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(54) **ADJUSTABLE SPHERICAL MOTION SENSOR HOUSING FOR OUTDOOR SECURITY LIGHT**

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(51) **Int. Cl.**
F21S 8/00 (2006.01)
H05B 47/115 (2020.01)

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CPC ***F21S 8/033*** (2013.01); ***H05B 47/115*** (2020.01)

(58) **Field of Classification Search**
CPC .. F21S 8/033; F21S 8/003; F21S 9/032; F21S 9/037; H05B 47/115; H05B 45/10; (Continued)

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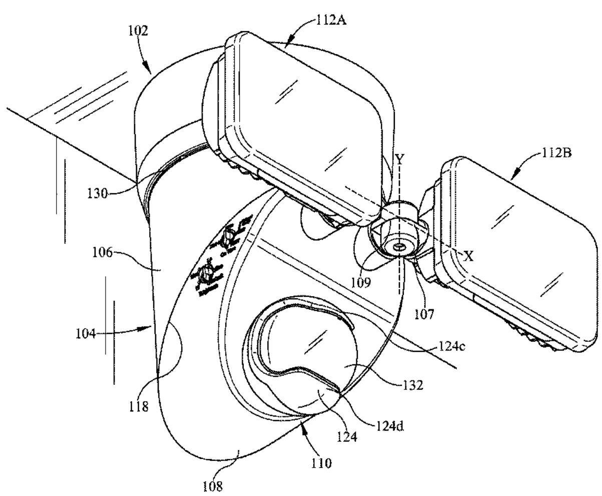
(74) *Attorney, Agent, or Firm* — Gray Ice Higdon

(57) **ABSTRACT**

The present disclosure sets forth a motion sensing outdoor security light with the flexibility of being mounted to either a wall structure or to an eave or ceiling structure. An adjustable spherical motion sensor housing may be provided with the rotationally adjustable outdoor security light, allowing easy adjustment of motion detection ranges under different mounting schemes without comprising the aesthetic design of the light. The adjustable spherical motion sensor housing may also provide an enlarged horizontal field of view for better performance. Sensitivity of a motion sensor may be adjusted via a control circuit based on adjustment of the spherical motion sensor housing.

20 Claims, 17 Drawing Sheets



Related U.S. Application Data

continuation-in-part of application No. 17/334,918, filed on May 31, 2021, now Pat. No. 11,506,348.

(60) Provisional application No. 63/077,848, filed on Sep. 14, 2020.

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CPC F21V 21/30; F21V 23/023; F21V 23/04; F21V 23/0471; F21V 23/0442; F21V 23/0478; G01J 1/0214; G01J 1/0411; G01J 5/0025; G01V 3/12; G02B 19/0009; G02B 19/0076; F21Y 2115/10; F21W 2131/10
See application file for complete search history.

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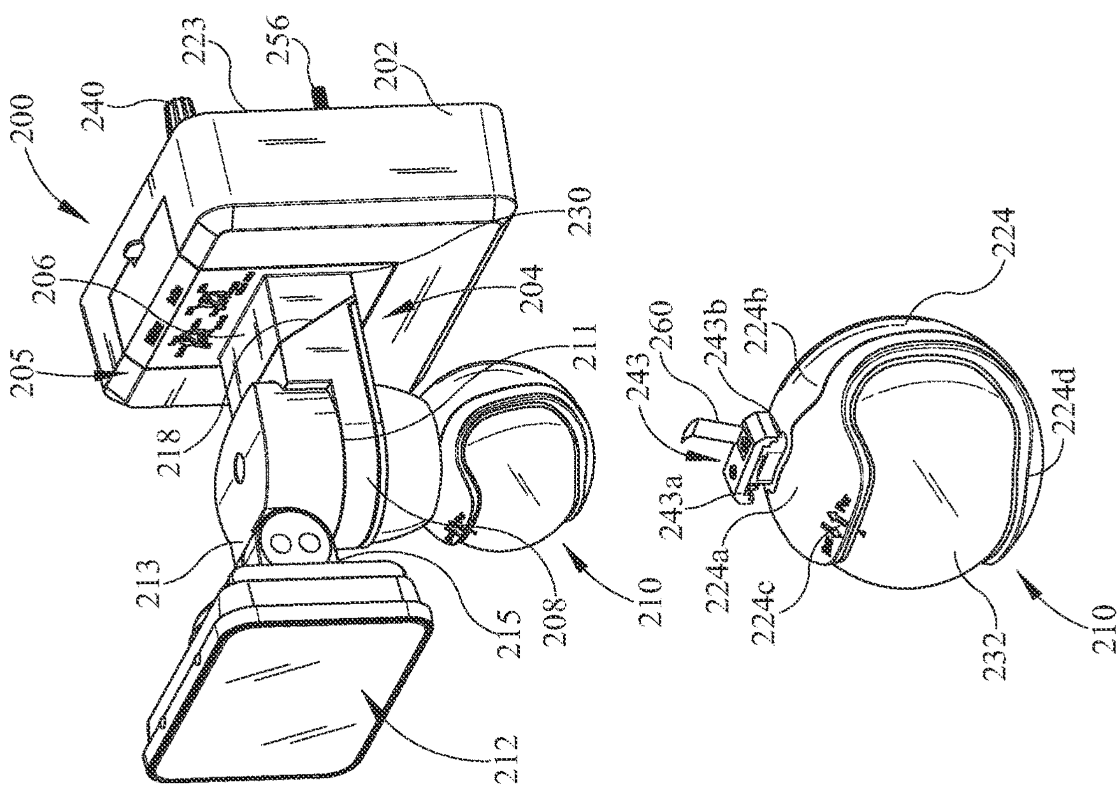
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FIG. 1B

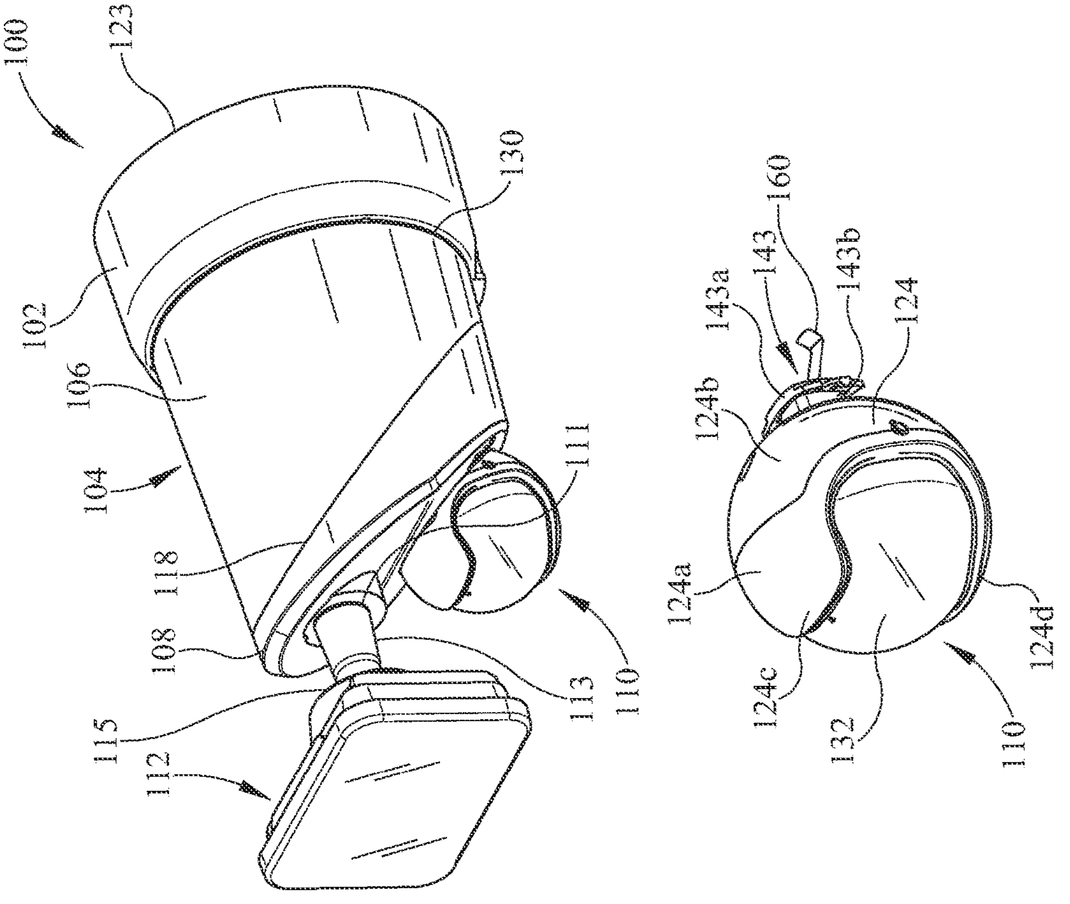
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FIG. 1A

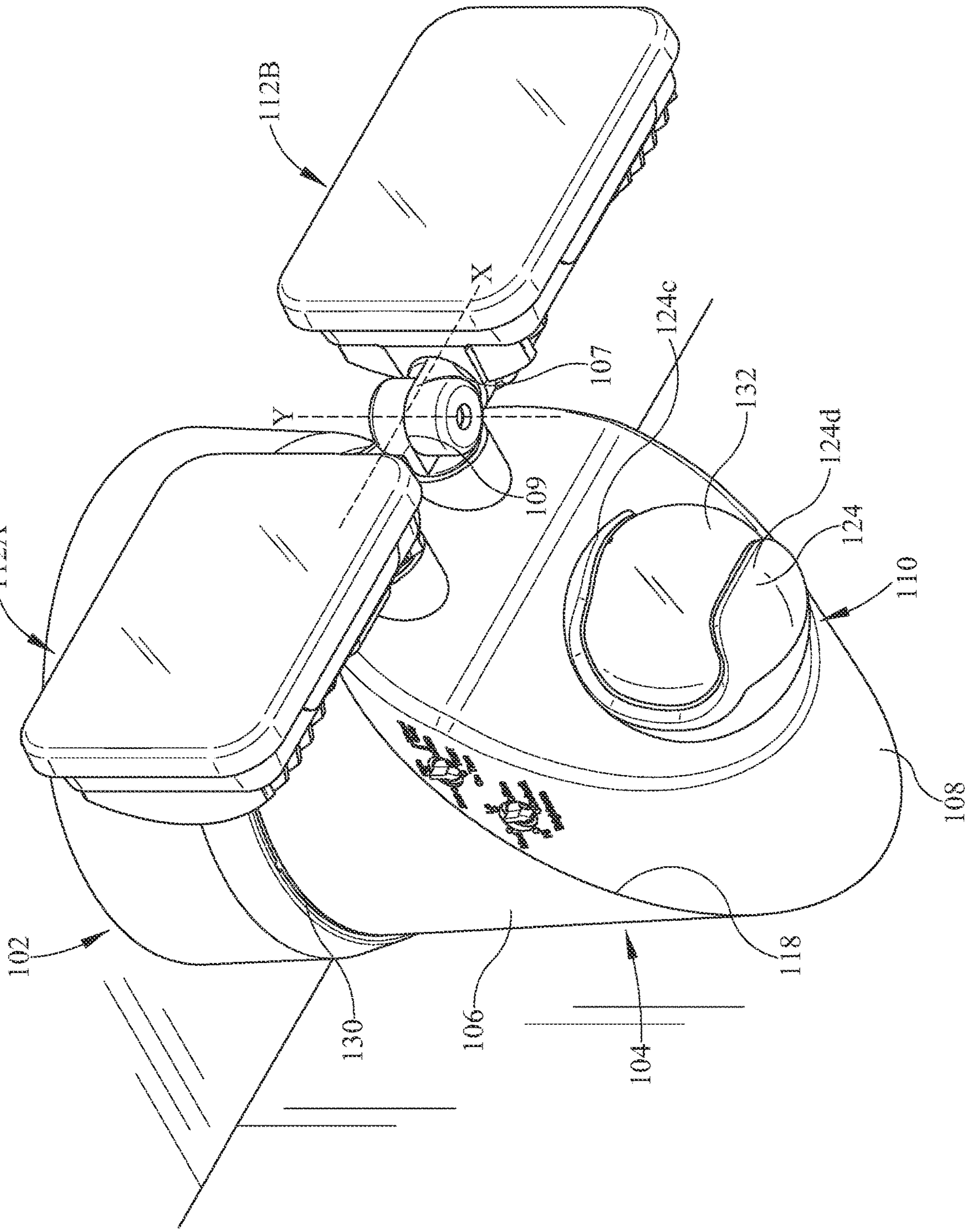

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FIG. 2

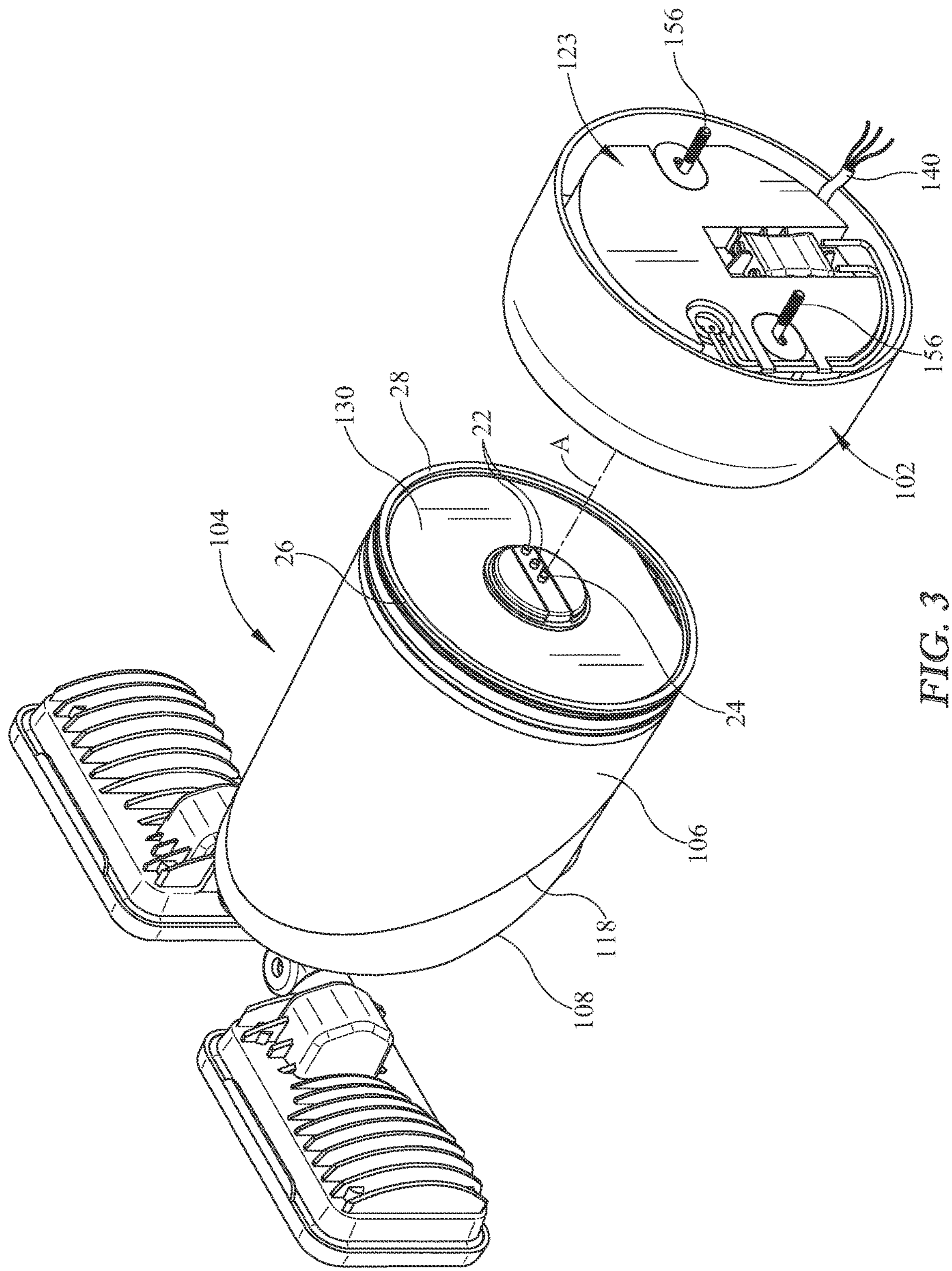

FIG. 3

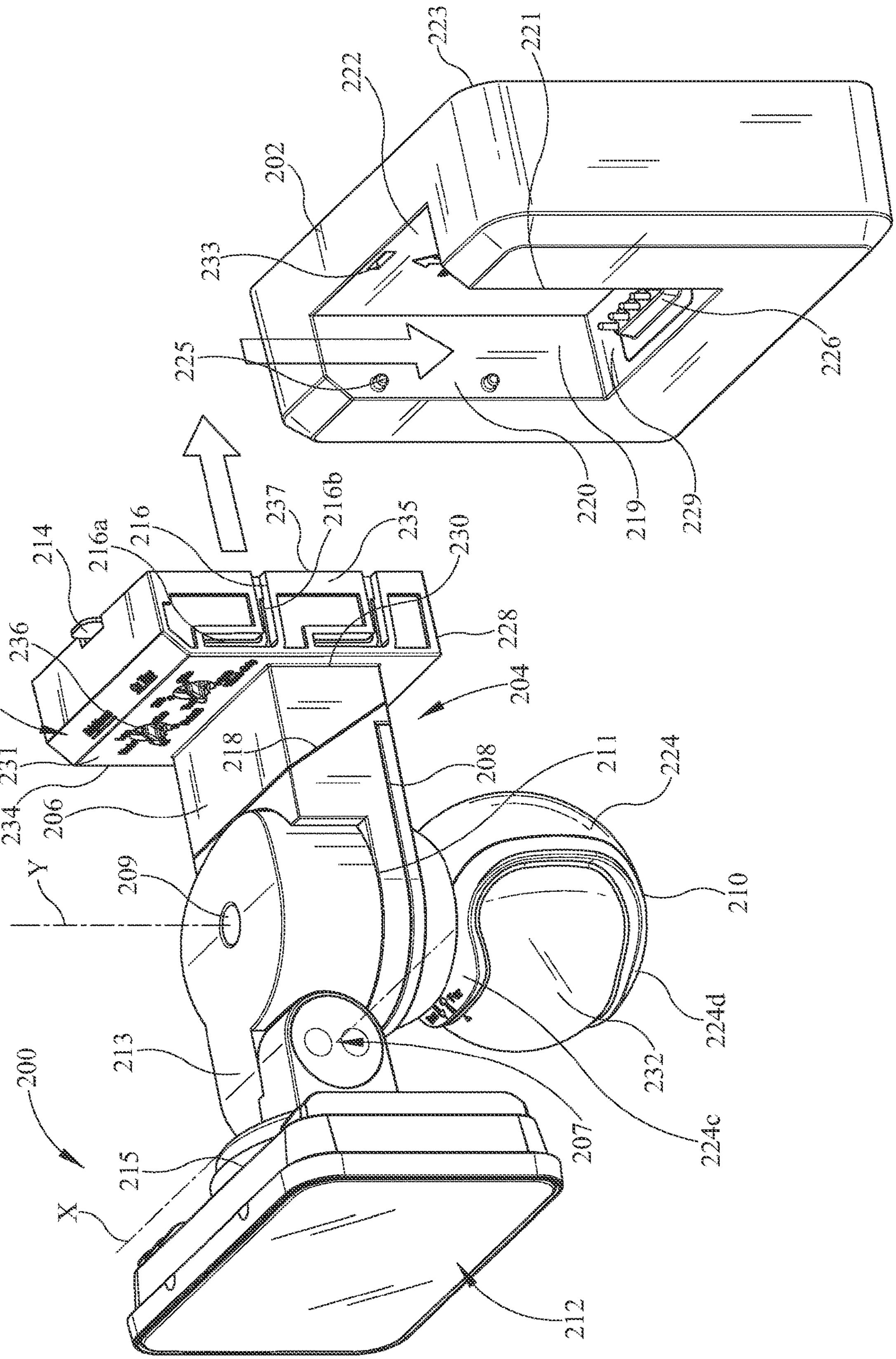
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FIG. 4

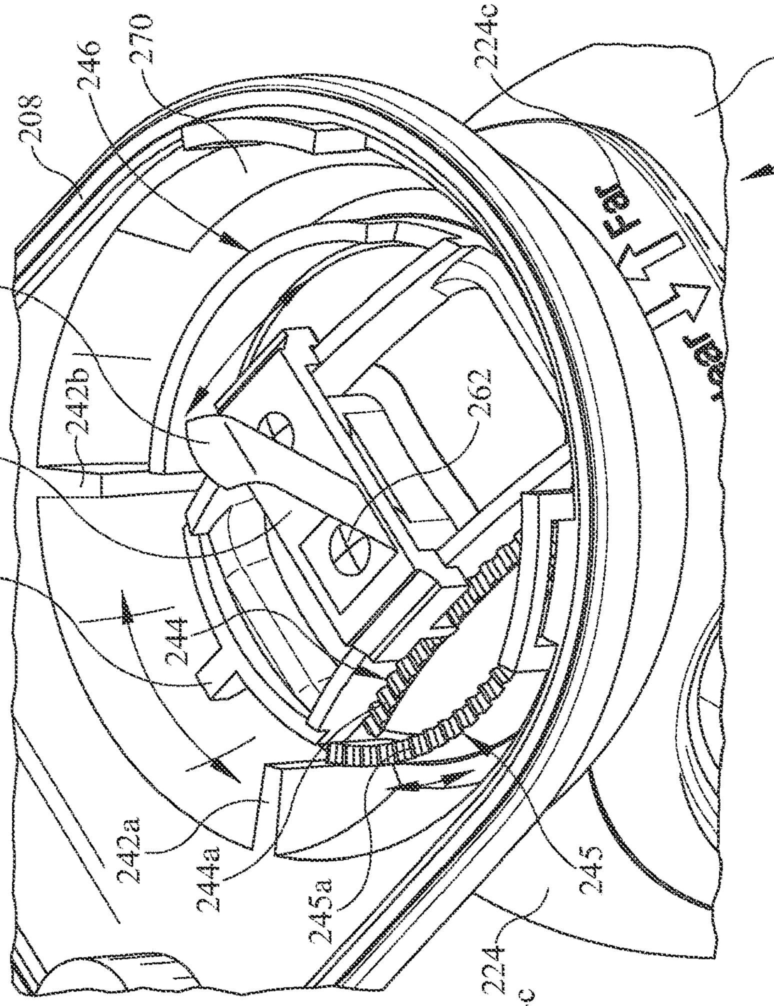

FIG. 5A

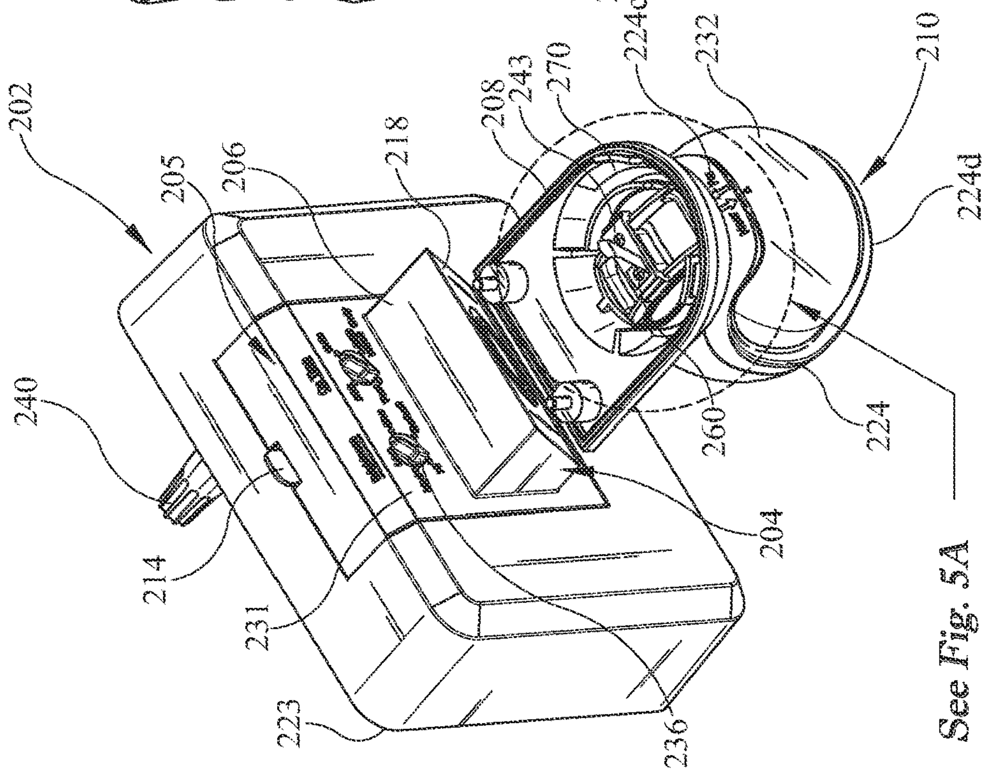

FIG. 5

See Fig. 5A

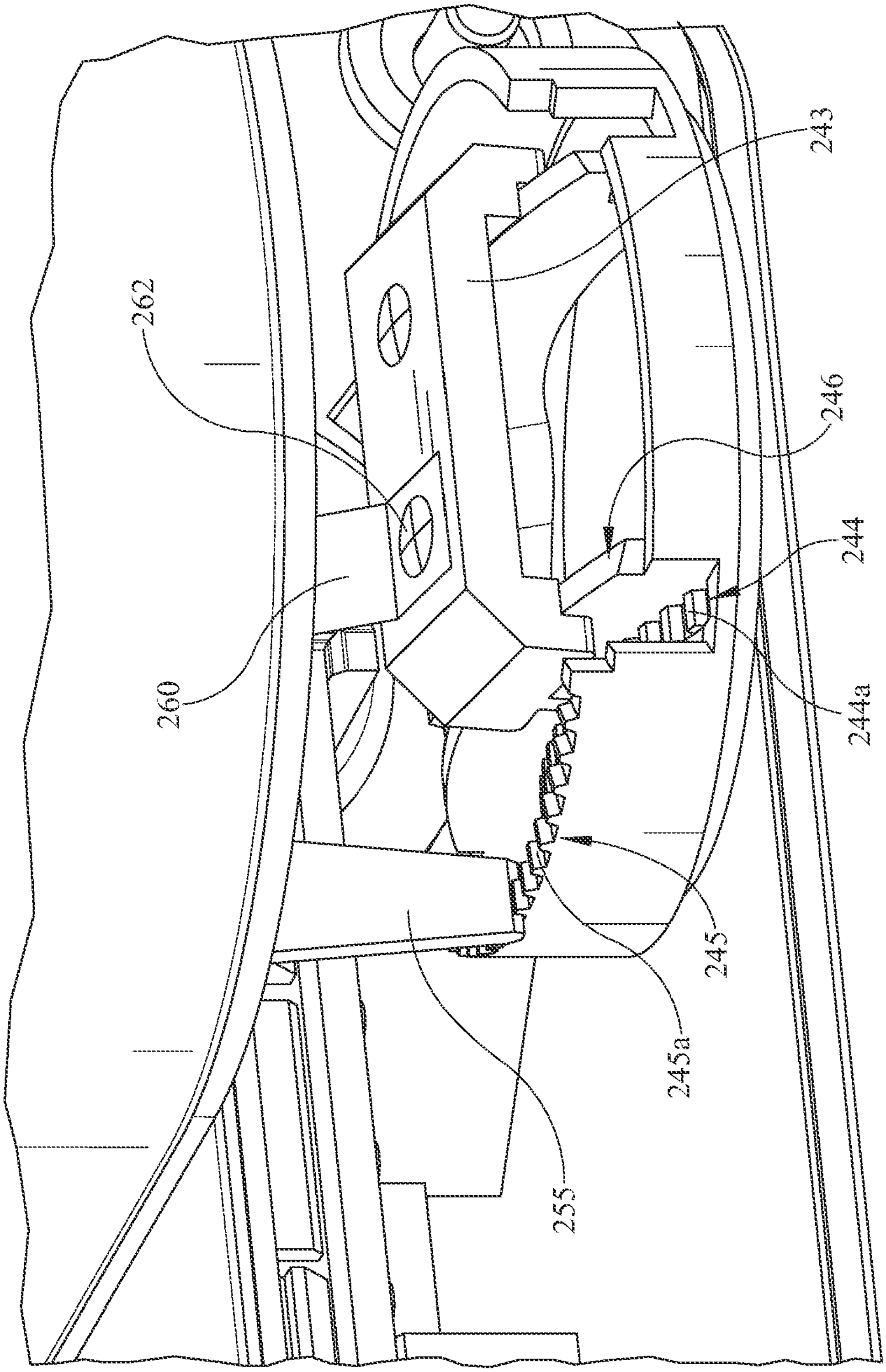

FIG. 5B

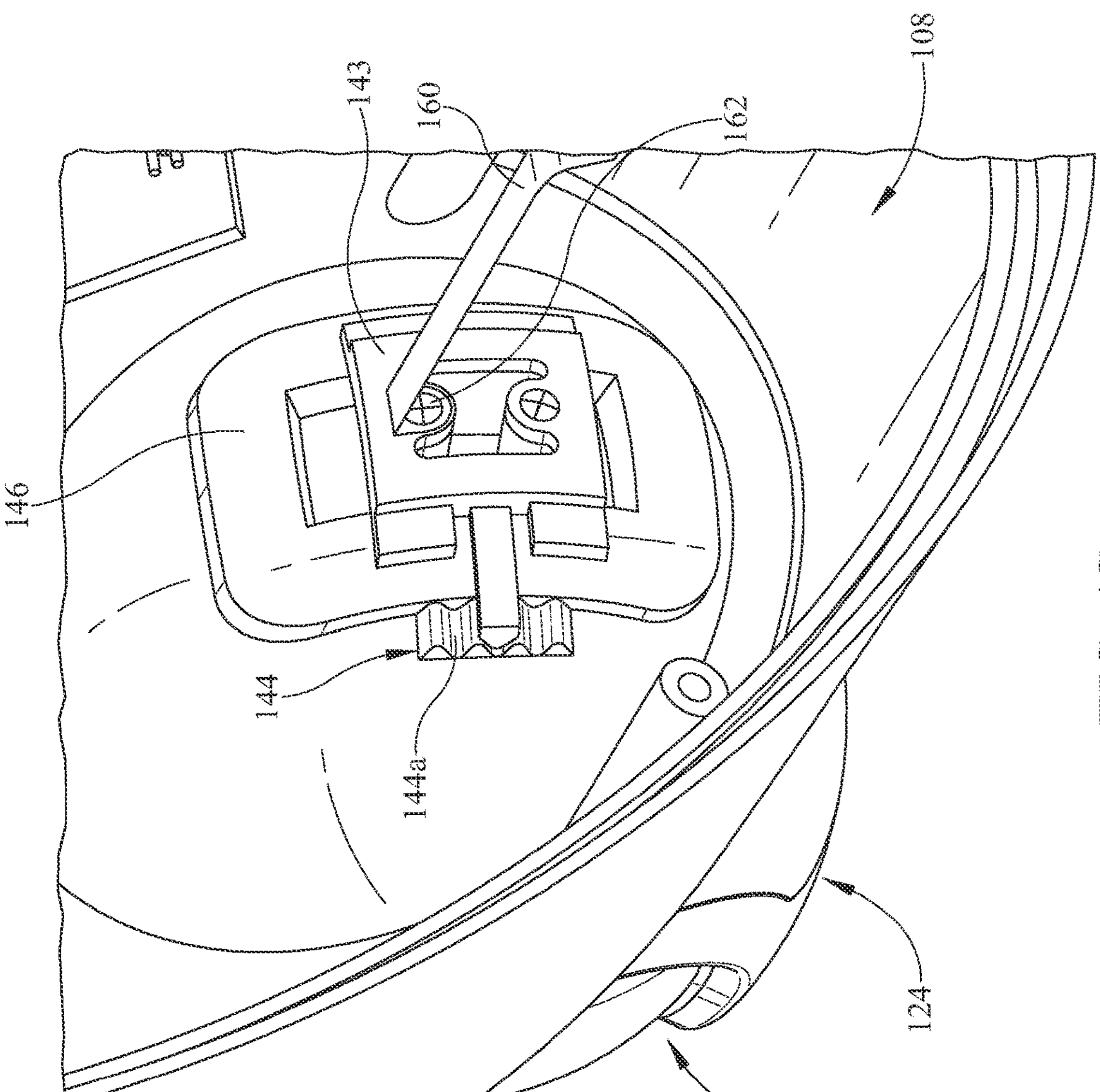

FIG. 5C

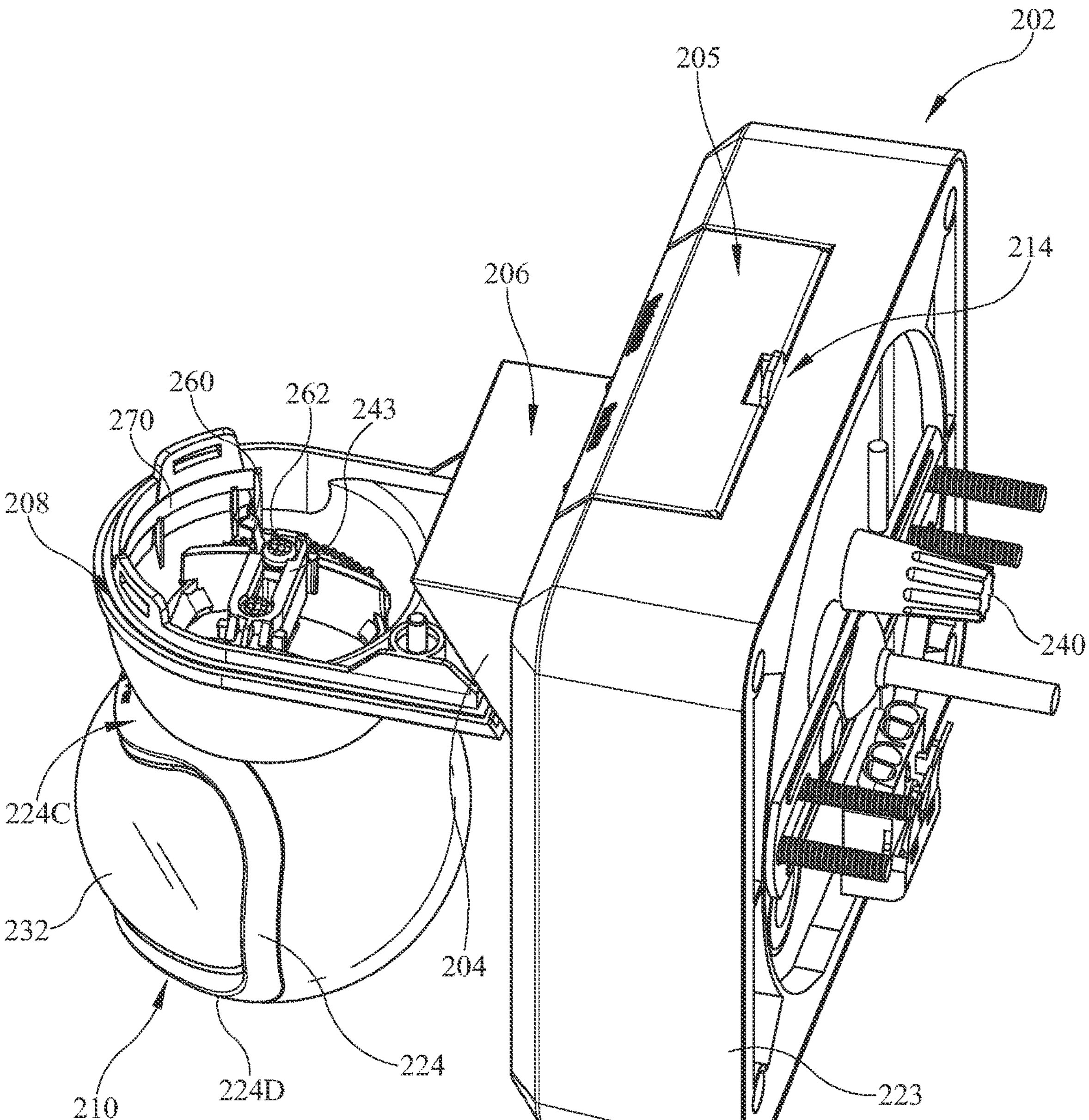
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FIG. 5D

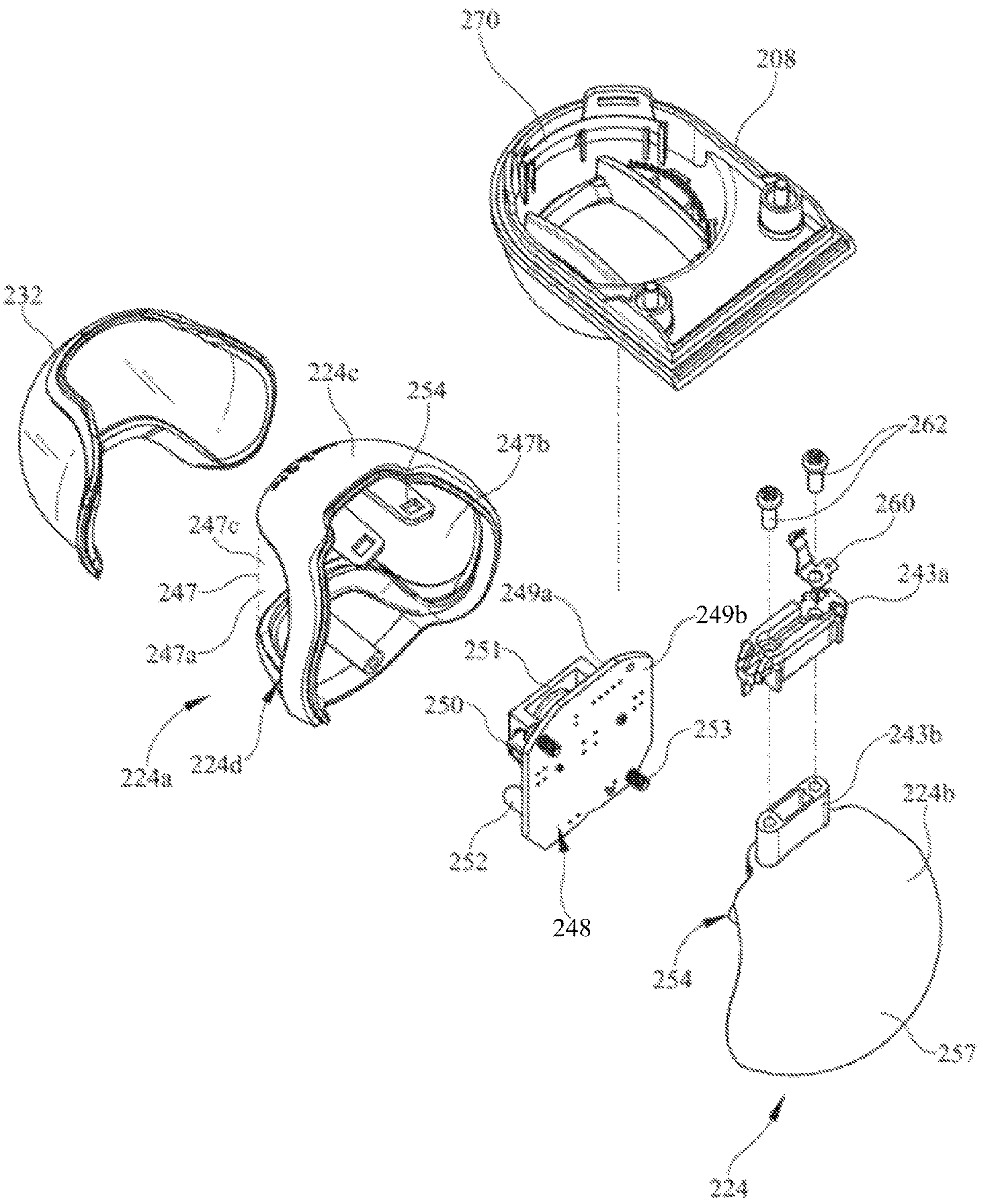
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FIG. 6

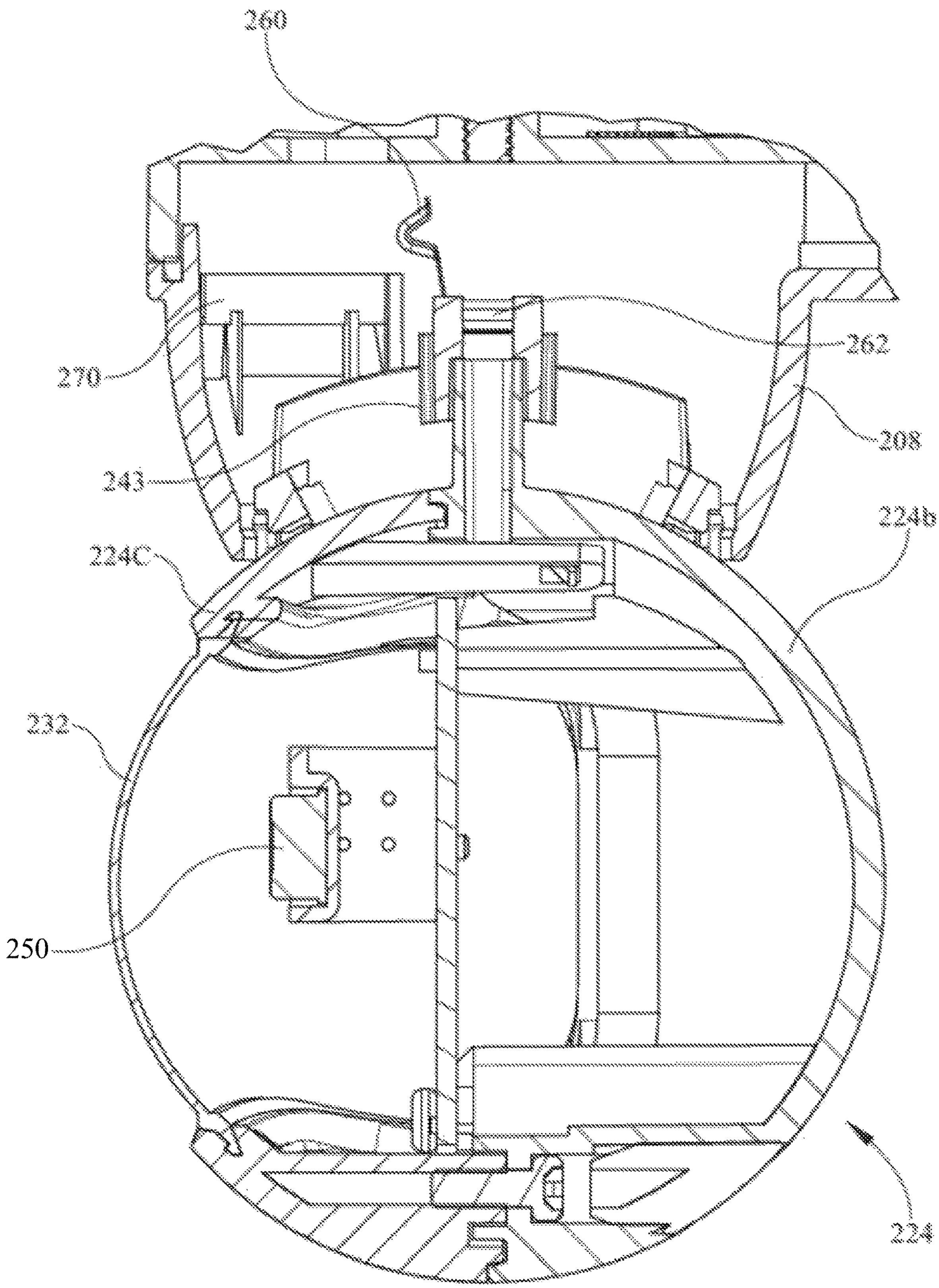

FIG. 7A

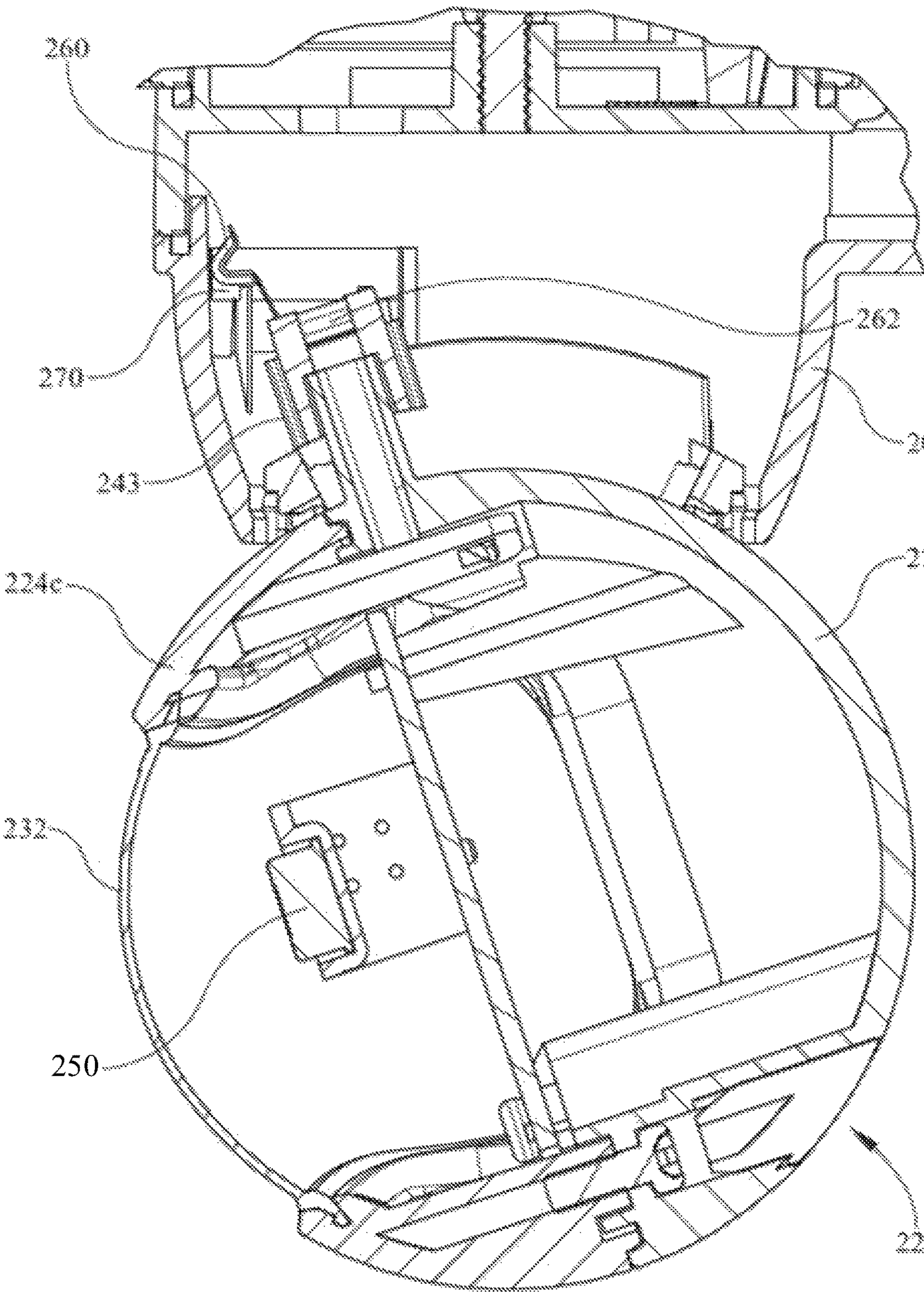

FIG. 7B

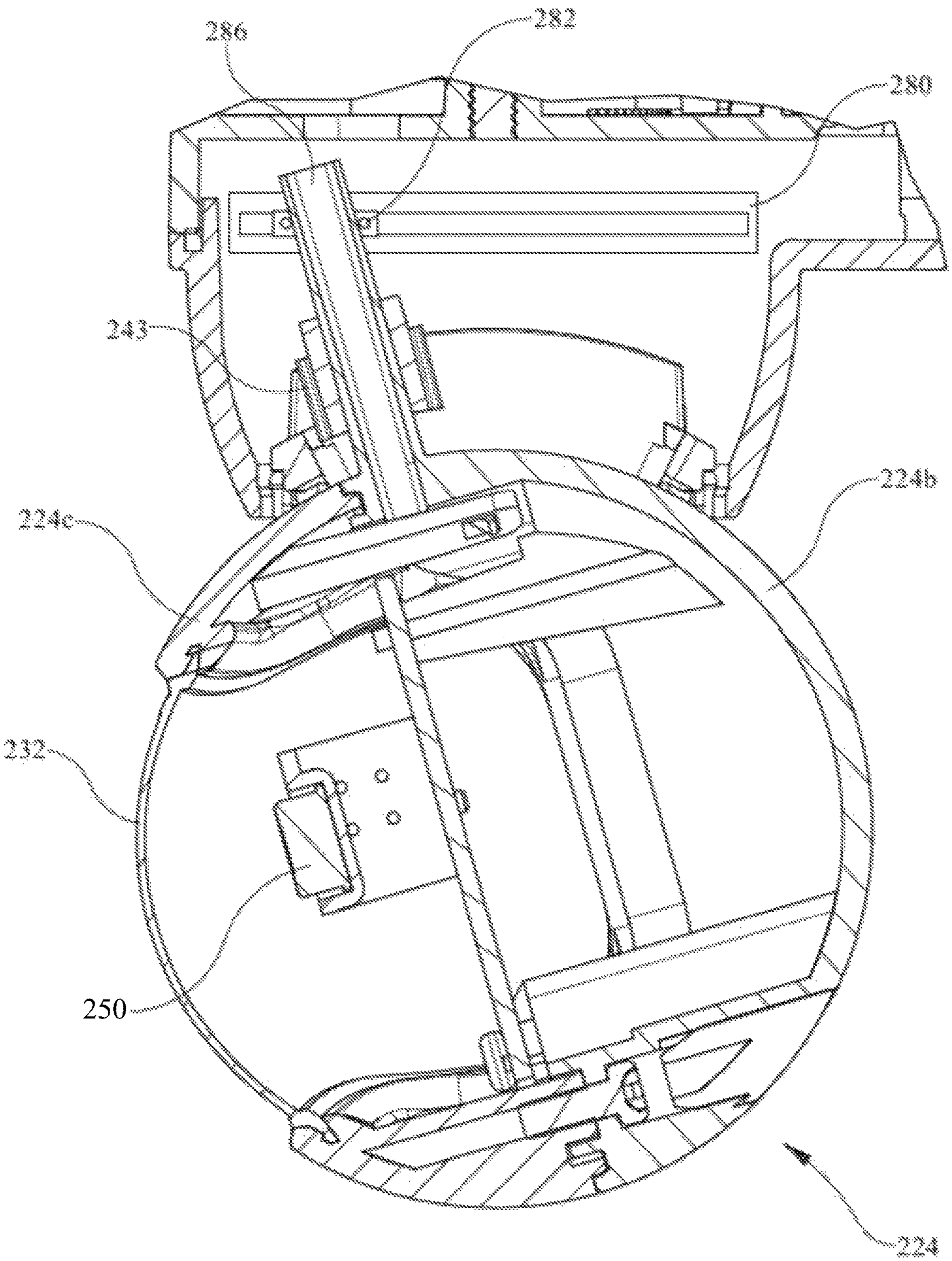

FIG. 8A

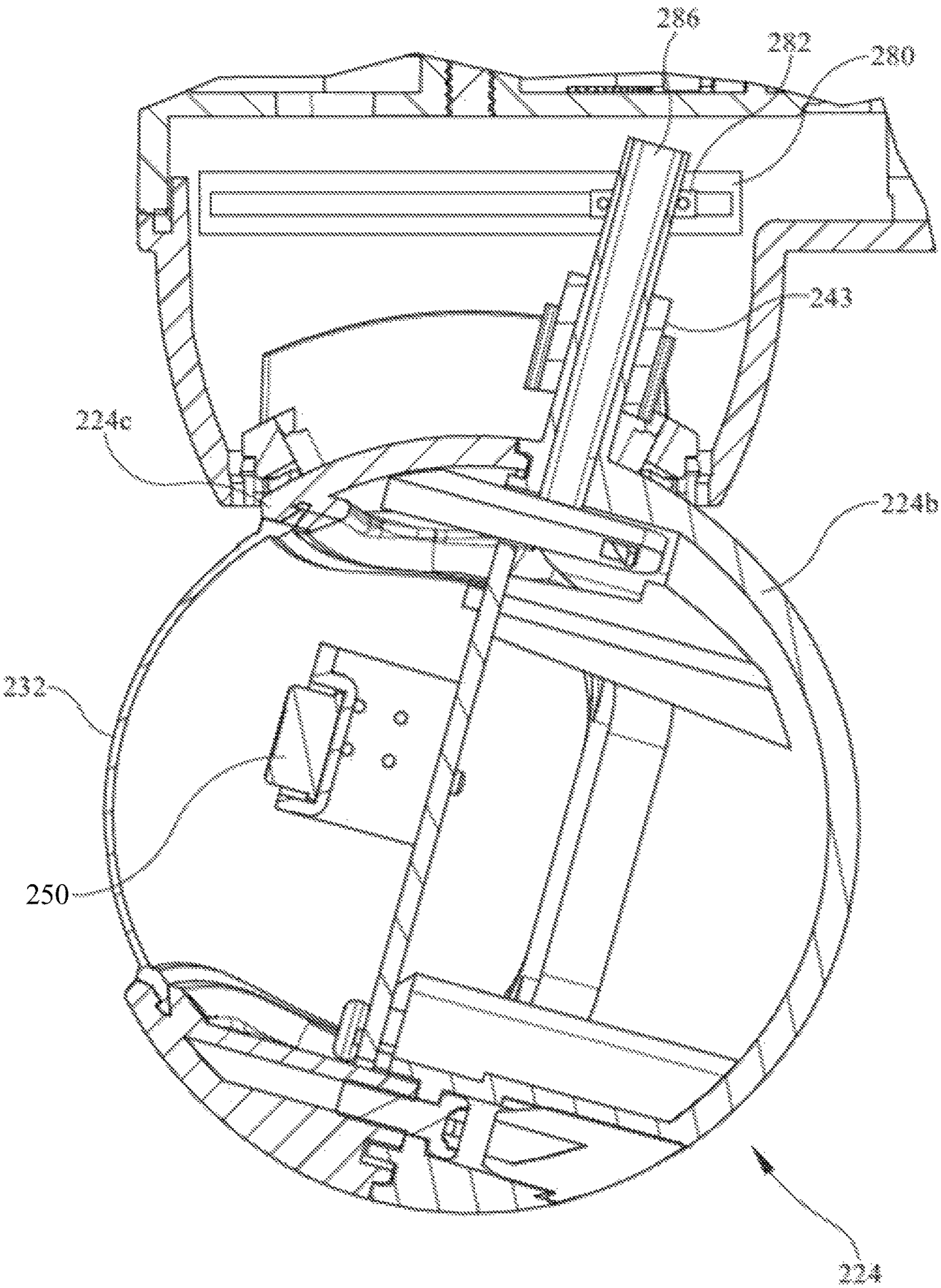

FIG. 8B

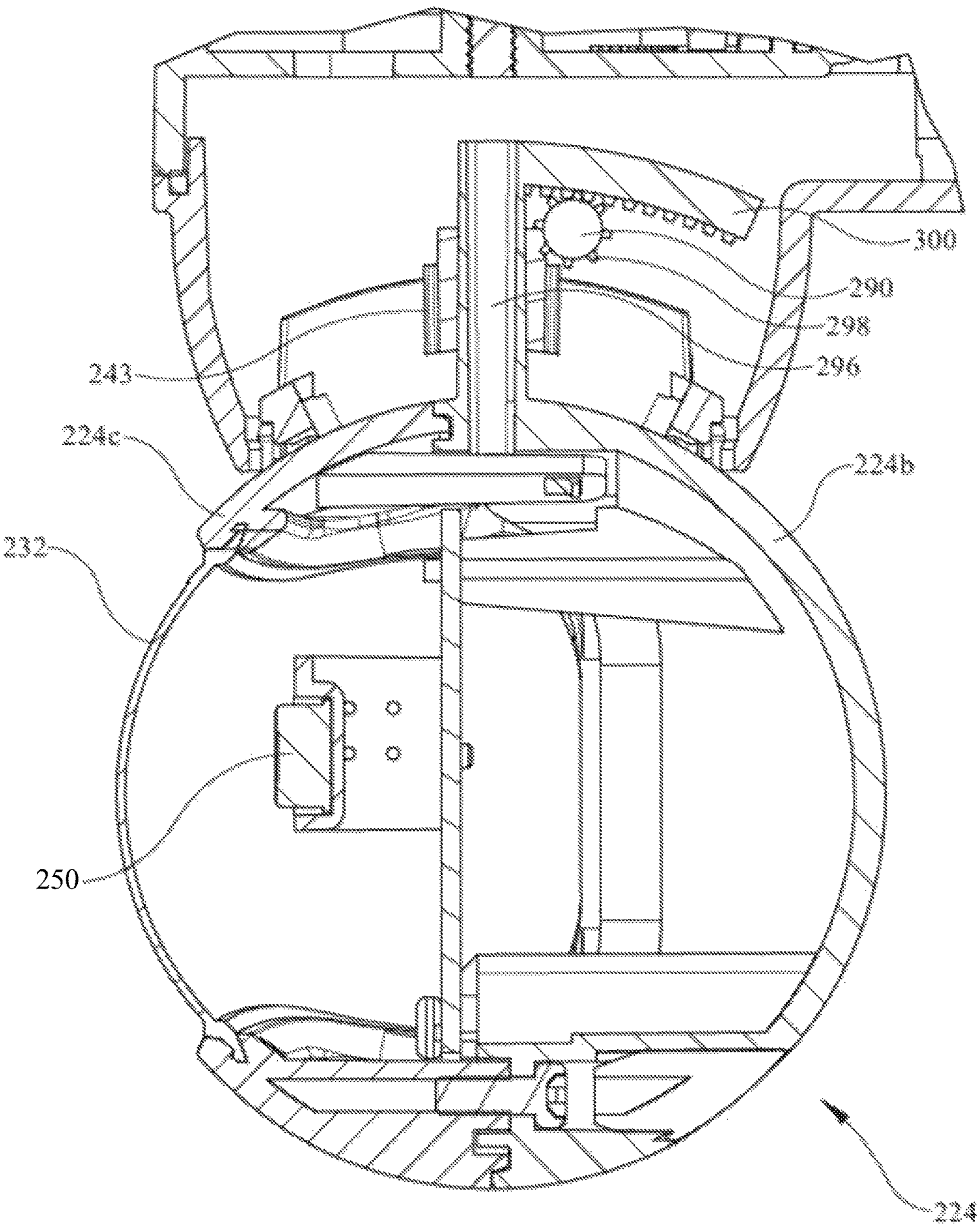

FIG. 9A

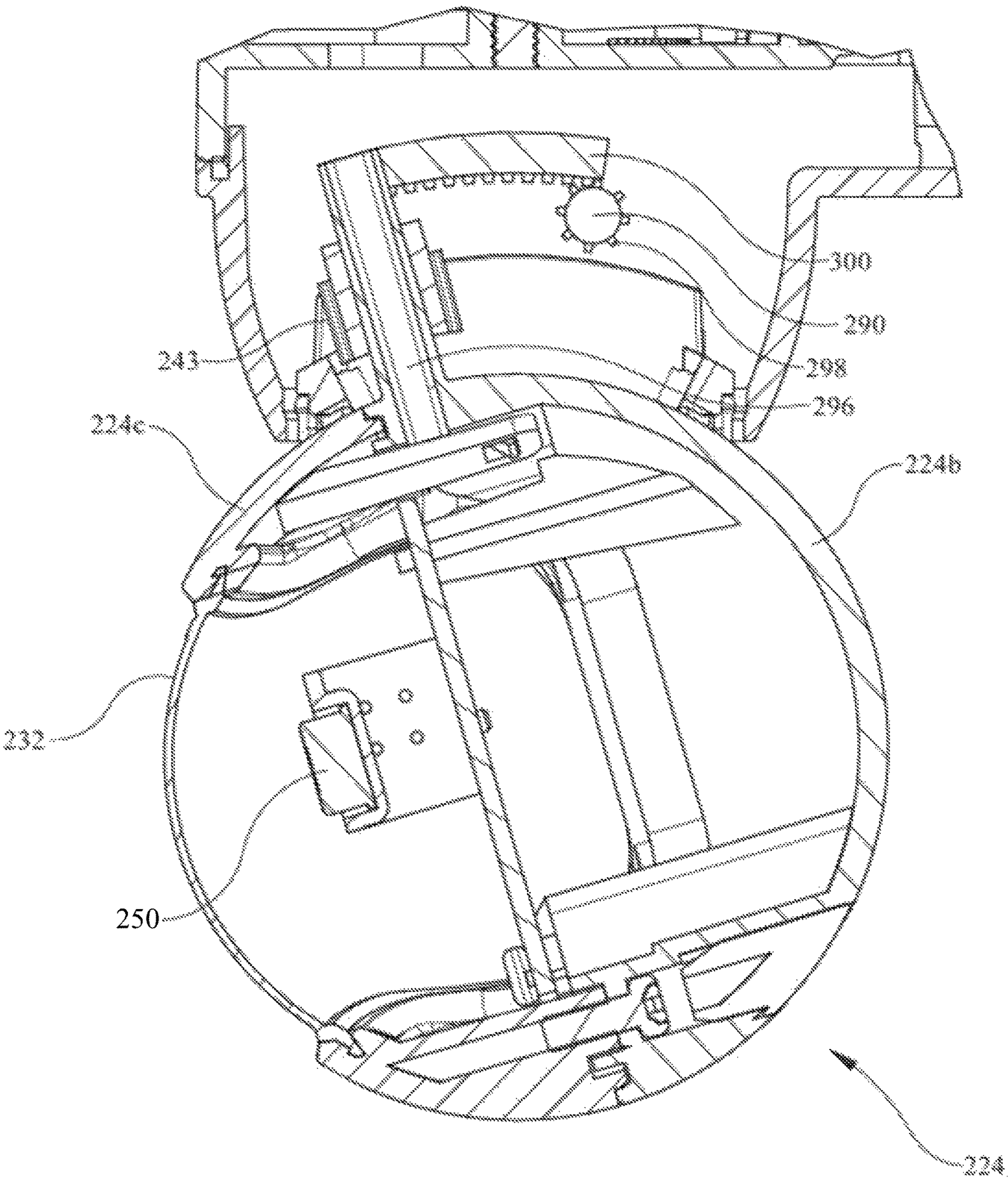

FIG. 9B

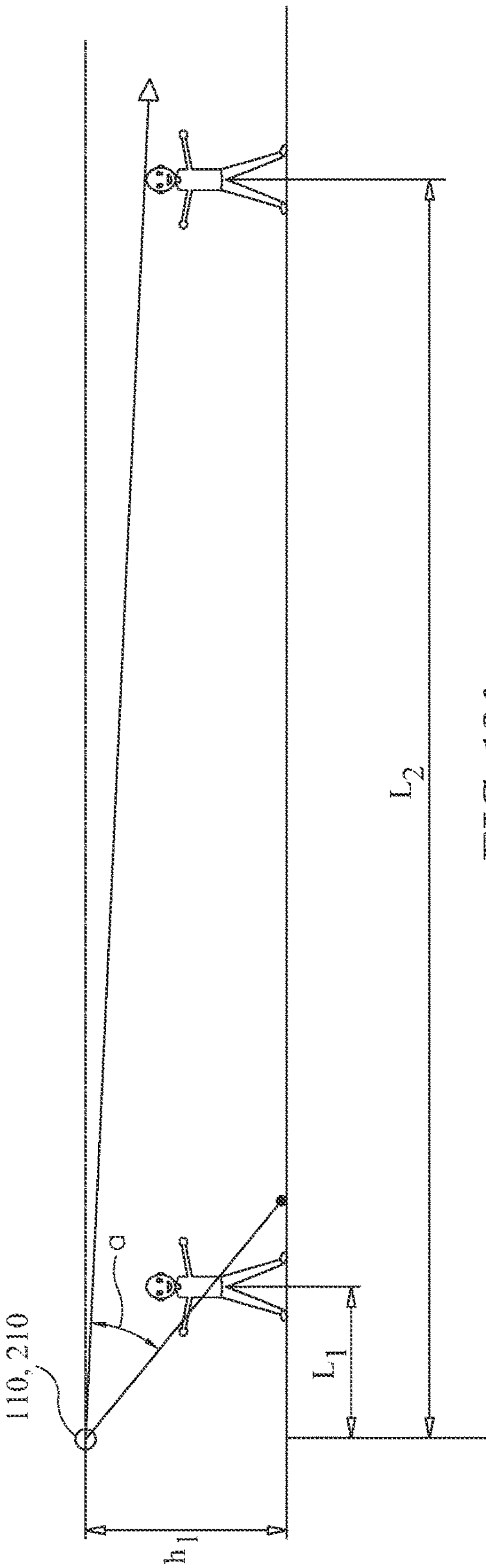

FIG. 10A

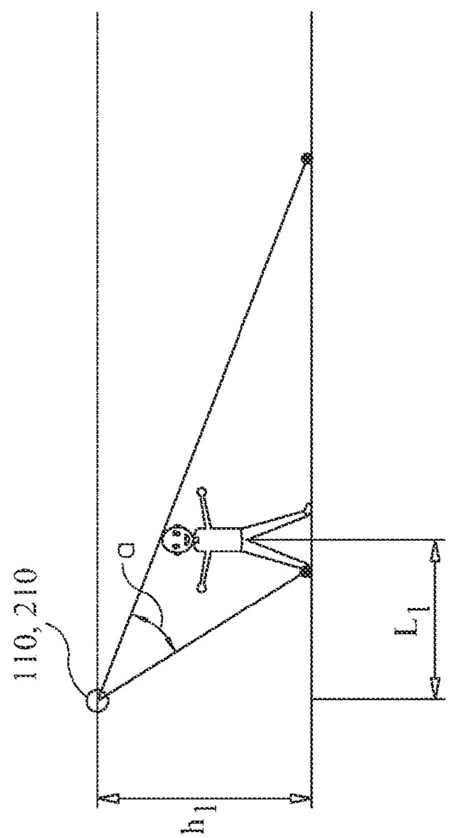

FIG. 10B

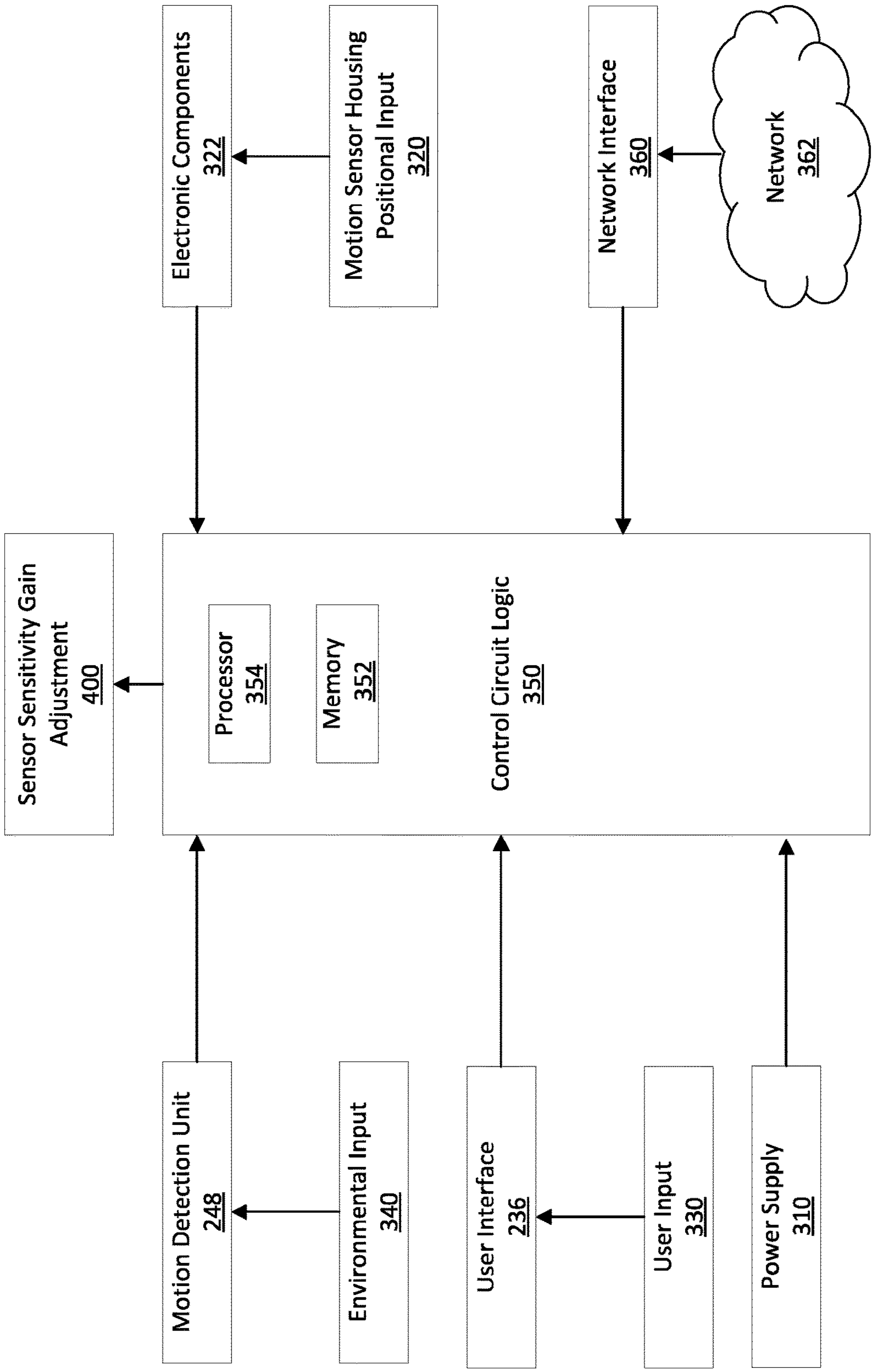
Electronic Components 322
Motion Sensor Housing Positional Input 320
Network Interface 360
Network 362
Sensor Sensitivity Gain Adjustment 400
Processor 354
Memory 352
Control Circuit Logic 350
Motion Detection Unit 248
Environmental Input 340
User Interface 236
User Input 330
Power Supply 310

FIG. 11

ADJUSTABLE SPHERICAL MOTION SENSOR HOUSING FOR OUTDOOR SECURITY LIGHT

BACKGROUND

Motion based security lighting typically includes a motion sensor which is fixed to a luminaire housing. Such design prevents variability for motion detection in some situations. This disclosed security light motion sensor design provides a broader horizontal field of view and enables the sensor to be adjusted after installation to obtain a desired coverage.

Motion or occupancy sensors are designed to save energy by detecting the presence of a moving object in a specific predetermined area of coverage and switching a light source on and off depending upon the presence of the moving object. Specifically, when a moving object is detected within the area of coverage, the light source is turned on. In the alternative, when motion is not detected indicating that the area of coverage is not occupied, the light source is turned off after a predetermined period of time. Motion sensors are thus enabled to reduce electrical energy waste by taking over the functions of a light switch or an electrical outlet. Accordingly, outdoor security light fixtures with motion sensors are available for serving as light sources in a variety of areas, such as passageways, streets, parking lots, and gardens, and are energy-efficient and permit their attached luminaries to have longer lifetimes than conventional ones because they are activated only when an object, such as a person or a motor vehicle, approaches. A popular form of such a light fixture includes a motion sensor that is responsive to infrared radiation emitted by a person or motor vehicle as the person or vehicle moves within the field of view of the device. These devices are generally referred to as passive infrared, or "PIR" motion sensors. These sensors are incorporated into the light fixture housing to trigger the lighting upon detection of the person, motor vehicle, or like heat emitting objects. Typically, the motion sensors detect the presence of those objects in a specific predetermined area defined by preset coordinates.

As each motion sensor has a particular field of view for motion detection, it is important that the field of view of the motion sensors entirely cover the desired area so an object can be detected. Specifically, installation of such motion sensing light fixtures requires forethought regarding the proper mounting and orientation as the motion sensors work best when they are pointed at the desired motion detection areas. However, the coordinates of these areas of interest are often not known at the time the light fixture is installed, and there are also times when these coordinates in addition to other variables need adjustments (e.g., the field of view of the motion sensor at the installation may be too wide or too narrow to fully meet a particular user's needs). Thus, often the motion sensor's orientation has to be changed when environment changes occur that modify the motion pattern of an area such as new constructions, traffic pattern changes, etc.

Accordingly, sensitivity of a motion sensor may also need to be planned and adjusted. For example, less motion detection sensitivity may be desired for narrow and/or shorter fields of view, as motion may be easier to detect in smaller frames. Conversely, greater motion detection sensitivity may be desired for broader and/or longer fields of view, as motion may be difficult to detect in larger frames. Like motion sensor orientation, motion sensor sensitivity may need to be adjusted after installation. For instance,

sensitivity values may need be adjusted based on environmental changes that cause unwanted activation of the light source.

Most existing motion sensing light fixtures have a fixed and limited field of view, and adjustments for the sensor, sensor sensitivity, or sensor housing orientation is usually not allowed. Even if adjustments to function optimally in a particular location is possible for some traditional motion sensing light fixtures, it may not allow easy toolless manual adjustments of the sensor's performance. For example, most existing motion sensors require the use of a tool, such as a screwdriver, to remove an access cover to make adjustments. Sometimes tools are not readily available, and even when these tools are accessible, the adjustment may require disassembly and reassembly of a few parts including the housing of the security light. This type of adjustment is not only cumbersome and awkward, but damage may also occur during disassembly and reassembly. Also, there are times when the aesthetic design of the light fixture may be compromised in order to provide a more favorable orientation scheme for motion detection.

SUMMARY

The present disclosure is directed generally to an outdoor security light, including a single or multi-axis adjustable motion sensor housing in a spherical configuration with a limited vertical field of view while expanding the lateral or horizontal field of view to over 240 degrees. The disclosed light fixtures may for example, illuminate a walkway or driveway when a person or a motor vehicle approaches. The spherical configuration allows a user to adjust/rotate the motion sensor readily against the mounting surface without comprising the aesthetic design of the light.

Providing a rotationally adjustable spherical motion sensor or sensor housing mounted on the luminaire housing improves ease of field of view adjustment of the motion sensor while also increasing variability of installation location. The rotationally adjustable nature of the motion sensor also enables an electronic component, such as a contact or potentiometer, to adjust in response to sensor rotation, producing an output indicative of the adjustment. For example, adjustment of the electronic component results in an input signal being provided to a control circuit configured to modify sensor sensitivity. Modification of the sensor sensitivity may in some examples, be implemented through adjustment of the gain of an input signal from the sensor. The input signal to the control circuit may be representative of a continuity, resistance, voltage, current, and/or any derivation thereof. Moreover, providing a motion sensor housing in a spherical configuration separate from the luminaire housing further eases installation and improves the aesthetic design.

Consistent with various aspects of the present disclosure, a adjustable spherical motion sensor housing mounted on an outdoor security light canopy is disclosed.

The adjustable spherical motion sensor housing may comprise a spherical shroud including a first shroud hemisphere and a second shroud hemisphere. The shroud hemisphere includes a lens opening. The spherical motion sensor housing may further comprise a lens covering the lens opening of the spherical shroud, a supporting cup retained by the outdoor security light canopy, and a motion detection unit mounted within the spherical shroud. To implement modification and adjustability of the spherical motion sensor housing, the spherical motion sensor housing is mounted on the outdoor security light canopy by the supporting cup, the

spherical shroud may have a first interfacing tab attached to the spherical shroud of the spherical motion sensor housing, the supporting cup may have a first gear rack mounted thereon, and the first gear rack includes a plurality of first interfacing notches configured to mate with the first interfacing tab to allow the first interfacing tab to move along the first gear rack and allow a first axis adjustment of the spherical motion sensor housing. In some embodiments, the first interfacing tab is attached to the second shroud hemisphere of the spherical shroud through a stem.

The luminaire housing and/or adjustable motion sensor housing may house a control circuit. The control circuit may be configured to receive an input representative of an adjustment of the motion sensor housing in addition to a sensor input. The control circuit may be configured to adjust a sensor sensitivity, the adjustment resulting from receipt of an input indicating rotational adjustment of the motion sensor housing. The control circuit may be configured to adjust sensitivity of a motion sensor automatically based upon the amount of upward or downward tilt of the sensor. For example, with automatic sensitivity adjustment, when an input representing an adjustment of the motion sensor housing is provided to the control circuit, the sensitivity of a motion sensor retained inside the motion sensor housing may be adjusted depending on the positioning and/or field of view of the sensor. The control circuit may also be configured to receive input from other components, such as a user interface configured to provide an output in response to receiving a user input, such as user input of a dial adjustment to adjust the sensitivity of the motion sensor. In some examples, this adjustment may result in an adjustment of the gain of the signal output from the motion sensor.

In some embodiments, the control circuit may receive a binary input indicating full downward tilt of the motion sensor, resulting in either a first signal representing a first sensitivity state or a second signal representing a second sensitivity state. In some embodiments, the control circuit may receive a variable input capable of providing one or more signal values indicating a plurality of tilt positions of the motion sensor between an upper and a lower limit.

In some embodiments, the control circuit may receive an input signal derived from one or more binary electronic components, such as contacts or a switch. For example, when the motion sensor housing is in a first position, the contacts are connected and an input signal is of a first value, and conversely, when the motion sensor housing is in a second position, the contacts are disconnected and an input signal is of a second value, the input values correlating to sensitivity gain. In some embodiments, one contact is stationary and one contact is non-stationary.

In some embodiments, the stationary contact may be located on a portion of the luminaire housing and the non-stationary contact may be located on a portion of the adjustable motion sensor housing. For example, the stationary contact may be located on a second portion of the luminaire housing and the non-stationary contact may be located on an interfacing tab of the motion sensor housing which may be rotationally adjustable, the contact or switch indicating, in one example, that the motion sensor is in a full downward tilt position.

In some embodiments, the control circuit may receive an input signal derived from one or more variable electronic components, such as potentiometers or transistors. For example, a potentiometer may be integrated into a mechanical adjustment structure such that when the motion sensor housing moves in a vertical adjustment manner, the resistance of the potentiometer correspondingly increases or decreases, the increase or decrease in resistance effecting the input signal provided to the control circuit to thereby result in adjustment of the sensitivity gain for the motion sensor.

In some embodiments, sensitivity adjustment may occur when the motion sensor housing is engaged in, or disengaged from, a full tilt permitted within one or more axes. For example, when the motion sensor housing is initially oriented such that a sensor within the motion sensor housing has an initial sightline of a landscape horizon, and the motion sensor housing is subsequently oriented downwards within a maximum vertical axial range. The sensor can maintain a field of view towards the ground directly in front of the motion sensor. In this example, a sensitivity adjustment of the motion sensor may occur correlating to the adjusted field of view (for which more or less sensitivity may be desired).

In some embodiments, when sensitivity adjustment occurs in response to the motion sensor housing being continuously engaged in a full tilt position, the sensitivity adjustment will remain in effect despite movement within other axes. For instance, the motion sensor housing may be rotated along the horizontal axis such that the sensor within the motion sensor housing is oriented in a maximum downward adjustment position.

In some embodiments the sensitivity adjustment polarity may be changed. For instance, sensitivity adjustment may be of a first polarity when the motion sensor housing is adjusted in a first direction, resulting in greater sensitivity, and sensitivity adjustment may be of a second polarity when the motion sensor housing is adjusted in a direction opposite the first direction, resulting in greater sensitivity.

In some embodiments, the magnitude of the sensitivity adjustment may be changed. For instance, sensitivity adjustments correlating to adjustment of the motion sensor housing may be of a greater magnitude, resulting in a higher gain-to-movement ratio, or of a lower magnitude, resulting in a lower gain-to-movement ratio.

One or more of the following may be optionally included with the adjustable spherical motion sensor housing. In some variations, a second interfacing tab may be attached to the outdoor security light canopy, and the supporting cup further includes a second gear rack mounted thereon including a plurality of second interfacing notches configured to mate with the second interfacing tab to allow the second interfacing tab to move along the second gear rack to allow a second axis adjustment of the spherical motion sensor housing. In some embodiments, the plurality of first interfacing notches of the first gear rack are provided on an arcuate/inclined surface in a linear configuration, while the plurality of second interfacing notches of the second gear rack are provided on a planar surface. In some embodiments, the first axis adjustment is substantially perpendicular to the second axis adjustment. In some other embodiments, the supporting cup further comprises at least one outwardly directed projection and at least one stop mounted within the security light canopy to limit the second axis adjustment of the spherical motion sensor housing by abutting the at least one outwardly directed projection against the at least one stop. In some embodiments, the lens is in a partial spherical arc.

In some other embodiments, the motion detection unit includes at least one PIR sensor mounted within the spherical shroud. In such embodiments, the lens is a segmented Fresnel lens comprising a plurality of sections, and each section is capable of independently focusing infrared radiation for the at least one PIR sensor. In some embodiments, the lens is curved in a conical or convex shape. In such embodiments, the motion detection unit further includes a mounting surface, and the at least one PIR sensor is mounted on the mounting surface by a mounting block. The mounting block has at least one block surface for holding the at least one PIR sensor. In such embodiments, the mounting surface may be mounted internally within the spherical shroud to a rear portion of the second shroud hemisphere. In some embodiments, the mounting surface is a printed circuit board mounted within the spherical shroud and carries the mounting block with the at least one PIR sensor on a first circuit board face thereof behind the lens. In some embodiments, the motion detection unit is mounted within the spherical shroud proximal to a rear portion of the spherical shroud and distal from the lens.

In some embodiments, the first shroud hemisphere may include a first occluding portion and a second occluding portion, and the first occluding portion and the second occluding portion may be in opposing relationship within the lens opening and extending inwards towards each other. In some embodiments, each of the first occluding portion and the second occluding portion is a tab with a curved surface. In some embodiments, the lens opening may be defined by a center opening portion, a first horizontal extent opening portion, and a second horizontal extent opening portion.

In some embodiments, the adjustable spherical motion sensor housing may comprise a spherical shroud including a lens opening, a lens covering the lens opening of the spherical shroud, a supporting cup retained by the outdoor security light canopy, and a motion detection unit mounted within the spherical shroud. To implement modification and adjustability of the spherical motion sensor housing, the spherical motion sensor housing is mounted on the outdoor security light canopy by the supporting cup, the spherical shroud may have an interfacing tab attached thereto, the supporting cup may have a gear rack mounted thereon, and the gear rack includes a plurality of interfacing notches configured to mate with the interfacing tab to allow the first interfacing tab to move along the first gear rack and allow a first axis adjustment of the spherical motion sensor housing.

In still further embodiments, the spherical motion sensor housing may comprise a comprise a spherical shroud including a lens opening, a lens covering the lens opening of the spherical shroud, and a motion detection unit mounted within the spherical shroud. To implement modification and adjustability of the spherical motion sensor housing, spherical shroud may have an interfacing tab attached thereto, the supporting cup may have a gear rack mounted thereon, and the gear rack includes a plurality of interfacing notches configured to mate with the interfacing tab to allow the first interfacing tab to move along the first gear rack and allow a first axis adjustment of the spherical motion sensor housing.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, like reference characters generally refer to the same parts throughout the different views. Also, the drawings are not necessarily to scale, emphasis instead generally being placed upon illustrating the principles of the disclosure

FIG. **1**A is a prospective view of a rotationally adjustable outdoor security light with a motion sensor mounted from the rear, according to an embodiment of the present disclosure.

FIG. **1**B is a prospective view of another rotationally adjustable outdoor security light with a motion sensor mounted from the top, according to another embodiment of the present disclosure.

FIG. **2** is a perspective view of the rotationally adjustable outdoor security light of FIG. **1**A mounted under an eave with two lamp heads, according to an embodiment of the present disclosure.

FIG. **3** is a rear perspective view of the rotationally adjustable outdoor security light of FIG. **1**A with the housing mount separated from the luminaire housing, according to an embodiment of the present disclosure.

FIG. **4** is a perspective disassembly view of the rotationally adjustable outdoor security light of FIG. **1**B with the housing mount separated from the luminaire housing, according to an embodiment of the present disclosure.

FIGS. **5** and **5**A-D illustrate various adjustment mechanisms of an adjustable spherical motion sensor housing, according to different embodiments of the present disclosure.

FIG. **6** is a an exploded, perspective view of an adjustable spherical motion sensor housing, according to an embodiment of the present disclosure.

FIGS. **7**A and **7**B illustrate cross-sectional views of the housing and motion sensor interaction with two contacts controlling sensitivity, according to an embodiment of the present disclosure.

FIGS. **8**A and **8**B illustrate cross-sectional views of the housing and motion sensor interaction with a sliding potentiometer controlling sensitivity, according to an embodiment of the present disclosure.

FIGS. **9**A and **9**B illustrate cross-sectional views of the housing and motion sensor interaction with a rotary potentiometer controlling sensitivity, according to an embodiment of the present disclosure.

FIGS. **10**A and **10**B illustrate two different detection ranges that can be achieved with an adjustable spherical motion sensor, according to an embodiment of the present disclosure.

FIG. **11** illustrates an example embodiment of a control circuit, according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

As depicted in the drawings, wherein like numbers denote like parts throughout the several views, various rotationally adjustable outdoor security light **100**, **200** in accordance with various embodiments will be described with reference to the accompanying drawings. It is appreciated that one or more control circuits may electrically connect and/or be configured to operate one or more components depicted in these illustrations. Mounting of the security light **100**, **200** may be implemented under various scenarios, and FIGS. **1**A, **1**B, and **2** illustrate two typical installations and orientations of the security light **100**, **200** to display the overall adjustability with the security light **100**, **200**. FIGS. **1**A and **1**B the security light **100**, **200** is installed on a wall in a vertical orientation against a wall surface, while in FIG. **2** the security light **200** is installed under an eave in a horizontal installation (the security light **100** may be installed in a horizontal installation in a similar manner). The security light **100**, **200** in both orientations is adjustable so as to be forwardly directed to properly illuminate an area when turned on regardless of location of installation while also allowing the motion sensor to adequately view a motion sensing zone.

To allow the security light **100**, **200** to be mounted in multiple configurations, the security light **100**, **200** includes a separated housing mount **102**, **202** and luminaire housing **104**, **204**, which may be removably coupled to each other. Separation of the housing mount **102**, **202** and the luminaire housing **104**, **204** improves the installation process of the security light **100**, **200** and increases variability of installation locations. As can be understood in looking at the figures, direct mounting of a typical wall mount as depicted in FIGS. **1**A and **1**B to an eave mount as shown in FIG. **2** would not allow both the lamp head(s) and sensors to be properly oriented towards an illumination zone and detection zone. Particularly, by reorienting the luminaire housing against the ceiling/eave without rotational adjustment, the motion sensor field of view would not be oriented appropriately for detection of movement. Also, the lamp heads may be limited in their adjustability due to low clearance of the ceiling structure. However, providing both a separated housing mount in combination with a rotatable first and second portion of a removable security light luminaire housing alleviates such shortcomings.

Typical installation of the security light **100**, **200** set forth herein includes initial installation of the housing mount **102**, **202** which is electrically connected to an electrical connection within a junction box in some implementations. Separately, the security light luminaire housing **104**, **204** is removably attached to the housing mount **102**, **202** respectively. The luminaire housing **104**, **204** also has both a first portion **106**, **206** and a second portion **108**, **208**, which are rotatable relative to each other, allowing for adjustability as depicted. Separate installation of the housing mount **102**, **202** to the fixed structure increases the ease of electrical connection and fixating its position. Further, the housing mount **102**, **202** may provide additional and separated functionality, such as modification of the electricity provided by the wired housing/structure to an adjusted low voltage DC provided to the electrical interface between the housing mount and the security light housing. Hence, the housing mount **102**, **202** may provide direct and easy mechanical and electrical connection of the luminaire housing **104**, **204** once the initial housing mount **102**, **202** is installed. Further, the luminaire housing **104**, **204** may be rotatably adjusted for proper clearance and aiming of both the motion sensor(s) and lamp head(s). Hence, separating the housing mount **102**, **202** from the rotatably adjustable security luminaire housing **104**, **204** improves both mechanical installation, electrical connectivity and illumination of the illumination zone.

The separated housing mount **102**, **202** is adapted to be affixed to an installation surface (e.g., a wall, an eave, a ceiling, etc.) of a building structure. For example, a base or rear portion **123**, **223** of the housing mount **102**, **202** may include one or more projections **256**, such as a pair of screws (best shown in FIG. **3**), for fastening the housing mount **102**, **202** to the structure of the eave or the wall. Other examples of fastening elements on the base **123**, **223**, may include but are not limited to, a bracket, a hanger, a brace, a hook, a closed or open slit, a closed or open slot, or other structure enabling attachment of the base to the wall or eave. Alternatively, the housing mount **102**, **202** may simply be affixed to the structural surface.

As shown in FIGS. **1**A and **1**B, the luminaire housing **104**, **204** may include the luminaire housing first portion **106**, **206** and the luminaire housing second portion **108**, **208** which are rotatably secured together. In some embodiments, the luminaire housing first portion **106**, **206** may be further rotatable or slidable relative to the housing mount **102**, **202** during installation. For mounting purposes, the first portion **106**, **206** may be removably attached to the housing mount **102**, **202** respectively, and the second portion **108**, **208** is rotatable relative to the first portion **106**, **206**. For example, a user can rotate the second portion **108**, **208** 180 degrees relative to the first portion **106**, **206** to switch the security light **100**, **200** from a horizontal mounting surface as shown in FIGS. **1**A and **1**B to a vertical mounting surface orientation as shown in FIG. **2**. Both embodiments of the security light **100**, **200** may be similarly adjusted through rotation about a rotatable hinge **118**, **218**. By providing a separated housing mount **102**, **202** and luminaire housing **104**, **204**, ease of installation is achieved for the wired electrical connection to the housing mount **102**, **202** while allowing separate installation of the luminaire housing **104**, **204** directly to a mounting structure containing electrical contacts. Rotatable luminaire housing **104**, **204** further allow orientation modifications for redirection of the lamp heads and motion sensors.

The outdoor security light **100**, **200** may also include at least one motion sensor or sensor housing **110**, **210** and has at least one lamp head **112**, **212** rotatably and adjustably located on the luminaire housing **104**, **204**. In some embodiments, as shown in FIGS. **1**A and **1**B, the motion sensor **110**, **210** may be positioned along a lower section of the luminaire housing **104**, **204** and independent from the lamp head **112**, **212**, so that it may be adjustably positioned relative to the housing and aimed towards high traffic areas or other detection zones. For example, a detection zone may be in front of the installation and lower than an illumination zone. The motion sensor **110**, **210** may include at least one sensor and supporting electronics and may also include a lens over the sensor housing opening to properly focalize the input towards the sensor or sensors. The motion sensor **250** sensitivity may be adjusted by a control circuit configured to receive input from an electronic component. For example, a first contact **160**, **260** may extend from the motion sensor housing **110**, **210** and a second contact **170**, **270** may extend from the second portion of the luminaire housing **108**, **208**. The contacts **160**, **260**/**170**, **270** may be configured to provide an input to a control circuit, the control circuit configured to adjust sensitivity gain when the motion sensor housing **110**, **210** is rotated, wherein rotation along an axis of the motion sensor housing **110**, **210** results in a point of contact between the two contacts **160**, **260**/**170**, **270**, the contact resulting in modification to the input value provided to the control circuit. Other electronics of the motion sensor may be located within the luminaire housing **104**, **204** or the housing mount **102**, **202** to properly interpret the input and send appropriate control signals to a luminaire controller or other electronics. More details of the motion sensor **110**, **210** will be discussed below.

In some embodiments for the security light **100**, **200**, the second portion **108**, **208** may be connected to the first portion **106**, **206** via a rotatable connection that is angularly displaced between the two portions. The rotatable connections may allow rotation of the second portion **108**, **208** relative to the first portion **106**, **206** so that a user may direct the motion sensor **110**, **210** and the light head toward desired locations. For example, the rotational interface between the first portion and the second portion may be along an angled rotational surface or interface **118**, **218**. In such embodiments, the angled rotational surface or interface **118**, **218** is angled relative to a rear mounting plane **130**, **230** of the first portion **106**, **206**. The angled rotational surface **118**, **218** between the first portion and the second portion allows the security light apparatus **100**, **200** disclosed to be mounted on different surfaces, horizontal or vertical, while allowing the lamp heads and sensor heads to be properly directed outwards toward the illumination and the sensor/detection zone.

The security light **100**, **200** allows for multiple installation orientations and includes at least one lamp head **112**, **212**, which may be adjustably connected to the luminaire housing **104**, **204** to adjust the light output or illumination zone. In some embodiments, as shown in FIGS. **1**A and **1**B, the lamp head **112**, **212** may be adjustably mounted onto the luminaire housing second portion **108**, **208** via an arm **113**, **213**. In particular, a first end **111**, **211** of the arm **113**, **213** may be coupled to the second portion **108**, **208**, and a second end **115**, **215** of the arm **113**, **213** that is opposite to the first end **111**, **211** may be in different configurations (e.g., a knuckle joint configuration or other suitable adjustable mechanisms) and coupled to the lamp head **112**, **212**. For example, a knuckle joint shown in FIG. **1**A may be used to appropriately adjust the position of the lamp head **112** to allow the lamp head **112** to be variably positioned three dimensionally so that a user may direct light emitted from the security light **100** in various directions as desired. Hence the lamp head(s) which are connected to the luminaire housing may be adjusted along both a first and a second axis and in some implementations the first adjustment axis may be substantially perpendicular to the second adjustment axis.

Although FIG. **1**A describe using knuckle joints at the end **115** for the adjustment of a lamp head **112**, it should be understood that other adjusting mechanisms (e.g., a multi-axis hinge) may also be used to couple the lamp head **112** to the luminaire housing second portion **108**. For example, FIG. **2** illustrates a configuration with two lamp heads **112**, where the first lamp head **112**A and the second lamp head **112**B are each rotationally attached to the luminaire housing second portion **108** by a respective first and second rotational hinge **107** and **109**. As shown in FIG. **2**, the first rotational hinge **107** may rotate about a first rotation axis X while the second rotational hinge **109** may rotate about a second rotation axis Y, and the first rotation axis X may be perpendicular to the second rotation axis Y. In some other embodiments for the security light **200**, FIG. **4** illustrates a configuration with a single lamp head **212** is rotationally attached to the luminaire housing second portion **208** by a respective first and second rotational hinge **207** and **209**. As shown in FIG. **4**, the first rotational hinge **207** may rotate about a first rotation axis X while the second rotational hinge **209** may rotate about a second rotation axis Y, and the first rotation axis X may be perpendicular to the second rotation axis Y in some embodiments. Although FIGS. **2** and **4** describe using a multi-axis hinge adjustable arm for the adjustment of a lamp head **112**, **212**, it should be understood that other adjusting mechanisms may also be used to couple the lamp head **112**, **212** to the luminaire housing second portion **108**, **208**. It should be understood that even further embodiments may allow for a separated lamp head remote from the luminaire housing **104**, **204** and connected thereto by an electrical connection to power and control the illumination sources. For example, a separate lamp head may be individually mounted on a supporting structure by mechanical or magnetic means and be electrically connected to the luminaire housing **104**, **204** for electrical connectivity. It should be also understood that the number of lamp heads is not limited here. For example, in some embodiments, two or more lamp heads may be connected to the luminaire housing second portion **108**, **208** for brighter illumination.

As well, it should be understood that while a single lamp head is shown in some embodiments, multiple lamp heads may be provided with similar adjustability mechanisms so that each of the plurality of lamp heads are independently adjustable about multiple axis.

The security light **100**, **200** may be adjusted to be operable, such as being well-suited for an eave-mounted, wall-mounted, ceiling-mounted, and/or freestanding security light. Further, alternative power sources may be configured for the electricity needed for operation. In some embodiments, the security light **100**, **200** may be adapted for connection to a wired external power source, such as the junction box with a 110V or 220V line voltage electrical service, a remote solar charging station with rechargeable batteries, and/or one or more internal batteries. For example, in some embodiments, electrical wiring cables within the junction box may be connected to an electrical connector **140**, **240** of the housing mount **102**, **202** to provide a wired line voltage electrical connection to the security light **100**, **200** and the embedded electronic components. In some embodiments, the electrical connector **140**, **240** may be a quick connector configured to be connected to Romex wires (the 110V AC hot, neutral, and ground wires) from a junction box.

As shown in FIGS. **3** and **4**, the electrical power may be provided to the security light **100**, **200** via electrical low voltage contacts between the housing mount **102**, **202** and the luminaire housing **104**, **204**, thereby allowing the luminaire housing to be wired without additional hard wiring as is typical. For example, the electrical contact between the first portion **106**, **206** and the housing mount **102**, **202** may be quick connect low voltage electrical contacts. When assembled, the luminaire housing **104**, **204** may rotate and/or slide relative to the installed orientation of the housing mount **102**, **202**. In some embodiments, a rotatable electrical connection as shown in FIG. **3** may allow the initial orientation of the junction box and/or the housing mount **102** to not limit the orientation of the motion sensor **110** and the lamp head **112**. That is to say that the security light **100**, in one of the many implementations, is always electrically coupled regardless of the rotational orientation between the luminaire housing **104** relative to the housing mount **102**. In implementations, the electrical connection between the housing mount **102** and luminaire housing **104** includes ground, neutral, and hot connections. In some implementations, these connections may be maintained for up to about 360 degrees of rotation or less (e.g. CW and/or CCW) about an axis A as shown in FIG. **3**. Electricity for the security light **100** is supplied through the rotational quick connect construction providing low voltage DC to the security light. In some installations, the luminaire housing **104** of the security light **100** initially attaches to the housing mount **102** at an offset angle between the two structures allowing rotation to be a part of the installation. For example, installation may require rotation of the luminaire housing relative to the housing mount **102** by 20-40 degrees before the two structures are in a final locked orientation. In some embodiments, rotational electrical connection may be a full 360 degrees. In other implementations, the rotational electrical connection may be less, for example between 90 and 180 degrees. In some implementations, the rotation between the two structures acts to mechanically lock the structures together. For example, helical threads on both structures may be used to properly orient and lock the two structures together. In still further examples, there may be a direct connection between the housing mount **102**, **202** and the luminaire housing **104**, **204**, which does not require rotational adjustment. For example, the luminaire housing **104**. **204** may snap fit, friction fit or be installed in the proper orientation to the housing mount **102**, **202**.

In some embodiments as shown in FIG. **3**, the rotational electrical contacts between the housing mount **102** and the luminaire housing **104** may be concentric contacts located on respective receiving interfacing surfaces of the two components. When the two components are in a mounted contacting position, the contacts may be aligned to corresponding opposing contacts on the receiving surface, allowing the power to be exchanged between the contacts. As shown in FIG. **3**, electrical contacts or connections **22** between the housing mount **102** and the luminaire housing **104** may be rotatably electrically engaged during the rotation (e.g. in the plurality of rotational orientations of the luminaire housing **104** in respect to the housing mount **102**). The one or more electrical contacts **22** of the luminaire housing **104** may have rotational contact with the one or more respective electrical contacts of the housing mount **102** (not visible here). The one or more electrical contacts **22** of the luminaire housing **104** rotates with the luminaire housing **104** and maintains the contact (e.g. axial and/or radial contact, etc. for 360 degrees contact about the axis A) with the fixed connections of the housing mount **102**. Stated alternatively, the one or more engaging contacts **22** may be rotationally held in electrical contact with the other corresponding contacts at the housing mount **102** during any point of the rotation. Thus, in some embodiments, the rotatable luminaire housing **104** may be in rotational connection with the housing mount **102** wherein electrical connectivity between the light luminaire housing **104** and the housing mount **102** is maintained during all points of rotation. In other embodiments, rotational connectivity may be maintained only during a predefined rotational extent wherein the luminaire housing **104** is energized at recognized rotational points relative to the housing mount **102** while at other points during the rotational extent relative to the two the electrical connections may be interrupted. Similar aspects and features may be implemented in a rotatable electrical plug connection as well.

For example, in the embodiment shown in FIG. **3**, the luminaire housing **104** may include a first and second rearwardly projecting electrical contacts **22** in a tensioned leaf spring or brush configuration, engaging the electrical contacts in a concentric annular ring configuration (e.g. hot and neutral) of the housing mount **102**. The contacts may include a centrally located coil spring **24** for ground with a corresponding centrally located disc of the housing mount **102**. In such embodiments, the first and second rearwardly projecting electrical contact **22** may maintain electrical connectivity to the energized concentric annular rings during the entire rotational extent of the luminaire housing **104** relative to the housing mount **102** while the rings are continually in electrical connectivity to respective hot, neutral, and ground wiring from the junction box. In some embodiments, one or more structures of the luminaire housing **104** and/or the housing mount **102** may axially and/or rotationally engage each other to allow relative rotation and/or energizing of the security light **100**. Alternatively, or in combination with the light fixture structure, the user may need to axially and/or rotationally maintain the luminaire housing **104** with the housing mount **102** until the rotational orientation is fixed. For example, with the luminaire housing **104** assembled with the housing mount **102**, the electrical contacts **22** may be engaged/energized.

In some embodiments as shown in FIG. **3**, one or more structures of the luminaire housing **104** and/or the housing mount **102** may axially and/or rotationally engage each other to allow relative rotation and/or energizing of the security light **100**. Alternatively, or in combination with the light fixture structure, the user may need to axially and/or rotationally maintain the luminaire housing **104** with the housing mount **102** until the rotational orientation is fixed. For example, with the luminaire housing **104** assembled with the housing mount **102**, the electrical contact **22** may be engaged/energized. In some embodiments, one or more retention members (e.g. lugs, taps, projections, dimples) may be used to axially retain the luminaire housing **104** with the housing mount **102**. The retention member may also allow for relative rotation between the luminaire housing **104** and the housing mount **102**. The retention member may be received within one or more receivers **26** located on a skirt **28** of the luminaire housing **104**.

In some other embodiments, the security light **200** may have a different mechanical and electrical engaging manner compared with the security light **100** as described above. For example, FIG. **4** is a perspective disassembly view of the security light **200** showing a state before the luminaire housing **204** is attached to the housing mount **202**. As shown here, in some embodiments, the luminaire housing **204** may be attachable to and detachable from the housing mount **202** in a sliding manner, such that when the luminaire housing **204** has been attached, electrical contacts such as positive and negative terminals (e.g., power pins and power receptacle as shown here) of the luminaire housing **204** and the housing mount **202** are brought into alignment and contact with each other. For example, as shown in FIG. **4**, the first portion **206** of the luminaire housing **204** may include a mounting block **205**, and attaching of the luminaire housing **204** to the housing mount **202** is performed by sliding the mounting block **205** down in the housing mount **202** to lock luminaire housing **204**. Accordingly, detaching of the luminaire housing **204** may be performed by operating above actions in a reverse manner (i.e., sliding the mounting block **205** up from the housing mount **202** and pulling back therefrom).

As described above, in some embodiments, the mounting block **205** provided at an end of the first portion **206** of the luminaire housing **204** is removably engaged (e.g., slidably attached) to the housing mount **202** of the security light **200** so as to be attached and detached via a receiving opening **219**. In such embodiments, as shown in FIG. **4**, the receiving opening **219** formed in front of the housing mount **202** may include a first side surface **220**, a second side surface **221**, and an engaging surface **222**. The mounting block **205** may include a front wall **231**, a rear wall **237**, and the first and second side walls **234** and **235**, which are formed at both sides of the mounting block **205**. In some embodiments, a control panel **236** capable of operation as a user interface includes one or more control functions such as a timer adjustment, a motion sensor sensitivity gain adjustment, and a brightness adjuster may be located on the front wall **231** of the mounting block **205**. Direction and other control may be implemented through a lighting controller or through the LED drivers or other similar electronics.

In some embodiments, both the first and second side walls **234** and **235** of the mounting block **205** may be provided with one or more sliding slots **216** thereon to pair with one or more sliding protrusions **225** respectively formed on the first and second side surfaces **220** and **221** of the housing mount **202** for guiding and locking the mounting block **205** in place during the installation process. In some embodiments, the sliding slot **216** may include a first, vertical sliding portion **216***a* and a second, horizontal sliding portion **216***b* to align and guide the installation direction as described above and indicated by the arrows as shown in FIG. **4**. The configuration (e.g., the shape, height, etc.) of the sliding slots **216** and the sliding protrusions **225** may be formed to such extent that the sliding protrusion **225** is able to be firmly engaged within the sliding slot **216** when the mounting block **205** is slid into the housing mount **202**. It should be noted that the location and/or configurations of the sliding slot **216** and the paired sliding protrusion **225** are not limited here. For example, in some embodiments, the locations of the sliding slot **216** and the paired sliding protrusion **225** as shown in FIG. **4** may be exchanged (i.e., the sliding slot **216** is located on the first and second side surfaces **220** and **221** of the housing mount **202** while the sliding protrusion **225** is located on the first and second side walls **234** and **235** of the mounting block **205**).

In some embodiments, besides the sliding slot **216** and the sliding protrusion **225**, one or more locking, aligning or safety mechanisms may also be provided for additional alignment and restraining of the mounting block **205** within the housing mount **202**. For example, in some embodiments, an elastic body lock **214** may be provided on the rear wall **237** of the mounting block **205** with a pressed locking mechanism including a hook configured to be locked into and unlocked from a lock receiving opening **233** on the engaging surface **222** of the housing mount **202**. For example, the lock **214** and the lock receiving opening **233** configured to be engaged with the lock **214** in a sliding direction may be formed at an upper end portion of the rear wall **237** of the mounting block **205** and the engaging surface **222** of the housing mount **202** respectively. It should be noted that the location and/or configurations of the lock **214** and the lock receiving opening **233** are not limited as depicted in the figures. For example, in some embodiments, the locations of the lock **214** and the lock receiving opening **233** as shown in FIG. **4** may be exchanged (i.e., the lock **214** is located on the engaging surface **222** of the housing mount **202**, while the lock receiving opening **233** is located on the rear wall **237** of the mounting block **205**). In some other embodiments, the lock **214** and the corresponding lock receiving opening **233** may be located at one or both side surfaces/walls of the housing mount **202** and/or the mounting block **205**. With the pressed locking mechanism (e.g., the elastic body lock **214**), the detaching of the luminaire housing **204** may be performed by pressing the lock **214** thereby to release the locking mechanism between the mounting block **205** and the housing mount **202**. It should be understood that although the lock **214** shown here is so constructed that the operation parts are pressed inward to unlock the hook in the above described embodiments, some other suitable lock operation manners may also be adopted here. For example, the lock parts may be provided with taper faces, and the lock may be locked/unlocked by sliding.

As shown in FIG. **4**, the housing mount **202** and the mounting block **205** may include interfacing electrical contact connections **226**. The luminaire housing **204** may be electrically engaged during the installation (e.g. with the sliding motion of the mounting block **205** in respect to the housing mount **202** as described above). For example, in the embodiment shown in FIG. **4**, the housing mount **202** may include a plurality of upwardly projecting electrical contact connections **226** in a pin configuration located on an electrical receiving surface **229** within the receiving opening **219**, capable of engaging the electrical contact connection in an electrical receptacle configuration located on an electrical connecting surface **228** of the mounting block **205** (not visible in the figures) of the first portion **206** of the luminaire housing **204**. Thus, the electrical contact connection of the luminaire housing **204** sliding with the mounting block **205** may maintain electrical connection with the fixed electrical connection **226** of the housing mount **202** in a pin and receptacle configuration. Accordingly, the first, vertical sliding portion **216***a* as shown in FIG. **4** may be configured to align/guide the mounting block **205** to slide far enough vertically to allow the electrical contact connections **226** to be in full electrical contact for power supply.

Thus, in the embodiment as shown in FIG. **4**, for attaching the luminaire housing **204** to the housing mount **202** of the security light **200** fixed on an eave or a side wall, the sliding slot **216** of the mounting block **205** are slid into and engaged with the sliding protrusion **225** of the housing mount **202** by pushing and sliding down as indicated by the arrows in FIG. **4**. When the mounting block **205** has been pushed in and slid to the end having the electrical receiving surface **229** of the housing mount **202**, the lock **214** of the mounting block **205** may enter into the lock receiving opening **233** of the housing mount **202** to be locked automatically, whereby the luminaire housing **204** can be reliably attached to the fixed housing mount **202**. For detaching the luminaire housing **204** from the housing mount **202**, the lock **214** may be pressed inward to release the engagement from the lock receive opening **233**, then the mounting block **205** may be slid in an opposite direction thereby to be detached from the fixed housing mount **202**.

In some embodiments, the spherical motion sensor housing **110**, **210** may be rotatable/adjustable against the mounting structure (e.g., the luminaire housing first or second portion **106**, **206** and/or **108**, **208**) and/or the sensor shroud **124**, **224**. FIGS. **5**, **5**A, **5**B, **5**C, and **5**D illustrate various adjusting mechanisms for the motion sensor **110**, **210** in different embodiments. For example, in some embodiments, the motion sensor **110** may be capable of a single-axis rotation/adjustment (e.g., vertical tilting) as shown in FIG. **5**C. In such embodiments, an interfacing tab **143** may be attached to the rear of the shroud **124** of the motion sensor **110** and be supported and guided by a supporting cup or rail **146** mounted interior of the luminaire housing second portion **108** for coupling and retaining the spherical motion sensor housing **110** with the interfacing tab **143** to the luminaire housing second portion **108**. The interfacing tab **143** may be configured to mate with a plurality of interfacing notches **144***a* included on a first gear rack **144**. In some embodiments, the first gear rack **144** may be in a linear configuration and mounted interior of the luminaire housing second portion **108**, so that a tactile horizontal adjustment of the motion sensor **110** may be achieved by manually tilting the shroud **124** of the spherical motion sensor housing **110** as shown in FIG. **5**C. It should be understood that the adjustment may be limited by the number of notches **144***a*, the length/configuration of the first gear rack **144**, and the configuration of the supporting cup **146**, etc.

In some other embodiments, the spherical motion sensor housing may have a two-axis rotation/adjustment with the sensor shroud. In some such embodiments, the two-axis of rotation/adjustment may be along substantially perpendicular axis. For example, as shown in FIGS. **5** and **5**A-B, the motion detection range and/or the field of view (FOV) of the motion sensor may be adjusted vertically (e.g., a first axis adjustment) by tilting the motion sensor on a vertical plane such as up or down (e.g., a far range may be achieved by tilting the sensor **110**, **210** up, and a near range may be achieved by tilting the sensor **110**, **210** down as indicated in FIGS. **7**A and **7**B). The motion sensor **110**, **210** may also be adjusted horizontally on a horizontal plane (e.g., a second axis adjustment). In such embodiments, the up-down and/or left-right adjustment may be limited by abutting one or more structures (e.g., an outwardly directed tab) against one or more stops to prevent over-rotation.

For example, FIGS. **5**, **5**A, and **5**B illustrate an exemplary adjustment mechanism of the spherical motion sensor housing **210** that the entire motion sensor is adapted to rotate to undergo the first and second axis adjustment (e.g., pivoting and panning motion) as indicated above. In some embodiments, one or more interfacing tabs combined with one or more gear racks may be attached to the motion sensor such that the entire motion sensor housing is able to rotate about first and second orthogonal axes, respectively. For example, in some embodiments, within a supporting cup **246** retained within the luminaire housing second portion **208**, an outwardly directed projection **241** may be located on the supporting cup **246**, a first stop **242***a* and a second stop **242***b* may be located on a convex surface of the luminaire housing second portion **208**, a first interfacing tab **243** may be attached to the spherical motion sensor housing **210**, and a first gear rack **244** including a plurality of first negative notches **244***a* for mating with the first interfacing tab **243** in different positions may be provided on the supporting cup **246**. Accordingly, in such embodiments, the horizontal adjustment may be limited by the projection **241** abutting against the first stop **242***a* and/or the second stop **242***b* (e.g., the range of horizontal motion may be limited within 34 degrees left and 34 degrees right from the center, for example), and the vertical adjustment may be limited by the tactile positions between the first interfacing tab **243** and the plurality of first negative notches **244***a* on the first gear rack **244**.

In some embodiments, a second gear rack **245** including a plurality of second negative notches **245***a* for mating with a second interfacing tab **255** (as shown in FIG. **5**B) may be provided on the supporting cup **246** for the horizontal adjustment of the motion sensor **210**. In such embodiments, the second interfacing tab **255** may be located on a portion (e.g., a rotational assembly) of the luminaire housing **204** to allow the supporting cup **246** to rotate around the second axis as indicated by the arrows in FIG. **5**A to provide a tactile horizontal adjustment of the motion sensor **210**. In some embodiments, the first interface tab **143**, **243** may be located on the second shroud hemisphere **124***b*, **224***b* (at the top or at the rear portion of the second shroud hemisphere **224***b* as shown in FIGS. **1**A and **1**B) including a moving tab plate **143***a*, **243***a*, and the first interface tab **143**, **243** may be coupled to the second shroud hemisphere **124***b*, **224***b* via a stem **143***b*, **243***b* incorporating a pin-slot mechanism, or any other attachment mechanisms such as pop rivet. In different embodiments, the configuration of the first interface tab **143**, **243** may vary. For example, in some embodiments, the first interface tab **143** may be in an approximate "T" shape as shown in FIG. **5**C, and in some other embodiments, the first interface tab **243** may be in an approximate sliding plate configuration as shown in FIG. **5**B.

As indicated by FIGS. **5**A-**5**D, a first contact **260** may be attached to the first interfacing tab **243**. Accordingly, the first contact **260** follows the movement of the first interfacing tab **243**. In some embodiments, the first contact **260** may be secured to the first interfacing tab **243** by a screw **262**. In some embodiments, the first contact **260** may be secured to the first interfacing tab **243** via other mechanical attachment.

As illustrated in FIGS. **5**A and **5**D, the second contact **270** may be attached to the second portion **208** of the luminaire housing. In some embodiments, the second contact **270** is stationary. In some embodiments, the second contact **270** may be contoured to the second portion **208** of the luminaire housing.

The first contact **260** interfaces with the second contact **170** resulting in a change in input to a control circuit. The control circuit is configured to adjust sensor **250** sensitivity as a result of the measuring tilt position of the motion sensor. The input to the control circuit may be representative of a continuity, resistance, voltage, current, and/or any signal representative of the tilt position of the sensor head. The control circuit may be configured using components appreciated by one of skill in the art, including a microprocessor configured to execute one or more functions.

The depictions of the first contact **260** and second contact **270** are functional examples not limiting to the shape or location of the contacts **260**, **270**. For example, the second contact **260** may be placed on the opposing side of the second portion **208** of the luminaire housing, relative to the depiction of FIG. **5**A and/or FIG. **5**D. While placement of the second contact **270** on the opposing side of the second portion **208** of the luminaire housing would require opposing adjustments of the motion sensor housing **210** to effect an input provided to the control circuit, the electrical interaction between the first contact **260** and the second contact **270** and resulting change in input would be the same. As such, contacts **260**, **270** may be placed in any location or configuration enabling a rotational adjustment of the motion sensor housing **210** to potentially result in an interface between a first contact **260** and a second contact **270**.

In some embodiments as shown in FIGS. **5**A, **5**B, and **5**D, the plurality of first interfacing notches **244***a* of the first gear rack **244** may be provided on an arcuate or inclined surface for the vertical adjustment, while the plurality of second interfacing notches **245***a* of the second gear rack **245** may be provided on a flat/level surface for the tactile horizontal adjustment of the motion sensor **210**. Various other adjustment mechanisms are also available such as standard ball and knuckle connections, two axis elbow connections and the like. It should be understood that a smooth adjustment without using the interfacing notches may also be adapted here as desired, for example, using a gear rack and pinion mechanism.

In some other embodiments, instead of being affixed directly to the luminaire housing **104**, **204** as shown here, the motion sensor **110**, **210** may also be remote therefrom and may be connected to the security light **100**, **200** either by a wired or a wireless connection. For example, the motion sensor **110**, **210** may communicate with the security light **100**, **200** from a remote location and provide a signal indicating detected motion. Such technology may include heat signatures, range finding and/or distance measurement algorithms and other techniques which may be electronically implemented in the motion sensor **110**, **210**, combined with electronics within the luminaire housing **104**, **204**.

FIG. **6** is an exploded view of one example for the components within the spherical motion sensor housing **210** (the motion sensor **110** has a similar configuration except the location of the interfacing tab **143** for adjustment is located on the rear instead of at the top of the housing). As shown here, the motion sensor **210** may include a spherical shroud **224**, a lens **232**, and a motion detection unit **248** mounted within the spherical shroud **224**. The shroud **124**, **224** may comprises abutting non-light-transmissive a first shroud hemisphere shell **124***a*, **224***a* and a second shroud hemisphere shell **124***b*, **224***b*, which together form the hollow sphere shroud **124**, **224**, which substantially totally surrounds the motion detection unit **248**. The first and second shroud hemisphere **124***a*, **224***a* and **124***b*, **224***b* are held in abutting relationship by connecting the shells, via various fastening mechanisms, such as pin and slot and/or snap clip mechanism **254** as shown in FIG. **6**. In some embodiments, the adjustable sensor shroud **124**, **224** may be configured to support, and at least partially house the spherical motion sensor housing **110**, **210**. In some embodiments, the adjustable sensor shroud **124**, **224** may automatically adjust (e.g., by gravity) in various configurations to position properly for the operation of the motion sensor. In still further embodiments, the shroud **124**, **224** may be combined from more than first and second hemisphere portions as the example shown in the drawings are exemplary only.

The motion detection unit **248** has an optical field of view for motion detection through a lens opening **247** located on the first shroud hemisphere **224***a*, and the lens **232** may be configured to cover the lens opening **247** of the spherical shroud **224**. The optical field of view for motion detection includes a horizontal field of view and a vertical field of view. To increase the lateral or horizontal field of view, in some embodiments, the lens opening **247** may be defined by a center opening portion **247***a*, a first horizontal extent opening portion **247***b*, and a second horizontal extent opening portion **247***c*. In some embodiments, the center opening portion of the spherical shroud has a left periphery and a right periphery (the dashed line in the opening **247** as shown in FIG. **6**), and the first horizontal extent opening portion **247***b* abuts the center opening portion left periphery and the second horizontal extent opening portion **247***c* abuts the center opening portion right periphery.

In some embodiments, the first shroud hemisphere **224***a* may also include a first occluding portion **224***c* and a second occluding portion **224***d*, which may limit the upper and lower vertical field of view. Depending on the installation position, in some embodiments, the sensor shroud **124**, **224** combined with the first occluding portion **224***c*, the second occluding portion **224***d*, the first horizontal extent opening portion **247***b*, and the second horizontal extent opening portion **247***c* may provide a horizontal field of view ranging from about 200 degrees to about 240 degrees or more and a vertical field of view ranging from about 20 degrees to about 40 degrees or less. It should be understood that the motion detector detects motion only within its field of view. That is, motion detector with a vertical field view of up to 40 degrees is able to sense motion within a range falling under a vertical field of view of about 40 degrees. In some embodiments, each of the first occluding portion **124***c*, **224***c* and the second occluding portion **124***d*, **224***d* may be a tab with a curved surface as shown in FIG. **6**.

A second shroud hemisphere **224***b* may encompass a rear portion **257** of the motion sensor housing **224**. The second shroud hemisphere of the motion sensor **224***b* may include a first interfacing tab **243** on a top surface. The first interfacing tab **243** may have a stem **243***b* and a plate **243***a*. The first interfacing tab plate **243***a* may be configured to receive and/or secure a first contact **260**. In some embodiments, the first contact **260** may be secured with a screw **262**. The second portion of the luminaire housing **208** may be configured to receive and/or secure a second contact **270**.

The first contact **260** and second contact **270** are configured to contact when the motion sensor housing **224** is rotated vertically to one or more locations along one or more axes of travel, the contact producing an input that may be received by a control circuit configured to adjust sensitivity gain of one or more sensors **250** on the motion detection unit **248**. For example, contact **260** may close a circuit with contact **270** when the motion sensor housing is tilted fully downward in the vertical direction representing the motion sensor being directed to a field of view directly in front and below the sensor. In such examples, the gain of the signal output from the motion sensor may be lowered thereby lowering the sensitivity of the motion sensor when the field of view is in close proximity. In other examples, when the motion sensor is tilted upwards, the motion sensor has a wider field of view measuring input over a much larger area. In such tilt positions, it may be desirable to increase the gain of the signal from the motion sensor. When positioned to receive input from such a large field of view, relatively small input signals into the motion sensor should trigger the security light. Therefore, in some of these implementations, the gain of the signal would be increased. When the motion sensor is tilted all the way downward, an increase is gain would generally not be required as the signal input would be close within the field of view.

In some embodiments, the spherical motion sensor housing **110**, **210** may incorporate the use of multiple or single mounted passive infrared sensor (PIR), pyroelectric infrared radial (PR) sensor, radar, sonic and/or laser range finding, among various technologies known to electronically determine movement of people and/or animals. As existing PIR motion sensors have a fixed field of view, multiple PIR sensors facing different directions may be provided to provide an enlarged field of view in some embodiments. For example, in some embodiments, the motion detection unit **248** may include a structure, such as a mounting block **251** with a plurality of carrying surfaces, on which a plurality of thermal radiation sensors **250** (e.g., PIR sensor) may be mounted. In some embodiments, a plurality of sensors **250** (e.g., a first, second and third PIR sensors as shown in FIG. **6**) may be arranged at an angle as shown to face the front and both sides of the motion sensor (e.g., face the center opening portion **247***a*, the first horizontal extent opening portion **247***b*, and the second horizontal extent opening portion **247***c*, respectively). It should be understood that other suitable arrangements may also be adopted, and more or fewer than three sensors may be used. Further, each of the PIR sensors may be electrically connected to a lighting controller which reads the sensed input and acts accordingly depending on current security light settings.

In some embodiments, the motion detection unit **248** may also include a mounting surface **249**, such as a printed circuit board assembly as shown in FIG. **6**. In such embodiments, the printed circuit board assembly **249** may include a first circuit board surface **249***a* and a second circuit board surface **249***b*, and the mounting block **251** holding one or more sensors **250** may simply be affixed to the first surface **249***a* via glue, adhesive pads, or other suitable mechanisms. In some embodiments, the mounting surface **249** may be mounted internally within the spherical shroud **224** to a rear portion **257** of the second shroud hemisphere **224***b* through at least one fastener, such as one or more screws **253**. In some embodiments, the motion detection unit **248** may be mounted within the spherical shroud **224** proximal to the rear portion **257** of the spherical shroud **224** and distal from the lens **232** as shown in FIG. **6**. In some embodiments, at least one LED indicator light **252** may be also provided on the mounting surface **249** to inform the user of the operation of the motion detector in detecting movement/heat.

While PIR sensors are depicted within the sensor shroud herein, it is understood that many different types of motion sensors may be included such as non-heat based sensors, vision sensors/circuits, radar or other circuitry which detects movement within a field of view. The output of any of these different types of motion sensors may be provided to the lighting controller for reading and subsequent determination of response by the security light.

A motion detection unit **248** and/or printed circuit board assembly **249** to which the motion detection unit **248** is affixed may be electrically connected to a control circuit. In some embodiments, the control circuit may be included in or on the printed circuit board assembly **249** electrically connected to a motion detection unit **248**. The control circuit may include a processor configured to execute one or more functions. The control circuit may receive input from, and provide output to, one or more electronic components connected to the circuit.

In some embodiments, the lens **132**, **232** may be flexible plastic lens (e.g., flexible segmented Fresnel lens), enabling a more compact spherical design. For example, the lens **132**, **232** may be a flexible plastic lens formed from a thin flexible sheet of plastic material, on which are formed a number of individual Fresnel lens segments or lenslets. In some embodiments, the lens may also be pre-formed to a particular shape. For example, the lens **132**, **232** may be curved to the desired angle or shape, such as a partial spherical arc as shown in FIG. **6**, or curved around the circumference of the opening of the spherical shroud **124**, **224** for fully coverage. For PIR sensors, the lens **132**, **232** may be configured to pass infrared wavelength radiation for the purpose of motion detection. In some embodiments, the light-transmissive lens **132**, **232** may be a segmented Fresnel lens to focalize signal inputs towards the one or more PIR sensors or other type sensors and also to protect electronics inside, and through which the motion sensor can detect motion. In some other embodiments, the lens **132**, **232** may be a plain sheet of translucent or transparent polymer, and/or other similar structures to focus light and/or radiation to the opening allowing input to the PIR sensor electronics, and the lens **132**, **232** may be configured in any other curved arc and having a plurality of Fresnel lenses formed. For example, in some embodiments, the lens **132**, **232** may be made of a light-transmissive material, such as a clear acrylic, and curved in a conical or convex shape to focus infrared radiation over a desired field of view so as to permit the sensor to function optimally through the lens. In some embodiments, the lens may be a transparent or translucent bulb type housing. It should be understood that the lens may be of many other suitable shapes/configuration/materials, such as parabolic, cylindrical, glass, etc.

It should be understood that other motion detection technologies may be adapted here instead of PIR. For example, in some embodiments, the motion sensor **110**, **210** may be a capacitive sensor that utilizes a heatsink of the security light **100**, **200** and/or a transparent patch of indium tin oxide (ITO) on an outer surface of security light **100**, **200** as a key. Also, for example, in some embodiments, the motion sensor **110**, **210** may be an ultra-sonic Doppler transmitter and receiver that uses time of flight techniques to determine distance to an object. Also, for example, in some embodiments, the motion sensor **110**, **210** may be a radar transmitter and receiver that uses time of flight techniques to determine distance to an object. Also, for example, in some embodiments, the motion sensor **110**, **210** may be an infra-red reflection distance sensor receiver that measures distance to an object. Also, for example, in some embodiments, the motion sensor **110**, **210** may be a PIR that detects a heat source (such as a user's hand). Also, for example, in some embodiments, the motion sensor **110**, **210** may be light reflection sensor that detects presence and/or distance of an object based on reflections of light output of the security light **100**, **200**. Also, for example, in some embodiments, the motion sensor **110**, **210** may be a camera and one or more signals from the camera may be utilized to detect presence and/or distance of an object. For example, signals from a depth camera may be utilized to determine an object in the shape of a person or vehicle is approaching. Also, for example, signals from a camera may be utilized to determine movement and the movement may be assumed or determined to be human movement. Also, for example, signals from a camera may be utilized to determine presence of a heart beat for example, by monitoring changes in reflected light from a hand and/or other body part of a user. In some embodiments a proximity sensor may include one or more controllers to determine presence, distance, and/or other values.

FIGS. **7**A, **7**B illustrate a cross-sectional view of the motion sensor shroud **224** and part of the second portion of the luminaire housing **208** in an embodiment having two contacts **260** and **270**. The motion sensor shroud **224** may be rotatably adjusted with respect to the luminaire housing **204** allowing tilt of the motion sensor upward and downward. For example, as depicted in FIG. **7**A, the motion sensor is tilted upward and the representative field of view of the motion sensor is relatively wide. In this state where the first contact **260** is disconnected from the second contact **270**, the signal gain from the motion sensor may be maximized since smaller objects further away should still trigger the lights. FIG. **7**B depicts the motion sensor shroud **224** in a second "full downward tilt" state wherein the first contact **260** is connected to the second contact **270**. In such a state, sensed objects are relatively close and a respective signal will be fairly high thereby reducing the need for any gain of the input signal.

The first contact **260** may be secured to the first interfacing tab **243**, which is connected to the motion sensor shroud **224** and which thereby rotates or tilts as the motion sensor head is tilted. As shown in the examples of FIG. **7**A, **7**B, the second contact **270** may be secured to a portion of the interior wall of the luminaire housing **208**.

In some examples, one or both of the contacts may be connected to electrical circuits measuring electrical engagement. Many forms of electrical circuits are known in the art to determine whether two contacts are in electrical connectivity and may be implemented herein. For example, one contact may be grounded and the other contact may have a low voltage signal. In another example, resistive measurement may be detected at one or the other or both of the contacts.

In some embodiments, the first contact **260** and/or the second contact **270** may be located on a different portion of the motion sensor housing. It is appreciated that contact could be physical, inductive, or another form of contact.

In some embodiments, the first contact **260** and/or the second contact **270** may be differently shaped. For example, as illustrated in FIGS. **7**A, **7**B the contacts may be electrically conductive. However, the contacts could be formed as other shapes/configurations. Similarly, contacts may be made of different materials having conductive properties. For example, the contacts could be made of a magnetic alloy, enabling a greater attractive force between the contacts.

As noted previously, FIG. **7**B illustrates a cross-section of the motion sensor shroud **224** and part of the second portion of the luminaire housing **208** similar to that found in FIG. **7**A. However, in FIG. **7**B the motion sensor shroud **224** in a state wherein the first contact **260** is connected to the second contact **270** and the motion sensor is in a fully downward tilt. The connection between the first contact **260** and the second contact **270** may be utilized in a control circuit, configured to adjust motion sensor sensitivity based on the motion sensor housing position.

FIGS. **8**A and **8**B illustrate a cross-section of the motion sensor shroud **224** and part of the second portion of the luminaire housing **208** in an embodiment having a sliding potentiometer. As discussed, a control circuit may be configured to receive an input from a potentiometer. In FIGS. **8**A and **8**B a sliding potentiometer **280** is mounted on and/or in the second portion of the luminaire housing **208**, the potentiometer **280** configured to adjust electrical resistance based on the position of the sliding arms **282** extending from the potentiometer **280**. This change in electrical resistance may affect a control circuit configured to adjust sensitivity of the motion sensor based on rotation of the motion sensor housing, wherein the change in electrical resistance of the potentiometer correlates to a positional change of the motion sensor housing.

In FIGS. **8**A and **8**B a protrusion **286** extends from the first interfacing tab **243** between and slightly beyond the potentiometer sliding arms **282**, such that at any point in the axis of rotation of the motion sensor housing, a portion of the protrusion **286** is capable of being higher than the sliding arms' **282** axis of movement. This height ensures that, although the height of the protrusion **286** may change relative to the sliding arms **282** due to the arcuate axis of travel that the protrusion is subjected to, and the linear axis of travel that the sliding arms **282** are subjected to, a portion of the protrusion **286** will always be at least level with a sliding arm **282**, enabling the protrusion **286** to interface with and move the sliding arms **282** proportional to motion sensor housing rotation regardless of a current position of the motion sensor housing.

FIGS. **9**A and **9**B also illustrate a cross-sectional view of the motion sensor shroud **224** and part of the second portion of the luminaire housing **208** in an embodiment having a potentiometer. In FIGS. **9**A and **9**B a rotary potentiometer **290** is mounted in the second portion of the luminaire housing **208**, the potentiometer **290** configured to adjust electrical resistance based on a rotational position of a wiper of the potentiometer connected to a control shaft of the potentiometer. Change in electrical resistance modified by rotation of the control shaft may affect a control circuit that the potentiometer **290** is connected to, the control circuit configured to adjust sensitivity of the motion sensor based on the position of the motion sensor housing, wherein change in electrical resistance exhibited by the potentiometer correlates to a positional change of the motion sensor housing.

In FIGS. **9**A and **9**B a protrusion **296** includes a linear portion which extends vertically from the first interfacing tab **243** for a distance. An arcing portion of the protrusion **296** extends initially substantially perpendicularly outward from a point of the linear portion of the protrusion **296** which is most distal from the motion sensor housing for a distance towards the potentiometer **290**. In some embodiments, the arcing portion of the protrusion **296** includes a surface having a gear rack **300**.

In the embodiment illustrated in **9**A and **9**B, the potentiometer **290** control shaft is configured to have a plurality of gear teeth, effectively enabling the control shaft to be rotated as a gear. The arced portion of the protrusion **296** includes a section having a surface having a gear rack **300**, the gear rack configured to interface with the potentiometer **296** gear teeth, such that when the motion sensor housing is rotated, the protrusion **296** is correspondingly rotated and the gear rack attached to the protrusion **296** causes the potentiometer **290** control shaft to rotate as well, modifying the electrical resistance that the potentiometer **290** control shaft controls.

It is appreciated that neither embodiment illustrated in **8**A/**8**B or **9**A/**9**B is exhaustive of the shape, material, location, or configuration of the protrusion and/or potentiometer—components may be added or removed. For example, in FIGS. **9**A and **9**B the gear rack of the potentiometer **290** and gear teeth of the protrusion **296** may be removed, enabling friction only between the protrusion and control shaft surface to control the control shaft rotation. Similarly, materials such as rubber may be incorporated into and/or onto these surfaces, allowing for greater frictional cohesion between the control shaft and protrusion. Other potentiometer designs, locations, and shapes are appreciated by one having ordinary skill in the art. Additionally, substitute components, such as transistors or microprocessors configured to perform equivalent functions in a circuit are also appreciated by one having ordinary skill in the art.

FIGS. **10**A and **10**B illustrate two different detection ranges or view cones corresponding to two motion sensor adjustment settings (e.g., a far detection range and a near detection range). FIG. **10**A illustrates a far detection range with a detection angle α, with the motion sensor **110**, **210** mounted at a height h**1** (e.g., 8 feet from the ground). Accordingly, the motion sensor **110**, **210** may be able to sense motion from an object (e.g., a person) between a range at a near distance L**1** (e.g., 6 feet horizontally from the sensor) and at a far distance L**2** (e.g., 50 feet horizontally from the sensor). As described previously, sometimes the detection range may be too large or too small in a given setting. For example, when the outdoor security light with the motion sensor **110**, **210** is affixed to an exterior wall or a garage door of a house, the motion detector may detect motion both within the user's own yard and also motion that occurs in a next door neighbor's yard with the far detection range setting as shown in FIG. **10**A. With the disclosed security light motion sensor design here, the user is able to adjust the detection range to a near detection range setting by tilting down the motion sensor, for example, only cover an object within the near distance L**1** range (e.g., 6 feet horizontally from the sensor) as shown in FIG. **10**B, to exclude motion in the neighbor's yard from detection. Conversely, the user may also increase the detection range by tilting the motion sensor up. It is to be understood that the detection angle α does not change during the vertical orientation adjustment of the sensor.

FIG. **11** illustrates an example embodiment of a control circuit **350** for the outdoor security light that receives inputs from one or more components and/or drives a number of components in response thereto. Control circuit **350** may for example, include one or more processors **354** and a memory **352** within which may be stored program code for execution by the one or more processors. The memory may be embedded in control circuit **350**, but may also be considered to include volatile and/or non-volatile memories, cache memories, flash memories, programmable read-only memories, read-only memories, etc., as well as memory storage physically located elsewhere from control circuit **350**, e.g., in a mass storage device or on a remote computer interfaced with control circuit **350**.

As shown in FIG. **11**, control circuit **350** is electrically or communicatively connected to various components. In some examples, these components may include a user interface **236** for receiving user input **330** which may be implemented in various embodiments using various combinations of switches, knobs, buttons, sliders, touchscreens or touch-sensitive displays, microphones or audio input devices, image and capture devices. Further, as illustrated in FIG. **11**, control circuit **350** is electrically connected to a power supply **310**. In addition, the control circuit **350** may be connected or in communication with a motion detection unit **248** configured to receive environmental input which may be thermal, audio, visual, haptic, radar and/or other input relating to an environment.

The control circuit **350** may also receive motion sensor housing positional input **320** from one or more electronic components **322**. Electronic components **322** may include processors, conduit, contacts, potentiometers, transistors, sensors, and/or other components as would be appreciated by one having skill in the art. Moreover, in some instances the electronic components **322** may themselves be utilized in producing the motion sensor housing positional input **320**, while in other instances electronic components **322** may be used to transmit the input.

Control circuit **350** may be coupled to one or more network interfaces **360**, e.g., for interfacing with external devices via wired and/or wireless networks such as Ethernet, Wi-Fi, Bluetooth, NFC, optical, cellular and other suitable networks, collectively represented in FIG. **11** at **360**. Network **360** may incorporate in some embodiments a home automation network, and various communication protocols may be supported, including various types of home automation communication protocols. In some embodiments, control circuit **350** may also be interfaced with one or more user devices over a cloud network **362**, e.g., computers, laptops, tablets, smart phones, wearable devices, personal digital assistants, automated assistants, etc., and through which control circuit **350** may be controlled and/or control circuit **350** may provide user feedback.

In some embodiments, control circuit **350** may operate under the control of an operating system and may execute or otherwise rely upon various computer software applications, components, programs, objects, modules, data structures, etc. In addition, control circuit **350** may also incorporate hardware logic to implement some or all of the functionality disclosed herein. Further, in some embodiments, the sequences of operations performed by control circuit **350** to implement the embodiments disclosed herein may be implemented using program code including one or more instructions that are resident at various times in various memory and storage devices, and that, when read and executed by one or more hardware-based processors, perform the operations embodying desired functionality. Moreover, in some embodiments, such program code may be distributed as a program product in a variety of forms, and that the invention applies equally regardless of the particular type of computer readable media used to actually carry out the distribution, including, for example, non-transitory computer readable storage media. In addition, it will be appreciated that the various operations described herein may be combined, split, reordered, reversed, varied, omitted, parallelized and/or supplemented with other techniques known in the art, and therefore, the invention is not limited to the particular sequences of operations described herein.

Control circuit **350** may provide sensor sensitivity gain adjustment **400** as a culmination of the inputs to the control circuit logic **350**, wherein said logic may be configured to provide weights to inputs based on features of the input when formulating the sensor sensitivity gain adjustment **400**. For instance, control circuit **350** may use a processor and/or logic to process one or more inputs received to adjust motion sensor sensitivity.

For example, if control circuit **350** received user input **330** from a user interface **236** indicating a lower magnitude of adjustment, and received a motion sensor housing input **320** from one or more electronic components **322**, then environmental input **340** received from a motion detection unit **248** subsequent to the motion sensor housing input **320** would be less likely to cause illumination of the security light.

Conversely, for example, if control circuit **350** received user input **330** from a user interface **236** indicating a higher magnitude of adjustment, and received a motion sensor housing input **320** from one or more electronic components **322**, then environmental input **340** received from a motion detection unit **248** subsequent to the motion sensor housing input **320** would be more likely to cause illumination of the security light.

The aforementioned examples are merely demonstrative of the numerous applications and variations that can be achieved. Numerous variations and modifications to the control circuit illustrated in FIG. **11** will be apparent to one of ordinary skill in the art.

It is to be understood that a rotationally adjustable outdoor security light with an adjustable spherical motion sensor housing disclosed here is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the drawings. The described embodiments are capable of other embodiments and of being practiced or of being carried out in various ways. That is, the structure of the rotationally adjustable outdoor security light with the adjustable spherical motion sensor housing as shown here is presented for purpose of illustration and description only. It is understood that numerous modifications and alterations of the structure of the rotationally adjustable outdoor security light with the adjustable spherical motion sensor housing may be made while retaining the teachings of the present disclosure. Consequently, the disclosed rotationally adjustable outdoor security light with the adjustable spherical motion sensor housing may be installed in various environments. Also, it is to be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of "including," "comprising," or "having" and variations thereof herein is meant to encompass the items listed thereafter and equivalents thereof as well as additional items. Unless limited otherwise, the terms "connected," "coupled," and "mounted," and variations thereof herein are used broadly and encompass direct and indirect connections, couplings, and mountings. In addition, the terms "connected" and "coupled" and variations thereof are not restricted to direct physical or mechanical connections or couplings. It should be understood that the rotationally adjustable mechanism could vary greatly and still accomplish the same intent. The elements depicted in the accompanying figures may include additional components and that some of the components described in those figures may be removed and/or modified without departing from scopes of the elements disclosed herein. The elements depicted in the figures may not be drawn to scale and thus, the elements may have different sizes and/or configurations other than as shown in the figures.

While several inventive embodiments have been described and illustrated herein, those of ordinary skill in the art will readily envision a variety of other means and/or structures for performing the function and/or obtaining the results and/or one or more of the advantages described herein, and each of such variations and/or modifications is deemed to be within the scope of the inventive embodiments described herein. More generally, those skilled in the art will readily appreciate that all parameters, dimensions, materials, and configurations described herein are meant to be exemplary and that the actual parameters, dimensions, materials, and/or configurations will depend upon the specific application or applications for which the inventive teachings is/are used. Those skilled in the art will recognize, or be able to ascertain using no more than routine experimentation, many equivalents to the specific inventive embodiments described herein. It is, therefore, to be understood that the foregoing embodiments are presented by way of example only and that, within the scope of the appended claims and equivalents thereto, inventive embodiments may be practiced otherwise than as specifically described and claimed. Inventive embodiments of the present disclosure are directed to each individual feature, system, article, material, kit, and/or method described herein. In addition, any combination of two or more such features, systems, articles, materials, kits, and/or methods, if such features, systems, articles, materials, kits, and/or methods are not mutually inconsistent, is included within the inventive scope of the present disclosure.

All definitions, as defined and used herein, should be understood to control over dictionary definitions, definitions in documents incorporated by reference, and/or ordinary meanings of the defined terms.

The indefinite articles "a" and "an," as used herein in the specification and in the claims, unless clearly indicated to the contrary, should be understood to mean "at least one."

The phrase "and/or," as used herein in the specification and in the claims, should be understood to mean "either or both" of the elements so conjoined, i.e., elements that are conjunctively present in some cases and disjunctively present in other cases. Multiple elements listed with "and/or" should be construed in the same fashion, i.e., "one or more" of the elements so conjoined. Other elements may optionally be present other than the elements specifically identified by the "and/or" clause, whether related or unrelated to those elements specifically identified. Thus, as a non-limiting example, a reference to "A and/or B", when used in conjunction with open-ended language such as "comprising" can refer, in one embodiment, to A only (optionally including elements other than B); in another embodiment, to B only (optionally including elements other than A); in yet another embodiment, to both A and B (optionally including other elements); etc.

As used herein in the specification and in the claims, "or" should be understood to have the same meaning as "and/or" as defined above. For example, when separating items in a list, "or" or "and/or" shall be interpreted as being inclusive, i.e., the inclusion of at least one, but also including more than one, of a number or list of elements, and, optionally, additional unlisted items. Only terms clearly indicated to the contrary, such as "only one of" or "exactly one of," or, when used in the claims, "consisting of," will refer to the inclusion of exactly one element of a number or list of elements. In general, the term "or" as used herein shall only be interpreted as indicating exclusive alternatives (i.e. "one or the other but not both") when preceded by terms of exclusivity, such as "either," "one of," "only one of," or "exactly one of." "Consisting essentially of," when used in the claims, shall have its ordinary meaning as used in the field of patent law.

As used herein in the specification and in the claims, the phrase "at least one," in reference to a list of one or more elements, should be understood to mean at least one element selected from any one or more of the elements in the list of elements, but not necessarily including at least one of each and every element specifically listed within the list of elements and not excluding any combinations of elements in the list of elements. This definition also allows that elements may optionally be present other than the elements specifically identified within the list of elements to which the phrase "at least one" refers, whether related or unrelated to those elements specifically identified. Thus, as a non-limiting example, "at least one of A and B" (or, equivalently, "at least one of A or B," or, equivalently "at least one of A and/or B") can refer, in one embodiment, to at least one, optionally including more than one, A, with no B present (and optionally including elements other than B); in another embodiment, to at least one, optionally including more than one, B, with no A present (and optionally including elements other than A); in yet another embodiment, to at least one, optionally including more than one, A, and at least one, optionally including more than one, B (and optionally including other elements); etc.

It should also be understood that, unless clearly indicated to the contrary, in any methods claimed herein that include more than one step or act, the order of the steps or acts of the method is not necessarily limited to the order in which the steps or acts of the method are recited.

In the claims, as well as in the specification above, all transitional phrases such as "comprising," "including," "carrying," "having," "containing," "involving," "holding," "composed of," and the like are to be understood to be open-ended, i.e., to mean including but not limited to. Only the transitional phrases "consisting of" and "consisting essentially of" shall be closed or semi-closed transitional phrases, respectively, as set forth in the United States Patent Office Manual of Patent Examining Procedures, Section 2111.03. It should be understood that certain expressions and reference signs used in the claims pursuant to Rule 6.2(b) of the Patent Cooperation Treaty ("PCT") do not limit the scope.

What is claimed is:

1. An adjustable ellipsoidal motion sensor housing mounted on an outdoor security light canopy, comprising:
- an ellipsoidal shroud including an aperture;
- a motion detection unit mounted within the ellipsoidal shroud; and
- an adjustment mechanism facilitating adjustment of the adjustable ellipsoidal motion sensor housing within one or more axis; and
- a control circuit configured to process input from one or more electronic components, wherein the control circuit modifies a sensitivity gain of the motion detection unit in response to an input indicating rotational movement of the adjustable ellipsoidal motion sensor housing.

2. The adjustable ellipsoidal motion sensor housing of claim **1**, wherein the control circuit receives the input from at least one electronic component capable of providing a binary input to the control circuit.

3. The adjustable ellipsoidal motion sensor housing of claim **2**, wherein the input is derived from at least two electrical contacts.

4. The adjustable ellipsoidal motion sensor housing of claim **3**, wherein a first contact, of the at least two electrical contacts, is located on an interfacing tab connected to the adjustable ellipsoidal motion sensor housing, and a second contact, of the at least two electrical contacts, is located on a portion of the outdoor security light canopy.

5. The adjustable ellipsoidal motion sensor housing of claim **4**, wherein the first contact is displaceable within one or more axes.

6. The adjustable ellipsoidal motion sensor housing of claim **5**, wherein the second contact is stationary.

7. The adjustable ellipsoidal motion sensor housing of claim **6**, wherein the first contact and the second contact are configured to interface within a first axis and maintain the interface at a plurality of points along a second axis.

8. The adjustable ellipsoidal motion sensor housing of claim **1**, wherein the aperture is a lens opening.

9. The adjustable ellipsoidal motion sensor housing of claim **2**, further comprising a user interface, the user interface configured to receive a user input, and the control circuit configured to adjust polarity and/or magnitude of the sensitivity gain of the motion detection unit in response to user input provided to the user interface.

10. The adjustable ellipsoidal motion sensor housing of claim **2**, wherein the motion detection unit includes at least one PIR sensor mounted within the ellipsoidal shroud.

11. The adjustable ellipsoidal motion sensor housing of claim **10**, wherein the motion detection unit further includes a mounting surface, and the at least one PIR sensor is mounted on the mounting surface.

12. The adjustable ellipsoidal motion sensor housing of claim **11**, wherein the mounting surface is mounted internally within a rear portion of the ellipsoidal shroud.

13. The adjustable ellipsoidal motion sensor housing of claim **1**, wherein the control circuit receives an input derived from one or more electronic components capable of providing a variable input to the control circuit.

14. The adjustable ellipsoidal motion sensor housing of claim **13**, wherein the variable input is from a potentiometer.

15. The adjustable motion sensor housing of claim **1**, further comprising a user interface, the user interface configured to receive user input adjusting the sensitivity gain of the motion detection unit.

16. The adjustable motion sensor housing of claim **15**, wherein the control circuit is configured to adjust polarity and/or magnitude of the sensitivity gain of the motion detection unit in response to user input.

17. The adjustable ellipsoidal motion sensor housing of claim **1**, wherein the motion detection unit includes at least one PIR sensor mounted within the ellipsoidal shroud.

18. An adjustable ellipsoidal motion sensor housing, comprising:

a ellipsoidal shroud having an aperture; and

a motion detection unit mounted within the ellipsoidal shroud; and

a control circuit configured to process input received by the control circuit, wherein the control circuit is configured to modify sensitivity of the motion detection unit in response to an input indicating adjustment of the adjustable ellipsoidal motion sensor housing.

19. The adjustable motion sensor housing of claim **18**, wherein the control circuit receives the input derived from one or more electronic components capable of providing a binary or variable input to the control circuit.

20. An adjustable motion sensor housing, comprising:

a shroud having an aperture;

a motion detection unit mounted within the shroud; and

a control circuit configured to process input received by the control circuit, wherein the control circuit is configured to modify sensitivity of the motion detection unit in response to at least adjustment of the adjustable motion sensor housing.

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