TITLE: **WATERPROOF NON-MECHANICAL MAGNETIC SWITCH**

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CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application 63/572,052 filed March 29, 2024, which is incorporated by reference herein in entirety.

FIELD OF THE INVENTION

[0002] Embodiments of the present disclosure relate to a switch.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] The subject matter of the present disclosure is particularly pointed out and distinctly claimed in the concluding portion of the specification. A more complete understanding of the present disclosure, however, may best be obtained by referring to the detailed description and claims when considered in connection with the following illustrative figures. In the following figures, like reference numbers refer to similar elements and steps throughout the figures.

[0004] FIG. 1 is a cross-sectional view of a CEW that includes a magnetic switch, in accordance with various embodiments;

[0005] FIG. 2 is a schematic view of a magnetic switch, in accordance with various embodiments;

[0006] FIG. 3A is a view of a CEW and a magnetic switch in a first state associated with the CEW being deactivated, in accordance with various embodiments;

[0007] FIG. 3B is a view of a CEW and a magnetic switch in a transition state associated with the CEW in the process of being activated, in accordance with various embodiments;

[0008] FIG. 3C is a view of a CEW and a magnetic switch in a second state associated with the CEW being activated, in accordance with various embodiments;

[0009] FIG. 4 is a view of a CEW and a magnetic switch in a third state associated with the CEW being reactivated, in accordance with various embodiments;

[0010] FIG. 5 is a process diagram association with activation of a CEW in response to a magnetic switch transitioning from a first state to a second state, in accordance with various embodiments;

[0011] Elements and steps in the figures are illustrated for simplicity and clarity and have not necessarily been rendered according to any particular sequence. For example, steps that may be performed concurrently, in different order, or omitted are illustrated in the figures to help to improve understanding of embodiments of the present disclosure.

DETAILED DESCRIPTION

[0012] The detailed description of exemplary embodiments herein makes reference to the accompanying drawings, which show exemplary embodiments by way of illustration. While these embodiments are described in sufficient detail to enable those skilled in the art to practice the disclosures, it should be understood that other embodiments may be realized and that logical changes and adaptations in design and construction may be made in accordance with this disclosure and the teachings herein. Thus, the detailed description herein is presented for purposes of illustration only and not of limitation.

[0013] The scope of the disclosure is defined by the appended claims and their legal equivalents rather than by merely the examples described. For example, the steps recited in any of the method or process descriptions may be executed in any order and are not necessarily limited to the order presented. In some embodiments, one or more steps recited in any of the method or process descriptions may be omitted. Any reference herein to singular includes plural embodiments, and any reference to more than one component or step may include a singular embodiment or step. Reference to attached, fixed, coupled, connected, or the like may include permanent, removable, temporary, partial, full, and/or any other possible attachment option. Surface shading lines may be used throughout the figures to denote different parts but not necessarily to denote the same or different materials.

[0014] Systems, methods, and apparatuses may be used to interfere with voluntary locomotion (e.g., walking, running, moving, etc.) of a target. Additionally, systems, methods, and apparatuses may be utilized by a projectile launcher, the projectile launcher potentially comprising one or more of a handle, a magazine, a cartridge, a power supply, and/or other components of the projectile launcher. For example, a projectile launcher may be configured as a conducted electrical weapon ("CEW") may be used to deliver a current (e.g., stimulus signal, pulses of current, pulses of charge, etc.) through tissue of a human or animal target. Although generally referred to as a CEW, as described herein, the term CEW may refer to a conducted electrical weapon, a conducted energy weapon, and/or any other similar device or apparatus configured to provide a stimulus signal through one or more deployed projectiles (e.g., electrodes).

[0015] Systems, methods, and apparatuses may be used to interfere with, prevent, and/or otherwise disincentivize escalation and/or further interaction during an event. For example, a projectile launcher may be utilized to deploy a deterrent and/or other substance to a human or

animal target that disincentivizes further interaction. Additionally, the projectile launcher may be utilized to deploy an identifying substance and/or device to a human or animal target that enables the human or animal target to be identified at a different location and/or a later time removed from the event. The deterrent, identifying substance, and/or other substances may be referred to as a projectile payload.

[0016] A projectile payload may comprise a substance and/or components selected to induce a desired response and/or enable further interaction at a safe location and appropriate time. The substance may be stored and/or provided to the targeted human and/or animal as a gas, liquid, powered solid, fluid, and/or an otherwise dispersible state. Alternatively, or in addition, the components may include one or more electrodes and/or other projectiles configured to provide a stimulus signal to the targeted human and/or animal. Where the projectile payload comprises a deterrent, the projectile launcher may launch a projectile to disperse the projectile payload in proximity to a human or animal target. During dispersal, the deterrent may contact and/or otherwise interact with the human or animal target to cause pain, discomfort, confusion, disorientation, and/or otherwise deter the human or animal target from continuing a course of action. Where the projectile payload comprises other substances, the projectile launcher may launch the projectile to disperse and/or otherwise deploy the projectile payload in proximity to and/or in contact with the human or animal target.

[0017] A magazine may be a housing and/or structural component that receives one or more projectiles and/or cartridges. The magazine may be configured to receive and/or secure the one or more projectiles (and/or cartridges) within one or more firing tubes. Additionally, the magazine may be configured to fit within and/or couple with a handle of a projectile launcher. In some embodiments, each projectile may be directly received in a magazine. For example, the magazine may receive a respective projectile within the one or more firing tubes prior to deployment. After a projectile is deployed, another projectile may be inserted in the magazine to permit launch of another projectile. Projectiles may be inserted within the magazine while the magazine is associated with the handle or when the magazine is unassociated with the handle. Alternately or additionally, the magazine may receive one or more cartridges that each include one or more projectiles. Similar to the respective projectile above, the magazine may receive a respective cartridge within the one or more firing tubes prior to deployment.

[0018] In various embodiments, a magazine may include two or more projectiles (e.g., a cartridge containing two or more projectiles, two or more projectiles are launched directly from two or more firing tubes of the magazine, etc.) that are launched at the same time. In various embodiments, a magazine may include two or more projectiles that may each be launched individually at separate times. In various embodiments, a magazine may include a single projectile configured to be launched from the magazine. Launching the projectiles may be referred to as activating (e.g., firing) a magazine and/or a bay of the handle. After use (e.g., activation, firing), a magazine may be removed from the bay and replaced with an unused (e.g., not fired, not activated) magazine to permit launch of additional projectiles.

[0019] A cartridge may be configured as an external housing comprised of a single projectile. For example, a CEW cartridge may comprise a single electrode. Alternatively, a payload cartridge may comprise a single projectile having a single payload. The single projectile may be individually deployed from the cartridge and the magazine in which the cartridge is received. Alternately, a cartridge may comprise two or more projectiles that are launched at the same time. Launching or deploying a projectile may be referred to as activating (e.g., firing) a cartridge. After use (e.g., activation, firing), at least a portion of a cartridge may remain in the magazine. After the use, the portion of the cartridge may be removed from the magazine and replaced with an unused (e.g., not fired, not activated) cartridge to permit launch of an additional projectile or projectiles.

[0020] In various embodiments, a projectile launcher may include a handle and one or more magazines (e.g., deployment units, etc.). The handle may include one or more bays for receiving the magazine(s). Each magazine may be removably positioned in (e.g., inserted into, coupled to, etc.) a bay. Each magazine may releasably electrically, electronically, and/or mechanically couple to a bay. A deployment of the projectile launcher may launch one or more projectiles from the magazine toward a target to remotely deliver a projectile payload.

[0021] In various embodiments, a projectile may include a handle and one or more bays for receiving one or more projectiles (e.g., electrodes, pepper projectiles, marker projectiles, etc.). Each projectile may be removably positioned in (e.g., inserted into, coupled to, etc.) a bay. Each projectile may releasably electrically, electronically, and/or mechanically couple to a bay. A deployment of the projectile launcher may launch one or more projectiles from one or more bays of the handle and toward a target to remotely deliver the stimulus signal and/or the projectile payload.

[0022] In various embodiments, and with reference to FIG. 1, a CEW 100 is disclosed. It should be noted that CEW 100 may comprise a magazine removably coupled to a handle of a projectile launcher, may be configured as an integrated portion of a projectile launcher, and/or otherwise be configured to deploy one or more projectiles. Alternatively, or in addition, CEW 100 may be configured as a projectile launcher that deploys the one or more projectiles based at least on a user input receiver by a user interface (e.g., trigger 128). Additionally, while various components are discussed as being associated with CEW 100, individual components may be associated with other portions of the projectile launcher. CEW 100 may comprise a safety slide 102, the safety slide further comprising a magnet 104 having a first polarity 106 and a second polarity 108. Additionally, CEW 100 may comprise a first sensor 110 and a second sensor 112 associated with a sensor circuit 114. A housing 116 of CEW 100 may comprise a slide track 118 that permits safety slide 102 to transition between at least a first position and a second position, wherein an activated indicator 120 is observable by a user of the projectile launcher in at least the second position of safety slide 102. Sensor circuit 114 may be communicatively associated with at least a control circuit 122, electrically associated with at least a power supply 124, and logically associated with at least one or more projectile deploying mechanisms 126.

[0023] In various embodiments, CEW 100 and the various components of CEW 100 may comprise any suitable material. One or more components of CEW 100 may be formed of one or more rigid, durable materials able to withstand force(s) applied during use. For example, housing 116 may comprise one or more rigid, plastic material(s), metal material(s), and/or composite material(s). The one or more rigid materials may include corrosion-resistant materials, UV resistant materials, and/or any other suitable material configured to at least partially withstand environmental factors. Rigid materials may include metals and metallic alloys (e.g., aluminum, steel, titanium, etc.), composites (e.g., fiberglass, carbon fiber, etc.), plastics (e.g., polycarbonate, acrylonitrile butadiene styrene, polyether ether ketone, etc.), and/or the like. The rigid materials may also be treated (e.g., heat-treated, galvanized, anodized, etc.), painted (e.g., powder-coated, e-coated, etc.), and/or coated or modified to aid in withstanding environmental factors. Additionally, one or more components of CEW 100 may be formed of one or more deformable materials able to repeatedly transition between a first state and a second state, repeatedly compress and decompress, and/or otherwise be deformed and return to an original shape of the one or more components. The one or more deformable materials may include some or all of the one or more

rigid materials (e.g., plastic materials, metal materials, and/or composite materials). The one or more deformable materials may be configured to permit an amount of deformation without accumulating substantial damage to a component. Similar to the one or more rigid materials, the one or more deformable materials may include metals and metallic alloys (e.g., aluminum, steel, titanium, etc.), composites (e.g., fiberglass, carbon fiber, etc.), plastics (e.g., polycarbonate, acrylonitrile butadiene styrene, polyether ether ketone, etc.), and/or the like. Further, the deformable materials may also be treated (e.g., heat-treated, galvanized, anodized, etc.), painted (e.g., powder-coated, e-coated, etc.), and/or coated or modified to aid in withstanding environmental factors.

[0024] In various embodiments, safety slide 102 may be configured to enable a user of a projectile launcher to switch the projectile launcher from a deactivated state to an activated state and from the activated state to the deactivated state. More generally, safety slide 102 may be configured to enable the user of the projectile launcher to transition the projectile launcher from at least a first state to a second state and from the second state to the first state. It should be noted that safety slide 102 may be configured to transition between two or more states of the projectile launcher.

[0025] In various embodiments, a first state of safety slide 102 may be a deactivated state, a "safe" state, a standby state, and/or other state where the projectile launcher is prevented from deploying, launching, and/or otherwise causing a projectile from being provided to a target by the projectile launcher. Similarly, a second state of safety slide 102 may be an activated state, a "fire" state, a ready state, and/or other state where the projectile launcher is permitted to provide one or more projectiles to the target. In particular, safety slide 102 may comprise magnet 104 and maintain magnet 104 in at least a first position associated with the first state and a second position associated with the second state. Additionally, and while in the first position and/or the second position, a magnetic field of magnet 104 may be detected by and/or interact with at least one of first sensor 110 and second sensor 112. For example, and in the first state of the safety slide 102, magnet 104 may be in the first position such that at least one of first sensor 110 and/or second sensor 112 detects second polarity 108. Further, in the second state of the safety slide 102, magnet 104 may be in the second position such that second sensor 112 detects at least one of first polarity 106 and/or second polarity 108. As will be discussed in greater detail below, detection of first

polarity 106 and second polarity 108 may modify operation of first sensor 110 and second sensor 112.

[0026] In various embodiments, and as noted above, safety slide 102 may be configured to transition from a first state to a second state. Additionally, transition from the first state to the second state may cause magnet 104 to transition from a first position to a second position. In particular, safety slide 102 may be configured to translate along slide track 118 between at least the first state and the second state. Safety slide 102 may be configured to interface with, couple to, and/or otherwise associated with slide track 118 such that a user is able to modify a safety state of the projectile launcher by translating safety slide 102 along slide track 118. It should be noted that safety slide 102 and/or slide track 118 may be configured as a variety of physical components. While described as a slide and a slide track, safety slide 102 and/or slide track 118 may be configured as a switch, a latch, and/or other physical configuration that translates magnet 104 between at least the first position and the second position.

[0027] In various embodiments, magnet 104 may be installed within, coupled to, and/or otherwise be associated with safety slide 102. It should be noted that magnet 104 may be installed within CEW 100 and at least one of first sensor 110 and second sensor 112 may be installed within safety slide 102. More generally, magnet 104 may be configured to move relative to first sensor 110 and second sensor 112. Alternatively, at least one of first sensor 110 and/or second sensor 112 may be configured to move relative to magnet 104.

[0028] In various embodiments, magnet 104 may be associated with safety slide 102 such that a user may translate magnet 104 between at least the first position and the second position. Translating magnet 104 between at least the first position and the second position may modify one or more magnetic field readings generated by first sensor 110 and/or second sensor 112. For example, and while magnet 104 is in the first position, at least first sensor 110 may detect second polarity 108 of magnet 104. During translation between the first position and the second position, first sensor 110 and second sensor 112 may detect second polarity 108. Upon reaching the second position, first sensor 110 may detect first polarity 106 and second sensor 112 may detect second polarity 108. Further, safety slide 102 and magnet 104 may be configured to translate from the second position to a third position, wherein at least second sensor 112 may detect first polarity 106 while magnet 104 is in the third position.

[0029] In various embodiments, sensor circuit 114 may comprise first sensor 110 and second sensor 112. Sensor circuit 114 may communicatively couple first sensor 110 and second sensor 112 such that one or more indications from second sensor alter operation of first sensor 110. Alternatively, or in addition, one or more indications from first sensor 110 may alter operation of second sensor 112. Additionally, first sensor 110 and second sensor 112 may be configured to output at least a magnetic field and a polarity associated with a magnetic field. For example, first sensor 110 and/or second sensor 112 may be configured to generate a first signal in response to a magnetic field with first polarity 106 (e.g., a "north" polarity, a "south" polarity, etc.) and a second signal in response to a magnetic field with second polarity 108 (e.g., a "north" polarity, a "south" polarity, etc.). In some embodiments, first sensor 110 and second sensor 112 may be configured as Hall effect sensors.

[0030] In various embodiments, first sensor 110 and second sensor 112 may be configured to provide one or more signals in response to first polarity 106 and second polarity 108 of magnet 104. In particular, first sensor 110 and second sensor 112 may be associated with a detection range for magnetic fields. Alternatively, or in addition, first sensor 110 and second sensor 112 may be associated with a detection threshold satisfied by a magnetic field of sufficient magnitude. In response to a detected magnetic field, first sensor 110 and second sensor 112 may output the first signal or the second signal to the sensor circuit 114, wherein the sensor circuit 114 may provide the first signal or the second signal to first sensor 110, second sensor 112, and/or control circuit 122. For example, sensor circuit 114 may transmit a first indication to control circuit 122 based at least on first sensor 110 and/or second sensor 112 indicating that safety switch 102 is in the first state and/or magnet 104 is in the first position. Similarly, sensor circuit 114 may transmit a second indication to control circuit 122 based at least on first sensor 110 and/or second sensor 112 indicating that safety switch 102 is in the second state and/or magnet 104 is in the second position. Alternatively, sensor circuit 114 may transmit a third indication to first sensor 110 based at least on second sensor 112 indicating that safety switch 102 has transitioned from the first state and/or magnet 104 has transitioned from the second position.

[0031] In various embodiments, first sensor 110 and second sensor 112 may comprise a plurality of electrical leads. In particular, first sensor 110 and second sensor 112 may comprise a first set of electrical leads associated with operation of the first sensor 110 and/or the second sensor 110 and a second set of electrical leads associated with indication output of the first sensor 110

and/or the second sensor 110. For example, the first set of electrical leads may comprise at least a power source lead associated with power supply 124 and a ground lead configured to comprise a circuit with the power source lead. Additionally, the second set of electrical leads may comprise a north signal output lead for an indication that a "north" polarity is detected and a south signal output lead for an additional indication that a "south" polarity is detected.

[0032] In various embodiments, sensor circuit 114 may be configured to alter operation of first sensor 110 and/or second sensor 112 based at least on an indication provided by the second sensor 112 and/or the first sensor 110. For example, sensor circuit 114 may be configured to activate and deactivate at least first sensor 110 based at least on one or more indications provided by second sensor 112. Similarly, sensor circuit 114 may be configured to activate and deactivate at least second sensor 112 based at least on one or more indications provided by first sensor 110. In particular, and as discussed in greater detail below, a sensor output may cause sensor circuit to modify power supplied to a sensor (e.g., first sensor 110, second sensor 112, an additional sensor, etc.). Modifying power supplied to the sensor enables activating and deactivating the sensor.

[0033] In various embodiments, sensor circuit 114 may be associated with control circuit 122, power supply 124, and/or one or more projectile deploying mechanisms 126. In particular, control circuit 122 may be configured to receive one or more indications from sensor circuit 114 based at least on magnetic field(s) and/or magnetic polarities detected by at least first sensor 110 and/or second sensor 112. Additionally, control circuit 122 may be configured to electrically connect sensor circuit 114 with power supply 124 and enable operation of first sensor 110 and/or second sensor 112. Alternatively, or in addition, power supply 124 may be in electrical communication with sensor circuit 114. Further, control circuit 122 may be configured to enable and disable the one or more projectile deploying mechanisms 126. For example, control circuit 122 may receive a first indication from sensor circuit 114 associated with safety slide 102 (or magnet 104) being in a first state. In response, control circuit 122 may deactivate the one or more projectile deploying mechanisms 126, preventing one or more projectiles from being deployed to a target of the projectile launcher. Similarly, control circuit 122 may receive a second indication from sensor circuit 114 associated with safety slide 102 (or magnet 104) being in a second state. In response, control circuit 122 may deactivate the one or more projectile deploying mechanisms 126, enabling one or more projectiles to be deployed to the target of the projectile launcher.

[0034] In various embodiments, transition of safety slide 102 between the first state and the second state may expose a trigger 128 of CEW 100. Trigger 128 may be configured to generate a deployment signal for CEW 100 that is provided to control circuit 122 when activated by a user of CEW 100. In particular, trigger 128 may be covered, blocked, and/or otherwise obscured by safety slide 102 when safety slide 102 is in the first state. Transition of safety slide 102 from the first state to the second state may uncover, reveal, and/or otherwise expose trigger 128. A user of CEW 100 may be prevented from activating trigger 128 when safety slide 102 is in the first state and may be able to activate trigger 128 when safety slide 102 is in the second state. However, in the course of storing CEW 100 and/or handling CEW 100, a user may inadvertently activate trigger 128 while CEW is not in the second state (e.g., safety slide 102 has only partially transitioned from the first state, an object becomes lodged underneath safety slide 102, etc.) Accordingly, control circuit 122 may be configured to process the deployment signal generated by trigger 128 based at least on the one or more indications output by sensor circuit 114.

[0035] In various embodiments, the deployment signal output by trigger 128, based at least on a user activating trigger 128, may be processed by control circuit 122 based at least on one or more indications output by sensor circuit 114. In particular, control circuit 122 may be configured to suppress the deployment signal based at least on second sensor 112 deactivating first sensor 110, first sensor 110 not detecting the first polarity of first portion 106 at a magnetic field strength that satisfies the detection threshold of first sensor 110, and/or control circuit 122 determining that safety slide 102 is not in the second state from the one or more indications provided by sensor circuit 114. Similarly, the deployment signal provided from trigger 128 to control circuit 122 may deploy one or more projectiles based at least on second sensor 112 activating first sensor 110, first sensor 110 detecting the first polarity of first portion 106 at a magnetic field strength that satisfies the detection threshold of first sensor 110, and/or control circuit 122 determining that safety slide 102 is in the second state from the one or more indications provided by sensor circuit 114.

[0036] In various embodiments, and with reference to FIG. 2, a sensor circuit 200 is disclosed. Sensor circuit 200 may be configured to provide indications associated with a safety switch state based at least on magnetic field and magnetic polarity detected by one or more sensors. Sensor circuit 200 may comprise a power source 202 (e.g., a connection to power supply 124). Sensor circuit 200 may comprise a first sensor 204 and a second sensor 206. Sensor circuit 200 may comprise a signal output 208.

[0037] In various embodiments, first sensor 204 and second sensor 206 may be configured as Hall effect sensors. In brief, and while the Hall effect is a known aspect of electromagnetic theory, the Hall effect is the production of a potential difference (the Hall voltage) across an electrical conductor that is transverse to an electric current in the conductor and to an applied magnetic field perpendicular to the current. Application of an electric voltage to an electrical element enables one or more sensing elements disposed along an axis perpendicular to a central axis of electrical element. In the presence of a magnetic field, the one or more sensing elements are able to detect the magnetic field based at least on interactions between the magnetic field and the electrical current through the one or more sensing elements. It should be noted that Hall effect sensors are a single option for detecting a magnetic field and while the below examples primarily reference the use of Hall effect sensors, other magnetic field sensors may be utilized (e.g., inductive sensors).

[0038] In various embodiments, first sensor 204 may comprise a ground contact 210 and a power supply contact 212 that provides electrical current to electrical element 214. Additionally, first sensor 204 may comprise a detection circuit 216 that enables first polarity detector 218 and/or second polarity detector 220 to determine that first sensor 204 is in a magnetic field. Generally, electrical current may be provided by power source 202 via at least power supply contact 212 and may traverse electrical element 214 along a first axis A1. Further, first sensor 204 may be disposed within sensor circuit 200 such that, independent of polarity, a magnetic field traverses the electrical element 214 along a second axis A2. Accordingly, while first sensor 204 is powered, detection circuit experiences an induced current along a third axis A3 that may be detected by first polarity detector 218 or second polarity detector 220. It should be noted that in various configurations, first polarity detector 218 and second polarity detector 220 may be configured as individual components associated with a shared detection circuit 216, individual components associated with separate detection circuits 216, and/or an integrated component associated with shared detection circuit 216. Generally, detection circuit 216, when exposed to a magnetic field, may be configured to output a first indication via first polarity detector 218 in response to the magnetic field being associated with a first polarity and/or a second indication via second polarity detector 220 in response to the magnetic field being associated with a second polarity different from the first polarity.

[0039] In various embodiments, detection circuit 216 may enable first polarity detector 218 and/or second polarity detector 220 to detect electrical current generated through interactions

between the magnetic field and the electrical current through electrical element 214. Colloquially known as "Flemings Left-Hand Rule," a magnetic field disposed perpendicular to an electrical current will result in a force being applied to charge carriers of detection circuit 216 perpendicular to both the magnetic field and the electrical field. Application of the force to the charge carries for detection circuit 216 induces a measurable current that causes at least one of first polarity detector 218 and/or second polarity detector 220 to output an indication of the magnetic field and/or a polarity of the magnetic field.

[0040] In various embodiments, second sensor 206 may be configured in a similar manner to first sensor 204. In particular, second sensor 206 may comprise a ground contact and a power supply contact that provides electrical current to electrical element. Additionally, second sensor 206 may comprise a detection circuit and one or more polarity detectors. Further, second sensor 206 may be configured to output a first indication in response to a first polarity and a second indication in response to a second polarity.

[0041] In various embodiments, first sensor 204 and second sensor 206 may be enabled and disabled based at least on one or more indications provided by first sensor 204 and second sensor 206. For example, second sensor 206 may be configured as signal sensor 206 and first sensor 204 may be configured as activation sensor 204. In particular, second sensor 206 may be configured as signal sensor 206 such that signal sensor 206 generates a signal indication that, when provided to a control circuit of a projectile launcher (e.g., CEW 100), activates and/or deactivates the projectile launcher and the ability for the projectile launcher to deploy one or more projectiles. Additionally, first sensor 204 may be configured as activation sensor 204 such that activation sensor 204 generates a power indication that enables sensor signal 206 to detect a polarity of a magnetic field.

[0042] In various embodiments, and as noted above, first sensor 204 may be configured as activation sensor 204 and output one or more indications based at least on a polarity of a detected magnetic field. In particular, output of one or more indications may comprise transition a first output voltage to a second output voltage. For example, activation sensor 204 may be configured to output the first output voltage as a default output for activation sensor 204 not detecting a magnetic field that satisfies a field threshold. Alternatively, or in addition, activation sensor 204 may be configured to output the first output voltage from first polarity detector 218 based at least on first polarity detector 218 detecting a second polarity of the magnetic field. Additionally,

activation sensor may be configured to output the second output voltage based at least on activation sensor 204 detecting a magnetic field that satisfies the field threshold and/or first polarity detector 218 detecting a first polarity of the magnetic field. In some embodiments, first output voltage may be greater than second output voltage. In some embodiments, second output voltage may be equal to a ground voltage associated with ground contact 210. Where second output voltage is less than first output voltage, first polarity detector 218 may be configured to output the power indication as an active low indication.

[0043] In various embodiments, and as noted above, first sensor 204 may be configured as activation sensor 204. In particular, activation sensor 204 may be configured to output the power indication in response to a detected polarity of the magnetic field. For example, and as depicted by FIG. 2, a first output of first polarity detector 218 may couple with second sensor 206. Additionally, the first output of first polarity detector 218 may complete a circuit for the electrical element of second sensor 206. As noted above, the first output of first polarity detector 218 may be configured as active low. In response, second sensor 206 may, via its connection with first polarity detector 218 of activation sensor 204, be provided a ground voltage at a ground contact of second sensor 206. As a result, a voltage difference across the electrical element of second sensor 206 may be provided such that second sensor 206 may determine a magnetic field and a polarity of the magnetic field.

[0044] In various embodiments, first sensor 204 may be configured such that first polarity detector 218 is configured as north polarity detector 218 that outputs an active low indication based at least on a north polarity magnetic field satisfying a field threshold. In particular, first sensor 204 may be configured such that first polarity detector 218 is a north polarity detector 218 that outputs an active low indication when the north polarity magnetic field satisfies the field threshold. The field threshold may be associated with a position of a safety switch, a position of a magnet relative to sensor circuit 200, and/or other association of a magnet with sensor circuit 200. North polarity detector 218 may be configured to output a first voltage equal to a power supply voltage received from power source 202 at power supply contact 212 when exposed to a south polarity magnetic field, a magnetic field is absent, and/or a north polarity magnetic field does not satisfy the field threshold.

[0045] In various embodiments, and in a first state, first sensor 204 may be in electrical communication with power source 202 via power supply contact 212. The first state of first sensor

204 may be configured as a default state and may be associated with first sensor 204 being unassociated with a magnetic field having a first polarity that satisfies the field threshold. Additionally, the first state of first sensor 204 may be associated with second sensor 206 being inactive. It should be noted that, similar to first sensor 204, second sensor 206 may be in electrical communication with power source 202 via power supply contact 212. Instead, second sensor 206 may be in an inactive state based at least in part on first polarity detector 218 of being configured to output the power source voltage via first detector contact 222. First detector contact 222 may be coupled to ground contact 224 of second sensor 206. Output of the power source voltage via first detector contact 222 may result in first sensor 204 holding second sense 206 in the inactive state. Generally, ground contact 224 matching the power source voltage provided by power source 202 via power supply contact 212 may prevent an electric current from being applied to the electrical element of second sensor 206. As a result, where the ground contact 224 matches the voltage of the power supply contact 212 of second sensor, second sensor 206 may be prevented from detecting a magnetic field.

[0046] In various embodiments, first sensor 204 may be transitioned from the first state to a second state by a magnetic field having a first polarity and satisfying the field threshold associated with first polarity detector 218. In particular, and based at least on first polarity detector 218 sensing the magnetic field (e.g., the magnetic field has the first polarity and satisfies the field threshold), first polarity detector 218 may output a ground contact voltage via first detector contact 222. Additionally, second sensor 206 may receive the ground voltage at ground contact 224 and experience an electrical current across an electrical element (e.g., an electrical element 214 of second sensor 206). Further, second sensor 206 receiving the ground voltage from first detector 218 of first sensor 204 may activate second sensor 206 and enable second sensor 206 to detect one or more magnetic fields.

[0047] In various embodiments, first sensor 204 may place second sensor 206 into an active state and enable second sensor to detect one or more magnetic fields. In particular, second sensor 206 may be configured similar to first sensor 204, wherein second sensor comprises a first polarity detector and a second polarity detector. Second sensor 206 may be configured such that a first indication output by the first polarity detector and/or a second indication output by the second polarity detector are provided via signal output 208.

[0048] In various embodiments, and with reference to FIG. 3A, a CEW 300 (e.g., CEW 100) is disclosed. It should be noted that CEW 300 may be configured as a handheld device utilized by a user and/or as a portion of a larger device (e.g., CEW 300 may be configured as a magazine that is removably coupled to a handle of a projectile launcher). CEW 300 may be configured as an integrated portion of a projectile launcher, and/or otherwise be associated with a projectile launcher. Additionally, while various components are discussed as being associated with CEW 300, individual components may be associated with individual portions of CEW 300 and/or a projectile launcher associated with CEW 300. CEW 300 may comprise a safety slide 302, the safety slide 302 further comprising a first portion 304 of a magnet and a second portion 306 of the magnet. Additionally, CEW 300 may comprise a first sensor 308 and a second sensor 310. A housing 312 of CEW 300 may at least partially secure first sensor 308, second sensor 310, and safety slide 302 in a first state.

[0049] In various embodiments, second sensor 310 may comprise one or more contacts, the one or more contacts further comprising power supply contact 314, ground contact 316, and one or more output contacts associated with at least one of first polarity sensor 318 and second polarity sensor 320. Second sensor 310 may further comprise an electrical element 322 that a first electrical current may pass from power supply contact 314 to ground contact 316.

[0050] In various embodiments, and similar to second sensor 310, first sensor 308 may comprise one or more additional contact, the one or more additional contacts further comprising second sensor contact 324, power supply contact 326, and one or more output contacts associated with at least one of first polarity sensor 328 and second polarity sensor 330. First sensor 308 may further comprise an electrical element 332 that a second electrical current may pass from power supply contact 326 to second sensor contact 324.

[0051] In various embodiments, safety slide 302 may be disposed in a first state. In particular, the first state of safety slide 302 may be associated with second sensor 310 deactivating first sensor 308. Additionally, the first state of safety slide 302 may be associated with second sensor 310 not detecting first portion 304 or second portion 308 of the magnet. Alternatively, or in addition, the first state of safety slide 302 may be associated with second sensor 310 detecting first portion 304 and/or second portion 306 of the magnet at a field strength less than a field threshold of second sensor 310. For example, the first state may be associated with safety slide 302 being disposed such that a magnetic field from second portion 306 of the magnetic field is not detected by second

sensor 310 and/or being detected at a field strength less than the field threshold of second sensor 310. In response, second sensor 310 may provide, via first polarity detector 318 and as a first polarity detector output, a power source voltage to second sensor contact 324 of first sensor 308.

[0052] In various embodiments, the first state of safety slide 302 may be associated with control circuit 336 receiving a safe indication (e.g., an indication that magazine, a projectile launcher, a projectile deploying mechanism, and/or other component is to be prevented from deploying one or more projectiles). In particular, and when safety slide 302 is in the first state, second sensor 310 may deactivate first sensor 308 by preventing electrical element 332 from receiving an electrical current (e.g., by setting second sensor contact 324 voltage equal to power supply contact 326). Additionally, first sensor 308 may be configured output a safe indication to control circuit 336 while deactivated by second sensor 310, wherein the safe indication may cause control circuit 336 to prevent projectile deployment. Alternatively, deactivation of first sensor 308 by second sensor 310 may prevent an indication being provided from first sensor 308 to control circuit 336, wherein a null indication (e.g., no indication transmission) may cause control circuit 336 to prevent projectile deployment.

[0053] In various embodiments, the first state of safety slide 302 may be associated with second sensor 310 determining that a magnetic field does not satisfy the field threshold of first polarity detector 318. In particular, power supply 338 may provide an electrical current to second sensor 310 via at least power source contact 314. The electrical current may traverse electrical element 320 to ground contact 316. Based at least on the electrical current traversing electrical element 320, second sensor 310 may be activated such that the magnetic field (in situations where there is a magnetic field) is detected by at least one of first polarity detector 318 and/or second polarity detector 320. In the first state of safety slide 302, second sensor 310 may determine that the magnetic field does not satisfy the field threshold associated with first polarity detector 318. Further, first polarity detector 318 may be configured to output the power supply voltage provided via power source contact 314. It should be noted that first polarity detector 318 may comprise a signal generator component, the signal generator component may be associated with first polarity detector 318 to modify one or more indications provided by first polarity detector 318. For example, the signal generator component may enable first polarity detector 318 to output an inactive high indication in response to the field threshold not being satisfied. Similarly, the signal

generator component may enable first polarity detector 318 to output an active low indication in response to the field threshold being satisfied.

[0054] In various embodiments, and as noted above, second sensor 310 may deactivate first sensor 308 based at least on the field threshold of first polarity detector 318 not being satisfied. In particular, field polarity detector 318 may provide an inactive high indication to first sensor 308 via second sensor contact 324. Additionally, power source contact 326 of first sensor 308 may be in electrical communication with power supply 338. Based at least on the inactive high indication received via second sensor contact 324 being provided at the power supply voltage received at power source contact 326, first sensor 308 may not experience an electrical current at electrical element 332. As a result, first sensor 308 may output a default indication and/or a null indication via sensor circuit output 334. Sensor circuit output 334 may be configured to at least provide one or more indications to control circuit 336. Similar to first polarity detector 318, sensor circuit output 334 may be operated by a signal generator component to modify the output of at least one of first polarity detector 328 and/or second polarity detector 330 to provide the default indication and/or the null indication.

[0055] In various embodiments, control circuit 336 may receive the default indication and/or the null indication from first sensor 308. In particular, control circuit 336 may determine that first sensor 308 and second sensor 310 indicate that CEW 300 is to be placed into a safe mode where one or more projectiles are prevented from deploying. For example, and based at least on the default indication and/or the null indication, control circuit 336 may determine that safety switch 302 is in the first position and that the first position is associated with CEW 300 and/or the projectile launcher is to be maintained in a safe mode. Further, control circuit 336 may prevent one or more projectile deploying mechanisms 340 from deploying one or more projectiles based at least on the default indication and/or the null indication received from first sensor 308.

[0056] In various embodiments, and with reference to FIG. 3B, a CEW 300 (e.g., CEW 100) is disclosed. It should be noted that CEW 300 may be configured as a projectile launcher utilized by a user to deploy one or more projectiles and/or may be removably coupled to a handle of a projectile launcher. Additionally, CEW 300 may be configured as an integrated portion of a projectile launcher and/or otherwise be associated with a projectile launcher. Further, various components may be discussed as associated with CEW 300 and individual components may be associated with individual portions of CEW 300 and/or the projectile launcher. CEW 300 may

comprise a safety slide 302, the safety slide 302 further comprising a first portion 304 of a magnet having a first polarity and a second portion 306 of the magnet having a second polarity. Additionally, CEW 300 may comprise a first sensor 308 and a second sensor 310. A housing 312 of CEW 300 may at least partially secure first sensor 308, second sensor 310, and safety slide 302 in a transition state. The transition state may be associated with a user input provided via safety slide 302. Additionally, the transition state may be associated with one or more triggered actions associated with CEW 300 and/or the projectile launcher associated with CEW 300.

[0057] In various embodiments, a transition state may be associated with a user of CEW 300 and/or a projectile launcher associated with CEW 300 activating CEW 300 and/or the projectile launcher. As previously noted, the first state may be associated with a safe mode and/or other mode of CEW 300 and/or projectile launcher associated with at least control circuit 336 preventing deployment of one or more projectiles. The user may utilize safety slide 302 to provide user input as safety slide transitions between the first state and a second state.

[0058] In various embodiments, safety slide 302 may be disposed in one or more transition positions associated with the transition state. In particular, a first portion 304 of a magnet within safety slide 302 may be associated with a first polarity. Additionally, first portion 304 may be disposed proximate to at least second sensor 310, wherein first portion 304 may at least approach second sensor 310 as safety slide translates between the one or more transition positions. Second sensor 310 may receive an electrical current from power supply 338 at power source contact 314 that traverses electrical element 322 to ground contact 316. Based at least on the electrical current at electrical element 322, first polarity detector 318 may detect the first polarity of the magnetic field. Further, and based at least on the magnetic field satisfying the field threshold, first polarity detector 318 may switch from providing an inactive high indication to first sensor 308 to providing an active low indication to first sensor 308. For example, and prior to detecting the magnetic field, first polarity detector 318 may provide the inactive high indication at the power supply voltage received at power source contact 314. In response to the magnetic field satisfying the field threshold, first polarity detector 318 may provide the active low indication to first sensor 308 at a ground voltage associated with ground contact 316.

[0059] In various embodiments, second sensor 310 may be configured to activate first sensor 308 based at least on detecting a magnetic field that satisfies the field threshold. In particular, first polarity detector 318 may determine that the magnetic field, associated with the first polarity,

satisfies the field threshold. The field threshold may be associated with magnetic field magnitude, strength, and/or other measurable aspects of the magnetic field. The field threshold may be associated with a minimum magnetic field strength.

[0060] In various embodiments, and based at least on the determination that the field threshold is satisfied by the magnetic field, first sensor 308 may be activated by first polarity detector 318 of second sensor 318. In particular, first polarity detector 318 may be in electrical communication with first sensor 308 such that one or more indications output to first sensor 308 modify operation of first sensor 308. Accordingly, during a transition state between the first state and a second state of safety switch 302, first polarity detector 318 may switch from a first indication that is inactive high to a second indication that is active low. Alternatively, or in addition, first polarity detector 318 may switch from a high voltage indication output to first sensor 308 to a low voltage indication. The high voltage indication and/or the inactive high indication may be provided to second sensor contact 324 of first sensor 308 to prevent electrical current from being provided to electrical element 332. The low voltage indication and/or the active low indication may be provided to second sensor contact 324 to enable electrical current to be provided to electrical element 332.

[0061] In various embodiments, and based at least on receiving the low voltage indication and/or the active low indication, first sensor 308 may be configured to detect a magnetic field. In particular, and based at least on the active low indication being received at second sensor contact 324, an electrical current may pass from power source contact 326 to second sensor contact 324 via electrical element 332. Similar to second sensor 310, first sensor 308 may comprise first polarity detector 328 and second polarity detector 330 that utilize the electrical current traversing electrical element 332 to detect the magnetic field.

[0062] In various embodiments, first sensor 308 may transmit a first indication associated with the first polarity and the magnetic field. In particular, first polarity detector 328 of first sensor 308 may determine that the magnetic field has the first polarity and whether the magnetic field satisfies the field threshold. It should be noted that first sensor 308 may be disposed between a starting position of safety slide 302 associated with the first state of safety slide 302 and second sensor 310. Positioning first sensor 308 between the starting position of safety slide 302 and second sensor 310 may result in first sensor 308 being exposed to the magnetic field with sufficient strength to satisfy the field threshold, independent of whether first sensor 308 is active. For example, at a first

time and when safety slide 302 is in the starting position, first sensor 308 may be exposed to a first magnetic field strength of the first polarity greater than a second magnetic field strength that second sensor 310 is exposed to. At a second time, and while safety slide 302 is in the transition state, safety slide may have translated and/or be in translation from the starting position. While safety slide 302 is in the transition state, the first magnetic field strength may increase to a maximum field strength value and/or decrease until the first magnetic field strength of the first polarity reaches zero. Similarly, the second magnetic field strength may increase towards the maximum field strength value. Further, and based at least on translation of safety slide 302, the second magnetic field strength may increase such that the field threshold is satisfied at second sensor 310 and the second magnetic field strength exceeds the first magnetic field strength.

[0063] In various embodiments, first sensor 308 may provide a first indication from first polarity detector 324. In particular, and after second sensor 310 activates first sensor 308, first polarity detector 324 of first sensor 308 may be configured to provide the first indication to control circuit 336. Additionally, the first indication may trigger one or more control circuit action. The one or more control circuit actions may be executed by control circuit 336 while control circuit 336 maintains CEW 300 (e.g., one or more projectile deploying mechanisms 340, the projectile launcher, etc.) in a safe mode and/or otherwise prevents one or more projectiles from being deployed from CEW 300. Alternatively, or in addition, the first indication may be provided as a wake-up signal and/or other notification to control circuit 336.

[0064] In various embodiments, and with reference to FIG. 3C, a CEW 300 (e.g., CEW 100) is disclosed. It should be noted that CEW 300 may comprise a magazine removably coupled to a handle of a projectile launcher, CEW 300 may be configured as an integrated portion of a projectile launcher, and/or CEW 800 may otherwise be associated with a projectile launcher. Additionally, while various components are discussed as being associated with CEW 300, individual components may be associated with other portions of the projectile launcher. CEW 300 may comprise a safety slide 302, the safety slide 302 further comprising a first portion 304 of a magnet having a first polarity and a second portion 306 of the magnet having a second polarity. Additionally, CEW 300 may comprise a first sensor 308 and a second sensor 310. A housing 312 of CEW 300 may at least partially secure first sensor 308, second sensor 310, and safety slide 302 in a second state. The second state may be associated with a user input provided via safety slide 302. Additionally, the second state may be associated with CEW 300 and/or the projectile launcher

associated with CEW 300 being activated and one or more projectiles being enabled for deployment.

[0065] In various embodiments, a second state of safety slide 302 may be associated with CEW 300 and/or a projectile launcher associated with CEW 300 being activated and able to deploy one or more projectiles. As previously noted, the first state may be associated with a safe mode and/or other mode of CEW 300 and/or projectile launcher associated with at least control circuit 336 preventing deployment of one or more projectiles. The transition state may be associated with a user input that activates CEW 300 and/or the projectile launcher. Accordingly, the user input may place safety slide 302 in the second state, causing control circuit 336 to enable deployment of one or mor projectiles by the user.

[0066] In various embodiments, the second state of safety slide 302 may be associated with first portion 304 and second portion 306 of a magnet within safety slide 302 being disposed proximate to first sensor 308 and/or second sensor 310. For example, the second state of safety slide 302 may be associated with first portion 304 being disposed proximate to second sensor 310 and second portion 306 may be disposed proximate to first sensor 308. In particular, first portion 304 of the magnet may be associated with a first polarity (e.g., north, south) that is detectable by second sensor 310. Additionally, second portion 306 of the magnet may be associated with a second polarity (e.g., south, north) that is detectable by first sensor 308. Safety slide 302 may be configured such that the second state of safety slide 302 places first portion 304 and second portion 306 of the magnet in a second position. The second position of first portion 304 and second portion 306 may be configured such that first portion 304 is proximate to second sensor 310, separated by at least housing 312. Further, the second position of first portion 304 and second portion 306 may be configured such that second portion 306 is proximate to first sensor 308, separated by at least housing 312.

[0067] In various embodiments, housing 312 may be configured to support safety slide in association with the first position and the second portion of first portion 304 and/or second portion 306. For example, housing 312 may comprise a slide track that safety slide 302 translates along between the first state and the second state. Safety slide 302 may be releasably secured in the first state and/or the second state in association with housing 312. Application of a translation force by a user may cause safety slide 302 to transition from the first state to the transition state until is placed in the second state.

[0068] In various embodiments, the second state of safety slide 302 may place first portion 304 of a magnet proximate to second sensor 310. In particular, and similar to the transition state, second sensor 310 may detect the magnetic field of first portion 304 and output an active low indication based at least on the magnetic field satisfying the field threshold. Additionally, the second state of safety switch 302 may be associated with second sensor 310 outputting the active low indication to first sensor 308 to activate first sensor 308.

[0069] In various embodiments, the second state of safety slide 302 may place second portion 306 of a magnet proximate to first sensor 308. In particular, first sensor 308 may be activated by second sensor 310 and detect an additional magnetic field associated with second portion 306, the magnetic field associated with second portion 306 may have a second polarity different from a first polarity of first portion 304. The magnet of safety slide 302 may be configured such that, as safety slide 302 transitions between the first state and the second state, first sensor 308 transitions from being exposed to a first polarity from first portion 304 to being exposed to a second polarity from second portion 306. Additionally, safety slide 302 may be configured such that, while translating between the first state and the second state, first portion 304 translates past first sensor 308 such that second portion 306 is placed proximate to first sensor 308. As a result, the first polarity of the magnetic field is translated past first sensor 308 and the second polarity is translated into association with first sensor 308. Accordingly, first sensor 308 may transition from first polarity detector 324 outputting a first indication to second polarity detector 326 outputting a second indication.

[0070] In various embodiments, first sensor 308 may detect the second polarity of the magnetic field and output one or more indications. In particular, first sensor 308 may be configured to output the one or more indications to control circuit 336 in response to the second polarity of the magnetic field. For example, and similar to the first polarity of the magnetic field, the second polarity of the magnetic field may exert a force on charge carriers of electrical element 332 that is detected by second polarity detector 326. Based at least on second polarity detector 326 detecting the second polarity of the magnetic field, one or more indications may be output via control circuit contact 334 to control circuit 336. Further, the one or more indications provided by second polarity detector 326 may cause control circuit 336 to enable at least one or more projectile deploying mechanisms 340 to deploy one or more projectiles from CEW 300.

[0071] In various embodiments, and with reference to FIGs. 3A-3C, translation of safety slide 302 may modify the magnetic field that at least first sensor 308 and/or second sensor 310 are able to detect. In particular, and as depicted by FIG. 3A a first magnetic field 342 associated with the first polarity may influence at least first sensor 308. As first sensor 308 is inactive based at least on the inactive high indication provided by first polarity detector 318, first sensor 308 may be prevented from detecting first magnetic field 342 via first polarity detector 328. Translation of safety slide 302 from the first state (and the first position of a magnetic associated with safety slide 302), may also translate first magnetic field 342. Additionally, and as safety slide 302 is associated with the transition state, first magnetic field 342 may translate with safety slide 302 such that a first field strength of first magnetic field 342 at first sensor 308 fluctuates. Fluctuation of the first field strength may be associated with first magnetic field 342 increasing in field strength, reaching a maximum field strength, and/or decreasing in field strength.

[0072] In various embodiments, and with reference to FIG. 3A-3C, translation of safety slide 302 in the translation state may modify the magnetic field that at least first sensor 308 and/or second sensor 310 are able to detect. In particular, and as depicted by FIG. 3B, translation of safety slide 302 may cause both first sensor 308 and second sensor 310 to detect first magnetic field 342. Additionally, and based at least on safety slide 302 translating toward second sensor 310, second sensor 310 may detect first magnetic field 342 via first polarity detector 318 and provide the active low indication to first sensor 308. Activation of first sensor 308 may cause first sensor 308 to detect a first field strength of first magnetic field 342 and second sensor 310 to detect a second field strength of first magnetic field 342.

[0073] In various embodiments, and with reference to FIGs. 3A-3C, translation of safety slide 302 from the translation state to the second state may modify the magnetic field that first sensor 308 and/or second sensor 310 detect. In particular, and as depicted by FIG. 3C, safety slide may translate into the second state such that second sensor 310 detects first magnetic field 342 and first sensor 308 detects second magnetic field 344. First state of safety slide 302 may be configured such that first magnetic field 342 is not detected by second sensor 310 and/or does not satisfy the field threshold of first polarity detector 318. Translation state of safety slide 302 may be configured such that first magnetic field 342 is translated such that second sensor 310 detects first magnetic field and outputs the active low indication to activate first sensor 308. Second state of safety slide 302 may be configured such that first magnetic field 342 is detected by second sensor 310 and first

polarity detector 318 outputs the active low indication to activate first sensor 308. Additionally, second state of safety slide 302 may be configured such that second magnetic field 344 is detected by first sensor 308 and second polarity detector 330 outputs an activation indication to control circuit 336 via sensor circuit output 334.

[0074] In various embodiments, safety slide 302 and a magnet disposed within safety slide 302 may be configured to enable activation of first sensor 308 and activation of CEW 300. In particular, first portion 304 and second portion 306 of the magnetic may be disposed within safety slide 302 to enable progressive exposure of first sensor 308 and/or second sensor 310 to first magnetic field 342 and/or second magnetic field 344. First portion 304 of the magnet may be configured such that the first state of safety slide 302 prevents second sensor 310 from detecting first magnetic field 342 at a magnetic field strength that satisfies the field threshold of first polarity detector 318. Additionally, first portion 304 of the magnet may be configured such that second state of safety slide 302 causes second sensor 310 to detect first magnetic field 342 at an additional magnetic field strength that satisfies the field threshold.

[0075] In various embodiments, safety slide 302 and a magnet disposed within safety slide 302 may be configured to enable first sensor 308 to provide an activation indication for CEW 300. In particular, first portion 304 and second portion 306 may be disposed within safety slide 302 to enable activation of second sensor 310 by first portion 304 and first sensor 308 by second portion 306. Second portion 306 of the magnet may be configured such that the first state of safety slide 302 prevents first sensor 308 from detecting second magnetic field 344. Additionally, second portion 306 may be configured such that second state of safety slide 302 enables first sensor 308 to be activated by second sensor 310 detecting first magnetic field 342, wherein activating first sensor 308 enables second magnetic field 344 to be detected by first sensor 308. First portion 304 and second portion 306 may be disposed within safety slide 302 such that a midpoint between first portion 304 and second portion 306 is disposed between first sensor 308 and second sensor 310 along the axis of translation for safety slide 302. The midpoint between first portion 304 and second portion 306 may be associated with a boundary between first magnetic field 342 and second magnetic field 344. As a result, the second state of safety slide 302 may be associated with first magnetic field 342 extending from the midpoint past second sensor 310 and second magnetic field 344 extending from the midpoint past first sensor 308.

[0076] In various embodiments, first portion 304 and second portion 306 may be configured to provide first magnetic field 342 and second magnetic field 344 to satisfy the field threshold of second sensor 310 and first sensor 308. In particular, the field threshold may be configured to mitigate false positives from ambient magnetic fields external to CEW 300. For example, the field threshold may be configured such that a relatively strong magnetic field is utilized to switch a polarity detector (e.g., first polarity detector 318, second polarity detector 320, first polarity detector 328, second polarity detector 330, etc.) from an inactive high indication to an active low indication. As a result, disposing first portion 304 and second portion 306 proximate to second sensor 310 and first portion 308, separated by housing 312, may provide first magnetic field 342 and second magnetic field 344 at sufficient magnetic field strength(s) to satisfy the field threshold. Further, the proximity of first portion 304 and second portion 306 may enable first magnetic field 342 and second magnetic field 344 to exert greater influence on second sensor 310 and first sensor 308 than ambient magnetic field(s) in the environment of CEW 300. Additionally, configuring first sensor 308 and second sensor 310 to be disposed on either side of the midpoint of first portion 304 and second portion 306 may associate activation of CEW 300 with a specific magnetic environment.

[0077] In various embodiments, and with reference to FIG. 4, a CEW 400 (e.g., CEW 100, CEW 300, etc.) is disclosed. It should be noted that CEW 400 may comprise a magazine removably coupled to a handle of a projectile launcher, CEW 400 may be configured as an integrated portion of a projectile launcher, and/or CEW 400 may otherwise be associated with a projectile launcher. Additionally, while various components are discussed as being associated with CEW 400, individual components may be associated with other portions of the projectile launcher. CEW 400 may comprise a safety slide 402, the safety slide 402 further comprising a first portion 404 of a magnet having a first polarity and a second portion 406 of the magnet having a second polarity. Additionally, CEW 400 may comprise a first sensor 408, a second sensor 410, and a third sensor 412. A housing 412 of CEW 400 may at least partially secure first sensor 408, second sensor 410, third sensor 412 and safety slide 402.

[0078] In various embodiments, CEW 400 may function similar to CEW 300 discussed in above referencing FIG. 3. In particular, CEW 400 may be configured such that safety switch 402 is configured to translate between a first state and a second state. In the first state, a first magnetic field (e.g., magnetic field 342) of first portion 404 may be detectable by first sensor 408 and

undetected by second sensor 410. Alternatively, in the first state, the first magnetic field of first portion 404 may not satisfy a field threshold of second sensor 410. In the second state, the first magnetic field of first portion 404 may be detectable by second sensor 410 while a second magnetic field (e.g., second magnetic field 344) of second portion 406 is detectable by first sensor 408. Detection of the first magnetic field may cause second sensor 410 to activate first sensor 408 such that first sensor 408 detects the second magnetic field and outputs an activation indication.

[0079] In various embodiments, first sensor 408 and second sensor 410 may be configured similar to first sensor 308 and second sensor 310. In particular, second sensor 410 may comprise power supply contact 416, ground contact 418, first polarity detector 420, second polarity detector 422, and electrical element 424. Additionally, first sensor 408 may comprise power supply contact 426, second sensor contact 428, first polarity detector 430, second polarity detector 432, and electrical element 434. Similar to first sensor 408 and second sensor 410, CEW 400 may comprise third sensor 412, third sensor 412 comprising second sensor contact 436, power supply contact 438, first polarity detector 440, second polarity detector 442, and electrical element 444.

[0080] In various embodiments, second sensor 410 may be configured to activate first sensor 408 and third sensor 412 based at least on a slide state associated with safety slide 402. In particular, first sensor 408 may be in electrical communication with first polarity detector 420 via second sensor contact 428 and third sensor 412 may be in electrical communication with second polarity detector 422 via second sensor contact 436. First sensor 408 may be activated by second sensor 410 based at least on first polarity detector 420 detecting that the first magnetic field satisfies a field threshold. Similarly, third sensor 412 may be activated by second sensor 410 based at least on second polarity detector 422 detecting that the second magnetic field satisfies an additional field threshold. Additionally, and similar to the sensors discussed in reference to FIG. 3, first polarity detector 420 and second polarity detector 422 may be configured to output an inactive high indication in response to the field threshold and the additional field threshold being unsatisfied. Similarly, first polarity detector 420 and second polarity detector 422 may be configured to output an active low indication in response to the field threshold and the additional field threshold being satisfied. It should be noted that while the terminology of satisfied and unsatisfied has been utilized in reference to first polarity detector 420 (and other first polarity detectors) and/or second polarity detector 420, a pair of thresholds may be utilized. For example, first polarity detector 420 may be associated with a high indication threshold and a low indication

threshold. First polarity detector 420 may be configured to output a high voltage indication based at least on the first magnetic field satisfying the high indication threshold (e.g., field strength is less than the high indication threshold) and output a low voltage indication based at least on the first magnetic field satisfying the low indication threshold (e.g., field strength is greater than the low indication threshold). Similarly, second polarity detector 422 may be associated with an additional high indication threshold and an additional low indication threshold. Second polarity detector 422 may be configured to output an additional high voltage indication based at least on the second magnetic field satisfying the additional high indication threshold (e.g., field strength is less than the additional high indication threshold) and output a low voltage indication based at least on the second magnetic field satisfying the additional low indication threshold (e.g., field strength is greater than the additional low indication threshold). It should be noted that while the high indication and the low indication are referred to as voltage indications, they may be configured to output a different signal that enables operation of an associated sensor (e.g., first sensor 408, third sensor 410, etc.).

[0081] In various embodiments, second sensor 410 may be configured to cause control circuit 450 to determine that safety slide 402 is in a first state. In particular, the first magnetic field of first portion 404 may be disposed by safety slide 402 such that first portion 404 does not cause the field threshold of second sensor 410 to be satisfied. Additionally, the second magnetic field of second portion 406 may be disposed by safety slide 402 such that second portion 406 does not cause the additional field threshold of second sensor 410 to be satisfied. Further, first polarity detector 420 may be configured to output the inactive high indication that deactivates first sensor 408 and second polarity detector 422 may be configured to output the inactive high indication that deactivates third sensor 412. Deactivation of first sensor 408 by first polarity detector 420 may cause first sensor 408 to provide a first default indication to control circuit 450 via first sensor circuit output 448 (e.g., sensor circuit output 334, a sensor circuit output, etc.). Similarly, deactivation of third sensor 412 by second polarity detector 422 may cause third sensor 412 to provide a second default indication to control circuit 450 via second sensor circuit output 448 (e.g., an additional sensor circuit output, the sensor circuit output, an OR configured gate, an XOR configured gate, etc.). Control circuit 450 may receive the first default indication and/or the second default indication and determine that safety switch 402 is in the first state, wherein control circuit

450 causes CEW 400 and/or a projectile launcher to be prevented from deploying one or more projectiles.

[0082] In various embodiments, second sensor 410 may be configured to enable first sensor 408 to provide an indication to control circuit 450 indicating that safety slide 402 is in a second state. In particular, the first magnetic field may satisfy the field threshold associated with first polarity detector 420 of second sensor 410 based at least on safety slide 402 disposing first portion 404 proximate to second sensor 410. Disposing first portion 404 proximate to second sensor 410 may enable first polarity detector 420 to detect the first magnetic field at a field strength that satisfies the field threshold and provide an active low indication to first sensor 408 via second sensor contact 428. Similar to CEW 300, providing the active low indication may enable first sensor 408 to experience an electrical current from power supply contact 426 via electrical element 434. Additionally, safety slide 402 may dispose second portion 406 proximate to first sensor 408 such that the second magnetic field satisfies the field threshold associated with first sensor 408. Second polarity detector 432 of first sensor 408 may be configured to output a first output indication to control circuit 450 based at least on the second magnetic field satisfying the field threshold. Further, first sensor 408 outputting the first output indication to control circuit 450 may cause control circuit 450 to enable deployment of one or more projectiles from CEW 400.

[0083] In various embodiments, second sensor 410 may be configured to enable third sensor 412 to provide an additional indication to control circuit 450 indicating that safety slide 402 is in a third state. In particular, the second magnetic field may satisfy the field threshold associated with second polarity detector 422 of second sensor 410 based at least on safety slide 402 disposing second portion 406 proximate to second sensor 410. Disposing second portion 406 proximate to second sensor 410 may enable second polarity detector 422 to detect the second magnetic field at a field strength that satisfies the field threshold and provide an active low indication to third sensor 412 via second sensor contact 436. Similar to CEW 300, providing the active low indication may enable third sensor 412 to experience an electrical current from power supply contact 438 via electrical element 444. Additionally, safety slide 402 may dispose first portion 404 proximate to third sensor 412 such that the first magnetic field satisfies the field threshold associated with third sensor 412. First polarity detector 440 of third sensor 412 may be configured to output a second output indication to control circuit 450 based at least on the first magnetic field satisfying the field threshold. Further, third sensor 412 outputting the second output indication to control circuit 450

may cause control circuit 450 to enable additional functionality of CEW 400 and/or a projectile launcher (e.g., re-energize the one or more projectiles, provide an indication to a remote device, etc.).

[0084] In various embodiments, safety slide 402 may be configured to transition between the first state, the second state, and the third state. Additionally, safety slide 402 may be configured to transition between a number of states. Safety slide 402 transitioning between at least the first state, the second state, and the third state may cause first portion 404 and second portion 406 to translate between a first position, a second position, and/or a third position. The first position may be associated with CEW 400 being prevented from deploying one or more projectiles. The second position may be associated with CEW 400 being enabled to deploy one or more projectiles to a target. The third position may be associated with CEW 400 being reactivated, re-energizing one or more deployed projectiles, and/or otherwise activating a secondary function of CEW 400. It should be noted that where safety slide 402 may transition between a plurality of states (e.g., first state, second state, third state, an additional state, etc.), first portion 404 and second portion 406 may translate between a plurality of positions (e.g., first position, second position, third position, an additional position, etc.) associated with one or more functions of CEW 400 (e.g., CEW 400 prevented from deploying projectiles, CEW 400 enabled to deploy projectiles, activation of a secondary function of CEW 400, activating one or more additional functions, etc.).

[0085] In various embodiments, control circuit 450 may be configured to receive a set of signals from a signal circuit comprised of first sensor 408, second sensor 410, and third sensor 412. In particular, control circuit 450 may be configured to receive one or more indications from and/or monitor the sensor circuit. The first state of safety slide 402 may be associated with control circuit 450 receiving a default indication, a null indication, and/or other indication associated with CEW 400 being prevented from deploying one or more projectiles. The second state of safety slide 402 may be associated with control circuit 450 receiving an activation indication, a first sensor indication from first sensor 408, and/or other indication associated with CEW 400 being able to deploy one or more projectiles to a target. The third state of safety slide 402 may be associated with control circuit 450 receiving a reactivation indication, an energize indication, and/or other indication associated with a secondary function of CEW 400. Control circuit 450 may determine that safety slide 402 is in the first state based at least on first sensor 408 being deactivated by second sensor 410. For example, and while safety slide 402 is in the first state, second sensor 410

may detect that a first magnetic field is absent and/or does not satisfy a field threshold, wherein second sensor 410 may output an inactive high indication that deactivates first sensor 408 based at least on the field threshold being unsatisfied. Additionally, deactivation of first sensor 408 by second sensor 410 may cause first sensor to output a default indication, a null indication, and/or other indication to control circuit 450. In response to receiving the default indication from first sensor 408, control circuit 450 may prevent one or more projectiles from being deployed by one or more deployment indications received from a projectile launcher.

[0086] In various embodiments, transitioning safety slide 402 from the first state to the second state may update a first sensor indication provided to control circuit 450 by first sensor 408. In particular, transitioning safety slide 402 to the second state may cause a first magnetic field to satisfy a field threshold. Second sensor 410 may, based at least on the first magnetic field satisfying the field threshold, activate first sensor 408 by outputting an active low indication and enable first sensor to detect a second magnetic field. Additionally, first sensor 408 may output the first sensor indication as an activation indication to control circuit 450 based at least on second magnetic field satisfying an additional field threshold of first sensor 408. Control circuit 450 may receive the first sensor indication, determine that the first sensor indication is different from the default indication, and enable one or more projectiles to be deployed from CEW 400. Similarly, transitioning safety slide 402 from the second state to the third state may update a third sensor indication output by third sensor 412. For example, second sensor 410 may detect the second magnetic field from second portion 406 based at least on safety switch 402 being in the third state, wherein second sensor 410 may enable third sensor 412 based at least on the second magnetic field satisfying a field threshold associated with second sensor 410. Activation of third sensor 412 may enable third sensor 412 to determine that the first magnetic field associated with first portion 404 satisfies an additional field threshold and transmit a reactivation indication to control circuit 450. Control circuit 412 may reactivate a function of the projectile launcher (e.g., re-energizing one or more deployed projectiles) and/or activate a secondary function of the projectile launcher (e.g., activate a signal device, provide a warning, enable a flashlight, etc.).

[0087] In various embodiments, and with reference to FIG. 5, a control circuit may be configured to manage at least an operating mode of a projectile launcher based at least in part on one or more indications received from a sensor circuit.

[0088] In various embodiments, and at block 502, a control circuit may receive, at a first time, a first set of indications from a sensor circuit. In particular, the control circuit may be communicatively coupled to one or more sensors of the sensor circuit such that one or more sensor outputs provide the first set of indications to the control circuit. In a first configuration, one or more activatable sensors (e.g., first sensor 110, second sensor 206, first sensor 308, third sensor 412, etc.) may be communicatively coupled with the control circuit. Alternatively, or in addition, one or more activation sensors (e.g., second sensor 112, first sensor 204, second sensor 310, etc.) may be communicatively coupled with the control circuit and/or the activatable sensor(s). Generally, the control circuit may receive at least indications from one or more activatable sensors associated with a default state (e.g., unpowered, no magnetic field detected, field threshold not satisfied by magnetic field etc.), an activated state (e.g., powered, indication received from associated activation sensor, etc.), and/or a detection state (e.g., powered and magnetic field satisfies the field threshold). The first set of indications may be received by the control circuit on a periodic, aperiodic, continuous, and/or other basis. Alternatively, or in addition, the first set of indications may be requested by the control circuit from the sensor circuit on a periodic, aperiodic, continuous, and/or other basis.

[0089] In various embodiments, one or more activatable sensors may be configured to provide the first set of indications via an electrical signal. In particular, individual sensors may be configured to output a specified voltage, current, and/or other electrical property that is provided to the control circuit and enables the control circuit to generate a response to the first set of indications. As noted above, individual sensors may be configured to output an active high indication, an active low indication, an inactive high indication, an inactive low indication, and/or otherwise configured indications that correspond to a safety switch state and/or operating mode of the projectile launcher.

[0090] In various embodiments, and at block 504, a control circuit may determine, at the first time, that a projectile launcher is to be maintained in a safe operating mode. As noted above, individual sensors of the sensor circuit may output one or more indications to the control circuit in response to detected magnetic fields, absence of magnetic fields, sensor state managed by other sensors, and/or other operating parameters of the individual sensors. The control circuit may receive the one or more indications and utilize the one or more indications to determine an operating state for the projectile launcher. Additionally, the control circuit may utilize the one or

more indications to prevent false positives from individual sensors to trigger an operating state update (e.g., a magnetic field in the environment of the projectile launcher switching the projectile launcher between operating states). Further, the projectile launcher may be configured such that disposing a safety switch and/or other switch in a first position causes the sensor circuit to output the first set of indications. As a result, the control circuit may receive the first set of indications and determine that the sensor circuit is in a magnetic environment associated with the safe operating mode. Accordingly, the control circuit may update the operating mode of the projectile launcher to the safe operating mode and/or maintain the projectile launcher in the safe operating mode.

[0091] In various embodiments, and at block 506, the control circuit may cause, based at least on the safe operating mode, one or more user inputs to be suppressed. In particular, the control circuit may be configured to monitor one or more user interfaces and/or receive one or more user inputs from the one or more user interfaces. Additionally, the safe operating mode, determined from the first set of indications, may cause one or more functions of the projectile launcher to be prevented, suppressed, and/or otherwise suspended. As a result, receipt of a user input associated with the one or more functions may be ignored, suppressed, and/or otherwise rejected by the control circuit.

[0092] In various embodiments, and at block 508, the control circuit may receive, at a second time, a second set of indications from the sensor circuit. As previously noted, the control circuit may be communicatively coupled to one or more sensors of the sensor circuit such that one or more sensor outputs provide the first set of indications and the second set of indication to the control circuit. The projectile launcher may be transitioned from a first configuration that results in the first set of indications being received by the control circuit to a second configuration that provides the second set of indications to the control circuit. Similar to the first set of indications, the second set of indications may be received by the control circuit on a periodic, aperiodic, continuous, and/or other basis once the projectile launcher has transitioned to the second configuration. Alternatively, or in addition, the second set of indications may be requested by the control circuit from the sensor circuit on a periodic, aperiodic, continuous, and/or other basis.

[0093] In various embodiments, one or more activatable sensors may be configured to provide the second set of indications via an electrical signal. In particular, individual sensors may be configured to output a specified voltage, current, and/or other electrical property that is provided

to the control circuit and enables the control circuit to generate a response to the second set of indications. As noted above, individual sensors may be configured to output an active high indication, an active low indication, an inactive high indication, an inactive low indication, and/or otherwise configured indications that correspond to a safety switch state and/or operating mode of the projectile launcher.

[0094] In various embodiments, the second set of indications may be received by the control circuit based at least on a user of the projectile launcher transitioning a safety switch to the second configuration. Transition to the second configuration may modify a magnetic environment of the sensor circuit and update one or more indications output by the sensor circuit. In particular, the second configuration may cause one or more activation sensors to activate one or more activatable sensors of the sensor circuit. For example, where the magnetic field affecting an activation sensor satisfies a field threshold of the activation sensor, the activation sensor may provide an indication to the activation sensor that enables the activation sensor to detect an additional magnetic field affecting the activatable sensor. Further, where the additional magnetic field satisfies an additional field threshold of the activatable sensor, the activatable sensor may output an additional indication to control circuit as at least a portion of the second set of indications.

[0095] In various embodiments, and at block 510, the control circuit may determine at the second time, that the projectile launcher is to be maintained in an activated operating mode. In particular, the control circuit may receive the second set of indications and determine the operating state for the projectile launcher. Additionally, the control circuit may utilize the second set of indications to confirm that the activation sensor has activated the activatable sensor based at least on the first magnetic field satisfying the first field threshold of the activation sensor. Similarly, the control circuit may utilize the second set of indications to confirm that the activatable sensor has detected the second magnetic field such that the second field threshold is satisfied the activatable sensor based at least on the first magnetic field satisfying the first field threshold of the activation sensor. As a result, the second set of indications may trigger an operating state update (e.g., a magnetic field in the environment of the projectile launcher switching the projectile launcher between operating states). Further, the projectile launcher may be configured such that disposing a safety switch and/or other switch in a second position causes the sensor circuit to output the second set of indications. The control circuit may receive the second set of indications and determine that the sensor circuit is in a magnetic environment associated with the activated

operating mode. Accordingly, the control circuit may update the operating mode of the projectile launcher to the activated operating mode and/or maintain the projectile launcher in the activated operating mode.

[0096] In various embodiments, and at block 512, the control circuit may cause based at least on the activated operating mode, one or more additional user inputs to deploy one or more projectiles from the projectile launcher.

[0097] In various embodiments, a safety switch system for a projectile launcher may be comprised of various components that enable the projectile launcher to be maintained in various operating modes. The safety switch system may comprise at least a safety switch, a first sensor, a second sensor, and a control circuit. The safety switch may be associated with a first state and a second state, wherein a magnet of the safety switch is disposed in a first position while the safety switch is in the first state and a second position while the safety switch is in the second state. Additionally, the first sensor may be comprised of a first polarity detector, a first sensor connector, and a signal output, wherein the first sensor outputs a default indication based at least on the safety switch disposing the magnet in the first position and outputs an activation indication based at least on the safety switch disposing the magnet in the second position. Similarly, the second sensor may be comprised of a second polarity detector and a second sensor connector, the second sensor connector electrically coupled with the first sensor connector, wherein the second sensor is configured to activate the first sensor based at least on the safety switch being in the second state such that the second polarity detector detects the magnet in the second position. Further, the control circuit may be configured to determine whether the safety switch is in the first state or the second state. For example, the control circuit may determine that the safety switch is in the first state based at least on the default indication received from the first sensor via the signal output. The control circuit may determine that the safety switch is in the second state based at least on the activation indication received from the first sensor via the signal output. The control circuit may determine an operation mode for the projectile launcher associated with the safety switch system based at least on the first state or the second state of the safety switch.

[0098] In various embodiments, the safety switch may be transitioned between the first state and the second state based at least on a user input associated with the safety switch. In particular, transitioning the safety switch between the first state and the second state may cause the magnet to translate between the first position and the second position. The magnet may be comprised of a

first portion and a second portion; the first portion associated with a first magnetic field and the second portion associated with a second magnetic field. Additionally, the first magnetic field may be associated with a first polarity and the second magnetic field may be associated with a second polarity.

[0099] In various embodiments, the safety switch system may further comprise a housing of the projectile launcher and/or a portion of the housing of the projectile launcher. The first state of the safety switch may be associated with a first safety position and the second state of the safety switch may be associated with a second safety position, wherein the safety switch translates between the first safety position and the second safety position along a safety track of the housing to transition between the first state and the second state. Additionally, the housing may comprise a first end and a second end of the safety track, the first safety position associated with the first end and the second safety position associated with the second end. The first portion of the magnet may be disposed between the first end of the safety track and the second portion. The second portion of the magnet may be disposed between the second end of the safety track and the first portion. For example, the safety switch, the first end, the second end, and the magnet may be aligned to a central axis. Translation of the safety switch between the first safety position and the second safety position may occur at least partially along the central axis. As a result, translation of safety switch may also cause translation of the first magnetic field and the second magnetic field along the central axis.

[0100] In various embodiments, a state of the safety switch may be configured to trigger one or more interactions between the first sensor and the second sensor. For example, the first state of the safety switch may be configured to prevent the second magnetic field of the second portion from satisfying a field threshold of the second sensor. Similarly, the second state of the safety switch may be configured to provide the second magnetic field of the second portion to the second sensor and satisfy the field threshold. Additionally, the second state of the safety switch may be configured to provide the first magnetic field of the first portion to the first sensor and satisfy an additional field threshold of the first sensor.

[0101] In various embodiments, the second sensor may be configured to detect a second magnetic field, determine whether a field threshold is satisfied, and provide a first indication. The second magnetic field of the magnet may be detected by the second sensor based at least on the second polarity detector detecting a second polarity of the magnetic field. The second sensor may

determine whether the field threshold associated with the second polarity detector is satisfied by the second magnetic field. Further, the second sensor may provide the first indication to the first sensor via the second sensor connector. Additionally, the field threshold associated with the second polarity detector may be configured as a minimum field strength threshold that is satisfied based at least on the second magnetic field being detected at a second magnetic field strength equal to or greater than the minimum field strength threshold. The first indication provided to the first sensor may be an active low indication based at least on the minimum field strength threshold being satisfied by the second magnetic field, the active low indication activating the first sensor. Alternatively, or in addition, the field threshold associated with the second polarity detector may be configured as a minimum field strength threshold that is satisfied based at least on the second magnetic field being detected at a second magnetic field strength less than the minimum field strength threshold. The first indication provided to the first sensor is an inactive high indication based at least on the minimum field strength threshold being satisfied by the second magnetic field, the inactive high indication deactivating the first sensor.

[0102] In various embodiments, the first sensor may be configured to receive, based at least on a first indication received from the second sensor, an electrical current across a magnetic field sensing component of the second sensor. The first sensor may detect a first magnetic field of the magnet having a first polarity via the first polarity detector and determine whether a field threshold associated with the first polarity detector is satisfied by the first magnetic field. As a result, the first sensor may provide a second indication to the control circuit via the signal output. In particular, the field threshold associated with the first polarity detector may be configured as a minimum field strength threshold that is satisfied based at least on the first magnetic field being detected at a first magnetic field strength equal to or greater than the minimum field strength threshold.

[0103] In various embodiments, the safety switch system may have a first state and a second state. The first state of the safety switch may secure the magnet in the first position at a first time, wherein the first position of the magnet causes the magnet to provide a second magnetic field to the second sensor such that a second magnetic field strength is less than a second field threshold of the second sensor. Additionally, the first position of the magnet may cause the magnet to provide a first magnetic field to the first sensor such that a first magnetic field strength is less than a first field threshold of the first sensor. As a result, the second sensor may provide a second indication

to the first sensor that prevents the first sensor from detecting the first magnetic field based at least on the second magnetic field strength being less than the second field threshold. Accordingly, the first sensor may provide, via the signal output, a first indication to the control circuit based at least on the second sensor preventing the first sensor from detecting the first magnetic field.

[0104] In various embodiments, the second state of the safety switch secures the magnet in the second position at a second time. In particular, the second position of the magnet may cause the second magnetic field to be provided at the second sensor such that the second magnetic field strength is greater than or equal to the second field threshold. Additionally, the second position of the magnet may cause the first magnetic field to be provided at the first sensor such that the first magnetic field strength is greater than or equal to the first field threshold of the first sensor.

[0105] In various embodiments, a projectile launcher may comprise a projectile launcher housing, a switch, a sensor circuit, and a control circuit. The projectile launcher housing may define an exterior surface of the projectile launcher. The switch may be disposed on the exterior surface of the projectile launcher and may be configured to translate between at least a first state and a second state. The sensor circuit may be configured to determine whether the switch is in the first state or the second state. Additionally, the sensor circuit may comprise a first sensor configured to determine whether a first magnetic field of the switch satisfies a first field threshold and a second sensor, activatable by the first sensor, configured to determine whether a second magnetic field of the switch satisfies a second field threshold. The control circuit may be associated with the sensor circuit and one or more projectiles. The control circuit may determine whether the switch is in the first state or the second state based at least on one or more indications output by the second sensor. Additionally, the control circuit may prevent the one or more projectiles from being deployed based at least on the sensor circuit indicating that the switch is in the first state. Further, the control circuit may enable the one or more projectiles to be deployed based at least on the sensor circuit indicating the switch is in the second state. The projectile launcher may further comprise a trigger that receives a user input to deploy the one or more projectiles. Accordingly, the control circuit may prevent the user input from deploying the one or more projectiles based at least on the one or more indications output by the second sensor indicating that the switch is in the first state. Similarly, the control circuit may deploy the one or more projectiles based at least on the user input and the one or more indications output by the second sensor indicating that the switch is in the second state.

[0106] In various embodiments, the first state of the switch may be associated with the switch being disposed in a first position of the exterior surface. Similarly, the second state of the switch may be associated with the switch being disposed in a second position of the exterior surface. Additionally, the switch is comprised of a first magnet portion associated with the first magnetic field and a second magnet portion associated with the second magnetic field, the first magnet portion disposed between the second magnet portion and the second position and the second magnet portion disposed between the first magnet portion and the first position. Further, the first state of the switch is configured such that the first position maintains a minimum distance between the first magnet portion and the sensor circuit such that the first field threshold is unsatisfied by the first magnetic field. The second state of the switch is configured such that a midpoint between the first magnet portion and the second magnet portion is disposed between the first sensor and the second sensor. Further, disposing the midpoint between the first sensor and the second sensor may cause the first field threshold to be satisfied by the first magnetic field of the first magnet portion and the second field threshold to be satisfied by the second magnetic field of the second magnet portion.

[0107] In various embodiments, the projectile launcher may further comprise a power supply in electrical communication with at least the sensor circuit. The power supply may induce an electrical current by providing a power supply voltage at a first power supply contact of the first sensor. The power supply may provide the power supply voltage to a second power supply contact of the second sensor. Additionally, the first sensor may prevent the electrical current from being induced at the second sensor by providing the power supply voltage at a ground contact of the second sensor based at least on the first field threshold being unsatisfied by the first magnetic field. Similarly, the first sensor may enable the electrical current being induced at the second sensor by providing a ground voltage at the ground contact of the second sensor based at least on the first field threshold being satisfied by the first magnetic field.

[0108] In various embodiments, the first state of the switch may be associated with a safe mode of the projectile launcher. Additionally, the second state of the switch may be associated with a fire mode of the projectile launcher.

[0109] In various embodiments, the switch configured to translate to a third state from the second state. Additionally, the sensor circuit may comprise a third sensor, activatable by the first sensor, configured to determine whether the first magnetic field of the switch satisfies a third field

threshold. The third sensor may be activated by the first sensor based at least on the second magnetic field satisfying a fourth field threshold of the second sensor. Further, the control circuit may determine whether the switch is in the third state based at least on one or more additional indications, output by the third sensor, that the control circuit receives. Accordingly, the control circuit may activate one or more projectile launcher functions based at least on the one or more additional indications indicating that the switch is in the third state.

[0110] In various embodiments, a method may comprise one or more steps associated with determining an operating state of a projectile launcher. In particular, a control circuit may be configured to determine, at a first time and based at least on a first set of indications received from a sensor circuit, whether a first field threshold of a first sensor is satisfied by a first magnetic field of a safety switch. The first set of indications may be utilized to switch the projectile launcher into and/or maintain the projectile launcher in a safe operating mode. The safe operating mode may be associated with suppression of user inputs from deploying one or more projectiles, prevention of a user from activating the projectile launcher, and/or otherwise preventing activation of one or more projectile launcher functions by the user. Additionally, the control circuit may determine, at a second time and based at least on a second set of indications received from the sensor circuit, whether the first field threshold of the first sensor is satisfied by the first magnetic field of the safety switch. Similarly, at the second time and based at least on the second set of indications received from the sensor circuit, the control circuit may determine whether a second field threshold of a second sensor is satisfied by a second magnetic field of the safety switch. Further, and based at least on the second set of indications, the control circuit may determine that the projectile launcher is to be maintained in an activated operating mode. As a result, the control circuit may cause the projectile launcher to be maintained in the activated operating mode and an additional user input to deploy one or more projectiles from the projectile launcher and/or to otherwise activate the projectile launcher. The first set of indications may comprise a default indication provided by the second sensor. The second set of indications may comprise an activated indication provided by the second sensor.

[0111] Benefits, other advantages, and solutions to problems have been described herein with regard to specific embodiments. Furthermore, the connecting lines shown in the various figures contained herein are intended to represent exemplary functional relationships and/or physical couplings between the various elements. It should be noted that many alternative or additional

functional relationships or physical connections may be present in a practical system. However, the benefits, advantages, solutions to problems, and any elements that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as critical, required, or essential features or elements of the disclosures. The scope of the disclosure is accordingly to be limited by nothing other than the appended claims and their legal equivalents, in which reference to an element in the singular is not intended to mean "one and only one" unless explicitly so stated, but rather "one or more." Moreover, where a phrase similar to "at least one of A, B, or C" is used in the claims, it is intended that the phrase be interpreted to mean that A alone may be present in an embodiment, B alone may be present in an embodiment, C alone may be present in an embodiment, or that any combination of the elements A, B, and C may be present in a single embodiment; for example, A and B, A and C, B and C, or A and B and C.

[0112] Systems, methods, and apparatus are provided herein. In the detailed description herein, references to "various embodiments," "some embodiments," "one embodiment," "an embodiment," "an example embodiment," etc., indicate that the embodiment described may include a particular feature, structure, or characteristic, but every embodiment may not necessarily include the particular feature, structure, or characteristic. Moreover, such phrases are not necessarily referring to the same embodiment. Further, when a particular feature, structure, or characteristic is described in connection with an embodiment, it is submitted that it is within the knowledge of one skilled in the art to affect such feature, structure, or characteristic in connection with other embodiments whether or not explicitly described. After reading the description, it will be apparent to one skilled in the relevant art(s) how to implement the disclosure in alternative embodiments. Furthermore, no element, component, or method step in the present disclosure is intended to be dedicated to the public regardless of whether the element, component, or method step is explicitly recited in the claims. No claim element is intended to invoke 35 U.S.C. 112(f) unless the element is expressly recited using the phrase "means for." As used herein, the terms "comprises," "comprising," or any other variation thereof, are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that comprises a list of elements does not include only those elements but may include other elements not expressly listed or inherent to such process, method, article, or apparatus.

CLAIMS

1. A safety switch system for a projectile launcher, the safety switch system comprising:

a safety switch comprised of a magnet, wherein the safety switch transitions between at least a first position and a second position;

a first sensor comprised of a first polarity detector, a first sensor connector, and a signal output, wherein the first sensor outputs a default indication based at least on the safety switch being disposed in the first position and outputs an activation indication based at least on the safety switch being disposed in the second position;

a second sensor comprised of a second polarity detector and a second sensor connector, the second sensor connector electrically coupled with the first sensor connector, wherein the second sensor is configured to activate the first sensor based at least on the safety switch being in the second position such that the second polarity detector detects the magnet; and

a control circuit, the control circuit configured to determine whether the safety switch is in the first position or the second position, wherein:

the control circuit determines that the safety switch is in the first position based at least on the default indication received from the first sensor via the signal output;

the control circuit determines that the safety switch is in the second position based at least on the activation indication received from the first sensor via the signal output; and

the control circuit determines an operation mode for the projectile launcher based at least on the safety switch being disposed in the first position or the second position.

2. The safety switch system of claim 1, wherein the safety switch transitions between the first position and the second position based at least on a user input associated with the safety switch.

3. The safety switch system of claim 2, wherein transitioning the safety switch between the first position and the second position causes the magnet to translate between the first position and the second position.

4. The safety switch system of claim 1, wherein:

the magnet is comprised of a first portion and a second portion; the first portion associated with a first magnetic field and the second portion associated with a second magnetic field;

the first magnetic field having a first polarity; and

the second magnetic field having a second polarity different from the first polarity.

5. The safety switch system of claim 4, further comprising a housing associated with the projectile launcher, wherein the safety switch translates between the first position and the second position along a safety track of the housing.

6. The safety switch system of claim 5, wherein:

the housing comprises a first end of the safety track and a second end of the safety track, the first position associated with the first end and the second position associated with the second end;

the first portion of the magnet is disposed between the first end of the safety track and the second portion of the magnet; and

the second portion of the magnet is disposed between the second end of the safety track and the first portion of the magnet.

7. The safety switch system of claim 4, wherein:

the first position of the safety switch is configured to prevent the second magnetic field of the second portion from satisfying a field threshold of the second sensor;

the second position of the safety switch is configured to provide the second magnetic field of the second portion to the second sensor and satisfy the field threshold; and

the second position of the safety switch is configured to provide the first magnetic field of the first portion to the first sensor and satisfy an additional field threshold of the first sensor.

8. The safety switch system of claim 1, wherein the second sensor is configured to:

detect a second magnetic field of the magnet having a second polarity via the second polarity detector;

determine whether a field threshold associated with the second polarity detector is satisfied by the second magnetic field; and

provide a first indication to the first sensor via the second sensor connector.

9. The safety switch system of claim 8, wherein the field threshold associated with the second polarity detector is a minimum field strength threshold that is satisfied based at least on the second magnetic field being detected at a second magnetic field strength equal to or greater than the minimum field strength threshold.

10. The safety switch system of claim 9, wherein the first indication provided to the first sensor is an active low indication based at least on the minimum field strength threshold being satisfied by the second magnetic field, the active low indication activating the first sensor.

11. The safety switch system of claim 8, wherein the field threshold associated with the second polarity detector is a minimum field strength threshold that is satisfied based at least on the second magnetic field being detected at a second magnetic field strength less than the minimum field strength threshold.

12. The safety switch system of claim 11, wherein the first indication provided to the first sensor is an inactive high indication based at least on the minimum field strength threshold being satisfied by the second magnetic field, the inactive high indication deactivating the first sensor.

13. The safety switch system of claim 1, wherein the first sensor is configured to:

receive, based at least on a first indication received from the second sensor, an electrical current across a magnetic field sensing component of the second sensor;

detect a first magnetic field of the magnet having a first polarity via the first polarity detector;

determine whether a field threshold associated with the first polarity detector is satisfied by the first magnetic field; and

provide, based at least on the field threshold being satisfied, a second indication to the control circuit via the signal output.

14. The safety switch system of claim 13, wherein the field threshold associated with the first polarity detector is a minimum field strength threshold that is satisfied based at least on the first magnetic field being detected at a first magnetic field strength equal to or greater than the minimum field strength threshold.

15. The safety switch system of claim 1, wherein:

the safety switch secures the magnet in the first position at a first time;

the first position of the safety switch causes the magnet to provide a second magnetic field to the second sensor such that a second magnetic field strength is less than a second field threshold of the second sensor; and

the first position of the safety switch causes the magnet to provide a first magnetic field to the first sensor such that a first magnetic field strength is less than a first field threshold of the first sensor.

16. The safety switch system of claim 15, wherein:

the second sensor provides, based at least on the second magnetic field strength being less than the second field threshold, a second indication to the first sensor that prevents the first sensor from detecting the first magnetic field; and

the first sensor provides, via the signal output, a first indication to the control circuit based at least on the second sensor preventing the first sensor from detecting the first magnetic field, wherein the first indication is a default output of the first sensor.

17. The safety switch system of claim 15, wherein:

the safety switch secures the magnet in the second position at a second time;

the second position of the safety switch causes the second magnetic field of the magnet to be provided at the second sensor such that the second magnetic field strength is greater than or equal to the second field threshold; and

the second position of the safety switch causes the first magnetic field of the magnet to be provided at the first sensor such that the first magnetic field strength is greater than or equal to the first field threshold of the first sensor.

18. A projectile launcher comprising:

a projectile launcher housing, the projectile launcher housing defining an exterior surface of the projectile launcher;

a switch disposed on the exterior surface of the projectile launcher and configured to translate between at least a first state and a second state;

a sensor circuit configured to determine whether the switch is in the first state or the second state, the sensor circuit comprising a first sensor configured to determine whether a first magnetic field of the switch satisfies a first field threshold and a second sensor, activatable by the first sensor, configured to determine whether a second magnetic field of the switch satisfies a second field threshold; and

a control circuit associated with the sensor circuit and one or more projectiles, wherein:

the control circuit determines whether the switch is in the first state or the second state based at least on one or more indications output by the second sensor;

the control circuit prevents the one or more projectiles from being deployed based at least on the sensor circuit indicating that the switch is in the first state; and

the control circuit enables the one or more projectiles to be deployed based at least on the sensor circuit indicating the switch is in the second state.

19. The projectile launcher of claim 18, further comprising a trigger that receives a user input to deploy the one or more projectiles, wherein:

the control circuit prevents the user input from deploying the one or more projectiles based at least on the one or more indications output by the second sensor indicating that the switch is in the first state; and

the control circuit deploys the one or more projectiles based at least on the user input and the one or more indications output by the second sensor indicating that the switch is in the second state.

20. The projectile launcher of claim 18, wherein:

the first state of the switch is associated with the switch being disposed in a first position of the exterior surface;

the second state of the switch is associated with the switch being disposed in a second position of the exterior surface; and

the switch is comprised of a first magnet portion associated with the first magnetic field and a second magnet portion associated with the second magnetic field, the first magnet portion disposed between the second magnet portion and the second position and the second magnet portion disposed between the first magnet portion and the first position.

21. The projectile launcher of claim 20, wherein the first state of the switch is configured such that the first position maintains a minimum distance between the first magnet portion and the sensor circuit such that the first field threshold is unsatisfied by the first magnetic field.

22. The projectile launcher of claim 20, wherein:

the second state of the switch is configured such that a midpoint between the first magnet portion and the second magnet portion is disposed between the first sensor and the second sensor; and

disposing the midpoint between the first sensor and the second sensor causes the first field threshold to be satisfied by the first magnetic field of the first magnet portion and the second field threshold to be satisfied by the second magnetic field of the second magnet portion.

23. The projectile launcher of claim 18, further comprising a power supply in electrical communication with at least the sensor circuit, wherein:

the power supply provides a power supply voltage to a first power supply contact of the first sensor;

the power supply provides the power supply voltage to a second power supply contact of the second sensor;

the first sensor prevents an electrical current from being induced at the second sensor by providing the power supply voltage at a ground contact of the second sensor based at least on the first field threshold being unsatisfied by the first magnetic field; and

the first sensor enables the electrical current being induced at the second sensor by providing a ground voltage at the ground contact of the second sensor based at least on the first field threshold being satisfied by the first magnetic field.

24. The projectile launcher of claim 18, wherein the first state of the switch is associated with a safe mode of the projectile launcher.

25. The projectile launcher of claim 18, wherein the second state of the switch is associated with a fire mode of the projectile launcher.

26. The projectile launcher of claim 18, the switch configured to translate to a third state from the second state and the sensor circuit comprising a third sensor, activatable by the first sensor, configured to determine whether the first magnetic field of the switch satisfies a third field threshold.

27. The projectile launcher of claim 26, wherein the third sensor is activated by the first sensor based at least on the second magnetic field satisfying a fourth field threshold of the second sensor.

28. The projectile launcher of claim 26, wherein:

the control circuit determines whether the switch is in the third state based at least on one or more additional indications output by the third sensor the control circuit receives; and

the control circuit activates one or more projectile launcher functions based at least on the one or more additional indications indicating that the switch is in the third state.

29. A method comprising:

determining, at a first time and based at least on a first set of indications received from a sensor circuit, whether a first field threshold of a first sensor is satisfied by a first magnetic field of a safety switch;

determining, based at least on the first set of indications, that a projectile launcher is to be maintained in a safe operating mode;

causing, based at least on the safe operating mode; a user input to be suppressed;

determining, at a second time and based at least on a second set of indications received from the sensor circuit, whether the first field threshold of the first sensor is satisfied by the first magnetic field of the safety switch;

determining, at the second time and based at least on the second set of indications received from the sensor circuit, whether a second field threshold of a second sensor is satisfied by a second magnetic field of the safety switch;

determining, based at least on the second set of indications, that the projectile launcher is to be maintained in an activated operating mode; and

causing, based at least on the activated operating mode; an additional user input to deploy one or more projectiles from the projectile launcher.

30. The method of claim 29, wherein the first set of indications comprises a default indication provided by the second sensor.

31. The method of claim 29, wherein the second set of indications comprises an activated indication provided by the second sensor.