US 20250264302A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2025/0264302 A1**

Forestieri, SR. (43) **Pub. Date: Aug. 21, 2025**

(54) **ARCHERY BOW RISERS AND BOW ACCESSORIES HAVING LEVELING DEVICES**

(71) Applicant: **LEVEL TECHNOLOGY SYSTEMS LLC**, Florida, NY (US)

(72) Inventor: **Andrew Forestieri, SR.**, Monroe, NY (US)

(21) Appl. No.: **19/201,793**

(22) Filed: **May 7, 2025**

Related U.S. Application Data

(63) Continuation-in-part of application No. 18/097,251, filed on Jan. 15, 2023.

(60) Provisional application No. 63/643,469, filed on May 7, 2024, provisional application No. 63/653,371, filed on May 30, 2024, provisional application No. 63/758,350, filed on Feb. 14, 2025.

Publication Classification

(51) **Int. Cl.**
F41G 1/467 (2006.01)

(52) **U.S. Cl.**
CPC ***F41G 1/467*** (2013.01)

(57) **ABSTRACT**

Archery bow risers and bow sight devices are provided which comprise integrated level devices for use in, e.g., tuning and installing accessories on archery bows such as compound bows. For example, a bow sight device comprises a mounting bracket configured for attachment to a bow riser, a sight extension bar configured to slidably interface with the mounting bracket, and a first level device disposed on the sight extension bar and oriented in a first direction.

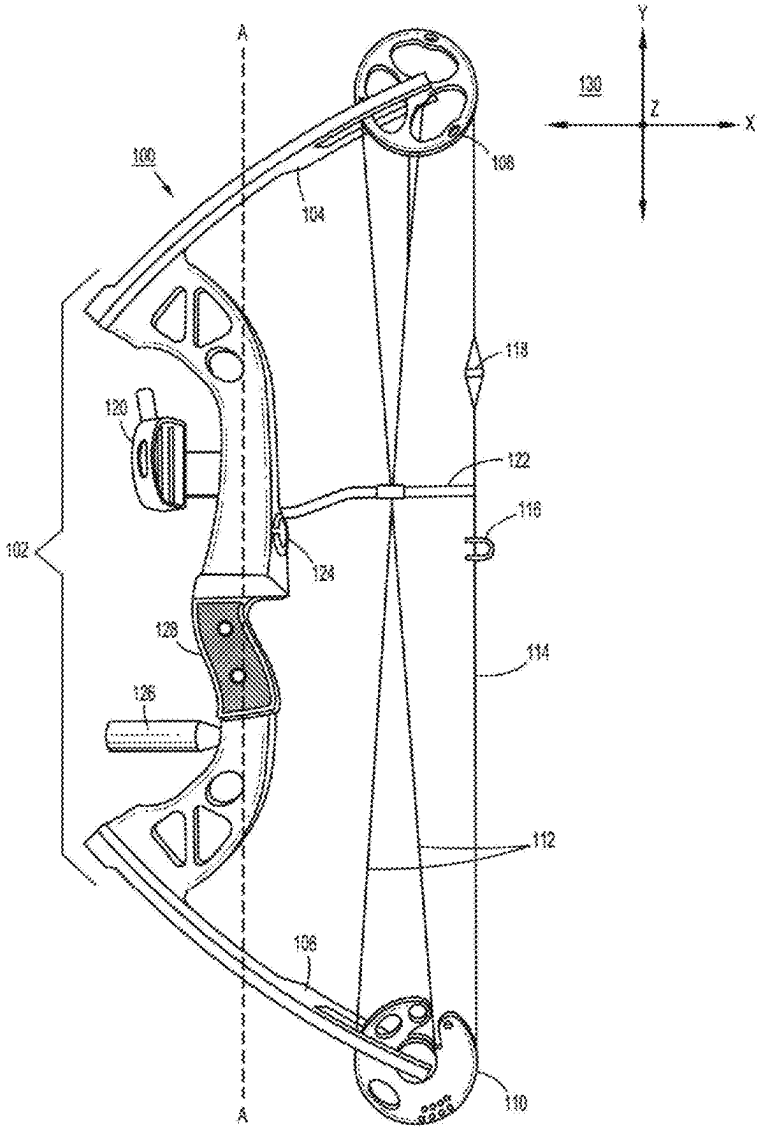
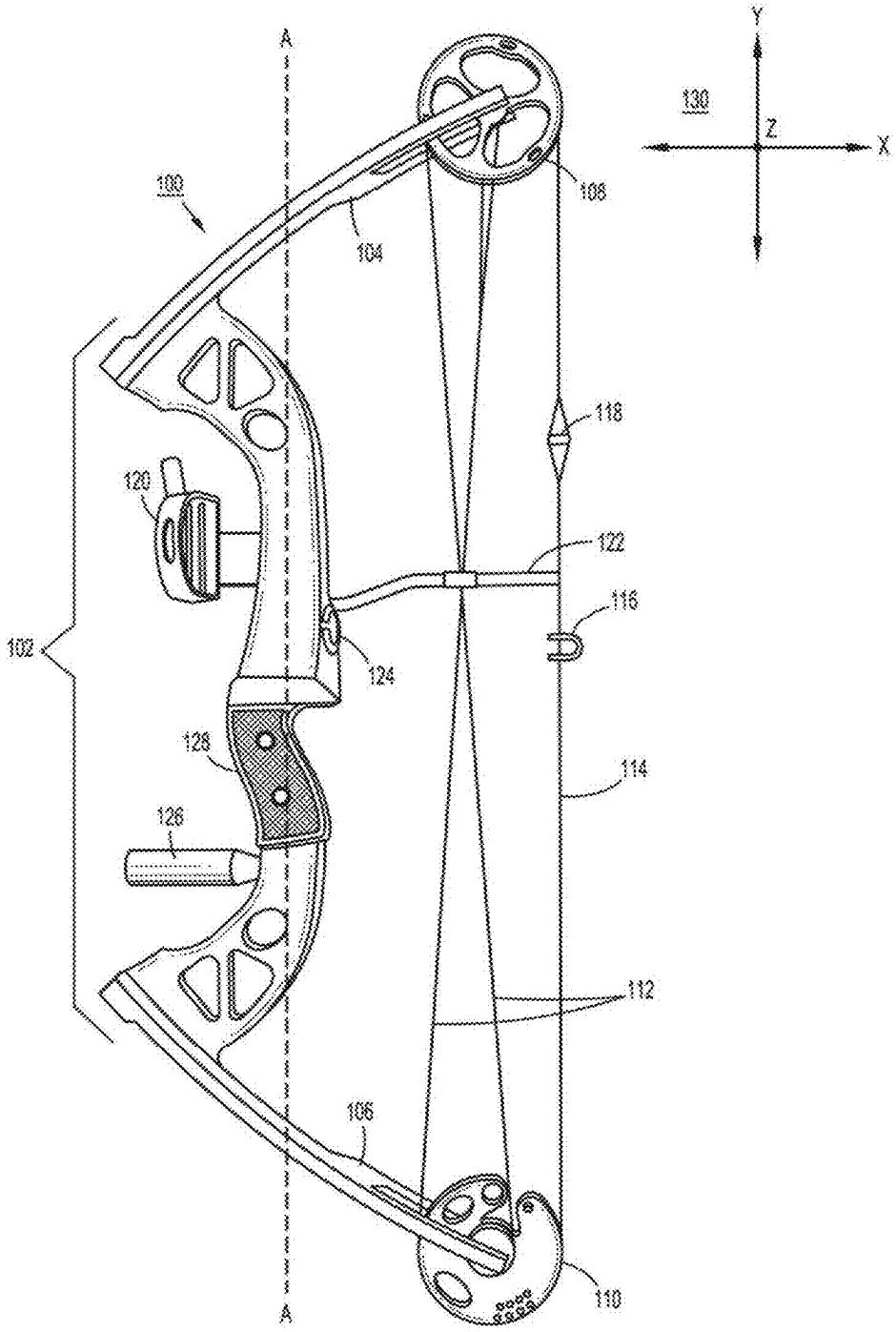


FIG. 1


A
Y
130
Z
X
100
104
108
118
120
122
116
102
124
128
114
126
112
106
110
A

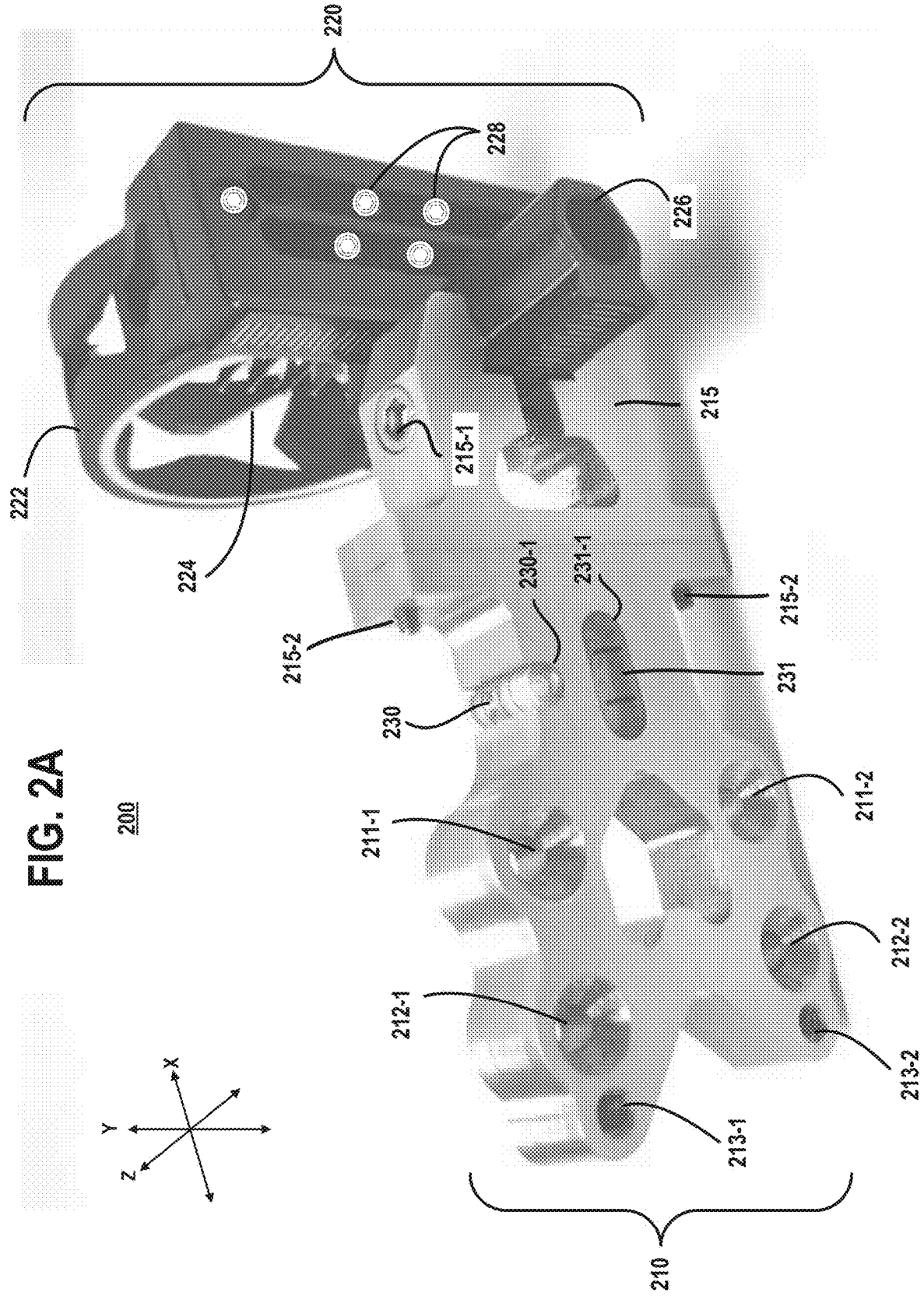

220
228
226
222
224
215-1
215
215-2
230-1
231-1
215-2
230
231
211-1
211-2
212-1
212-2
213-2
213-1
210
200
X
Y
Z

FIG. 2A

FIG. 2B
200

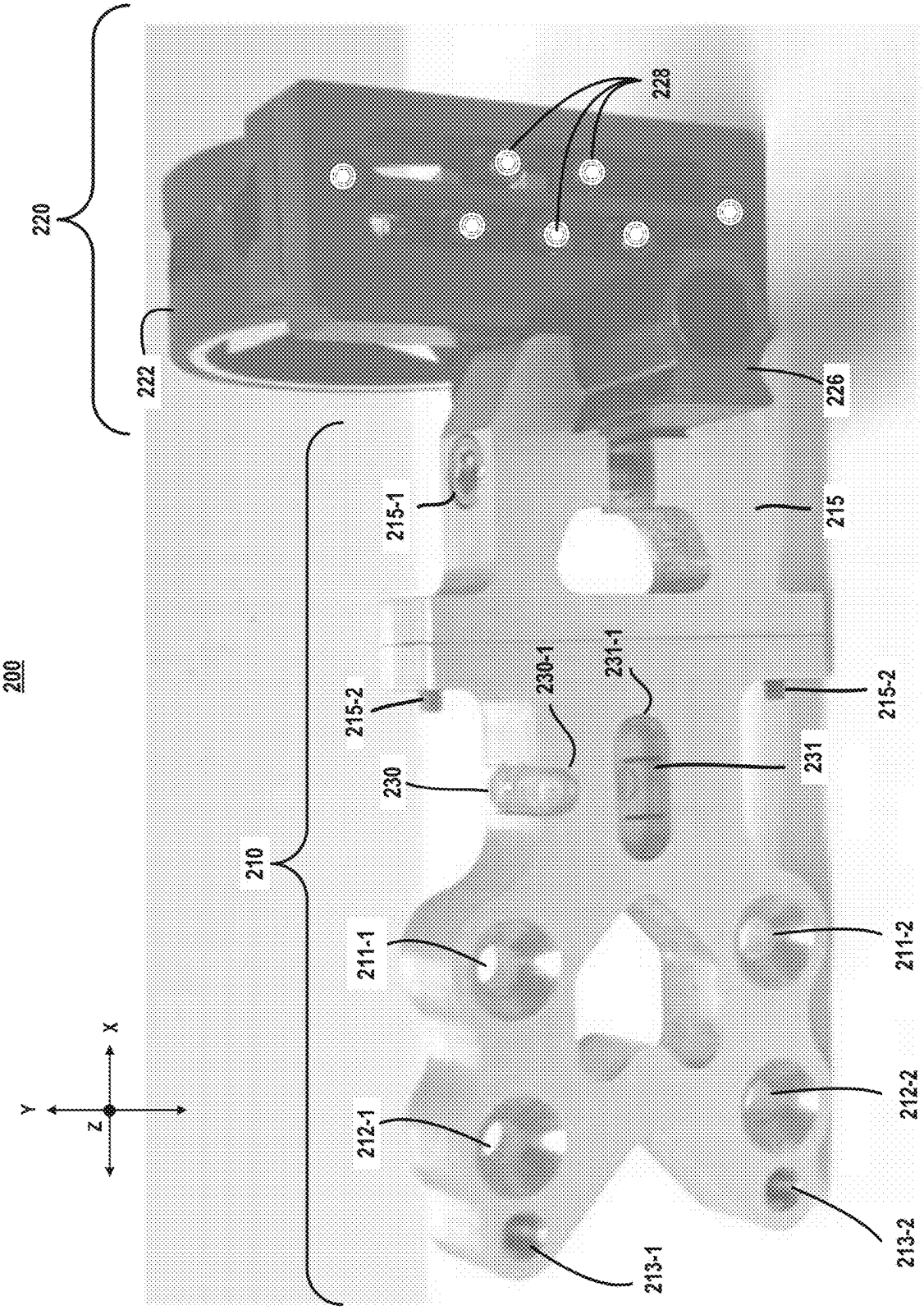

220
222
228
226
210
215-1
215
215-2
230-1
231-1
230
231
211-1
211-2
212-1
212-2
213-1
213-2
X
Y
Z

FIG. 2C

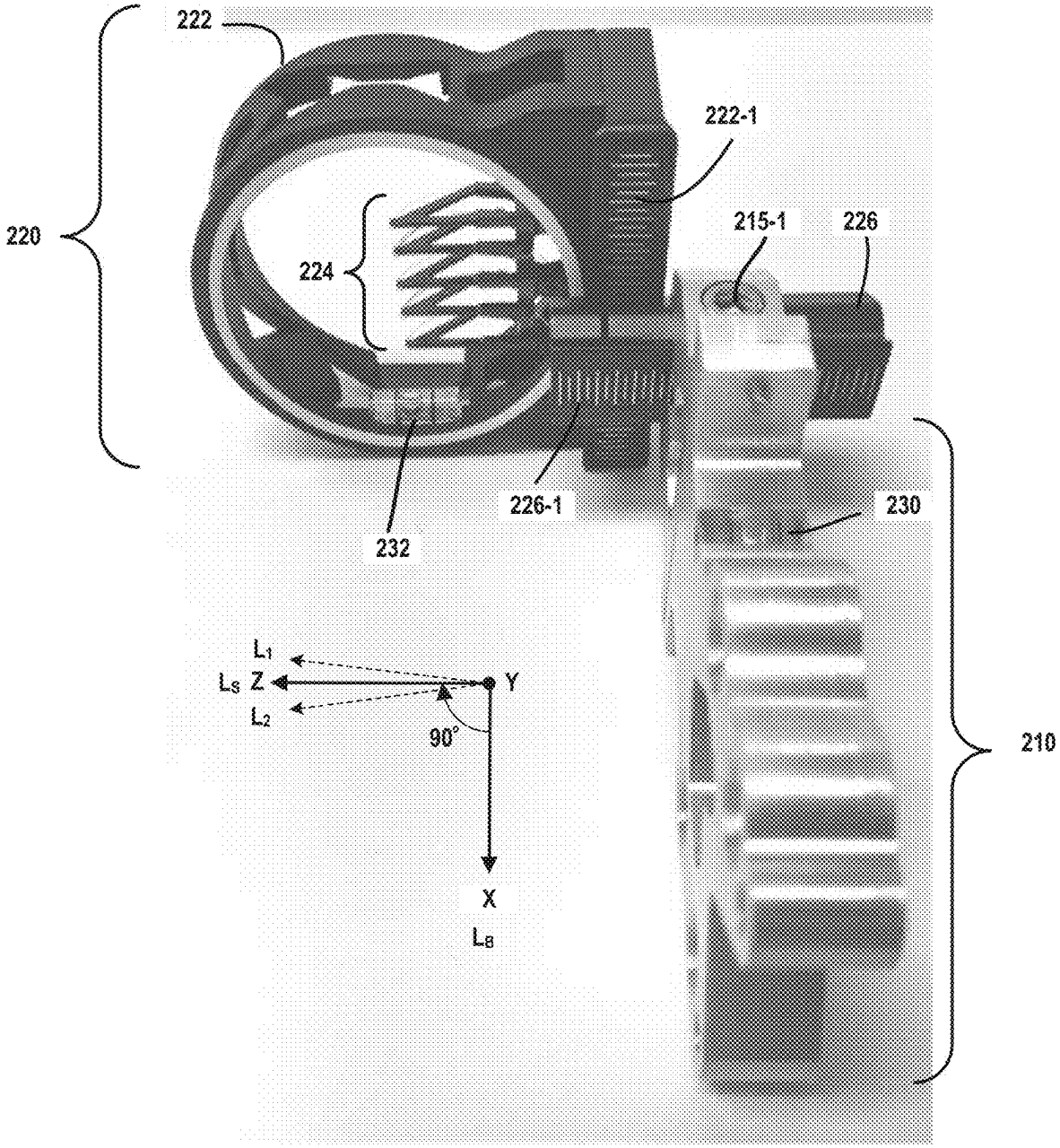


FIG. 3A

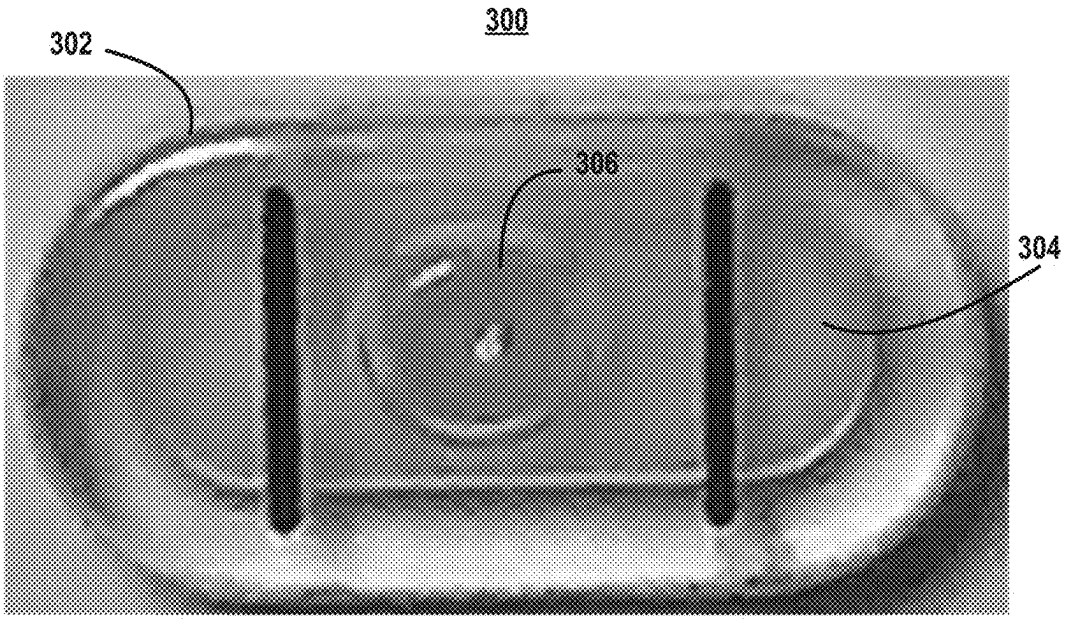


FIG. 3B

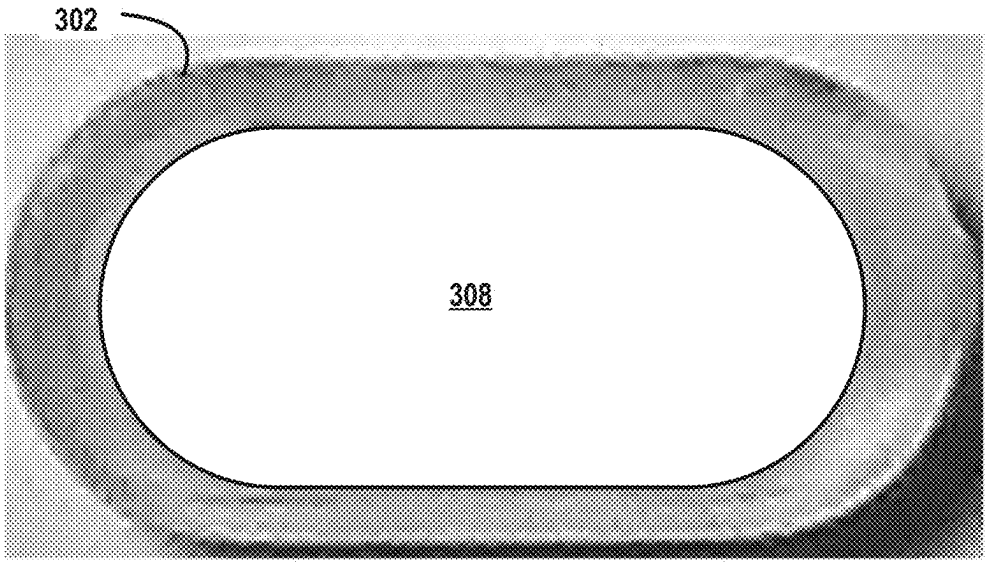


FIG. 4A

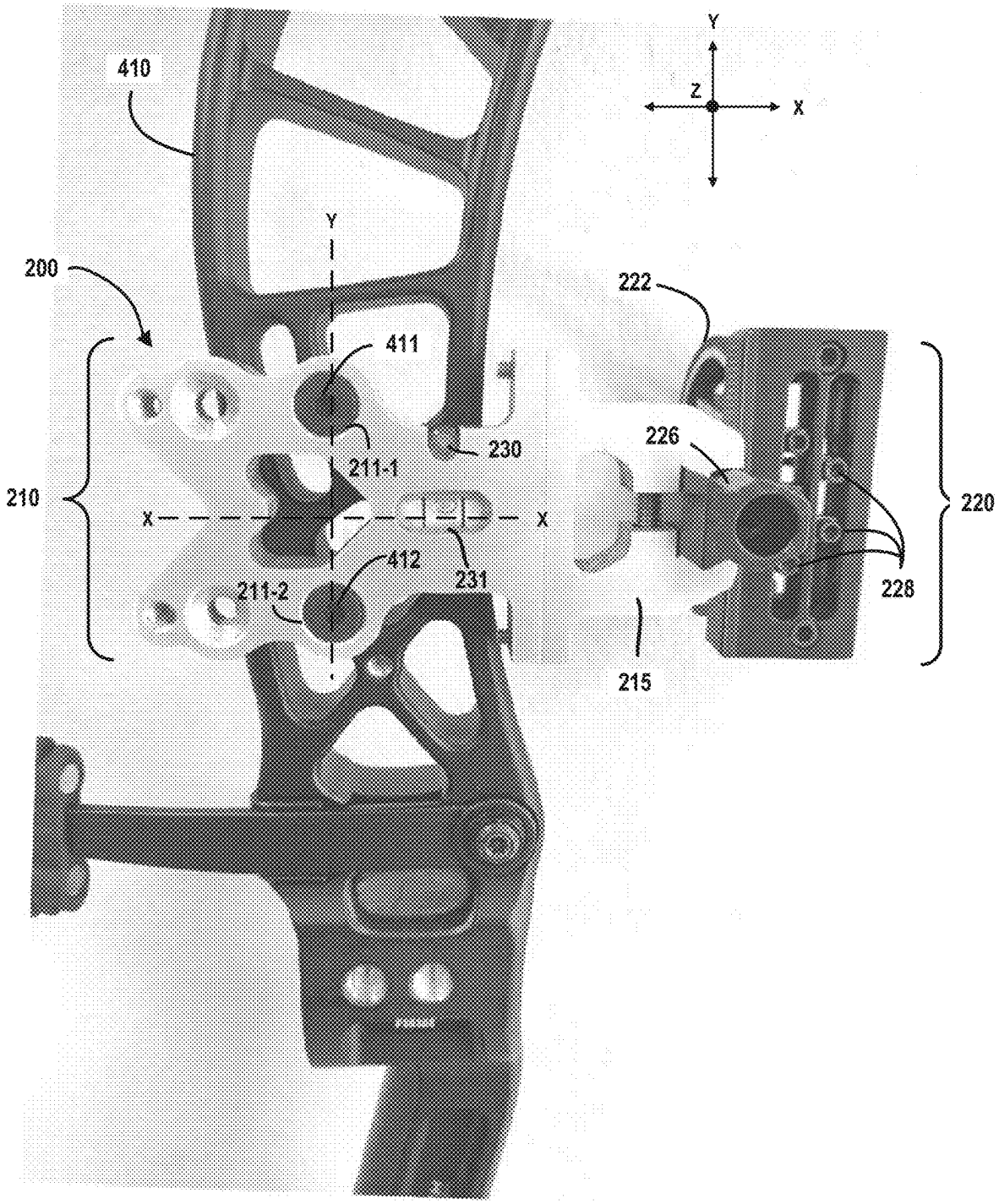

400
410
Y
Z
X
200
222
411
226
230
211-1
210
X
X
220
412
231
211-2
228
215

FIG. 4B

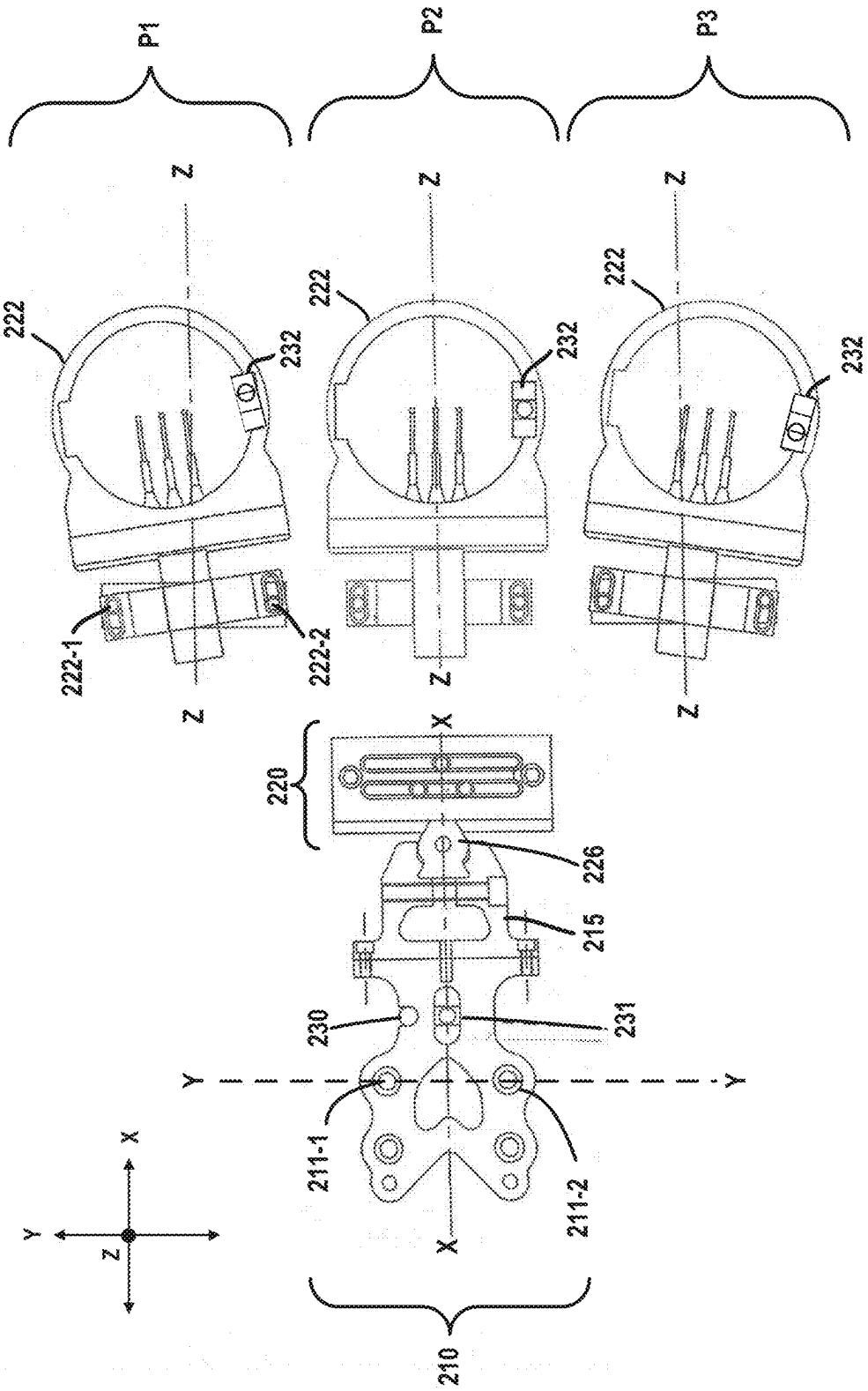


FIG. 5A

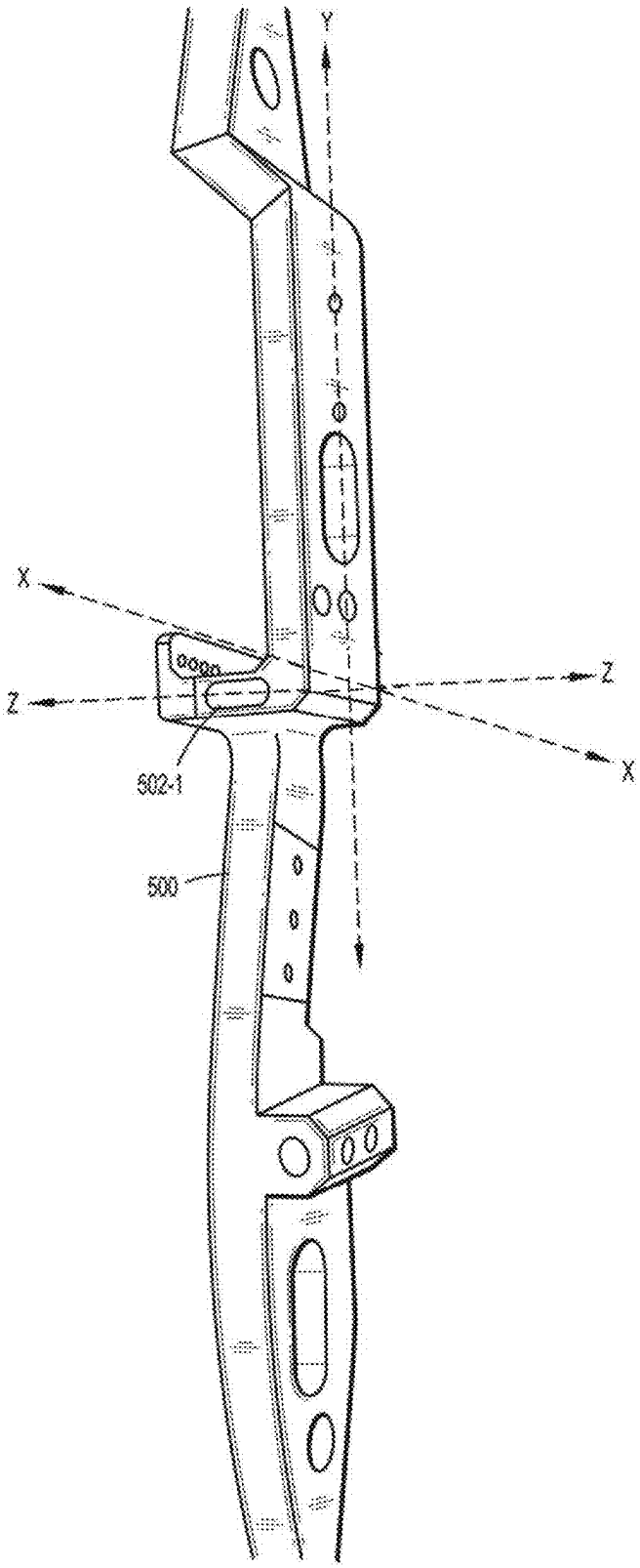


FIG. 5B

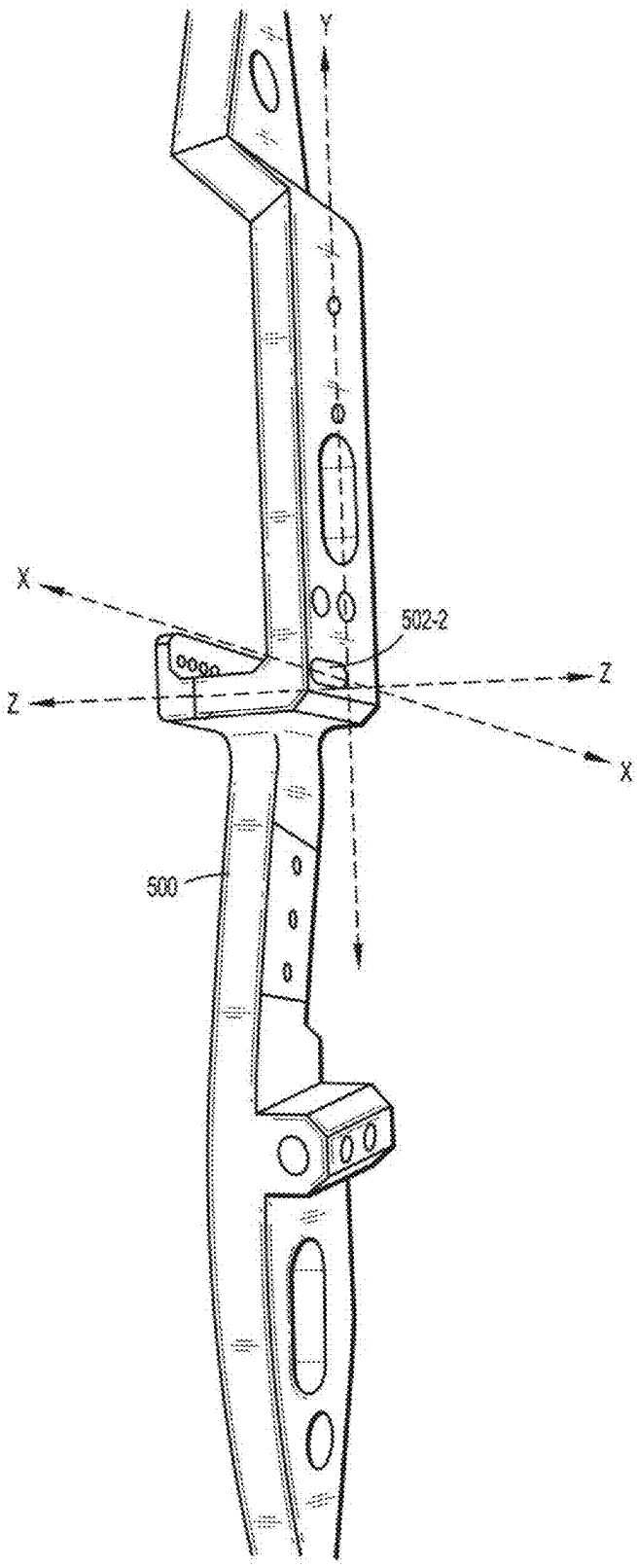


FIG. 6A

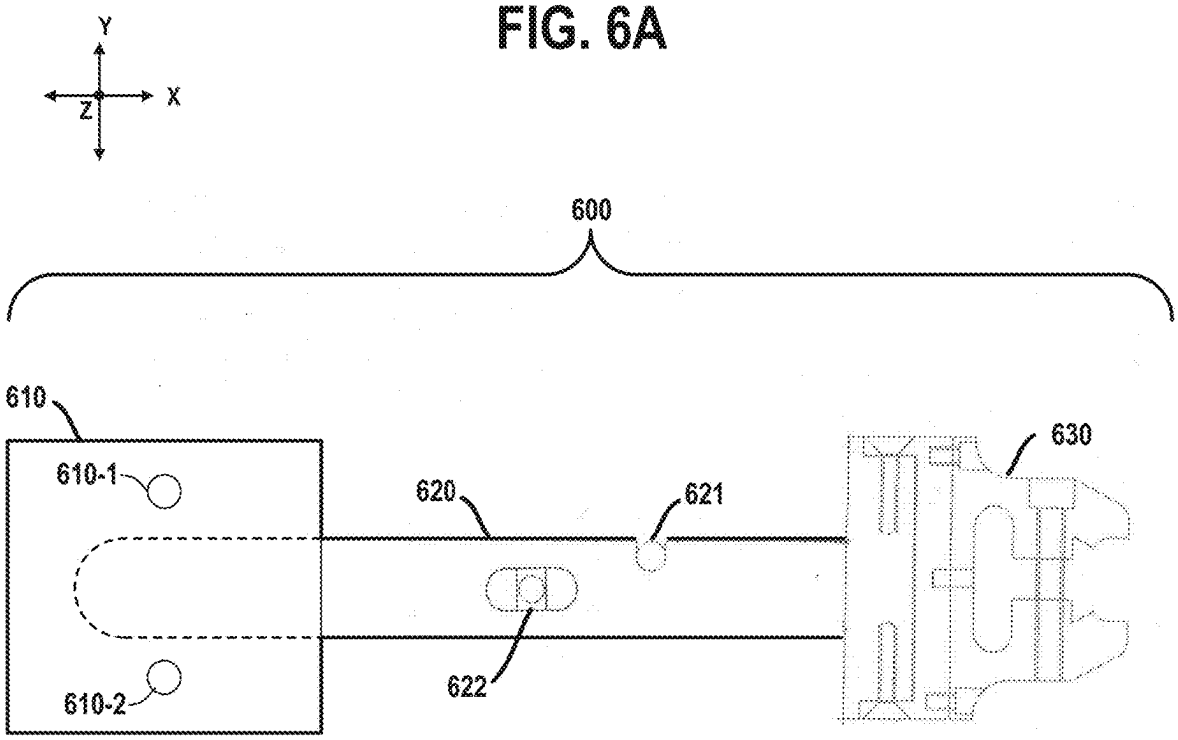


FIG. 6B

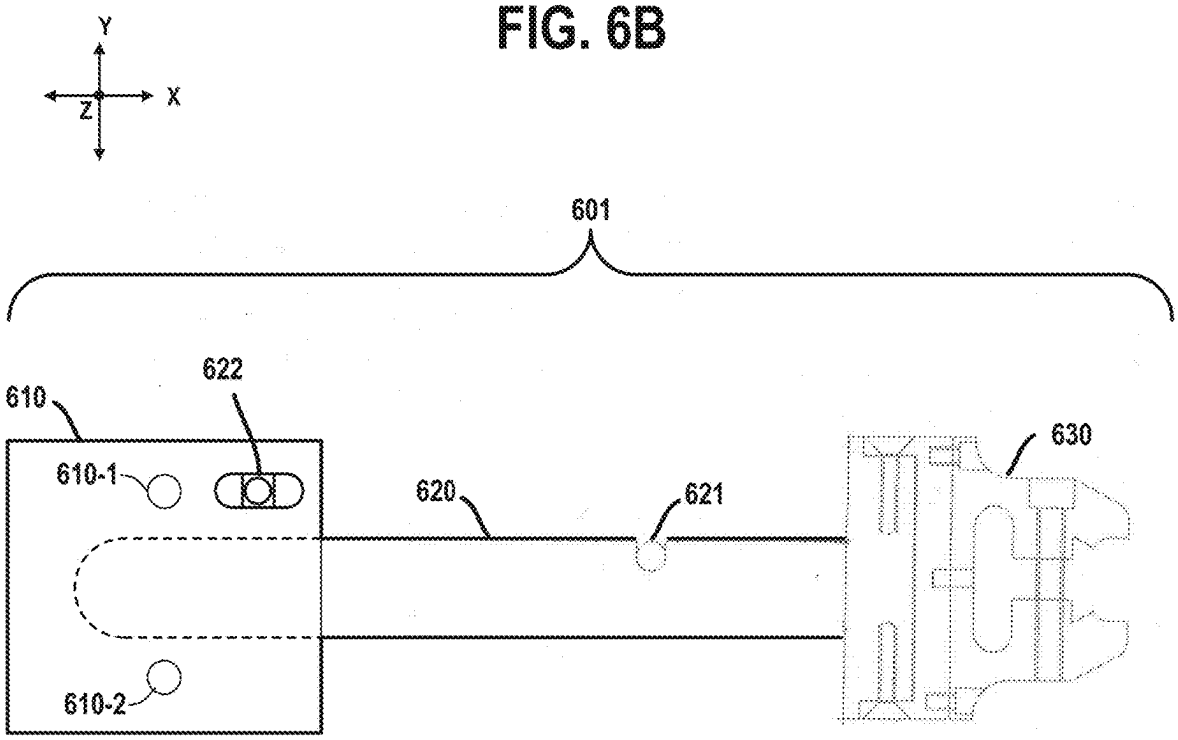


FIG. 7

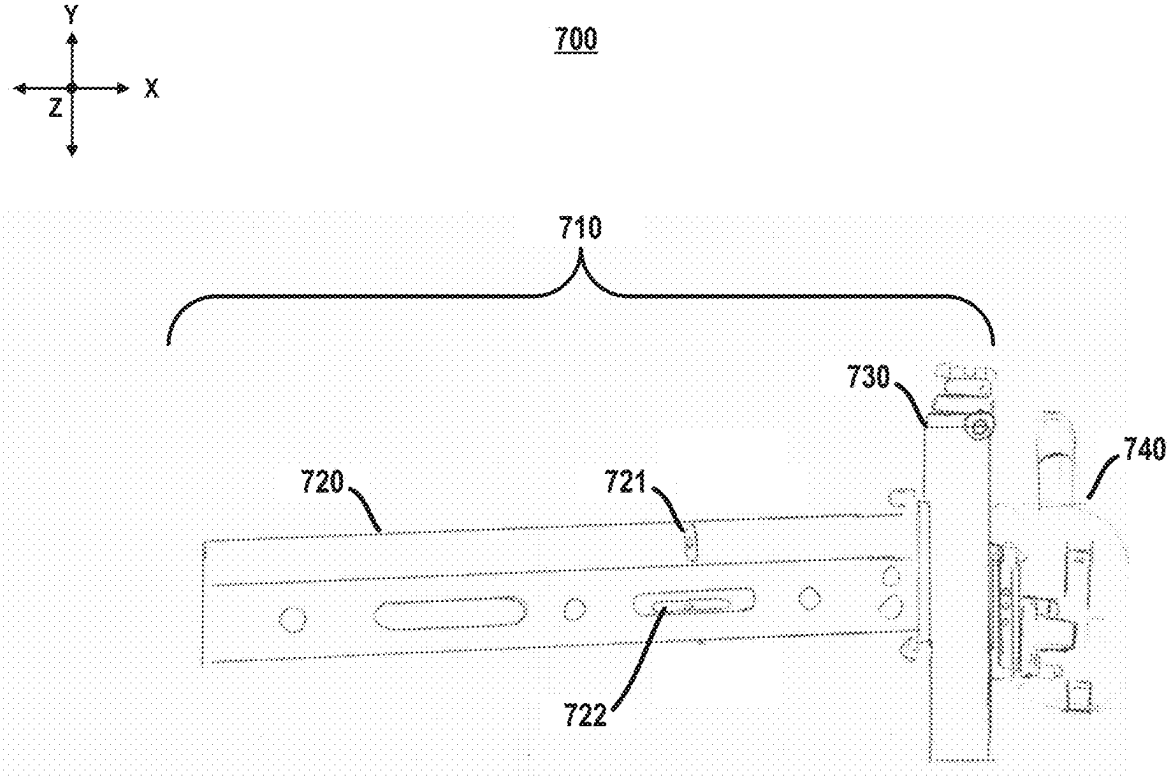


FIG. 8A

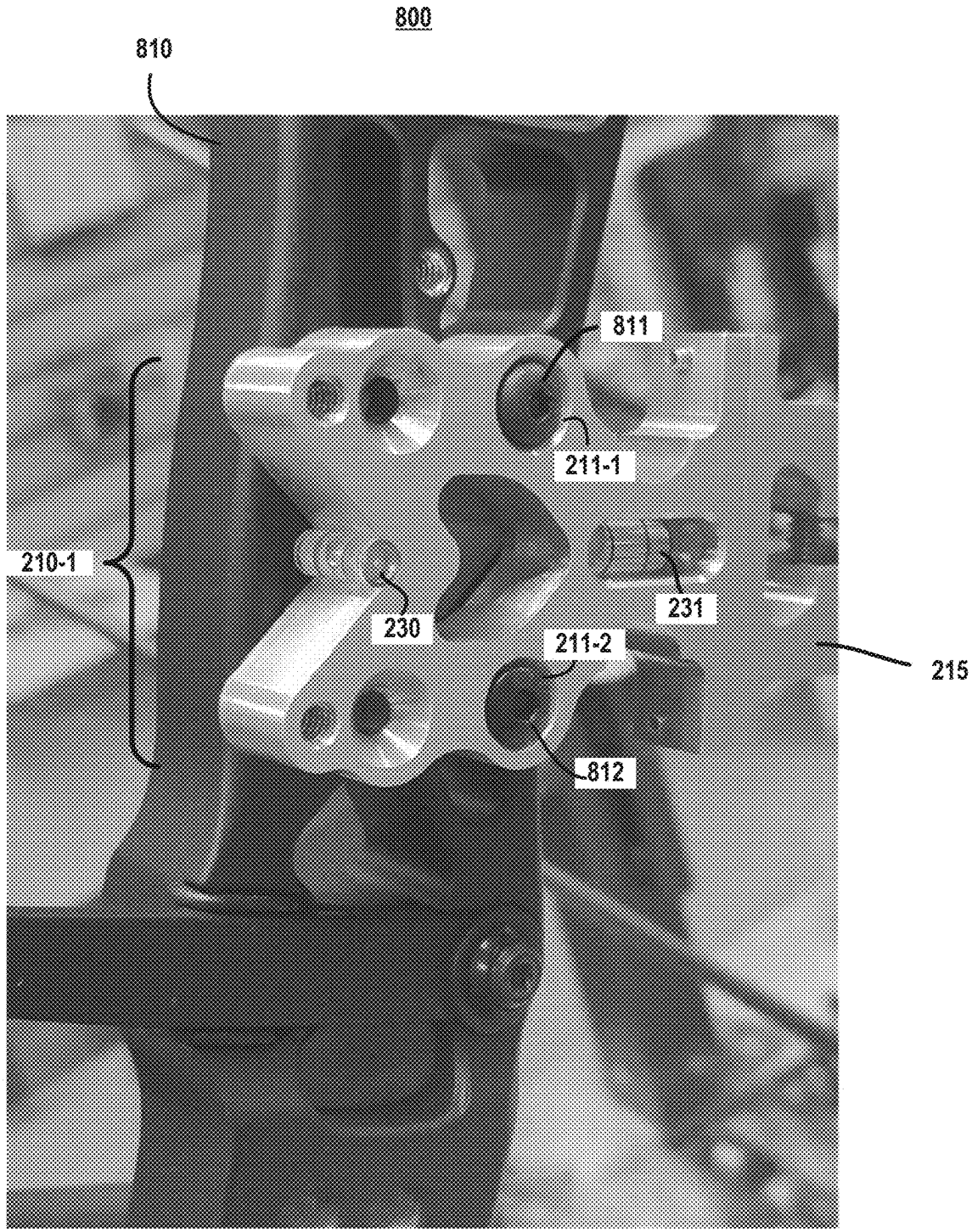


FIG. 8B

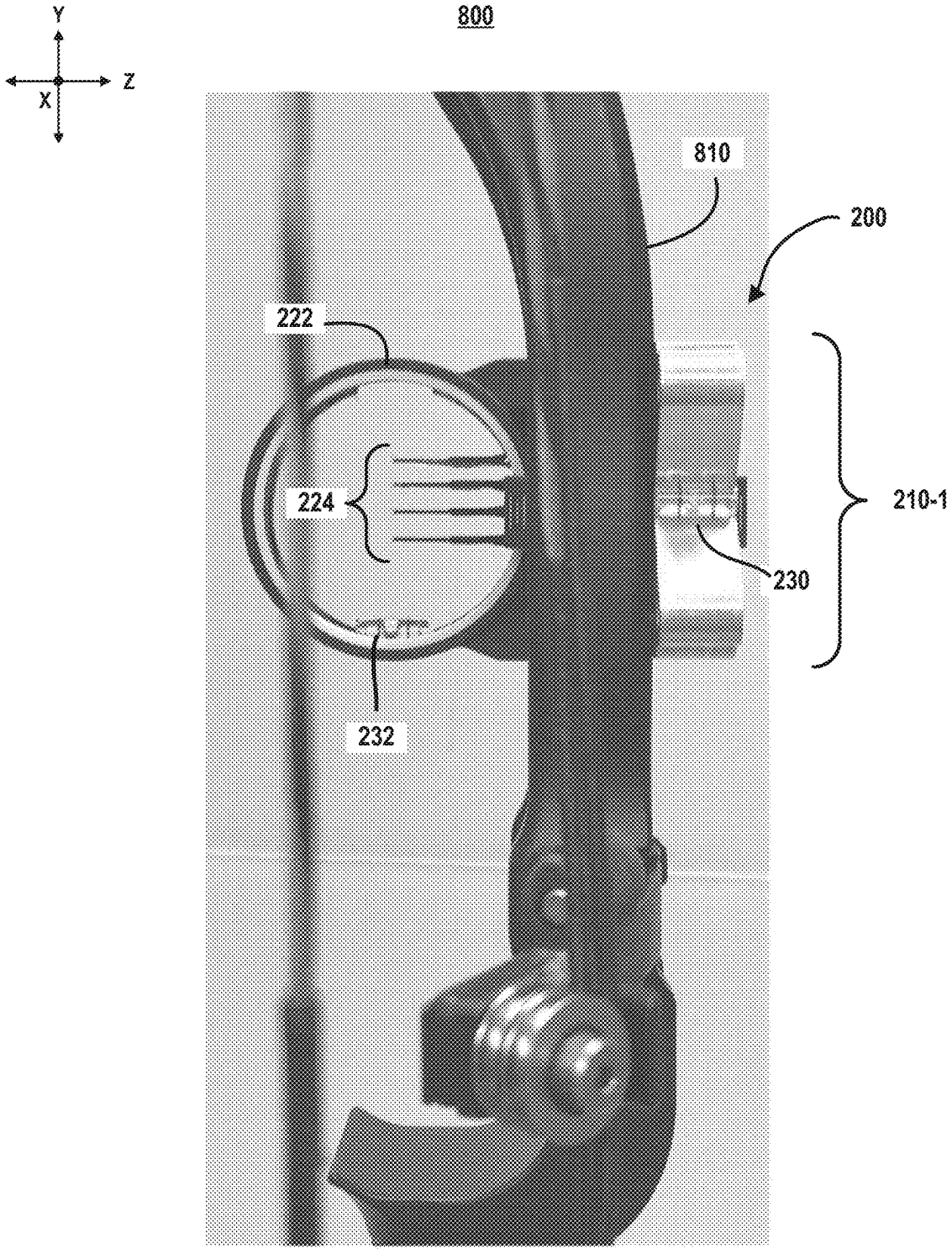


FIG. 9

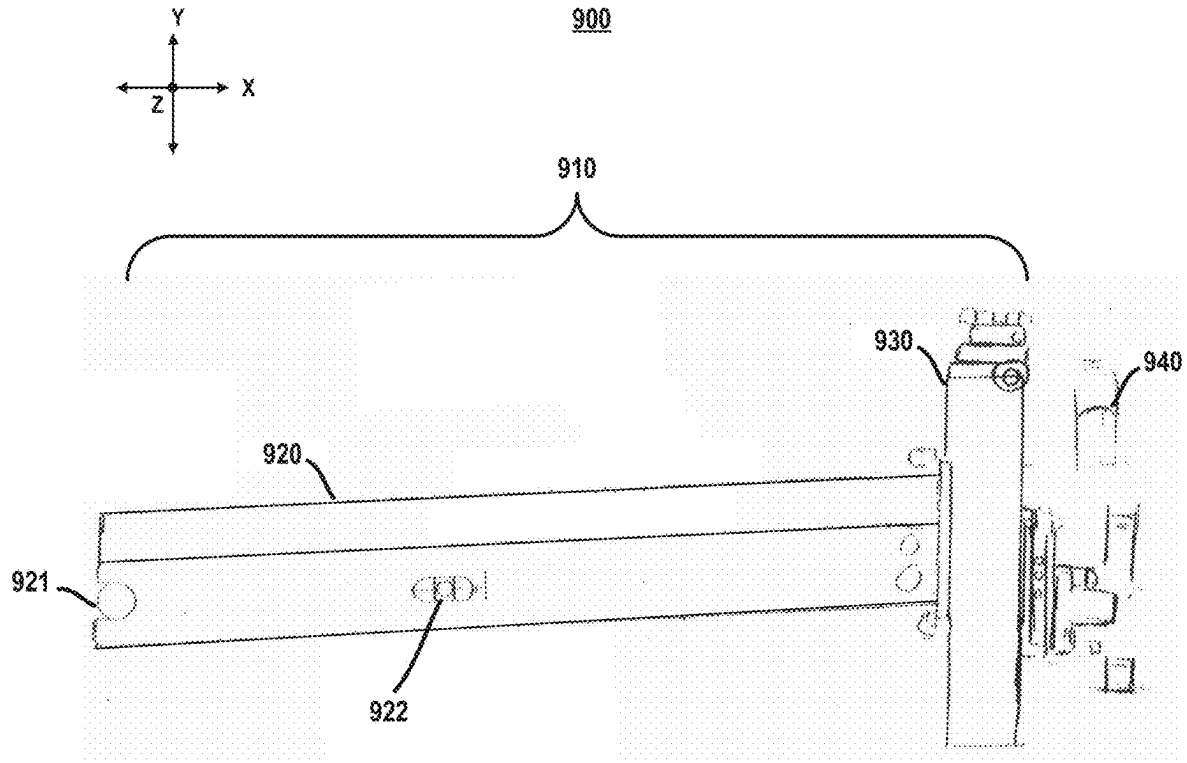


FIG. 10A

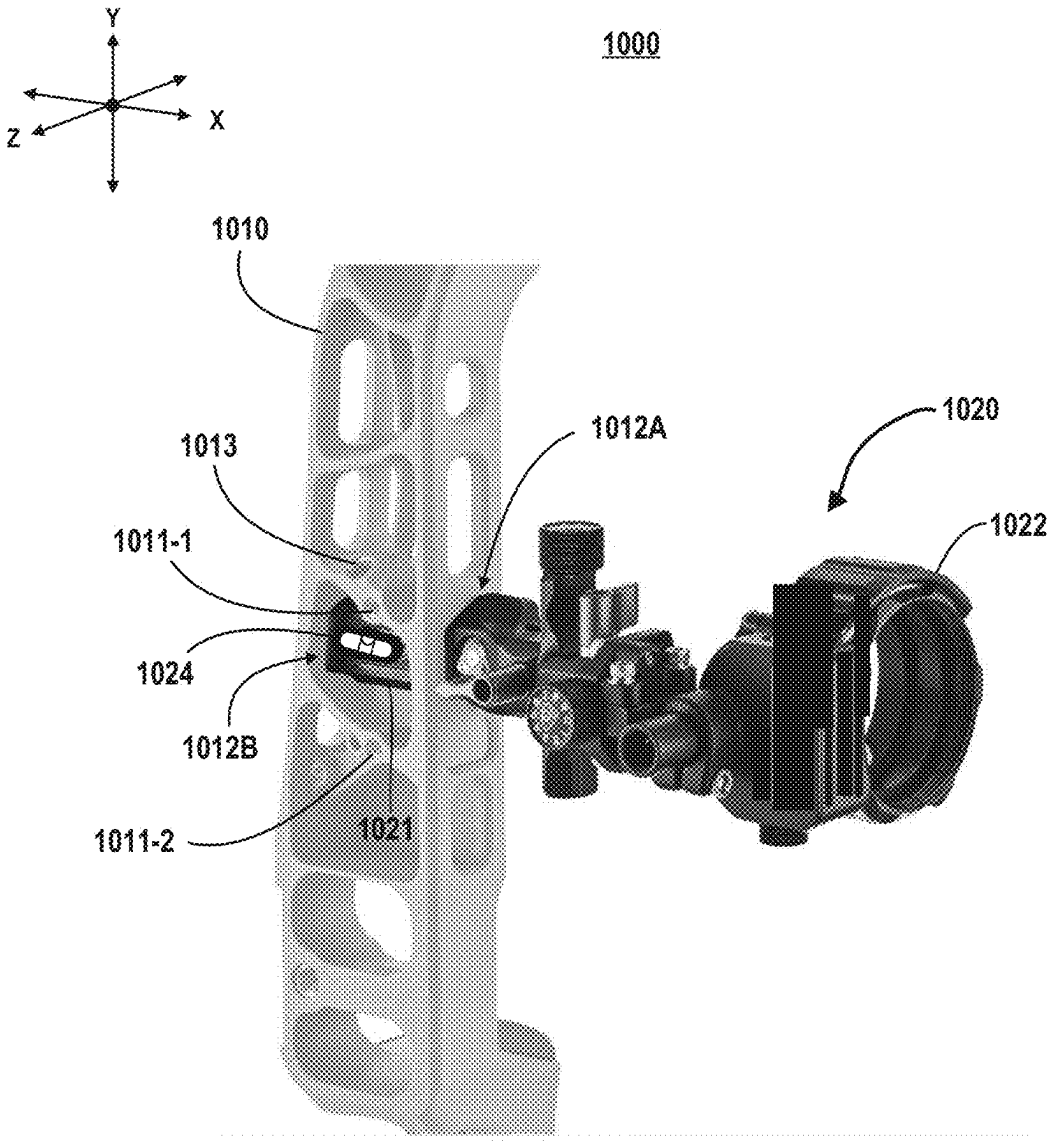
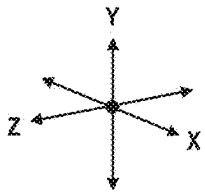

1000
Y
Z
X
1010
1013
1011-1
1024
1012B
1011-2
1021
1012A
1020
1022

FIG. 10B



1020

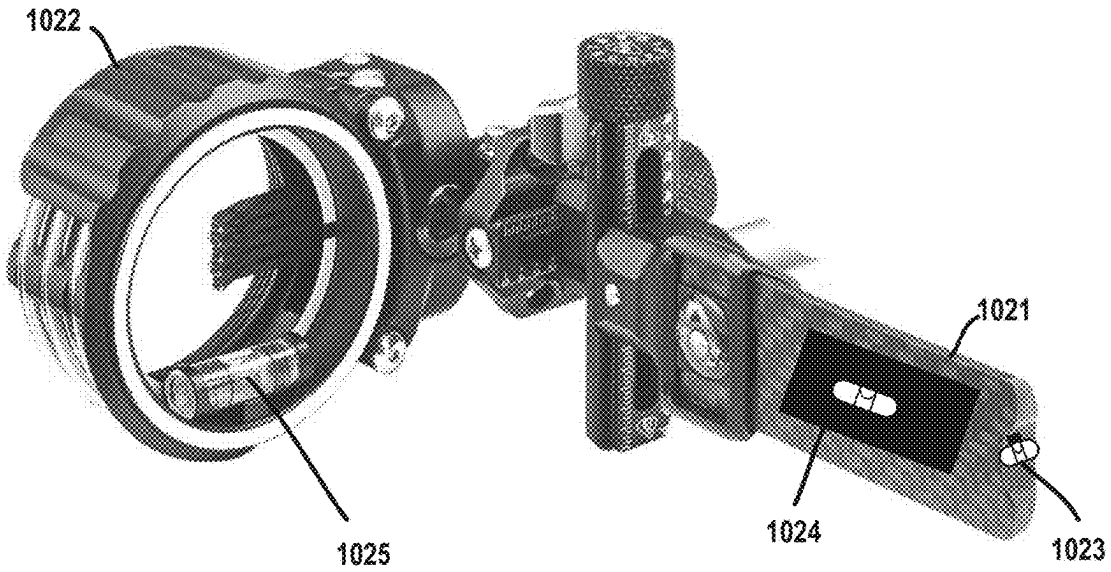


FIG. 11A

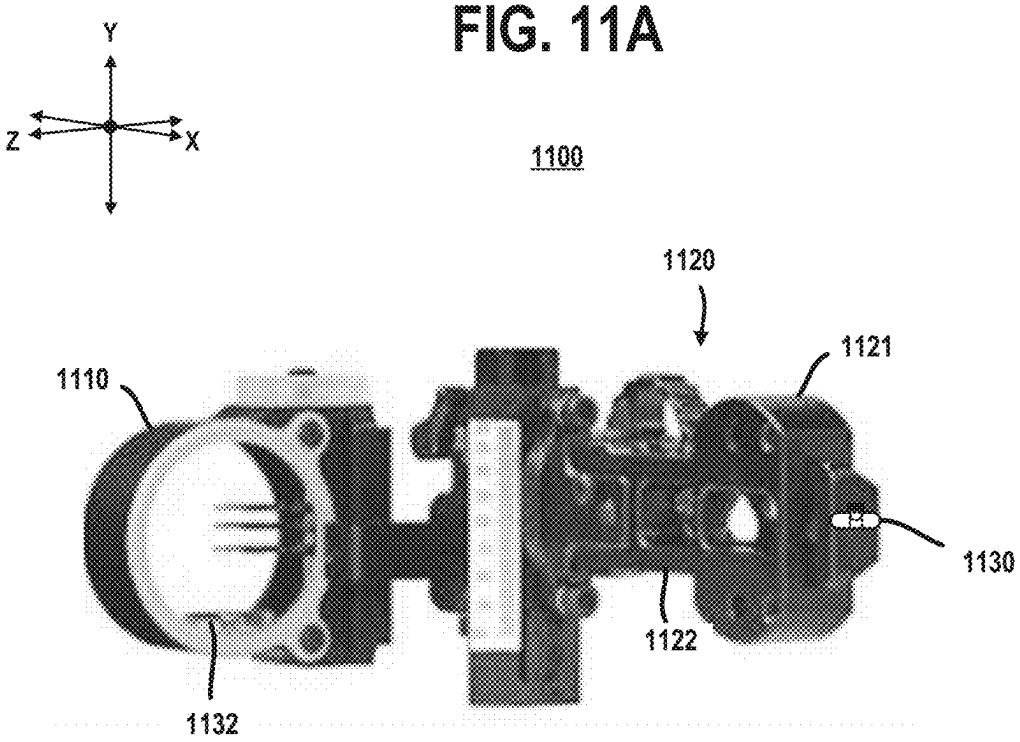


FIG. 11B

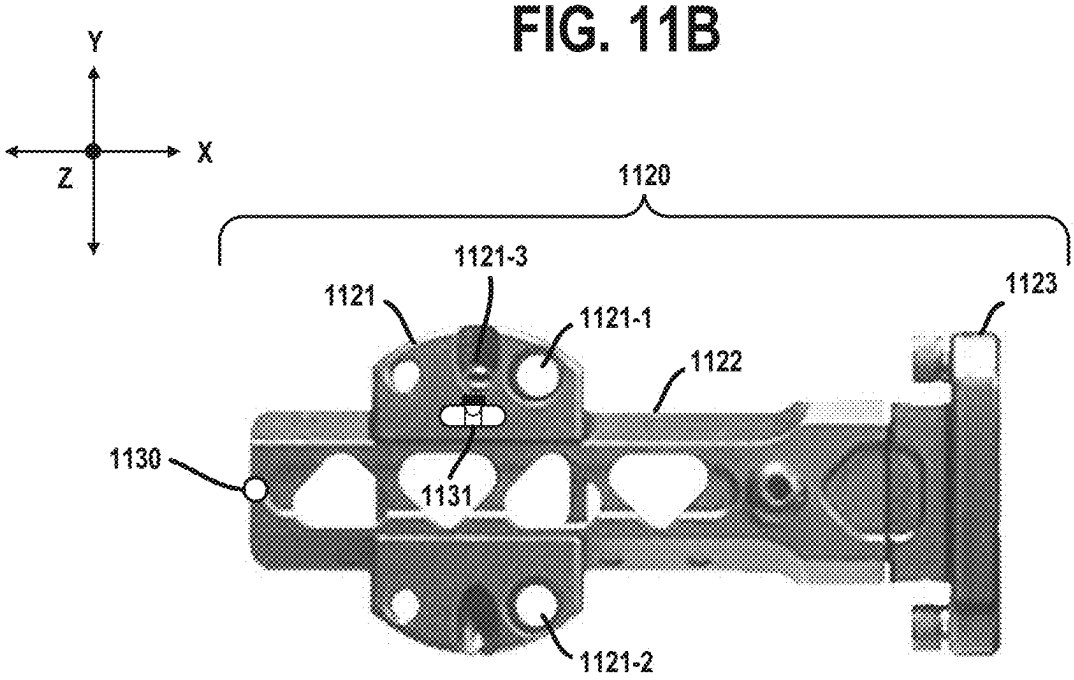
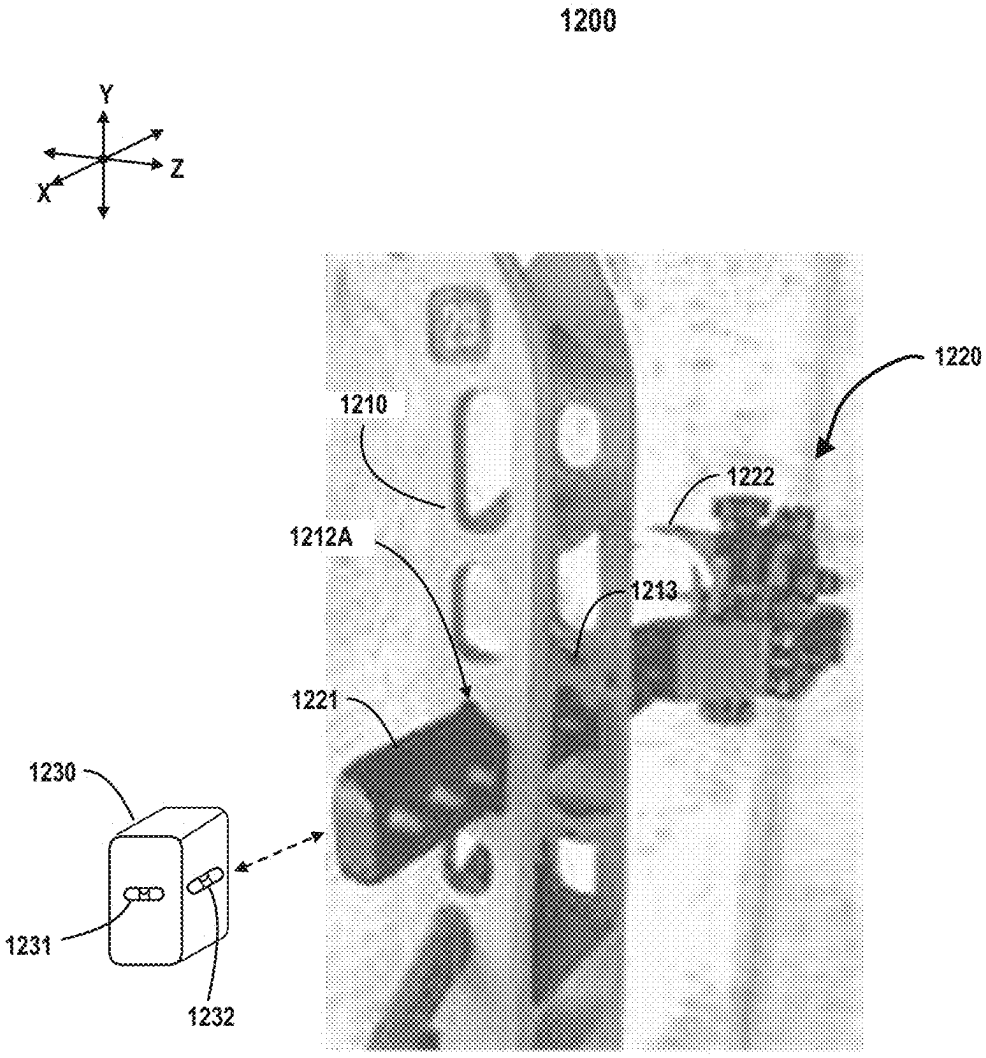


FIG. 12



ARCHERY BOW RISERS AND BOW ACCESSORIES HAVING LEVELING DEVICES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a Continuation-in-Part of U.S. patent application Ser. No. 18/097,251, filed on Jan. 15, 2023, the disclosure of which is incorporated herein by reference. This application claims the benefit of, and priority to, U.S. Provisional Application Ser. No. 63/643,469, filed on May 7, 2024, U.S. Provisional Application Ser. No. 63/653,371, filed on May 30, 2024, and U.S. Provisional Application Ser. No. 63/758,350, filed on Feb. 14, 2025, the disclosures of which are incorporated herein by reference.

BACKGROUND

[0002] This disclosure generally relates to techniques for tuning archery bows such as compound bows. Bowhunting has become an increasingly popular form of recreational hunting. In the early days of bowhunting, hunters used traditional archery bows such as a longbow or a recurve bow. However, the introduction of the compound bow revolutionized the sport of archery and bowhunting, as the compound bow design has proven to be easy to use and can provide higher arrow velocity and precision arrow flight, as compared to traditional bows. In general, archery bows require frequent adjustment, repair, installment, and tuning of bow strings and peep sights, and other accessories such as arrow rests and sighting devices. When tuning an archery bow or installing accessories on an archery bow, it is important to maintain the archery bow in a level orientation. In particular, to ensure precise alignment and proper installation of accessories such as arrows rests, peep sights and sighting devices on a compound bow, for example, it is imperative to fixedly position the compound bow in a level vertical orientation prior to and during such installation.

SUMMARY

[0003] Embodiments of the disclosure generally include archery bow risers and bow accessories having integrated level devices for use in, e.g., tuning and installing accessories on archery bows such as compound bows.

[0004] For example, an exemplary embodiment includes a bow sight device which comprises a mounting bracket configured for attachment to a bow riser, a sight extension bar configured to slidably interface with the mounting bracket, and a first level device disposed on the sight extension bar and oriented in a first direction.

[0005] Another exemplary embodiment includes a bow sight device which comprises an elongated mounting bar configured to slidably engage slots of a bow riser to mount the elongated mounting bar to the bow riser, and a first level device disposed on the elongated mounting bar and oriented in a first direction.

[0006] Another exemplary embodiment includes a bow sight device which comprises a mounting bracket configured for attachment to a bow riser, and a sight housing adjustably connected to the mounting bracket by a sight housing adjustment mechanism. The mounting bracket comprises a first level device and a second level device. The sight housing comprises a third level device. The first level device is disposed on a backside surface of the mounting bracket in a first direction which is orthogonal to a longitudinal axis of the mounting bracket. The second level device is disposed on a sidewall surface of the mounting bracket in a second direction which is parallel to the longitudinal axis of the mounting bracket. The sight housing adjustment mechanism is configured to adjust an orientation of the sight housing so that the third level device is oriented in alignment with the first direction of the first level device.

[0007] These and other embodiments of the disclosure will be described in the following detailed description of embodiments, which is to be read in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. **1** illustrates an example of compound bow that can be tuned and accessorized using leveling devices and methods according to exemplary embodiments of the disclosure.

[0009] FIGS. **2**A, **2**B, and **2**C are perspective views of a bow sight device comprising one or more integrated level devices, according to an exemplary embodiment of the disclosure.

[0010] FIGS. **3**A and **3**B illustrate a level device which can be implemented comprising a bow sight device, according to an exemplary embodiment of the disclosure.

[0011] FIG. **4**A is a perspective view of an apparatus comprising a bow riser and bow sight device mounted to the bow riser, wherein the bow sight device comprises one or more integrated level devices, according to an exemplary embodiment of the disclosure.

[0012] FIG. **4**B schematically illustrates a method for adjusting a bow sight device when mounted to a bow riser, according to an exemplary embodiment of the disclosure.

[0013] FIG. **5**A is a perspective view of a bow riser having an integrated level device, according to an exemplary embodiment of the disclosure.

[0014] FIG. **5**B is a perspective view of a bow riser having an integrated level device, according to another exemplary embodiment of the disclosure.

[0015] FIG. **6**A schematically illustrates a bow sight device comprising one or more integrated level devices, according to another exemplary embodiment of the disclosure.

[0016] FIG. **6**B schematically illustrates a bow sight device comprising one or more integrated level devices, according to another exemplary embodiment of the disclosure.

[0017] FIG. **7** schematically illustrates a bow sight device comprising one or more integrated level devices, according to another exemplary embodiment of the disclosure.

[0018] FIGS. **8**A and **8**B are perspective views of an apparatus comprising a bow riser and a bow sight device mounted to the bow riser, wherein the bow sight device comprises one or more integrated level devices, according to another exemplary embodiment of the disclosure.

[0019] FIG. **9** schematically illustrates a bow sight device comprising one or more integrated level devices, according to another exemplary embodiment of the disclosure.

[0020] FIG. **10**A is a perspective view of an apparatus comprising a bow riser and bow sight device comprising integrated level devices and mounted to the bow riser, according to another exemplary embodiment of the disclosure.

[0021] FIG. **10**B is a perspective view of the bow sight device of FIG. **10**A, according to another exemplary embodiment of the disclosure.

[0022] FIGS. **11**A and **11**B are perspective views of a bow sight device comprising integrated level devices, according to another exemplary embodiment of the disclosure.

[0023] FIG. **12** is a perspective view of an apparatus comprising a bow riser and bow sight device and a cap element having integrated level devices, which can be connected to an end portion of an elongated mounting bar of the bow sight device, according to another exemplary embodiment of the disclosure.

DETAILED DESCRIPTION OF EMBODIMENTS

[0024] Embodiments of the disclosure will now be described in further detail with regard to archery bow risers and bow accessories having integrated level devices for use in, e.g., tuning and installing accessories on archery bows such as compound bows.

[0025] It is to be understood that various features shown in the accompanying drawings are schematic illustrations that are not drawn to scale. Moreover, the same or similar reference numbers are used throughout the drawings to denote the same or similar features, elements, or structures, and thus, a detailed explanation of the same or similar features, elements, or structures will not be repeated for each of the drawings. Further, the term "exemplary" as used herein means "serving as an example, instance, or illustration." Any embodiment or design described herein as "exemplary" is not to be construed as preferred or advantageous over other embodiments or designs. Further, it is to be understood that the phrase "configured to" as used in conjunction with a structure, element, component, etc., providing some functionality, is intended to encompass embodiments where the structure, element, component, etc., is able to provide a specific functionality when in an operational state, as well as cover embodiments where the structure, element, component, etc., is in a non-operational state (e.g., not connected nor otherwise deployed in a given apparatus or system), etc.

[0026] With initial reference to FIG. **1**, an exemplary compound bow **100** is shown, which can be tuned and accessorized using leveling devices and methods according to exemplary embodiments of the disclosure. In general, the compound bow **100** comprises a bow riser **102**, an upper limb **104** and lower limb **106** attached to opposite ends of the bow riser **102**, upper and lower cam elements **108** and **110**, cables **112**, and a bow string **114**. The bow string **114** includes a nocking loop **116** (e.g., D-loop), and a peep sight **118**. Various accessories are attached to the bow riser **102** including, for example, a bow sight device **120**, a cable guard **122**, an arrow rest element **124**, and a stabilizer device **126**. The bow riser **102** comprises a grip region **128**, which is held by an individual when using the compound bow **100**. The functions of the various components of the compound bow **100** shown in FIG. **1** are well known in the art and, therefore, no detailed discussion is necessary for understanding embodiments of the disclosure.

[0027] Briefly, the arrow rest element **124** is a device which is installed on the bow riser **102** and utilized to hold an arrow in place while the arrow is being drawn. The arrow rest element **124** helps stabilize the arrow while shooting the arrow, and reduces vibration of the arrow upon release of the arrow. There are different styles of arrow rests for bows including, e.g., a plunger style, a containment ring style, and a fall away style. The bow sight device **120** is a device that is utilized for accurately aiming an arrow. The bow sight device **120** can have a single sight pin to align with a target, or multiple sight pins that are used to align with a target for different distances.

[0028] The nocking loop **116** is a piece of cord that is attached by, e.g., cinch knots, to the bow string **114** at two points between a "nocking point" of the bow string **114**. The nocking point is the point on the bow string **114** at which an arrow nock element (at an end portion of an arrow shaft) is placed on the bow string **114**. With a D-loop type nocking loop **116**, the nocking point on the bow string **114** is the point located between the two attachment points of the nocking loop **116** on the bow string **114**. The predefined nocking point serves as a common point for placing the arrow nock of an arrow to achieve consistent results when shooting the arrows.

[0029] FIG. **1** further depicts a dashed line A-A which denotes a central longitudinal axis of the bow riser **102**, as well as a three-axis coordinate system **130** including an X-axis, a Y-axis, and a Z-axis, which are all orthogonal in relation to each other. In FIG. **1**, the X-axis and Y-axis are shown to extend orthogonal to each other in a **2**D plane of the drawing, and the Z-axis is shown to extend in a direction in and out of the drawing. Moreover, FIG. **1** shows that the central longitudinal axis A-A of the bow riser **102** extends in the same direction as the Y-axis. In accordance with principles of the disclosure, when tuning the compound bow **100** or when installing accessories on the bow riser **102**, it is desirable to maintain the bow riser **102** level in a vertical direction. By way of specific example, with regard to the coordinate system **130** shown in FIG. **1**, the central longitudinal axis A-A of the bow riser **102** should be maintained level in the Y-axis direction. One method to position the central longitudinal axis A-A of the bow riser **102** in a level vertical orientation is to concurrently position both the X-axis and the Z-axis in a level horizontal orientation. Indeed, by principles of geometry, when the X-axis and the Z-axis are both leveled in a horizontal orientation, it necessarily follows that the Y-axis is level in a vertical orientation. These geometric concepts are implemented in accordance with embodiments of the disclosure which include inventive techniques for utilizing a bow riser and/or the bow sight device with integrated level devices for tuning an archery bow, e.g., determining a nocking point on the bow string, making bow sight adjustments, etc.

[0030] For example, FIGS. **2**A, **2**B, and **2**C are perspective views of a bow sight device **200** comprising one or more integrated level devices, according to an exemplary embodiment of the disclosure. As shown in FIGS. **2**A, **2**B, and **2**C, the bow sight device **200** comprises a mounting bracket **210** and a sight housing **220** (alternatively referred to as sight head) which is adjustably connected to the mounting bracket **210**. The mounting bracket **210** comprises a first set of mounting holes **211-1** and **211-2**, a second set of mounting holes **212-1** and **212-2**, a third set of mounting holes **213-1** and **213-2**, a clamp element **215**, a first level device **230**, and a second level device **231**. The sight housing **220** comprises a sight window **222** (alternatively, sight aperture), a plurality of sight pins **224** disposed within the sight window **222**, a slidable bracket **226**, sight pin adjustment screws **228**, and a level device **232** that is disposed at a base of the sight window **222**.

[0031] The mounting bracket **210** is utilized to mount the bow sight device **200** to a bow riser using either (i) the first set of mounting holes **211-1** and **211-2** or (ii) the second set of mounting holes **212-1** and **212-2**, which allows the sight housing **220** to be disposed on one of two different horizontal distances (e.g., X-direction) from the bow riser. The first set of mounting holes **211-1** and **211-2** and the second set of mounting holes **212-1** and **212-2** are configured to be aligned with industry standard threaded mounting holes that are drilled into a bow riser for mounting a bow sight device to the bow riser. For a first mounting position, threaded bolts are inserted through the first set of mounting holes **211-1** and **211-2** and screwed into the threaded mounting holes of the bow riser. Alternatively, for a second mounting position, threaded bolts are inserted through the second set of mounting holes **212-1** and **212-2** and screwed into the threaded mounting holes of the bow riser. In some embodiments, the third set of mounting holes **213-1** and **213-2** are utilized for mounting a bow accessory such as a bow quiver to the mounting bracket **210**.

[0032] The clamp element **215** of the mounting bracket **210** is configured to slidably interface and engage with the slidable bracket **226** of the sight housing **220**. The clamp element **215** comprises a locking screw **215-1** which is used to (i) tighten the clamp element **215** to either fixedly secure the slidable bracket **226** in a desired position, or (ii) loosen the clamp element **215** to allow the slidable bracket **226** to be adjustably moved (e.g., along the Z-axis) into a desired position. As shown in FIG. **2**C, the slidable bracket **226** comprises a series of alignment marks **226-1** which are used as a guide to incrementally adjust the horizontal position (e.g., along the Z-axis direction) of the sight window **222** left or right, which provides a windage adjustment mechanism (e.g., essentially to dial in a wind offset into the sight window **222**) to compensate for wind. As further shown in FIG. **2**C, the sight window **222** comprises a series of alignment marks **222-1** which are used as a guide to incrementally adjust the vertical position (e.g., along the Y-axis direction) of the sight window **222** up or down, which provides an elevation adjustment mechanism to compensate for elevation when shooting an arrow.

[0033] In some embodiments, the clamp element **215** is screwed to the main body of the mounting bracket **210** using screws **215-2**. This allows the clamp element **215** to be removably attached to the main body of the mounting bracket **21**. In this regard, the clamp element **215** comprises a modular component which can have different structural configurations to slidably interface with slide bars of other sight housing devices. In other words, the mounting bracket **210** can be a universal mounting bracket that can be used with different (commercially available) sight housing devices by selectively using a given modular clamp element **215** which is designed to interface with the slide bar of a desired sight housing device.

[0034] As shown in FIG. **2**C, in an exemplary embodiment, the bow sight device **200** comprises a multi-pin sighting device where the plurality of sight pins **224** in the sight window **222** comprise five (5) sight pins. The different sight pins correspond to different shooting distances. For example, in the exemplary embodiment shown in FIG. **2**C, the 5 sight pins may correspond to 20, 30, 40, 50, and 60 yards, respectively, where the upper most sight pin corresponds to 20 yards, and the lower most sight pin corresponds to 60 yards. In other embodiments, the sight window **222** may have 7 sight pins, 3 sight pins, or just one sight pin, as desired. The different sight pins are often implemented with different color markings or constructed with fiber-optics for visibility, which allows an archer to more easily differentiate the different pins/distances. At full draw, an archer will align a target at a given distance with a corresponding sight pin for aiming.

[0035] In some embodiments, the level devices **230**, **231**, and **232** of the bow sight device **200** comprise bubble level devices. The first level device **230** is disposed in a retaining cavity/channel **230-1** that is formed on a upper surface of the mounting bracket **210**. The second level device **231** is disposed in a rounded rectangular-shaped cavity **231-1** formed in a sidewall surface of the mounting bracket **210**. In some embodiments, the rounded rectangular-shaped cavity **231-1** is formed on one sidewall surface of the mounting bracket **210** and not exposed on the opposite sidewall surface of the mounting bracket **210**. The level device **232** is fixedly attached to a bottom region of the sight window **222**. In some embodiments, the level devices **230** and **232** are tubular-shaped bubble levels. On the other hand, in some embodiments, the level device **231** comprises a rounded rectangular-shaped profile.

[0036] For example, FIGS. **3**A and **3**B illustrate a level device which can be implemented with a bow sight device, according to an exemplary embodiment of the disclosure. In particular, FIGS. **3**A and **3**B illustrate a bubble level device **300** having a rounded rectangular-shaped profile, which is an exemplary embodiment of the bubble level device **231** shown in FIGS. **2**A, **2**B, and **2**C. FIG. **3**A illustrates a top view of the rounded rectangular-shaped bubble level device **300**, which shows that the bubble level device **300** comprises an outer shell **302** with a rounded rectangular-shaped profile, and an inner cavity **304** which is incompletely filled with a liquid (e.g., colored alcohol) leaving a bubble **306** in the inner cavity **304**. FIG. **3**B illustrates a bottom view of the rounded rectangular-shaped bubble level device **300**, which shows that the bubble level device **300** comprises planar bottom surface with an opaque capping layer **308** which encloses the inner cavity **304** and maintains the liquid within the inner cavity **304**. The planar bottom surface of the bubble level device **300** is disposed on a bottom recessed surface of the rounded rectangular-shaped cavity **231-1** that is formed in the sidewall surface of the mounting bracket **210** of FIGS. **2**A-**2**C.

[0037] In some embodiments, the level devices **230**, **231**, and **232** of the bow sight device **200** are utilized to position a bow riser in a true vertically level position, and aid in performing bow tuning operations for tuning an archery bow, such as determining a nocking point on the bow string, making bow sight adjustments (first, second, and third axis adjustments), and installing other bow accessories such as installing an arrow rest on a bow riser, etc., the details of which will be explained in detail below in conjunction with FIGS. **4**A and **4**B.

[0038] To facilitate such bow tuning operations, referring to FIG. **2**B, the first set of mounting holes **211-1** and **211-2** of the mounting bracket **210** are formed in vertical alignment in a Y-direction, wherein the first set of mounting holes **211-1** and **211-2** are aligned along a longitudinal axis A-A of the bow riser (e.g., as shown in FIG. **1**) when the bow sight device **200** is mounted to the bow riser using the first set of mounting holes **211-1** and **211-2**. Similarly, the second set of mounting holes **212-1** and **212-2** of the mounting bracket

210 are formed in vertical alignment in a Y-direction, wherein the second set of mounting holes **212-1** and **212-2** are aligned along the longitudinal axis A-A of the bow riser (FIG. **1**), when the bow sight device **200** is mounted to the bow riser using the second set of mounting holes **212-1** and **212-2**. As further shown in FIG. **2**B, the retaining cavity **231-1** and the bubble level device **231** are horizontally disposed along a first direction (X-axis direction) which is orthogonal to the Y-axis and Z-axis directions. Moreover, the retaining cavity **230-1** and the bubble level device **230** are horizontally disposed along a second direction (Z-axis direction) which is orthogonal to the Y-axis and X-axis directions.

[0039] With the exemplary structural configuration of the bow sight device **200** as shown in FIGS. **2**A-**2**C, each level device **230**, **231**, and **232** has a specific use for tuning, wherein such uses are independent of each other. For example, as explained in further detail below, the level device **231** on the sidewall surface of the mounting bracket **210** is utilized (independent of the level devices **230** and **232**) to set a nocking point on a bow string. In addition, the level device **231** is utilized (independent of the level devices **230** and **232**) to adjust a "first axis" of the bow sight device **200**. Further, the level device **230** is utilized (independent of the level device **231**) to adjust a "second axis" and a "third axis" of the bow sight device, using techniques as will now be described in further detail in conjunction with FIGS. **4**A and **4**B.

[0040] FIG. **4**A is a perspective view of an apparatus comprising a bow riser and a bow sight device mounted to the bow riser, wherein the bow sight device comprises one or more integrated level devices, according to an exemplary embodiment of the disclosure. In particular, FIG. **4**A illustrates an apparatus **400** comprising a bow riser **410** having the exemplary bow sight device **200** (of FIGS. **2**A-**2**C) mounted thereon. In the exemplary configuration shown in FIG. **4**A, the bow sight device **200** is mounted to the bow riser **410** using first and second threaded bolts **411** and **412** which are inserted through the first set of mounting holes **211-1** and **211-2** of the mounting bracket **210** and screwed into standard mounting holes that are drilled into the bow riser **410** for attaching the bow sight device **200** to the bow riser **410**. With the exemplary bow sight device **200** mounted to the bow riser **410**, the bow sight device **200** can be used to, e.g., facilitate bow tuning operations, perform adjustments of the bow sight device, and facilitate the installation of other bow accessories to the bow riser **410**.

[0041] For example, with the structural configuration shown in FIG. **4**A, as noted above, the bubble level device **231** on the sidewall surface of the mounting bracket **210** can be utilized (independent of the level devices **230** and **232**) to set a nocking point on a bow string using a tuning process as follows. Initially, the bow riser **410** can be placed into a position where the bubble level device **231** indicates a level horizontal orientation along the X-axis. With the horizontal X-axis in a level orientation, the nocking point on the bow string can be determined irrespective of whether or not the bubble level device **230** on the upper surface of the mounting bracket **210** indicates a level orientation of the Z-axis. In other words, the nocking point on the bow string can be determined irrespective of whether the bubble level device **230** indicates a horizontal level orientation of the Z-axis.

[0042] Assuming that an arrow rest device is already installed on the bow riser **410**, with the bubble level device **231** indicating that the horizontal X-axis is level, an arrow is placed in the arrow rest device and a nock element at the end of the arrow shaft is placed onto the bow string. A hand held level device (e.g., custom arrow level tool) is then placed on the arrow shaft, and the nock end of the arrow shaft is moved up or down on the bow string until the handheld arrow level device indicates that the arrow shaft is level. The nocking point will be the point on the bow string where the nock element of the arrow is positioned when the arrow shaft is horizontally level in the same horizontal X-axis orientation as indicated by the bubble level device **231** on the sidewall of the mounting bracket **210**. Again, it is to be noted that the nocking point can be accurately determined irrespective of whether the bow sight device **200** is level in the Z-axis direction.

[0043] It is to be appreciated that since the bow sight device **200** remains mounted to the bow riser, after some period of time of shooting arrows, an archer can recheck the arrow nocking position to make sure it has not moved. The nocking point can be rechecked using the same process as discussed above in conjunction with the bubble level device **231** on the sidewall of the mounting bracket **210** of the bow sight device **200**.

[0044] Furthermore, as noted above, the level device **231** is utilized (independent of the level devices **230** and **232**) to adjust a "first axis" of the bow sight device **200**. In the exemplary configuration of FIG. **4**A, the "first axis" adjustment of the bow sight device **200** is achieved when the bow sight device **200** is mounted to the bow riser **410** and the bow riser **410** is placed into a position where the bubble level device **231** indicates a level horizontal orientation of the X-axis. In this structural configuration, the frame of the sight window **222** is assumed to be straight up and down, i.e., the top/bottom portion of the sight window **222** does not lean toward/away or away/toward the archer. In other embodiments, when the sight housing **220** includes specific adjustment screws to adjust the lean of the sight window **222**, and when the bow sight device **200** is mounted to the bow riser **410** and the bow riser **410** is placed into a position where the bubble level device **231** indicates a level horizontal orientation of the X-axis, a handheld level device (e.g., bullet level) can be placed against the face of the sight window **222** to determine if the sight window **222** is vertically level. If not, the first axis adjustment screws or other mechanism can be used to adjustably move the sight window **222** into a vertical position such that a longitudinal vertical axis of the sight window **222** (in the Y-axis direction) is orthogonal to the X-axis that is fixed in the horizontal level position as indicated by the bubble level device **231**.

[0045] Furthermore, as noted above, the level device **230** is utilized (independent of the level device **231**) to adjust a "second axis" and a "third axis" of the bow sight device **200**. For example, in the exemplary configuration of FIG. **4**A, the "second axis" adjustment of the bow sight device **200** is achieved when the bow sight device **200** is mounted to the bow riser **410** and (i) the bow riser **410** is placed into a position where the bubble level device **230** on the upper surface of the mounting bracket **210** indicates a level horizontal orientation of the Z-axis, and (ii) the sight window **222** is positioned with the bubble of the level device **232** at the bottom of the sight window **222** matching the bubble of the level device **230** on the mounting bracket **210**.

[0046] For example, FIG. **4**B schematically illustrates a method for adjusting the second axis of the bow sight device

200 when mounted to the bow riser **410**, according to an exemplary embodiment of the disclosure. In FIG. **4**B, it is assumed that the bow sight device **200** is mounted to the bow riser **410** and that the bow riser **410** is positioned such that the bubble levels **231** and **230** indicate horizontal level orientations in both the X-axis and Z-axis directions. FIG. **4**B illustrates three different positions P**1**, P**2**, and P**3** of the sight window **222** with the bubble level device **230** on the mounting bracket **210** indicating a horizontal level orientation in the Z-axis direction. The first and third positions P**1** and P**3** of the sight window **222** as shown in FIG. **4**B are not level in the Z-axis direction, as indicated by the bubble level device **232** at the bottom of the sight window **222**. On the other hand, the second position P**2** of the sight window **222** is shown to be level in the Z-axis direction, as indicated by the bubble level device **232** at the bottom of the sight window **222**. In the second position P**2**, it is assumed that the level indication of the bubble level device **232** matches the level indication of the bubble level device **230** on the mounting bracket **210**, e.g., both of the level devices **230** and **232** indicate a horizontal level orientation in the Z-axis direction.

[0047] As schematically illustrated in FIG. **4**B, the sight window **222** comprises sight window adjustment screws **222-1** and **222-2** which can be loosened to adjustably move the sight window **222** from the first position P**1** or the third position P**3** to the second position P**2** to achieve the second axis adjustment. At the second position P**2**, where the sight window **222** is positioned in a level orientation along the horizontal Z-axis, the sight window adjustment screws **222-1** and **222-2** are tightened to maintain the sight window **222** in the second position P**2**.

[0048] It is to be noted that FIG. **2**C illustrates an exemplary configuration in which the level indication of the bubble level device **232** (which is disposed at the bottom of the sight window **222**) matches the level indication of the bubble level device **230** (which is disposed on the upper side surface of the mounting bracket **210**), thereby providing an indication of a proper "second axis" adjustment of the bow sight device **200**. Furthermore, FIG. **2**C illustrates a "third axis" adjustment of the bow sight device **200**. A "third axis" adjustment of the bow sight device **200** is performed following the "second axis" adjustment, to ensure that a longitudinal axis of the sight housing **220** is essentially perpendicular (orthogonal) to a longitudinal axis of the mounting bracket **210**. Indeed, while the second axis adjustment process results in the longitudinal axis of the sight housing **220** (or sight window **220**) being level in the X-Z plane, there can be an instance where the longitudinal axis of the sight housing **220** (or sight window **220**) is not perpendicular to the plane (X-Y plane) of the mounting bracket **210**.

[0049] In particular, FIG. **2**C illustrates an exemplary X-Y-Z coordinate system in which the X-axis and the Z-axis are orthogonal (i.e., 90 degree). The X-axis is assumed to be aligned with a longitudinal axis L_B of the mounting bracket **210**, and the Z-axis is assumed to be aligned with a longitudinal axis L_S of the sight housing **220** (or the sight window **222**) when there is a proper "third axis" alignment. On the other hand, there can be a circumstance where the longitudinal axis L_S of the sight housing **220** (or the sight window **222**) is aligned to an axis L_1 in which case the longitudinal axis L_S of the sight housing **220** (or the sight window **222**) is disposed at an angle of greater than 90 degrees in relation to the X-axis and the longitudinal axis L_B of the mounting bracket **210**, as graphically illustrated in FIG. **2**C. Furthermore, there can be a circumstance where the longitudinal axis L_S of the sight housing **220** (or the sight window **222**) is aligned to an axis L_2 in which case the longitudinal axis L_S of the sight housing **220** (or the sight window **222**) is disposed at an angle of less than 90 degrees in relation to the X-axis and the longitudinal axis L_B of the mounting bracket **210**, as graphically illustrated in FIG. **2**C

[0050] In either circumstance of the improper third axis alignment, when shooting an arrow at a target on a flat ground, the bubble level device **232** at the bottom of the sight window **222** will read level assuming the second axis has been properly adjusted as discussed above. On the other hand, when shooting at a target uphill or downhill, when the bow is aimed uphill or downhill, the bubble level device **232** at the bottom of the sight window **222** will not read level, notwithstanding that the second axis has been properly adjusted. By way of specific example, assume that the longitudinal axis L_S of the sight window **222** is angled away and aligned to the axis L_1. As the bow is aimed uphill, the larger angle (greater than 90 degrees) on the third axis will take effect and the bubble of the level device **232** will move to the left of center (for a right handed shooter), indicating improper third axis alignment. Further, as the bow is aimed downhill, the larger angle (greater than 90 degrees) on the third axis will take effect and the bubble of the level device **232** will move to the right of center (for a right handed shooter), indicating an improper third axis alignment. The similar, but opposite bubble level readings of the bubble level device **232** occur when the longitudinal axis L_S of the sight window **222** is angled toward the shooter, e.g., aligned to the axis L_2 as shown in FIG. **2**C.

[0051] In view of the above, a third axis alignment performed using the level devices **230** and **232**. In particular, once the second axis alignment process is performed, the third axis alignment can be performed by aiming the bow downward (or upward) while keeping the bow riser **410** positioned such that the level device **230** on the top of the mounting bracket **210** reads level. If the reading of the level device **232** on the bottom of the sight window **222** remains level while the bow is being aimed downward or upward, then third axis alignment is achieved. On the other hand, if the reading of the level device **232** on the bottom of the sight window **222** does not remain level while the bow is being aimed downward or upward, then the angular orientation of the sight window **222** or sight housing **220** can be adjusted using a third axis adjustment mechanism of the bow sight device **200** (not specifically shown) to rotate the sight window **222** into a proper angular position in which the longitudinal axis L_S of the sight housing sight window **222** is disposed orthogonal to the longitudinal axis L_B of the mounting bracket **210**.

[0052] It is to be noted that the exemplary bow tuning techniques as disclosed herein can be performed using a bow leveling tuning system such as disclosed in U.S. Pat. No. 5,344,110, entitled Holder Apparatus For Positioning Archery Bow Relative To Orthogonal Axes, to adjustably position a bow riser in a vertical level orientation and fixedly hold the bow rise in place in a vertical level orientation while being tuned/accessorized. Commercially available products, which are based on the structural embodiments disclosed in U.S. Pat. No. 5,344,110, are currently manufactured and sold by R.S. Bowvise Inc. These commercially available

products are currently sold under the trade name R.S. BOW-VISE™. These commercially available bow leveling tuning products are configured to securely hold an archery bow in an upright position, while providing flexibility in tipping the archery bow backward and forward or side to side and locking in at any angle. These tuning devices enable hands free mounting of accessories to archery bows, and well as micro adjustment capabilities for nock alignment and bow sight installation.

[0053] It is to be appreciated that the integrated level devices **230** and **231** of the bow sight device **200** can be used to position a bow riser in a level vertical orientation and allow an individual to tune the bow or otherwise install other accessories (such as an arrow rest) on the bow riser with the bow riser fixed in a level position. For example, with a bow riser disposed in a proper level vertical orientation using the bubble level devices **230** and **231** of the bow sight device **200**, an arrow rest device can be mounted to the riser and leveled in a horizontal orientation (X-axis direction) using a handheld level device.

[0054] In other embodiments of the disclosure, rather than using multiple bubble level devices on the bow sight device **200** to achieve level orientations in the X-axis, Y-axis, and Z-axis directions, bow risers can be fabricated with integrated level devices (e.g., integrated bubble levels) to assist with leveling and tuning. For example, FIG. **5**A is a perspective view of a bow riser **500** having an integrated level device, according to an exemplary embodiment of the disclosure. M ore specifically, as shown in FIG. **5**A, the bow riser **500** includes an integrated level device **502-1** which is disposed within a cavity of the bow riser **500**, or which is otherwise fixedly mounted to the body of the bow riser **500**. In the exemplary embodiment of FIG. **5**A, the integrated level device **502-1** is utilized to enable leveling in the Z-axis direction.

[0055] In this configuration, the integrated level device **502-1** is configured for use to perform the same or similar functions as the integrated level device **230** of the exemplary bow sight device **200**, as discussed above. Moreover, in this configuration, an exemplary bow sight device can be fabricated with a single level device (e.g., bubble level device **231**) to enable leveling in the X-axis direction, while the integrated level device **502-1** of the bow riser **500** is used to enable leveling in the Z-axis direction. As such, the integrated level device **502-1** of the bow riser **500**, the integrated level device on the bow sight mounting bracket (e.g., bubble level device **231**), and the integrated level device **232** on the bottom of the sight window **222** can be utilized to perform the same or similar tuning techniques as discussed above including, e.g., a first axis alignment, a second axis alignment, a third axis alignment, a nock point tuning, an arrow rest installation, etc.

[0056] Next, FIG. **5**B is a perspective view of a bow riser having an integrated level device, according to another exemplary embodiment of the disclosure. More specifically, as shown in FIG. **5**B, the bow riser **500** includes an integrated level device **502-2** which is disposed within a cavity of the bow riser **500**, or which is otherwise fixedly mounted to the body of the bow riser **500**. In the exemplary embodiment of FIG. **5**B, the integrated level device **502-2** is utilized to enable leveling in the X-axis direction.

[0057] In this configuration, the integrated level device **502-2** is configured for use to perform the same or similar functions as the integrated level device **231** of the exemplary bow sight device **200**, as discussed above. Moreover, in this configuration, an exemplary bow sight device can be fabricated with a single level device (e.g., bubble level device **230**) to enable leveling in the Z-axis direction, while the integrated level device **502-2** of the bow riser **500** is used to enable leveling in the X-axis direction. As such, the integrated level device **502-2** of the bow riser, the integrated level device on the bow sight mounting bracket (e.g., level device **230**), and the integrated level device **232** on the bottom of the sight window **222** can be utilized to perform the same or similar tuning techniques as discussed above including, e.g., a first axis alignment, a second axis alignment, a third axis alignment, a nock point tuning, an arrow rest installation, etc. The same concepts shown in FIGS. **5**A and **5**B applying to each of the exemplary bow sight devices discussed in further detail below.

[0058] FIG. **6**A schematically illustrates a bow sight device which comprises one or more integrated level devices, according to another exemplary embodiment of the disclosure. In particular, FIG. **6**A schematically illustrates a bow sight mounting bracket assembly **600** comprising a mounting bracket **610**, a sight extension bar **620**, and a clamp element **630**. The mounting bracket **620** is configured to attach to a bow riser, and the sight extension bar **620** is configured to slidably engage with the mounting bracket **620** to adjust a distance of a bow sight from the bow riser. The clamp element **630** is configured to slidably engage a slidable bracket of sight housing (e.g., the slidable bracket **226** of the sight housing **220**, as shown in FIGS. **2**A-**2**C) to couple the sight housing to the mounting bracket assembly **600**.

[0059] The mounting bracket **610** comprises at least one set of mounting holes **610-1** and **610-2** which are aligned with industry standard threaded mounting holes that are drilled into a bow riser for mounting a bow sight device to the bow riser. As noted above, threaded bolts are inserted through the mounting holes **610-1** and **610-2** and screwed into the threaded mounting holes of the bow riser. In addition, the mounting bracket **610** comprises a locking mechanism (e.g., set screw, screw knob, etc.) which is configured to fixedly secure the sight extension bar **620** into a desired position, or loosened to allow the sight extension bar **620** to be adjustably moved (e.g., along the X-axis) into a desired position.

[0060] As schematically shown in FIG. **6**A, the sight extension bar **620** comprises first level device **621** (e.g., bubble level) and a second level device **622**, which are utilized to facilitate tuning operations, as discussed above. The first level device **621** is disposed on a top side of the sight extension bar **620** and oriented in a Z-direction, and the second level device **622** is disposed on a side of the sight extension bar **620** and oriented in an X-direction. In this regard, the first level device **621** is disposed in a first direction which is orthogonal to a longitudinal axis of the sight extension bar **620**, and the second level device **622** is disposed in a second direction that is parallel to (or otherwise aligned to) the longitudinal axis of the sight extension bar **620**. The first and second level devices **621** and **622** are utilized to facilitate tuning operations in the same manner as the first and second level devices **230** and **231** of the mounting bracket **210** (FIGS. **2**A-**2**C), as discussed above in conjunction with FIGS. **4**A and **4**B. For example, the second level device **622** is utilized (independent of other level devices) to set a nocking point on a bow string, and to adjust

a "first axis" of the bow sight device. Further, the first level device **621** is utilized (independent of the level device **622**) to adjust a "second axis" and a "third axis" of the bow sight device, in conjunction with a level device of a sight window of a sight housing (e.g., level device **232** of sight window **222** of sight housing **220** (FIGS. **2**A-**2**C)) which is connected to the clamp element **630**, using techniques as discussed above, the details of which will not be repeated.

[0061] FIG. **6**B schematically illustrates a bow sight device which comprises one or more integrated level devices, according to another exemplary embodiment of the disclosure. In particular, FIG. **6**B schematically illustrates a bow sight device **601** which is similar to the bow sight device **600** of FIG. **6**A, the first and second level devices **621** and **622** are oriented in orthogonal directions, except that FIG. **6**B illustrates an exemplary embodiment in which the first level device **621** is disposed on the top side of the sight extension bar **620** (oriented in a Z-direction), while the second level device **622** is disposed within a sidewall of the mounting bracket **610** (oriented in an X-direction). Other arrangements of the first and second level devices **621** and **622** on the mounting bracket **610** and the sight extension bar **620** are possible, as discussed herein.

[0062] It is to be noted that there are various types of bow sight mounting assemblies having sight extension bars, and that FIGS. **6**A and **6**B are merely presented as a non-limiting embodiments to illustrate the concept of incorporating level devices on a sight extension bar. For example, FIG. **7** schematically illustrates a bow sight device comprising one or more integrated level devices, according to another exemplary embodiment of the disclosure. In particular, FIG. **7** schematically illustrates a bow sight device **700** which comprises a mounting bracket assembly **710**, and a sight housing **740**. The mounting bracket assembly **710** comprises a sight extension bar **720**, and a mounting plate **730** fixedly connected to one end of the sight extension bar **720**, which is configured to connect to the sight housing **740**. In the exemplary embodiment of FIG. **7**, the sight extension bar **720** is shown to extend in a X-direction, while the mounting plate **730** is shown to extend in a Z-direction. Similar to the bow sight mounting bracket assembly **600** of FIG. **6**A, the mounting bracket assembly **710** comprises a mounting bracket (not specifically shown) which is configured to attach to a bow riser (i.e., bolted to a bow riser using threaded bolts that engage industry standard threaded mounting holes of the bow riser), and configured to slidably engage the sight extension bar **720** to adjust a distance (in X-direction) of the bow sight device **740** from the bow riser.

[0063] As schematically shown in FIG. **7**, the sight extension bar **720** comprises first level device **721** (e.g., bubble level) and a second level device **722**, which are utilized to facilitate tuning operations, as discussed above. The first level device **721** is disposed on a top side of the sight extension bar **720** and oriented in a Z-direction, and the second level device **722** is disposed on a sidewall of the sight extension bar **720** and oriented in an X-direction. In this regard, the first level device **721** is disposed in a first direction which is orthogonal to a longitudinal axis of the sight extension bar **720**, and the second level device **722** is disposed in a second direction that is parallel to (or otherwise aligned to) the longitudinal axis of the sight extension bar **720**. The first and second level devices **721** and **722** are utilized to facilitate tuning operations in the same manner as the first and second level devices **230** and **231** of the mounting bracket **210** (FIGS. **2**A-**2**C), as discussed above in conjunction with FIGS. **4**A and **4**B. For example, the second level device **722** is utilized (independent of other level devices) to set a nocking point on a bow string, and to adjust a "first axis" of the bow sight device. Further, the first level device **721** is utilized (independent of the level device **722**) to adjust a "second axis" and a "third axis" of the bow sight device **700**, in conjunction with a bubble level of a sight window of the sight housing **740**, using techniques as discussed above, the details of which will not be repeated.

[0064] In other embodiments of bow sight mounting assemblies having sight extension bars, first and second level devices can be disposed on the mounting bracket itself (e.g., mounting bracket **610**, FIGS. **6**A and **6**B), instead of being disposed on the sight extension bar, wherein the first and second level devices (of the mounting bracket) are oriented in first and second directions that are perpendicular. For example, the mounting bracket **610** in FIGS. **6**A and **6**B can be designed to have (i) the first level device **621** disposed on a top side of the mounting bracket **610** and oriented in a Z-direction (or X-direction), and (ii) the second level device **622** disposed within the sidewall of the mounting bracket **610** and oriented in an X-direction (or Z-direction), to enable tuning operations as discussed herein. In this regard, mounting brackets with integrated levels can be separately designed and configured to operatively engage with sight extension bars of commercially available bow sight assemblies.

[0065] Moreover, similar to the exemplary embodiments discussed in conjunction with FIGS. **5**A and **5**B, the bow riser **500** can have a first level device oriented in a first direction, and the sight extension bar of a bow sight mounting assembly (which is mounted to the bow riser **500**) can have a second level device oriented in a second direction, which is orthogonal to the first direction. In this configuration, with the bow sight mounting assembly mounted to the bow riser **500**, the first and second level devices facilitate tuning in multiple axes.

[0066] FIGS. **8**A and **8**B are perspective views of an apparatus comprising a bow riser and a bow sight device mounted to the bow riser, wherein the bow sight device comprises one or more integrated level devices, according to another exemplary embodiment of the disclosure. In particular, FIGS. **8**A and **8**B illustrates an apparatus **800** comprising a bow riser **810** having the exemplary bow sight device **200** (of FIGS. **2**A-**2**C) with a mounting bracket **210-1** which has a modified architecture from the mounting bracket **210** shown in FIGS. **2**A-**2**C. The mounting bracket **210-1** is mounted to the bow riser **810** using first and second threaded bolts **811** and **812** which are inserted through the first set of mounting holes **211-1** and **211-2** of the mounting bracket **210-1** and screwed into standard mounting holes that are drilled into the bow riser **810** for attaching the bow sight device **200** to the bow riser **810**. The bow sight device **200** in FIGS. **8**A and **8**B has a slightly different configuration of the mounting bracket **210-1** in which the first level device **230** is disposed on a back sidewall surface of the mounting bracket **210-1** and orientated in a Z-direction, as opposed to being disposed on a top side surface of the mounting bracket **210** and oriented in the Z-direction, as shown in, e.g., FIG. **2**A. In this regard, the first level device **230** is disposed in a first direction which is orthogonal to a longitudinal axis of the mounting bracket **210-1**, and the second level device **231**

is disposed in a second direction that is parallel to (or otherwise aligned to) the longitudinal axis of the mounting bracket **210-1**.

[0067] In this configuration, disposing the first level device **230** on the backside sidewall surface of the mounting bracket **210-1** (FIGS. **8**A and **8**B) serves the same purpose as disposing the first level device **230** on the top side surface of the mounting bracket (FIG. **2**A). However, as shown in FIG. **8**B, disposing the first level device **230** on the backside sidewall surface of the mounting bracket **210-1** allows an individual to more easily simultaneously view the first level device **230** (disposed on the backside sidewall surface of the mounting bracket **210-1**) and the level device **232** that is disposed at a base of the sight window **222**. This configuration allows both level devices **230** and **232** to be more easily simultaneously viewed when adjusting a "second axis" and a "third axis" of the bow sight device **200**.

[0068] For example, as noted above, the "second axis" adjustment of the bow sight device **200** is achieved when the bow sight device **200** is mounted to the bow riser **810** and (i) the bow riser **810** is placed into a position where the bubble level device **230** on the backside sidewall surface of the mounting bracket **210-1** indicates a level horizontal orientation of the Z-axis and (ii) the sight window **222** is positioned with the bubble of the level device **232** at the bottom of the sight window **222** matching the bubble of the level device **230** on the mounting bracket **210-1**. FIG. **8**B illustrates the exemplary configuration which facilitates the simultaneous viewing of both level devices **230** and **232** when adjusting a "second axis" and a "third axis" of the bow sight device **200**.

[0069] FIG. **9** schematically illustrates a bow sight device comprising one or more integrated level devices, according to another exemplary embodiment of the disclosure. In particular, FIG. **9** schematically illustrates a bow sight device **900** which comprises a mounting bracket assembly **910**, and a sight housing **940**. The mounting bracket assembly **910** comprises a sight extension bar **920**, and a mounting plate **930** fixedly connected to one end of the sight extension bar **920**, which is configured to connect to the sight housing **940**. In the exemplary embodiment of FIG. **9**, the sight extension bar **920** is shown to extend in a X-direction, while the mounting plate **930** is shown to extend in a Z-direction. Similar to the bow sight mounting bracket assembly **600** of FIG. **6**A, the mounting bracket assembly **910** comprises a mounting bracket (not specifically shown) which is configured to attach to a bow riser (i.e., bolted to a bow riser using threaded bolts that engage industry standard threaded mounting holes of the bow riser), and configured to slidably engage the sight extension bar **920** to adjust a distance (in X-direction) of the bow sight device **940** from the bow riser.

[0070] It is to be noted that the bow sight device **900** of FIG. **9** is similar to the bow sight device **700** of FIG. **7** in that the sight extension bar **920** comprises first level device **921** which is oriented in a Z-direction, and a second level device **922** which is oriented in an X-direction, and utilized to facilitate tuning operations, as discussed above. In this regard, the first level device **921** is disposed in a first direction which is orthogonal to a longitudinal axis of the sight extension bar **920**, and the second level device **722** is disposed in a second direction that is parallel to (or otherwise aligned to) the longitudinal axis of the sight extension bar **720**. However, FIG. **9** illustrates an exemplary configuration in which the first level device **921** is disposed on the end of the sight extension bar **920** and oriented in the Z-direction (instead of on the top side of the sight extension bar **720** as shown in FIG. **7**). The placement of the first level device **921** on the end of the sight extension bar **920** serves the same purpose as the level device **230** shown in FIG. **8**B, i.e., allowing an individual to more easily simultaneously view the first level device **921** (disposed on the end of the sight extension bar **920**) and a level device that is disposed at a base of the sight window of the sight device **940**.

[0071] FIG. **10**A is a perspective view of an apparatus comprising a bow riser and bow sight device comprising integrated level devices and mounted to the bow riser, according to another exemplary embodiment of the disclosure. In particular, FIG. **10**A illustrates an apparatus **1000** comprising a bow riser **1010** and a bow sight device **1020** mounted to the bow riser **1010**. FIG. **10**B is a perspective view of the bow sight device **1020** of FIG. **10**A. The bow riser **1010** comprises sight mounting holes **1011-1** and **1011-2** for mounting a bow sight device (such as shown in FIG. **4**A). However, as an alternative mounting method of using the sight mounting holes **1011-1** and **1011-2** to mount a sight device using mounting bolts on the side of the bow riser **1010** (such as shown in FIGS. **4**A and **8**A), the bow riser **1010** comprises first and second slots **1012**A and **1012**B, which are configured to slidably receive a mounting bar **1021** of the sight device **1020**, wherein the sight device **1020** is fixedly secured in place using a setscrew **1013** that is recessed into the bow riser **1010** above the mounting bar **1021** of the sight device **1020**. In some embodiments, the first and second slots **1012**A and **1012**B of the bow riser **1010** are dovetail-shaped slots, and the mounting bar **1021** has a corresponding dovetail-shaped cross-section which is inserted into and through the first and second slots **1012**A and **1012**B of the bow riser **1010**. In other embodiments, the first and second slots **1012**A and **1012**B of the bow riser **1010** and the cross-section of the mounting bar **1021** can have other corresponding shapes.

[0072] As collectively shown in FIGS. **10**A and **10**B, the sight device **1020** comprises a sight window **1022**, a first level device **1023**, a second level device **1024**, and a third level device **1025**. The first level device **1023** is disposed on the end of the mounting bar **1021** and oriented in a Z-direction. The second level device **1024** is disposed within a sidewall of the mounting bar **1021** of the sight device **1020** and oriented in an X-direction (e.g., shooting direction). In this regard, the first level device **1023** is disposed in a first direction which is orthogonal to a longitudinal axis of the mounting bar **1021**, and the second level device **622** is disposed in a second direction that is parallel to (or otherwise aligned to) the longitudinal axis of the mounting bar **1021**. The third level device **1025** is disposed on the bottom of the sight window **1022** and oriented in a Z-direction. The first, second, and third level devices **1023**, **1024**, and **1025** are utilized to perform tuning operations as discussed above. For example, the second level device **1024** is utilized (independent of other level devices) to set a nocking point on a bow string, and to adjust a "first axis" of the bow sight device **1020**. Further, the first level device **1023** is utilized (independent of the second level device **1024**) to adjust a "second axis" and a "third axis" of the bow sight device **1020** in conjunction with the third level device **1025** at the bottom of the sight window **1022** of the sight housing **1022**, using techniques as discussed above, the details of which will not be repeated. Moreover, as discussed above for other

embodiments, the placement of the first level device **1023** on the end of the mounting bar **1021** allows an individual to more easily simultaneously view the first level device **1023** (disposed on the end of the mounting bar **1021**) and third level device **1025** of the sight window **1022**, when performing tuning operations.

[0073] It is to be noted that the sight device **1020** shown in FIGS. **10**A and **10**B eliminates the need to screw a separate mounting bracket to the bow riser **1010**, as the mounting bar **1021** serves as the mounting bracket of the bow sight device **1020**, as well as a sight extension bar to adjust a distance (in the X-direction) of the sight window **1022** from a bow riser. In this regard, a bow sight device having a relatively long mounting bar can be used to slidably engage corresponding slots of a bow riser for purposes of mounting (such as shown in FIG. **10**A), as well as enable an individual to adjust a distance (in the X-direction) of the sight window from the bow riser (e.g., to adjust the distance of the sight window **1022** from the eye of the individual).

[0074] Moreover, in other embodiments of bow sight devices with elongated sight extension bars or mounting bars, a cap element with a level can be placed on an end portion of the elongated sight extension bar or mounting bar of the sight device, after the sight device is mounted to the bow riser (via a separate bracket or through slots of the bow riser). For example, in FIG. **9**, the level device **921** can be a component of a cap element that is placed on the end of the sight extension bar **920**.

[0075] FIGS. **11**A and **11**B are perspective views of a bow sight device **1100** comprising integrated level devices, according to another exemplary embodiment of the disclosure. As collectively shown in FIGS. **11**A and **11**B, the bow sight device **1100** comprises a sight window **1110**, a bow sight mounting bracket assembly **1120**, a first level device **1130**, a second level device **1131**, and a third level device **1132**. The mounting bracket assembly **1120** comprises a mounting bracket **1121**, a slidable sight extension bar **1122**, and a sight window connection element **1123**. The mounting bracket **1121** comprises a plurality of mounting holes **1121-1** and **1121-2** for mounting to a bow riser, as discussed above. The slidable sight extension bar **1122** is configured to slidably engage with the mounting bracket **1121** and be set in place using a set screw **1121-3**. The sight window connection element **1123** is configured to attach the sight window **1110** to the slidable extension bar **1122**.

[0076] The first level device **1130** is fixedly disposed within an end sidewall surface of the slidable sight extension bar **1122** and oriented in a Z-direction. The second level device **1131** is fixedly mounted in a sidewall surface of the mounting bracket **1121** in a region below the set screw **1121-3**, and oriented in an X-direction. The third level device **1132** is disposed on bottom of the sight window **1110** and oriented in a Z-direction. The first, second, and third level devices **1130**, **1131**, and **1132**, are utilized for tuning along multiple axes, as discussed above. Moreover, as discussed above for other embodiments, the placement of the first level device **1130** on the end of the slidable extension bar **1122** allows an individual to easily simultaneously view the first level device **1130** and the third level device **1132** of the sight window **1022**.

[0077] With the exemplary configuration shown in FIGS. **11**A and **11**B, the mounting bracket assembly **1120** can fabricated and sold as a standalone mounting bracket assembly with integrated level devices (e.g., the first and second level devices **1130** and **1131**), where the sight window connection element **1123** is designed to interface with, or otherwise couple to, commercially available sight window of bow sight devices. This allows an individual to purchase a commercially available bow sight device and remove the sight window component and attach it to the exemplary mounting bracket assembly **1120** with the integrated level devices **1130** and **1131**.

[0078] Moreover, in other embodiments of bow sight devices with elongated sight extension bars or mounting bars, as noted above, a cap element with one or more level devices can be placed on an end portion of the elongated sight extension bar or mounting bar of the bow sight device, after the sight device is mounted to the bow riser via a separate mounting bracket or through slots of the bow riser, as discussed above. For example, FIG. **12** is a perspective view of an apparatus **1200** comprising a bow riser **1210**, a bow sight device **1220** having a sight window **1222**, and a cap element **1230** having integrated level devices, which can be connected to an end portion of an elongated mounting bar of the bow sight device **1220**, according to another exemplary embodiment of the disclosure. In particular, as shown in FIG. **12**, the bow sight device **1220** comprises an elongated mounting bar **1221**, and a sight window **1222**. The elongated mounting bar **1221** is configured to insertably slide through slots **1212**A of the bow riser **1210** (e.g., dovetail-shaped slots). The slots **1212**A of the bow riser **1210** are configured to slidably receive the elongated mounting bar **1221** of the bow sight device **1220**, wherein the elongated mounting bar **1221** is fixedly secured in place using a setscrew **1213** that is recessed into the bow riser **1210**.

[0079] The cap element **1230** comprises a first level device **1231** and a second level device **1232**. The cap element **1230** is designed to slidably connect to the end of the elongated mounting bar **1221** after the elongated mounting bar **1221** is inserted through the slots **1212**A of the bow riser **1210**. The first level device **1231** is fixedly disposed on or within a backside surface of the cap element **1230** and oriented in a Z-direction. The second level device **1232** is fixedly disposed on or within a side surface of the cap element **1230** and oriented in a X-direction. Moreover, as with other embodiments discussed above, a third level device (not shown in FIG. **12**) is disposed on bottom of the sight window **1222** and oriented in a Z-direction. The first and second level devices **1231** and **1232** of the cap element **1230**, in conjunction with the third level device of the bow sight window **1222**, are utilized to perform tuning operations along multiple axes, as discussed above. Moreover, as discussed above for other embodiments, the placement of the first level device **1231** on the backside of the cap element **1230** allows an individual to easily simultaneously view the first level device **1231** and the third level device of the sight window **1222**.

[0080] It is to be noted that the exemplary embodiments discussed here are meant to be illustrative, non-limiting embodiments of bow sight devices and associated sight mounting brackets which are configured to mount the bow sight devices to bow risers, and which have one or more integrated level devices for purposes of performing tuning operations as discussed above. Other types of bow sight brackets can be implemented with integrated level devices. For example, some commercially available bow sight devices utilize a Picatinny rail mount to enable attachment

of a bow sight window to a bow riser, wherein a Picatinny rail mount is configured, for example, to be slidably inserted through slotted openings of a bow riser and held in place by suitable set screws or mounting bolts. The bow sight window element can be adjustably mounted to a given slot of a plurality of slots of the Picatinny rail mount to adjust the distance between the bow sight window and the bow riser. In an exemplary embodiment, a Picatinny rail mount can be designed to have one or more integrated level devices, similar to the mounting brackets, sight extension bars, or elongated mounting bars as discussed herein. In this regard, although exemplary embodiments of the present disclosure have been described herein with reference to the accompanying figures, it is to be understood that the disclosure is not limited to those precise embodiments, and that various other changes and modifications may be made therein by one skilled in the art without departing from the scope of the appended claims.

What is claimed is:

1. A bow sight device, comprising:
a mounting bracket configured for attachment to a bow riser;
a sight extension bar configured to slidably interface with the mounting bracket; and
a first level device disposed on the sight extension bar and oriented in a first direction.

2. The bow sight device of claim **1**, wherein:
the first level device is disposed on an upper surface of the sight extension bar; and
the first direction is orthogonal to a longitudinal axis of the sight extension bar.

3. The bow sight device of claim **1**, wherein:
the first level device is disposed on end of the sight extension bar; and
the first direction is orthogonal to a longitudinal axis of the sight extension bar.

4. The bow sight device of claim **1**, further comprising a second level device disposed on the sight extension bar and oriented in a second direction orthogonal to the first direction.

5. The bow sight device of claim **4**, wherein:
the first direction is orthogonal to a longitudinal axis of the sight extension bar; and
the second direction is parallel to the longitudinal axis of the sight extension bar.

6. The bow sight device of claim **1**, further comprising a second level device disposed on the mounting bracket and oriented in a second direction orthogonal to the first direction.

7. The bow sight device of claim **6**, wherein:
the first direction is orthogonal to a longitudinal axis of the sight extension bar; and
the second direction is parallel to the longitudinal axis of the sight extension bar.

8. The bow sight device of claim **1**, further comprising a sight housing connected to a an end of the sight extension bar, the sight housing comprising a third level device, and a sight housing adjustment mechanism that is configured to adjust an orientation of the sight housing so that the third level device is oriented in alignment with the first direction of the first level device.

9. The bow sight device of claim **1**, wherein the first level device and the third level devices are simultaneously viewable by an individual looking in a shooting direction.

10. A bow sight device, comprising:
an elongated mounting bar configured to slidably engage slots of a bow riser to mount the elongated mounting bar to the bow riser; and
a first level device disposed on the elongated mounting bar and oriented in a first direction.

11. The bow sight device of claim **10**, wherein:
the first level device is disposed on end of the elongated mounting bar; and
the first direction is orthogonal to a longitudinal axis of the elongated mounting bar.

12. The bow sight device of claim **10**, further comprising a second level device disposed on the elongated mounting bar and oriented in a second direction orthogonal to the first direction.

13. The bow sight device of claim **12**, wherein:
the first direction is orthogonal to a longitudinal axis of the elongated mounting bar; and
the second direction is parallel to the longitudinal axis of the elongated mounting bar.

14. The bow sight device of claim **10**, further comprising a cap element configured to slidably connect to an end of the elongated mounting bar, the cap element comprising a second level device which is disposed in a second direction, orthogonal to the first direction, when the cap element is connected on the end of the elongated mounting bar.

15. The bow sight device of claim **14**, wherein:
the first direction is parallel to a longitudinal axis of the elongated mounting bar; and
the second direction is orthogonal to the longitudinal axis of the elongated mounting bar.

16. The bow sight device of claim **10**, further comprising a sight housing connected to a an end of the elongated mounting bar, the sight housing comprising a third level device, and a sight housing adjustment mechanism that is configured to adjust an orientation of the sight housing so that the third level device is oriented in alignment with the first direction of the first level device.

17. The bow sight device of claim **16**, wherein the first level device and the third level devices are simultaneously viewable by an individual looking in a shooting direction.

18. A bow sight device, comprising:
a mounting bracket configured for attachment to a bow riser, the mounting bracket comprising a first level device and a second level device;
a sight housing adjustably connected to the mounting bracket by a sight housing adjustment mechanism, the sight housing comprising a third level device;
wherein the first level device is disposed on a backside surface of the mounting bracket in a first direction which is orthogonal to a longitudinal axis of the mounting bracket;
wherein the second level device is disposed on a sidewall surface of the mounting bracket in a second direction which is parallel to the longitudinal axis of the mounting bracket; and
wherein the sight housing adjustment mechanism is configured to adjust an orientation of the sight housing so that the third level device is oriented in alignment with the first direction of the first level device.

19. The bow sight device of claim **18**, wherein the mounting bracket comprises a first through hole and a second through hole aligned with a central longitudinal axis of the bow riser.

20. The bow sight device of claim **18**, wherein the first level device and the third level devices are simultaneously viewable by an individual looking in a shooting direction.

* * * * *