



(51) International Patent Classification:

A63B 22/00 (2006.01) A63B 22/18 (2006.01)
A63B 22/16 (2006.01) A63B 26/00 (2006.01)

(21) International Application Number:

PCT/US2017/018088

(22) International Filing Date:

16 February 2017 (16.02.2017)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/298,163 22 February 2016 (22.02.2016) US

(71) Applicant: NAUTILUS, INC. [US/US]; 17750 SE 6TH Way, Vancouver, Washington 98683 (US).

(72) Inventor: POLINSKY, Glenn W.; 4416 SE 185th Court, Vancouver, Washington 98683 (US).

(74) Agents: GILLELAND, Justin G. et al.; Dorsey & Whitney LLP, 1400 Wewatta Street, Suite 400, Denver, Colorado 80202 (US).

(81) Designated States (unless otherwise indicated, for every

kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA,

MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every

kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

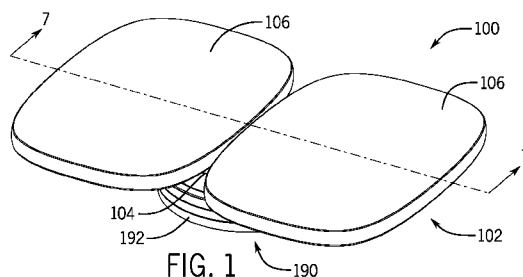
Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(54) Title: BALANCE TRAINING DEVICE



(57) Abstract: A balance training device is provided. The balance training device may include a rail, a plurality of foot supports slidably coupled to the rail, and at least one balance pad connected to the rail to provide a degree of angular instability. The balance training device may include an adjustment mechanism associated with the rail and each foot support to selectively position each foot support in a desired position along the longitudinal length of the rail. The balance training device may include a base including an adjustable height dimension to provide increasing levels of balance difficulty.

BALANCE TRAINING DEVICE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of priority under 35 USC 119(e) of U.S. Provisional Patent Application No. 62/298,163 filed 22 February 2016 and entitled "Balance Training Device," which is hereby incorporated herein in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates generally to physical fitness and personal training and more specifically to devices and systems for balance training.

BACKGROUND

[0003] Various devices and systems exist to perform a variety of fitness and balance training exercises. These devices and systems, however, do not provide sufficient selective control by the user, user feedback, and/or user tracking.

[0004] It is therefore desirable to provide an improved balance training device that addresses at least in part the above described problems and/or which more generally offers improvements or an alternative to existing arrangements.

SUMMARY

[0005] The present disclosure generally provides a balance training device. The balance training device provides a range of angular instability to improve a user's balance. The balance training device is expandable to vary the degree of instability as desired. For example, the balance training device may include a plurality of foot supports that move relative to one another to vary the foot stance and/or angular tipping of the device. Additionally or alternatively, a user may select from a variety of balance pads providing differing degrees of curvature. In some embodiments, the balance training device may include a sensing device that allows a user to measure their balance and track their balance ability and improvement over time. The sensing device may be received within a compartment during use and/or storage of the balance training device.

[0006] Embodiments of the present disclosure may include a balance training device. The balance training device may include a rail including a longitudinal length, a plurality of foot supports slidably connected to the rail, an adjustment mechanism associated with each foot

support and the rail to selectively lock each foot support in a plurality of positions along the length of the rail, and at least one balance pad connected to the rail and including a convex bottom surface to provide a degree of angular instability. The rail may include opposing first and second side ends and opposing front and rear longitudinal edges. The longitudinal length of the rail may be defined between the opposing first and second side ends. The rail may include a width defined between the opposing front and rear longitudinal edges and transverse to the longitudinal length.

[0007] Embodiments of the present disclosure may include a balance training device. The balance training device may include an elongate rail including a longitudinal length, a plurality of foot supports coupled to the rail and configured to slide at least partially along the length of the rail, and a base engaging a support surface. The base may include an adjustable height dimension configured to provide increasing levels of balance difficulty.

[0008] Embodiments of the present disclosure may include a method of expanding a balance board. The method may include slidably coupling a plurality of foot supports along a longitudinal length of a rail member, positioning the plurality of foot supports in a first position to provide a first degree of balance instability, and sliding the plurality of foot supports along the longitudinal length of the rail to a second position. The second position may provide a second degree of balance instability.

[0009] Additional embodiments and features are set forth in part in the description that follows, and will become apparent to those skilled in the art upon examination of the specification and drawings or may be learned by the practice of the disclosed subject matter. A further understanding of the nature and advantages of the present disclosure may be realized by reference to the remaining portions of the specification and the drawings, which forms a part of this disclosure.

[0010] One of skill in the art will understand that each of the various aspects and features of the disclosure may advantageously be used separately in some instances, or in combination with other aspects and features of the disclosure in other instances. Accordingly, while the disclosure is presented in terms of embodiments, it should be appreciated that individual aspects of any embodiment can be claimed separately or in combination with aspects and features of that embodiment or any other embodiment. The present disclosure of certain embodiments is merely exemplary in nature and is in no way intended to limit the claimed invention or its applications or uses. It is to be understood that other embodiments may be

utilized and that structural and/or logical changes may be made without departing from the spirit and scope of the present disclosure.

[0011] The present disclosure is set forth in various levels of detail in this application and no limitation as to the scope of the claimed subject matter is intended by either the inclusion or non-inclusion of elements, components, or the like in this summary. In certain instances, details that are not necessary for an understanding of the disclosure or that render other details difficult to perceive may have been omitted. Moreover, for the purposes of clarity, detailed descriptions of certain features will not be discussed when they would be apparent to those with skill in the art so as not to obscure the description of the present disclosure. It should be understood that the claimed subject matter is not necessarily limited to the particular embodiments or arrangements illustrated herein, and the scope of the present disclosure is defined only by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The description will be more fully understood with reference to the following figures in which components may not be drawn to scale, which are presented as various embodiments of the exercise machine described herein and should not be construed as a complete depiction of the scope of the exercise machine.

[0013] Fig. 1 is a top isometric view of a balance training device in a collapsed configuration.

[0014] Fig. 2 is a top isometric view of the balance training device of Fig. 1 in an expanded configuration.

[0015] Fig. 3 is a bottom isometric view of the balance training device of Fig. 1 in a collapsed configuration.

[0016] Fig. 4 is a bottom isometric view of the balance training device of Fig. 1 in an expanded configuration.

[0017] Fig. 5 is a top exploded view of the balance training device of Fig. 1.

[0018] Fig. 6 is a bottom exploded view of the balance training device of Fig. 1.

[0019] Fig. 7 is a cross-sectional view of the balance training device of Fig. 1 taken along line 7-7 of Fig. 1.

[0020] Fig. 8 is a cross-sectional view of the balance training device of Fig. 1 taken along line 8-8 of Fig. 2.

[0021] Fig. 9 is an elevation view of the balance training device of Fig. 1 including one balance pad.

[0022] Fig. 10 is an elevation view of the balance training device of Fig. 1 including two balance pads.

[0023] Fig. 11 is an elevation view of the balance training device of Fig. 1 including three balance pads.

[0024] Fig. 12 is a top isometric view of an additional balance training device in a collapsed configuration.

[0025] Fig. 13 is a top isometric view of the balance training device of Fig. 12 in an expanded configuration.

[0026] Fig. 14 is an exploded view of the balance training device of Fig. 12.

[0027] Fig. 15 is a cross-sectional view of the balance training device of Fig. 12 taken along line 15-15 of Fig. 12.

[0028] Fig. 16 is a cross-sectional view of the balance training device of Fig. 12 taken along line 16-16 of Fig. 13.

[0029] Fig. 17 is an elevation view of the balance training device of Fig. 12 including one balance pad.

[0030] Fig. 18 is an elevation view of the balance training device of Fig. 12 including two balance pads.

[0031] Fig. 19 is an elevation view of the balance training device of Fig. 12 including three balance pads.

[0032] Fig. 20 is a top isometric view of an additional balance training device in a collapsed configuration.

[0033] Fig. 21 is a top isometric view of the balance training device of Fig. 20 in an expanded configuration.

[0034] Fig. 22 is a bottom isometric view of the balance training device of Fig. 20 in a collapsed configuration.

DETAILED DESCRIPTION

[0035] Figs. 1-11 illustrate an exemplary embodiment of a balance training device 100 including at least one adjustment mechanism 102 operable to provide a variable degree of angular instability to the balance training device 100. As detailed below, the adjustment mechanism(s) 102 may permit the balance training device 100 to selectively expand or collapse to provide a desired functional characteristic. For example, as provided herein, the expandable nature of the balance training device 100 may allow a user to customize the size and/or function

of the balance training device 100. In one embodiment, the balance training device 100, which may be referred to as a balance board, may be selectively expanded or collapsed to provide a varied foot placement, a varying dimensional size, or the like, as more fully explained in detail below. Additionally, a more collapsed version may allow for varying amount of angular tipping to provide more instability compared to a more expanded version due at least in part to a narrower foot stance, increased angular tipping, etc. Additionally or alternatively, a more collapsed version may allow for easier transport (e.g., within a bag or case) and may permit a user to perform both one-footed and two-footed balance exercises. In some embodiments, the balance training device 100 may be expanded or collapsed to adjust the balance training device 100 to a particular body size (e.g., child vs. adult).

[0036] Referring to Figs. 1-4, an embodiment of the balance training device 100 may include an elongated rail 104 to which a plurality of foot supports 106 may be slidably connected. As may be seen in Figs. 5 and 6, the rail 104, which may be referred to as a rail member, may include a top surface 108 (see Fig. 5), a bottom surface 110 (see Fig. 6), opposing first and second side ends 112, 114, and opposing front and rear longitudinal edges 116, 118. The rail 104 may be shaped quadrilaterally and may include a longitudinal length L and a transverse width W. As shown, the longitudinal length L of the rail 104 is defined between its first and second side ends 112, 114. In such embodiments, the transverse width W of the rail 104 is defined between its front and rear longitudinal edges 116, 118. In some embodiments, the length L of the rail 104 may be greater than its width W such that the rail 104 may be considered rectangular. Rails of other shapes may be suitable, including those where the front and rear longitudinal edges 116, 118 are at least partially non-linear. In one embodiment, the rail 104 may include a thickness T that is substantially less than its length L or its width W such that the rail 104 may be considered to have a thin profile.

[0037] As explained in more detail below, the size and shape of the rail 104 may provide, in combination with the foot supports 106, a desired aesthetic and/or functional characteristic of the balance training device 100. For example, the rail 104 may include a track 130 defined in its top surface 108. As shown, the track 130 is formed along at least a portion of the length L of the rail 104 (e.g., the entirety of the length L) between the first and second side ends 112, 114. The track 130 may include a depth less than the thickness T of the rail 104 such that the rail 104 is substantially U-shaped in cross section. In some embodiments, the cross-section of the rail 104 may be closed-shaped to define a cavity 132 therein for at least the purposes explained below. Referring to Figs. 5 and 6, each of the front and rear longitudinal edges 116, 118 may

be curvilinear along the thickness T of the rail 104 to facilitate attachment of the foot supports 106 to the rail 104, as explained more fully hereafter. For example, each of the front and rear longitudinal edges 116, 118 may include a contoured, such as curved or angled, outer surface 134 operable to couple the foot supports 106 to the rail 104.

[0038] With continued reference to Figs. 5 and 6, the rail 104 may include a plurality of end caps 160, such as a pair of end caps 160. As illustrated, each end cap 160 is positioned adjacent an end (e.g., one of the first and second side ends 112, 114) of the rail 104. In some embodiments, each end cap 160 may close the associated end of the rail 104, such as the cavity 132. Each end cap 160 may be sized and shaped to complement the cross-sectional shape of the rail 104. For instance, each end cap 160 may be substantially U-shaped in cross section and may be sized to sit substantially flush with the bottom surface 110 and the front and rear longitudinal edges 116, 118 of the rail 104 (see Figs. 3 and 4). As seen in Figs. 7 and 8, the rail 104 may include a ridge 164, in this example formed on the end cap 160, extending above the bottom of the track 130 of the rail 104. As described hereinafter, each ridge 164 may engage an associated adjustment mechanism 102 to facilitate locking of the adjustment mechanisms 102 in defined positions. Though shown and described as part of the end cap 160, the ridge 164 may be formed elsewhere on the rail 104, such as not part of the end cap 160, anywhere within the track 130 of the rail, or the like. For purposes of illustration only, the ridge 164 is described as part of the end cap 160 hereinafter.

[0039] With continued reference to Figs. 5 and 6, the balance training device 100 in some embodiments may include first and second foot supports 136, 138 slidably connected to the rail 104 at least partially along the length L of the rail 104. As shown, each of the first and second foot supports 136, 138 may include a support plate 140 and a plurality of elongated retaining members 142 operable to couple each foot support 106 to the rail 104, as explained below. Each support plate 140 may include an upper surface 144 (see Fig. 5) and an underside 146 (see Fig. 6) collectively defining a length L_{FS} and a transverse width W_{FS} of the foot support 106 (see Fig. 5). In some embodiments, the length L_{FS} and the width W_{FS} of the support plate 140 may extend along the length L and the width W of the rail 104, respectively. The support plate 140 may be elongate such that one of the length L_{FS} and the width W_{FS} is greater than the other of the length L_{FS} and the width W_{FS} . For example, in the embodiment of Fig. 12, the width W_{FS} of the support plate 140 may be greater than its length L_{FS} , though the reverse may be true in other embodiments. In some embodiments, the length L_{FS} and the width W_{FS} of the support plate 140 may be dimensioned to match (or approximately match) the size of a user's foot or

shoe. For example, the length L_{FS} of the support plate 140 may be in the range of approximately 4 inches to approximately 12 inches, and the width W_{FS} of the support plate 140 may be in the range of approximately 8 inches to approximately 20 inches. The upper surface 144 of each foot support 106 may provide a gripping surface to limit slipping of a user's hand and/or feet when placed on the balance training device 100. In some embodiments, a pad may be secured (e.g., adhered) to the upper surface 144 of the support plate 140 to provide a desired look, feel, gripping feature, or cushioning characteristic. As shown, the upper surface 144 is substantially planar and may include any number of cross-sectional shapes, including round or elliptical (see Figs. 1 and 12), semi-circular (see Fig. 20), ovate, square, rectangular, polygonal, or the like. In some embodiments, the foot supports 106 may be sized and shaped to complement one another. For example, in the embodiment shown in Fig. 20-22, the first and second foot supports 136, 138 may be sized and shaped such that when the foot supports 106 are positioned adjacent each other, a generally uninterrupted and continuous periphery of the balance training device 100 is defined. As best seen in Figs. 3, 4, and 6, the underside 146 of each support plate 140 may include a cellular structure 148 to simultaneously decrease weight and provide increased rigidity of the support plate 140.

[0040] To secure each foot support 106 to the rail 104, a plurality of retaining members 142 may be connected to the underside 146 of each support plate 140, such as through fasteners, adhesive, heat or sonic welding, corresponding engagement features, or the like. As illustrated in Figs. 5 and 6, each retaining member 142 may be an elongate member including an engagement surface 150. The engagement surface 150 may be shaped to complement the contoured outer surfaces 134 of the front and rear longitudinal edges 116, 118. The retaining members 142 are coupled to the underside 146 of each support plate 140 in a substantially parallel relationship. As explained below, the engagement surfaces 150 of opposing retaining members 142 may face one another to facilitate attachment of each foot support 106 to the rail 104. For example, as illustrated in Figs. 3 and 4, the retaining members 142 may be spaced apart along the width W_{FS} of each foot support 106 to receive the rail 104 therebetween. In some embodiments, the width W of the rail 104 may be captured substantially between the retaining members 142 (e.g., between the engagement surfaces 150 of opposing retaining members 142) to slidably couple each foot support 106 to the rail 104. In this manner, the retaining members 142 attached to the underside 146 of each support plate 140 form a channel 152 extending at least partially along the length L_{FS} of each foot support 106 (see Figs. 3 and 4).

[0041] As illustrated, at least a portion of the rail 104 may be slidably received within the channel 152 to secure each foot support 106 to the rail 104. The channel 152 formed by the retaining members 142 (e.g., the engagement surfaces 150 of the retaining members 142) slidably receives the rail 104, with the front and rear longitudinal edges 116, 118 of the rail 104 mating with the engagement surfaces 150 of the retaining members 142. For example, the matching contoured shapes of the engagement surfaces 150 of the retaining members 142 substantially capture the rail 104 to retain the rail 104 within the channel 152 and allow the rail 104 to slide along the channel 152. Additionally or alternatively, the matching contoured shapes of the outer surfaces 134 of the rail and the engagement surfaces 150 of the retaining members 142 maintain alignment between each foot support 106 and the rail 104 to at least limit binding and facilitate smooth motion of the rail 104 along the channel 152. In this manner, each foot support 106 may slide along at least a portion of the length L of the rail 104 to, for example, expand and collapse the balance training device 100, as detailed more fully below. Though two long retaining members 142 are shown attached to the underside 146 of each support plate 140, each foot support 106 may include a series of shorter, parallel positioned retaining members 142 without departing from the spirit and scope of the present disclosure.

[0042] Referring now to Figs. 3 and 4, the adjustment mechanisms 102 to selectively position each foot support 106 in a plurality of positions along the length L of the rail 104 may be associated with the rail 104 and the foot supports 106. For example, the adjustment mechanisms 102 may form a releasable connection structure between the rail 104 and the foot supports 106 to selectively lock the balance training device 100 in at least a collapsed configuration (see Figs. 1 and 3) and an expanded configuration (see Figs. 2 and 4). In the collapsed configuration, the first and second foot supports 136, 138 may be positioned adjacent each other, such as in an abutting relationship. In the expanded configuration, the first and second foot supports 136, 138 may be positioned in a horizontally-spaced relationship with each other along the length L of the rail 104 such that a gap G is defined between the first and second foot supports 136, 138. As explained below, the adjustment mechanisms 102 may be operable to position the first and second foot supports 136, 138 relative to each other to vary the gap G therebetween.

[0043] With reference to Figs. 3-8, each adjustment mechanism 102 may include a latch member 162 associated with one of the end caps 160 and one of the foot supports 106. As shown in Figs. 3, 4, and 6, each latch member 162 may engage (e.g., be connected to) the underside 146 of the support plates 140. For example, each latch member 162 may be

attached to the underside 146 of the support plates 140, such as through mechanical fasteners. In some embodiments, each latch member 162 may be attached to an associated support plate 140 in a manner that allows movement of at least a portion of the latch member 162 towards or away from the underside 146 of the support plates 162, as explained below. As illustrated, each latch member 162 may include a plurality of engagement structures 166, such as slots, defining the positions in which the foot supports 106 may be selectively locked. In such embodiments, each of the engagement structures 166 may engage the ridge 164, which limits translational movement of the foot supports 106 along the length L of the rail 104. In some embodiments, the latch members 162 may take the form of a leaf spring connected to the underside 146 of the support plates 140. In such embodiments, each latch member 162 may be attached to the underside 146 of the support plates 140 substantially along the midline of the latch member 162, such as through mechanical fasteners, in a manner that allows the engagement structures 166 to disengage the ridge 164. For example, the latch members 162 may be connected to the support plates 140 in a manner to facilitate movement of a portion of each latch member 162 away from the end cap 160 and towards the underside 146 of the support plate 140 to disengage the engagement structures 166 from the ridge 164, as detailed more fully below.

[0044] With reference to Figs. 5 and 6, each latch member 162 may include opposing first and second portions 168, 170. As explained below, the first portion 168 may be operable to position each foot support 106 in a first position, such as a collapsed position, and the second portion 170 may be operable to position each foot support 106 in a second position, such as an expanded position. For example, the first and second portions 168, 170 may include first and second engagement structures 172, 174, respectively, which in some embodiments may be substantially identical in form and function. As may be seen in Figs. 7 and 8, each of the first and second engagement structures 172, 174 may include a groove 176 defined by opposing ridges 178 extending from the latch member 162. In such embodiments, the groove 176 may be sized for receipt of at least a portion of the ridge 164 to engage the latch member 162 and the rail 104 together and limit translational movement of the foot supports 106 along the length L of the rail 104 to define the selectable positions of the foot supports 106.

[0045] With continued reference to Figs. 7 and 8, one of the opposing ridges 178 (e.g., an inner ridge) may define a ramp 180 on each of the first and second portions 168, 170 of the latch member 162 to facilitate automatic receipt of the end cap 160 within the groove 176 of an associated engagement structure 166, as detailed below. In some embodiments, each of the first and second portions 168, 170 may include a grip portion 182 for engagement by a user to

release the first and second engagement structures 172, 174 and permit the foot supports 106 to slide along the rail 104 (see Figs. 3 and 4).

[0046] Referring to Figs. 1-4, 7, and 8, a user may actuate the adjustment mechanisms 102 to convert the balance training device 100 between expanded and collapsed positions to provide a desired functional characteristic. To expand the balance training device 100, a user may depress the grip portion 182 of the first portion 168 of the latch member 162 to decouple the first engagement structures 172 of the adjustment mechanisms 102. For example, the first portion 168 of the latch member 162 may resiliently bend to permit sufficient disengagement of the ridge 164 from the groove 176 of each first engagement structure 172. Once the ridge 164 disengages the first engagement structure 172 (e.g., the inner ridge of the first engagement structure 172), the user may then slide the associated foot support 106 outwardly along the length L of the rail 104 until the second engagement structure 174 locks the foot support 106 in place. In this manner, the first engagement structure 172 of the latch member 162 may line up with the ridge 164 when the foot support 106 is in an inner or collapsed position, and the second engagement structure 174 of the latch member 162 may line up with the ridge 164 when the foot support 106 is in an outer or expanded position. To facilitate engagement of the ridge 164 with the second engagement structure 174, the ramp 180 of the second portion 170 of the latch member 162 may cause the second portion 170 to resiliently bend towards the support plates 140 as the user pulls the foot supports 106 outwardly. Once the ridge 164 clears the inner ridge of the second engagement structure 174, the latch member 162 may automatically bias the second portion 170 towards the end cap 160 to seat the ridge 164 within the groove 176 of the second engagement structure 174. When the balance training device 100 is in an expanded configuration, a user may perform a variety of balance training exercises, such as placing one foot on each of the foot supports 106 to perform two-footed balance training exercises.

[0047] Collapsing the balance training device 100 may be accomplished in substantially reverse order from that described above. To collapse the balance training device 100, a user may depress the grip portion 182 of the second portion 170 of the latch member 162 to decouple the second engagement structure 174 of the adjustment mechanisms 102. In such embodiments, the second portion 170 of the latch member 162 resiliently bends to sufficiently remove the end cap 160 from the groove 176 of the second engagement structure 174. Once the end cap 160 clears the second engagement structure 174 (e.g., the inner ridge of the second engagement structure 174), the user may then slide each foot support 106 inwardly along the length L of the rail 104 until the first engagement structure 172 locks each foot support

106 in place, such as through at least partial receipt of the end cap 160 within the groove 176 of the first engagement structure 172. Similar to the description above, the angled nature of the ramp 180 of the first portion 168 of the latch member 162 may cause the first portion 168 to resiliently bend as the user pushes the foot supports inwardly. Once the ridge 164 clears the inner ridge of the first engagement structure 172, the latch member 162 automatically biases the first portion 168 towards the end cap 160 to seat the ridge 164 within the groove 176 of the first engagement structure 172. When the balance training device 100 is in a collapsed configuration, a user may place one foot on each of the foot supports 106 to perform two-footed balance training exercises. Additionally or alternatively, the user may place one foot across the first and second foot supports 136, 138 to perform one-footed balance training exercises.

[0048] Though shown and described as moving between two positions, the adjustment device may be configured such that the foot supports 106 move between any number of positions by, for example, providing additional engagement structures 166. In some embodiments, each foot support 106 may slide along the length L of the rail 104 between about 60 mm and about 100 mm (e.g., about 80 mm) between expanded and collapsed positions, though the balance training device 100 may support more or less movement depending on the size and shape of the rail 104, the foot supports 106, and the adjustment mechanisms 102. Because each foot support 106 includes an adjustment mechanism 102, the foot supports 106 may be positioned along the rail 104 independently from one another to customize the balance characteristics of the balance training device 100. For example, one of the first and second foot supports 136, 138 may be positioned in a first position along the rail while the other of the first and second foot supports 136, 138 may be positioned in a second position along the rail. In some embodiments, the first and second positions may be equivalent such that both the first and second foot supports 136, 138 are in the same position relative to the center of the rail 104 to provide symmetrical placement of the first and second foot supports 136, 138 along the rail 104. However, it is contemplated that the first and second positions may be different such that the first and second foot supports 136, 138 are in different positions relative to the center of the rail 104 to provide asymmetrical placement of the first and second foot supports 136, 138 along the rail 104.

[0049] Referring now to Figs. 1-11, the balance training device 100 may include a base 190 configured to provide increasing levels of balance difficulty by, for example, adjusting a height dimension of the rail 104 above a support surface. For example, the balance training device 100 may include at least one balance pad 192 connected to the rail 104 (e.g., to the bottom

surface 110 of the rail 104) to provide a desired height and/or a desired angular instability of the balance training device 100. In some embodiments, the balance training device 100 may include a plurality of balance pads 192, each of the balance pads 192 including a convex bottom surface 194 to provide a degree of angular instability (see Fig. 6). As illustrated in Figs. 5 and 6, the balance pads 192 may be connected together serially or sequentially, such as in a vertically stacked, or layered, configuration, to create a balance pad stack 196 of varying height. As explained below, the serial or sequential connection means allows the balance pads 192 to be easily and/or quickly connected together to provide a desired level of balance difficulty. For example without limitation, the convex bottom surfaces 194 of each successively-connected balance pad 192 may decrease in radius. Additionally or alternatively, increasing the height of the balance pad stack 196 by adding additional balance pads 192 thereto may provide increasing balance difficulty by increasing the angle through which the balance training device 100 may be tilted during balance training exercises. In this manner, users may add or change balance pads 192 as their ability improves.

[0050] As shown in Figs. 9-11, the plurality of balance pads 192 may include a first balance pad 198 having a first bottom surface radius R_1 , a second balance pad 200 having a second bottom surface radius R_2 , a third balance pad 202 having a third bottom surface radius R_3 , and so on. In such embodiments, the first bottom surface radius R_1 may be greater than the second bottom surface radius R_2 , the second bottom surface radius R_2 may be greater than the third bottom surface radius R_3 , and so on. For instance, the first bottom surface radius R_1 may be between about 600 mm and about 900 mm (e.g., about 770 mm), the second bottom surface radius R_2 may be between about 400 mm and about 600 mm (e.g., about 480 mm), and the third bottom surface radius R_3 may be between about 100 mm and about 400 mm (e.g., about 270 mm). In such embodiments, the decreasing bottom surface radii of the first, second, and third balance pads 198, 200, 202 may provide increasing levels of balance difficulty by increasing the ability of the balance training device 100 to tilt. As shown, each of the first, second, and third balance pads 198, 200, 202 may be dish-shaped having a generally circular cross-section, though other cross-sections are contemplated including polygonal and elliptical, for instance.

[0051] Referring to Figs. 5 and 6, the balance pads 192 may be layered together in a set order to create the balance pad stack 196. For instance, in one embodiment, the second balance pad 200 may connect (e.g., exclusively) to the first balance pad 198, the third balance pad 202 may connect (e.g., exclusively) to the second balance pad 200, and so on. In such

embodiments, the second and third balance pads 200, 202 may include a plurality of posts 204 sized and shaped to be releasably secured within a plurality of recesses 206 formed in the bottom surfaces 194 of the first and second balance pads 198, 200, respectively. For example, the engagement between the posts 204 and the recesses 206 may define a detent structure (e.g., ribs and grooves, etc.) or may create an interference fit between the elements, such as an enlarged post 204 at least partially compressed within a smaller recess 206. To connect the balance pads 192 to the rail 104, the balance training device 100 may include a connection plate 208 connected to the bottom surface 110 of the rail 104. In such embodiments, the first balance pad 198 may connect (e.g., exclusively) to the connection plate 208 in any suitable manner. For example without limitation, the connection plate 208 may include a circumferential rib 210 extending annularly outward from the connection plate 208. To connect the first balance pad 198 to the connection plate 208, the first balance pad 198 may include an undercut defining a circumferential groove 212 in which the circumferential rib 210 of the connection plate 208 is received (see Fig. 5). In some embodiments, the first balance pad 198 may be releasably secured to the connection plate 208, though it is contemplated that the connection may be permanent in nature. In some embodiments, the connection plate 208 may be rotatably mounted to the bottom surface 110 of the rail 104. In such embodiments, the connection plate 208 may rotate about a shaft (e.g., a shaft 214 defined on a fastener 216) to allow a user to perform rotational movements while laterally balancing on the balance training device 100.

[0052] Referring back to Figs. 9-11, the balance pads 192 may provide increasing ranges of motion of the balance training device 100 due at least in part to the increasing height of the balance pad stack 196. For instance, with reference to Fig. 9, the first balance pad 198 may allow the balance training device 100 to tilt along its length L a first tilting angle φ_1 . Adding the second balance pad 200 to the balance pad stack 196 may increase the tilting ability of the balance training device 100 by allowing the balance training device 100 to tilt along its length L a second tilting angle φ_2 (see Fig. 10), the second tilting angle φ_2 being greater than the first tilting angle φ_1 . Similarly, adding the third balance pad 202 to the balance pad stack 196 may increase the tilting ability of the balance training device 100 by allowing the balance training device 100 to tilt along its length L a third tilting angle φ_3 (see Fig. 11), the third tilting angle φ_3 being greater than the second tilting angle φ_2 . As illustrated, each of the first, second, and third tilting angles φ_1 , φ_2 , φ_3 may be defined by the angle through which the balance training device 100 may be tilted until one of the foot supports 106 contacts a support surface. In such embodiments, the magnitude of each of the first, second, and third tilting angles φ_1 , φ_2 , φ_3 may

depend on whether the foot supports 106 are in an expanded or collapsed position. For example, when the balance training device 100 is in a collapsed configuration, each of the first, second, and third tilting angles ϕ_1 , ϕ_2 , ϕ_3 may be greater compared to the angles created when the balance training device 100 is in an expanded configuration.

[0053] With reference to Fig. 2, the balance training device 100 may include a sensing device 230 to track a user's balancing movements. The sensing device 230, which may be a smartphone, a tablet, or any other sensing mechanism, may include a plurality of sensors, such as a gyroscope or an accelerometer, operable to track movement of the balance training device 100. For example, as the balance training device 100 tilts or rotates, the sensors may detect the movement and provide feedback to a user. In some embodiments, the sensing device 230 may include a display 232 to provide real-time feedback to a user during a workout. Though the figures show a smartphone being used as the sensing device 230, any suitable device having the proper components and software may be used, including a device having a microprocessor, memory, and a gyroscope/accelerometer or other suitable sensing means.

[0054] As shown in Figs. 2, 7, and 8, the sensing device 230 may be received within the track 130 formed within the top surface 108 of the rail 104. In such embodiments, the track 130 may be sized and shaped to permit the foot supports 106 to slide along the rail 104 without contacting the sensing device 230. For example, the depth of the track 130 may be sufficient to permit the sensing device 230 to be positioned substantially between the rail 104 and the foot supports 106 (see Fig. 8). In this manner, the sensing device 230 may be substantially concealed from view when the balance training device 100 is in a collapsed configuration (see Figs. 1 and 7). Referring to Figs. 5 and 6, the rail 104 may include means to hold the sensing device 230 in place. For example, a mounting pad 234, which may be formed from silicone rubber and may be sticky or include a gripping feature, may be positioned on top of the rail 104 within the track 130. During use, the mounting pad 234 may limit lateral movement of the sensing device 230 within the track 130 relative to the rail 104.

[0055] In some embodiments, the balance training device 100 may include other features providing a desired aesthetic and/or functional characteristic. For example, as shown in Figs. 20-22, the balance training device 100 may include at least one bumper 236 connected to the underside 146 of at least one of the first and second foot supports 136, 138, such as through an interference fit. The bumper(s) 236 may be a cylindrical member having a substantially circular cross-section, though other cross-section shapes are contemplated including polygonal and elliptical, among others. In some embodiments, the bumper(s) 236 may taper in cross-sectional

size with distance away from the underside 146 of the first and second foot supports 136, 138 to provide a desired functional and/or aesthetic effect, such as progressive damping. The bumper(s) 236 may be compressible to cushion impacts between the balance training device 100 and a support surface (e.g., the ground) while performing balance training exercises. For example, the bumper(s) 236 may be formed from compressible material, such as rubber, or may take the form of a compressible spring. The bumper(s) 236 may be releasably secured to many locations of the cellular structure 148 to customize the balance characteristics of the balance training device 100. For example, the bumper(s) 236 may be operable to limit the angular instability of the balance training device 100, such as for recovery patients. In some embodiments, the bumper(s) 236 may add noticeable weight that must be overcome during balancing movements. The bumper(s) 236 may be attached symmetrically or asymmetrically to the underside 146 of the foot supports 106 to provide symmetrical or asymmetrical balance training, respectively.

[0056] In some embodiments, a material having fluid-like characteristics may be positioned within the cavity 132 of the rail 104. This material shifts its mass as the rail changes positions, and creates an irregular effect to the balance training, making it more challenging, for instance. Suitable materials may include fine particle solids, water, or other liquids.

[0057] Figs. 12-19 illustrate an additional embodiment of a balance training device 500. Like the balance training device 100 discussed above, the balance training device 500 is expandable to vary the degree of instability it provides. In general, the balance training device 500 is similar to the balance training device 100 and its associated description above and thus, in certain instances, descriptions of like features will not be discussed when they would be apparent to those with skill in the art in light of the description above and in view of Figs. 12-19. For ease of reference, like structure is represented with appropriately incremented reference numbers.

[0058] Referring to Figs. 12 and 13, similar to the balance training device 100 discussed above, the balance training device 500 may include a plurality of foot supports 506 (e.g., first and second foot supports 536, 538) slidably connected to a rail 504 at least partially along the length L of the rail 504. In general, the first and second foot supports 536, 538 are similar to the first and second foot supports 136, 138 discussed above. However, as shown in Fig. 14, each foot support 506 may include an aperture 250 for engagement with a portion of an associated adjustment mechanism 502, as explained below.

[0059] Referring to Figs. 14-16, the balance training device 500 may include an adjustment mechanism 502 associated with the rail 504 and each of the foot supports 506 to selectively

position each foot support 506 between a plurality of positions. In the embodiments of Figs. 14-16, each adjustment mechanism 502 includes a ridge 564, which may be formed on an end cap 560, and a latch member 562 attached to the ridge 564. For purposes of convenience, the ridge 564 is shown and described hereinafter as part of the end cap 560, though it is contemplated that the ridge 564 may be formed elsewhere on the rail 504. When the end cap 560 is connected to an end of the rail 504, at least a portion of the latch member 562 may extend from the end cap 560 within a track 530 of the rail 504 (see Figs. 15 and 16). As illustrated, each latch member 562 may include a plurality of engagement structures 566 defining the positions in which the first and second foot supports 536, 538 may be selectively locked. As detailed below, each of the engagement structures 566 may engage a portion of the foot supports 506 to define the positions thereof.

[0060] With continued reference to Figs. 14-16, each latch member 562 may include first and second portions 568, 570 defining first and second engagement structures 572, 574, respectively, thereon. As illustrated, in one embodiment, each of the first and second engagement structures 572, 574 may be a button 252 sized and shaped to be received at least partially within the aperture 250 of the foot supports 506 to limit translational movement of the foot supports 506 along the length L of the rail 504. With reference to Figs. 12 and 13, the buttons 252 of the first and second engagement structures 572, 574 may be accessible from the upper surface 544 of each foot support 506. In such embodiments, the buttons 252 may be depressed by a user to decouple the first and second engagement structures 572, 574 from the foot supports 506, as explained below. In some embodiments, the buttons 252 may be sized and shaped to move within the track 530 of the rail 504 to decouple the first and second engagement structures 572, 574 from the foot supports 506. For example, in one embodiment, each button 252 may be depressed about 4 mm to about 6 mm into the track 530 of the rail 504 to disengage the button 252 from the foot support 506. As shown, the buttons 252 may be substantially identical in size and shape. In particular, each button 252 may be small enough such that a user's foot does not depress the buttons 252 during use. The buttons 252, however, may be large enough such that a user may depress each button 252 using the user's thumb.

[0061] Referring now to Figs. 14 and 17-19, the balance training device 500 may include a plurality of balance pads 592 connected to the rail 504 for at least the same purposes described above. As shown in Figs. 17-19, the plurality of balance pads 592 may include a first balance pad 598 having a first bottom surface radius R_1 , a second balance pad 600 having a second bottom surface radius R_2 , a third balance pad 602 having a third bottom surface radius R_3 , and

so on. Like the first, second, and third balance pads 198, 200, 202 discussed above, the first, second, and third balance pads 598, 600, 602 of Figs. 17-19 may be connected together serially or sequentially, such as in a stacked or layered configuration, to form a balance pad stack 596. Referring to Fig. 14, the balance pad stack 596 may be connected to the rail 504 via a connection plate 608 similar to the connection plate 208 discussed above. In such embodiments, the first balance pad 598 may connect (e.g., exclusively) to the connection plate 608, the second balance pad 600 may connect (e.g., exclusively) to the first balance pad 598, the third balance pad 602 may connect (e.g., exclusively) to the second balance pad 600, and so on. To connect the balance pads 592 together, each of the first, second, and third balance pads 598, 600, 602 may include an undercut defining a circumferential groove 612. In such embodiments, at least the first and second balance pads 598, 600 may include a circumferential rib 610 extending annularly outward from the pads 598, 600. In this manner, each rib 610 may be received within the groove 612 of a successively-attached balance pad 592 to connect the first, second, and third balance pads 598, 600, 602 together. In like manner, the connection plate 608 may include a similar circumferential rib 610 extending annularly outward from the connection plate 608 to be received within the circumferential groove 612 of the first balance pad 598 to connect the balance pad stack 596 to the rail 504.

[0062] Operation of the balance training device 500 is similar to that of the balance training device 100 above. To expand the balance training device 500, a user may depress the button 252 of the first portion 568 of the latch member 562 to decouple the first engagement structure 572 of the adjustment mechanism 502. For example, the first portion 568 of the latch member 562 may resiliently bend to permit sufficient removal of the button 252 from the aperture 250 defined in the foot supports 506. Once the button 252 of the first portion 568 of the latch member 562 is removed from the aperture 250 defined in each foot support 506, the user may then slide each foot support 506 outwardly along the length L of the rail 504 until the second engagement structure 574 locks the foot supports in place, such as through at least partial receipt of the button 252 of the second portion 570 of the latch member 562 within the aperture 250 defined in the foot supports 506. In this manner, the button 252 of the first portion 568 of the latch member 562 may line up with the aperture 250 in the foot support 506 when the foot support 506 is in an inner or collapsed position, and the button 252 of the second portion 570 of the latch member 562 may line up with the aperture 250 in the foot support 506 when the foot support 506 is in an outer or expanded position. In some embodiments, the first and second portions 568, 570 of the latch member 562 may be biased towards the underside 546 of each

foot support 506 such that the buttons 252 of the first and second portions 568, 570 seat automatically within the aperture 250 of the foot supports 506 once in alignment. Additionally or alternatively, to facilitate engagement of the buttons 252 within the aperture 250 defined in the foot supports 506, in some embodiments each button 252 may be chamfered along its top edge to at least partially guide the buttons 252 into the aperture 250.

[0063] Collapsing the balance training device 500 may be accomplished in substantially reverse order from that described above. To collapse the balance training device 500, a user may depress the button 252 of the second portion 570 of the latch member 562 to decouple the second engagement structure 574 of the adjustment mechanism 502. For instance, the second portion 570 of the latch member 562 may resiliently bend to permit sufficient removal of the button 252 from the aperture 250 defined in the foot supports 506. Once the button 252 of the second portion 570 of the latch member 562 is removed from the aperture 250, the user may then slide each foot support 506 inwardly along the length L of the rail 504 until the first engagement structure 572 locks the foot support 506 in place, such as through at least partial receipt of the button 252 of the first portion 568 of the latch member 562 within the aperture 250 defined in the foot supports 506. Though shown and described as moving between two positions, the adjustment device may be configured such that the foot supports 506 move between any number of positions by, for example, providing additional engagement structures 566 (e.g., buttons 252).

[0064] Referring to Figs. 17-19, the balance pad stack 596 may provide a base 590 of the balance training device 500, the base 590 configured to provide increasing levels of balance difficulty by, for example, allowing the balance training device 500 to tilt an increasing degree. For example without limitation, similar to the description above regarding the balance training device 100, the first balance pad 598 may allow the balance training device 500 to tilt along its length L a first tilting angle ϕ_1 (see Fig. 17). Adding the second balance pad 600 to the balance pad stack 596 may increase the tilting ability of the balance training device 500 by allowing the balance training device 500 to tilt along its length L a second tilting angle ϕ_2 (see Fig. 18), the second tilting angle ϕ_2 being greater than the first tilting angle ϕ_1 . Similarly, adding the third balance pad 602 to the balance pad stack 596 may increase the tilting ability of the balance training device 500 by allowing the balance training device 500 to tilt along its length L a third tilting angle ϕ_3 (see Fig. 19), the third tilting angle ϕ_3 being greater than the second tilting angle ϕ_2 . In all other aspects, the balance training device 500 may be similar to the balance training device 100 discussed above.

[0065] The balance training device 100 or 500 may be formed from a variety of materials and means. For instance, the rail 104 or 504, the foot supports 106 or 506, the balance pads 192 or 592, and each component of the adjustment mechanisms 102 or 502, among others, may be formed from metal, plastic, or any other suitable material with sufficient strength. In some embodiments, the rail 104 or 504 may be extruded from metal or another thermoformable material. Metals may include aluminum, steel, titanium, or any other suitable metal, alloy, or composite. Plastics may include a thermoplastic material (self-reinforced or fiber reinforced), nylon, LDPE, ABS, polycarbonate, polypropylene, polystyrene, PVC, polyamide, and/or PTFE, among others, and may be formed or molded in any suitable manner, such as by plug molding, blow molding, injection molding, extrusion, or the like. In some embodiments, at least some of the components of the balance training device 100 or 500 (e.g., the foot supports 106 or 506, the balance pads 192 or 592, among others) may be coated with a vinyl, a rubberized material, or any other coating for increased durability.

[0066] All relative and directional references (including: upper, lower, upward, downward, left, right, leftward, rightward, top, bottom, side, above, below, front, middle, back, vertical, horizontal, and so forth) are given by way of example to aid the reader's understanding of the particular embodiments described herein. They should not be read to be requirements or limitations, particularly as to the position, orientation, or use unless specifically set forth in the claims. Connection references (e.g., attached, coupled, connected, joined, and the like) are to be construed broadly and may include intermediate members between a connection of elements and relative movement between elements. As such, connection references do not necessarily infer that two elements are directly connected and in fixed relation to each other, unless specifically set forth in the claims.

[0067] Those skilled in the art will appreciate that the presently disclosed embodiments teach by way of example and not by limitation. Therefore, the matter contained in the above description or shown in the accompanying drawings should be interpreted as illustrative and not in a limiting sense. The following claims are intended to cover all generic and specific features described herein, as well as all statements of the scope of the present method and system, which, as a matter of language, might be said to fall there between.

CLAIMS

What is claimed is:

1. A balance training device, comprising:
 - a rail including opposing first and second side ends and opposing front and rear longitudinal edges, the rail including a longitudinal length defined between the opposing first and second side ends and a width defined between the opposing front and rear longitudinal edges and transverse to the longitudinal length;
 - a plurality of foot supports slidably connected to the rail;
 - an adjustment mechanism associated with each foot support and the rail to selectively lock each foot support in a plurality of positions along the longitudinal length of the rail; and
 - at least one balance pad connected to the rail and including a convex bottom surface to provide a degree of angular instability.
2. The balance training device of claim 1, wherein each of the plurality of foot supports includes a set of retaining members operable to slidably couple the foot supports to the rail.
3. The balance training device of claim 2, wherein each set of retaining members engages the front and rear longitudinal edges of the rail.
4. The balance training device of any of claims 2 and 3, wherein the width of the rail is substantially captured by the retaining members to slidably couple each foot support to the rail.
5. The balance training device of any preceding claim, wherein each adjustment mechanism comprises:
 - a ridge extending from the rail; and
 - a latch member associated with the ridge and including a plurality of engagement structures defining the plurality of positions of an associated foot support.
6. The balance training device of claim 5, wherein each of the plurality of engagement structures engages the ridge to define the plurality of positions of the associated foot support.

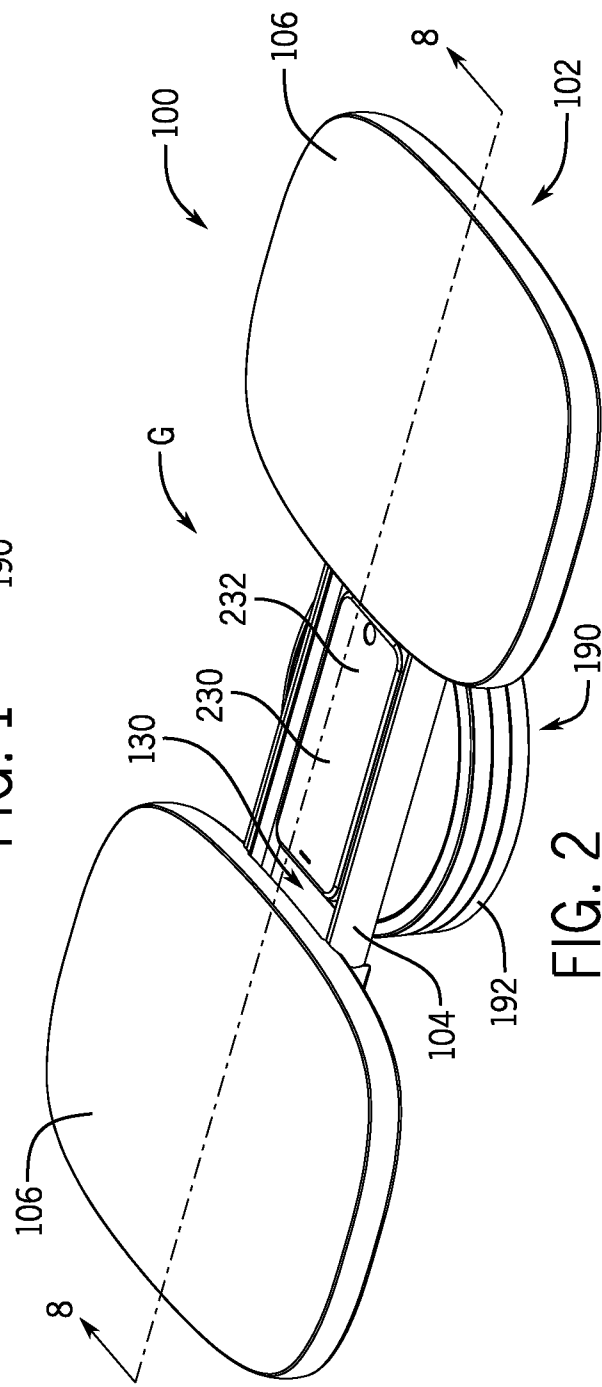
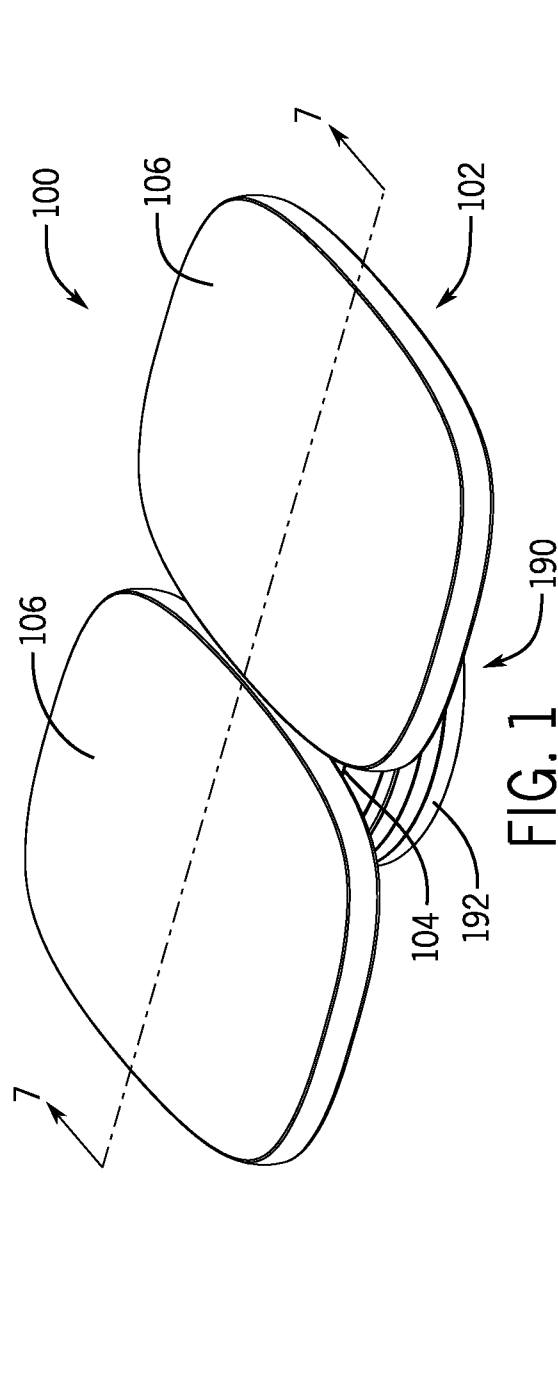
7. The balance training device of claim 6, wherein the latch member is a leaf spring connected to an underside of the associated foot support.
8. The balance training device of any of claims 6 and 7, wherein each of the plurality of engagement structures includes a groove sized for receipt of at least a portion of the ridge therein.
9. The balance training device of claim 5, wherein:
 - the latch member is attached to the ridge; and
 - each of the plurality of engagement structures engages a portion of the associated foot support to define the plurality of positions of the associated foot support.
10. The balance training device of claim 9, wherein:
 - the associated foot support includes an aperture defined therethrough; and
 - each of the plurality of engagement structures is a button operable to be received at least partially within the aperture of the associated foot support.
11. The balance training device of any of claims 5-10, wherein:
 - the rail includes an end cap; and
 - the ridge of the adjustment mechanism is formed on the end cap.
12. The balance training device of any preceding claim, wherein the adjustment mechanisms are operable to position the plurality of foot supports asymmetrically about a center of the rail.
13. The balance training device of any preceding claim, wherein the at least one balance pad includes a plurality of balance pads serially-connected together.
14. The balance training device of any preceding claim, further comprising at least one bumper connected to an underside of at least one of the plurality of foot supports.
15. A system including the balance training device of claim 1, further comprising a sensing device including a plurality of sensors configured to track movement of the balance training device and provide feedback to a user.

16. The system of claim 15, wherein the sensing device includes a display to provide the feedback to a user during a workout.
17. The system of any of claims 15 and 16, wherein the sensing device is received within a track formed within a surface of the rail.
18. The system of claim 17, wherein the sensing device is substantially concealed from view when the balance training device is in a collapsed configuration.
19. A balance training device, comprising:
 - an elongate rail including a longitudinal length;
 - a plurality of foot supports coupled to the rail and configured to slide at least partially along the length of the rail; and
 - a base engaging a support surface, the base including an adjustable height dimension configured to provide increasing levels of balance difficulty.
20. The balance training device of claim 19, wherein:
 - the base includes at least one balance pad, each of the at least one balance pad including a convex bottom surface; and
 - the at least one balance pad is connected together in a stacked configuration to adjust the height dimension of the base.
21. The balance training device of claim 20, wherein the convex bottom surfaces of each successively connected balance pad decreases in radius.
22. The balance training device of any of claims 20 and 21, wherein:
 - the at least one balance pad comprises:
 - a first balance pad including a first bottom surface radius;
 - a second balance pad including a second bottom surface radius; and
 - a third balance pad including a third bottom surface radius;
 - the first bottom surface radius is greater than the second bottom surface radius;
 - and
 - the second bottom surface radius is greater than the third bottom surface radius.
23. The balance training device of claim 22, wherein:
 - the second balance pad connects only to the first balance pad; and

the third balance pad connects only to the second balance pad.

24. The balance training device of any of claims 20-23, further comprising a connection plate connecting the balance pads to the rail.
25. The balance training device of claim 24, wherein the connection plate rotates freely relative to the rail.
26. The balance training device of any of claims 24 and 25, wherein the first balance pad connects only to the connection plate.
27. The balance training device of any of claims 19-26, further comprising an adjustment mechanism associated with the rail and each of the plurality of foot supports to selectively position each foot support between a plurality of positions along the length of the rail.
28. The balance training device of claim 27, wherein the adjustment mechanisms selectively lock the balance training device in a collapsed configuration and in an expanded configuration.
29. A method of expanding a balance board, the method comprising:
 - slidably coupling a plurality of foot supports along a longitudinal length of a rail member;
 - positioning the plurality of foot supports in a first position to provide a first degree of balance instability; and
 - sliding the plurality of foot supports along the longitudinal length of the rail to a second position, the second position providing a second degree of balance instability.
30. The method of claim 29, further comprising adjusting a height of the rail member above a support surface by adjusting a base of the balance board.
31. The method of claim 30, wherein adjusting the base of the balance board includes adding or removing a number of sequentially-connected balance pads to form a balance pad stack of varying height.

32. The method of claim 29, wherein positioning the plurality of foot supports in the first and second positions includes releasably locking each of the plurality of foot supports in the first and second positions via an adjustment mechanism.
33. The method of claim 32, wherein each adjustment mechanism forms a releasable connection structure between the rail and each of the foot supports.
34. The method of claim 29, wherein sliding the plurality of foot supports along the longitudinal length of the rail includes positioning the foot supports asymmetrically about a centerline of the rail.



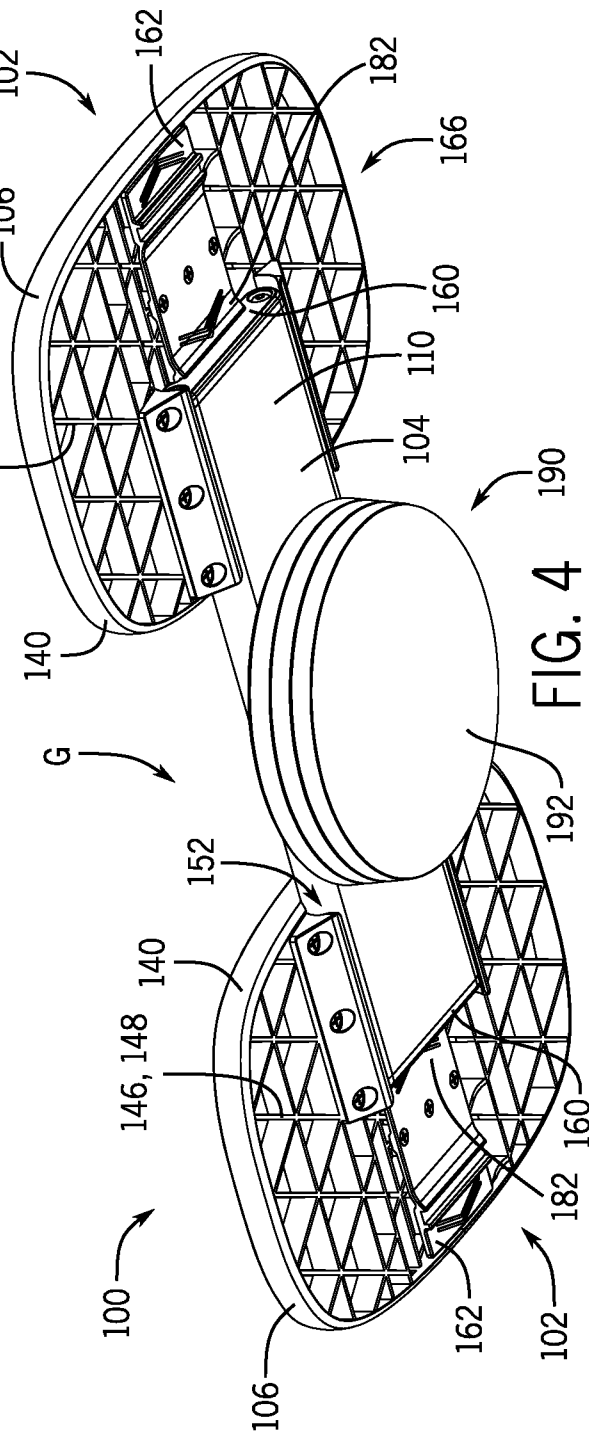
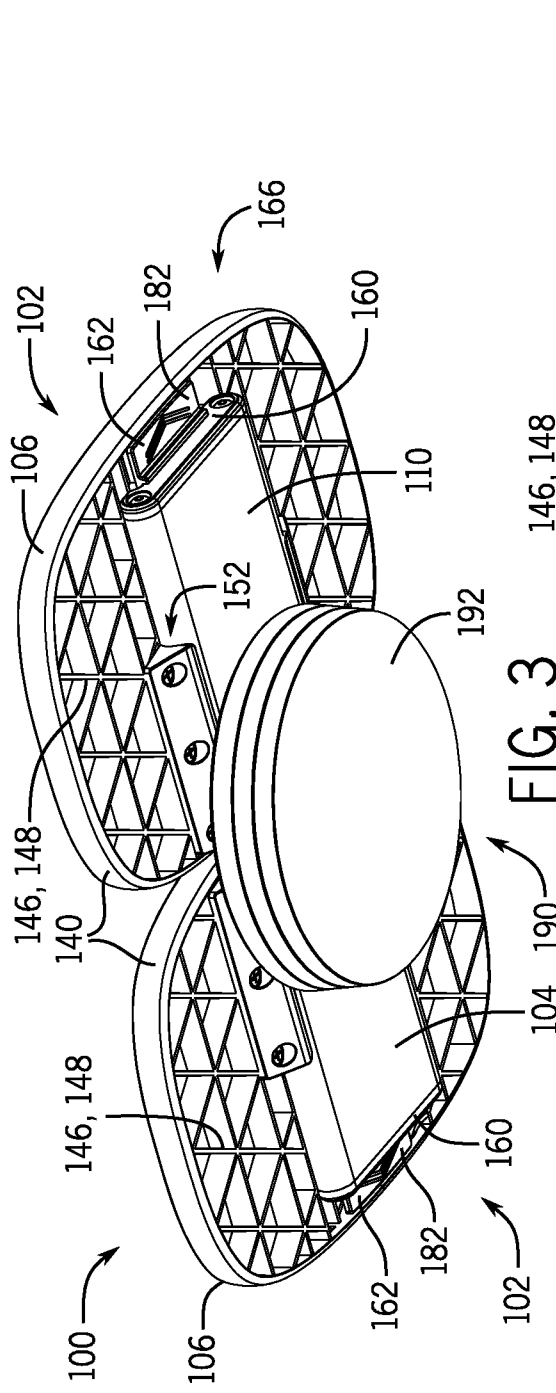


FIG. 5

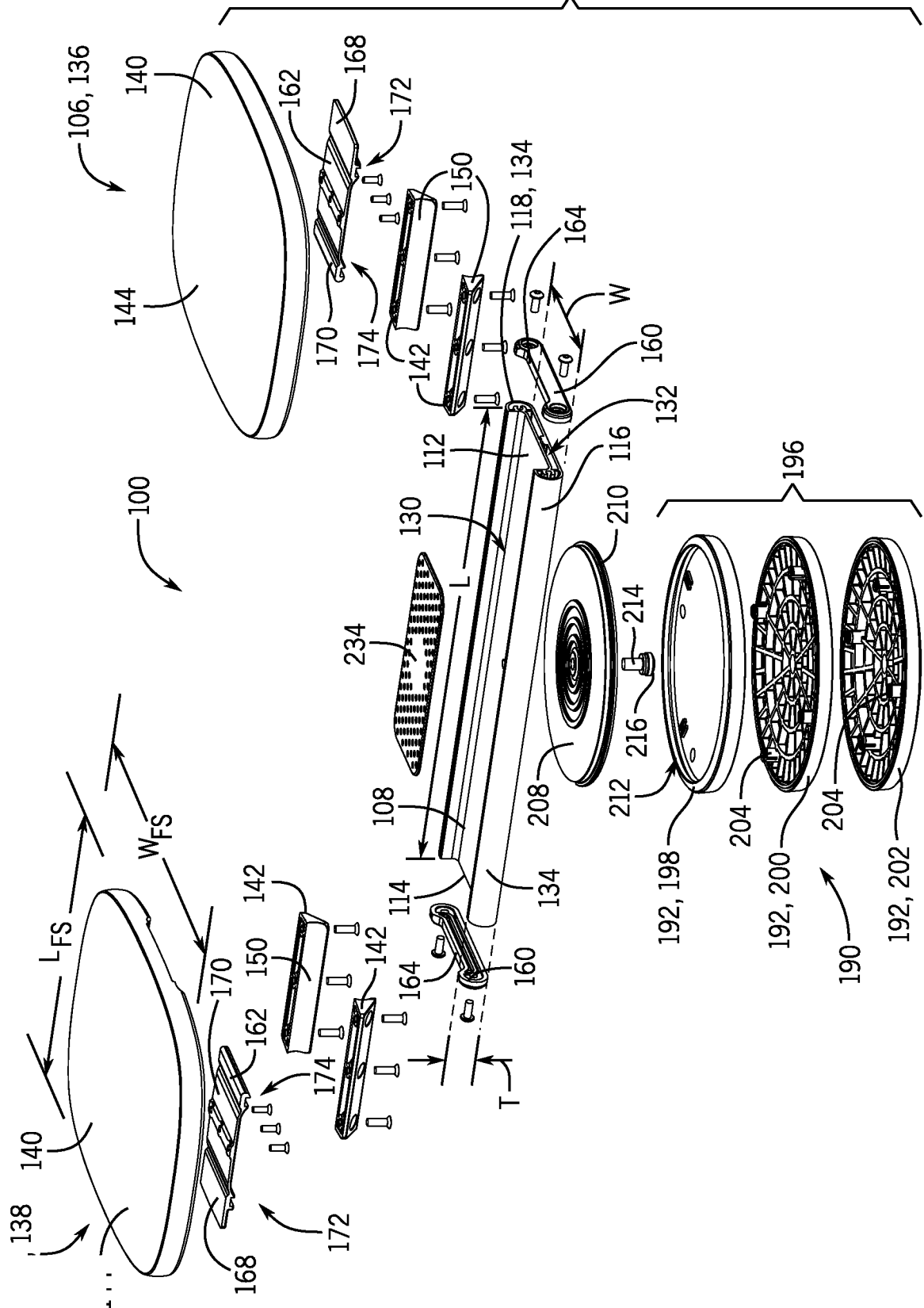
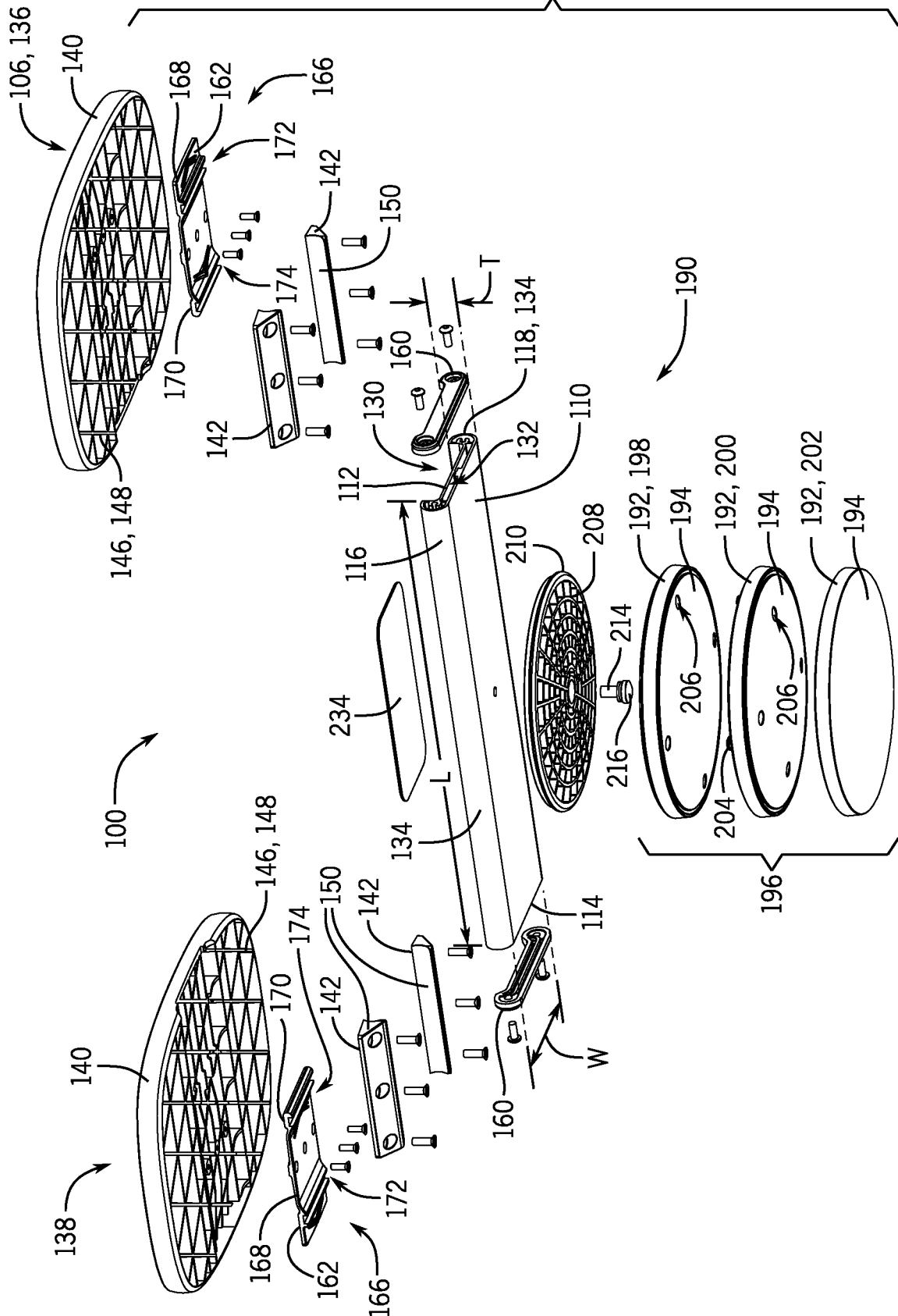


FIG. 6



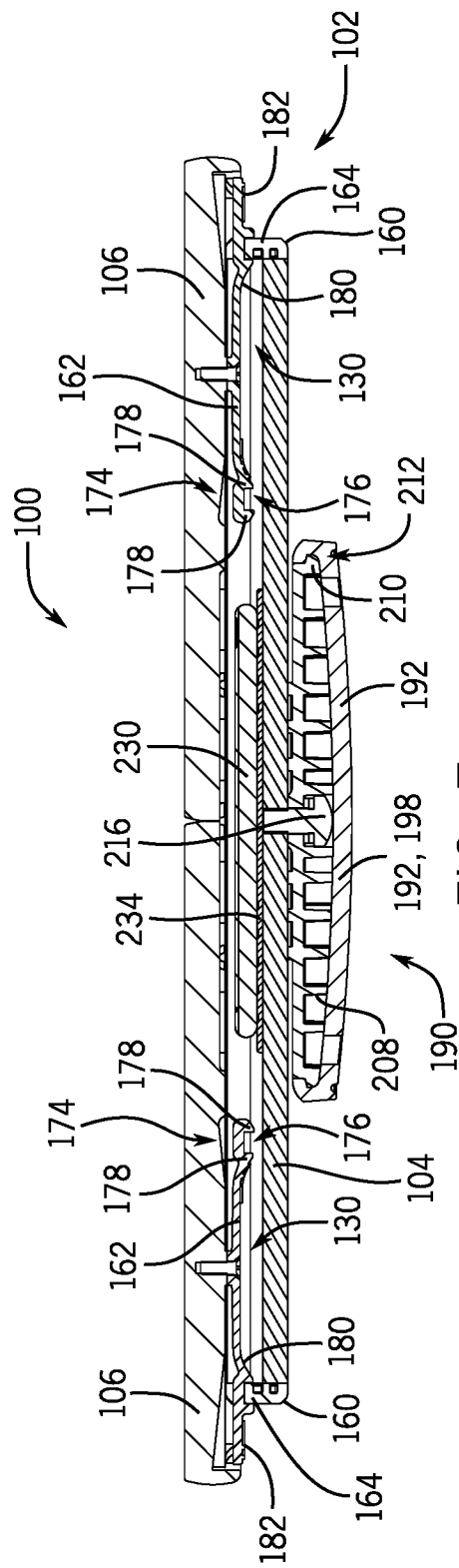


FIG. 7

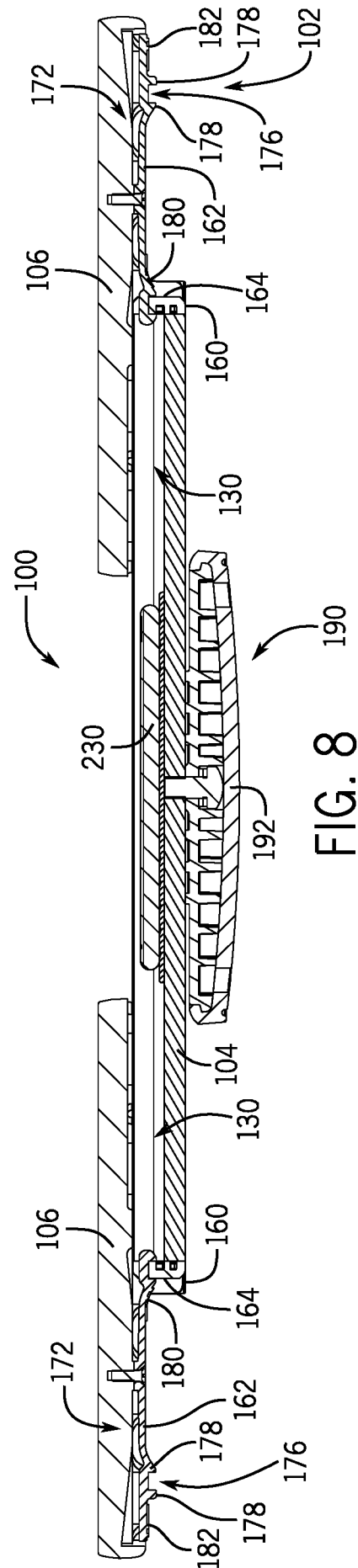


FIG. 8 190

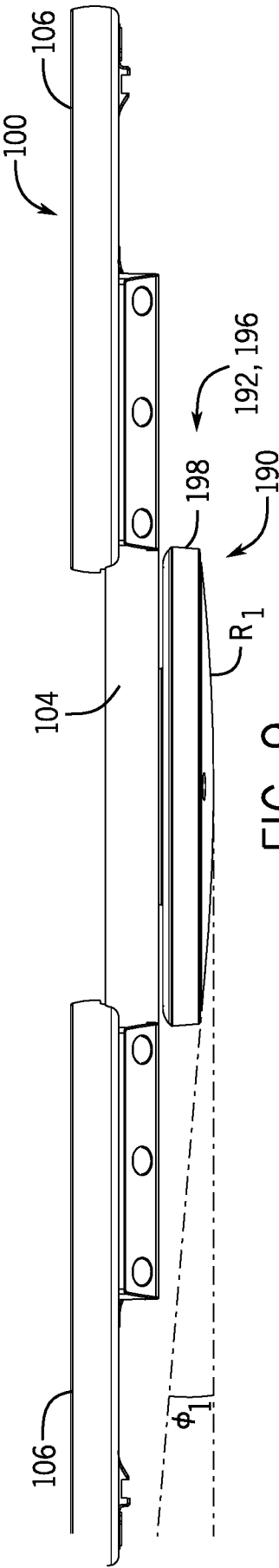


FIG. 9

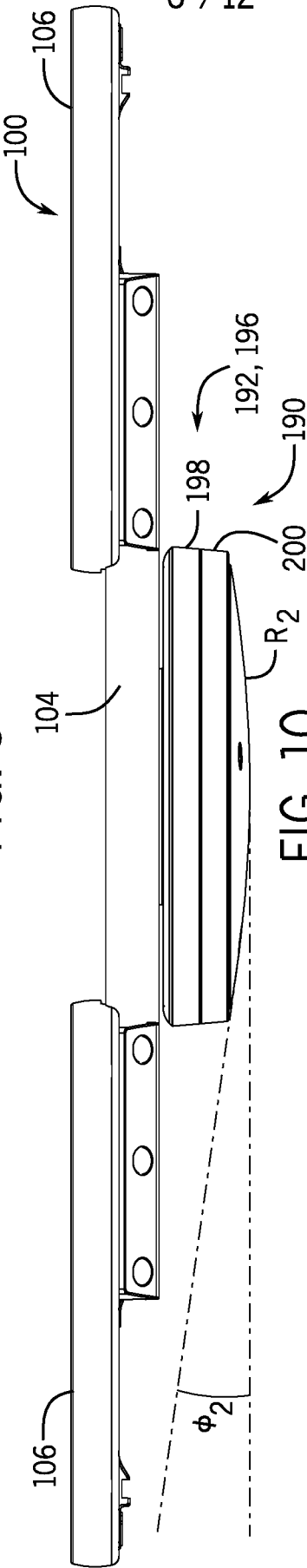


FIG. 10

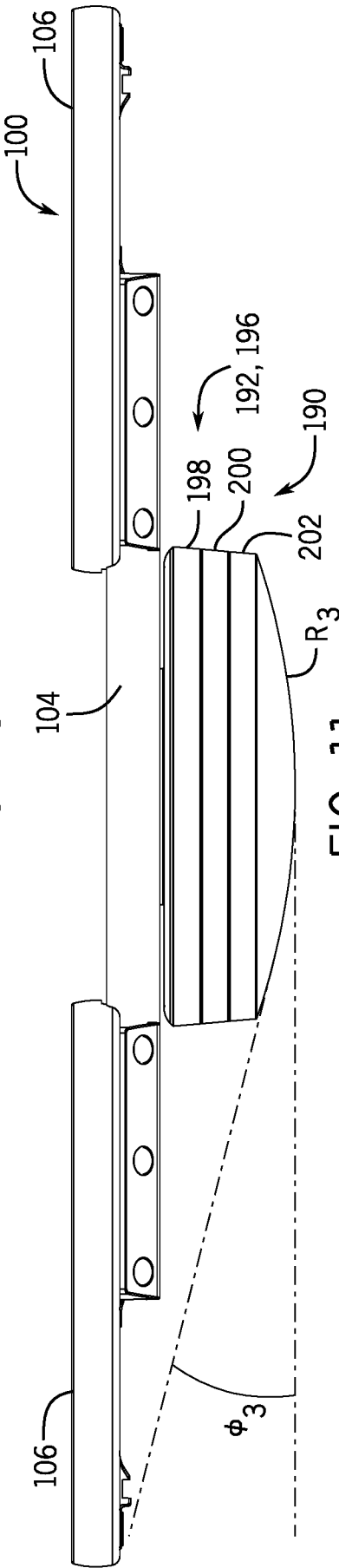


FIG. 11

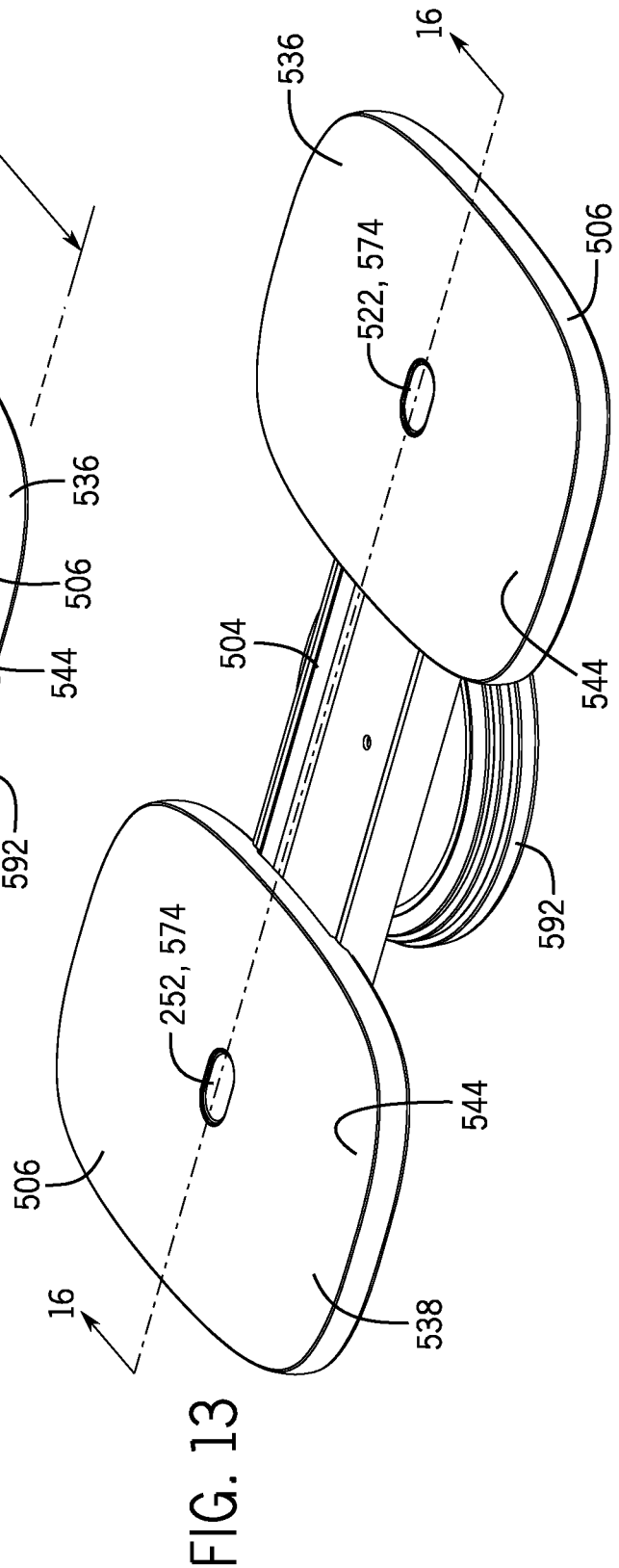
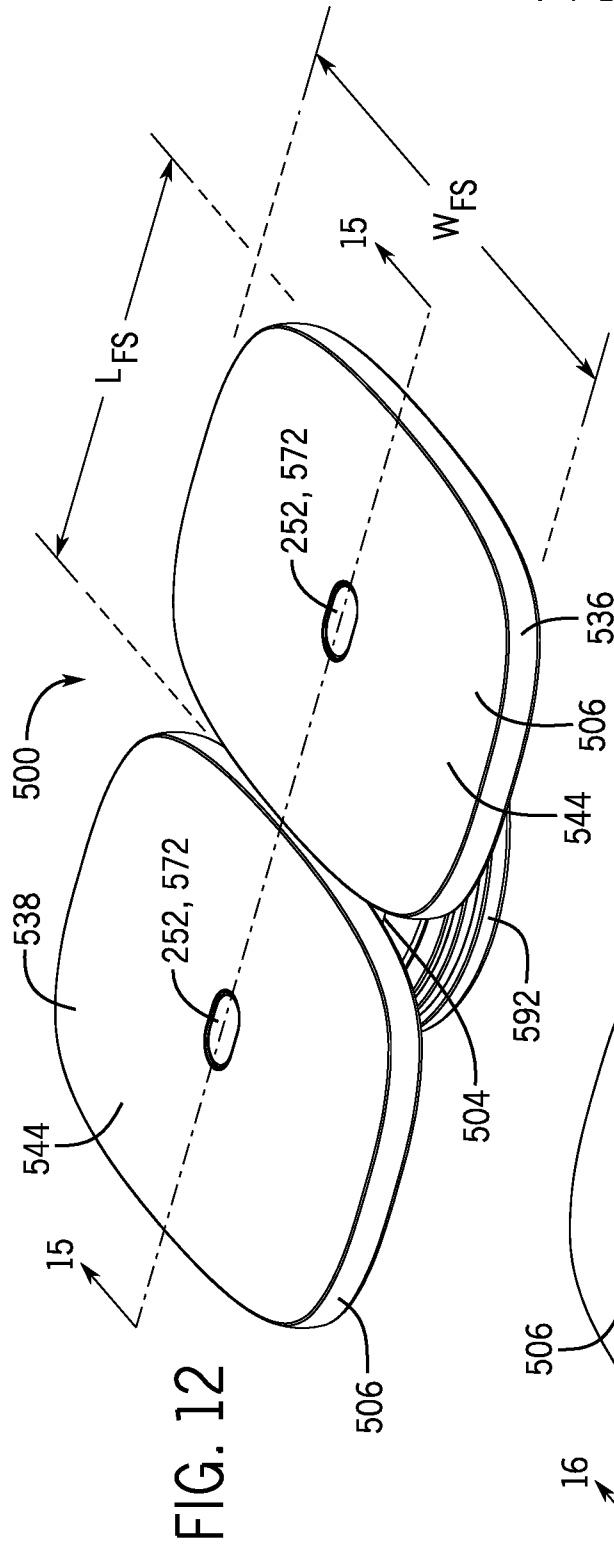
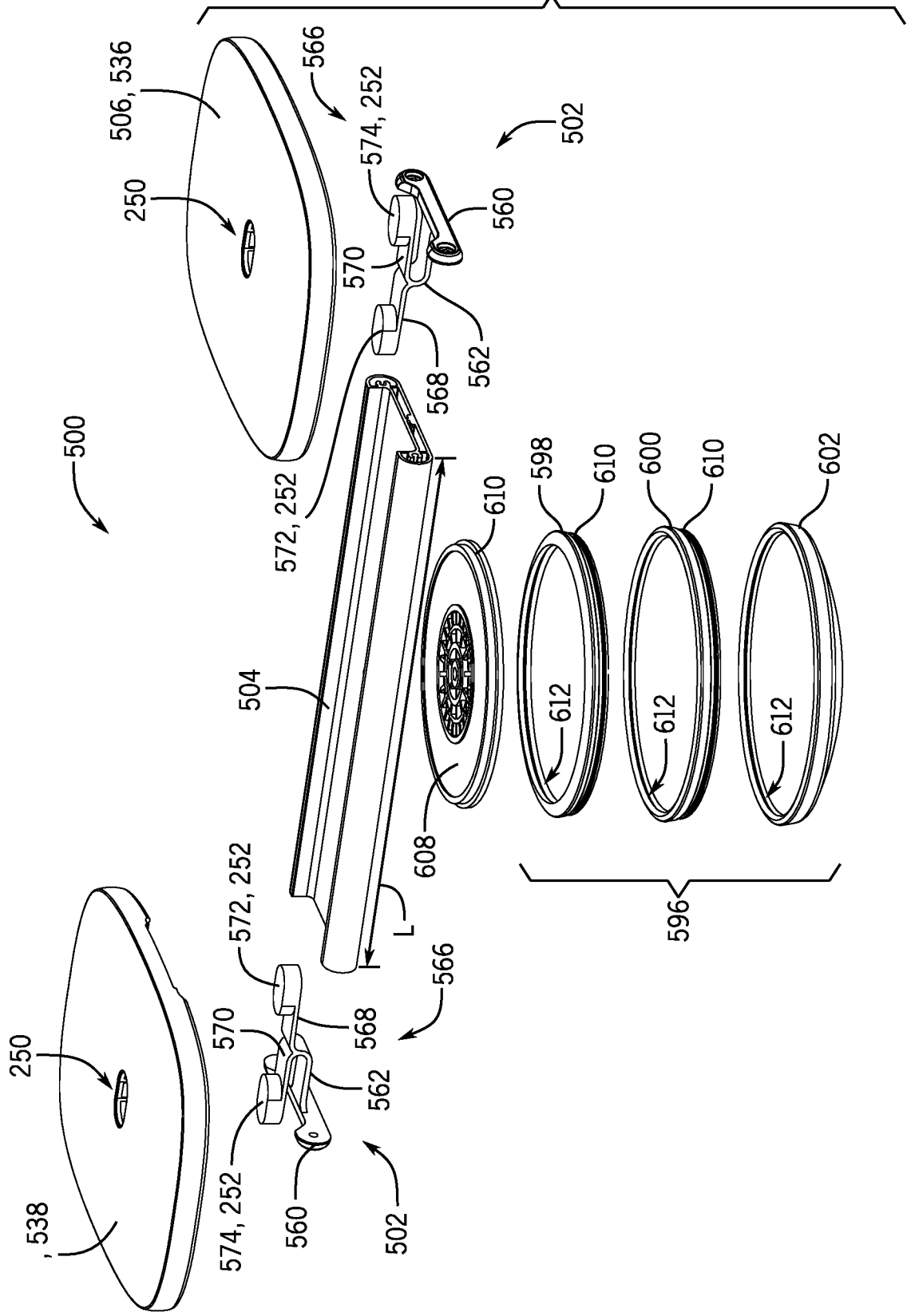
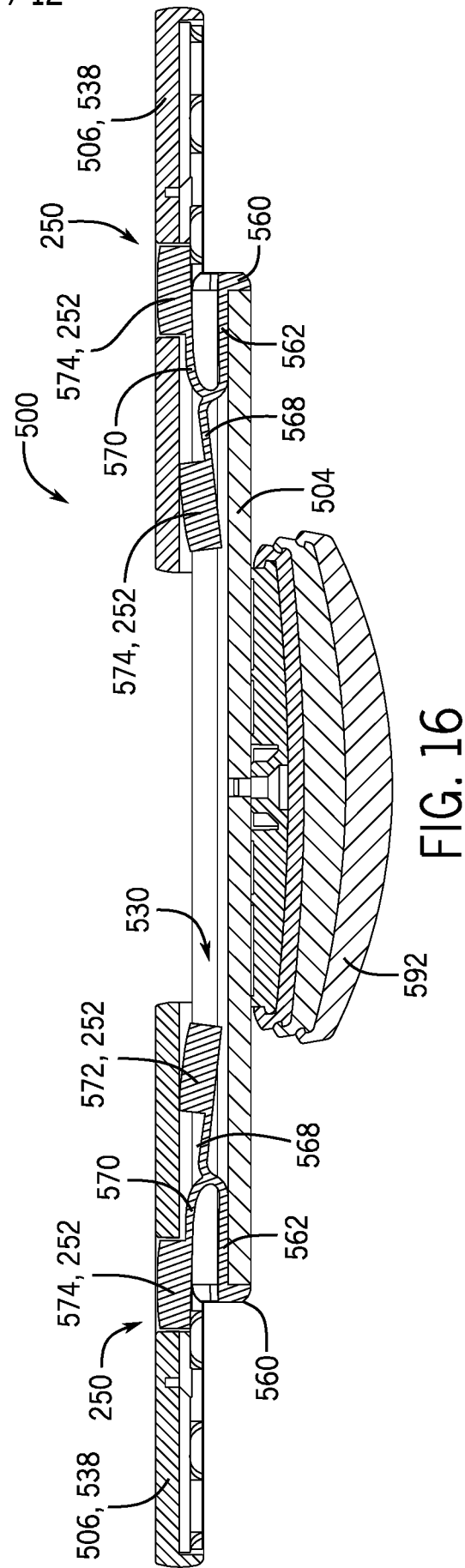
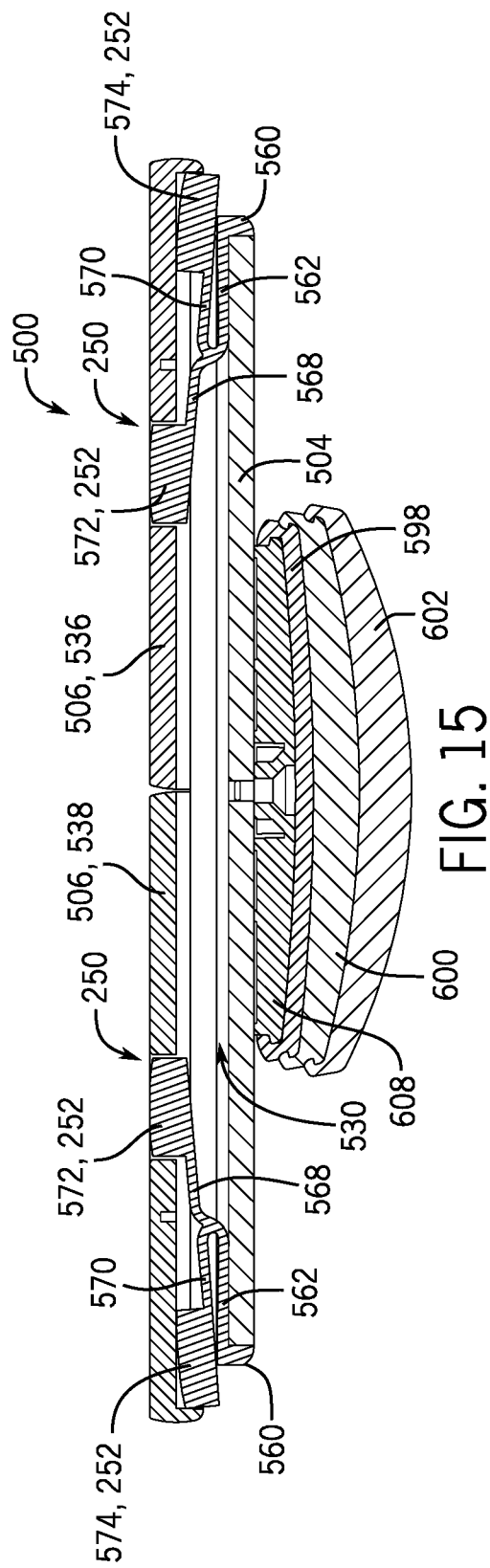


FIG. 14





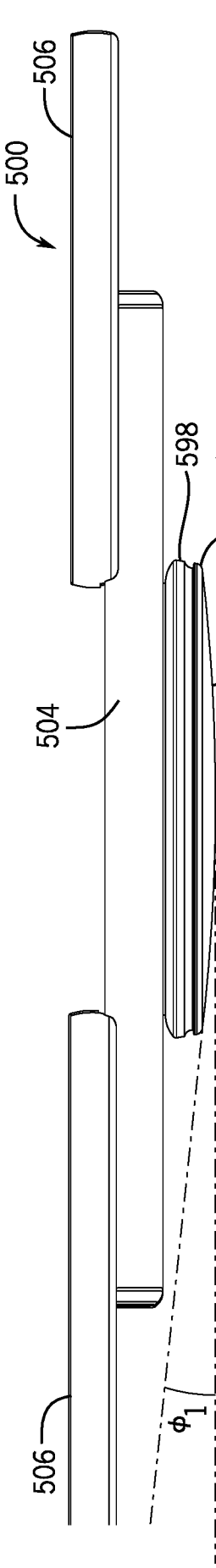


FIG. 17

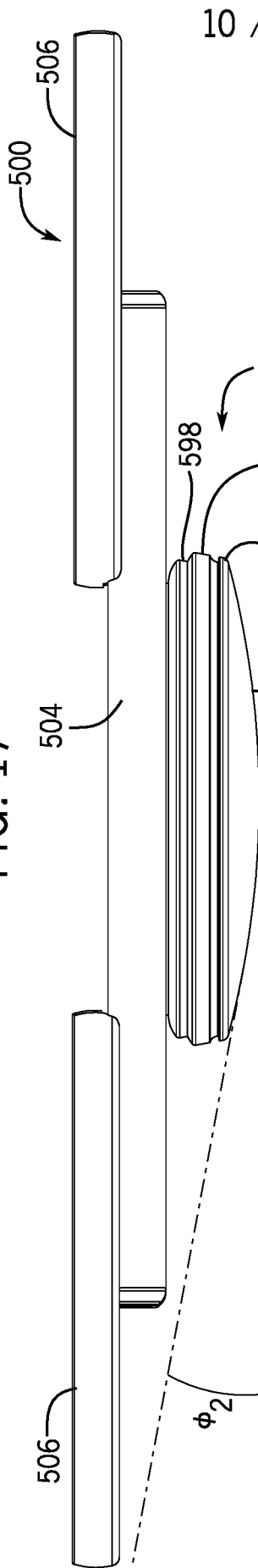


FIG. 18

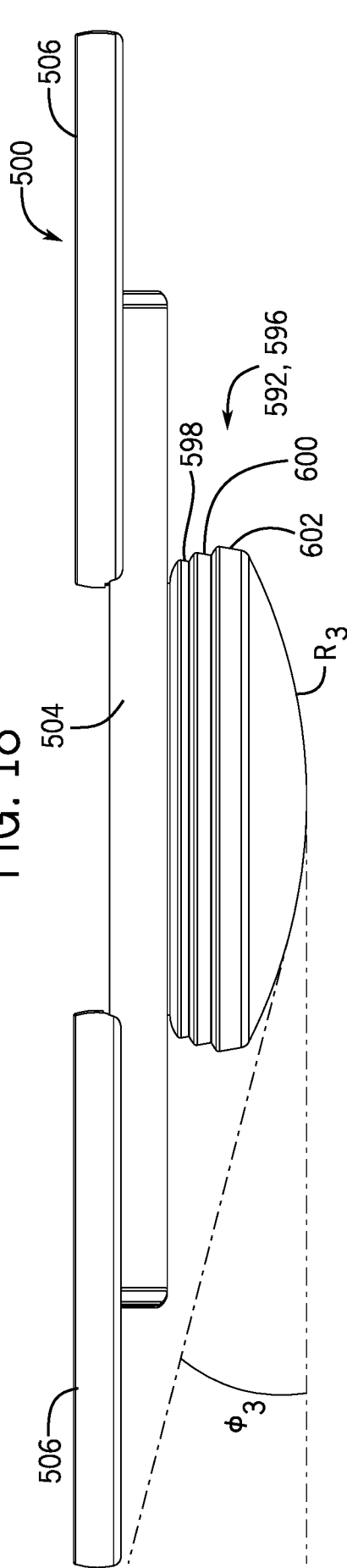


FIG. 19

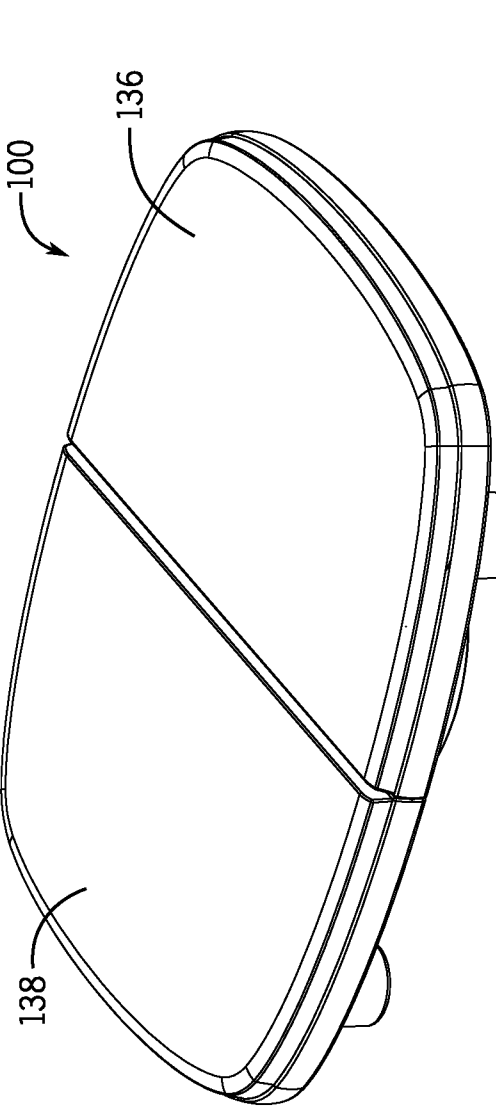


FIG. 20

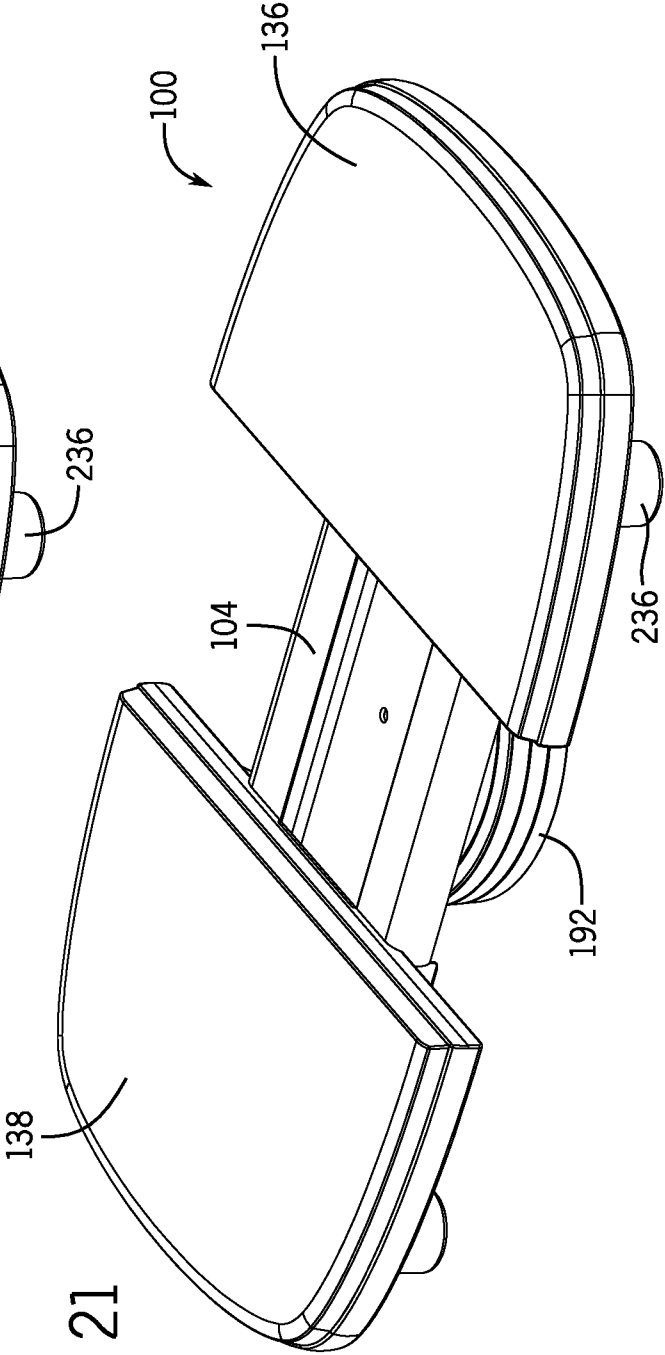


FIG. 21

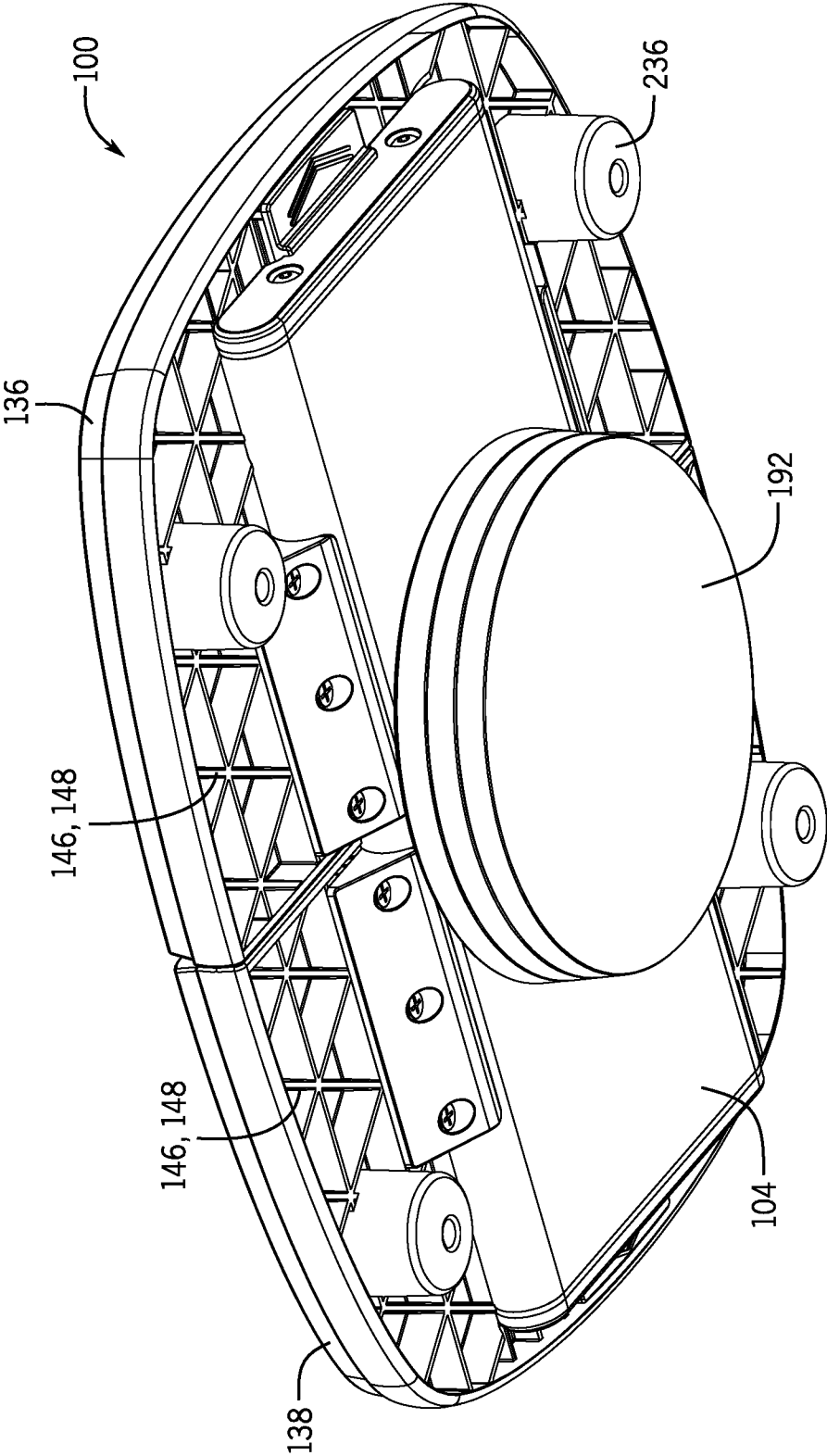


FIG. 22

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US17/18088

A. CLASSIFICATION OF SUBJECT MATTER
 IPC - A63B 22/00, 22/16, 22/18, 26/00 (2017.01)
 CPC - A63B 22/16, 22/18, 26/003

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)

See Search History document

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

See Search History document

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

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2013/141839 A1 (LAGANO J.) September 26, 2013; abstract; figures 5A-5C, 8A, 9, 10C, 10D; paragraphs [0008], [0027]	1-3, 4/2, 4/3, 15, 16, 19-21, 22/20, 22/21
Y	DE 20 2015 002518 U1 (BROWN F. et al.) April 23, 2015; abstract; figure 7D; paragraphs [0069], [0081], [0083]	1-3, 4/2, 4/3, 15, 16, 19-21, 22/20, 22/21
Y	US 2004/0053752 A1 (YANG H.) March 18, 2004; figures 1, 3; paragraph [0023]	1-3, 4/2, 4/3, 15, 16, 19-21, 22/20, 22/21
Y	US 2007/0270296 A1 (CALDICOTT R. J.) November 22, 2007; paragraphs [0019]-[0022], [0035]	15, 16
A	US 2008/0287263 A1 (CHENG C.) November 20, 2008; entire document	15, 16
A	US 2012/0264579 A1 (KLEIN M. et al.) October 18, 2012; entire document	15, 16
A	CN 204319638 U (QINGDAO AGRICULTURAL UNIVERSITY) May 13, 2015; entire document	1-3, 4/2, 4/3, 15, 16, 17/15, 17/16, 18/17/15, 18/17/16, 19-21, 22/20, 22/21, 23/22/20, and 23/22/21

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" 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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" 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

"X" 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

"Y" 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

Date of the actual completion of the international search
 25 May 2017 (25.05.2017)

Date of mailing of the international search report

16 JUN 2017

Name and mailing address of the ISA/
 Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
 P.O. Box 1450, Alexandria, Virginia 22313-1450
 Facsimile No. 571-273-8300

Authorized officer
 Shane Thomas

PCT Helpdesk: 571-272-4300
 PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US17/18088

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2006/0160682 A1 (MALOY T. et al.) July 20, 2006; entire document	1-3, 4/2, 4/3, 15, 16, 17/15, 17/16, 18/17/15, 18/17/16, 19-21, 22/20, 22/21, 23/22/20, and 23/22/21
A	US 2009/0298657 A1 (POTOK P. S.) December 3, 2009; entire document	1-3, 4/2, 4/3, 15, 16, 17/15, 17/16, 18/17/15, 18/17/16, 19-21, 22/20, 22/21, 23/22/20, and 23/22/21
A	US 2015/0190679 A1 (CARBONE A. N. et al.) July 9, 2015; entire document	1-3, 4/2, 4/3, 15, 16, 17/15, 17/16, 18/17/15, 18/17/16, 19-21, 22/20, 22/21, 23/22/20, and 23/22/21
A	'Gymnastics Balance Beams' (MANSION SCHOOLS) April 14, 2015. Retrieved from the Internet on May 25, 2017. URL: https://web.archive.org/web/20150414052041/http://www.mansionschools.com/sportime-the-ultimate-balance-boards-with-adjustable-height-fulcrums-set-of-3-assorted-colors-020728.html	1-3, 4/2, 4/3, 15, 16, 17/15, 17/16, 18/17/15, 18/17/16, 19-21, 22/20, 22/21, 23/22/20, and 23/22/21

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US17/18088

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of 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. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims 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. ☒ Claims Nos.: 5-14, 24-28
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:

Continued Within the Next 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 claims Nos.:
Group I: Claims 1-4, 15-18; Group II: Claims 19-23
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 claims 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.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/US17/18088

-***-Continued from Box No. III Observations where unity of invention is lacking-***-

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-4, 15-18 are directed toward a balance training device, comprising an adjustment mechanism to selectively lock each foot support, and at least one balance pad.

Group II: Claims 19-23 are directed toward a balance training device, comprising a base engaging a support surface, the base including an adjustable height dimension.

Group III: Claims 29-34 are directed toward a method of expanding a balance board, the method comprising positioning the plurality of foot supports in a first position and sliding the plurality of foot supports along the longitudinal length of the rail to a second position.

The inventions listed as Groups I-III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons.

The special technical features of Group I include an adjustment mechanism associated with each foot support and the rail to selectively lock each foot support in a plurality of positions along the longitudinal length of the rail; and at least one balance pad connected to the rail and including a convex bottom surface to provide a degree of angular instability (which is not present in Groups II or III).

The special technical features of Group II include a base engaging a support surface, the base including an adjustable height dimension configured to provide increasing levels of balance difficulty (which is not present in Groups I or III).

The special technical features of Group III include positioning the plurality of foot supports in a first position to provide a first degree of balance instability; and sliding the plurality of foot supports along the longitudinal length of the rail to a second position, the second position providing a second degree of balance instability (which is not present in Groups II or III).

The common technical features of Groups I, II, and III include a rail including opposing first and second side ends and opposing front and rear longitudinal edges, the rail including a longitudinal length defined between the opposing first and second side ends and a width defined between the opposing front and rear longitudinal edges and transverse to the longitudinal length; a plurality of foot supports slidably connected to the rail

These common technical features are disclosed by US 2009/0298657 A1 (POTOK): a rail (attached rails 24, 34 collectively defining a rail; figure 4) including opposing first and second side ends and opposing front and rear longitudinal edges, the rail including a longitudinal length defined between the opposing first and second side ends and a width defined between the opposing front and rear longitudinal edges and transverse to the longitudinal length (as shown; figure 4); a plurality of foot supports (shells 44 of the trolleys may be structured to permit placement of a user's foot; figures 4, 9, and 1; paragraph [0055]) slidably connected to the rail (rail is slidably engaged with the trolleys; figures 21-23; paragraph [0037])

Because the common technical features are disclosed by Potok, the inventions are not so linked as to form a single general inventive concept. Therefore, Groups I-III lack unity.