned on the exterior surface of posterior thumb phalange region 231 0A. Posterior index phalange region 231 2A can be disposed adjacent to thumb phalange region 2310, and posterior index phalange region 231 2A can comprise one or more posterior index phalange protrusions 2332 coupled to and positioned on the exterior surface of posterior index phalange region 2312A. Posterior middle phalange region 2314A can be disposed adjacent to index phalange region 2312, and posterior middle phalange region 2314A can comprise one or more posterior middle phalange protrusions 2334 coupled to and positioned on the exterior surface of posterior middle phalange region 231 4A. Posterior ring phalange region 231 6A can be disposed adjacent to middle phalange region 2314, and posterior ring phalange region 2316A can comprise one or more posterior ring phalange protrusions 2336 coupled to and positioned on the exterior surface of posterior ring phalange region 231 6A. Posterior little phalange region 2318A can be disposed adjacent to ring phalange region 2316, and posterior little phalange region 231 8A can comprise one or more posterior little phalange protrusions 2338 coupled to and positioned on the exterior surface of posterior little phalange region 231 8A.

[0165] In some embodiments, where there are two or more posterior phalange protrusions, posterior connecting material 2360 can extend from a first posterior phalange protrusion to a second posterior phalange protrusion. The posterior connecting material 2360 can be coupled to and extend along the exterior surface of the posterior phalange region 2310A, 2312A, 2314A, 2316A, or 231 8A. The posterior connecting material 2362 can comprise the same materials used for the posterior phalange protrusions 2330, 2332, 2334, 2336, and 2338, as described above. The posterior connecting material can provide additional resistance when the user flexes its fingers which can require additional effort by the user.

[0166] Glove 2300 can comprise an anterior region 2304 adapted to cover the front or palmar region of a user's hand. Anterior region 2304 can comprise anterior protrusion 2320 coupled to and positioned on the exterior surface of anterior region 2304. Each phalange region 2310, 2312, 2314, 2316, and 2318, can extend outwardly from the dorsal region 2302 and can comprise an anterior phalange region such as anterior thumb phalange region 231 0B, anterior

index phalange region 2312B, anterior middle phalange region 2314B, anterior ring phalange region 2316B, and anterior little phalange region 2318B, coupled to or integral with and extending outwardly from the anterior region 2304. Anterior thumb phalange region 2310B can extend outwardly from the anterior region 2304 and can comprise one or more anterior thumb phalange protrusions 2340 coupled to and positioned on the exterior surface of anterior thumb phalange region 2310B. Anterior index phalange region 2312B can be disposed adjacent to thumb phalange region 2310, and anterior index phalange region 2312B can comprise one or more anterior index phalange protrusions 2342 coupled to and positioned on the exterior surface of anterior index phalange region 2312B. Anterior middle phalange region 2314B can be disposed adjacent to index phalange region 2312, and anterior middle phalange region 2314B can comprise one or more anterior middle phalange protrusions 2344 coupled to and positioned on the exterior surface of anterior middle phalange region 2314B. Anterior ring phalange region 2316B can be disposed adjacent to middle phalange region 2314, and anterior ring phalange region 2316B can comprise one or more anterior ring phalange protrusions 2346 coupled to and positioned on the exterior surface of anterior ring phalange region 2316B. Anterior little phalange region 2318B can be disposed adjacent to ring phalange region 2316, and anterior little phalange region 2318B can comprise one or more anterior little phalange protrusions 2348 coupled to and positioned on the exterior surface of anterior little phalange region 2318B.

[0167] In some embodiments, where there are two or more anterior phalange protrusions, anterior connecting material 2362 can extend from a first anterior phalange protrusion to a second anterior phalange protrusion. The anterior connecting material 2362 can be coupled to and extend along the exterior surface of the anterior phalange region 2310B, 2312B, 2314B, 2316B, or 2318. The anterior connecting material 2362 can comprise the same materials used for the anterior phalange protrusions 2340, 2342, 2344, 2346, and 2348, as described above. The anterior connecting material can provide additional resistance when the user extends its fingers which can require additional effort by the user.

[0168] In some embodiments, each phalange region 2310, 2312, 2314, 2316, and 2318, can comprise a fingertip region such as thumb phalange fingertip region 2310C, index phalange fingertip region 2312C, middle phalange fingertip region 2314C, ring phalange region 2316C,

and little phalange fingertip region 231 8C. One or more of the phalange fingertip regions 231 00, 2312C, 2314C, 2316C, and 231 8C can comprise fingertip protrusions 2350 coupled to and positioned on the exterior surface of phalange fingertip region 231 0C, 231 2C, 231 4C, 231 6C, and 231 8C.

[0169] In some embodiments, glove 2300 can further comprise weights placed on the back of the hand or on the backside of one or more of the digits of the glove, either as separate weights that can be inserted into pockets disposed on the gloves, or that can be attached to the gloves during their manufacture. In some embodiments, weight 800 can be added or disposed on dorsal region 2302, while in other embodiments, weights 802 can be added or disposed on the posterior phalange regions 2310A, 2312A, 2314A, 2316A and 2318A. By providing weights 800 and 802 on gloves 2300, the weights, even in small amounts, can intensify the effect of exercise using free weights or resistance training equipment. The inclusion of weights 800 and 802 on gloves 2300 can reduce the amount of free weight or resistance used by the person performing the exercise thereby allowing them to move more freely without restriction in a natural and functional way, which can be more athletic in nature.

[01 70] In some embodiments, as shown in Figure 24, glove 2300 can comprise one or more inter-phalange compressible members 2480 between phalange regions 2310 and 2312, 2312 and 2314, 2314 and 2316, and 2316 and 2318. The inter-phalange compressible members 2480 can be coupled to each of the adjacent phalange regions.

[01 71] In some embodiments the protrusions can be coupled to glove 2300 with heat bonding, chemical bonding, adhesives, stitching, clasp type fasteners, clip type fasteners, rivet type fasteners, threaded type fasteners, other types of fasteners, or any other suitable joining method.

[01 72] In some embodiments, glove 2300 can comprise one or more pressure sensors 2580, which can measure the pressure applied to each of the protrusions. The pressure sensors 2580 can be placed between the protrusions and the exterior surface of glove 2300 or embedded within the protrusions. In some embodiments, pressure sensors 2580 can comprise one of more of the following load sensing technologies: piezoresistive sensors, piezoelectric sensors, strain gauge sensors comprise wheatstone bridges, capacitive sensors, electromagnetic

sensors, optical sensors, resistive sensors and any other load sensing technology as well known by those skilled in the art including, but not limited to, pressure sensitive fabric (see http://eeonyx.com/product_category/pressure-sensors/).

[01 73] Shoes can be provided which comprise at least one compressible protrusion. In configuring shoes in this manner, instability can be created when the protrusion is located between the users foot and a surface such as when standing when lifting weights, using weight/resistance equipment, performing floor exercises or other stretching activities, which can allow additional muscles to be used during a weight lifting exercise without comprising the joints of the person lifting the weight. This can also cause the user to actively hold the muscles, joints and body in a proper alignment providing proprioceptive feedback to the CNS. These voluntary movements can be repeated and stored as central commands. This patterning of the brain allows various skills to be performed without continuous without continuous reference to consciousness and can increase the conscious and unconscious awareness of the joint or limb in motion.

[01 74] Referring to Figures 3 to 5, one embodiment of improved weight lifting shoe 16 is shown. In some embodiments, sole 18 of shoe 16 can comprise compressible hemisphere A disposed on ball portion 20 and heel portion 21 on sole 18. In further embodiments, sole 18 can comprise compressible hemispheres disposed on arch portion 22, and on other portions, of sole 18. In yet further embodiments, sole 18 can comprise compressible hemispheres C disposed in the interstitial spaces between hemispheres A and B, where hemisphere A can be larger in volume than hemisphere B that, in turn can be larger in volume than hemisphere C. As shown in Figure 5, hemispheres A, B and C can be sections of notional sphere 12 comprised of the elastomeric or other durable materials as described above. In providing a weight lifting shoe in this configuration, can require the user to hold the body in proper alignment, adding proprioceptive elements to the exercise to assist in proper patterning of the CNS and to exert additional muscles to maintain balance and stability while lifting a weight as standing on hemispheres A, B and C is similar in effect to balancing on a plastic compressible dome, as well known to those skilled in the art and used in other forms of exercise.

[01 75] Referring to Figures 9 and 10, one embodiment of improved running shoe 30 is shown. In some embodiments, sole 18 of shoe 30 can comprise a plurality of similarly sized compressible hemispheres A disposed thereon. Hemispheres A disposed on shoe 30 can be comprised of the elastomeric or other durable materials discussed above. In providing a running shoe of this configuration, a runner can exert the use of additional muscles to hold the body in proper alignment and maintain balance and stability while running, thus enhancing the effects of the physical exercise.

[01 76] Referring to Figure 27, an embodiment of an exercise shoe is shown. Shoe 2700 can be configured to cover portions of the sole or bottom region and portions of the instep or top of the foot. In this embodiment, the shoe 2700 can comprise instep region 2702 adapted to cover the top or instep of a user's foot. Instep region 2702 can comprise instep protrusion 2720 coupled to and positioned on the exterior surface of instep region 2702. One or more toe regions 2710, configured to receive a toe of a foot can be coupled to or integral with the instep region 2702. In some embodiments, the one or more toe regions 2710 can comprise up to five toe regions 2710, one for each toe of the user's foot.

[01 77] Each toe region 2710 can comprise a posterior toe region 271 OA coupled to or integral with and extending outwardly from the instep region 2702. One or more posterior toe regions 271 OA can extend outwardly from the instep region 2702 and can comprise one or more posterior toe protrusions 2730 coupled to and positioned on the exterior surface of posterior toe region 271 OA.

[01 78] In some embodiments, where there are two or more posterior toe protrusions 2730, posterior connecting material 2760 can extend from a first posterior toe protrusion to a second posterior toe protrusion. The posterior connecting material 2760 can be coupled to and extend along the exterior surface of the posterior toe region 271 OA.

[01 79] Shoe 2700 can comprise a sole region 2704 adapted to cover the sole or bottom region of a user's foot. Sole region 2704 can comprise sole protrusion 2720 coupled to and positioned on the exterior surface of sole region 2704. Each toe region 2710, can extend outwardly from the instep region 2702 and can comprise a sole toe region 271 0B, coupled to or integral with and extending outwardly from the sole region 2704. Sole toe region 271 0B can extend

outwardly from the sole region 2704 and can comprise one or more sole toe protrusions 2740 coupled to and positioned on the exterior surface of sole toe region 271 OB.

[01 80] In some embodiments, where there are two or more sole toe protrusions 2740, sole connecting material 2762 can extend from a first sole toe protrusion to a second sole toe protrusion. The sole connecting material 2762 can be coupled to and extend along the exterior surface of the sole toe region 271 OB.

[01 81] In some embodiments, each toe region 2710 can comprise a tiptoe region 2710C. One or more of the tiptoe regions 2710C can comprise tiptoe protrusions 2750 coupled to and positioned on the exterior surface of tiptoe region 2710C.

[01 82] In some embodiments, shoe 2700 can comprise one or more inter-toe compressible members 2780 between adjacent toe regions 2710. The inter-toe compressible members 2780 can be coupled to each of the adjacent toe regions 2710.

[01 83] In some embodiments the protrusions can be coupled to the shoe 2700 with heat bonding, chemical bonding, adhesives, stitching, clasp type fasteners, clip type fasteners, rivet type fasteners, threaded type fasteners, other types of fasteners, or any other suitable joining method.

[01 84] In some embodiments, the shoe 2700 can comprise one or more pressure sensors 2580, which can measure the pressure applied to each of the protrusions. The pressure sensors 2580 can be placed between the protrusions and the exterior surface of the shoe 2700 or embedded within the protrusions. In some embodiments, pressure sensors 2580 can comprise one or more of the following load sensing technologies: piezoresistive sensors, piezoelectric sensors, strain gauge sensors comprise wheatstone bridges, capacitive sensors, electromagnetic sensors, optical sensors, resistive sensors and any other load sensing technology as well known by those skilled in the art including, but not limited to, pressure sensitive fabric (see http://eeonyx.com/product_category/pressure-sensors/).

[01 85] Referring to Figure 32, an embodiment of an improved cycling shoe 3200. In some embodiments, sole 3208 of shoe 3200 can comprise one or more compressible members 3204 disposed on ball portion 3216 of sole 3208, so as to contact a pedal of a bicycle. In further embodiments, sole 3208 can comprise a cleat 3212 for use as part of a clipless pedal system.

The one or more compressible members 3204 can be positioned around the cleat such that the compressible members 3204 contact the pedal of the clipless pedal system. Providing a cycling shoe in this configuration, can require the user to engage the quadriceps and hold the body in proper alignment, adding proprioceptive elements to the cycling to assist in proper patterning of the CNS and to exert additional muscles to maintain balance and stability while cycling as the compressible members 3204 can create instability.

[01 86] Referring to Figure 33, an improved bicycle pedal 3300 is shown. In some embodiments pedal 3300 can comprise spindle 3308. Spindle 3308 can comprise threaded end 3312 for attaching pedal 3300 to a bicycle crank arm. Pedal 3300 can also comprise housing 3316 that rotates around spindle. Housing 3316 can comprise platform 3320 and can provide a surface for placing a shoe while operating the bicycle. Platform 3320 can comprise one or more compressible members 3304 protruding upwards from the platform 3320. Providing a bicycle pedal 3300 in this configuration, can require the user to engage the quadriceps and hold the body in proper alignment, adding proprioceptive elements to the cycling to assist in proper patterning of the CNS and to exert additional muscles to maintain balance and stability while cycling as standing on compressible members 3304 can create instability

[01 87] Referring to Figures 6 and 7, an embodiment of improved galosh 24 is shown fitted onto shoe 26. In some embodiments, sole 18 can comprise compressible hemisphere A disposed on ball portion 20 and on heel portion 21 of sole 18. In providing improved galosh 24 for use with any shoe, a person can achieve similar effects as provided by improved weight lifting shoe 16 without having a dedicated weight lifting shoe; they can simply fit galosh 24 onto any shoe the person wishes to wear. Hemispheres A used on galosh 24 can be comprised of the elastomeric or other durable material, as discussed above. Galosh 24, itself, can be comprised of rubber or Luon™, while sole 18 of galosh can be comprised of a heavier or denser material, such as plastic or a dense elastomeric material similar to those discussed above.

[01 88] Referring to Figures 19 and 20, one embodiment of improved shoe cover 400 is shown. In some embodiments, shoe cover 400 can comprise one or more compressible hemispheres A disposed thereon, extending outwardly. The compressible hemispheres A can be disposed on shoe cover 400 on sole portion 410, toe portion 420, instep 430, heel portion 440 or leg portion

450. The compressible hemispheres can be comprised of the elastomeric or other durable materials as described above. Shoe cover 400 can be configured to be worn over any type of shoe. In some embodiments, shoe cover 400 can stretch to slip over a shoe worn by the user. In other embodiments, shoe cover 400 can comprise a closure means such as a zipper, or hook and loop closure along the back of leg portion to facilitate application and removal of shoe cover 400. Shoe cover 400, itself, can be comprised of nylon, polyester, neoprene or other suitably flexible material as well known to those skilled in the art. In providing a shoe cover with compressible hemispheres disposed on sole portion 410, a person standing while wearing shoe cover 400 can experience a similar effect to standing on an exercise dome and, thus, will need to hold the body in proper alignment and exert the use of additional muscles to maintain balance and stability. In providing a shoe cover with compressible hemispheres disposed on other portions of shoe cover 400, instability can be created at the contact point with the floor or exercise equipment when performing the workout which can allow additional muscles to be used and reduce strain on the joints of person. Compressible hemispheres A can be removably attached to shoe cover 400 in the same manner described with respect to the workout garments.

[01 89] Referring to Figure 11, one embodiment of improved shoe insole 32 is shown. In some embodiments, insole 32 can comprise a plurality of similarly sized compressible hemispheres A disposed thereon. Hemispheres A disposed on insole 32 can be comprised of the elastomeric or other durable materials discussed above. In providing an insole of this configuration that can be placed in any shoe, a person wearing such a shoe with insole 32 can experience at least some of the effects that can be provided by improved running shoes 30 discussed above.

[01 90] Referring to Figure 12a, one embodiment of improved workout mat 34 is shown. In some embodiments, mat 34 can comprise base or substrate 36, further comprising a plurality of compressible hemispheres A and compressible hemispheres B disposed thereon in a spaced-apart configuration, where hemispheres A can be larger in volume than hemispheres B. In some embodiments, one or both of hemispheres A and B can be comprised of the elastomeric or other durable material discussed above. Referring to Figure 12b, another embodiment of improved workout mat 34 is shown. In some embodiments, mat 34 can comprise base or

substrate 36, further comprising a plurality of compressible hemispheres A disposed thereon in a spaced-apart configuration. In some embodiments, one or both of hemispheres A and B can be comprised of the elastomeric or other durable material discussed above. In providing an exercise mat of this configuration, a person standing or contacting the hemispheres protruding from the mat can experience a similar effect to standing on an exercise dome and, thus, will need to hold the body in proper alignment and exert the use of additional muscles to maintain balance and stability while on the mat. In some embodiments, mat 34 can be configured as a rectangle 100 cm by 180 cm.

[0191] Referring to Figure 21, one embodiment of improved workout floor covering 600 is shown. In some embodiments, floor covering 600 can comprise base or substrate 610, further comprising a plurality of compressible hemispheres A and compressible hemispheres B disposed thereon, where hemispheres A can be larger in volume than hemispheres B. In some embodiments, one or both of hemispheres A and B can be comprised of the elastomeric or other durable material discussed above. In providing a floor covering of this configuration, a person standing or contacting the hemispheres protruding from the floor covering can experience a similar effect to standing on an exercise dome and, thus, will need to hold the body in proper alignment and exert the use of additional muscles to maintain balance and stability while on the floor covering. In some embodiments, floor covering 600 can be configured as a tile 30 cm to 100 cm square. In some embodiments the sides of the tile can comprise interlocking elements to connect with adjacent tiles. As an example of this, floor covering 600 can comprise one or more connecting tabs 612 configured to couple with tab openings 614 wherein tabs 612 of a first piece of floor covering 600 can fit into tab openings 614 of a second piece of floor covering 600 thereby interlocking them together.

[0192] Referring to Figures 13 and 14, one embodiment of improved bar wrap 37 is shown. In some embodiments, wrap 37 can be a down-sized version of mat 34 that can enable a person to place wrap 37 around handle 40 of dumbbell 38 or around barbell 42. In some embodiments, wrap 37 can comprise base or substrate 36, further comprising a plurality of compressible hemispheres A and compressible hemispheres B disposed thereon, where hemispheres A can be larger in volume than hemispheres B. In some embodiments, one or both of hemispheres A

and B can be comprised of the elastomeric or other durable material discussed above. In providing a barbell wrap of this configuration, and using it around handle 40 of dumbbell 38 or around barbell 42 while performing a weight lifting exercise, can cause a person to hold the body in proper alignment and use additional muscles in their hands and forearms to maintain balance, stability and control of the dumbbell or barbell during the exercise, thus, enhancing the effects of the physical exercise. Wrap 37 can also be placed around other handles such as the grip of a golf club, baseball bat, hockey stick or a racquet to provide similar benefits.

[01 93] Referring to Figures 46 to 49, four alternate embodiments of free weight or dumbbell 38 are shown with compressible members disposed around an external surface of handle 40 disposed between end weights 39. In Figure 46, a first embodiment of dumbbell 38 can comprise a plurality of ellipsoid-shaped compressible members 684 arranged circumferentially around the external surface of handle 40. In Figure 47, a second embodiment of dumbbell 38 can comprise a plurality of ellipsoid-shaped compressible members 686 arranged around the external surface of handle 40 in a spiral configuration. In Figure 48, a third embodiment of dumbbell 38 can comprise a plurality of ellipsoid-shaped compressible members 688 configured in a cross-hatch pattern disposed around the external surface of handle 40. In Figure 49, a fourth embodiment of dumbbell 38 can comprise a plurality of hemispherical-shaped compressible members 684 disposed circumferentially around the external surface of handle 40. In providing a dumbbell of this configuration, a separate wrap, as discussed above, would not be necessary thereby making these configurations of dumbbell more convenient to use. As with wrap 37 described above, the compressible members disposed around handle 40 of dumbbell 38 while performing a weight lifting exercise can cause a person to experience or enhance proprioceptive feedback from holding dumbbell 38, and can the person to hold their body in proper alignment and use additional muscles in their hands and forearms to maintain balance, stability and control of the dumbbell or free weight during an exercise using the weight, thus, enhancing the effects of the physical exercise.

[0194] Referring to Figures 15 and 16, one embodiment of improved joint wrap 44 is shown. In some embodiments, joint wrap 44 can comprise one or more compressible hemisphere A disposed thereon, extending outwardly. Joint wrap 44 can be comprised of an elastic or

stretchy tube of fabric that can be slipped over elbow 46 or knee 48 on person P, as shown in Figure 16. In some embodiments, wrap 44 can comprise a single compressible hemisphere A that can be positioned over elbow 46 or over the knee cap of knee 48. In other embodiments, wrap 44 can comprise a plurality of compressible hemispheres A, where a hemisphere can extend outwardly from either side of knee 48. Compressible hemisphere A can be comprised of the elastomeric or other durable materials discussed above. In providing a joint wrap of this configuration, exercises such as "planking" or conventional floor exercises such as push-ups can be enhanced by having a compressible hemisphere placed between an elbow or knee and the floor.

[01 95] Referring to Figure 17, two embodiments of improved workout garments are shown. Workout shirt 120 is shown on upper body portion 110 of person P and workout pants 130 are shown on lower body portion 112 of person P. In some embodiments, the improved workout garments can include garments for upper body portion 110 such as long and short sleeve shirts, tank tops, hoodies, sleeves and other upper body apparel as well as garments for lower body portion 112 such as leggings, tights, pants, shorts, socks and other lower body apparel. As shown in Figure 17, workout shirt 120 or workout pants 130 can comprise one or more compressible hemispheres A disposed thereon, extending outwardly.

[01 96] Workout pants 130 can be comprised of any suitable material used for workout apparel as well known to those skilled in the art. The compressible hemispheres A can be disposed on workout pants 130 so as to be over or near the joints or other desired contact points of person P when workout pants 130 are worn. The compressible hemispheres A can contact the fitness equipment or other surface such as the floor during the workout. By configuring workout pants 130 in this manner, instability can be created when performing the workout which can allow additional muscles to be used and reduce strain on the joints of person P. Exercises such as "planking" or other floor exercises such as push-ups can be enhanced by having a compressible hemisphere placed between an elbow or knee or other contact point and the floor.

[01 97] Also shown in Figure 17, workout shirt 120 can be comprised of any suitable material used for workout apparel as well known to those skilled in the art. The compressible hemispheres A can be disposed on workout shirt 120 so as to be over or near the joints or other

desired contact points of person P when workout shirt 120 is worn. The compressible hemispheres A can contact the fitness equipment or other surface such as the floor during the workout. By configuring workout shirt 120 in this manner, instability can be created when performing the workout which can cause the wearer to hold the body in proper alignment and allow additional muscles to be used and reduce strain on the joints of person P. In some embodiments, as shown in Figure 17, workout shirt 120 can comprise hood portion 140. Hood portion 140 can be fitted to the head of person P and compressible hemispheres A can be disposed on head portion 142 or neck portion 144 of hood portion 140. In some embodiments, the workout garment can be a sleeve covering an arm of person P. The sleeve can comprise one or more compressible hemispheres A disposed thereon, extending outwardly.

[01 98] Referring to Figures 44 and 45, one embodiment of full-body workout suit 650 is shown. In some embodiments, workout suit 650 can comprise one or more of the following compressible members disposed thereon: neck compressible member 652, shoulder compressible member 654, bicep compressible member, 656 tricep compressible member 658, front forearm compressible member 660, rear forearm compressible member 661, side abdominal compressible member 662, pectoral compressible member 663, front abdominal compressible member 664, quadricep compressible member 666, outer thigh compressible member 668, hamstring compressible member 669, inner thigh compressible member 670, rear calf compressible member 672, front calf compressible member 674, upper back compressible member 676, mid-back compressible member 678, lower back compressible member 680 and gluteus compressible member 682. In some embodiments, workout suit 650 is intended to be tightly fitted on a person for when they are working out, so that a compressible member is situated as close as possible to a muscle group. Thus, when a person who is wearing workout suit 650 performs a movement, such as lifting a weight or moving a limb or body part, the muscle being worked will push out against workout suit 650 and press against the compressible member nearest to the muscle group being activated. In so doing, the contact between the muscle group and the compressible member can stimulate the nerves of the muscle group and trigger a proprioceptive effect during the movement. In some embodiments, workout suit 650 can comprise weights disposed on the forearms or calves of the suit that can intensify the effect

of movement and of resistance training while wearing the suit. In some embodiments, workout suit 650 can comprise forearm weights 716 and calf weights 718, which can result in a person using a lighter weight or lower resistance setting on an exercise machine, so as to work the body in a natural and functional way.

[01 99] In some embodiments, compressible hemispheres A can be integral with the workout garments. In some embodiments compressible hemispheres A can be removably attached to the workout garment. The workout garments can comprise pockets positioned at the desired location, as described above, for receiving the compressible hemisphere A. Other means of removable attachment of compressible hemispheres A can include Velcro™, hooks, buttons, snaps, straps or other suitable removable attachment as well known to those skilled in the art. In some embodiments compressible hemispheres can be interchanged for compressible hemispheres of different sizes or with different compressibility properties.

[0200] Figures 31a, 31b and 31c depicts a further embodiment of workout pants 3100. Workout pants 3100 can comprise one or more compressible member 3104 disposed therein. Workout pants 3100 can comprise exterior surface 3102 and interior surface 3106. In some embodiments, compressible member 3104 can be affixed to interior surface 3106, and can be positioned just below the sacrum of the person wearing workout pants 3100, wherein compressible member 3104 can extend downward along the intergluteal cleft. In some embodiments, pocket 3108 can be disposed provided on interior surface 3106 of workout pants 3100, wherein pocket 3108 can be configured for receiving compressible member 3104. In so doing, compressible member 3104 can be removed from pocket 3108 when workout pants 3100 are being laundered.

[0201] By configuring workout pants 3100 in this manner, instability can be created when performing a workout where the buttocks of the person are in contact with fitness equipment or other surface. Exercises can be enhanced by causing the person wearing the workout pants 3100 with compressible member 3104 to activate and engage the gluteus maximus muscles. Exercising using workout pants 3100 can cause the person to actively hold the muscles, joints and body in a proper alignment providing proprioceptive feedback to the CNS.

[0202] Referring to Figure 18, one embodiment of improved workout sock 300 is shown. In some embodiments, workout sock 300 can comprise one or more compressible hemispheres A disposed thereon, extending outwardly. The compressible hemispheres A can be disposed on workout sock 300 on foot bottom 310, toe portion 320, instep 330, heel portion 340 or leg portion 350. In some embodiments, the leg portion 350 can extend above the knee. The compressible hemispheres can be comprised of the elastomeric or other durable materials as described above. In providing a workout sock with compressible hemispheres disposed on foot bottom 310, a person standing while wearing workout sock 300 can experience a similar effect to standing on an exercise dome and, thus, will need to hold the body in proper alignment and exert the use of additional muscles to maintain balance and stability. In providing a workout sock with compressible hemispheres disposed on other portions of workout sock 300, instability can be created at the contact point with the floor or exercise equipment when performing the workout which can allow additional muscles to be used and reduce strain on the joints of person. Compressible hemispheres A can be removably attached to workout sock 300 in the same manner described above with respect to the workout garments.

[0203] Referring to Figures 22, one embodiment of improved headband 2200 is shown. In some embodiments, headband 2200 can comprise one or more compressible hemispheres A disposed thereon, extending outwardly. The compressible hemispheres can be comprised of the elastomeric or other durable materials as described above. In providing a headband 2200 with compressible hemispheres disposed thereon, a person wearing headband 2200 can position headband 2200 such that instability can be created at the contact point with a surface or exercise equipment when performing the workout which can cause the wearer to hold the body in proper alignment and allow additional muscles to be used and reduce strain on the joints of person. Compressible hemispheres A can be removably attached to headband 2200 in the same manner described above with respect to the workout garments.

[0204] In some embodiments, the embodiments described above can comprise one or more pressure sensors 2580, which can measure the pressure applied to each of the protrusions. The pressure sensors 2580 can be positioned so as to be under the compressible protrusion or embedded within the compressible protrusions. In some embodiments, pressure sensors 2580

can comprise one or more of the following load sensing technologies: piezoresistive sensors, piezoelectric sensors, strain gauge sensors comprise wheatstone bridges, capacitive sensors, electromagnetic sensors, optical sensors, resistive sensors and any other load sensing technology as well known by those skilled in the art including, but not limited to, pressure sensitive fabric (see http://eeonyx.com/product_category/pressure-sensors/).

[0205] The embodiments described above can also comprise a microcontroller 2600. As shown in Figure 25, the microcontroller can comprise processing unit 2510, one or more memory modules such as Read Only Memory (ROM) 2520, Random Access Memory (RAM) 2530, memory module 2540, analog to digital converter (ADC) 2550, and one or more communication module such as universal serial bus (USB) module 2560, wireless communication module 2570. Wireless communication module 2570 can comprise any suitable wireless communication protocol such as Bluetooth™, ZigBee™, Wi-Fi™, or other wireless communication protocol as known to one skilled in the art.

[0206] Figure 26 depicts a flowchart showing an embodiment of the method 2600 for acquiring data from the pressure sensors 2580. Step 2604 can start the method 2600 when microcontroller 2500 is powered on. Step 2608 can initialize the ADC 2650 with parameters required to acquire the data from the pressure sensors 2580. Step 2608 can also initialize the USB 2560 and wireless 2570 communication modules. Step 2612 can determine if a device has been connected to the microcontroller 2500. This can be either to the USB module 2560 or wirelessly to the wireless communication module 2670. If a device is connected, the method 2600 can proceed to step 2616 where the microcontroller 2500 waits to receive a start data transmission signal. If no device is connected, the method 2500 can proceed to step 2628 and operate in an offline mode where pressure sensor data is stored to memory module 2540. Alternatively, step 2612 can be programmed to wait for a device to be connected to the microprocessor 2500 before proceeding to step 2616.

[0207] As mentioned, step 2616 can wait to receive a start transmission request from the connected device. The request can include a request to receive data from all or a subset of pressure sensors 2580. Step 2620 can transmit the requested sensor data to the connected device. Step 2624 can determine whether to stop the data transmission. Step 2624 can

determine to stop transmission if a stop transmission request is received from the connected device, or alternatively, the transmission can be stopped if the connected device is disconnected. If step 2624 determines to stop transmission, the method can end at step 2644. In some embodiments, if step 2624 receives a stop transmission request from the connected device, the method 2600 can return to step 2616 to wait for a new start transmission request.

[0208] If no device is connected, step 2628 can initialize memory module 2540 to store the pressure sensor data. Step 2632 can wait to receive a start data capture request. The start data capture request can be a user input such as a button or switch. The start data capture request can also be determined by a threshold level on the pressure sensors 2580 where the data capture is initiated once a specified level of pressure is applied to any of the pressure sensors 2580. Step 2636 can store the sensor data to the memory module 2540. Step 2640 can determine whether to stop the data capture. Step 2640 can determine to stop capture if a stop capture request is received from the user. If step 2640 determines to stop the data capture, the method can end at step 2644. In some embodiments, if step 2640 receives a stop capture request, the method 2600 can return to step 2632 to wait for a new start capture request.

[0209] In some embodiments, as described below, compressible material can be positioned so as to be between the toes. The compressible material between the toes can activate the nerves in the toes and provide proprioceptive feedback to the CNS.

[0210] Referring to Figure 28, an embodiment of a shoe is shown. Shoe 2800 can comprise sole portion 2804 and upper portion 2802. The sole 2804 and the upper 2802 can each comprise an inner surface which defines a foot cavity for receiving the foot of the user. The sole 2804 can comprise a toe region 2810 and one or more inter-toe compressible members 2820 which can be coupled to and extend upwards from the inner surface of toe region 2810 of sole 2804 to the inner surface of the upper 2802. The one or more inter-toe compressible members 2820 can be configured to fit between the toes of the user when the user's foot is placed inside the shoe 2800.

[0211] Referring to Figure 29, an embodiment of a shoe insole is shown. In some embodiments, insole 2900 is configured to fit inside a shoe and can comprise toe region 2910 and one or more inter-toe compressible members 2920 which can be coupled to and extend

upwards from the upper surface of toe region 2910 of insole 2900. The one or more inter-toe compressible members 2820 can be configured to fit between the toes of the user when the user's foot is placed inside a shoe containing the insole 2900.

[0212] Referring to Figure 30, an embodiment of an exercise sock is shown. Sock 3000 can be configured to cover portions of the sole or bottom region and portions of the instep or top of the foot. In this embodiment, the sock 3000 can comprise instep region 3002 adapted to cover the top or instep of a user's foot. Two or more toe regions 3010, configured to receive a toe of a foot can be coupled to or integral with the instep region 3002. In some embodiments, the two or more toe regions 3010 can comprise up to five toe regions 3010, one for each toe of the user's foot.

[0213] In some embodiments, sock 3000 can comprise one or more inter-toe compressible members 3020 between adjacent toe regions 3010. The inter-toe compressible members 3020 can be coupled to each of the adjacent toe regions 3010.

[0214] Referring to Figures 34 and 35, one embodiment of a shoe insert is shown. In some embodiments, the shoe inserts can comprise right shoe insert 510a and left shoe insert 510b, which can be mirror images of each other in configuration. In some embodiments, shoe inserts 510a and 510b can comprise a loop of a compressible material that can be configured in the shape of a shoe insole so that it can be inserted into and disposed around the interior perimeter within a cavity of a shoe, either in place of a conventional insole or in combination with a conventional insole. The compressible material can comprise the elastomeric material described above for the compressible protrusions. In some embodiments, shoe inserts 510a and 510b can comprise toe perimeter portion 516, outer perimeter portion 512, heel portion 520 and inner perimeter portion 514, all connected together, as shown in Figures 34 and 35, to provide proprioceptive support around the perimeter of a person's foot when wearing the shoe. In some embodiments, inner perimeter portion 514 can further comprise arch support 518 to provide support to the arch of a person's foot when insert 510a or 510b is placed within a shoe. In some embodiments, heel portion 520 can further comprise an elevated or raised heel support 521 disposed thereof for providing further support to the heel of a person wearing a shoe with insert 510a or 510b placed therein.

[0215] Referring to Figures 36 and 37, another embodiment of shoe inserts 510a and 510b is shown. In this embodiment, the shoe inserts can further toe cap 522 disposed on toe perimeter portion 516 that can cover at least a portion of a person's toes when the shoe is worn. In some embodiments, toe cap 522 can further comprise one or more toe dividers 524 extending downwardly therefrom, as shown in Figure 37, to separate the toes and to provide proprioceptive support therebetween.

[0216] In some embodiments, toe dividers 524 can comprise compressible material positioned between the toes. The compressible material between the toes can activate the nerves in the toes and provide proprioceptive feedback to the CNS.

[0217] Referring to Figures 38 and 39, an embodiment of shoe 526 comprising top cap 522 is shown. Shoe 526 can comprise sole portion 528 and upper portion 529. Sole 528 and upper portion 529 can each comprise an inner surface which defines a foot cavity for receiving the foot of the user. Sole 528 can comprise one or more compressible toe dividers 524 that can be coupled to and extend downwards from an inner surface of toe cap 522. One or more toe dividers 524 can be configured to fit between the toes of the user when the user's foot is placed inside shoe 526.

[0218] In some embodiments, shoes can be provided that comprise at least one compressible protrusion extending downwardly from the soles. In configuring shoes in this manner, instability can be created when the protrusion is located between the users foot and a surface such as when standing when lifting weights, using weight/resistance equipment, performing floor exercises or other stretching activities, which can allow additional muscles to be used during a weight lifting exercise without comprising the joints of the person lifting the weight. This can also cause the user to actively hold the muscles, joints and body in a proper alignment providing proprioceptive feedback to the CNS. These voluntary movements can be repeated and stored as central commands. This patterning of the brain allows various skills to be performed without continuous without continuous reference to consciousness and can increase the conscious and unconscious awareness of the joint or limb in motion.

[0219] Referring to Figure 40, one embodiment of shoe 526 is shown. In some embodiments, sole 528 of shoe 526 can comprise compressible protrusions 532 extending downwardly

therefrom. For illustrative purposes only, only a few of protrusions 532 are labelled. In some embodiments, shoe 526 can comprise one or more pressure sensors 2580 disposed in one or more of protrusions 532, which can measure the pressure applied to each of the protrusions. In some embodiments, pressure sensors 2580 can be placed between the protrusions and the exterior surface of shoe 526, or can be embedded within protrusions 532, or both. In some embodiments, pressure sensors 2580 can comprise one or more of the following load sensing technologies: piezoresistive sensors, piezoelectric sensors, strain gauge sensors comprise wheatstone bridges, capacitive sensors, electromagnetic sensors, optical sensors, resistive sensors and any other load sensing technology as well known by those skilled in the art including, but not limited to, pressure sensitive fabric (see http://eeonyx.com/product_category/pressure-sensors/). In some embodiments, a combination of shoe 526 with pressure sensors 2560 disposed in protrusions 532 can communicate with microcontroller 2500, operating method 2600, as described above and illustrated in Figures 25 and 26.

[0220] Referring to Figures 41 to 43, another embodiment of a shoe insert is shown. In some embodiments, shoe insert 550 can comprise sole 552 having toe compressible member 554 and heel compressible member 556 disposed thereon, as shown Figures 41 to 43. In this embodiment, shoe insert 550 can be configured to be inserted into a shoe as an insole, or be comprised in a shoe as it is made. A person's toes can press against toe compressible member 554, and their heel can rest within or on heel compressible member 556, wherein contact with the compressible members can stimulate the person's nerves in their foot to trigger a proprioceptive effect when the person walks, runs or performs physical movements when wearing a shoe with the compressible members disposed therein.

[0221] Referring to Figures 50 to 52, one embodiment of a convertible cross-training shoe is shown. In some embodiments, cross-training shoe 700 can comprise strap 704 that can comprise one end thereof affixed to upper 703 via ring coupler 713, with the other end of strap 704 configured to attach at location 710 on shoe upper 703, using a hook and loop fastener, as an example, or with any other fastening means as well known to those skilled in the art including, without limitation, snaps, buttons, buckles and the like. In some embodiments, strap

704 can comprise a plurality of compressible members 706 disposed thereon. In some embodiments, strap 704 can be positioned over shoe upper 703, as shown in Figures 50 and 51, such that strap 704 is in contact with shoe upper 703. In this configuration, compressible members 706 can provide a proprioceptive effect to the top of a person's foot when they are walking while wearing shoe 700 with compressible members 706 compressed against shoe upper 703. In some embodiments, strap 704 can be wrapped around sole 702 and tread 707, as shown in Figure 52, such that strap is in contact with tread 707. In this configuration, compressible members 706 can provide a proprioceptive effect to the sole of a person's foot when they are exercising or in a training session. When the person has completed their training session, strap 704 can then be returned to its position on shoe upper 703, as shown in Figures 50 and 51. In some embodiments, shoe 700 can comprise compressible member 711 that can be placed on heel 709 of the shoes, and disposed between sole 702 and tread 707, to provide a cushioning effect on the heel of a person when walking or exercising.

[0222] Referring to Figure 53, an alternate embodiment of a convertible cross-training shoe is shown. In some embodiments, cross-training shoes 700a and 700b can comprise strap 704 that can comprise one end thereof affixed at location 705 on sole 702, with the other end of strap 704 configured to attach at location 710 on shoe upper 703, using a hook and loop fastener, as an example, or with any other fastening means as well known to those skilled in the art including, without limitation, snaps, buttons, buckles and the like. In some embodiments, strap 704 can comprise a plurality of compressible members 706 disposed thereon. In some embodiments, strap 704 can be positioned over shoe upper 703, as shown on shoe 700a, such that strap 704 is in contact with shoe upper 703. In this configuration, compressible members 706 can provide a proprioceptive effect to the top of a person's foot when they are walking while wearing shoe 700a with compressible members 706 compressed against shoe upper 703. In some embodiments, strap 704 can be wrapped around sole 702, as on shown on shoe 700b, such that strap is in contact with sole 702. In this configuration, compressible members 706 can provide a proprioceptive effect to the sole of a person's foot when they are exercising or in a training session. When the person has completed their training session, strap 704 can then be returned to its position on shoe upper 703, as shown on shoe 700a. In some embodiments,

shoes 700a and 700b can comprise compressible member 708 that can be placed on heel 709 of the shoes. In some embodiments, compressible member 708 can attach to heel 709 with a hook and loop fastener or with any other fastening means as described above. In some embodiments, compressible member 708 can be attached to sole 702 such that compressible member 708 can flip between a first position on sole 702 when training (as shown on shoe 700b) to a second position on the back of heel 709 when walking (as shown on shoe 700a). In some embodiments, shoes 700a and 700b can comprise one or more weights 712 disposed thereon. As shown on shoe 700a, weights 712 can be disposed on tongue 714, although weights 712 can be positioned at any suitable position on shoe upper 703 or disposed within sole 702. By providing weights 712 within shoes 700a and 700b, the weights, even in small amounts, can intensify the effect of movement while walking or running while working the body in a natural and functional way. In exercise involving the use of free weights, providing additional weights 712 in the shoes can reduce the amount of free weight used by the person performing the exercise allowing the person to move more freely without restriction, which can be more athletic in nature.

[0223] Referring to Figure 51, a sports helmet is shown having compressible members disposed therein that can provide further stabilization of an athlete's head when wearing such a helmet. In some embodiments, helmet 750 comprising outer shell 752 and inner liner 754 can comprise one or more compressible members disposed on liner 754. In the illustrated embodiment, helmet 750 is presented as a football helmet having facemask 756, although the embodiments described herein can equally apply to hockey helmets, ski helmets, bicycle helmets, skateboard helmet, motorsport helmet or any other form of helmet for sporting activities, whether comprising a facemask or not. In some embodiments, liner 754 can comprise forehead compressible member 760 for contacting the forehead of the athlete, top compressible member 758 for contacting the top of the head of the athlete, rear compressible member 762 for contacting the back of the head of the athlete, and side compressible members 764 for contacting the left and right sides of the head of the athlete. By providing compressible members in helmet 750 in this manner, the athlete's head can have constant direct contact with the compressible members, which can assist in stabilizing and protecting the athlete's head in

helmet 750 when contacted by another athlete or struck when colliding with the ground, or any other surface of the environment of the sporting activity that the athlete is participating in.

[0224] Although a few embodiments have been shown and described, it will be appreciated by those skilled in the art that various changes and modifications can be made to these embodiments without changing or departing from their scope, intent or functionality. The terms and expressions used in the preceding specification have been used herein as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding equivalents of the features shown and described or portions thereof, it being recognized that the invention is defined and limited only by the claims that follow.

WE CLAIM:

1. A glove for enhancing the effects of physical exercise for a person, the glove comprising at least one compressible protrusion disposed on the glove extending outwardly from the glove.
2. The glove as set forth in claim 1, wherein the glove comprises an anterior region and the at least one compressible protrusion extends outwardly from the anterior region.
3. The glove as set forth in claim 1, wherein the glove comprises a dorsal region and the at least one compressible protrusion extends outwardly from the dorsal region.
4. The glove as set forth in claim 1, wherein the glove comprises a plurality of phalange regions and the at least one compressible protrusion extends outwardly from at least one of the plurality of phalanges regions.
5. The glove as set forth in claim 4, wherein each of the plurality of phalange regions comprises a fingertip region and the at least one compressible protrusion extends outwardly from at least one of the fingertip regions of the plurality of phalanges regions.
6. The glove as set forth in claim 4, wherein each of the plurality of phalange regions comprises an anterior phalange region and the at least one compressible protrusion comprises a first anterior compressible protrusion and a second anterior compressible protrusion each extending outwardly from at least one of the anterior phalange regions of the plurality of phalanges regions.
7. The glove as set forth in claim 6, wherein the first anterior compressible protrusion and the second anterior compressible protrusion are connected by an anterior connecting material.
8. The glove as set forth in claim 4, wherein each of the plurality of phalange regions comprises a dorsal phalange region and the at least one compressible protrusion comprises a first dorsal compressible protrusion and a second dorsal compressible protrusion each extending outwardly from at least one of the dorsal phalange regions of the plurality of phalanges regions.
9. The glove as set forth in claim 8, wherein the first dorsal compressible protrusion and the second dorsal compressible protrusion are connected by a dorsal connecting material.

10. The glove as set forth in claim 1, wherein the at least one compressible protrusion comprises one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.
11. The glove as set forth in claim 1, wherein the glove comprises at least one pressure sensor disposed between the glove and the at least one compressible protrusion.
12. The glove as set forth in claim 11, wherein the glove comprises a microcontroller, the microcontroller comprising:
 - a) a processor;
 - b) at least one memory module;
 - c) at least one communication module;
 - d) an analog to digital converter; and
 - e) a power supply,wherein the at least one pressure sensor is operatively coupled to the analog to digital converter.
13. The glove as set forth in any one of claims 1 to 12, further comprising weights disposed on one or both of a back of the glove and a backside of one or more digits of the glove.
14. A shoe for enhancing the effects of physical exercise for a person, the shoe comprising at least one compressible protrusion disposed on the shoe extending outwardly from the shoe.
15. The shoe as set forth in claim 13, wherein the shoe comprises a sole region and the at least one compressible protrusion extends outwardly from the sole region.
16. The shoe as set forth in claim 13, wherein the shoe comprises an instep region and the at least one compressible protrusion extends outwardly from the instep region.
17. The shoe as set forth in claim 13, wherein the shoe comprises a plurality of toe regions and the at least one compressible protrusion extends outwardly from at least one of the plurality of toe regions.
18. The shoe as set forth in claim 17, wherein each of the plurality of toe regions comprises a tiptoe region and the at least one compressible protrusion extends outwardly from at least one of the tiptoe regions of the plurality of toe regions.

19. The shoe as set forth in claim 17, wherein each of the plurality of toe regions comprises a sole toe region and the at least one compressible protrusion comprises a first sole toe compressible protrusion and a second sole toe compressible protrusion each extending outwardly from at least one of the sole toe regions of the plurality of toe regions.
20. The shoe as set forth in claim 19, wherein the first sole toe compressible protrusion and the second sole toe compressible protrusion are connected by a sole toe connecting material.
21. The shoe as set forth in claim 17, wherein each of the plurality of toe regions comprises an posterior toe region and the at least one compressible protrusion comprises a first posterior toe compressible protrusion and a second posterior toe compressible protrusion each extending outwardly from at least one of the posterior toe regions of the plurality of toe regions.
22. The shoe as set forth in claim 21, wherein the first posterior toe compressible protrusion and the second posterior toe compressible protrusion are connected by a posterior toe connecting material.
23. The shoe as set forth in any of claims 13 to 22, wherein the at least one compressible protrusion comprises one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.
24. The shoe as set forth in any one of claims 13 to 23, wherein the shoe comprises at least one pressure sensor disposed between the shoe and the at least one compressible protrusion.

25. The shoe as set forth in claim 24, wherein the shoe comprises a microcontroller, the microcontroller comprising:
- a) a processor;
 - b) at least one memory module;
 - c) at least one communication module;
 - d) an analog to digital converter; and
 - e) a power supply,
- wherein the at least one pressure sensor is operatively coupled to the analog to digital converter.
26. The shoe as set forth in claim 15, wherein the sole region further comprises a ball portion, a heel portion and a remainder portion, and the at least one compressible protrusion comprises:
- a) at least one first compressible protrusion disposed on one or both of the ball portion and the heel portion, extending downwardly therefrom; and
 - b) at least one second compressible protrusion disposed on the remainder portion, extending downwardly therefrom.
27. The shoe as set forth in claim 26, wherein one or both of the at least one first compressible protrusion and the at least one second compressible protrusion is substantially hemispherical in configuration.
28. The shoe as set forth in claim 27, wherein the at least one first compressible protrusion is larger in volume than the at least one second compressible protrusion.
29. The shoe as set forth in claim 26, wherein the at least one compressible protrusion further comprising at least one third compressible protrusion, extending downwardly therefrom.
30. The shoe as set forth in claim 29, wherein the at least one third compressible protrusion is substantially hemispherical in configuration.
31. The shoe as set forth in claim 29, wherein the at least one third compressible protrusion is smaller in diameter than one or both of the at least one first compressible protrusion and the at least one second compressible protrusion.

32. The shoe as set forth in any one of claims 27 to 31, wherein one or both of the at least one first compressible protrusion and the at least one second compressible protrusion comprises one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.
33. The shoe as set forth in claim 29, wherein the at least one third compressible protrusion comprises one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.
34. The shoe as set forth in claim 15, wherein the shoe is a cycling shoe and wherein the sole region further comprises a ball portion and the at least one compressible protrusion comprises at least one first compressible protrusion disposed on the ball portion, extending downwardly therefrom.
35. The shoe as set forth in claim 34, wherein the shoe is a cycling shoe and wherein the sole region further comprises a ball portion and the at least one compressible protrusion comprises at least one first compressible protrusion disposed on the ball portion, extending downwardly therefrom, the at least one first compressible protrusion configured to contact the pedal of a bicycle.
36. The shoe as set forth in claim 35, wherein the ball portion further comprises a cleat for use with a clipless pedal system and the at least one first compressible protrusion is positioned around the cleat such that the at least one first compressible protrusion contacts a pedal of the clipless pedal system when the cleat is engaged with the pedal.
37. An improved insole for a shoe for enhancing the effects of physical exercise for a person, the insole comprising an upward-facing surface and a downward-facing surface, the improvement comprising at least one compression member disposed on the downward-facing surface, extending downwardly therefrom.
38. The improved insole as set forth in claim 37, wherein the at least one first compression member is substantially hemispherical in configuration.

39. The improved insole as set forth in claim 37, wherein the at least one first compression member comprises one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.
40. A sheet material for enhancing the effects of physical exercise for a person, the sheet material comprising:
- a) a sheet of planar material comprising a first elastomeric material; and
 - b) at least one protrusion extending from a first side of the sheet of planar material, the at least one protrusion comprising one or both of the first elastomeric material and a second elastomeric material, wherein the sheet material is configured to be disposed between the person and a piece of exercise equipment or a hard surface.
41. An improved workout mat for enhancing the effects of physical exercise for a person, the mat comprising an upward-facing surface and a downward-facing surface, the improvement comprising:
- a) at least one first compression member disposed on the upward-facing surface, extending upwardly therefrom; and
 - b) at least one second compression member disposed on the upward-facing surface, extending upwardly therefrom.
42. The improved workout mat as set forth in claim 41, wherein the mat is configured as a floor covering further comprising interlocking members.
43. The improved workout mat as set forth in claim 41, wherein one or both of the at least one first compression member and the at least one second compression member is substantially hemispherical in configuration.
44. The improved workout mat as set forth in claim 41, wherein the at least one first compression member is larger in volume than the at least one second compression member.
45. The improved workout mat as set forth in claim 41, wherein one or both of the at least one first compression member and the at least one second compression member comprises one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.

46. An bar wrap configured for use with free weights or exercise equipment comprising a bar or a handle, the improved bar wrap for enhancing the effects of physical exercise for a person, the improved bar wrap comprising an equipment side for contacting the bar or handle and a user side for the person to grip once the wrap has been wrapped onto the bar or the handle, the improvement comprising:
- a) at least one first compression member disposed on the user side, extending outwardly therefrom; and
 - b) at least one second compression member disposed on the user side, extending outwardly therefrom.
47. The improved bar wrap as set forth in claim 46, wherein one or both of the at least one first compression member and the at least one second compression member is substantially hemispherical in configuration.
48. The improved bar wrap as set forth in claim 47, wherein the at least one first compression member is larger in volume than the at least one second compression member.
49. The improved bar wrap as set forth in claim 46, wherein one or both of the at least one first compression member and the at least one second compression member comprises one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.
50. An improved joint wrap for enhancing the effects of physical exercise for a person, the wrap comprising an elastic tube configured for placement on an elbow or a knee of the person, the improvement comprising at least one compression member disposed on the elastic tube, extending outwardly therefrom.
51. The improved joint wrap as set forth in claim 50, wherein the at least one first compression member is substantially hemispherical in configuration.
52. The improved joint wrap as set forth in claim 50, wherein the at least one first compression member comprises one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.

53. An improved workout garment for enhancing the effects of physical exercise for a person, the workout garment comprising an inner surface and an outer surface, the improvement comprising at least one compression member disposed on one or both of the inner surface and the outer surface, extending outwardly therefrom.
54. The improved garment as set forth in claim, wherein the garment is configured as a suit covering both an upper body portion and a lower body portion of a person.
55. The improved workout garment as set forth in claim 53 or in claim 54, wherein the at least one first compression member is substantially hemispherical in configuration.
56. The improved workout garment as set forth in any one of claims 53 to 55, wherein the at least one compression member is removably attached to the outer surface.
57. The improved workout garment as set forth in claim 56, further comprising at least one pocket on the outer surface wherein the at least one compression member is removably attached to the outer surface by inserting the at least one compression member into the pocket.
58. The improved workout garment as set forth in claim 53, wherein the garment is fitted to a lower body portion of the person.
59. The improved workout garment as set forth in claim 53, wherein the garment is fitted to an upper body portion of the person.
60. The improved workout garment as set forth in claim 59, wherein the inner surface and the outer surface further comprise a hood portion wherein the at least one compression member is disposed on the hood portion.
61. The improved workout garment as set forth in claim 58, where in the at least one compressible member is removably attached to the inner surface and extends downward along the inner surface so as to be positioned along the intergluteal cleft of the person.
62. The improved workout garment as set forth in any one of claims 53 to 61, wherein the at least one first compression member comprises one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.

63. The improved workout garment as set forth in any one of claims 53 to 62, further comprising weights disposed thereon.
64. The improved workout garment as set forth in claim 63, wherein the weights are disposed on a limb portion thereof.
65. An improved workout sock for enhancing the effects of physical exercise for a person, the foot covering comprising an inner surface and an outer surface, the improvement comprising at least one compression member disposed on the outer surface, extending outwardly therefrom.
66. The improved workout sock as set forth in claim 65, wherein the at least one first compression member is substantially hemispherical in configuration.
67. The improved workout sock as set forth in claim 65 or in claim 66, wherein one or both of the at least one first compression member and the at least one second compression member comprises one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.
68. An improved shoe cover for enhancing the effects of physical exercise for a person, the shoe covering comprising an inner surface and an outer surface, the improvement comprising at least one compression member disposed on the outer surface, extending outwardly therefrom.
69. The improved shoe cover as set forth in claim 68, wherein the at least one first compression member is substantially hemispherical in configuration.
70. The improved shoe cover as set forth in claim 68 or in claim 69, wherein one or both of the at least one first compression member and the at least one second compression member comprises one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.

71. A shoe for enhancing proprioceptive feedback to a person, the shoe comprising:
- a) a sole portion comprising a sole inner surface, a toe region and one or more inter-toe compressible members; and
 - b) an upper portion comprising an upper inner surface, the sole inner surface and the upper inner surface defining a foot cavity for receiving the foot of the user, and the one or more inter-toe compressible members coupled to and extend upwards from the inner surface of toe region of the sole to the inner surface of the upper, the one or more inter-toe compressible members configured to fit between the toes of the person when the person's foot is placed inside the shoe.
72. An insole for enhancing proprioceptive feedback to a person, the insole configured to fit inside a shoe, the insole comprising:
- a) an upper surface;
 - b) a toe region; and
 - c) one or more inter-toe compressible members, the one or more inter-toe compressible members coupled to and extend upwards from the upper surface of toe region of the insole, the one or more inter-toe compressible members is configured to fit between the toes of the person when the person's foot is placed inside the shoe containing the insole.
73. A sock for enhancing proprioceptive feedback to a person, the sock comprising :
- a) an instep region; and
 - b) two or more toe regions coupled to the instep region and configured to receive at least one toe of the person; and
 - c) one or more inter-toe compressible members, the one or more inter-toe compressible members coupled to each of the adjacent two or more toe regions one or more inter-toe compressible members.
74. An improved pedal for a bicycle, the pedal comprising a spindle; and a housing, the housing comprising a platform, the improvement comprising at least one compression member disposed on the platform, extending upwardly therefrom.

75. An insert for a shoe for providing a proprioceptive effect on a person wearing the shoe, the insert comprising a loop of a compressible material that can be configured in the shape of a shoe insole so that the loop can be inserted and disposed around an interior perimeter within the shoe, the loop comprising:
- a) a toe perimeter portion;
 - b) an outer perimeter portion;
 - c) a heel portion; and
 - d) an inner perimeter portion.
76. The insert as set forth in claim 75, wherein the inner perimeter portion further comprises an arch support.
77. The insert as set forth in claim 75 or in claim 76, wherein the heel portion further comprises an elevated heel support.
78. The insert as set forth in any one of claims 75 to 77, further comprising a toe cap disposed on the toe perimeter portion, wherein the toe cap is configured to cover at least a portion of at least one of the person's toes when wearing the shoe with the insert disposed therein.
79. The insert as set forth in claim 78, wherein the toe cap comprises at least one toe divider extending downwardly therefrom, and configured to separate at least one pair of toes of the person when wearing the shoe with the insert disposed therein.
80. The insert as set forth in any one of claim 75 to 79, wherein the compressible material is comprised of one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.
81. A shoe for providing a proprioceptive effect on a person wearing the shoe, the shoe comprising an insert further comprising a loop of a compressible material that can be configured in the shape of a shoe insole so that the loop can be inserted and disposed around an interior perimeter within the shoe, the loop comprising:
- a) a toe perimeter portion;
 - b) an outer perimeter portion;
 - c) a heel portion; and
 - d) an inner perimeter portion.

82. The shoe as set forth in claim 81, wherein the inner perimeter portion further comprises an arch support.
83. The shoe as set forth in claim 81 or in claim 82, wherein the heel portion further comprises an elevated heel support.
84. The shoe as set forth in any one of claims 81 to 83, wherein the toe perimeter portion further comprises a toe cap disposed thereon, wherein the toe cap is configured to cover at least a portion of at least one of the person's toes when wearing the shoe with the insert disposed therein.
85. The shoe as set forth in claim 84, wherein the toe cap comprises at least one toe divider extending downwardly therefrom, and configured to separate at least one pair of toes of the person when wearing the shoe with the insert disposed therein.
86. The shoe as set forth in any one of claims 81 to 85, wherein the compressible material is comprised of one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.
87. The shoe as set forth in any one of claims 81 to 86, further comprising at least one protrusion extending downwardly from a sole of the shoe, the at least one protrusion comprised of the compressible material.
88. The shoe as set forth in claim 87, further comprising at least one pressure sensor disposed between the shoe and the at least one protrusion, or within the at least one protrusion.
89. The shoe as set forth in claim 88, wherein the shoe further comprises a microcontroller, the microcontroller comprising:
- a) a processor;
 - b) at least one memory module;
 - c) at least one communication module;
 - d) an analog to digital converter; and
 - e) a power supply,
- wherein the at least one pressure sensor is operatively coupled to the analog to digital converter.

90. A shoe for enhancing proprioceptive feedback to a person wearing the shoe, the shoe comprising:
- a) a sole;
 - b) an upper disposed on the sole;
 - c) a strap comprising a first end and a second end, the first end operatively attached to a lateral edge of the sole, the strap configured to move from a first position wherein the strap wraps over the upper, wherein the second end comprises a fastener for fastening to the upper and wherein the second fastens to the upper, to a second position where the strap wraps under the sole, wherein the second end fastens to the upper; and
 - d) a plurality of compressible members disposed on the strap.
91. The shoe as set forth in claim 90, wherein the fastener comprises one or more of a group comprising of hook and loop fasteners, snaps, buttons and buckles.
92. The shoe as set forth in claim 90 or in claim 91, further comprising a heel compressible member configured for removably attaching to a heel of the shoe.
93. The shoe as set forth in any one of claims 90 to 92, wherein at least one of the compressible members is comprised of one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.
94. A sports helmet for providing proprioceptive feedback to a person's head when the person is wearing the helmet, the helmet comprising:
- a) an outer shell comprising a cavity therein;
 - b) an inner liner disposed in the cavity and configured to receive the head; and
 - c) at least one compressible member disposed on the inner liner, wherein the at least compressible member contacts the head when the person places the helmet on their head.
95. The helmet as set forth in claim 94, wherein the at least one compressible member is disposed on one or more of a forehead portion, a rear portion, a top portion and side portions of the liner.

96. The helmet as set forth in claim 94 or in claim 95, wherein the at least one compressible member is comprised of one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.
97. An improved free weight comprising a pair of end weights and a handle disposed therebetween, the improvement comprising a plurality of compressible members disposed on an external surface of the handle.
98. The improved free weight as set forth in claim 97, wherein the plurality of compressible members is disposed on the handle in one or more arrangements comprising a circumferential arrangement around the handle, a spiral arrangement around the handle, and a cross-hatch pattern around the handle.
99. The improved free weight as set forth in claim 98, wherein at least one of the plurality of compressible members is hemispherical-shaped.
100. The improved free weight as set forth in any one of claims 97 to 99, wherein at least one of the plurality of compressible members is comprised of one or more of a group comprising rubber, thermoplastic rubber, foam rubber, polyurethane rubber, silicone rubber, thermoplastic resin and thermoplastic elastomer.

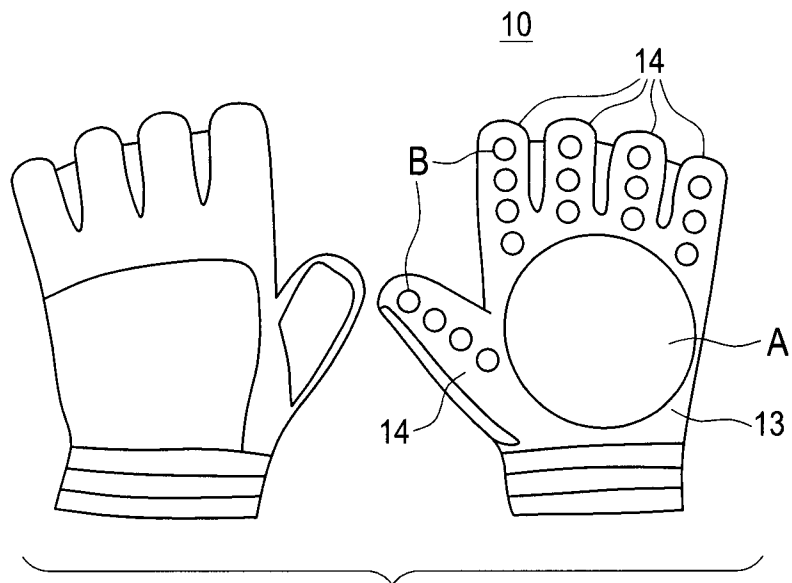


FIG. 1

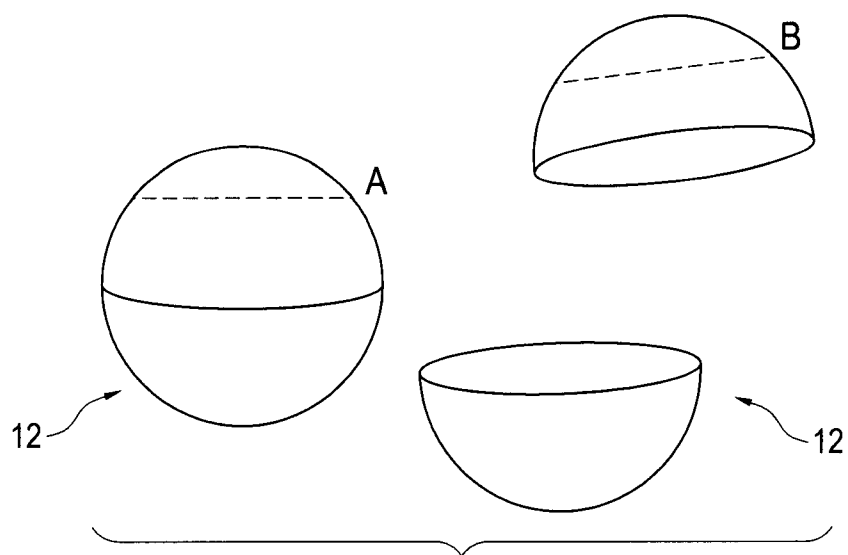


FIG. 2

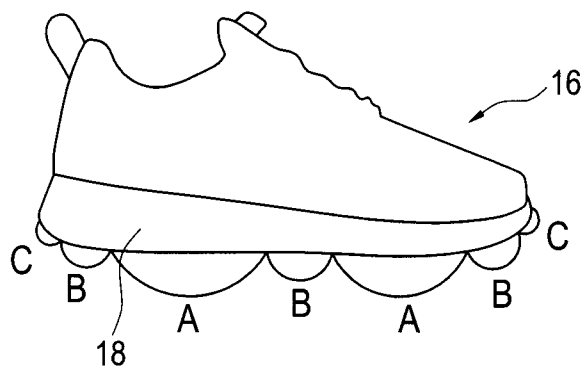


FIG. 3

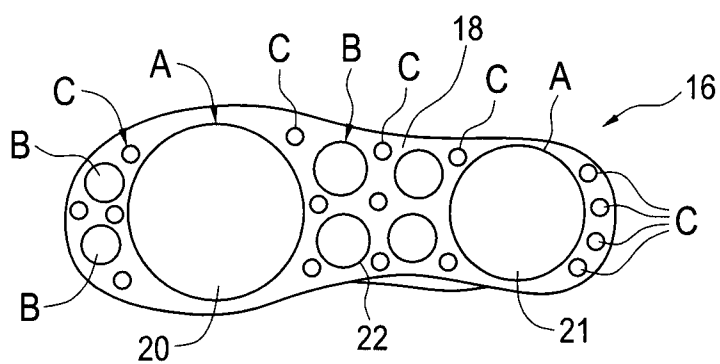


FIG. 4

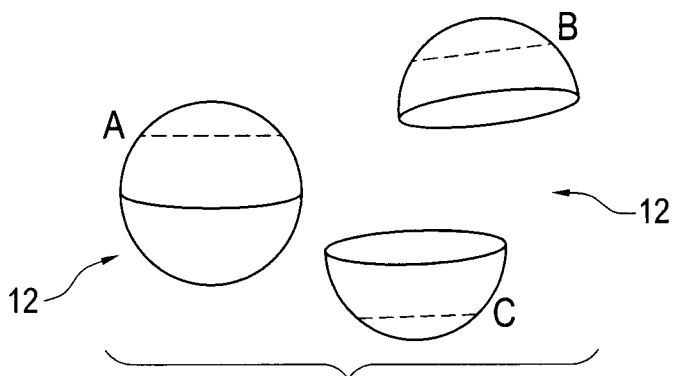


FIG. 5

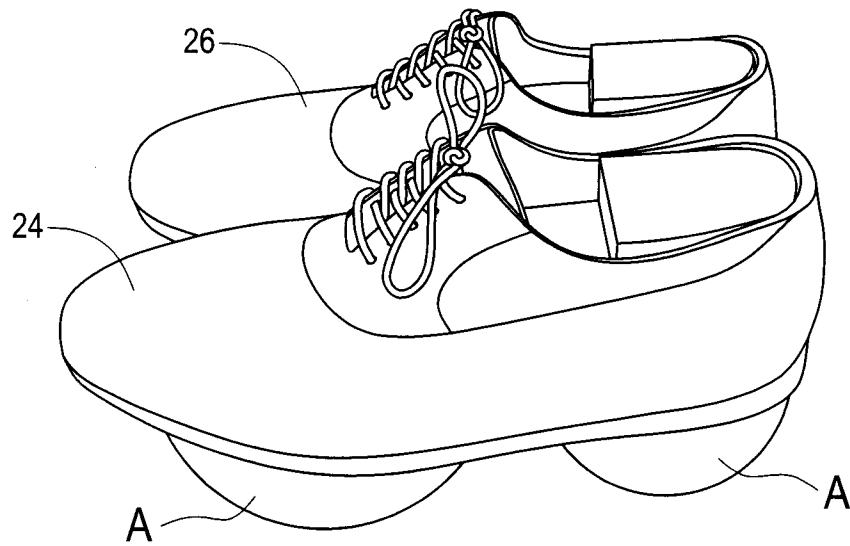


FIG. 6

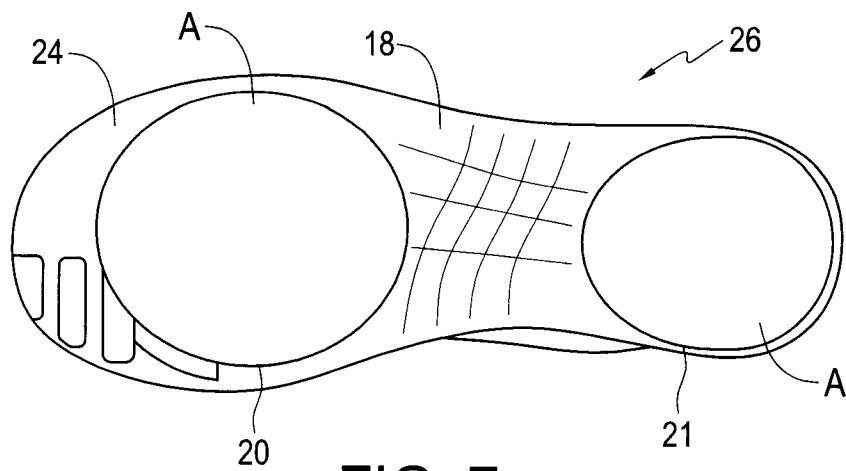


FIG. 7

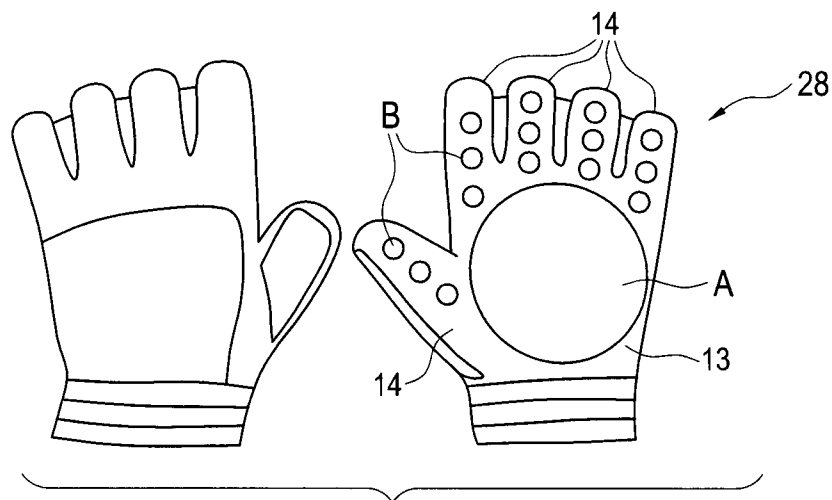


FIG. 8

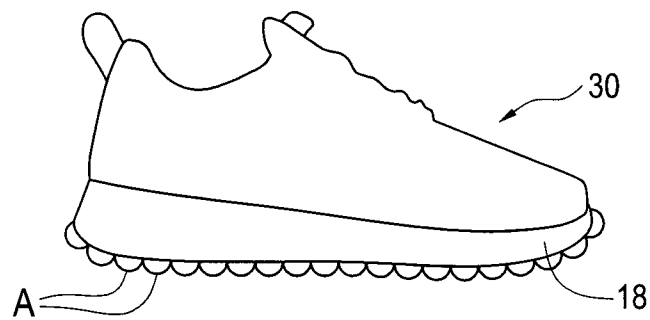


FIG. 9

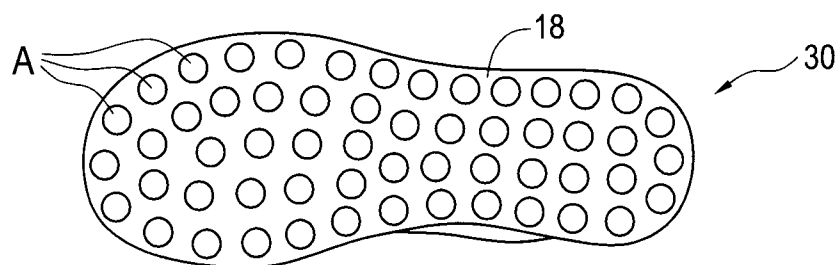


FIG. 10

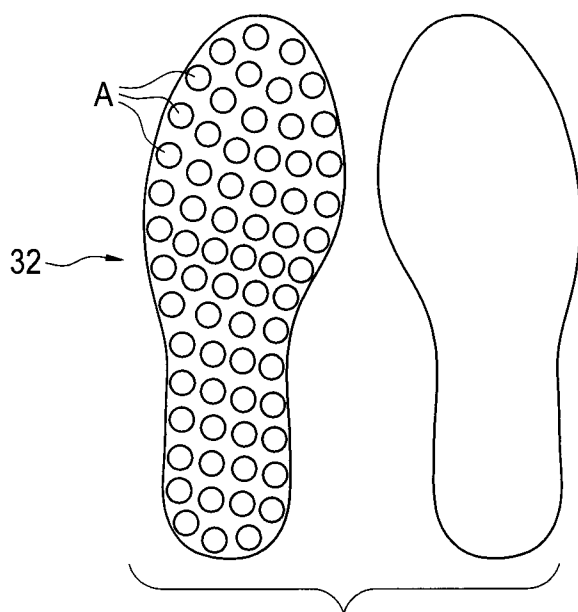


FIG. 11

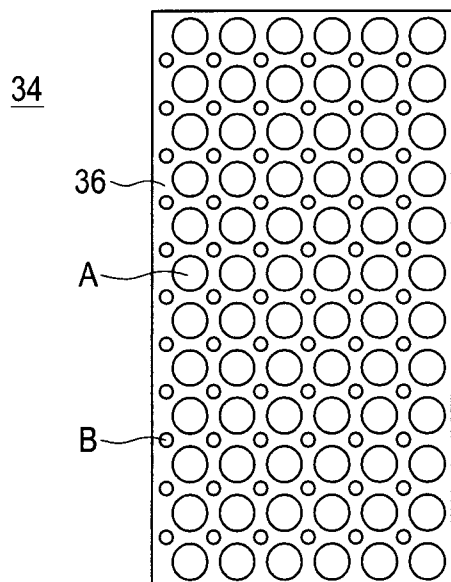


FIG. 12A

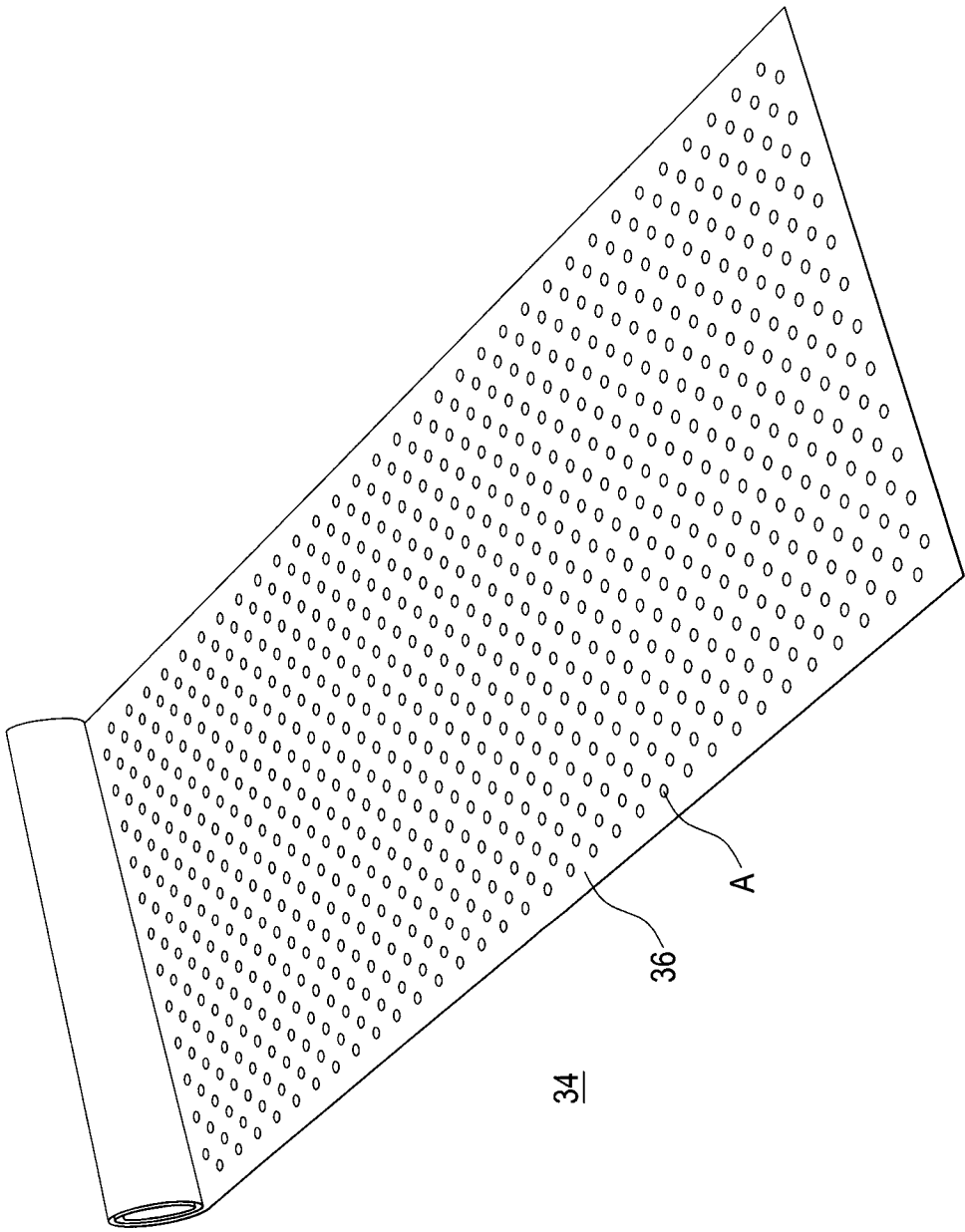


FIG. 12B

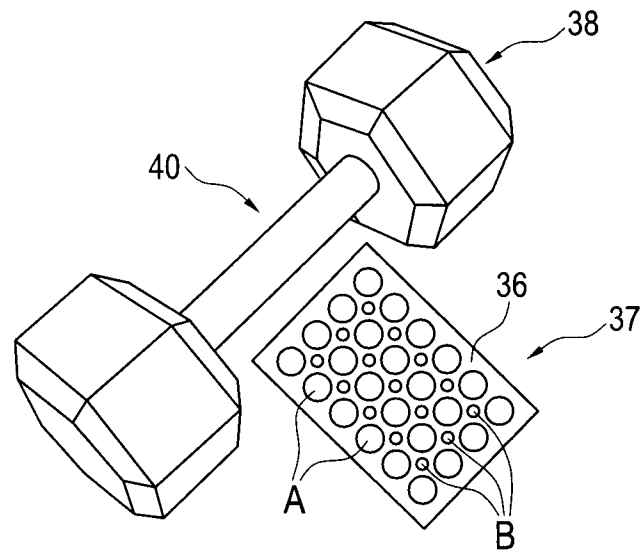


FIG. 13

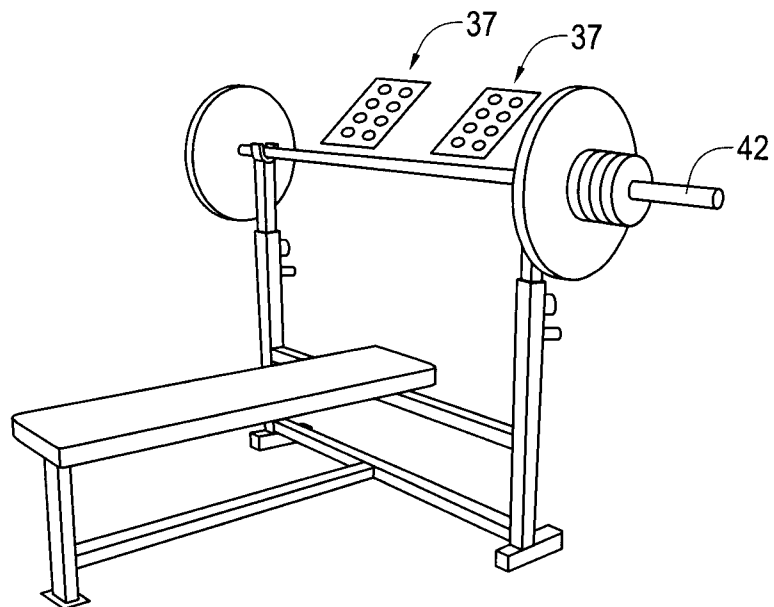


FIG. 14

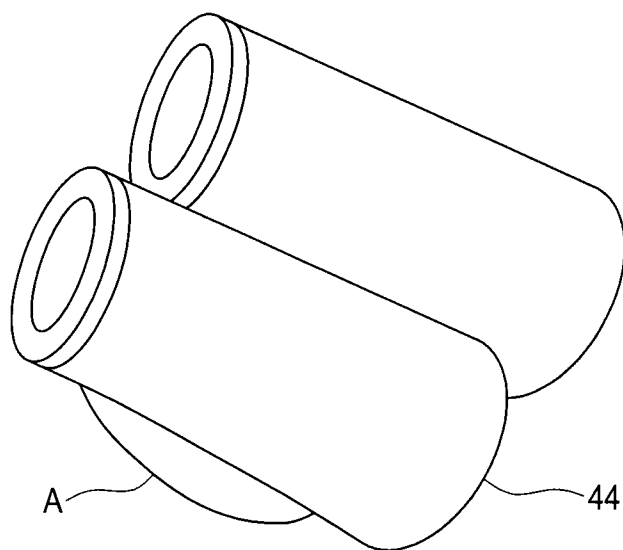


FIG. 15

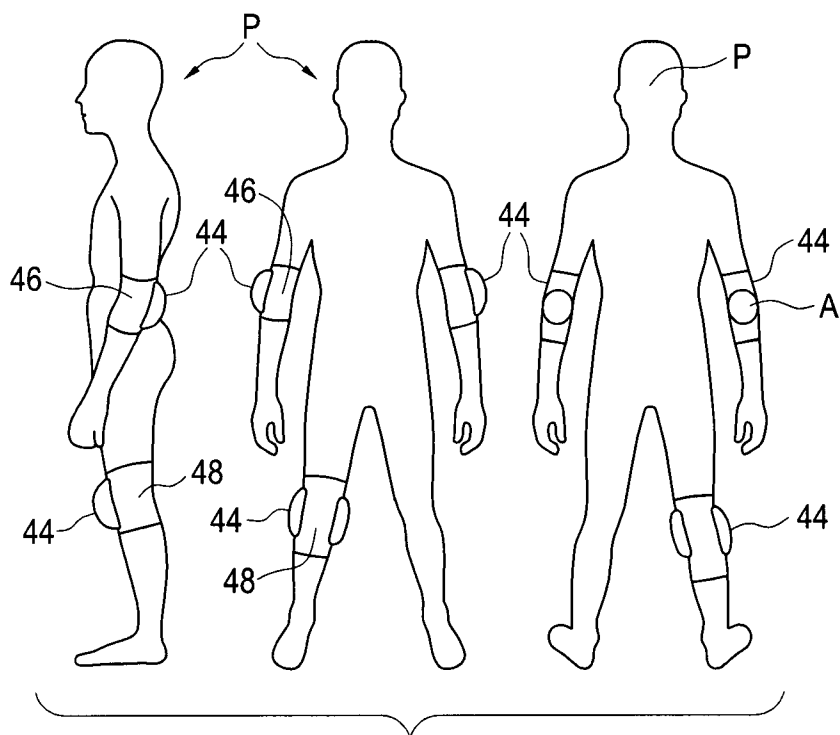


FIG. 16

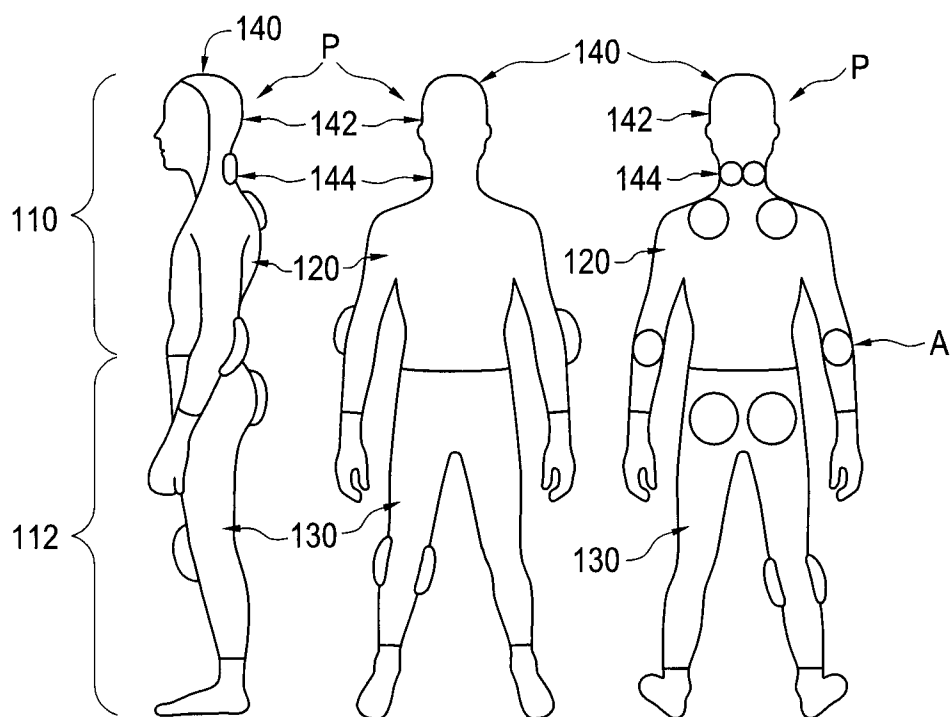


FIG. 17

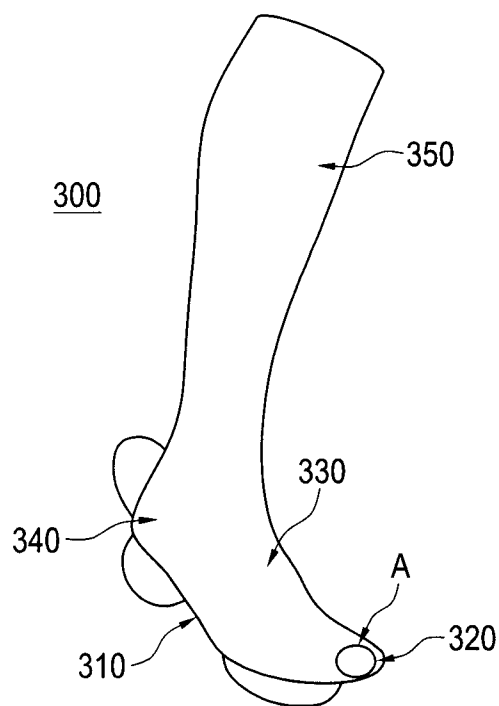


FIG. 18

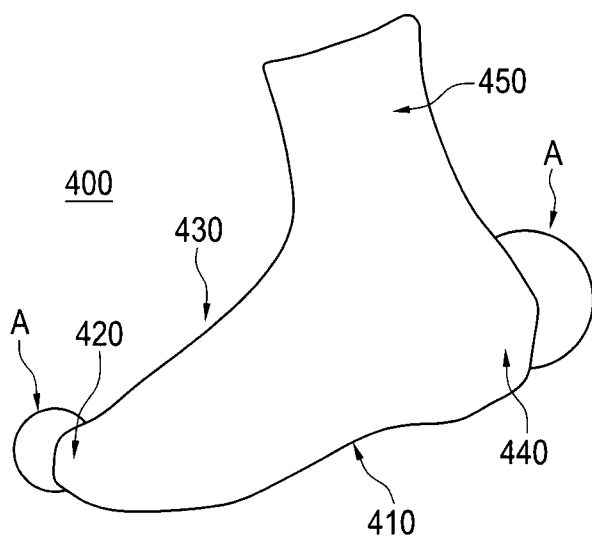


FIG. 19

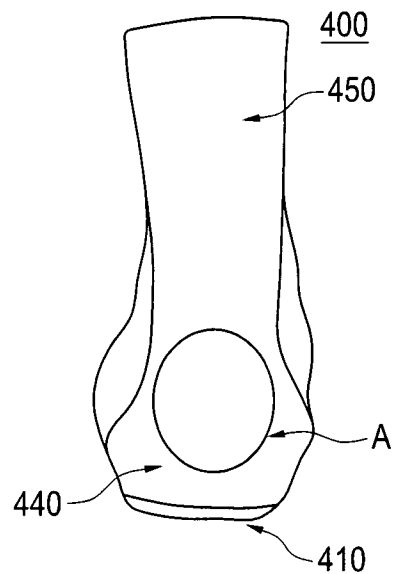


FIG. 20

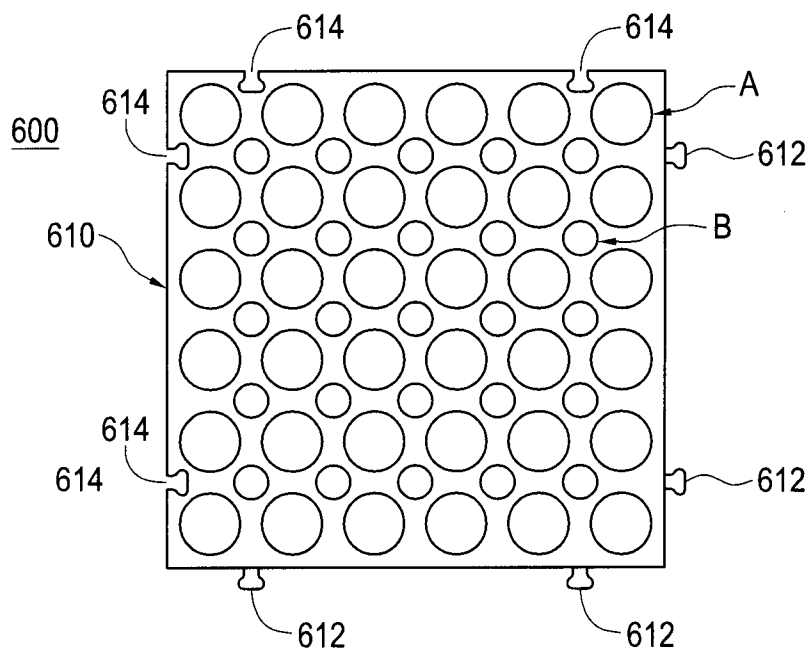


FIG. 21

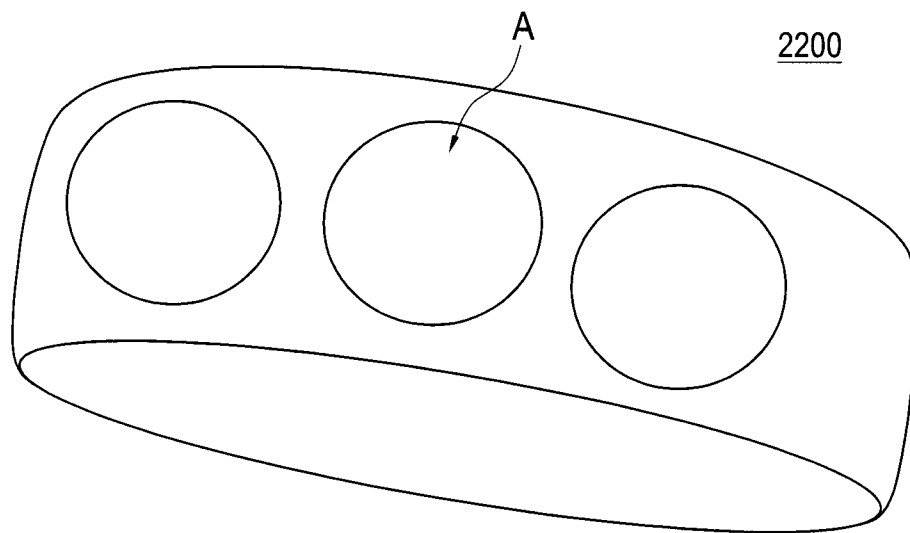


FIG. 22

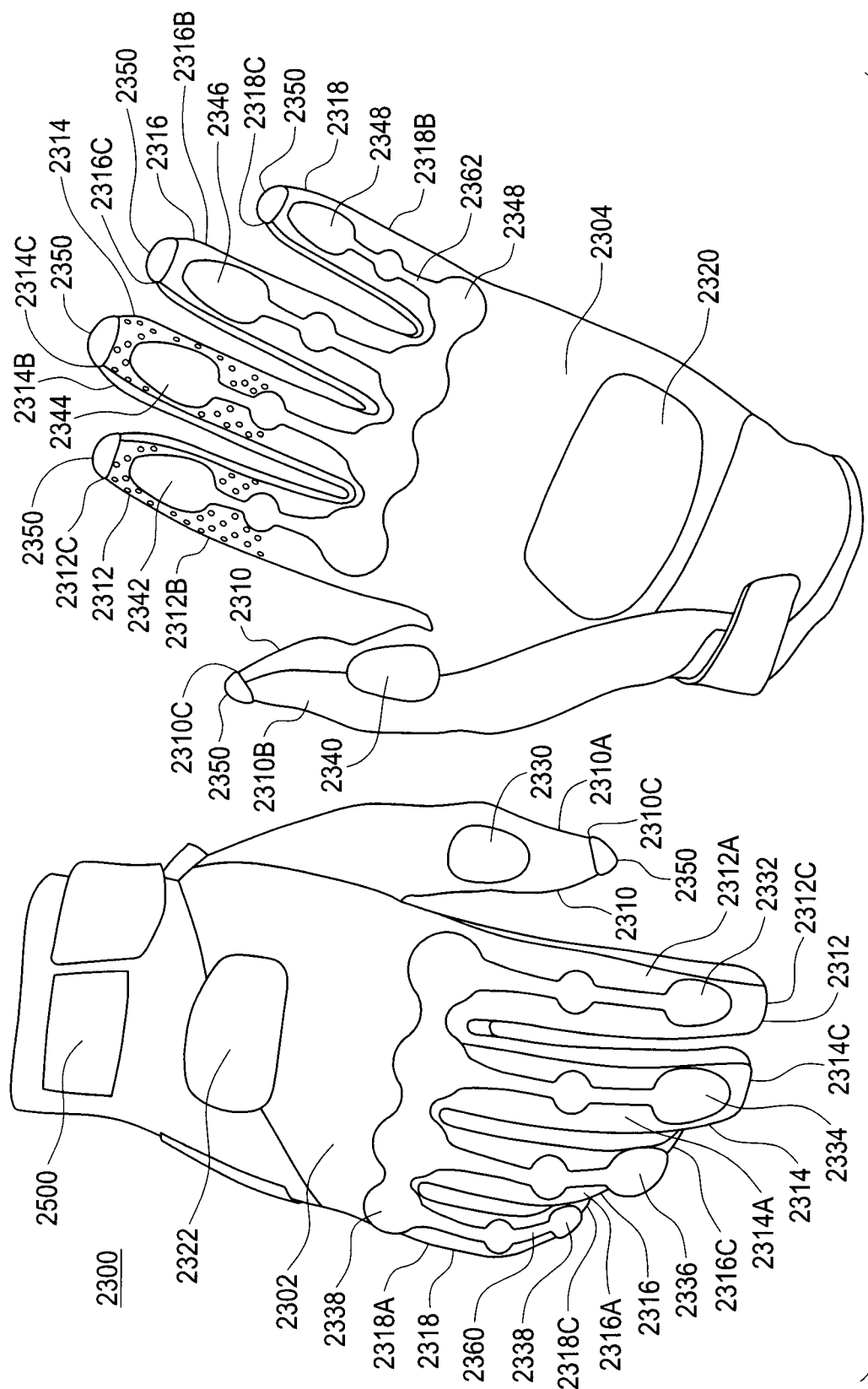


FIG. 23A

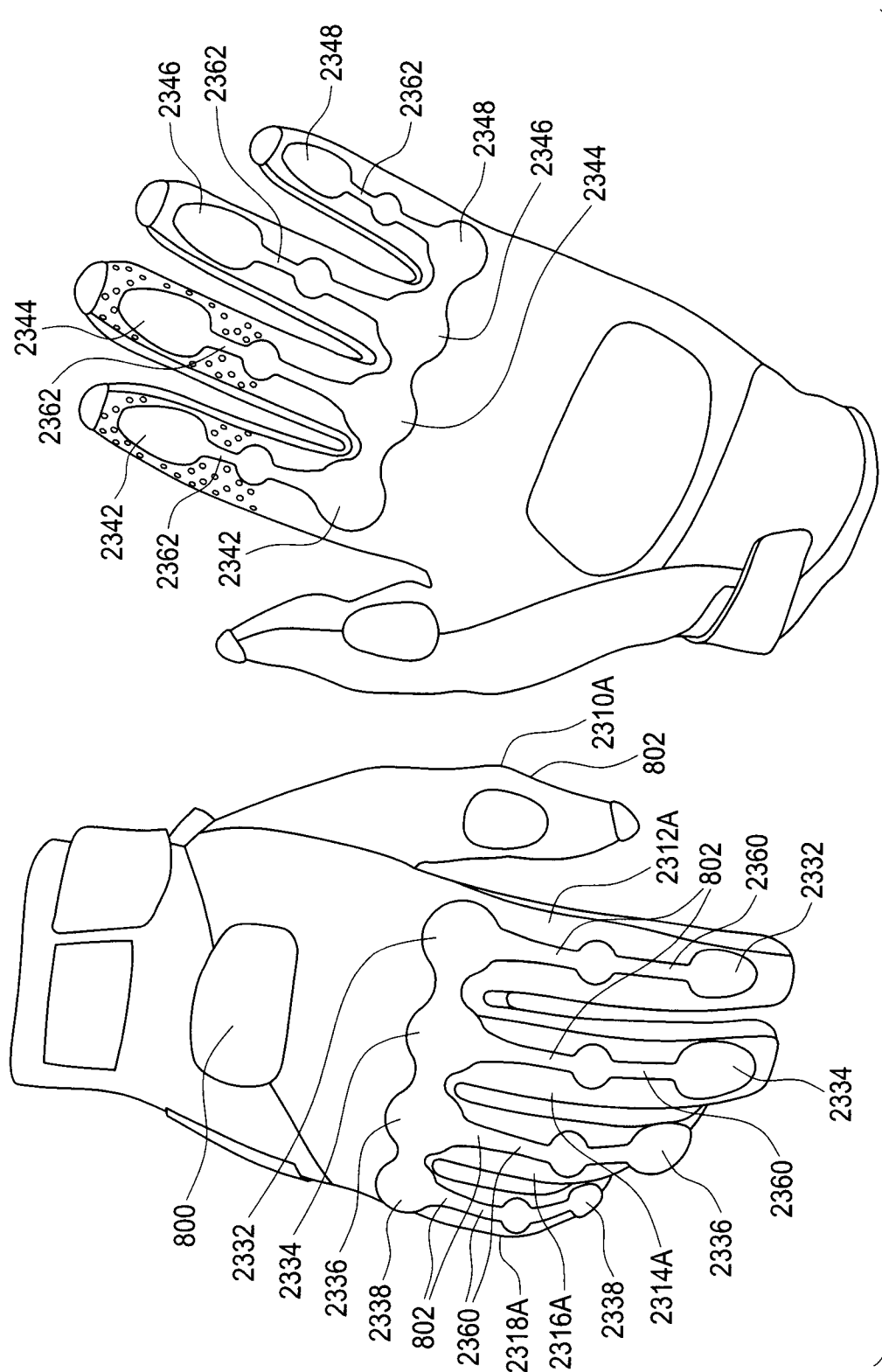


FIG. 23B

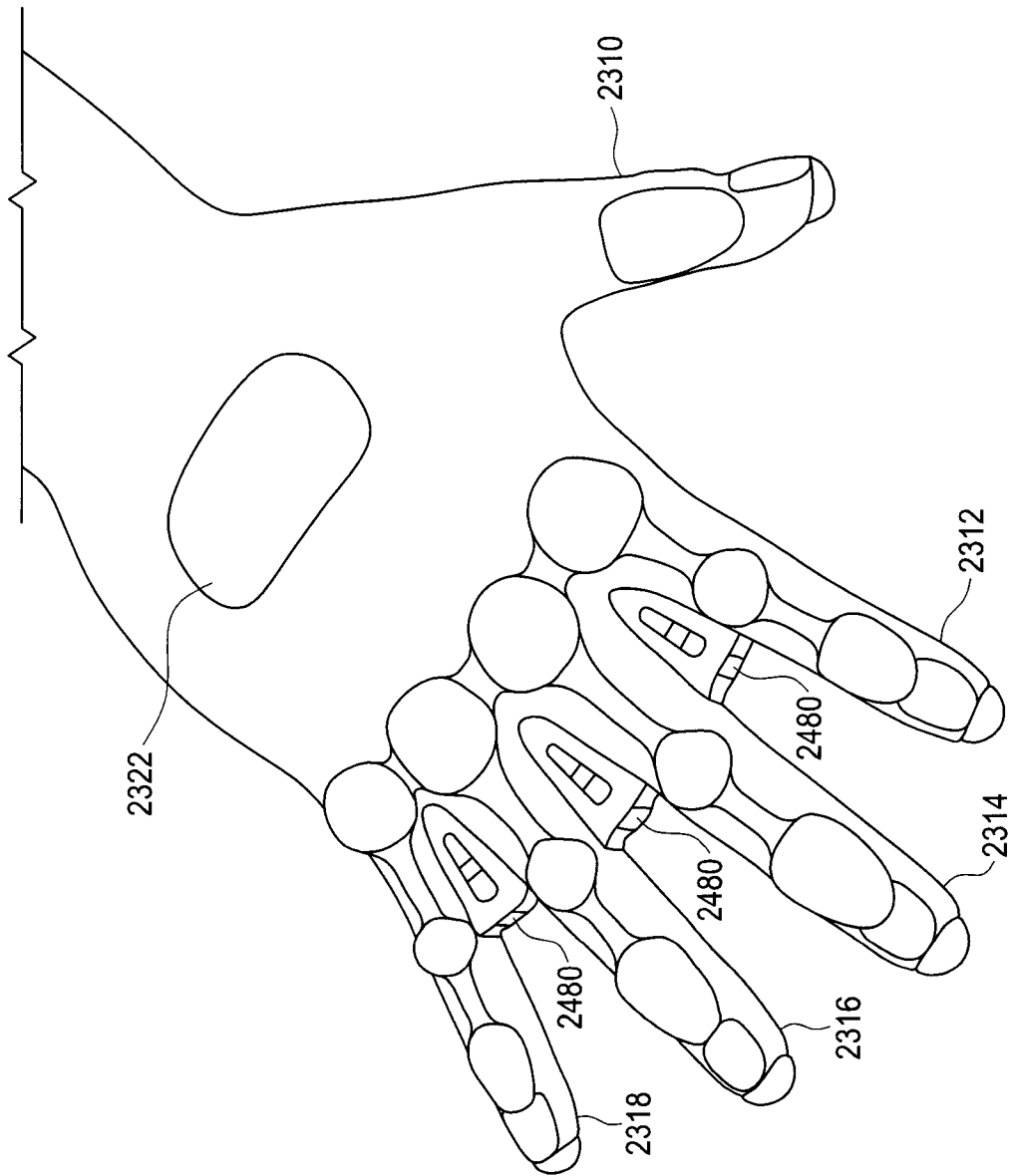


FIG. 24

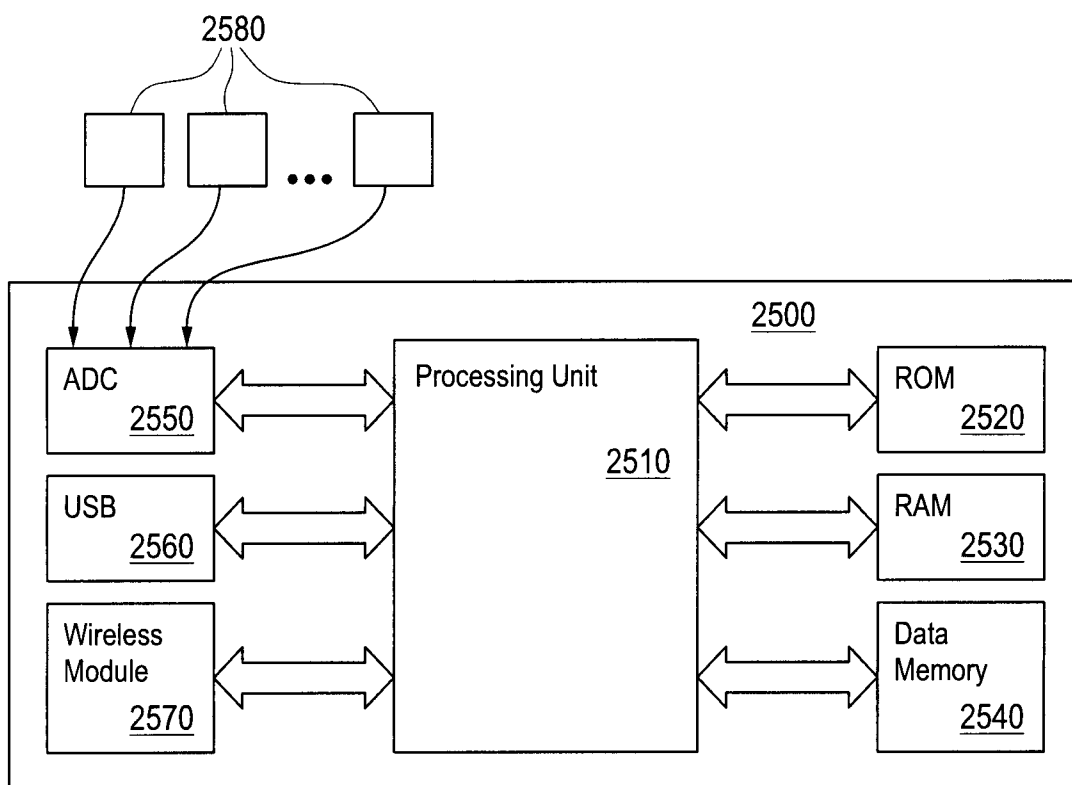


FIG. 25

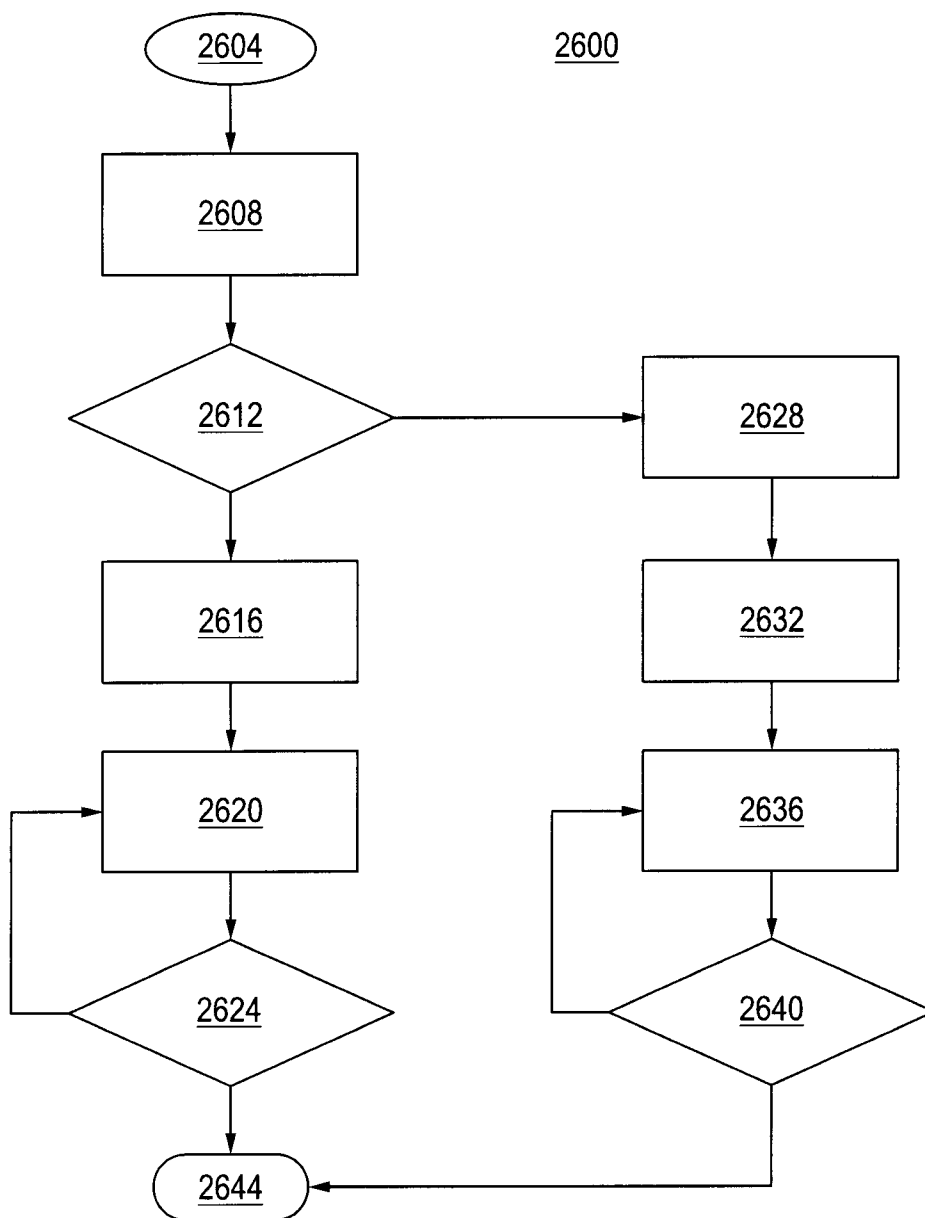


FIG. 26

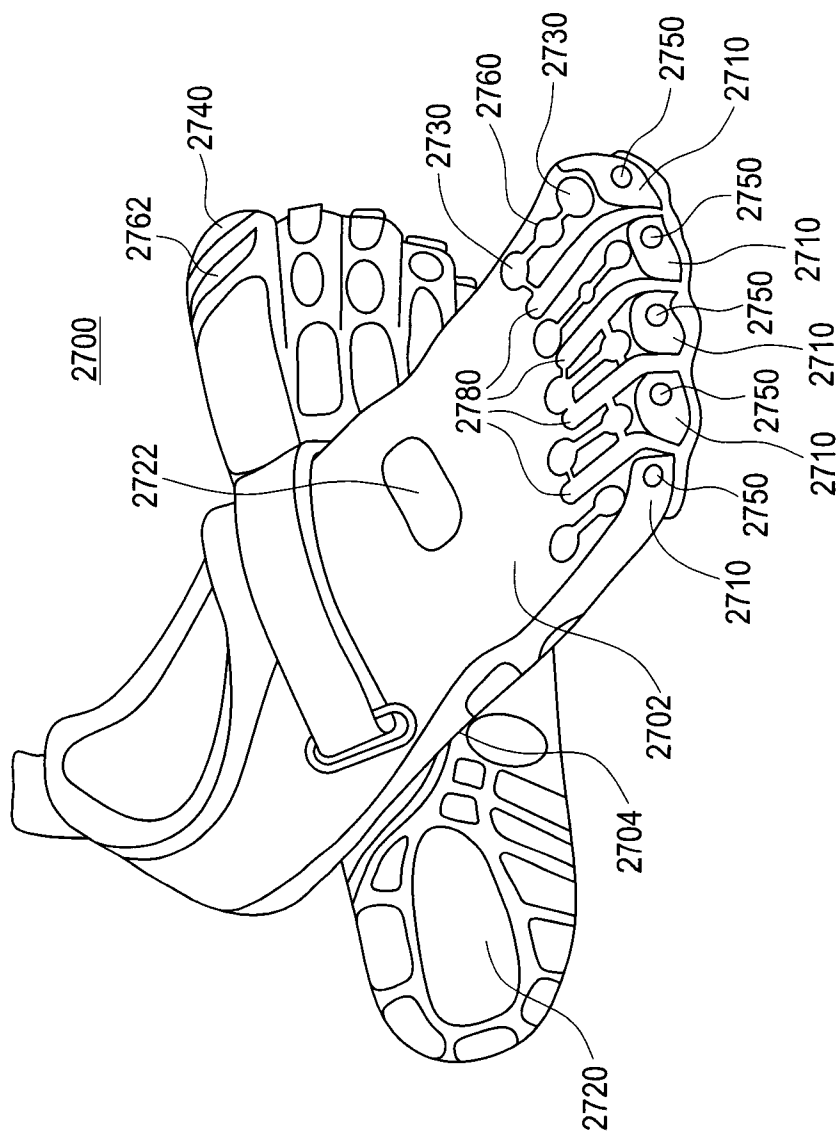


FIG. 27

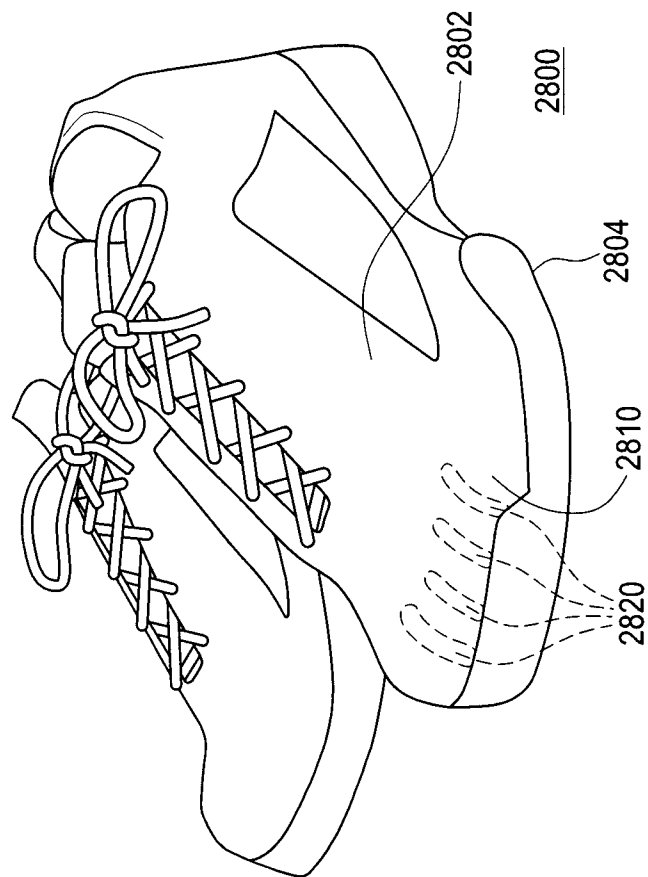


FIG. 28

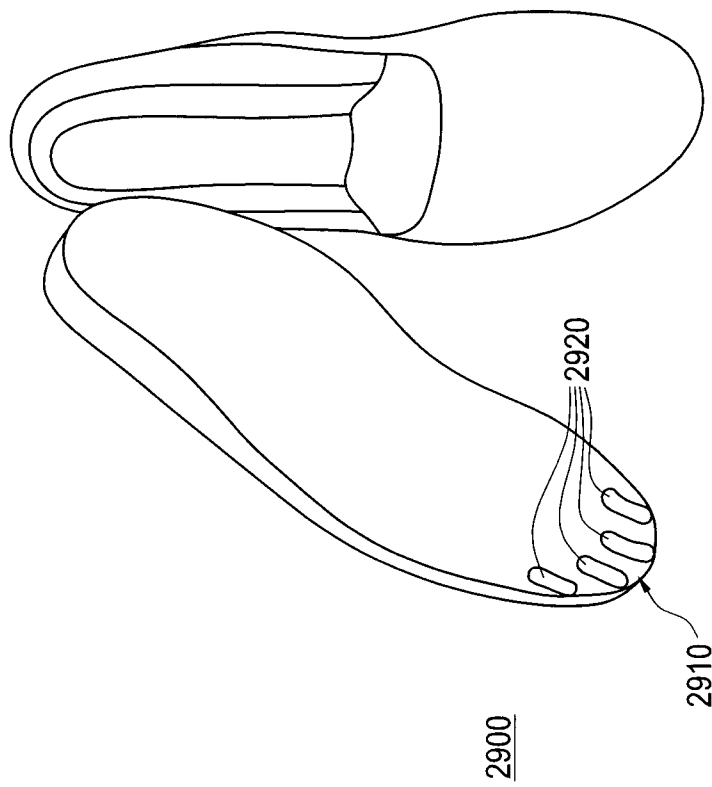


FIG. 29

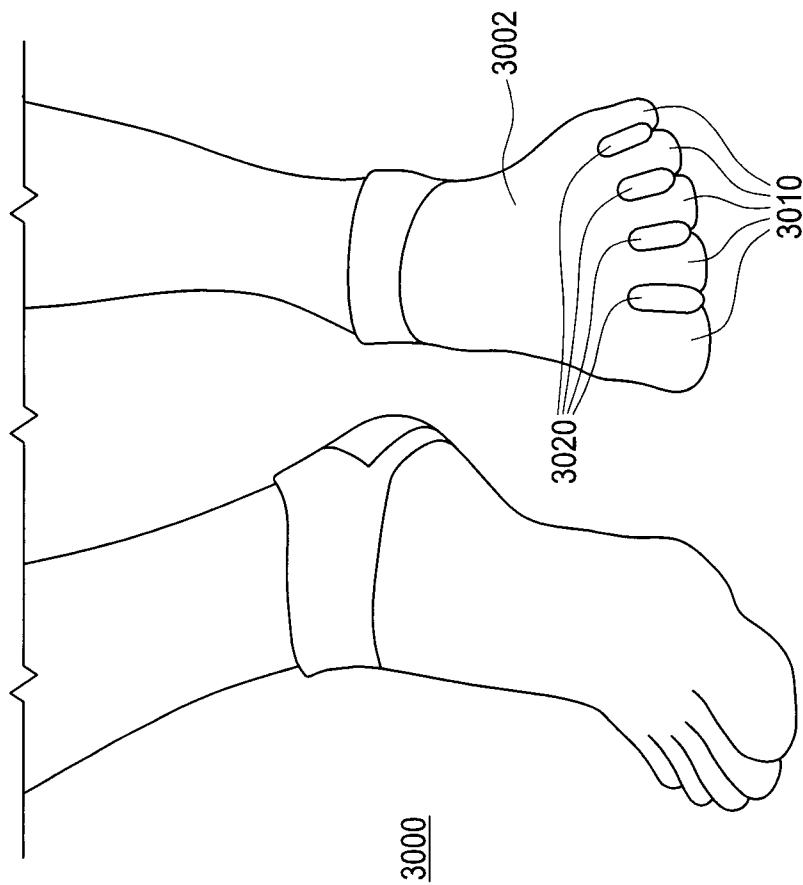


FIG. 30

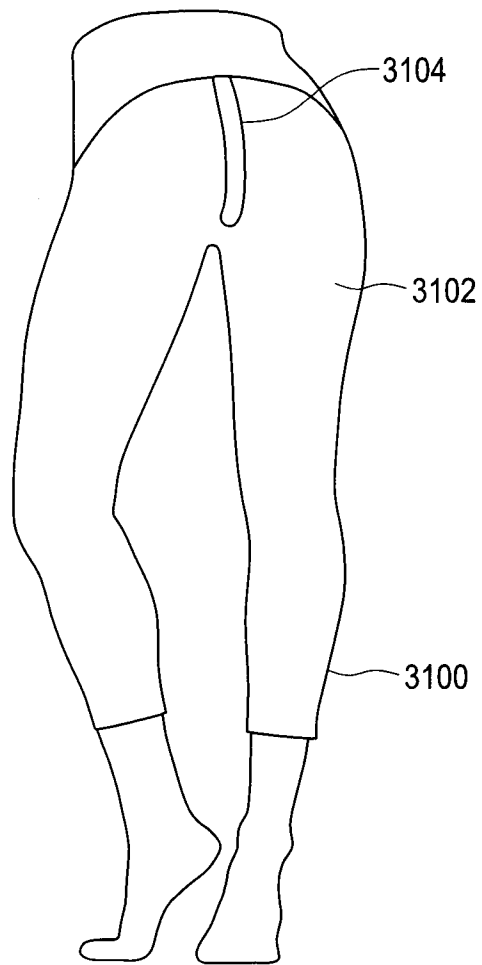


FIG. 31A

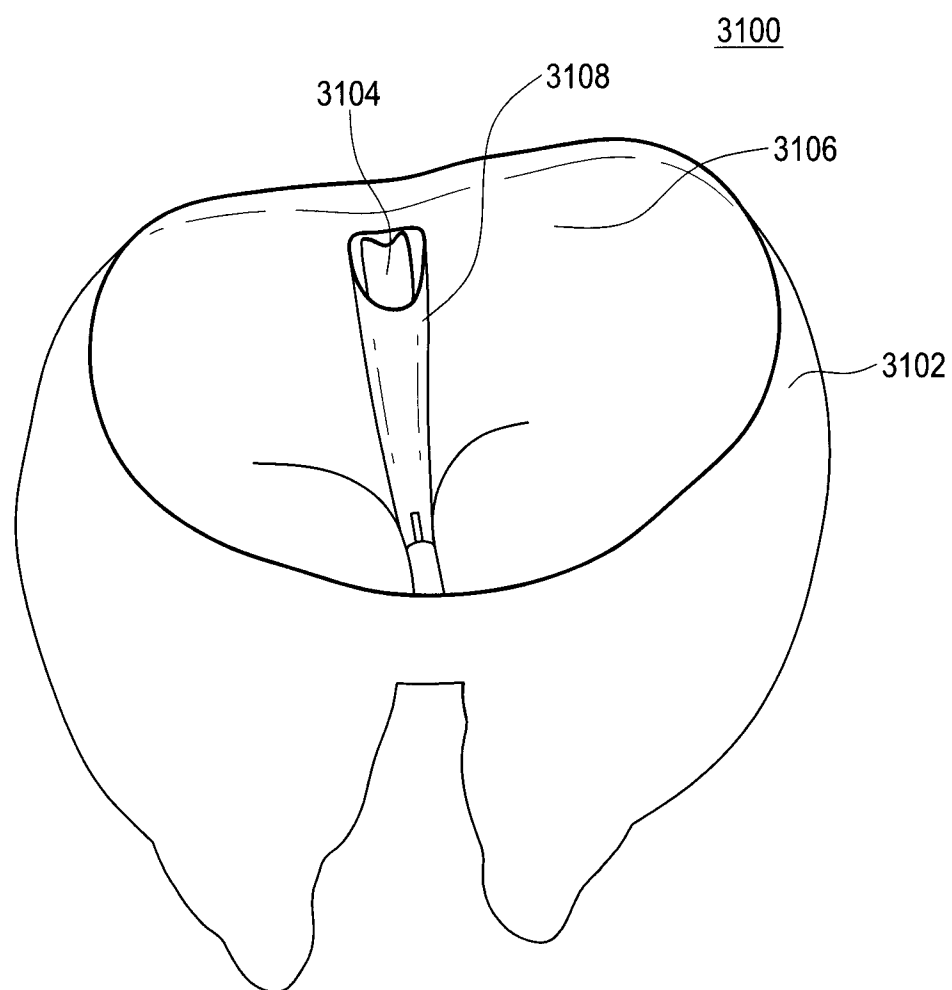


FIG. 31B

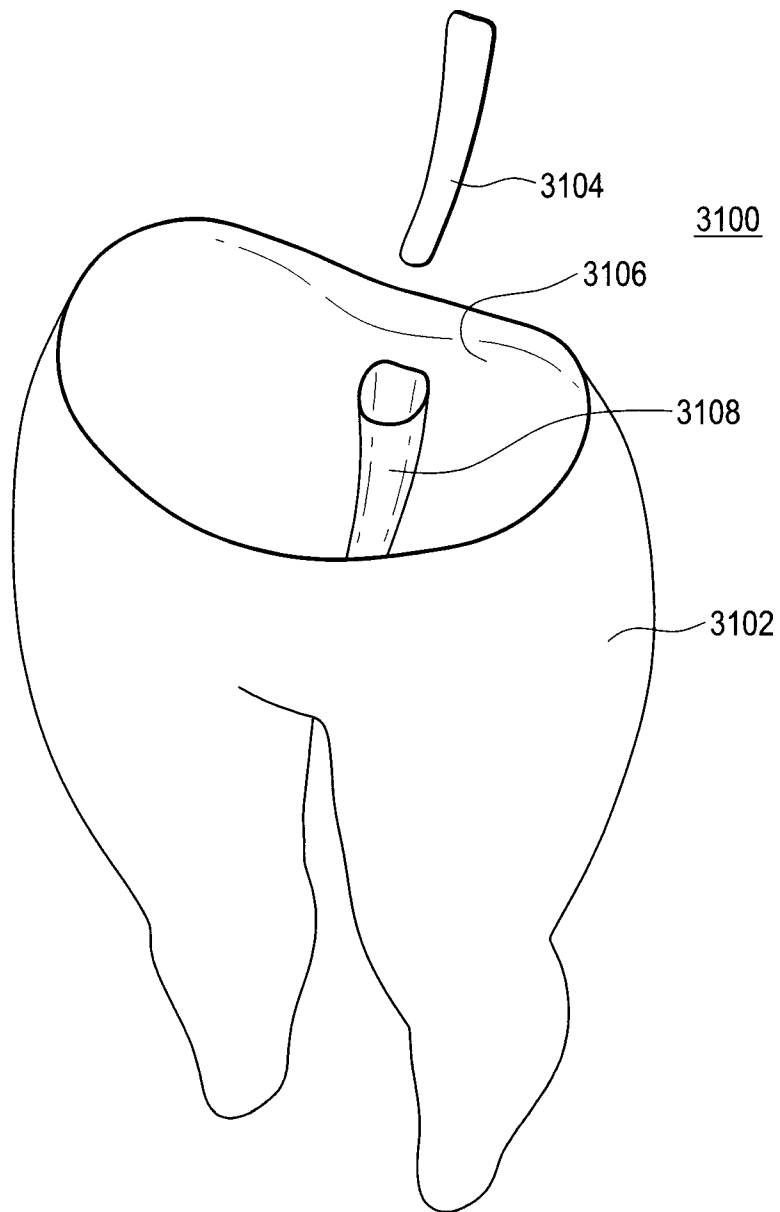


FIG. 31C

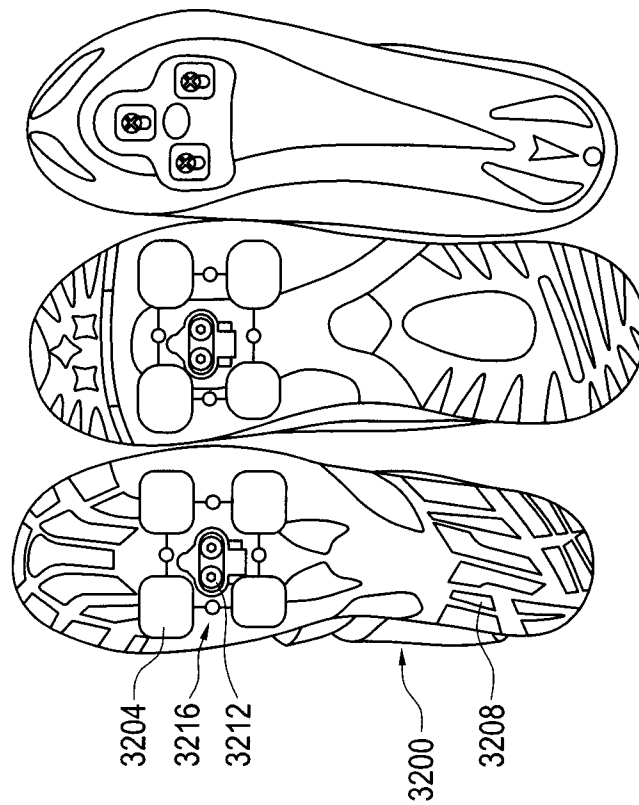


FIG. 32

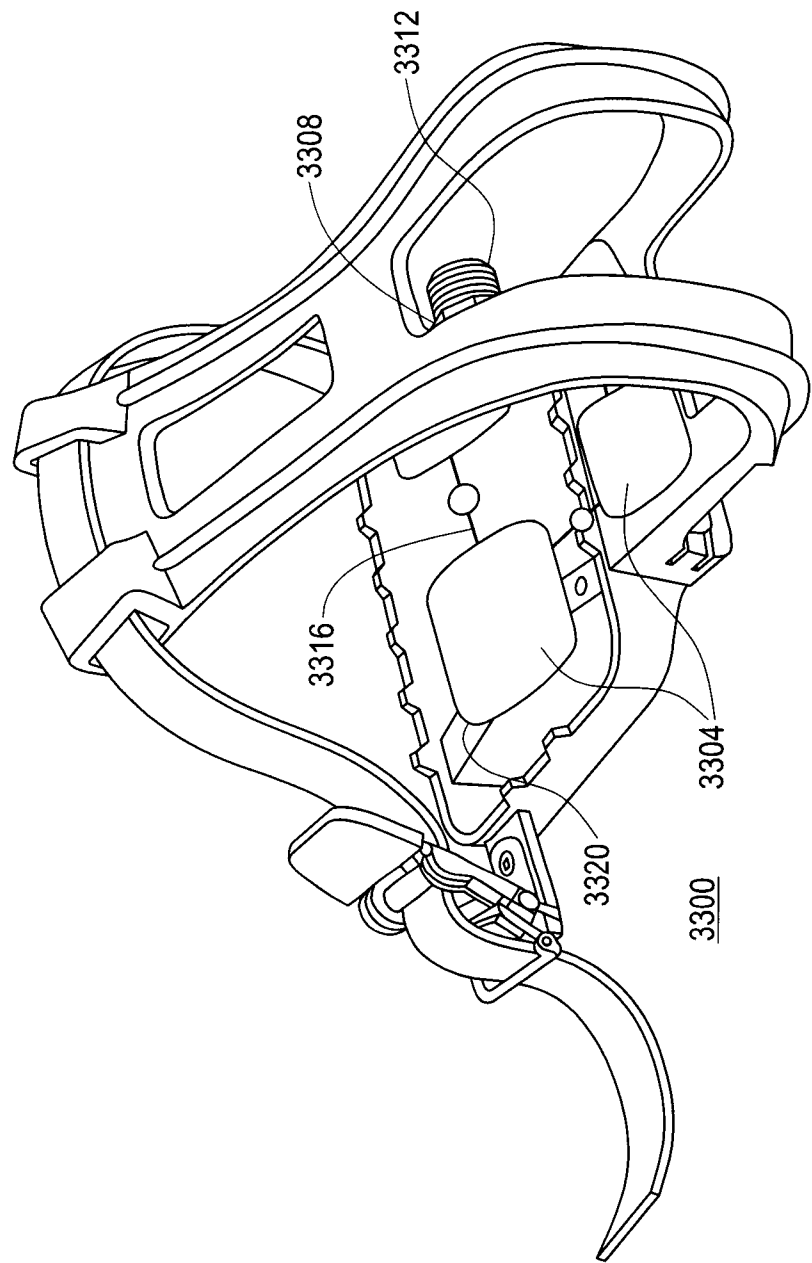


FIG. 33

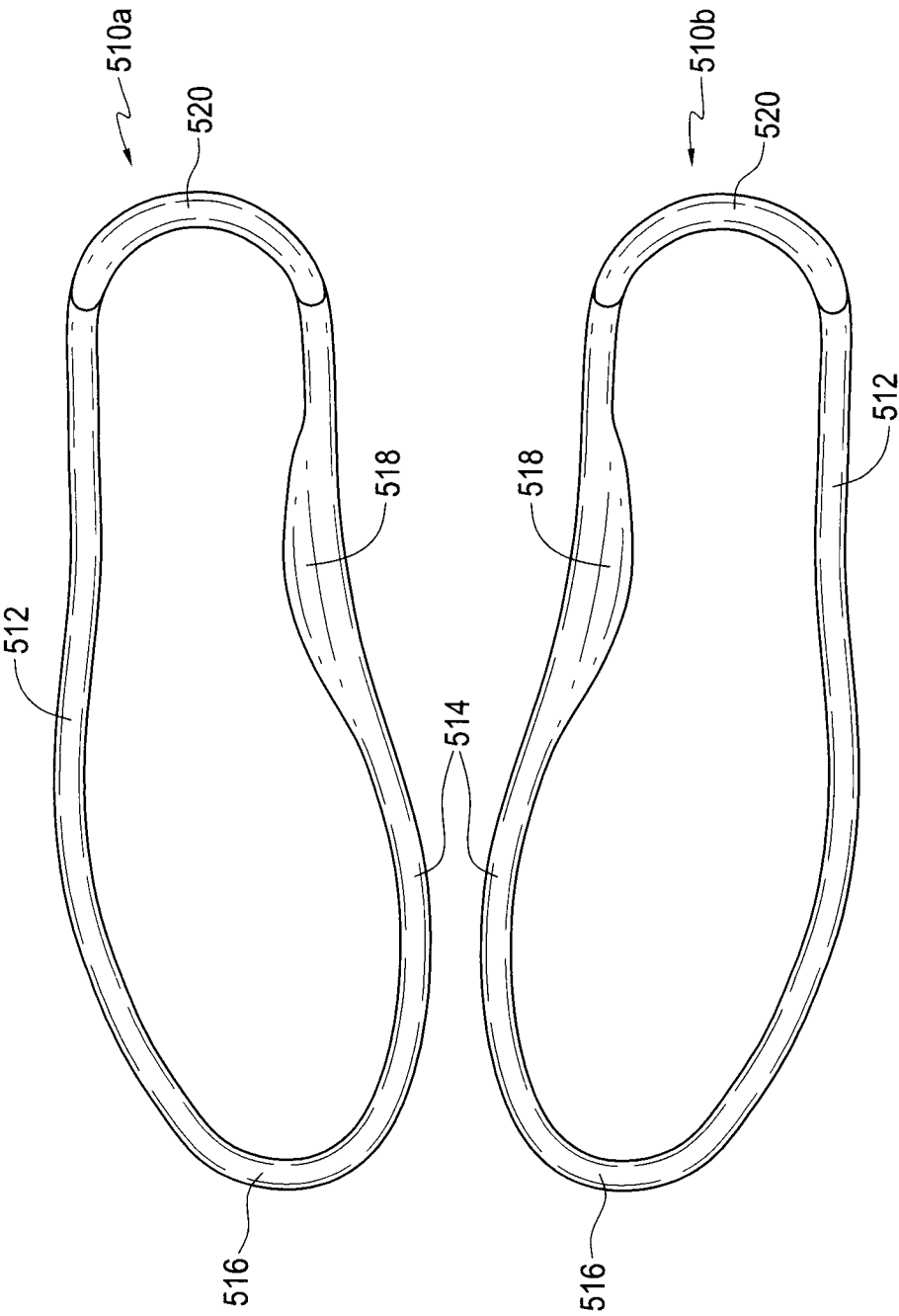


FIG. 34

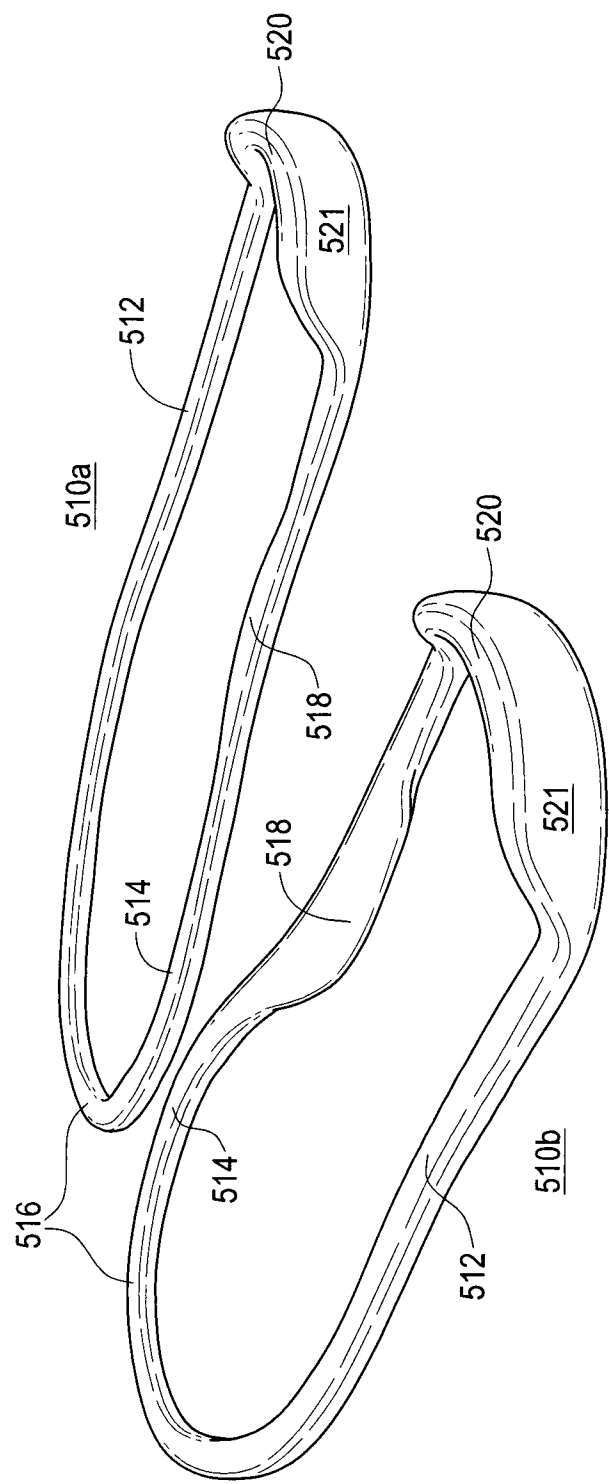


FIG. 35

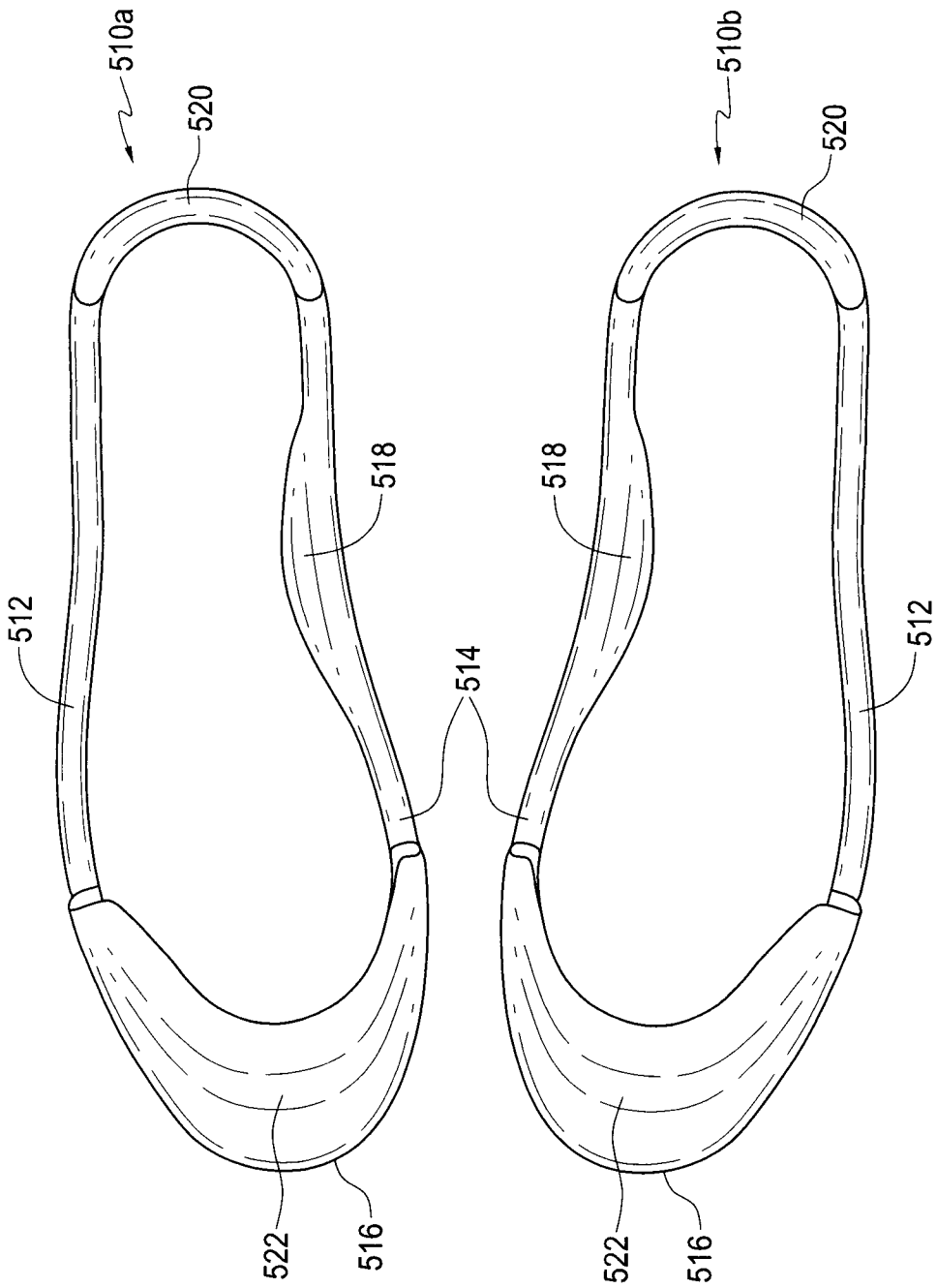


FIG. 36

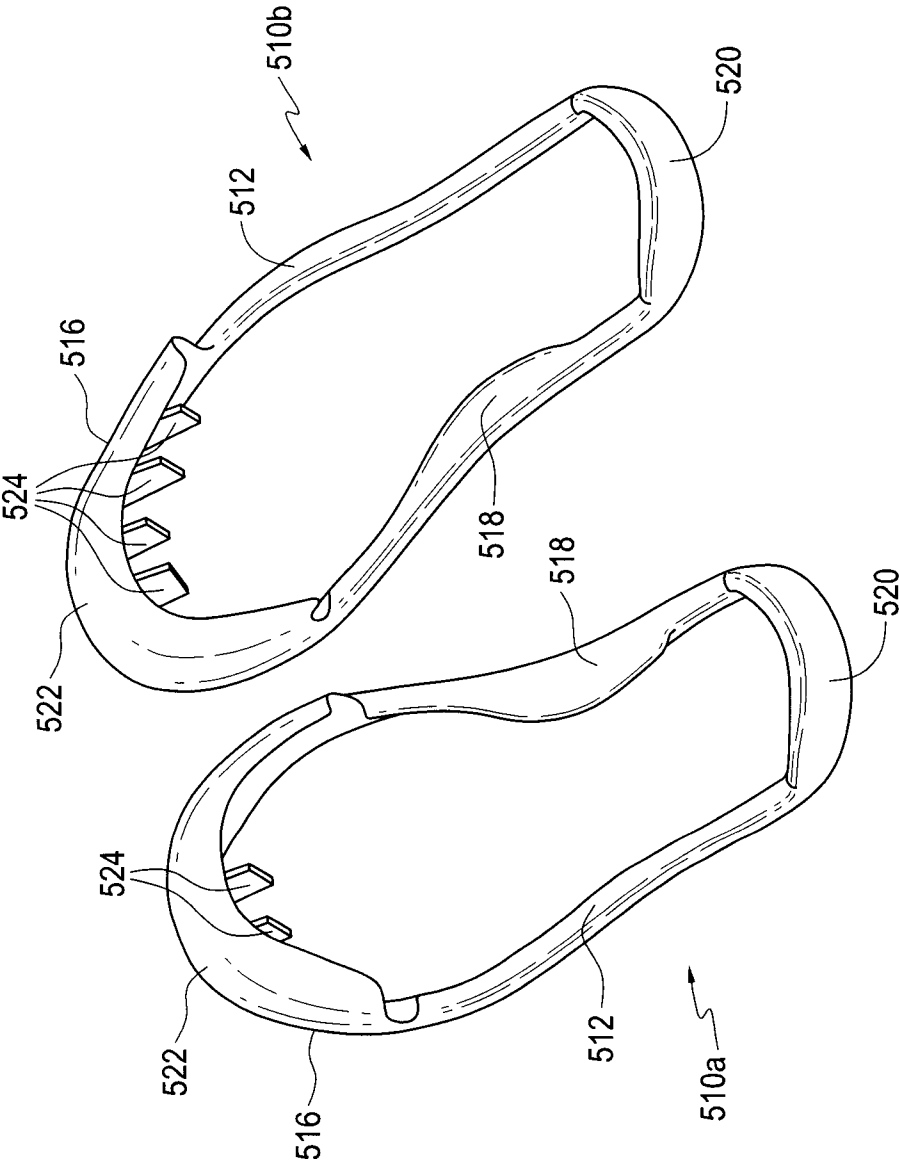


FIG. 37

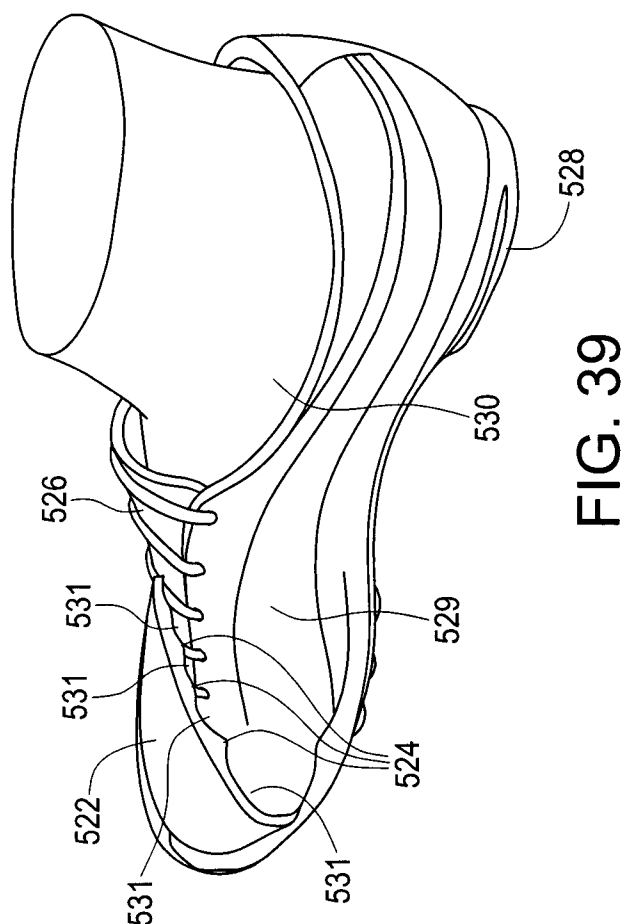


FIG. 39

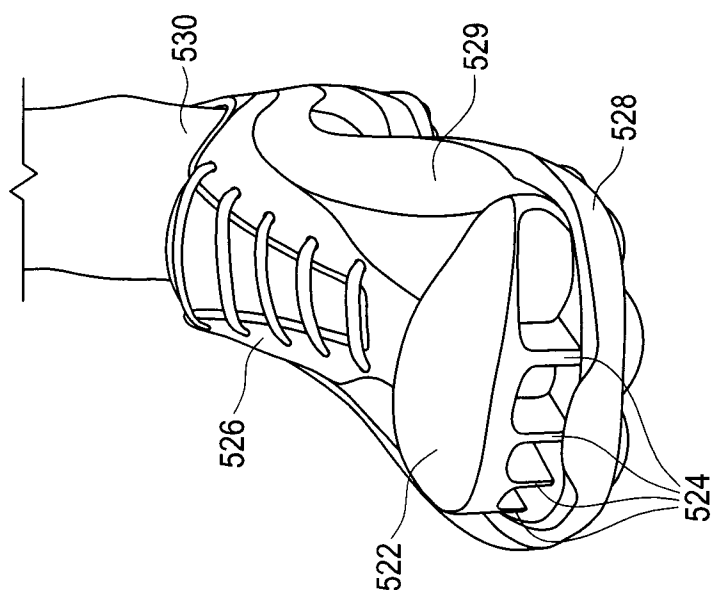


FIG. 38

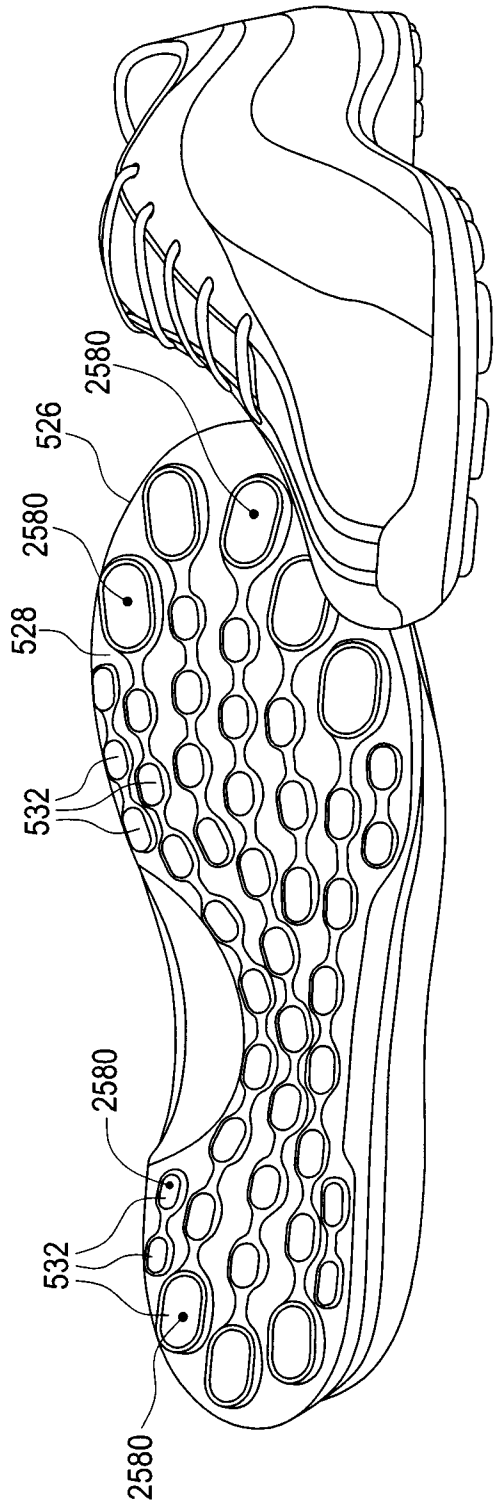


FIG. 40

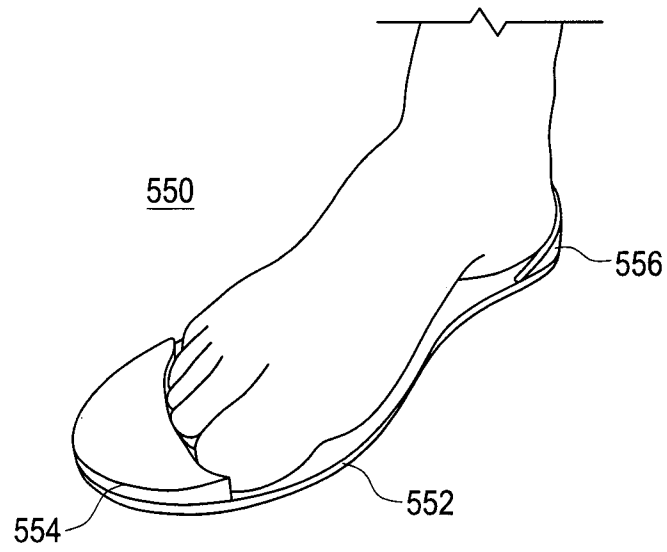


FIG. 41

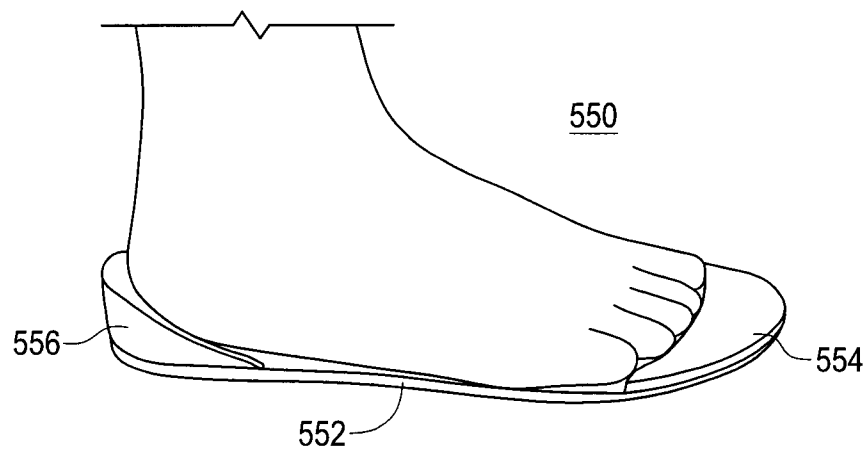


FIG. 42

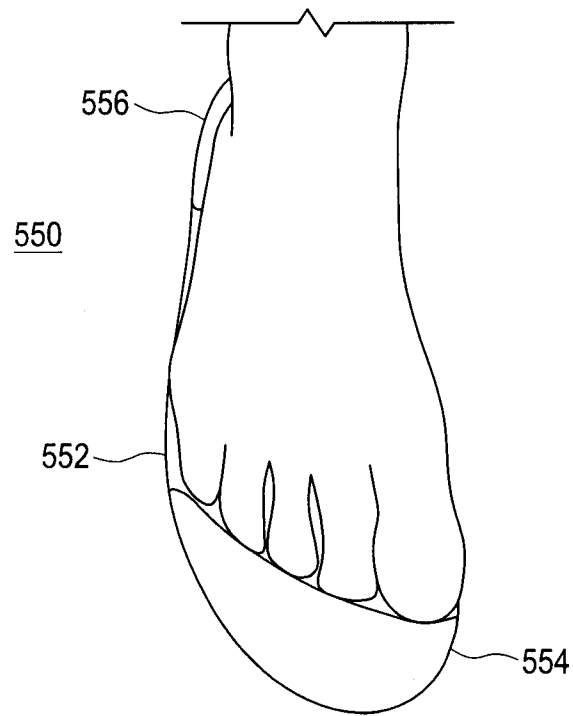


FIG. 43

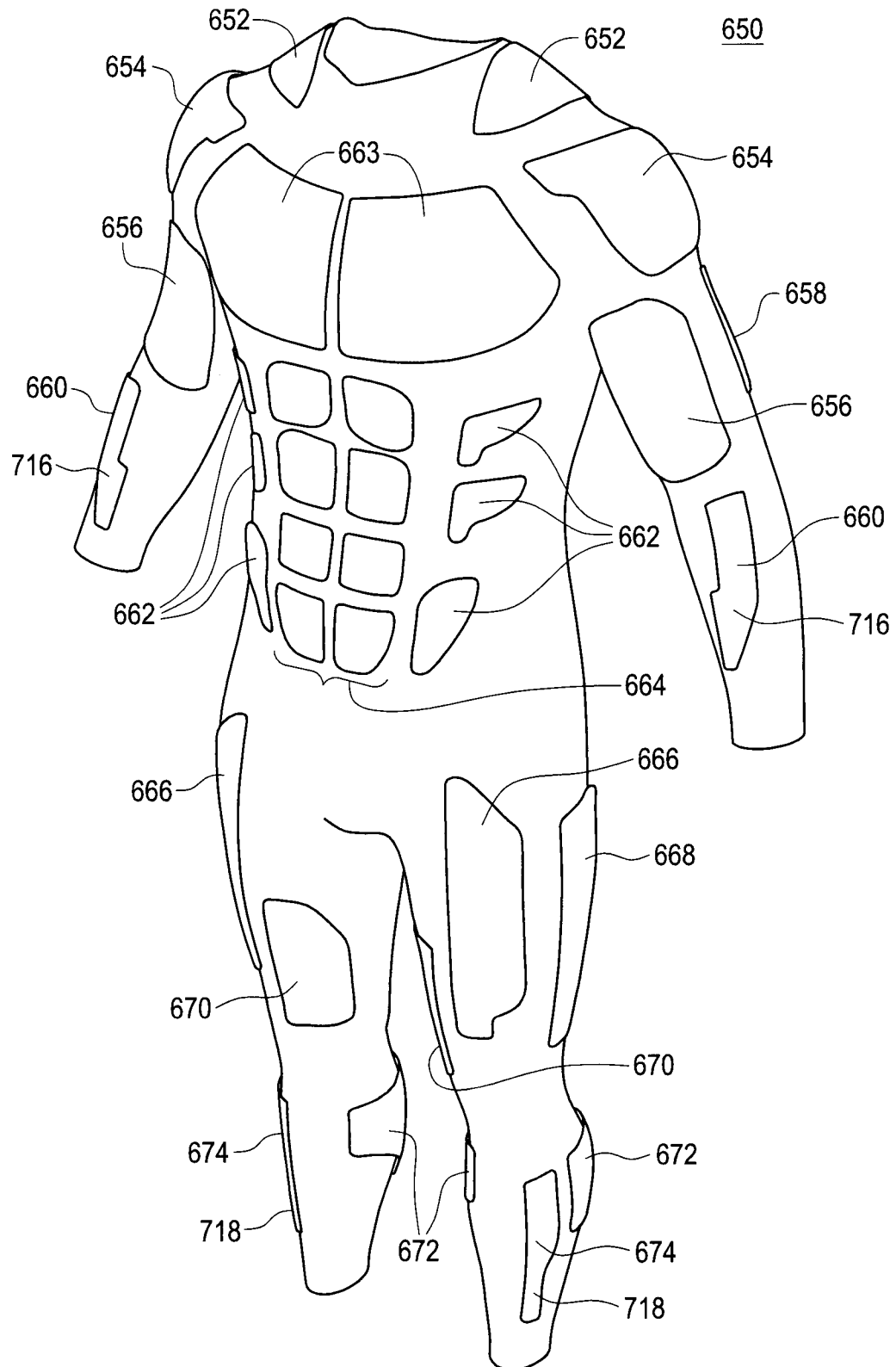


FIG. 44

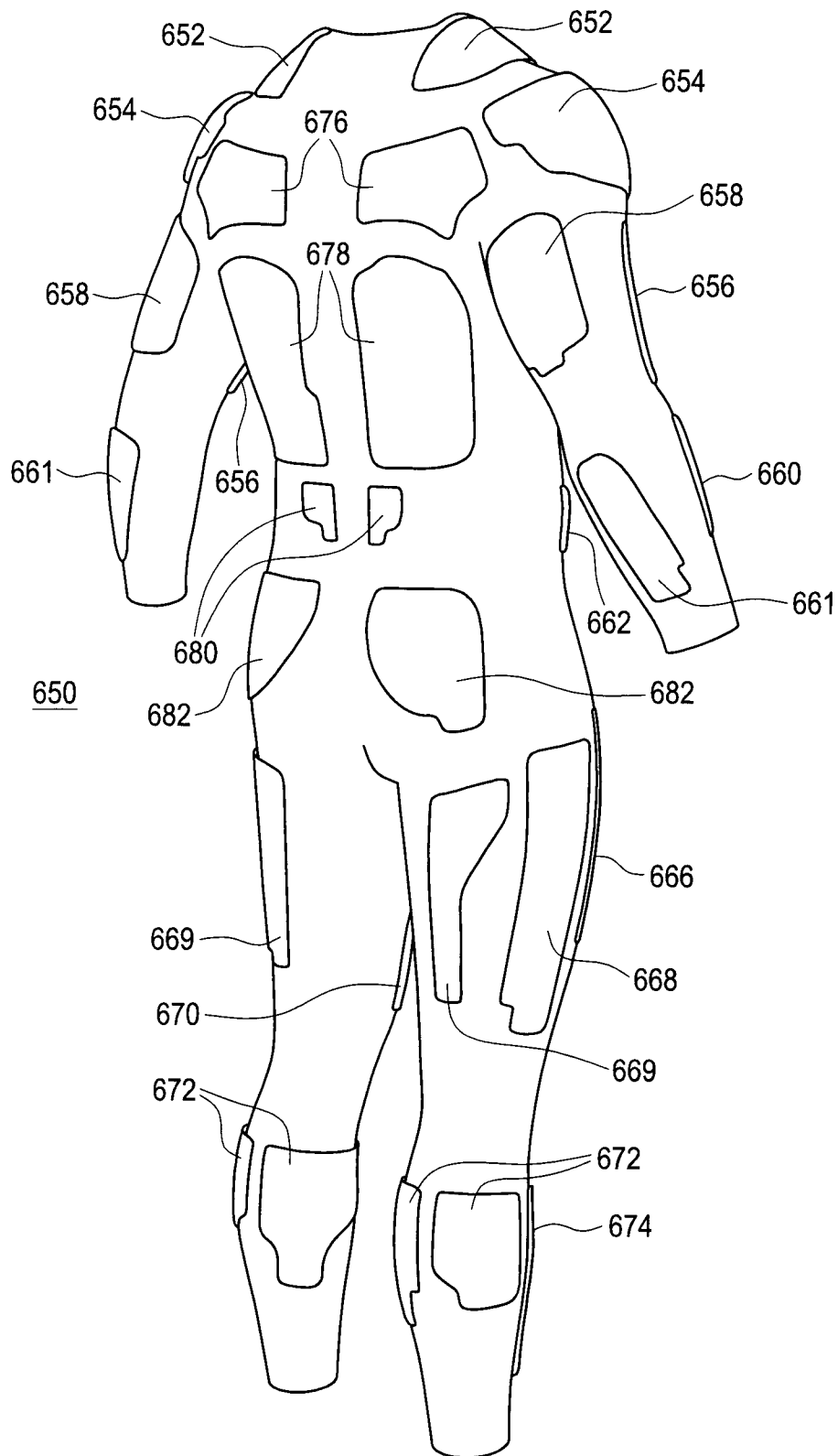


FIG. 45

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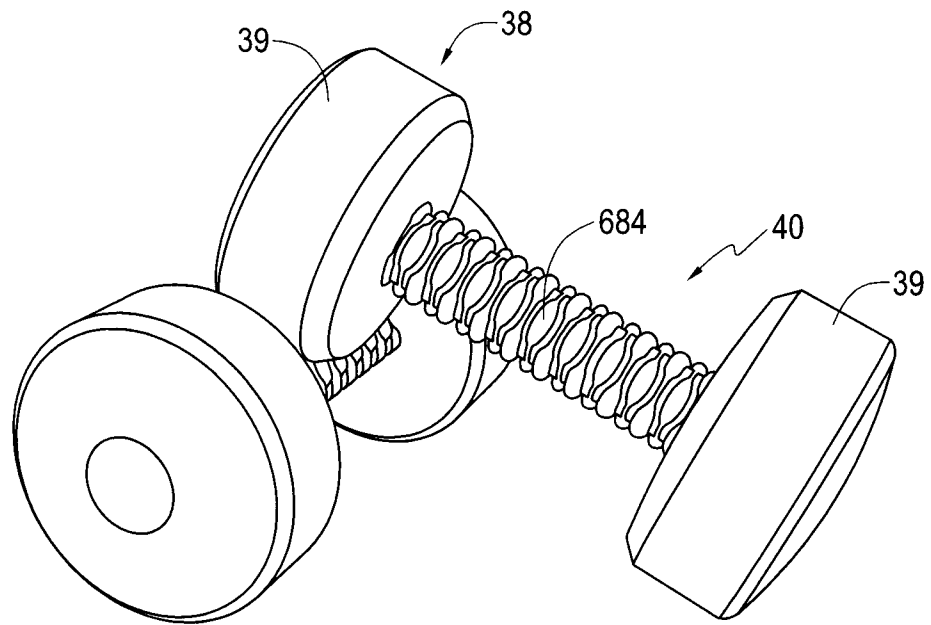


FIG. 46

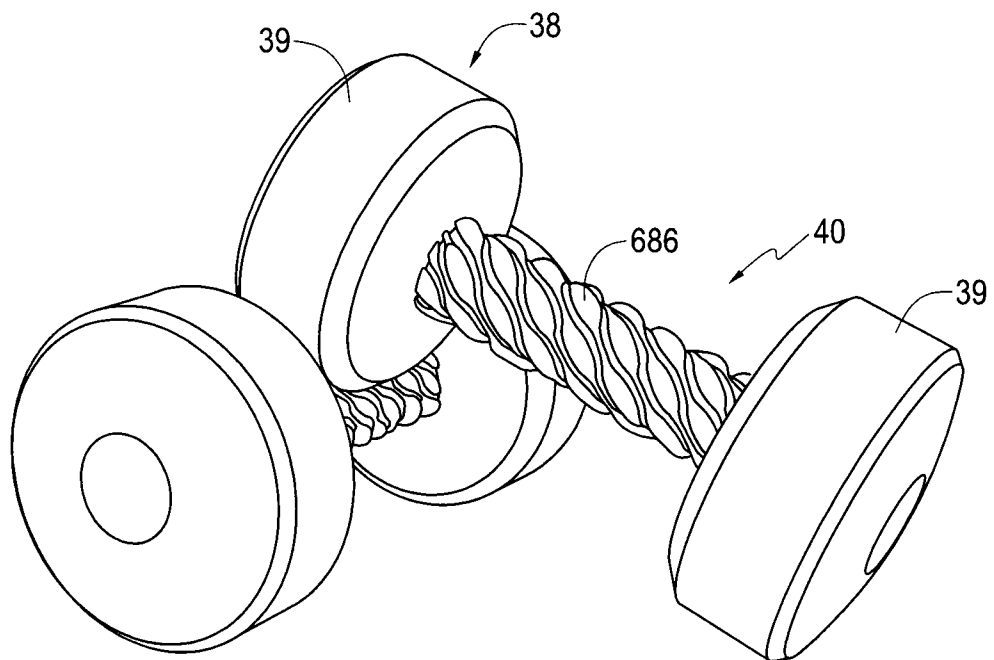


FIG. 47

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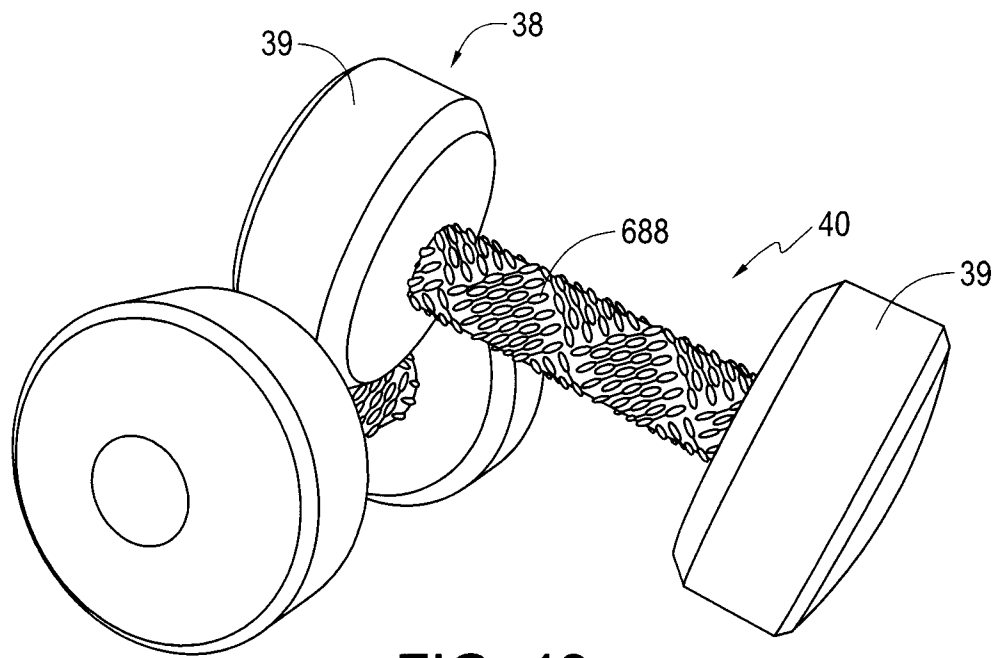


FIG. 48

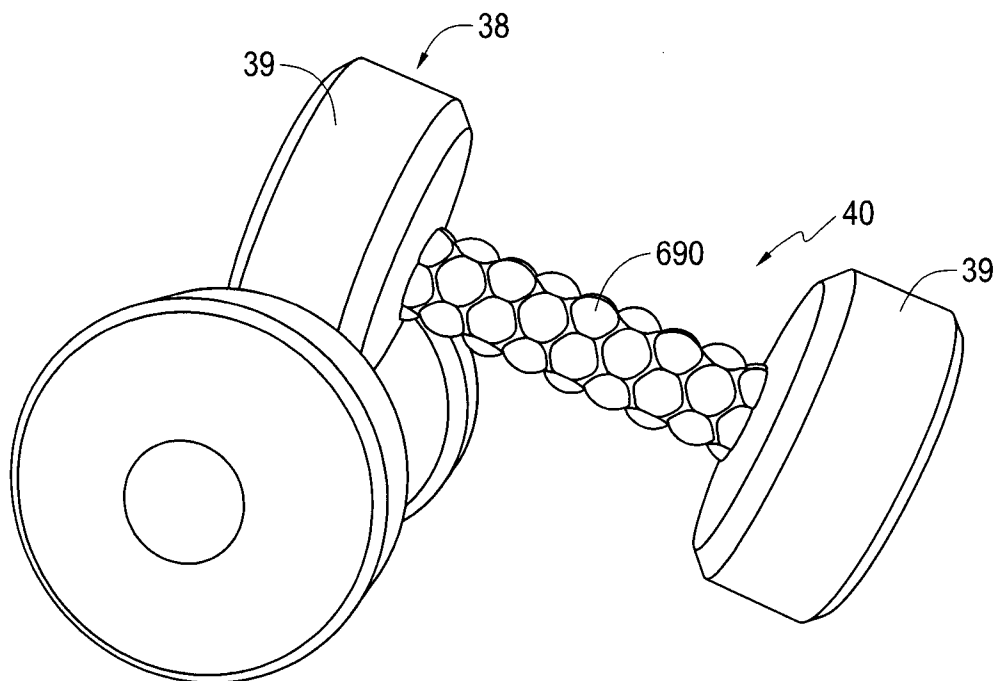


FIG. 49

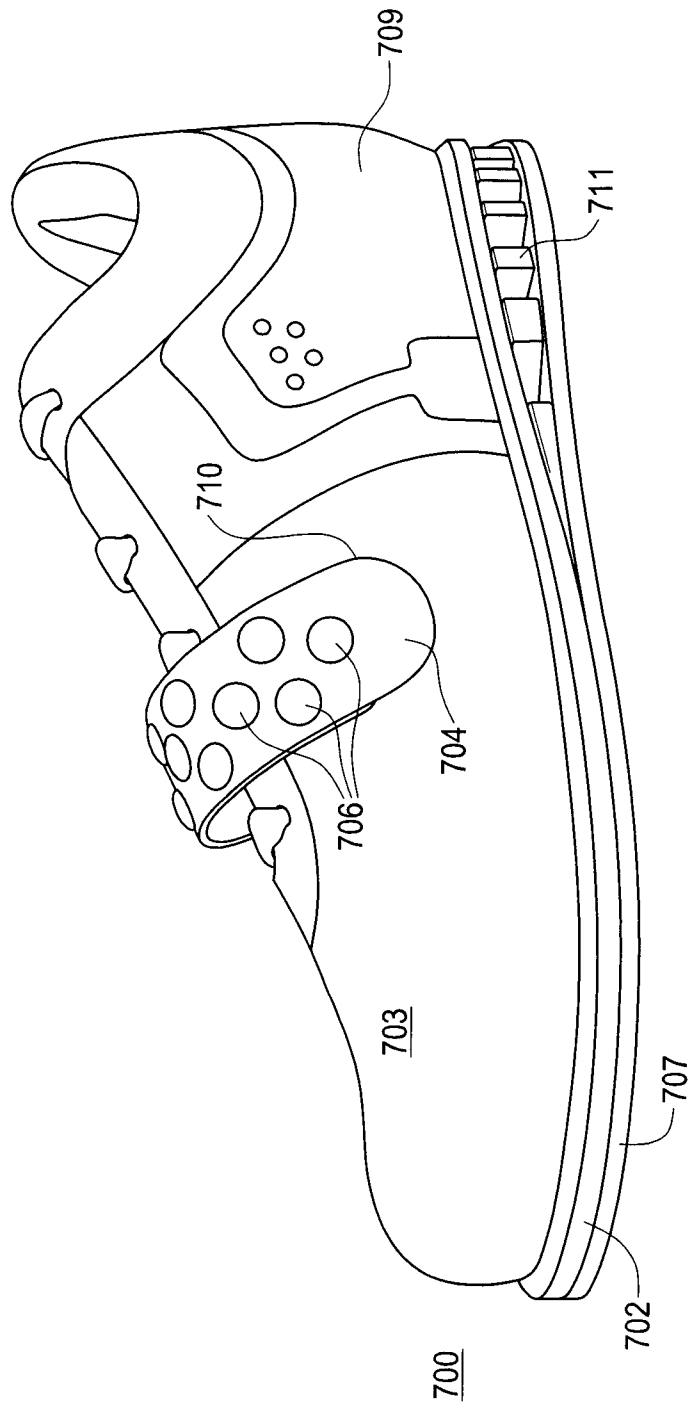


FIG. 50

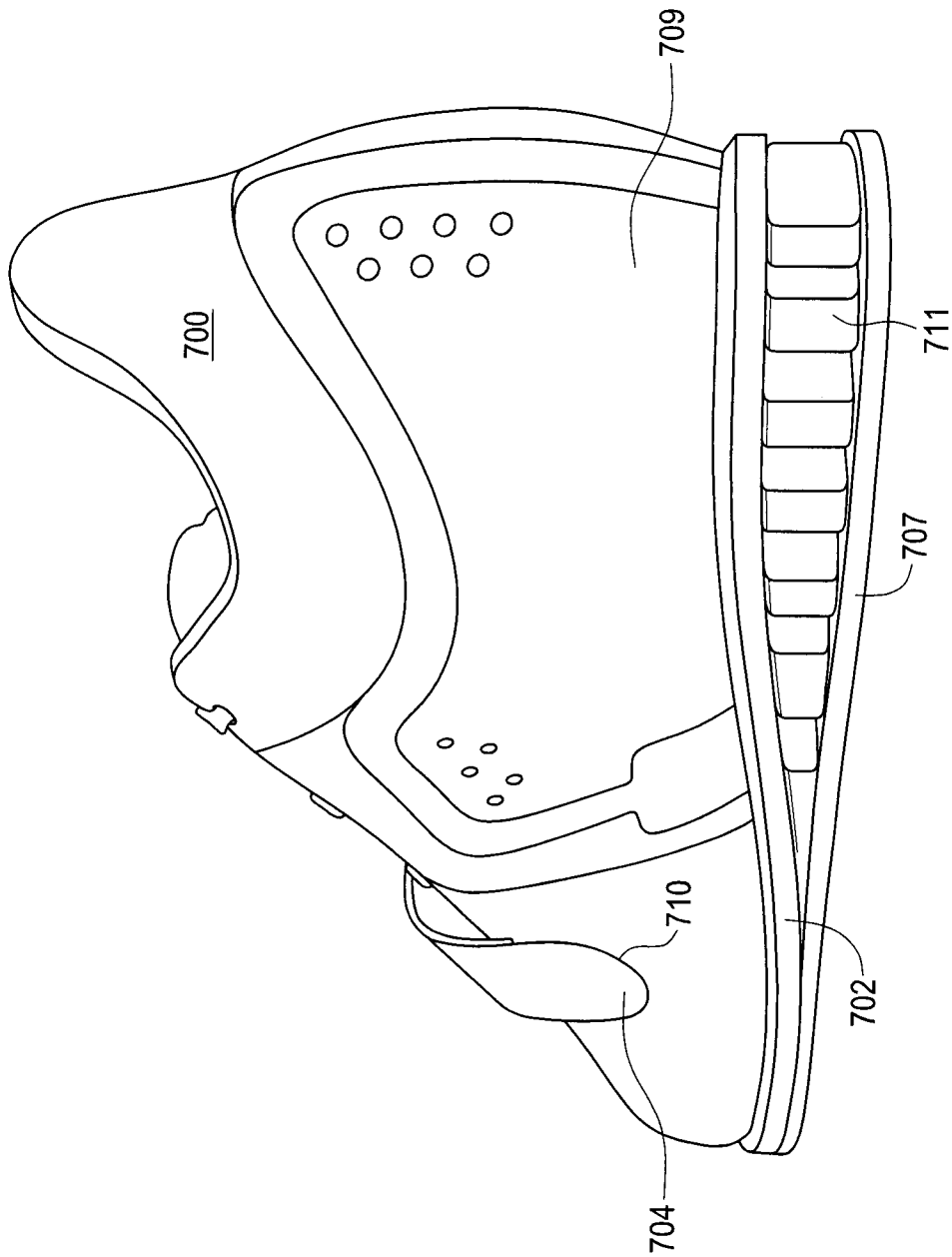


FIG. 51

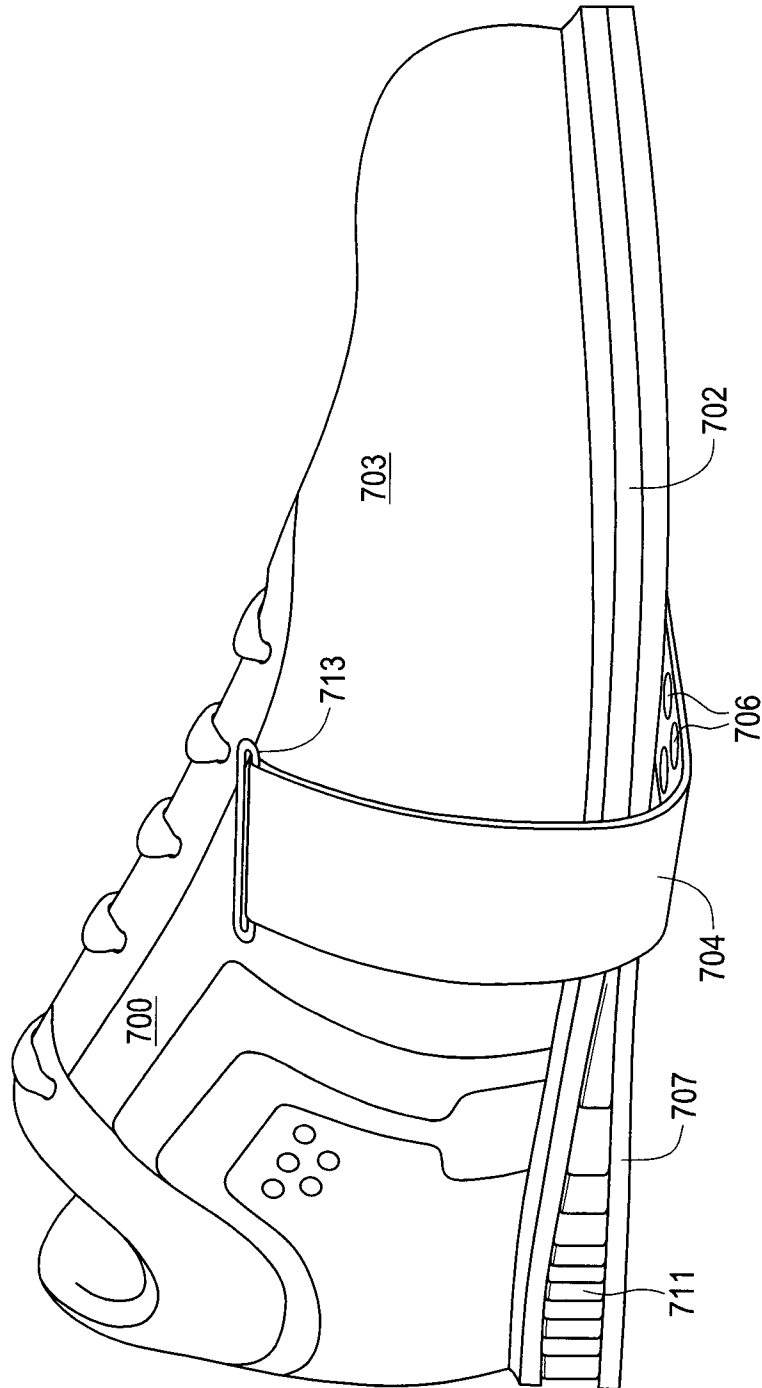


FIG. 52

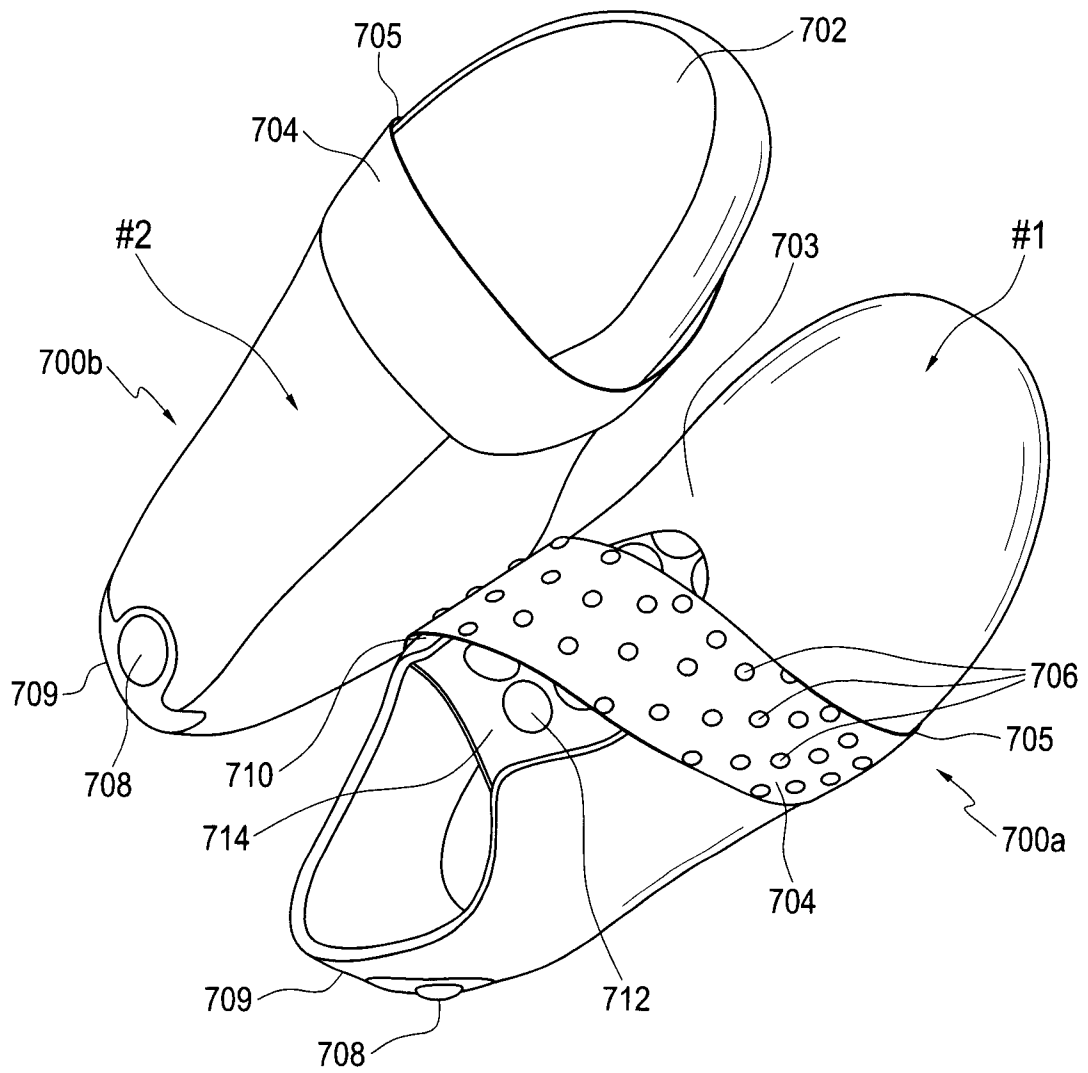


FIG. 53

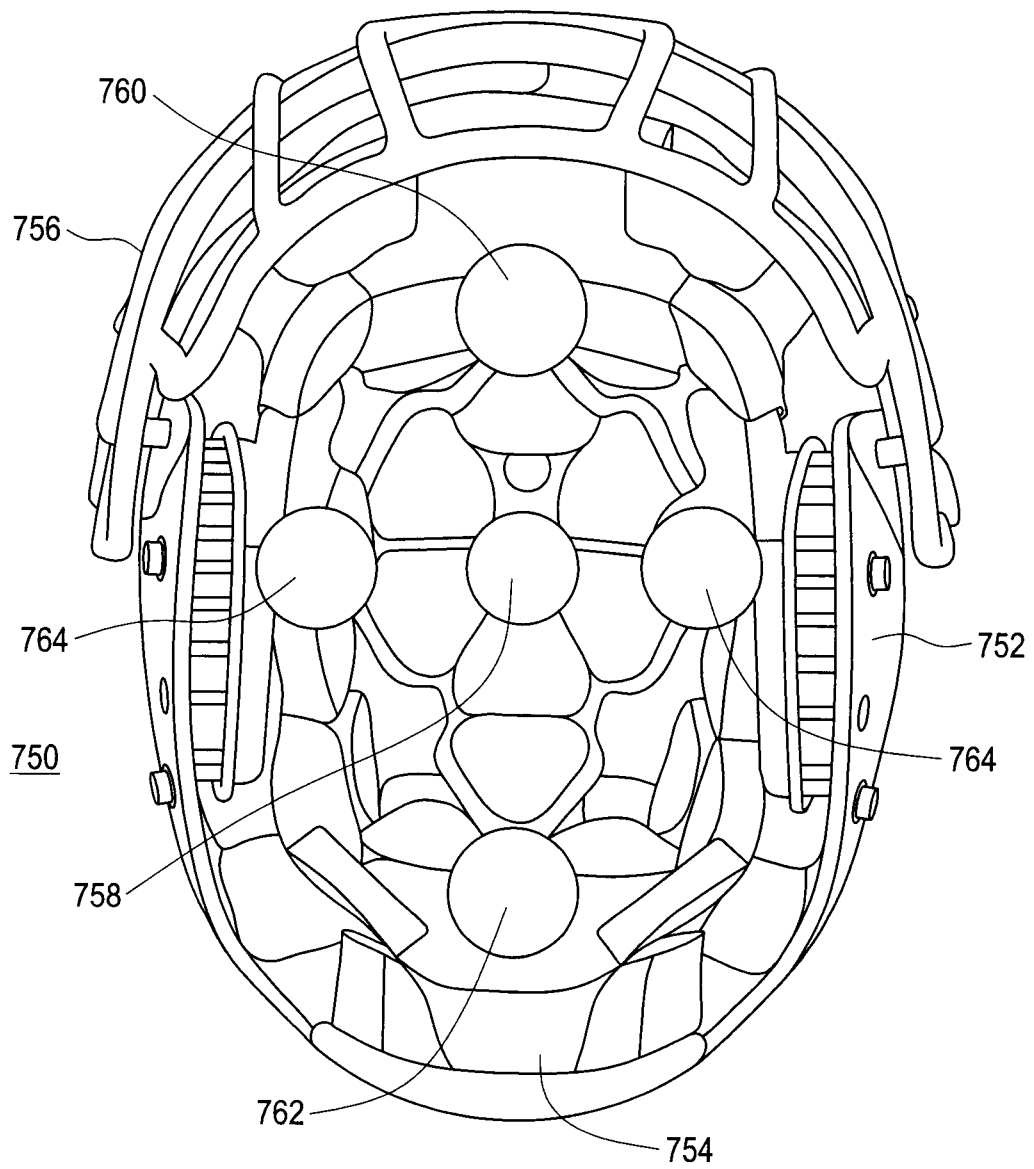


FIG. 54

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CA2017/050874

A. CLASSIFICATION OF SUBJECT MATTER

IPC: **A41D 19/015** (2006.01) , **A41D 1/00** (2006.01) , **A41D 13/00** (2006.01) , **A41D 13/08** (2006.01) ,
A42B 3/12 (2006.01) , **A43B 5/00** (2006.01) , **A43B 7/18** (2006.01) , **A43B 7/32** (2006.01) , **A63B 21/06** (2006.01) , **A63B 6/00** (2006.01)

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)

IPC and CPC: A41D 19/00, A41D 19/015, A63B 71/14, A41D 13/08, A41D 19/015, A63B 23/12, A63B 23/14, A63B 23/16, A41D 1/00, A41D 13/00, A41D 13/05, A41D 13/08, A41B 11/02, A41B1 1/007, A42B 3/00, A42B 3/04, A42B 3/06, A42B 3/10, A42B 3/16, A42B 3/12, A43B 3/16, A43B 5/00, A43B 7/00, A43B 7/14, A43B 7/18, A43B 7/00, A43B 7/32 A43B 7/26, A41B 11/004, A43B 17/00, A61F 5/14, A61F 5/30, A61F 5/32, A61F 5/34, A63B 21/00, A63B 21/06, A63B 6/00, A63B2 1/4037

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

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

QUESTEL ORBIT FAMPAT

Search terms: proprioceptive, proprioception, compressible, deform, glove, insole, sole, insert, toe, strap, sensor, rubber, foam, gel, silicone.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US2015 181955A1 (HUGHES, G. ET AL.) 02 May 2015 (02-07-2015) * Entire document. *	I to 10 II to 13
X Y	US2012159681A1 (GIBBY, G.R.) 28 June 2012 (28-06-2012) * Entire document. *	I to 10 II to 13
X Y	US2012017349A1 (MCCRANE, D.P.) 26 January 2012 (26-01-2012) * Entire document. *	I to 10 II to 13
X Y	US5345609A (FABRY, J. ET AL.) 13 September 1994 (13-09-1994) * Entire document. *	I to 10 II to 13

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* "A" "E" "L" "O" "P"	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance earlier application or patent but published on or after the international filing date document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed	"T" "X" "Y" "&"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art document member of the same patent family
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Date of the actual completion of the international search
18 September 2017 (18-09-2017)

Date of mailing of the international search report
05 October 2017 (05-10-2017)

Name and mailing address of the ISA/CA
Canadian Intellectual Property Office
Place du Portage I, CI 14 - 1st Floor, Box PCT
50 Victoria Street
Gatineau, Quebec K1A 0C9
Facsimile No.: 819-953-2476

Authorized officer

Javier Jorge (819) 639-7862

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CA2017/050874

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US6126572A (SMITH, C.) 03 October 2000 (03-10-2000) * Entire document. *	11 and 12
Y	US6 11927 1A (BYON E.) 19 September 2000 (19-09-2000) * Entire document. *	13
X	US2627676A (HACK, N.) 10 February 1953 (10-02-1953) * Entire document. *	14 to 23, 26 to 33, and 68 to 70
X	FR2769801A1 (LOIC, D.) 23 April 1999 (23-04-1 999) * Entire document. *	14 to 23 and 26 to 33
X	US20091 13760A1 (DOMINGUEZ T.) 07 May 2009 (07-05-2009) * Entire document. *	14 to 23 and 26 to 33
X	US8079 159B 1 (ROSA, A. ET AL.) 20 December 201 1 (20- 12-201 1) * Entire document. *	14 to 23 and 26 to 33
X	US2014013617A1 (MONTROSS M. ET AL.) 16 January 2014 (16-01-2014) * Entire document. *	14 to 23 and 26 to 33
X	US20143 17959A1 (ELBAZ, A. ET AL.) 30 October 2014 (30-10-2014) * Entire document. *	14 to 23 and 26 to 36
X	WO2009 152456A2 (SCHROCK, A ET AL), 17 December 2009 (17-12-2009) * Entire document. *	14 to 33
Y		87 to 89
X	WO200605693 1A1 (FUSCO, M.A.) 0 1 June 2006 (01-06-2006) * Entire document. *	37 to 39
X	EP173 1050A1 (SCHWARZE, W. ET AL) 13 December 2006 (13-12-2006) * Entire document. *	37 to 39
X	WO2007060499A1 (FUSCO, M.A.) 3 1 May 2007 (3 1-05-2007) * Entire document. *	37 to 39, 72 and 73
X	WO2012106803A1 (GARDNIER, R.) 16 August 2012 (16-08-2012) * Entire document. *	37 to 39
X	US2012277077A1 (HSU, C.-C. ET AL.), 0 1 November 2012 (01-1 1-2012) * Entire document. *	40 to 45
X	US2007275827A1 (GLASER W.) 29 November 2007 (29-1 1-2007) * Entire document. *	40 to 45
X	US2012164202A1 (HARRIS, F. ET AL.) 28 June 2012 (28-06-2012) * Entire document. *	40 to 45
X	US4351526A (SCHWARTZ L.) 28 September 1982 (28-09-1982) * Entire document. *	46 to 49

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CA2017/050874

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US2009275447A1 (FISHMAN, M.) 05 November 2009 (05-11-2009) * Entire document. *	46 to 49 and 97 to 100
X	US2010043 113A1 (CLARK, T. ET AL.) 25 February 2010 (25-02-2010) * Entire document. *	46 to 49
X	US20010527 10A1 (WITHERELL W.D.) 20 December 2001 (20-12-2001) * Entire document. *	46 to 49 and 97 to 100
X	US201 1256992A1 (GRAFMAN, L. ET AL.) 20 October 2011 (20-10-2011) * Entire document. *	46 to 49
X	CA2295346A1 (HALSTEAD, P. ET AL.) 04 December 2000 (04-12-2000) * Entire document. *	94 to 96
X	US2014033402A1 (DONNADIEU T. ET AL.) 06 February 2014 (06-02-2014) * Entire document. *	94 to 96
X	US5077837A (MEISTRELL, W.) 07 January 1992 (07-01-1992) * Entire document. *	50 to 52
X	US4250578A (BARLOW, C.S.) 17 February 1981 (17-02-1981) * Entire document. *	50 to 52
X	US4150442A (BOONE, W.S.) 24 April 1979 (24-04-1979) * Entire document. *	50 to 52
X	US2009139005A1 (WHALEY, P.) 04 June 2009 (04-06-2009) * Entire document. *	53 to 64
X	WO2007120584A2 (FEY, E. ET AL.) 25 October 2007 (25-10-2007) * Entire document. *	53 to 62
X	US200802243 1A1 (GALLO C. ET AL.) 31 January 2008 (31-01-2008) * Entire document. *	53 to 62
X	US2005081277A1 (MATECHEN J.M. ET AL.) 21 April 2005 (21-04-2005) * Entire document. *	53 to 62
X	WO2012158406A1 (TURNER, D.) 22 November 2012 (22-11-2012) * Entire document. *	53 to 62
X	US2014345032A1 (SHIEU, S-J) 27 November 2014 (27-11-2014) * Entire document. *	65 to 67
X	WO201 1150166A2 (SPICUZZA, E. ET AL.) 01 December 2011 (01-12-2011) * Entire document. *	65 to 67
X	US2006026740A1 (VARGAS, S. ET AL.) 09 February 2006 (09-02-2006) * Entire document. *	65 to 67

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CA2017/050874

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR2005009 1896 (JANG, SU HEE) 15 September 2005 (15-09-2005) * Entire document. *	65 to 67
X	EP1444910A1 (FERRARIO, R.) 11 August 2004 (11-08-2004) * Entire document. *	71 and 72
X	US2005 177085A1 (GREEN, A. ET AL.) 11 August 2005 (11-08-2005) * Entire document. *	72 and 73
X	DE102009029501A1 (FICHTMEIER, M.) 21 April 2011 (21-04-2011) * Entire document. *	72 and 73
X	US5048369A (CHEN, C.) 17 September 1991 (17-09-1991) * Entire document. *	74
X	US4759136A (STEWART, D. ET AL.) 26 July 1988 (26-07-1988) * Entire document. *	75 to 86
Y		87 to 89
X	JP2012245 168A (SAKURAI YOSHIMASA) 13 December 2012 (13-12-2012) * Entire document. *	75 to 86
Y		87 to 89
X	US2010036306A1 (LUSSIER, M. ET AL.) 11 February 2010 (11-02-2010) * Entire document. *	90 to 93

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of the first sheet)

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

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See supplemental box.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☒ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claim Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

Continuation of Box No. III

The claims are directed to a plurality of inventive concepts as follows:

Group A - Claims 1 to 13 are directed to a glove featuring at least one compressible protrusion disposed on the glove extending outwardly from the glove;

Group B - Claims 14 to 39 and 68 to 70 are directed to a shoe / insole / shoe cover featuring at least one compression member disposed on the downward-facing surface extending therefrom;

Group C - Claims 40 to 45 are directed to a sheet material / workout mat featuring a) at least one first compression member disposed on the upward-facing surface, extending upwardly therefrom, and b) at least one second compression member disposed on the upward-facing surface extending upwardly therefrom;

Group D - Claims 46 to 49 are directed to a bar wrap comprising: a) at least one first compression member disposed on the user side, extending outwardly therefrom, and b) at least one second compression member disposed on the user side extending outwardly therefrom;

Group E - Claims 50 to 67 are directed to a joint wrap / workout garment / sock featuring at least one compression member extending outwardly therefrom;

Group F - Claims 71 to 73 are directed to a shoe or insole or sock featuring one or more inter-toe compressible members;

Group G - Claim 74 is directed to a pedal comprising a spindle; and a housing, the housing comprising a platform, the improvement comprising at least one compression member disposed on the platform, extending upwardly therefrom;

Group H - Claims 75 to 89 are directed to an insert for a shoe / a shoe featuring a loop of a compressible material, the loop comprising: a) a toe perimeter portion, b) an outer perimeter portion, c) a heel portion, and d) an inner perimeter portion;

Group I - Claims 90 to 93 are directed to a shoe comprising a strap having a plurality of compressible members;

Group J - Claims 94 to 96 are directed to a sports helmet comprising: a) an outer shell, b) an inner liner, and c) at least one compressible member disposed on the inner liner, wherein the at least compressible member contacts the head when the person places the helmet on their head; and

Group K - Claims 97 to 100 are directed to a free weight comprising a pair of end weights and a handle disposed there between, and a plurality of compressible members disposed on an external surface of the handle.

The claims must be limited to one inventive concept as set out in PCT Rule 13.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CA2017/050874

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US2015181955A1	02 July 2015 (02-07-2015)	WO2015102851A1	09 July 2015 (09-07-2015)
US2012159681A1	28 June 2012 (28-06-2012)	US8950015B2	10 February 2015 (10-02-2015)
US2012017349A1	26 January 2012 (26-01-2012)	US9630083B2 EP2409740A2 EP2409740A3	25 April 2017 (25-04-2017) 25 January 2012 (25-01-2012) 27 April 2016 (27-04-2016)
US5345609A	13 September 1994 (13-09-1994)		
US6126572A	03 October 2000 (03-10-2000)	AU4824200A AU768389B2 CA2371058A1 CA2371058C EP1189664A1 EP1189664A4 JP2002543944A JP3946446B2 MXPA01011848A US6358187B1 US2002155925A1 US6913559B2 WO0069523A1	05 December 2000 (05-12-2000) 11 December 2003 (11-12-2003) 23 November 2000 (23-11-2000) 13 September 2005 (13-09-2005) 27 March 2002 (27-03-2002) 22 April 2009 (22-04-2009) 24 December 2002 (24-12-2002) 18 July 2007 (18-07-2007) 04 September 2003 (04-09-2003) 19 March 2002 (19-03-2002) 24 October 2002 (24-10-2002) 05 July 2005 (05-07-2005) 23 November 2000 (23-11-2000)
US6119271A	19 September 2000 (19-09-2000)	KR200167691Y1	15 February 2000 (15-02-2000)
US2627676A	10 February 1953 (10-02-1953)		
FR2769801A1	23 April 1999 (23-04-1999)	FR2769801B1	17 December 1999 (17-12-1999)
US2009113760A1	07 May 2009 (07-05-2009)		
US8079159B1	20 December 2011 (20-12-2011)	USD677869S US2012137544A1 US8938889B2 WO2013095709A2 WO2013095709A3	19 March 2013 (19-03-2013) 07 June 2012 (07-06-2012) 27 January 2015 (27-01-2015) 27 June 2013 (27-06-2013) 01 May 2014 (01-05-2014)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CA2017/050874

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US2014013617A1	16 January 2014 (16-01-2014)	EP2684479A2	15 January 2014 (15-01-2014)
		EP2684479A3	16 April 2014 (16-04-2014)
US2014317959A1	30 October 2014 (30-10-2014)	US9357812B2	07 June 2016 (07-06-2016)
		AU2003250510B2	12 June 2008 (12-06-2008)
		CA2495723C	24 May 2011 (24-05-2011)
		CN100467006C	11 March 2009 (11-03-2009)
		EP1964485 B1	10 October 2012 (10-10-2012)
		KR101189471B1	12 October 2012 (12-10-2012)
		N0325642B1	30 June 2008 (30-06-2008)
		RU2343946C2	20 January 2009 (20-01-2009)
		US6979287B2	27 December 2005 (27-12-2005)
		US7101330B2	05 September 2006 (05-09-2006)
		US8758207B2	24 June 2014 (24-06-2014)
		US9055788B2	16 June 2015 (16-06-2015)
		WO2004016321A2	26 February 2004 (26-02-2004)
WO2009152456A2	17 December 2009 (17-12-2009)	WO2009152456A3	04 February 2010 (04-02-2010)
		CA2827683C	09 February 2016 (09-02-2016)
		CA2827684C	27 September 2016 (27-09-2016)
		CN103476283B	20 January 2016 (20-01-2016)
		CN103476284B	25 November 2015 (25-11-2015)
		CN103476335B	09 June 2017 (09-06-2017)
		EP2330937B1	16 November 2016 (16-11-2016)
		EP2675310B1	04 January 2017 (04-01-2017)
		EP2675312B1	18 January 2017 (18-01-2017)
		JP5805218B2	04 November 2015 (04-11-2015)
		JP5852141B2	03 February 2016 (03-02-2016)
		JP5899247B2	06 April 2016 (06-04-2016)
		JP5925490B2	25 May 2016 (25-05-2016)
		JP6140778B2	31 May 2017 (31-05-2017)
		JP6194041B2	06 September 2017 (06-09-2017)
		KR101608481B1	01 April 2016 (01-04-2016)
		KR101618841B1	10 May 2016 (10-05-2016)
		KR101734473B1	12 May 2017 (12-05-2017)
		KR101754997B1	06 July 2017 (06-07-2017)
		US8676541B2	18 March 2014 (18-03-2014)
		US9002680B2	07 April 2015 (07-04-2015)
		US9089182B2	28 July 2015 (28-07-2015)
		US9279734B2	08 March 2016 (08-03-2016)
		US9297709B2	29 March 2016 (29-03-2016)
		US9410857B2	09 August 2016 (09-08-2016)
		US9462844B2	11 October 2016 (11-10-2016)
		US9622537B2	18 April 2017 (18-04-2017)
		WO2012112930A1	23 August 2012 (23-08-2012)
		WO2012112931A2	23 August 2012 (23-08-2012)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CA2017/050874

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
WO2006056931A1	01 June 2006 (01-06-2006)	AT392873T	15 May 2008 (15-05-2008)
		AU2005308493A1	01 June 2006 (01-06-2006)
		CA2589170A1	01 June 2006 (01-06-2006)
		CA2589170C	28 October 2014 (28-10-2014)
		DE602005006323D1	05 June 2008 (05-06-2008)
		DE602005006323T2	12 March 2009 (12-03-2009)
		DK1833434T3	25 August 2008 (25-08-2008)
		EP1833434A1	19 September 2007 (19-09-2007)
		EP1833434B1	23 April 2008 (23-04-2008)
		ES2307213T3	16 November 2008 (16-11-2008)
		ITRM20040573A1	23 February 2005 (23-02-2005)
		JP2008520323A	19 June 2008 (19-06-2008)
		PT1833434E	31 July 2008 (31-07-2008)
		US2009188129A1	30 July 2009 (30-07-2009)
EP1731050A1	13 December 2006 (13-12-2006)	US2006277801A1	14 December 2006 (14-12-2006)
WO2007060499A1	31 May 2007 (31-05-2007)	AU2005338575A1	31 May 2007 (31-05-2007)
		CA2630627A1	31 May 2007 (31-05-2007)
		EP1956933A1	20 August 2008 (20-08-2008)
		US2009025255A1	29 January 2009 (29-01-2009)
WO2012106803A1	16 August 2012 (16-08-2012)	CA2863067A1	16 August 2012 (16-08-2012)
		US2013318818A1	05 December 2013 (05-12-2013)
US2012277077A1	01 November 2012 (01-11-2012)	TWM416484U	21 November 2011 (21-11-2011)
US2007275827A1	29 November 2007 (29-11-2007)	None	
US2012164202A1	28 June 2012 (28-06-2012)	EP2654431A2	30 October 2013 (30-10-2013)
		EP2654431A4	04 March 2015 (04-03-2015)
		KR20140038357A	28 March 2014 (28-03-2014)
		RU2013134414A	27 January 2015 (27-01-2015)
		US2014205640A1	24 July 2014 (24-07-2014)
		WO2012088377A2	28 June 2012 (28-06-2012)
		WO2012088377A3	29 November 2012 (29-11-2012)
US4351526A	28 September 1982 (28-09-1982)	US4627618A	09 December 1986 (09-12-1986)
US2009275447A1	05 November 2009 (05-11-2009)	US2009275448A1	05 November 2009 (05-11-2009)
US2010043113A1	25 February 2010 (25-02-2010)		
US2001052710A1	20 December 2001 (20-12-2001)		

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CA2017/050874

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US2011256992A1	20 October 2011 (20-10-2011)	US8777816B2	15 July 2014 (15-07-2014)
CA2295346A1	04 December 2000 (04-12-2000)	CA2295346C US6219850B1 US6434755B1	05 December 2006 (05-12-2006) 24 April 2001 (24-04-2001) 20 August 2002 (20-08-2002)
US2014033402A1	06 February 2014 (06-02-2014)	CN103564936A EP2692259A1 FR2994061A1 FR2994061B1 JP2014031606A KR20140017451A RU2013136042A	12 February 2014 (12-02-2014) 05 February 2014 (05-02-2014) 07 February 2014 (07-02-2014) 27 March 2015 (27-03-2015) 20 February 2014 (20-02-2014) 11 February 2014 (11-02-2014) 10 February 2015 (10-02-2015)
US5077837A	07 January 1992 (07-01-1992)	None	
US4250578A	17 February 1981 (17-02-1981)	None	
US4150442A	24 April 1979 (24-04-1979)	None	
US2009139005A1	04 June 2009 (04-06-2009)	US8156572B2 EP2823722A1 USD683934S USD703919S US2010017931A1 US8375465B2 US2013305427A1 US9301554B2 US2011302687A1 US2013152265A1 US2013298302A1	17 April 2012 (17-04-2012) 14 January 2015 (14-01-2015) 11 June 2013 (11-06-2013) 06 May 2014 (06-05-2014) 28 January 2010 (28-01-2010) 19 February 2013 (19-02-2013) 21 November 2013 (21-11-2013) 05 April 2016 (05-04-2016) 15 December 2011 (15-12-2011) 20 June 2013 (20-06-2013) 14 November 2013 (14-11-2013)
WO2007120584A2	25 October 2007 (25-10-2007)	WO2007120584A3 US2010004099A1 US8123663B2 US2012178598A1 US2013095987A1	24 January 2008 (24-01-2008) 07 January 2010 (07-01-2010) 28 February 2012 (28-02-2012) 12 July 2012 (12-07-2012) 18 April 2013 (18-04-2013)
US2008022431A1	31 January 2008 (31-01-2008)	US7784116B2	31 August 2010 (31-08-2010)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CA2017/050874

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US2005081277A1	21 April 2005 (21-04-2005)	US7100216B2 CA2484680A1 CA2484 680C EP1523898A1 JP2005120565A	05 September 2006 (05-09-2006) 15 April 2005 (15-04-2005) 26 August 2008 (26-08-2008) 20 April 2005 (20-04-2005) 12 May 2005 (12-05-2005)
WO2012158406A1	22 November 2012 (22-11-2012)	CA2836406A1 CA2836406C CN103648317A CN103648317B CN103862794A CN103862794B EP2709478A1 EP2709478B1 US2012291946A1 US8764931B2	22 November 2012 (22-11-2012) 21 June 2016 (21-06-2016) 19 March 2014 (19-03-2014) 22 April 2015 (22-04-2015) 18 June 2014 (18-06-2014) 06 July 2016 (06-07-2016) 26 March 2014 (26-03-2014) 26 October 2016 (26-10-2016) 22 November 2012 (22-11-2012) 01 July 2014 (01-07-2014)
US2014345032A1	27 November 2014 (27-11-2014)	None	
WO2011150166A2	01 December 2011 (01-12-2011)	WO2011150166A3 CA2800954A1 EP2575524A2 US2013145521A1	12 April 2012 (12-04-2012) 01 December 2011 (01-12-2011) 10 April 2013 (10-04-2013) 13 June 2013 (13-06-2013)
US2006026740A1	09 February 2006 (09-02-2006)	US7346936B2	25 March 2008 (25-03-2008)
KR20050091896	15 September 2005 (15-09-2005)	None	
EP1444910A1	11 August 2004 (11-08-2004)	EP1444910B1 AT324809T DE602004000766D1 ES2264044T3 ITM120030181A1 PT1444910E	03 May 2006 (03-05-2006) 15 June 2006 (15-06-2006) 08 June 2006 (08-06-2006) 16 December 2006 (16-12-2006) 05 August 2004 (05-08-2004) 29 September 2006 (29-09-2006)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2017/050874

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
US2005177085A1	11 August 2005 (11-08-2005)	None	
DE102009029501A1	21 April 2011 (21-04-2011)	DE102009029501B4	02 October 2014 (02-10-2014)
US5048369A	17 September 1991 (17-09-1991)	FR2663604A3 FR2663604B3	27 December 1991 (27-12-1991) 17 July 1992 (17-07-1992)
US4759136A	26 July 1988 (26-07-1988)	None	
JP2012245168A	13 December 2012 (13-12-2012)	None	
US2010036306A1	11 February 2010 (11-02-2010)	US7918811B2 CN101642292B EP2151170A1 JP5764177B2	05 April 2011 (05-04-2011) 22 October 2014 (22-10-2014) 10 February 2010 (10-02-2010) 12 August 2015 (12-08-2015)