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(54) **SYSTEM AND METHOD FOR EXERCISE EQUIPMENT HINGE**

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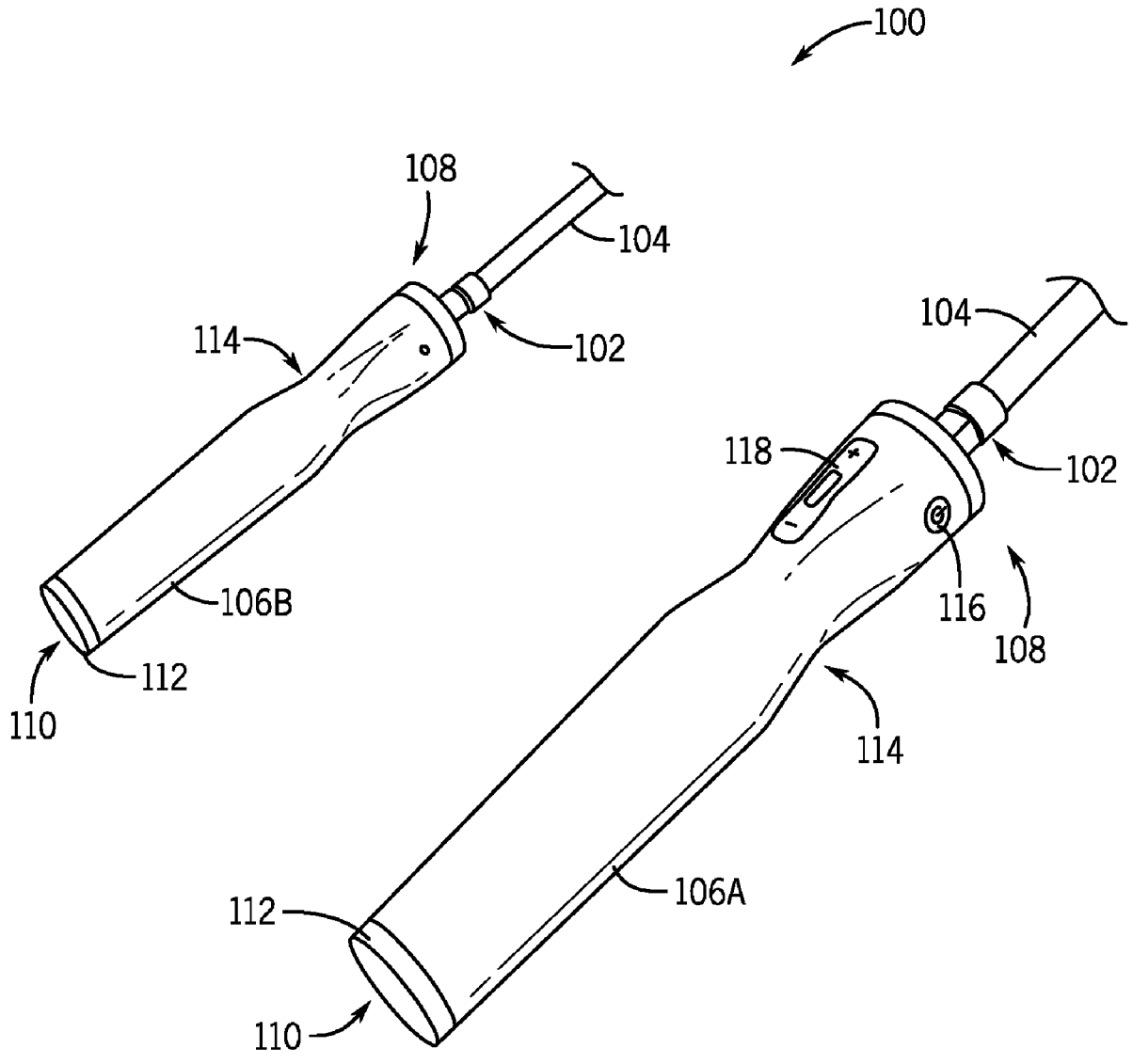
(57) **ABSTRACT**

A system includes a handle with a hinge mechanism at a first end, the hinge mechanism including a lower hinge portion and an upper hinge portion rotatably coupled together. The handle also includes a rotary mechanism positioned at the first end and coupled to the lower hinge portion to enable circumferential movement of the lower end portion about a longitudinal axis of the handle. Additionally, a sensor arrangement is positioned within a body of the handle, the sensor arrangement measuring a number of rotations of the rotary mechanism about the longitudinal axis of the handle.



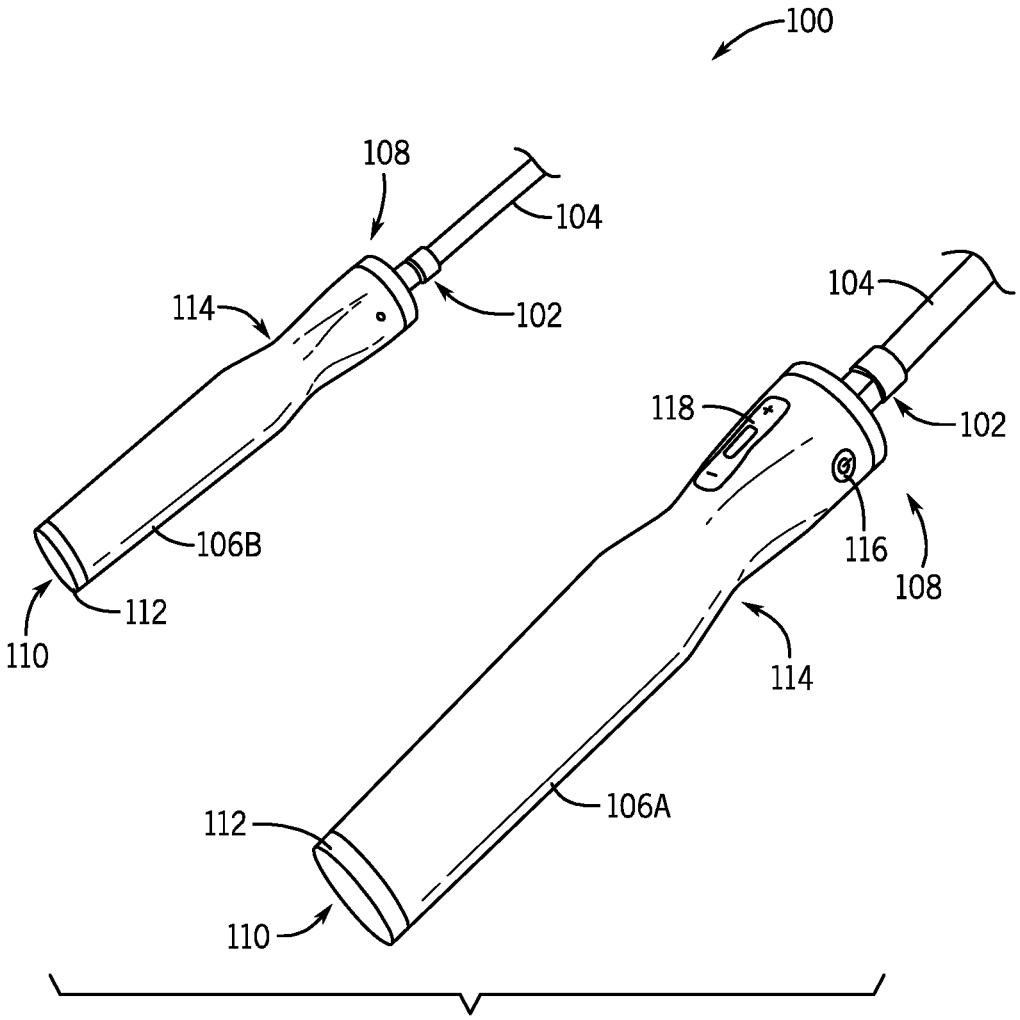

100
108
104
114
102
104
118
102
106B
116
108
112
110
114
112
106A
110

FIG. 1

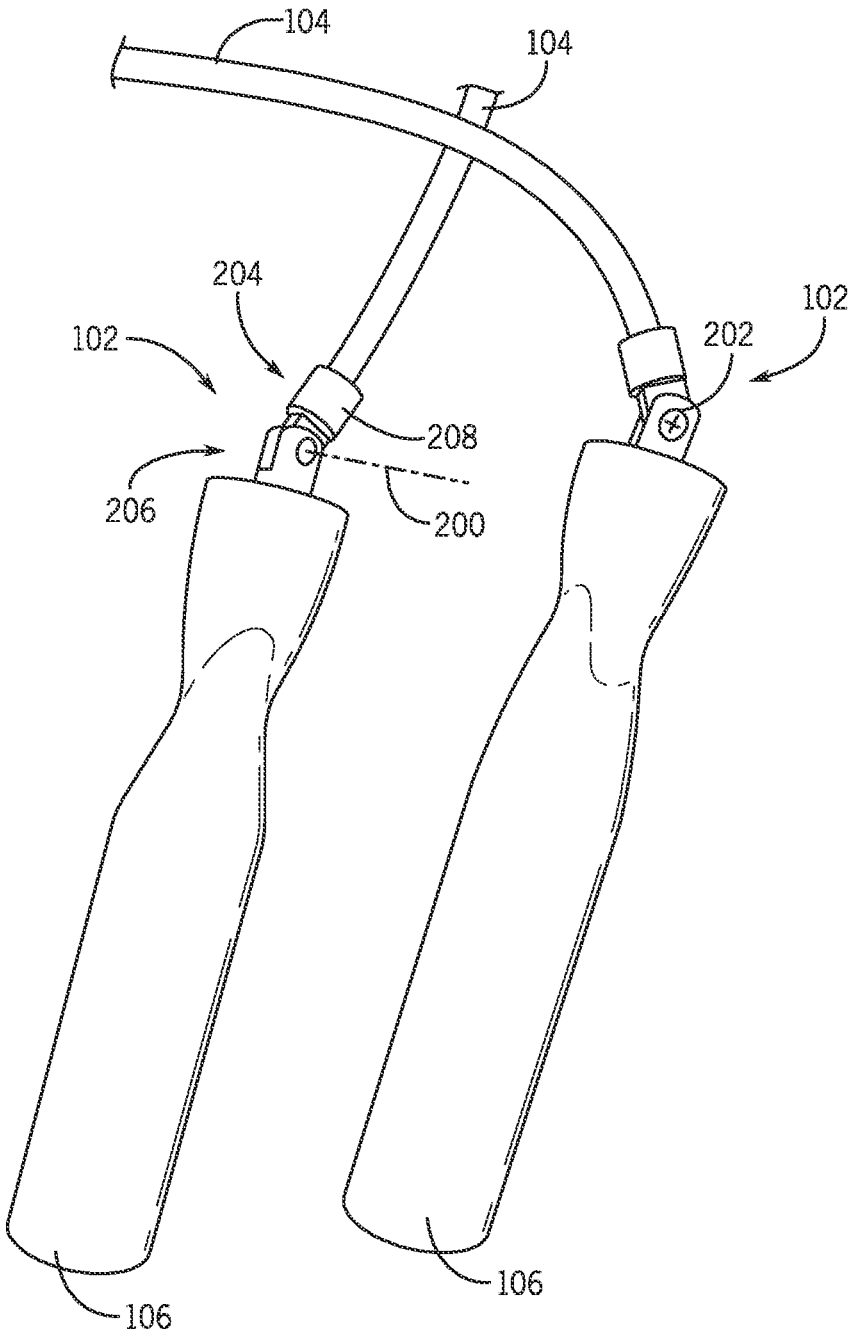


FIG. 2

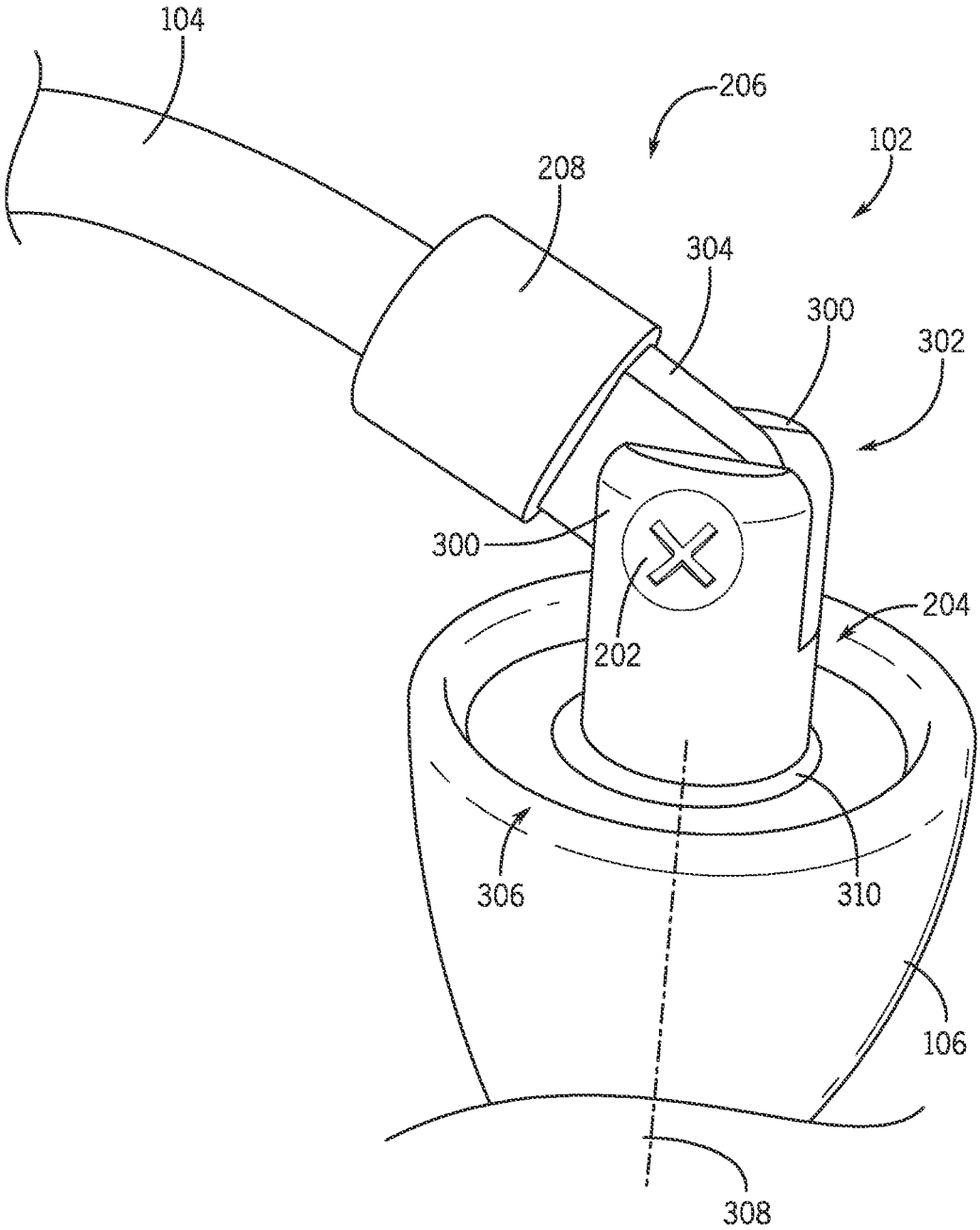


FIG. 3

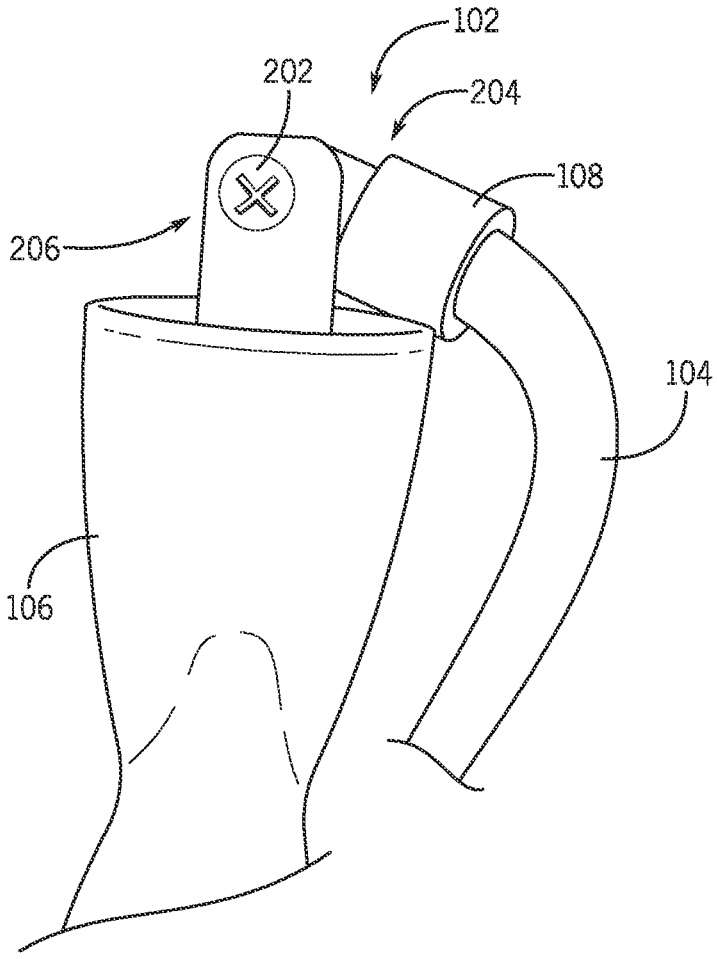


FIG. 4

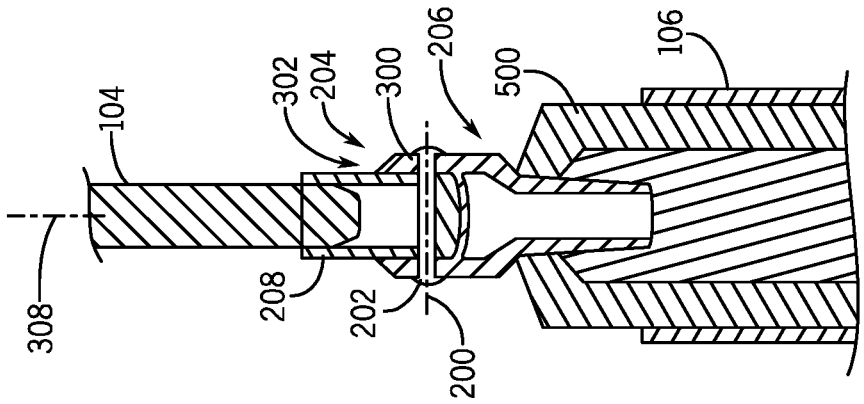

104
302
204
300
206
500
106
308
208
202
200

FIG. 5B

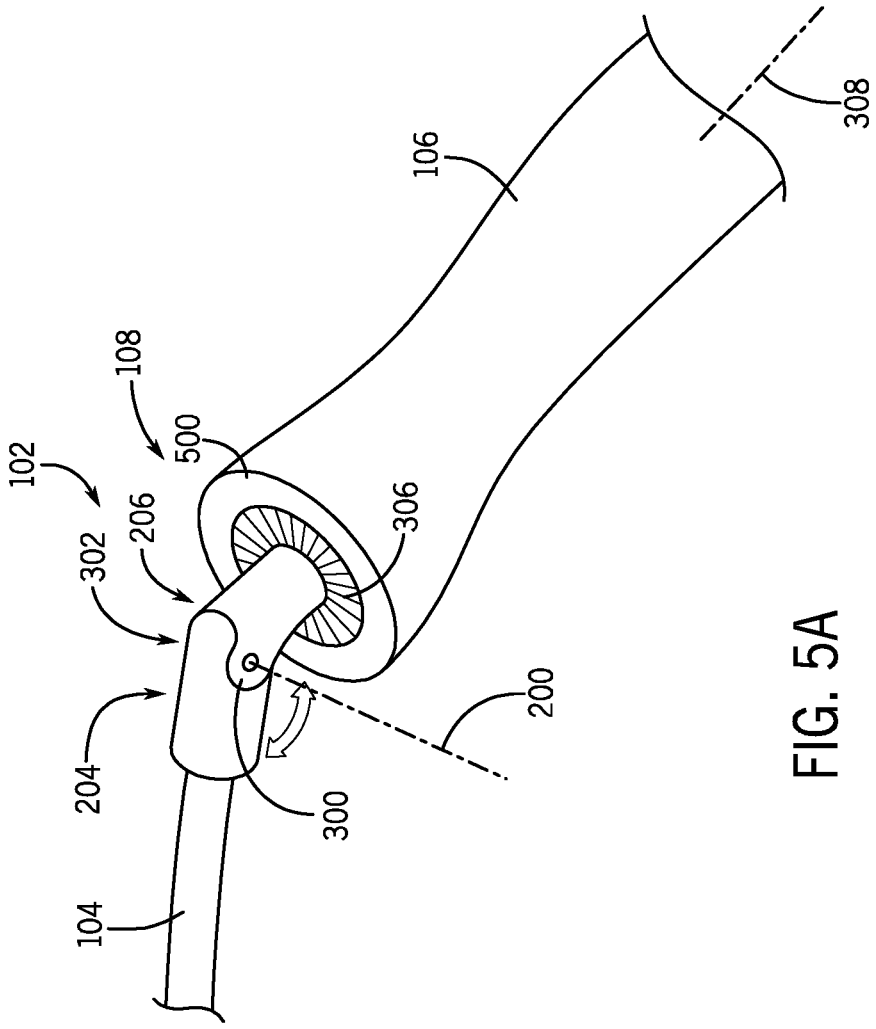

308
106
108
500
102
206
306
302
200
204
300
104

FIG. 5A

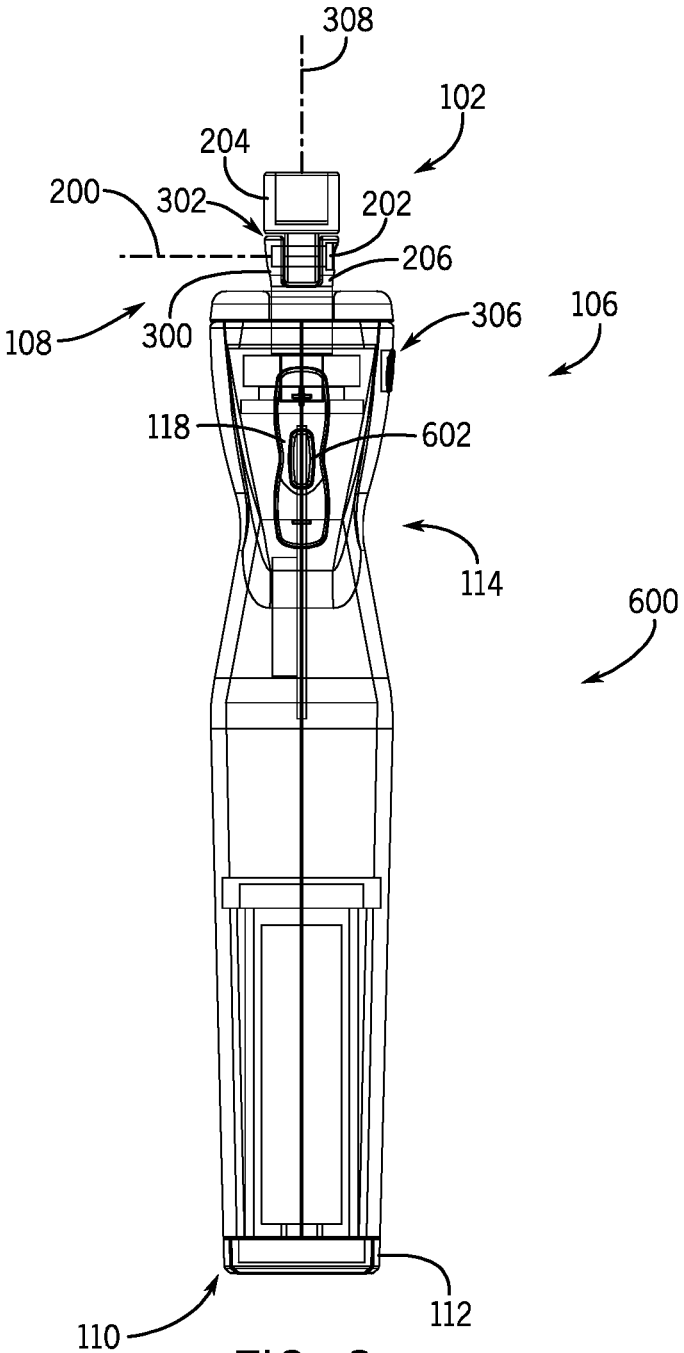

308
102
204
200
302
202
206
108
300
306
106
118
602
114
600
110
112

FIG. 6

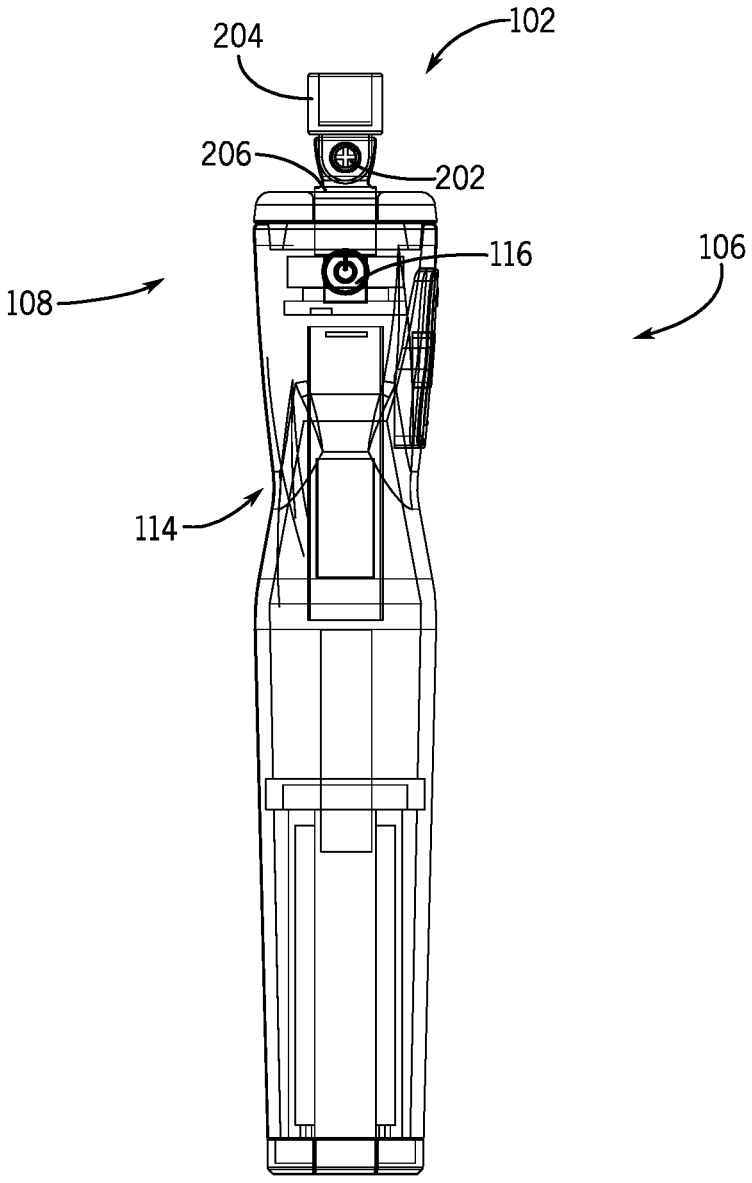


FIG. 7

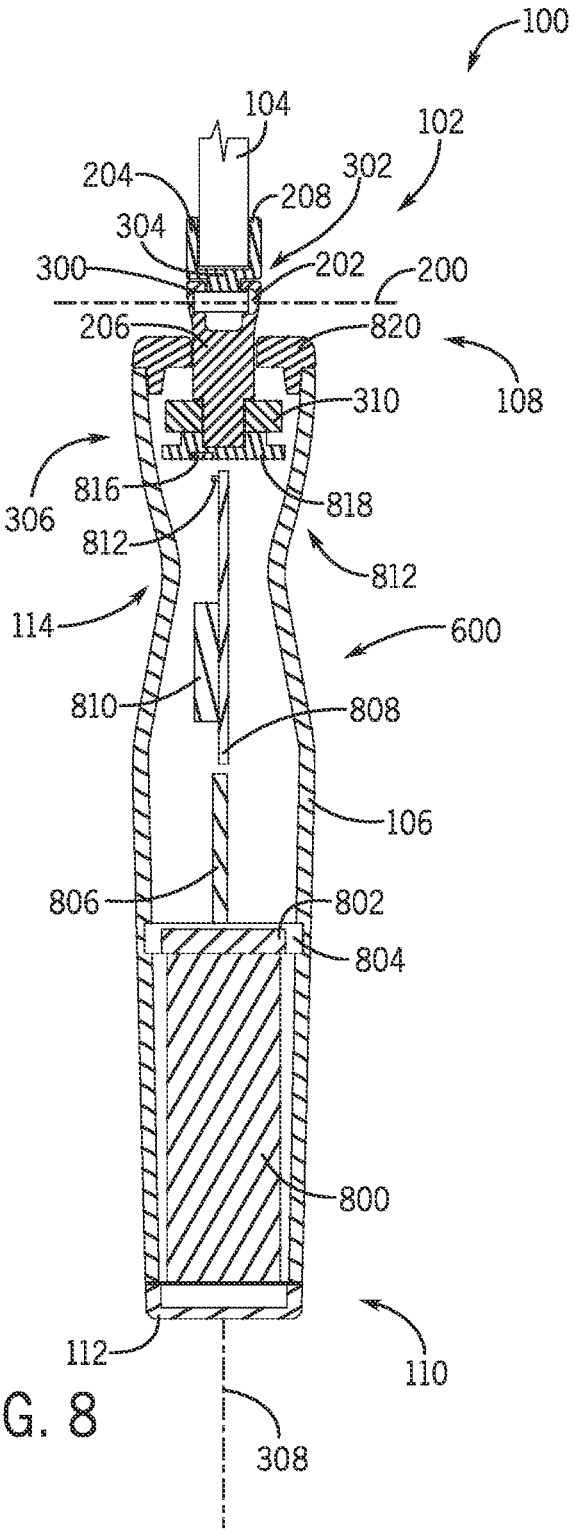

100
104
102
204
302
208
304
300
202
200
206
820
108
310
306
816
818
812
812
114
600
810
808
106
806
802
804
800
112
110
308

FIG. 8

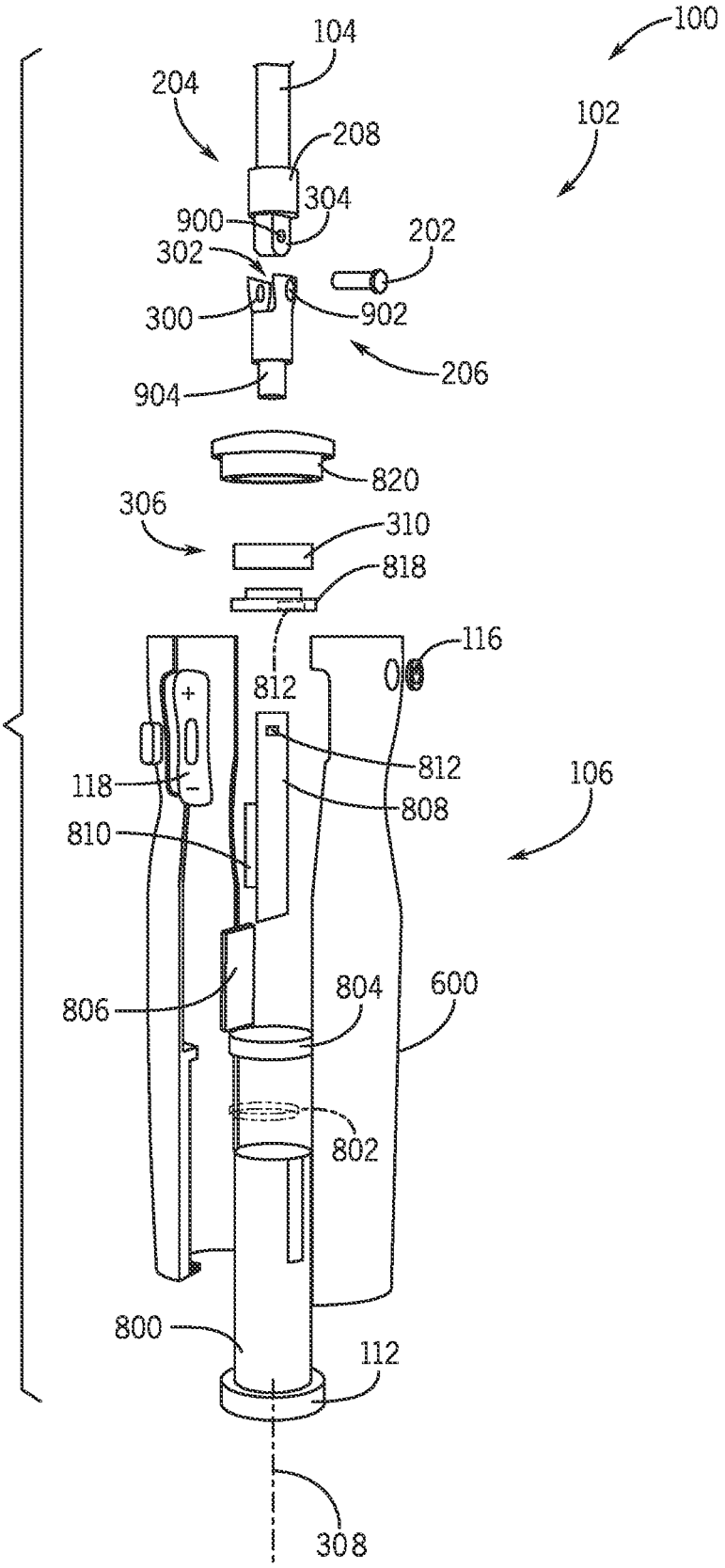

100
104
204
102
208
304
900
202
302
300
902
206
904
820
306
310
818
116
812
812
118
808
106
810
804
600
806
802
800
112
308

FIG. 9

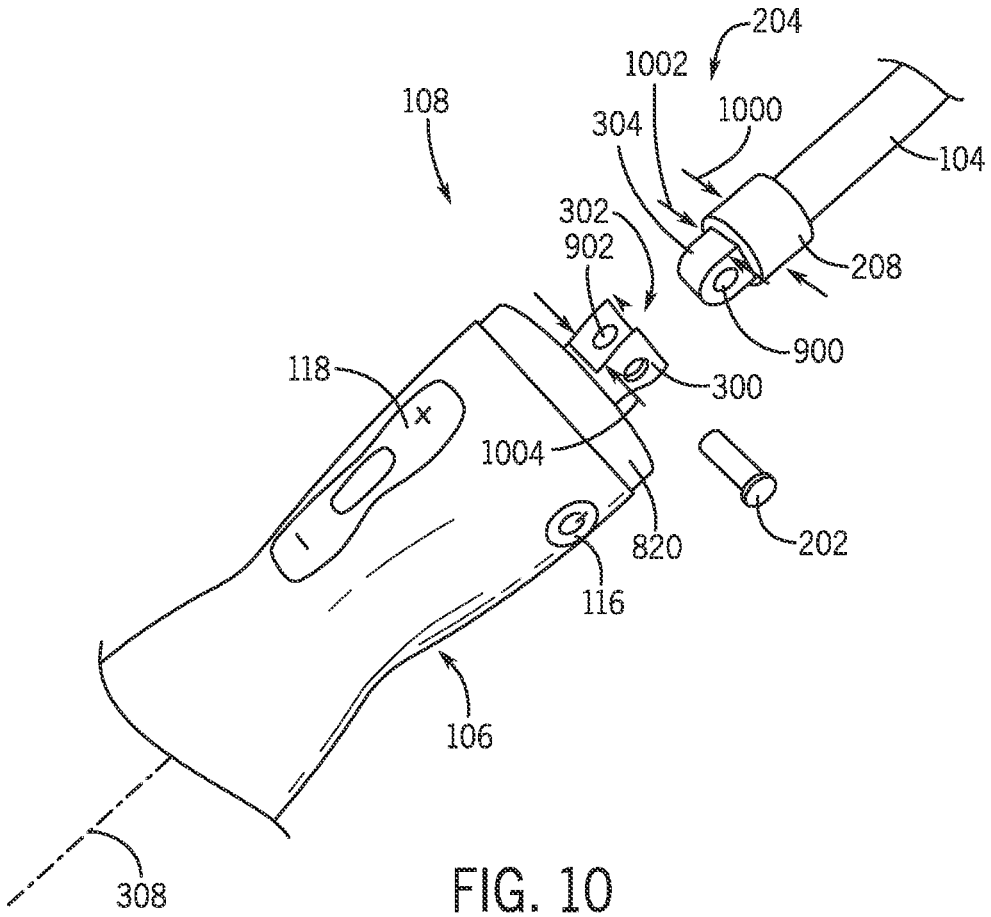

204
1002
108
304
1000
104
302
902
208
900
118
300
1004
820
202
116
106
308

FIG. 10

SYSTEM AND METHOD FOR EXERCISE EQUIPMENT HINGE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Non-Provisional patent application Ser. No. 16/390,656, filed Apr. 22, 2019 titled "SYSTEM AND METHOD FOR EXERCISE EQUIPMENT HINGE", which application claims priority to Provisional Patent Application Ser. No. 62/661,996 filed Apr. 24, 2018 titled "SYSTEM AND METHOD FOR EXERCISE EQUIPMENT HINGE," the disclosure of which are incorporated herein by reference in their entirety.

BACKGROUND

[0002] Various pieces of exercise equipment may be used to build muscle, reduce body fat, and improve cardiovascular endurance. A jump rope (e.g., skipping rope) provides all of these benefits and more. In operation, a user may hold a handle in each hand, the handles being connected together via a rope. As the user rotates their wrists, the rope moves in a circular or arc-like trajectory and the user jumps into the air to avoid having the rope strike their legs as the rope makes a full rotation. Jump ropes typically include a rope that is fixed to the handles such that repeated use may lead to tangling or kinking due to the rotation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] The present technology will be better understood on reading the following detailed description of non-limiting embodiments thereof, and on examining the accompanying drawings, in which:

[0004] FIG. **1** is front perspective view of an embodiment of a jump rope, in accordance with embodiments of the present disclosure.

[0005] FIG. **2** is a top plan view of handles of a jump rope, in accordance with embodiments of the present disclosure.

[0006] FIG. **3** perspective view of an embodiment of a hinge mechanism, in accordance with embodiments of the present disclosure.

[0007] FIG. **4** is a side elevational view of an embodiment of a hinge mechanism, in accordance with embodiments of the present disclosure.

[0008] FIG. **5**A is a perspective view of an embodiment of a handle, in accordance with embodiments of the present disclosure.

[0009] FIG. **5**B is a partial cross-sectional view of an embodiment of a handle, in accordance with embodiments of the present disclosure.

[0010] FIG. **6** is a side elevational view of an embodiment of a handle, in accordance with embodiments of the present disclosure.

[0011] FIG. **7** is a side elevational view of an embodiment of a handle, in accordance with embodiments of the present disclosure.

[0012] FIG. **8** is a schematic side elevational view of an embodiment of a handle, in accordance with embodiments of the present disclosure.

[0013] FIG. **9** is an exploded view of an embodiment of a handle, in accordance with embodiments of the present disclosure.

[0014] FIG. **10** is a partial detailed view of an embodiment of a hinge mechanism, in accordance with embodiments of the present disclosure.

DETAILED DESCRIPTION OF THE INVENTION

[0015] The foregoing aspects, features and advantages of the present technology will be further appreciated when considered with reference to the following description of preferred embodiments and accompanying drawings, wherein like reference numerals represent like elements. In describing the preferred embodiments of the technology illustrated in the appended drawings, specific terminology will be used for the sake of clarity. The present technology, however, is not intended to be limited to the specific terms used, and it is to be understood that each specific term includes equivalents that operate in a similar manner to accomplish a similar purpose.

[0016] When introducing elements of various embodiments of the present invention, the articles "a," "an," "the," and "said" are intended to mean that there are one or more of the elements. The terms "comprising," "including," and "having" are intended to be inclusive and mean that there may be additional elements other than the listed elements. Any examples of operating parameters and/or environmental conditions are not exclusive of other parameters/conditions of the disclosed embodiments. Additionally, it should be understood that references to "one embodiment", "an embodiment", "certain embodiments," or "other embodiments" of the present invention are not intended to be interpreted as excluding the existence of additional embodiments that also incorporate the recited features. Furthermore, reference to terms such as "above," "below," "upper", "lower", "side", "front," "back," or other terms regarding orientation are made with reference to the illustrated embodiments and are not intended to be limiting or exclude other orientations.

[0017] Various embodiments of the present disclosure are directed toward a hinge system (e.g., hinge mechanism) for use with a jump rope. The hinge system provides rotation about a first axis for a fixed or predetermined range. In certain embodiments, the hinge mechanism acts as a mechanical bearing to connect two solid objects while enabling a limited range of motion between them. Furthermore, the hinge system provides for rotation about a second axis, perpendicular to the first axis. For example, the hinge system may include a rotary mechanism (e.g., bearing arrangement) to provide full 360-degree rotational freedom for the hinge system relative to a handle. This multi-axis movement may provide improved performance of the jump rope, as the rope may not tangle or otherwise kink during rotation of handles of the jump rope. In other words, the hinge system and accompanying bearing arrangement enable freedom of movement in at least two directions.

[0018] Various embodiments also describe one or more tracking features within the jump rope to facilitate recording and/or feedback regarding use of the jump rope. For example, various embodiments may be directed toward a smart jump rope that tracks complete rotations of the hinge and/or rope. In embodiments, the handle includes a sensor assembly that tracks rotation of the hinge system relative to the handle. Full rotations can be counted as part of the smart jump rope device and transmitted, for example to a wearable

device for tracking fitness activities, via a communication protocol such as BLUETOOTH™.

[0019] FIG. **1** is a front perspective view of an embodiment of a jump rope **100** having a hinge mechanism **102** (e.g., hinge system) utilized to couple a rope **104** to handles **106**. In the illustrated embodiment, the rope **104** couples to respective handles **106**A, **106**B via the hinge mechanism **102** at first ends **108** of the handles **106**, while second ends **110** of the handles **106** include a cap **112**. In certain embodiments, the cap **112** is removable to enable access to the internal components of the handles **106**, which will be described in detail below. In the illustrated embodiment, the handles **106** include a contoured grip **114** to conform to the shape of a human hand, thereby improving comfort for the user operating the jump rope, for example as part of a fitness program. The illustrated handle **106**A includes a switch **116**, which may be an on/off button to activate the jump rope **100**. As will be described, the switch **116** may transmit a signal to a battery arranged within the handle **106**A to activate one or more components within the handle **106**A, such as a printed circuit board and/or a display. Additionally, the handle **106**A includes a toggle switch **118** that may be utilized to scroll through settings, which may be presented to the user on a display (not pictured) which may be formed in the handle **106**A. The display may include data regarding the exercise performed by the user (e.g., number of rotations, time, calories burned, etc.) or information regarding operation of the jump rope **100** (e.g., battery life, connectivity, etc.).

[0020] It should be appreciated that various features illustrated in the jump rope **100** are for illustrative purposes and are not intended to limit the scope of the disclosure. For example, while the power switch **116** and the toggle switch **118** are illustrated on the handle **106**A, it should be appreciated that the switches **116**, **118** may not be on the same handle **106**. Furthermore, the functionality may be integrated into a single switch. For example, the power switch **116** may be formed between the selectors of the toggle switch **118**.

[0021] FIG. **2** is a top plan view of an embodiment of the jump rope **100** illustrating the handles **106** being coupled together via the rope **104** that is connected to the handles **106** via respective hinge mechanisms **102**. The illustrated hinge mechanisms **102** enable 180 degree rotation relative to an axis **200** (e.g., a first axis, a rope axis) extending through a fastener **202**. That is, the hinge mechanism **102** enables plus or minus 90 degrees of rotational movement about the axis **200**. It should be appreciated that in other embodiments the range of movement about the axis **200** may be different. For example, the illustrated hinge mechanisms **102** may enable approximately 220 degrees of rotation relative to the axis **200** (e.g., about the axis **200**) extending through the fastener **202**. In various embodiments, the hinge mechanism **102** enables plus or minus 110 degrees of rotational movement about the axis **200**. Further, in certain embodiments, the range of rotation about the axis **200** may be approximately 140 degrees. It should be appreciated that various ranges of movement about the axis **200** may be provided in order to facilitate smooth movement of the rope **104** in an arching path as the handle **106** is rotated. As illustrated, the hinge mechanism **102** includes an upper hinge portion **204** and a lower hinge portion **206**. The upper hinge portion **204** includes a tube **208** that receives the rope **104**. The tube **208**, or at least a portion coupled to the tube **208**, is inserted into the lower hinge portion **206** and coupled together via the fastener **202**, such as a screw or a pin. In other words, the upper hinge portion **204** is coupled to the lower hinge portion **206**. The fastener **202** acts as a pivot point for the hinge mechanism **102**, thereby enabling rotation of the upper hinge portion **204** about the fastener **202** (e.g., about the axis **200**) over a range of approximately 180 degrees, in certain embodiments, but as noted above the range can be particularly adjusted.

[0022] FIG. **3** is a front perspective view of an embodiment of the handle **106** including the hinge mechanism **102** having the upper hinge portion **204** and the lower hinge portion **206**. As shown, the upper hinge portion **204** is inserted into the lower hinge portion **206**. The lower hinge portion includes a pair of arms **300** that extend upwardly and away from the handle **106** to thereby form a cavity or slot **302** to receive the upper hinge portion **204**. In various embodiments, the upper hinge portion **204** includes a tab **304** (e.g., extension, insert, etc.) that is arranged between the arms **300** of the lower hinge portion **206**. For example, the tab **304** may be a portion of the tube **208** that receives the rope **104**. In various embodiments, the tab **304** is integrally formed to the tube **208**. However, in various embodiments, the tab **304** may be a separate attachable component. Furthermore, in embodiments, the rope **104** may be a replaceable component, and as a result, the rope **104** may be a separate component that also includes the tube **208** and/or the tab **304**. In this manner, ropes **104** may be easily changed out and replaced while still including the tube **208** and/or tab **304** to facilitate coupling to the lower hinge portion **206**. Additionally, in various embodiments, the tab **304** may not be present and the tube **208** may have a diameter to facilitate insertion into the slot **302**. The fastener **202** in the illustrated embodiment is a screw, but it should be appreciated that other fasteners, such as pins, dowel rods, or the like may be utilized. As described above, the hinge mechanism **102** enables rotation of the upper hinge portion **204** about the axis **200** extending through the fastener **202**.

[0023] The embodiment illustrated in FIG. **3** has removed an upper cap (FIG. **8**) from the handle **106** to provide visual access to a rotary mechanism **306** (e.g., bearing system) enabling rotational movement of the hinge system **102** relative to a longitudinal axis **308** of the handle **106**. Accordingly, the upper hinge portion **204** has at least two degrees of freedom of movement. That is, the upper hinge portion **204** may rotate about the longitudinal axis **308** (e.g., via the rotary mechanism **306**) and also rotate about the axis **200**. The rotary mechanism **306** may include one or more bearings **310**, such as ball bearings or journal bearings, to enable 360-degree rotation of the hinge system **102** relative to the longitudinal axis **308** of the handle **106**. As will be described below, the lower hinge portion **206** may include a protrusion that extends through an aperture formed in the rotary mechanism **306** to thereby receive and support the lower hinge portion **206**. The above-described hinge mechanism **102** provides an accurate tracking of skips (described below) while providing an authentic jumping experience in which the rope **104** is not tangled or otherwise interferes with the jumping action. For example, if the rope **104** were to come straight out of the handle **106** (e.g., without the hinge mechanism **102**), then the number of skips may not be accurately counted due to the limited range of motion of the rope **104**. Furthermore, fixing the rope **104** at an angle, such as straight out from the handle **106**, may limit the motion of

the rope **104** and/or the ability of the user to perform certain jump tricks due to the restriction caused by the position of the rope **104**.

[0024] FIG. **4** is a side elevational view of an embodiment of the hinge mechanism **102** in which the upper hinge portion **204** is at an upper boundary of the range of motion. In certain embodiments, the upper hinge portion **204** may contact the handle **106** to thereby prevent further rotation about the axis **200** extending through the fastener **202**. In the illustrated embodiment, the axis **200** extends substantially perpendicular to the plane of the page. However, in certain embodiments, a stop or other mechanism (not pictured) may be arranged on the hinge mechanism **102** to limit the rotation of the upper hinge portion (**206**). For example, the stop may extend from the lower hinge portion **204** to block the upper hinge portion **204** from contacting the handle **206**. In the illustrated embodiment, the rope **104** is illustrated as extending into and being secured within the upper hinge portion **204**. For example, the rope **104** extends into the tube **208**. The rope **104** may include a sheath or cover, for example made of a polymer material.

[0025] FIG. **5**A is a schematic perspective view of an embodiment of the handle **106**. As shown, the rope **104** extends and couples to the upper hinge portion **204**, which extends into the slot **302** formed in the lower hinge portion **206** and is secured via the fastener **202**. In the illustrated embodiment, the handle **106** includes a clamp **500** arranged proximate the hinge mechanism **102**. The clamp **500** may be utilized to tighten the rope **104** and/or the hinge mechanism **102**. That is, the clamp **500** may be used to provide friction to thereby reduce a speed at which the hinge mechanism **102** rotates about the longitudinal axis **308** of the handle **106**. Moreover, in embodiments, the clamp **500** may be used to secure the hinge mechanism **102** to the handle **106**.

[0026] In the illustrated embodiment, the clamp **500** is arranged proximate an outer diameter of the first end **108** of the handle **106**. The clamp **500** may include threads or the like to couple to the handle **106** and may, in various embodiments, apply a pressure or frictional force to the rotary mechanism **306**. For example, in the illustrated embodiment, the rotary mechanism **306** is positioned radially inward from the clamp **500**. Moreover, the rotary mechanism **306** and clamp **500** are coaxial along the longitudinal axis **308**. In various embodiments, rotation of the clamp **500**, about the longitudinal axis **308**, in a first direction may apply a force to the rotary mechanism **306**, such as along an outer diameter of the rotary mechanism **306**, while rotation in a second rotation may release or remove a force from the rotary mechanism **306**. However, it should also be appreciated that the clamp **500** may be utilized to apply a frictional force to the lower hinge portion **206**. For example, as illustrated in FIG. **5**B.

[0027] FIG. **5**B is partial cross-sectional side view of an embodiment of the handle **106**. In the illustrated embodiment, the rope **104** extends into the upper hinge portion **204**, for example into the tube **208**. In various embodiments, the rope **104** is secured to the upper hinge portion **204** via a clamp, a fastener, an adhesive, or any other reasonable coupling mechanism. The upper hinge portion **204** extends into the slot **302** formed between the arms **300** of the lower hinge portion **206** and is secured to the lower hinge portion **204** via the fastener **202**, which is a pin in the illustrated embodiment. The clamp **500** is illustrated as securing the hinge mechanism **102** to the handle **106**. However, as described above, the clamp **500** may also be utilized to tighten the rope **104** and/or the hinge mechanism **102** to add friction to the rotation of the hinge mechanism **102**, for example via the rotary mechanism **306**, relative to the longitudinal axis **308** of the handle **106**. It should be appreciated that the rotary mechanism **306** has been removed from the illustrated embodiment for clarity, however, it should be appreciated that in various embodiments the rotary mechanism may be arranged about the lower hinge portion **206**. In the illustrated embodiment, the clamp **500** may apply a frictional force to the lower hinge portion **206**, thereby reducing rotation via the rotary mechanism, for example, slowing rotation within a journal bearing or by ball bearings facilitating rotation of the lower hinge portion **206**.

[0028] FIG. **6** is a side elevational view of an embodiment of the handle **106** having the hinge mechanism **102** arranged at the first end **108**. It should be appreciated that various portions of the handle **106** are illustrated as see through (such as a lower portion) or to include lines indicative of textures or elevation changes. The rope **104** has been removed for clarity. The illustrated handle **106** includes a body **600** having the contoured grip **114** for ergonomic purposes when the user interacts with the handle **106**. As shown, the toggle switch **118** is arranged on the handle **106**. In the illustrated embodiment, the toggle switch **118** further includes an enter button **602**, which may be utilized to navigate a user menu, which may be visible on a display (not pictured). Moreover, as described above, in various embodiments the enter button **602** may double as the power switch **116**. For example, a long press (e.g., above a threshold period of time) may be for power supply operation while a short press (e.g., below a threshold period of time) may be for selection or navigation purposes.

[0029] Further illustrated is the cap **112** arranged at the second end **110** of the handles **106**. As described above, in various embodiments the cap **112** provides access to an interior portion of the handles **106**. For example, the cap **112** may provide access to replace a battery, add weights to the handle **106**, or the like. However, it should be appreciated that the cap **112** may be secured to the remainder of the body **600** to block access to the interior portions.

[0030] As described above, the rotary mechanism **306** is arranged proximate the first end **108**, and is illustrated in FIG. **6** at a location where the body **600** is see-through for illustrative purposes. The rotary mechanism receives the lower hinge portion **206** within the body **600** to facilitate rotation of the lower hinge portion **206** about the longitudinal axis **308** of the handle **106**. The illustrated embodiment further includes the fastener **202** for coupling the upper hinge portion **204** to the lower hinge portion **206**. As shown, the upper hinge portion **204** extends into the slot **302** formed between the arms **300**. As described above, in various embodiments, the upper hinge portion **204** may rotate about the axis **200**.

[0031] FIG. **7** is a side elevational view of an embodiment of the handle **106** having the hinge mechanism **102** arranged at the first end **108** and the switch **116** (e.g., the on/off switch) arranged proximate the contoured grip **114**. In certain embodiments, a display may also be arranged on the handle to provide information to the user, such as data related to an exercise program or usage information such as power availability and connectivity. The illustrated embodiment further includes the fastener **202** coupling the upper hinge portion **204** to the lower hinge portion **206**, as

described above. As described above, the fastener **202** enables rotation of the upper hinge portion **204** relative to the lower hinge portion **206** about the axis **200** extending through the fastener **202**.

[0032] FIG. **8** is a schematic cross-sectional view of an embodiment of the handle **106**. As described above, the handle **106** includes the body **600** having the contoured grip **114** to accommodate a human hand holding the handle **106**. In the illustrated embodiment, the second end **110** of the handle **106** includes the cap **112** for securing the contents within the handle **106**. A weight **800** is arranged within the handle proximate the cap **112**. The weight **700** may be used to adjust the difficulty of the exercise program the user undergoes. For example, a heavier handle **106** may require more effort for the user to successfully rotate the handle **106** to move the rope **104** in the circular or arc-like movement. The illustrated embodiment also includes a magnet **802** proximate the weight **800** and a magnet enclosure **804** to secure the magnet **802** to the weight **800**. The magnet **802** may secure the weight **800** into position to prevent the weight **800** from moving or throwing the handle **106** off balance.

[0033] As shown in FIG. **8**, the handle further includes a display **806**, which may be an Organic Light Emitting Diode (OLED) or any other type of display. In embodiments, the handle **106** has an opening or aperture to enable visibility of the display **806**. Furthermore, it should be appreciated that while the display **806** is illustrated as being substantially centered within the body **600**, the display **806** may be closer to the opening or aperture to improve visibility. In various embodiments, at least a portion of the handle **106**, for example the portion proximate the display **806**, is formed from a semi-transparent material to provide visibility of the display **806**. The handle further includes a printed circuit board **808** (PCB) which may include a memory or processor for executing one or more programs stored on the memory. In the illustrated embodiment, a power source **810** is further included to provide operational power to the components, such as the display **806** and the PCB **808**. The illustrated power source is a battery, which may be a rechargeable battery such as a lithium ion battery. While not shown in the illustrated embodiment, a port may be provided in the body **600** to receive a cable from a power supply to recharge the power source **810**. Furthermore, in embodiments, the power source **810** may be rechargeable via other methods, such as electromagnetic induction.

[0034] In various embodiments, the jump rope **100** tracks a user's exercise progress by recording and displaying the number of rotations the jump rope makes over a period of time. In the illustrated embodiment, a sensor arrangement **812** (e.g., sensor assembly) includes a sensor **814** and a sensor magnet **816**. The sensor magnet **816** is arranged on a disc enclosure **818**, which is coupled to the rotary mechanism **306**. As a result, when the rotary mechanism **306** rotates the disc enclosure **818** and therefore the sensor magnet **816**, also rotate. As the sensor magnet **816** rotates past the sensor **814**, a signal may be transmitted indicating one rotation of the rope, which may correspond to one rotation of the rotary mechanism **306**. Accordingly, the sensor arrangement **812** may be utilized to track the number of rotations performed by the jump rope **100**. In various embodiments, the sensor arrangement **812** may include a Hall Effect sensor. Furthermore, in embodiments, different sensors, or additional sensors, such as accelerometers, reflective sensors, interrupter sensors, optical encoders, variable-reluctance sensors, and the like may also be utilized.

[0035] As described above, the handle further includes the hinge mechanism **102** coupled to the rotary mechanism **306**. As shown, the lower hinge portion **206** extends through the rotary mechanism **306** and is coupled to the rotary mechanism **306** such that rotation of the hinge mechanism **102** is enabled circumferentially about the longitudinal axis **308** of the handle **106**. The illustrated rotary mechanism **306** may include a journal bearing and/or ball bearing **310** to facilitate rotation of the lower hinge portion **206** about the longitudinal axis **308**. In various embodiments, the bearing **310** may be a journal bearing with a smooth finish and/or a dry lubricant that receives the lower hinge portion **206** through an aperture. Additionally, in embodiments, the bearing **310** may include ball bearings within an enclosure that facilitate rotation of the lower hinge portion **206**.

[0036] Moreover, the upper hinge portion **204** extends into the slot **302** of the lower hinge portion **206** and is secured via the fastener **202**. For example, the tab **304** extends into the slot **302** and includes one or more apertures to receive the fastener **202**, which extends through corresponding apertures in the arms **300**. The illustrated embodiment includes the rope **104** coupled to the upper hinge portion **204**. As shown, the rope **104** extends into the upper hinge portion **204** and may be secured to the upper hinge portion **204**, for example within the tube **208**, as described above. In various embodiments, an upper cap **820** is positioned at the first end **108** of the handle **106** to secure the hinge mechanism **102** to the handle **106**. In certain embodiments, the upper cap **820** restricts longitudinal movement of the hinge mechanism **102** and/or the rotary mechanism **306** along the longitudinal axis **308** of the handle. As a result, the hinge mechanism **102** is secured to the handle **106**. In various embodiments, the clamp **500**, described above, may be incorporated into the upper cap **820**.

[0037] FIG. **9** is an exploded view of an embodiment of the handle **106**. As described in detail above, the rope **104** is coupled to the upper hinge portion **204** which extends into the slot **302** formed by the arms **300** of the lower hinge portion **206**. For example, the tab **304** that is coupled to the tube **208** and forms at least a portion of the upper hinge portion **204**, in the illustrated embodiment, may be sized to enter the slot **302** such that an aperture **900** extending through the tab **304** aligns with apertures **902** extending through the arms **300**. The upper hinge portion **204** is secured to the lower hinge portion **206** by the fastener **202**, which enables rotational movement of the upper hinge portion **204** relative to the lower hinge portion **206** about the axis **200** extending through the fastener **202**. The illustrated upper cap **820** secures the hinge mechanism **102** to the handle **106**, for example to the body **600** of the handle **106**, and restricts longitudinal movement of the hinge mechanism **102** along the longitudinal axis **308** of the handle **106**. Moreover, in embodiments, the upper cap **820** may include the clamp **500** to apply a frictional force to adjust a rotational speed of the rotary mechanism **306**. The hinge mechanism **102** extends into the rotary mechanism **306** to thereby enable rotational movement of the hinge mechanism **102** circumferentially about the longitudinal axis **308** of the handle **106**. For example, an extension **904** of the lower hinge portion **206** may extend into an aperture formed within the rotary mechanism **306**.

[0038] The sensor arrangement **812** is illustrated within the body **600** of the handle **106** and includes the sensor magnet **816** coupled to the disc enclosure **818**. It should be appreciated that the disc enclosure **818** rotates along with the rotary mechanism **306**, and as a result, the sensor magnet **816** rotates about the longitudinal axis **308** of the handle **106**. The sensor arrangement **812** further includes the sensor **814** arranged on the PCB **808** at a fixed location. Accordingly, the sensor **814** will be activated when the sensor magnet **816** is positioned proximate the sensor **814**, which may transmit a signal to the PCB to record one rotation of the rope **104**.

[0039] Interior components of the handle **106** further include the display **806**, which may be communicatively coupled to the PCB **808** and powered by the power source **810** arranged within the handle **106**. In embodiments, the display **806** and the PCB **808** may receive signals indicative of instructions from the switch **116** and/or the toggle switch **118**. These instructions may turn the jump rope off and on, move between menu options, and the like.

[0040] In the illustrated embodiment, the cap **112** includes the weight **800** which is positioned proximate the magnet **802** and the magnet enclosure **804**. In certain embodiments, the cap **112** and weight **800** may be removable components that the user can change out to adjust their work out, that is, to increase the weigh to the handle **106** to make the work out more challenging. It should be appreciated that the cap **112** and weight **800** may be a joint component or singular components. The illustrated embodiment further includes a charging connector **906** for recharging the power source **810**.

[0041] FIG. **10** is a detailed perspective view of the hinge mechanism **102**. As illustrated, the lower hinge portion **206** extends out of the first end **108** of the handle **106**. In embodiments, the lower hinge portion **206** is secured to the handle **106** and longitudinal movement along the longitudinal axis **308** of the handle **106** is restricted by the upper cap **820**. The lower hinge portion **206** includes the arms **300** that form the slot **302** for receiving the upper hinge portion **204**. The apertures **902** extend through each of the arms **300** and align with the corresponding aperture **900** on the tab **304** of the upper hinge portion **204** to receive the fastener **202** and secure the upper hinge portion **204** to the lower hinge portion **206**. In various embodiments, the arms **300** may include a profile, such as a triangular profile, to improve strength and reduce weight.

[0042] The illustrated upper hinge portion **204** includes the tab **304**, which may be referred to as an attachment member, and the tube **208**, which may be referred to as a body member. As illustrated, a diameter **1000** of the body member **208** is larger than a second diameter **1002** the attachment member **304**. The size of the attachment member **304** may be particularly selected to correspond to a width **1004** of the slot **302** formed in the lower hinge portion **206**. In operation, the attachment member **304** is positioned within the slot **302** and the fastener **202** extends through the respective apertures **900**, **902** to secure the upper hinge portion **204** to the lower hinge portion **206**. The illustrated fastener **202** will serve as a pivot to enable rotation of the upper hinge portion **204** relative to the lower hinge portion **206** about the axis **200** that extends through the fastener **202**. In the illustrated embodiment, the rope **104** is secured to the upper hinge portion **204**, as described above.

[0043] Although the technology herein has been described with reference to particular embodiments, it is to be understood that these embodiments are merely illustrative of the principles and applications of the present technology. It is therefore to be understood that numerous modifications may be made to the illustrative embodiments and that other arrangements may be devised without departing from the spirit and scope of the present technology as defined by the appended claims.

1. (canceled)

2. A system, comprising:

a handle having a substantially hollow body;

a hinge mechanism extending at least partially into the hollow body, the hinge mechanism including a lower hinge portion and an upper hinge portion rotatably coupled together such that the upper hinge portion rotates about a hinge axis arranged substantially perpendicular to a handle axis;

a rotary mechanism positioned at least partially within the hollow body and coupled to the lower hinge portion, the rotary mechanism configured to enable rotation of the lower hinge portion about the handle axis;

an upper cap positioned to cover an opening within the handle, the hinge mechanism extending at least partially through the upper cap, the upper cap being secured to the handle to restrict longitudinal movement of the hinge mechanism along the handle axis; and

a sensor arrangement positioned within the hollow body, the sensor arrangement measuring a number of rotations of the rotary mechanism about the handle axis.

3. The system of claim **2**, further comprising:

an adjustable friction element configured to apply a frictional force to the lower hinge portion to resist rotation of the lower hinge portion.

4. The system of claim **3**, wherein the adjustable friction element forms at least a portion of the upper cap.

5. The system of claim **2**, wherein the handle has a contoured shape.

6. The system of claim **2**, wherein the hinge mechanism further comprises:

a tube forming at least a portion of the upper hinge portion; and

a tab extending longitudinally from the tube, the tab having a smaller diameter than the tube, the tab being coupled to the lower hinge portion.

7. The system of claim **2**, further comprising:

a slot formed in the lower hinge portion, the slot receiving the upper hinge portion; and

apertures extending through the lower hinge portion and the upper hinge portion, wherein a fastener extends through the apertures when the upper hinge portion is arranged within the slot to couple the upper hinge portion to the lower hinge portion.

8. The system of claim **2**, further comprising:

a magnetic sensor of the sensor arrangement, wherein the magnetic sensor includes a fixed sensor and a magnet, the magnet being coupled to the rotary mechanism;

one or more processors;

a memory; and

a power supply.

9. A system, comprising:
a handle having a void space;
a hinge mechanism, comprising:
a lower hinge portion positioned at least partially within the void space;
an upper hinge portion, coupled to the lower hinge portion, and positioned outside of the void space; and
a pivot point to enable the upper hinge portion to rotate about a hinge axis relative to the lower hinge portion;
a rotary mechanism coupled to the lower hinge portion at a reduced diameter area to enable rotation about a longitudinal axis extending through the handle;
a sensor assembly positioned within the void space, the sensor assembly comprising:
a sensor positioned on the rotary mechanism;
a magnetic sensor arranged proximate the rotary mechanism, the magnetic sensor positioned to count a number of rotations of the rotary mechanism; and
an adjustable friction element configured to apply a frictional force to the hinge mechanism.

10. The system of claim **9**, further comprising:
an upper cap positioned proximate the hinge mechanism to cover an opening to the void space, the hinge mechanism extending at least partially through the upper cap, the upper cap being secured to the handle to block longitudinal movement of the hinge mechanism along the longitudinal axis.

11. The system of claim **10**, wherein the adjustable friction element forms at least a portion of the upper cap.

12. The system of claim **9**, wherein the handle has a contoured shape.

13. The system of claim **9**, further comprising:
a printed circuit board (PCB) associated with the sensor assembly, the PCB configured to receive information from the sensor magnet.

14. The system of claim **9**, further comprising:
a display, the displaying being visible through an opening formed in the handle.

15. The system of claim **9**, further comprising:
a switch arranged on the handle, the switch being communicatively coupled to a power supply, the switch toggling the sensor assembly between an on state and an off state.

16. The system of claim **9**, further comprising:
a rotation limiter associated with the upper hinge portion, the rotation limiter restricting rotation of the upper hinge portion about the hinge axis within a predetermined range.

17. The system of claim **16**, wherein the predetermined range is between 90 degrees and 220 degrees.

18. An exercise system, comprising:
a rotating hinge mechanism configured to rotate about a longitudinal axis and to enable rotation about a hinge axis, the hinge axis being perpendicular to the longitudinal axis, the rotating hinge mechanism having a lower hinge portion and an upper hinge portion, wherein the hinge axis extends through an interface between the lower hinge portion and the upper hinge portion; and
a cap associated with the rotating hinge mechanism, the cap having an opening that receives at least a portion of the rotating hinge mechanism, wherein the cap is positioned to apply a frictional force to at least a portion of the rotating hinge mechanism to resist rotation about longitudinal axis.

19. The exercise system of claim **18**, further comprising:
a body portion coupled to the rotating hinge mechanism via the cap; and
a sensor arrangement positioned within the body portion, the sensor arrangement configured to determine a number of rotations about the longitudinal axis.

20. The exercise system of claim **18**, further comprising:
a rotary mechanism coupled to the lower hinge portion, the rotary mechanism secured to the lower hinge portion to block axial movement along the longitudinal axis beyond a predetermine amount.

21. The exercise system of claim **18**, wherein an end of the upper hinge portion is positioned within a slot in the lower hinge portion, the upper hinge portion and lower hinge portion coupled together via a fastener, the fastener permitting rotation about the hinge axis, wherein rotation is restricted by an increased diameter portion of the upper hinge portion.

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