(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 360 498 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.05.2024 Bulletin 2024/18

(21) Application number: **23203921.4**

(22) Date of filing: **16.10.2023**

(51) International Patent Classification (IPC):
A45F 5/00 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A45F 5/00; A45F 2005/008; A45F 2200/0516; A45F 2200/0525

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **28.10.2022 CN 202211337387**

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(54) FASTENING ASSEMBLY COMPRISING AN ACTUATOR

(57) Provided are various embodiments of a fastening assembly and wearable mount as well as methods, devices, components, and assemblies associated therewith. An example fastening assembly includes a trigger assembly having an actuator configured to be operated by a user and a housing comprising a housing connection portion. The housing may receive the actuator. The fastening assembly may further include a connector configured to engage the housing connection portion.

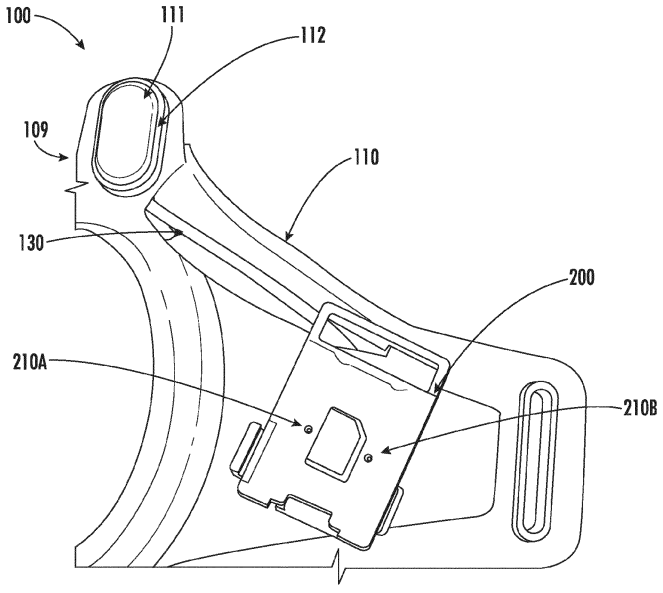

FIG. 1A

EP 4 360 498 A1

Description

TECHNICAL FIELD

[0001] The present disclosure relates to relates to a fastening assembly comprising an actuator. Various devices, components, and methods are also provided. In some example embodiments, the fastening assembly disclosed herein may be used to secure a wearable mount to a user.

BACKGROUND

[0002] Various wearable devices may be used frequently by their users, including in industrial settings, such as warehouse operations. Existing mounts for wearable devices may be difficult, inefficient, and time consuming to attach and remove, and may not provide a precise positioning of the device or various accessories associated therewith. Such mounts may further lack adequate controls for the user and/or for the wearable device. Through applied effort, ingenuity, and innovation, Applicant has solved problems relating to attachment mechanism by developing solutions embodied in the present disclosure, which are described in detail below.

BRIEF SUMMARY

[0003] Provided are various embodiments of a fastening assembly and wearable mount as well as methods, devices, components, and assemblies associated therewith. In various embodiments, a fastening assembly may include a trigger assembly and a connector. The trigger assembly may include an actuator configured to be operated by a user and a housing comprising a housing connection portion, wherein the housing may be configured to receive the actuator. The connector may be configured to engage the housing connection portion.

[0004] In some embodiments, the at least one connector may include at least one raised surface defined by an interior surface of the at least one connector. The at least one raised surface of the at least one connector may be configured to engage with the housing connection portion. The housing connection portion may include at least one raised surface defined by an exterior surface of the housing. In some embodiments, an innermost circumference of the at least one raised surface of the at least one connector may be less than an outermost circumference of the at least one raised surface of the housing. The housing connection portion may further include at least one raised surface defined by an exterior surface of the housing. In some embodiments, the at least one raised surface of the housing connection portion may be circumferentially disposed around the housing.

[0005] In some embodiments, the actuator may define a button surface, and the button surface is configured to be actuated by a user. In some embodiments, the actuator may be configured to be disposed at least partially within a cavity of the housing. The actuator may further define a hook portion. The protrusion may be configured to engage an inwardly facing lip of the housing to retain the actuator. In some embodiments, at least a portion of the actuator may be configured to translate from a first position to a second position within the housing during actuation. In some embodiments, the actuator may include at least one electrical contact, and the at least one electrical contact is configured to close upon actuation by a user.

[0006] In some embodiments, the connector may include a loop of material. The loop of material may be configured to be circumferentially disposed around the housing.

[0007] Various embodiments may include a wearable mount. The wearable mount may include at least one attachment strap, a fastening assembly, and a device mount. In some embodiments, the at least one attachment strap may include a first portion and a second portion. The fastening assembly may be configured to secure the at least one attachment strap to a user. The fastening assembly may include a trigger assembly and a connector. The trigger assembly may be connected to the first portion of the at least one attachment strap. The trigger assembly may include an actuator configured to be operated by a user and a housing comprising a housing connection portion, with the housing being configured to receive the actuator. The connector may be connected to the second portion of the at least one attachment strap, and the connector may be configured to engage the housing connection portion to attach the first portion of the at least one attachment strap with the second portion of the at least one attachment strap. The device mount may be connected to the at least one attachment strap, and the device mount may be configured to engage a wearable device.

[0008] In some embodiments, the at least one attachment strap may include at least one electrical connection device. The at least one electrical connection device may be embedded within the at least one attachment strap and extend between the actuator and the device mount. In some embodiments, the at least one electrical connection device may include a wire configured to transmit one or more electrical signals from the device mount to the actuator and/or one or more electrical signals from the actuator to the device mount. In some embodiments, the at least one attachment strap may be configured to be secured around a hand and/or wrist of a user. In some embodiments, in an instance in which the at least one attachment strap is secured around the hand and/or the wrist of the user, the actuator may be configured to be position adjacent to a thumb of a user. In some embodiments, the wearable mount may be further configured to secure the wearable device to a user by connecting the wearable device to the device mount and connecting the at least one attachment strap to the user.

[0009] Various embodiments may include a method of attaching a wearable mount to a user. The wearable

mount may include at least one attachment strap; a fastening assembly comprising a trigger assembly connected to a first portion of the at least one attachment strap, and the trigger assembly comprising an actuator and a housing comprising a housing connection portion. The housing may be configured to receive the actuator. The fastening assembly may include a connector connected to a second portion of the at least one attachment strap. The wearable mount may further include a device mount connected to the at least one attachment strap. The method may include securing the at least one attachment strap to the user by engaging the connector with the housing connection portion to attach the first portion of the at least one attachment strap with the second portion of the at least one attachment strap. In some embodiments, the method may further include attaching a wearable device to the device mount to secure the wearable device to the user via the wearable mount.

[0010] The above summary is provided merely for purposes of summarizing some example embodiments to provide a basic understanding of some aspects of the disclosure. Accordingly, it will be appreciated that the above-described embodiments are merely examples and should not be construed to narrow the scope or spirit of the invention in any way. It will be appreciated that the scope of the invention encompasses many potential embodiments in addition to those here summarized, some of which will be further described below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The following drawings are illustration of a particular embodiment of the present disclosure and therefor do not limit the scope of the present disclosure. The drawings are not necessarily drawn to scale and are intended for use in conjunction with the explanation in the following detailed description.

Fig. 1A illustrates an example top view of an example wearable strap having a device mount and a trigger assembly in accordance with various embodiments of the present disclosure.

Fig. 1B illustrates an example view of a base portion of a trigger assembly with one or more electrical election connection devices in accordance with various embodiments of the present disclosure.

Fig. 2A illustrates a side view of an example wearable device engaging with a wearable mount in accordance with various embodiments of the present disclosure.

Fig. 2B illustrates a top view of an example wearable device secured with a wearable mount in accordance with various embodiments of the present disclosure.

Fig. 3A illustrates a perspective view of an example fastening assembly in accordance various embodiments of the present disclosure.

Fig. 3B illustrates a perspective view of the example fastening assembly of Fig. 3A having a connector and housing connection portion engaged in accordance with various embodiments of the present disclosure.

Figs. 4A illustrates a top view of an example wearable mount with a fastening assembly in accordance with various embodiments of the present disclosure.

Figs. 4B illustrates a top view of the wearable mount of Fig. 4B having a connector and housing connection portion engaged in accordance with various embodiments of the present disclosure.

Fig. 5A illustrates a top view of an example wearable mount with at least one wearable strap in accordance with various embodiments of the present disclosure.

Fig. 5B illustrates a top view of the wearable mount of Fig. 5B having a connector and housing connection portion engaged in accordance with various embodiments of the present disclosure.

Fig. 6A illustrates a perspective view of an example trigger assembly in accordance with various embodiments of the present disclosure.

Fig. 6B illustrates a perspective view of an example connector in accordance with various embodiments of the present disclosure.

Fig. 6C illustrates a perspective cross-sectional view of an example trigger assembly with an actuator in accordance with various embodiments of the present disclosure.

Fig. 6D illustrates a perspective view of an example base portion of the trigger assembly in accordance with various embodiments of the present disclosure.

Fig. 7A illustrates a perspective view of an example trigger assembly attached with an example attachment strap in accordance with various embodiments of the present disclosure.

Fig. 7B illustrates a perspective view of an example connector attached with an example attachment strap in accordance with various embodiments of the present disclosure.

Fig. 8 illustrates a perspective view of an example wearable mount in accordance with various embodiments of the present disclosure.

Fig. 9A illustrates a perspective view of an example housing configured to engage with an example connector in accordance with various embodiments of the present disclosure.

Fig. 9B illustrates a perspective view of an example housing engaging with an example connector in accordance with various embodiments of the present disclosure.

Fig. 10A illustrates a perspective cross-sectional view of an example trigger assembly engaging with an example connector in accordance with various embodiments of the present disclosure.

Fig. 10B illustrates a perspective cross-sectional view of an example trigger assembly in accordance with various embodiments of the present disclosure.

Fig. 11 illustrates a perspective view of an example wearable mount secured to a user appendage in ac-

cordance with various embodiment of the present disclosure.

DETAILED DESCRIPTION

[0012] Some embodiments of the present invention will be described in a more detailed manner hereinafter with reference to the accompanying drawings, in which some embodiments of the invention are shown. Reference numbers refer to like elements throughout the multiple drawings unless otherwise specified. Multiple embodiments of the current invention may be embodied in different forms and should not be limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements.

[0013] As used herein, terms such as "front," "rear," "top," etc. are used for explanatory purposes in the examples provided below to describe the relative positions of certain components or portions of components with respect to each other but should not be interpreted as requiring an absolute orientation relative to the Earth. As used herein, the term "or" is used in both the alternative and conjunctive sense, unless otherwise indicated. The term "along," and similarly utilized terms, means near or on, but not necessarily requiring directly on a surface or other referenced location. The terms "approximately," "generally," and "substantially" refer to within manufacturing and/or engineering design tolerances for the corresponding materials and/or elements unless otherwise indicated. The use of such terms is inclusive of and is intended to allow independent claiming of specific values listed, and lack of the use of such terms is not intended to limit the scope of the specific values or claims including such specific values. Thus, use of any such aforementioned terms, or similarly interchangeable terms, should not be taken to limit the spirit and scope of embodiments of the present invention. As used in the specification and the appended claims, the singular form of "a," "an," and "the" include plural references unless otherwise stated. The terms "includes" and/or "including," when used in the specification, specify the presence of stated feature, elements, and/or components; it does not preclude the presence or addition of one or more other features, steps, operations, elements, components, and/or groups thereof.

[0014] As used herein, the phrases "in one embodiment," "according to one embodiment," "in some embodiments," and the like generally refer to the fact that the particular feature, structure, or characteristic following the phrase may be included in at least one embodiment of the present disclosure. Thus, the particular feature, structure, or characteristic may be included in more than one embodiment of the present disclosure such that these phrases do not necessarily refer to the same embodiment. As used herein, the terms "example," "exemplary," and the like are used to "serving as an example, instance, or illustration." Any implementation, aspect, or design described herein as "example" or "exemplary" is not necessarily to be construed as preferred or advantageous over other implementations, aspects, or designs. Rather, use of the terms "example," "exemplary," and the like are intended to present concepts in a concrete fashion.

[0015] As used herein, the term "battery-powered" is intended to refer to devices capable of engaging a battery to receive electrical power in at least some circumstances. The term "battery-powered" is intended to be interpreted inclusively and includes devices capable of engaging a battery as well as devices capable of being plugged in to a non-battery power source in at least some circumstances.

[0016] The figures are provided to illustrate some examples of the invention described. The figured are not to limit the scope of the depicted embodiments of the disclosure or the appended claims. Aspects of the example embodiments are described below with reference to example applications for illustration. It should be understood that specific details, relationships, and methods are set forth to provide a full understanding of the example embodiments. One of ordinary skill in the art will recognize that the example embodiments can be practiced without one or more specific details and/or with other methods.

[0017] Embodiments of the present disclosure relate to a fastening assembly. The fastening assembly may be part of a wearable mount capable of engaging and disengaging with a user to allow for versatile and ergonomic operation. In some embodiments, a wearable device may be attached to the user via a wearable mount using a fastening assembly according to the various embodiments herein. Various devices and methods are also provided. In some example embodiments, the fastening assembly disclosed herein may be used to secure a wearable mount to a user.

[0018] Wearable devices, such as bar code scanners, mobile phones, wearable computers, other battery powered devices, or the like, may be actuatable by a user to perform one or more functions. The actuation of the wearable device may be performed on the device itself (e.g., via a physical button or touch screen interface) or via a remote control mechanism. In some instances, for example, the wearable device may require actuation to scan one or more objects in a material handling setting. In some instances, a trigger may be disposed in an inconvenient location requiring the user to use two hands to operate the wearable device and/or twist one hand in a non-ergonomic manner to operate the wearable device.

[0019] Embodiments of the present disclosure provide a fastening assembly comprising a trigger assembly associated therewith, wherein the trigger assembly is, at least in part, included in the fastening assembly. In various embodiment of the present disclosure, the trigger assembly comprises a housing that receives an actuator therein for actuating the wearable device. The trigger assembly may also be configured to engage with a connec-

tor as part of the fastening assembly. Various embodiments of the present disclosure may additionally or alternatively allow for easier connection of a wearable device on a user with the fastening assembly. Various embodiments of the fastening assembly disclosed herein may be used for securing at least one wearable strap to a user, for example, by engaging the trigger assembly with a connector to join portions of one or more attachment straps.

[0020] Embodiments of the present disclosure may allow for secure engagement of a wearable mount to a user and ease of use of an actuator (e.g., a trigger for the wearable device) for a user. In some embodiments, the fastening assembly may comprise trigger assembly having an actuator and a housing comprising a housing connection portion. The housing connection portion may include at least one raised surface on the external surface of the housing. In some embodiments, the trigger assembly may attach to or otherwise be part of a first portion of at least one attachment strap. The fastening assembly may also include a connector. The connector may attach to or otherwise be a part of a second connection portion. The connector may be configured to securely engage with the housing connection portion to connect the first portion and the second portion of the at least one attachment strap (e.g., around the user's wrist and/or hand).

[0021] In some embodiments, the housing is configured to receive, at least in part, an actuator. The actuator may be disposed at least partially within a cavity of the housing, and the actuator may be configured to translate within the housing in response to user actuation. In some embodiments, the actuator may complete an electrical circuit to trigger the wearable device upon actuation of the actuator by the user. In operation, the actuator may be disposed adjacent the user's thumb when the first portion and the second portion of the at least one attachment strap are connected by the fastening assembly.

[0022] In some embodiments, the housing connection portion may be engageable with the connector. For example, the connector may be configured to engage with the housing connection portion vertically relative to the housing connection portion (e.g., by the connector being placed around the housing connection portion). Although described as vertical movement, one of ordinary skill in the art will appreciate that the direction of motion may be relative to the housing orientation. In some embodiments, the actuator may be disposed at least partially within the housing, such that the connector may be placed over at least a portion of the actuator at the same time as being engaged with the housing connection portion.

[0023] In various embodiments, the housing connection portion may comprise at least one raised surface on the housing, which raised surface may be configured to engage the connector. In some embodiments, the at least one raised surface of the housing connection portion may be disposed around a circumference of the external surface of the housing (e.g., a snap ring). In some embodiments, the connector may comprise at least one raised surface configured to engage the housing. For example, the connector may include at least one raised surface disposed circumferentially about an internal surface of the connector. In various embodiments, the at least one raised surface of the connector may be configured to securely engage with the at least one raised surface of the housing connection portion. For example, in various embodiments, the connector may translate into engagement with the housing connection portion by circumferentially disposing the at least one raised surface of the connector around the housing and translating the connector until the at least one raised surface of the connector snaps past the at least one raised surface of the housing connector portion to secure the connector and the housing together.

[0024] Embodiments of the present disclosure may provide a method for securing a wearable mount to a user, which wearable mount may be configured to hold the wearable device on the user. Various embodiments of the present disclosure may relate to securing at least one attachment strap to one or more components of the fastening assembly.

[0025] Figs. 1-11 depict views of example wearable mounts and fastening assemblies (e.g., wearable mount 100 and fastening assembly comprising an actuator 111 and a housing 112) and portions thereof in accordance with various embodiments of the present disclosure. Fig. 1A depicts a top view of an exemplary wearable mount 100, which in the depicted example embodiment includes a fastening assembly comprising an actuator 111 and a housing 112, a wearable strap 110, a device mount 200, an electrical connection device 130 (e.g., a wire), and associated circuitry for transmitting signals to a wearable device (e.g., pins 210A and 210B that extend from a PCB in the device mount 200). The wearable mount 100 in the depicted embodiment includes the fastening assembly comprising a trigger assembly 109 comprising an actuator 111 and the housing 112. The actuator 111 may be configured, at least in part, to be disposed within the housing 112. For example, in the depicted embodiment, a top surface of the actuator 111 is shown protruding from a top edge of the housing 112 while some or all of the remainder of the example actuator, including but not limited to electrical connections, switching elements, and physical structure, may be disposed beneath the top edge of the housing 112. The depicted embodiment illustrates an unactuated position of the depicted actuator 111, and in an actuated position, the top surface of the actuator 111 may be depressed below the top edge of the housing 112. In the depicted embodiment, the top surface of the actuator 111 is an elongated oval shape configured to be actuated by a user's thumb. As shown and described with respect to FIG. 11, when engaged with a user's hand, the wearable mount 100 is configured to position the actuator 111 between a user's thumb and the side of the user's index finger and/or the crook of the hand for efficient actuation by the user pressing the thumb into the actuator. For example, when attached to

a user's hand and/or wrist, the actuator 111 may be disposed adjacent the last knuckle (e.g., the IP joint) and/or distal phalanx of the thumb.

[0026] With continued reference to Fig. 1A, the wearable mount 100 may include a device mount 200, wherein the device mount 200 may be configured to secure a wearable device (e.g., a battery-powered electronic device) to the wearable mount 100, such as via the depicted snap elements. The device mount 200 may further include at least two pins 210A and 210B (collectively "210"), wherein the at least two pins 210 may be configured to electrically connect with the wearable device to enable the actuator 111 to trigger the wearable device (e.g., via electrical connection device 130, such as a wire). In some embodiments, the at least two pins 210 may be disposed parallel to each other on the surface of the device mount 200. In some embodiments, the pins 210 may be disposed opposite of each other on the surface of the device mount 200. Any structure of device mount 200 with any position of electrical contacts may be used with the various embodiments herein. In various embodiments, at least one electrical connection device 130 may be configured to couple with the pins 210 of the mount and extend into the base portion 113 of the trigger assembly (depicted in Fig. 1B) to connect with corresponding components therein. For example, as depicted in Fig. 1B, the at least one electrical connection device 130 is depicted in the form of a wire extending into the base portion 113 of the trigger assembly. In the depicted embodiment, the one or more electrical connection device 130 may be disposed below the uppermost surface of the at least one wearable strap 110 (e.g., a wire fed between two layers of fabric within the wearable strap. In various embodiments, the at least one electrical connection device 130 may be configured to extend into a base portion 113 of the trigger assembly. The one or more electrical connection 130 may be configured to transmit electrical signals from the trigger assembly to the device mount 200 and vice versa (e.g., to complete a signaling circuit beginning and ending at the wearable device). In various embodiments, the at least one electrical connection device 130 may be configured to transmit one or more electrical signals from the trigger assembly to one or both of the at least two pins 210.

[0027] In various embodiments, as depicted in Figs. 2A-2B, the wearable mount 100 may be configured to receive a wearable device 300 via a device mount 200 and facilitate securing the wearable device to the user. In various embodiments, the device mount 200 may be configured to secure the wearable device 300 to the wearable mount 100. In various embodiments, the wearable device 300 may be configured to attach to the device mount 200, such that the wearable device 300 may be disposed at a distal end of a user's appendage 400 in an instance in which the wearable mount is attached to the user's appendage (e.g., around the user's hand and/or wrist).

[0028] In one or more example embodiments, as depicted in Fig. 2B, the wearable device 300 may comprise a reading element (e.g., a signal receiver and/or imaging device) configured to read one or more signals and/or decodable indicia from adjacent devices and/or surfaces as would be appreciated by one of ordinary skill in the art in light of the present disclosure. In some example embodiments, the wearable device 300 may be configured to securely engage with a mount in a manner such that the reading element of the wearable device 300 may face outward from a user (e.g., towards a user's fingertips) in an instance in which the wearable mount 100 is secured to the user's appendage 400. In some example embodiments, the wearable device 300, when engaged with the device mount 200, may be configured to transmit one or more electrical signals from the wearable device 300 to the trigger assembly 109, and the trigger assembly may be configured to close one or more electrical circuits upon actuation thereof and may transmit one or more electrical signals back to the wearable device. In some example embodiments, the wearable device 300 may be configured to execute one or more functions (e.g., capture an image or record data and/or signals) in response to receiving one or more electrical signals via the trigger assembly 109.

[0029] In various embodiments, the fastening assembly may include a trigger assembly 109 and a connector 121 configured to engage at least a portion of the trigger assembly. In some embodiments, the trigger assembly may be disposed on a first portion of at least one wearable strap and the connector may be disposed on a second portion of at least one wearable strap such that the first and second portions are joined by attaching the connector and the trigger assembly. Turning to FIGS. 3A-3B, the second portion 120 may be configured to engage with the first portion 108, and each portion 108, 120 may be part of the at least one attachment strap 110 (e.g., the at least one attachment strap may comprise one or more sections of material, such that the first portion and second portion may be opposite sides of the same piece of material or two separate pieces of material joined via additional connection(s) at opposing ends).

[0030] In the depicted embodiment, the first portion 108 comprises a trigger assembly 109 which further comprises a housing 112 and an actuator 109. In various embodiments, as depicted in Fig. 3A, the second portion 120 may be configured with at least one connector 121, and the connector 121 may be configured to engage with the at least one corresponding housing 112. For example, in various examples, as depicted in Fig. 3B, the at least one connector 121 may be configured to securely engage with the at least one housing connection portions (e.g., raised surface 114 depicted in Figs. 6A,) to form a snap connection therebetween. For example, the at least one housing connection portion (housing 112 and/or raised surface 114 depicted in Figs. 6A, 6C, 7A, 9A-11) may comprise at least one raised surface 114 onto which the connector 121 may be disposed. In various embodiments, at least one raised surface 122 (de-

picted in Fig. 6B) of the connector 121 may be configured to engage with at least one raised surface 114 of the housing 112.

[0031] With reference to Figs. 4A-4B, an embodiment of a wearable mount 100 is illustrated in which the at least one wearable strap 110 comprises a wrist strap 125 and a finger strap 124. The finger strap 124 comprising the first portion 108 and the second portion 120. The depicted wrist strap 125 may wrap around a user's wrist to secure a base of the wearable mount 100 to the user's arm and the depicted finger strap 124 may wrap around a user's index finger for actuation by the user's thumb. In some embodiments, the finger strap 124 may be configured to incorporated into the wrist strap 125 (e.g., the finger loop is the same piece of material) across the palm side of the at least one wearable strap, wherein the wrist strap may secure to the wearable mount via one or more additional connection points on the wearable mount. In such embodiments, at least one wearable strap 110 may have two pieces, a hand back piece and palm strap piece. In some embodiments, the section of material that includes the first portion 108 may additionally include the device mount (shown in Figs. 2A-2B) to permit a wired electrical connection to the wearable device 300. In various embodiments, the second portion 120 of the at least one wearable strap 110 may comprise a connector 121 (e.g., a snap ring), wherein the connector 121 may be configured to engage the housing 112 (e.g., a corresponding snap ring) of the trigger assembly 109 by fitting over the housing and sliding down around the housing and/or actuator 111 to engage. In one or more example embodiments, the at least one wearable strap 110 may be configured to attach the wearable mount 100 to the user 400 (depicted in Fig. 2B). In various embodiments, as depicted in Fig. 4B, the connector 121 may be configured to engage with the trigger assembly 109, and the engagement may securely engage the wearable mount to the user. In various embodiments of the present disclosure, the at least one wearable strap 110 may comprise one or more of an inelastic material, an elastic material (including partially elastic materials), a moisture-wicking material, and/or breathable material. In one or more example embodiments, the at least one wearable strap 110 may be configured to engage with one or more additional portions of a wearable mount.

[0032] With reference to Figs. 5A-5B, an embodiment of the wearable mount 100 is shown having internally visible electrical connections 131 to the trigger assembly 109 and an internally visible electrical connector device 130 (e.g., a wire). In some embodiments, the at least one wearable strap 110 comprises a first strap comprising the first portion 108 and a second strap comprising the second portion 120. In some embodiments, the first portion 108 and the second portion 109 are part of the same strap material (e.g., connected off page at opposing ends) to form a single strap 110. In various embodiments, the first portion 108 and the second portion 120 may be configured to engage via the connector 121 and housing 112 and/or via one or more additional connections (e.g., snap connection 128). In the depicted embodiment, in an instance in which the trigger assembly 109 and connector 121 are engaged and the additional connection 128 is engaged, the one or more straps 110 may define a thumb hole 129 through which a user's thumb may extend to actuate the actuator 111. In various embodiments, the first portion 108 may be a first strap and the second portion 109 may be a second strap. The first strap and the second strap may be configured to join together via a plurality of fasting manners (e.g., hook and loop fasteners, etc.). The fastening manners may be disposed opposite of the fastening assembly (e.g., the slot depicted at the left side in Fig. 4B, through which a strap may insert, such as to pass through the slot and fasten to itself). In various embodiments, the first portion 108 and second portion 109 may be a single strap, and the single strap may be configured to join only along the side with the fastening assembly.

[0033] In various embodiments, the trigger assembly 109 may comprise one or more electrical connections 131 (e.g., pins, metal contacts, or the like). In some embodiments, the actuator 111 may be configured to electrically connect the one or more electrical connections 131 upon actuation to close one or more electrical circuit and transmit signals from the trigger to the device mount. In various embodiments, the one or more electrical connections 131 of the trigger assembly may be configured to be disposed within the trigger assembly housing 112. In some embodiments, the one or more electrical connections 131 of the trigger assembly may be parallel to each other.

[0034] With further reference to Fig. 5B, in various embodiments, the wearable mount 100 may further comprise one or more electrical connection devices 130 (e.g., wires) configured to engage with the one or more electrical connections 131 of the trigger assembly and the one or more pins 210 (depicted in Fig. 1A) of the device mount 200. In various embodiments, the one or more electrical connection devices 130 may be configured to transmit one or more electrical signals from the device mount 200 to the trigger assembly 109 and/or back from the trigger assembly 109 to the device mount 200. In various embodiments, the user may depress the actuator 111 which may be configured to close one or more electrical circuits (e.g., by connecting the two depicted electrical connections 131 in Figs. 5A-5B) to transmit one or more electrical signals. In one or more embodiments, the closing of the one or more electrical circuits may be configured to transmit one or more electrical signals from the one or more electrical connections 131 of the actuator 111 to the one or more mount pins 210 (depicted in Fig. 1A) of the device mount 200. The electrical signals indicative of the actuator being actuated may be configured to cause the wearable device 300 to complete an action (e.g., capture an image, etc.).

[0035] With reference to Figs. 6A, 6C, 6D, and 7A, in various embodiments, an example trigger assembly 109

are depicted in accordance with various embodiments described herein. In various embodiments, the trigger assembly 109 may comprise at least one actuator 111 and at least one housing 112, which may include at least one base portion 113 and/or at least one raised surface 114. In various embodiments, the fastening assembly may comprise a trigger assembly 109 and a connector 121 (e.g., connector 121 depicted in Figs. 6B and 7B). In some embodiments, the housing 112 may define the housing connection portion to which the connector 121 is configured to engage. For example, the raised surface 114 may define the housing connection portion.

[0036] The trigger assembly 109 depicted in Figs. 6A, 6C, 7A includes a housing 112 having a raised surface 114 (e.g., a circumferential projection) defined by the external surface of the housing 112 and facing outwardly for engagement with the connector 121. In various embodiments, the at least one raised surface 114 of the housing 112 may be configured to engage with the connector 121 associated with the second portion 120. In some example embodiments, the at least one raised surface 114 of the housing 112 may be disposed at least partially around the external surface of the housing 112. In various embodiments, the at least one raised surface 114 may be defined about some or all of the circumference of the external surface of the housing 112. The circumference of the outermost surface of the housing 112 at the raised surface 114 may be greater than an innermost circumference of the connector 121 along an internal surface thereof to facilitate engagement. In some embodiments, the connector 121 may be configured to snap onto the raised surface 114 to interlock the connector with the housing 112. In some embodiments, the raised surface 114 may be defined at a predetermined distance above the base portion 113. In some embodiments, the raised surface 114 may be defined along the top edge of the housing 112. The connector 121 (e.g., connector 121 depicted in Figs. 6B and 7B) may then be disposed over the housing 112 such that an inner surface of the connector engages the raised surface 114 of the housing to form a snap connection holding the first and second portions together.

[0037] In various embodiments, the base portion 113 of the trigger assembly may be configured to define a lower edge of the fastening assembly and may be configured to abut a portion of the connector 121. In one or more embodiments, the base portion 113 may be configured to prevent the connector 121 from translating further over the housing 112 and, in cooperation with the raised surface 114 and the oval shape of the housing and connector, retain the connector 121 and housing 112 in a fixed or substantially fixed relationship to each other when engaged. In various embodiments, the base portion 113 of the trigger assembly may be configured to engage with one or more wearable straps 110 (e.g., via fasteners extending through openings as shown in Figs. 6D and 9B), wherein the base portion 113 may secure the trigger assembly to the at least one wearable strap 110.

[0038] With further reference to Figs. 6A and 7A, in various embodiments, the fastening assembly may comprise the trigger assembly 109, and the trigger assembly may comprise an actuator 111 and a housing 112. In various embodiments, the actuator 111 may be configured to be disposed, at least in part, within a cavity of the housing 112. In some example embodiments, at least a portion of the actuator 111 may be configured to translate, at least in part, within the housing 112 of the fastening assembly between a first position and a second position (e.g., an unactuated position and an actuated position). In various embodiments, the uppermost edge of the actuator 111 may be configured to be disposed above the uppermost edge of the housing 112 at least in the unactuated position. In various embodiments, the uppermost surface of the actuator 111 may be disposed parallel to or beneath the uppermost edge of the housing 112 at least in the actuated position. In various other embodiments, the uppermost edge of the actuator 111 may be configured to be disposed above the uppermost edge of the housing 112 in the actuated position as well as the unactuated position.

[0039] With reference to Figs. 6B and 7B, an embodiment of the connector 121 associated with a second portion 120 of the at least one wearable strap 110 is shown. In the depicted embodiment, the connector 121 may include at least one raised surface 122 disposed along an inner surface of the connector (e.g., within an opening of the connector configured to be disposed over a portion of the housing). In one or more example embodiments, the at least one raised surface 122 of the connector may be oriented towards a center of the connector (e.g., in an opposite direction to the raised surface 114 of the housing 112). The raised surface 122 of the connector may be defined partly or entirely about a circumference of the inner surface of the connector 121. In various embodiments, the inner surface of the connector 121 at the raised surface 122 may define a circumference that is less than the circumference of the outer surface of the housing 112 at the raised surface 114 of the housing. In some embodiments, the diameter between opposite sides of the inner surface of the connector 121 at the raised surface 122 for a given vertical cross section may be less than the diameter between opposite sides of the outer surface of the housing 112 at the raised surface 114 of the housing. In some embodiments, the raised surface 122 may be broken or otherwise define a discontinuity 122A which may allow at least a portion of the raised surface to stretch or deflect to facilitate snapping around the raised surface 114 of the housing 112. In some embodiments, the connector 121 may comprise of a top piece, a bottom piece, and/or a ring, wherein the ring may be configured to engage with the raised surface 114 of the housing during connection. For example, with reference to Figs. 6B and 7B, the connector may attach to the loop of material at the second portion 120 by sandwiching opposing halves respectively having the raised

surface 114 and base portion 113 therebetween. In some embodiments, the internal raised surface 122 may be a separate ring configured to be inserted into a channel within the connector 121. Fig. 8 depicts an example wearable mount 100 and device mount 200 having a fastening assembly engaged according to various embodiments discussed herein.

[0040] In various embodiments, the at least one raised surface 122 of the connector may be configured to engage with the at least one raised surface 114 (e.g., via the raised surfaces snapping past each other to interlock the housing 112 and the connector 121). In various embodiments, the at least one raised surface 122 of the connector 121 may be disposed below the at least one raised surface 114 of the housing 112 when the connector 121 is engaged with the housing 112. In one or more example embodiments, the secure engagement of the at least one raised surface 122 of the connector and the at least one raised surface 114 of the housing may be configured to securely engage the wearable mount 100 to the user 400 via the at least one wearable strap 110.

[0041] With reference to Fig. 6B, in some embodiments, the connector may comprise a retaining collar 123 formed about an outer surface thereof. The retaining collar 123 may comprise two raised surfaces with a channel therebetween as illustrated in Fig. 6B. With reference to Fig. 7B, in various embodiments, the connector 121 may be configured to engage the second portion 120 of the at least one wearable strap 110 by inserting the connector 121 into a loop of material of the second portion 120. The loop of material at the second portion 120 may define a circumference that is less than an outermost circumference of the connector (e.g., along the raised surfaces) and greater than or equal to an outer circumference of the connector within the channel of the retaining collar 123. In such embodiments the connector 121 may be secured to the second portion 120 via the raised surfaces of the collar 123. In one or more example embodiments, an uppermost surface of the connector 121 may be disposed above the second portion 120 of the at least one wearable strap 110 and the lowermost surface of the connector 121 may be disposed beneath the second portion 120 of the at least one wearable strap 110. In various embodiments, the connector 121 may be configured to be two or more individual pieces and/or connect with other parts of the second portion 120. For example, the connector 121 may comprise a top connector piece and a bottom connector piece. In one or more embodiments, the connector 121 may be configured to be three or more individual pieces and/or connect with the second portion 120, wherein the connector 121 may comprise a top connector piece, a middle spring ring, and a bottom connector piece. In various embodiments, the top connector piece may be configured to connect with the bottom connector piece, wherein the connection may secure the two pieces to the second portion 120.

[0042] With reference to Figs. 6C and 10A-10B, cross-sectional views of actuators 111 usable in one or more example embodiments are shown. In the depicted embodiment, the actuator 111 may further comprise at least one protrusion 141, and/or at least one switching element 142, and/or at least one electrical device connector 132. In various embodiments, the at least one protrusion 141 and/or the at least one switching element 142 may be disposed within at least a portion of the actuator 111 and/or housing 112. The at least one switching element 142 may define an electrical contact. The protrusion 141 may be disposed on an underside of the actuatable portion of the actuator 111 (e.g., the underside of the button surface), such that, upon actuation by a user, the protrusion 141 may be configured to translate from an unactuated position downwardly towards an actuated position. In an instance in which the protrusion 141 is moved towards the actuated position, the protrusion 141 may be configured to engage and depress a switching element 142 disposed on at least one electrical device connector 132 (e.g., a printed circuit board configured to form or otherwise connect to the electrical connection(s) 131 which may engage the electrical connector device 130) to complete the electrical circuit (e.g., close the circuit) as described herein. In some embodiments, the actuator 111 may be spring loaded, such that the switching element 142, protrusion 141, and/or a dedicated spring may return the switching element 142 to the unactuated position in an instance in which the user ceases depressing the actuator. In an instance in which the protrusion 141 is moved to the unactuated position, the protrusion 141 may be configured to release the switching element 142 or otherwise cause the electrical circuit to interrupt (e.g., open) as described herein. In some embodiments, the trigger assembly may instead complete an electrical circuit when the actuator is in the unactuated position and break the electrical circuit when the actuator is moved to the actuated position without departing from the scope of the present disclosure. In various embodiments, the switching element 142 may comprise a rigid material (e.g., stainless steel, rigid plastics, rigid silicon, etc.). In some embodiments, the switching element 142 may comprise a domed sheet. The domed sheet may be made of metal (e.g., stainless steel), plastic, and/or silicon material.

[0043] With reference to Fig. 6C, the actuator 111 may comprise a hook portion 144 along an exterior surface of the actuatable portion thereof. The hook portion 144 may be configured to engage a corresponding inwardly-facing lip 145 of the housing 112 to prevent the actuator from disconnecting from the housing completely.

[0044] In various embodiments, the at least one electrical device connector 132 may be configured to receive or otherwise engage the at least one electrical connection device 130. In some embodiments, the electrical connections 131 (e.g., pins) may extend from the underside of the electrical connector device (e.g., beneath the printed circuit board) and may be connected to the electrical connection device 130 (e.g., soldered to the wire to electrically connect the trigger assembly 109 to the device

mount 200 and thereby to the wearable device 300).

[0045] With reference to Fig. 6D, an example perspective view of an exemplary base portion 113 of a trigger assembly 109 is depicted. In one or more example embodiments, the base portion 113 may further comprise one or more recesses 115A and 115B (collectively "115") configured to receive one or more fasteners (e.g., studs, pins, screws, rivets, clips, or the like, such as the fasteners 116 shown in Figs. 1B and 9B). As shown in Fig. 9B, the fasteners 116 may engage the at least one wearable strap 110 and/or the base portion 113 to secure the trigger assembly 109 to the at least one strap. In one or more example embodiments, the base portion 113 may be further configured to receive at least one electrical connection device 130 and/or electrical device connector 132 for facilitating operation of the trigger assembly 109. The base portion 113 may be formed of the same piece of material as the rest of the housing 112 or the base portion 113 may define a second component attached to the housing and/or wearable strap 110.

[0046] With reference to Figs. 9A-10B, an embodiment of the fastening assembly is shown in which the connector 121 comprises a loop of material that is integral with the second portion 120 of the at least one wearable strap 110. In the depicted embodiment, the raised portion 114 of the housing 112 extends wider than in embodiments having a snap connector with a corresponding raised portion 122 (e.g., as shown in Figs. 6B and 7B), such that the raised portion 114 and base portion 113 of the housing 112 operate similar to the channel 123 described with respect to Fig. 6B by holding the loop of material of the connector 121 therebetween. During operation, a user may loop the loop of material of the connector 121 over the housing 112 to fasten the first portion and the second portion of the at least one wearable strap 110. In some embodiments, the loop of material of the connector 121 may comprise an elastic material, a partially elastic material, or an inelastic material.

[0047] Turning to Fig. 11, another embodiment of the fastening assembly is shown in which the connector 121 comprises a fastener (e.g., a hook and/or loop fastener, and/or the like) disposed on an underside thereof and configured to engage a corresponding fastener on the housing connection portion (e.g., a hook and/or loop fastener on the base portion 113 facing upwardly). In such embodiments, the connector 121 may be disposed around the housing 112 with the actuator disposed at least partially in a cavity of the housing in a similar manner to the other embodiments discussed herein. In such embodiments, the housing 112 may define the housing connection portion via the hook and loop fasteners. For example, the layout shown in Figs. 5A and 5B may be substantially the same in an instance in which the connector 121 and housing 112 each comprise fasteners (e.g., the connector may include downward-facing hook and/or loop fasteners and the housing connection portion may comprise upward-facing hook and/or loop fasteners, such as being formed on the base portion).

[0048] In various embodiments, methods of attaching a wearable mount to a user and/or attaching a wearable device to a wearable mount may be provided. An example method of attaching a wearable mount to a user may include securing the at least one attachment strap to the user by engaging the connector with the housing connection portion to attach the first portion of the at least one attachment strap with the second portion of the at least one attachment strap. In some embodiments, the method may further include attaching a wearable device to the device mount to secure the wearable device to the user via the wearable mount. In various embodiments, the fastening assembly may be configured to secure the at least one attachment strap and thereby the device mount and the wearable device to the user.

[0049] Many modifications and other embodiments of the present disclosure set forth herein will come to mind to one skilled in the art to which this disclosure pertains having the benefit of the teachings presented in the foregoing description and the associated drawings. Therefore, it is to be understood that the present disclosure is not to be limited to specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Moreover, although the foregoing description and the associated drawings describe example embodiments in the context of certain example combination of elements and/or functions, it should be appreciated, in light of the present disclosure, that different combinations of elements and/or functions than those explicitly described above are also contemplated as can be set forth in some of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purpose of limitation.

Claims

1. A fastening assembly comprising:

a trigger assembly comprising:

an actuator configured to be operated by a user;
a housing comprising a housing connection portion, wherein the housing is configured to receive the actuator; and

a connector configured to engage the housing connection portion.

2. The fastening assembly of claim 1, the at least one connector comprises at least one raised surface defined by an interior surface of the at least one connector, wherein the at least one raised surface of the at least one connector is configured to engage with the housing connection portion.

3. The fastening assembly of claim 2, wherein the housing connection portion comprises at least one raised surface defined by an exterior surface of the housing, wherein an innermost circumference of the at least one raised surface of the at least one connector is less than an outermost circumference of the at least one raised surface of the housing.

4. The fastening assembly of any one of the preceding claims, wherein the housing connection portion further comprising:
at least one raised surface defined by an exterior surface of the housing, wherein the at least one raised surface of the housing connection portion is circumferentially disposed around the housing.

5. The fastening assembly of any one of the preceding claims, wherein the actuator defines a button surface, wherein the button surface is configured to be actuated by a user, wherein the actuator comprises at least one electrical contact, and wherein the at least one electrical contact is configured to close upon actuation by a user.

6. The fastening assembly of any one of the preceding claims, wherein the actuator is configured to be disposed at least partially within a cavity of the housing.

7. The fastening assembly of claim 6, wherein the actuator further defines a hook portion, wherein the protrusion is configured to engage an inwardly facing lip of the housing to retain the actuator.

8. The fastening assembly of claim 6, wherein at least a portion of the actuator is configured to translate from a first position to a second position within the housing during actuation.

9. The fastening assembly of any one of the preceding claims, wherein the connector comprises a loop of material, wherein the loop of material is configured to be circumferentially disposed around the housing.

10. A wearable mount comprising:

at least one attachment strap comprising a first portion and a second portion;
a fastening assembly configured to secure the at least one attachment strap to a user, the fastening assembly comprising:

a trigger assembly connected to the first portion of the at least one attachment strap, the trigger assembly comprising:

an actuator configured to be operated by a user;
a housing comprising a housing connection portion, wherein the housing is configured to receive the actuator;

a connector connected to the second portion of the at least one attachment strap, the connector being configured to engage the housing connection portion to attach the first portion of the at least one attachment strap with the second portion of the at least one attachment strap; and

a device mount connected to the at least one attachment strap, wherein the device mount is configured to engage a wearable device.

11. The wearable mount of claim 10, wherein the at least one attachment strap further comprises:
at least one electrical connection device, wherein the at least one electrical connection device is embedded within the at least one attachment strap and extends between the actuator and the device mount.

12. The wearable mount of claim 11, wherein the at least one electrical connection device comprises a wire configured to transmit one or more electrical signals from the device mount to the actuator and/or one or more electrical signals from the actuator to the device mount.

13. The wearable mount of claim 11, wherein the at least one attachment strap is configured to be secured around a hand and/or wrist of a user, wherein in an instance in which the at least one attachment strap is secured around the hand and/or the wrist of the user, the actuator is configured to be position adjacent to a thumb of a user.

14. The wearable mount of any one of claims 10 to 13, wherein the wearable mount is further configured to secure the wearable device to a user by connecting the wearable device to the device mount and connecting the at least one attachment strap to the user.

15. A method of attaching a wearable mount to a user, the wearable mount comprising at least one attachment strap; a fastening assembly comprising a trigger assembly connected to a first portion of the at least one attachment strap, the trigger assembly comprising an actuator and a housing comprising a housing connection portion, wherein the housing is configured to receive the actuator; the fastening assembly further comprising a connector connected to a second portion of the at least one attachment strap; the wearable mount further comprising a device mount connected to the at least one attachment strap; the method comprising:
securing the at least one attachment strap to the user by engaging the connector with the housing connection portion to attach the first portion of the at least

one attachment strap with the second portion of the at least one attachment strap.

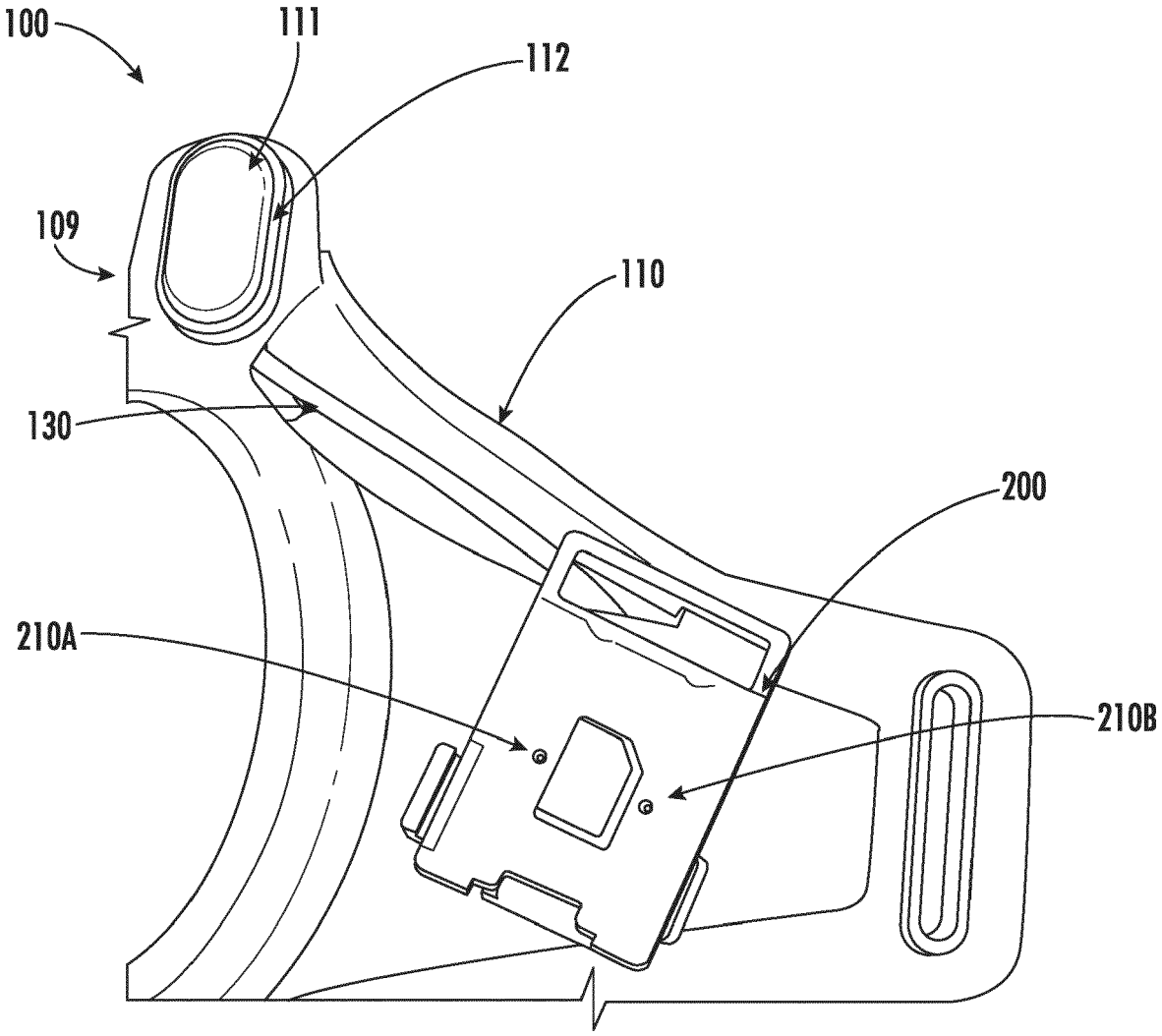

FIG. 1A

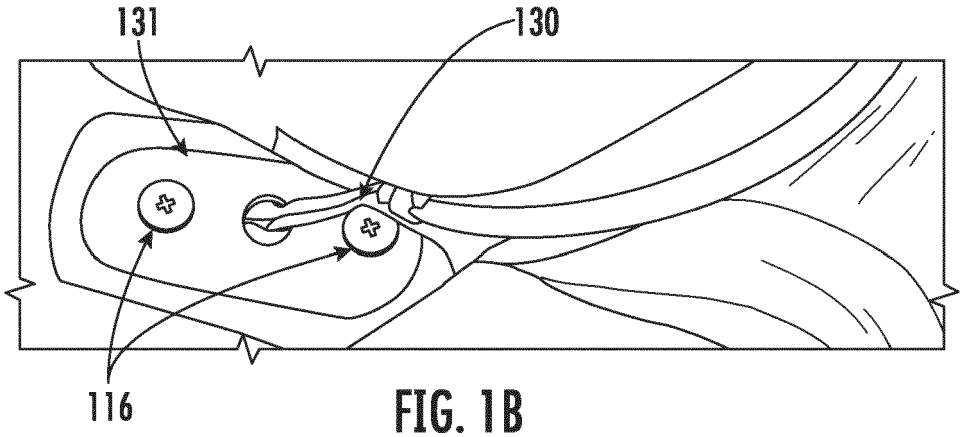

FIG. 1B

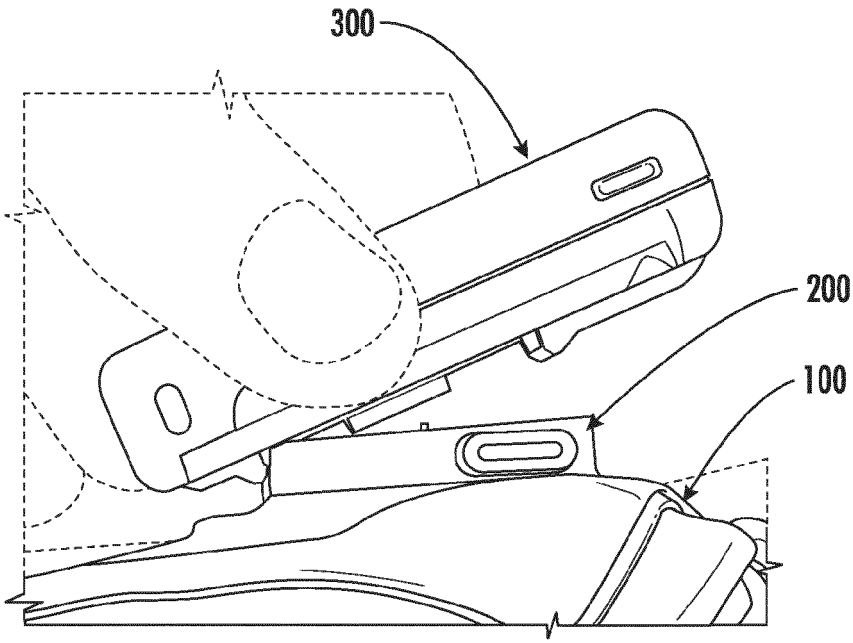

FIG. 2A

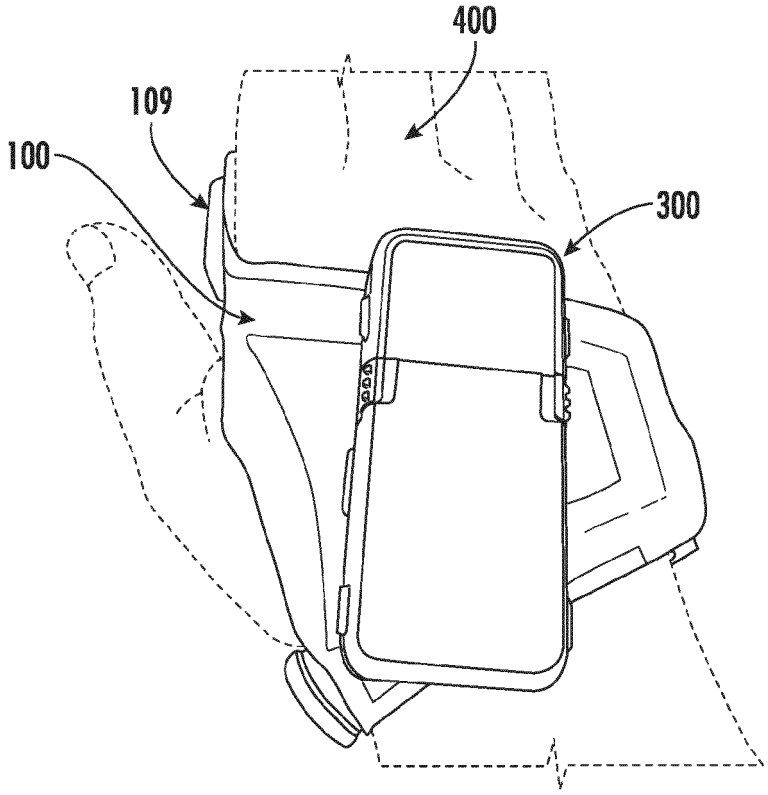

FIG. 2B

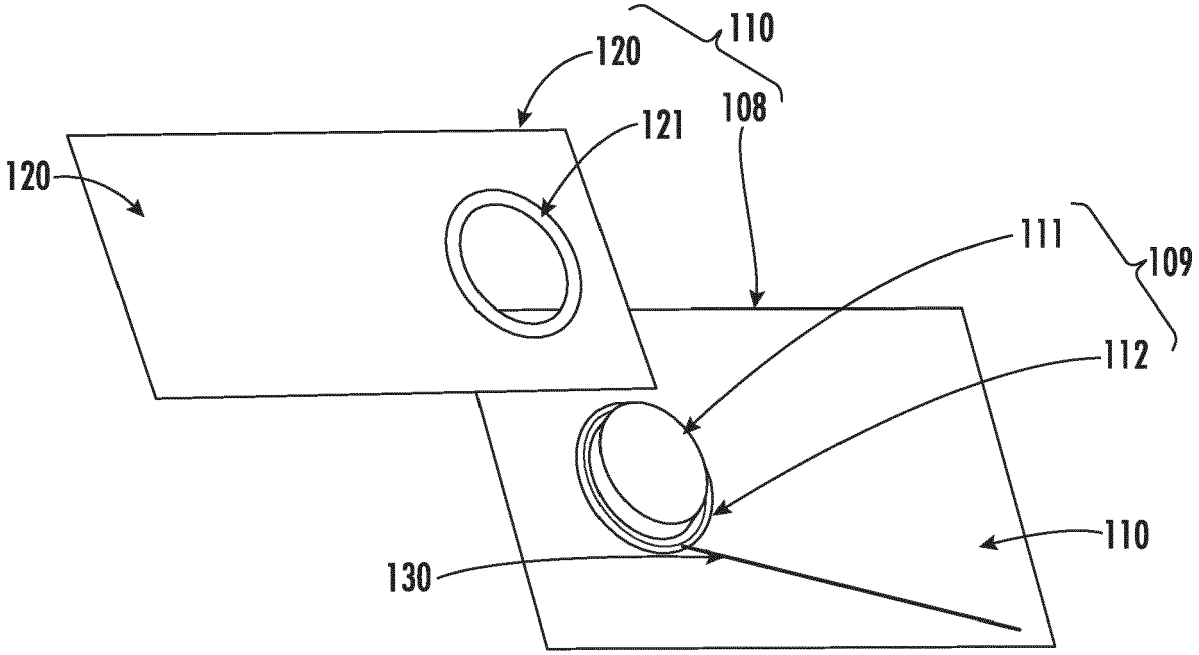
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FIG. 3A

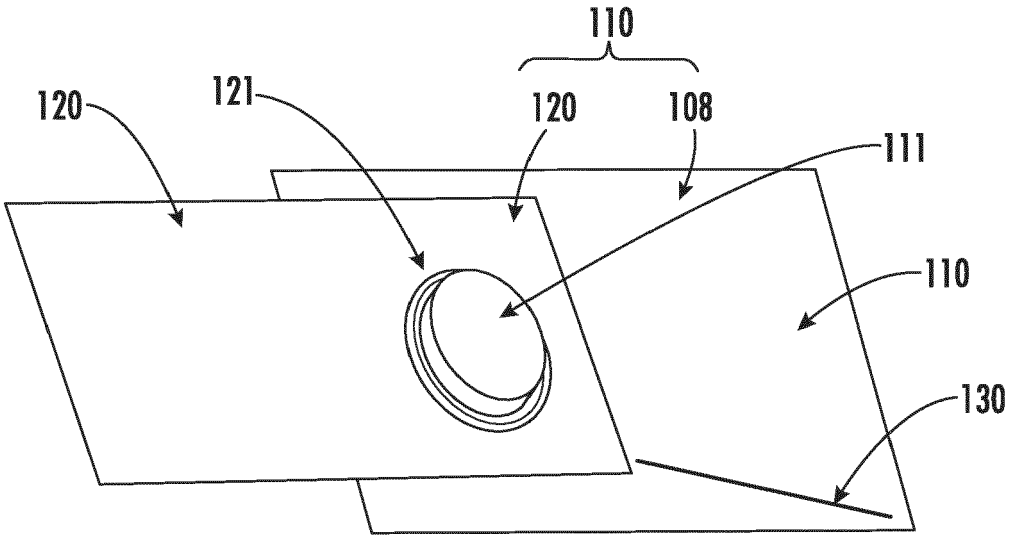
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FIG. 3B

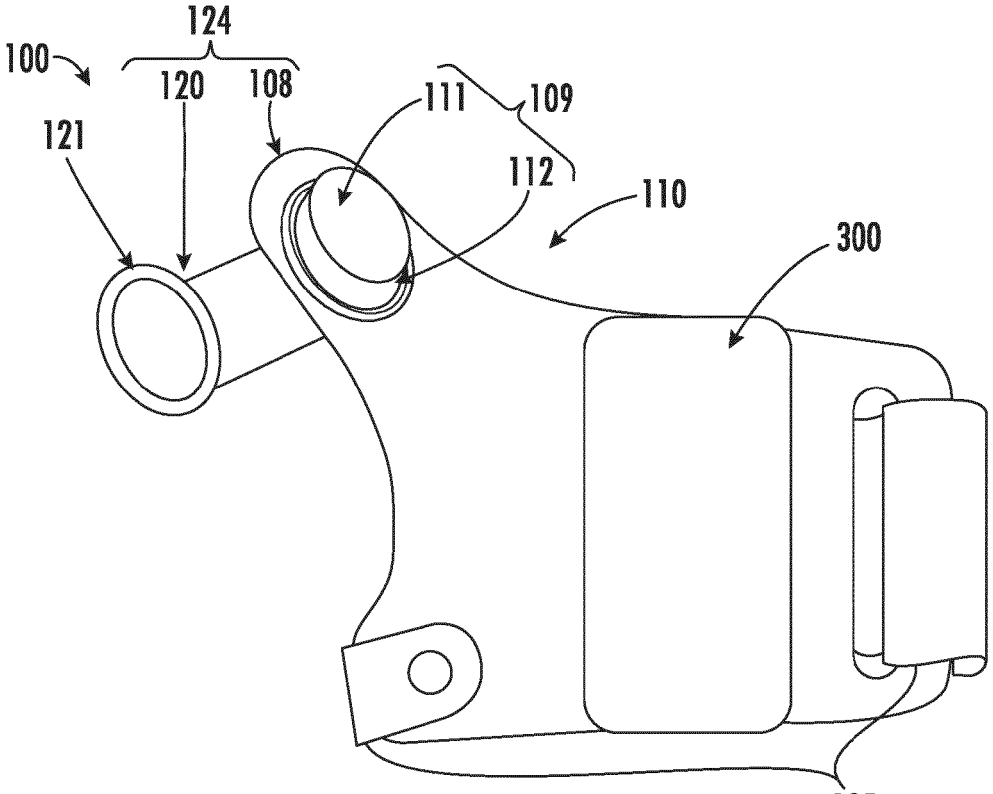
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FIG. 4A

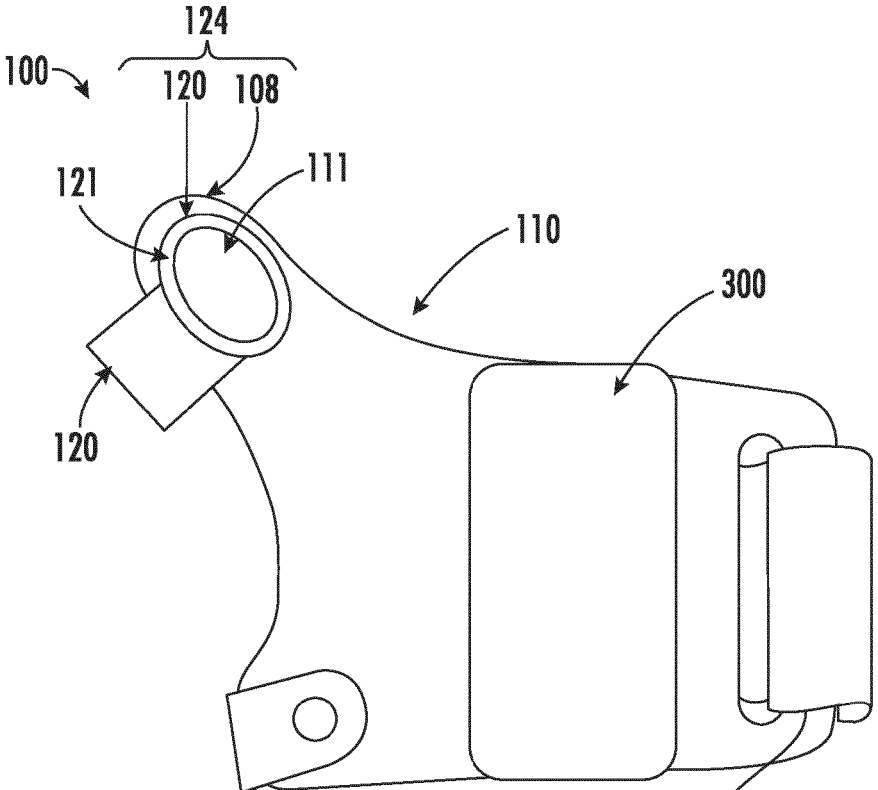
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FIG. 4B

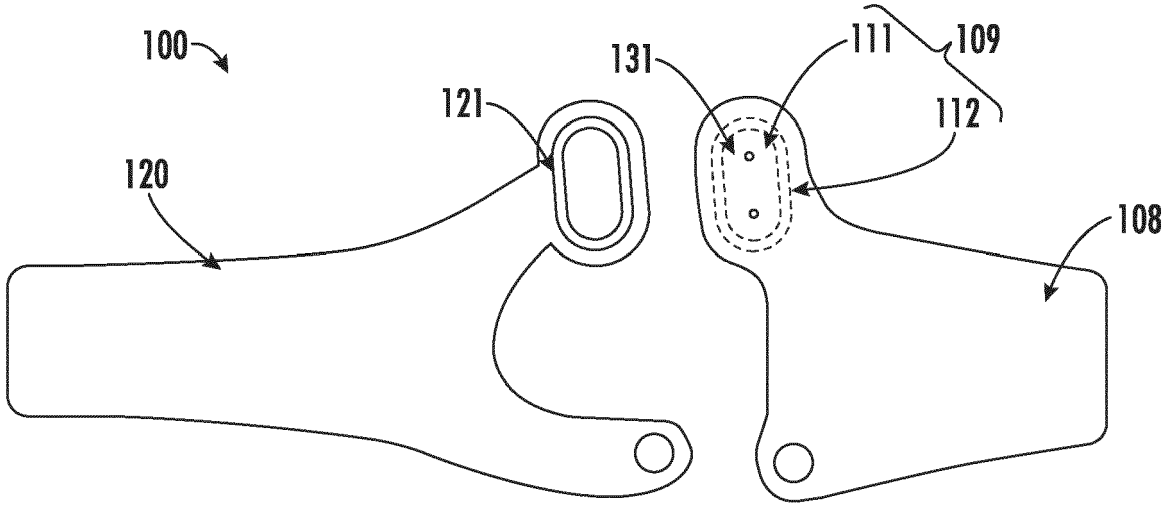
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FIG. 5A

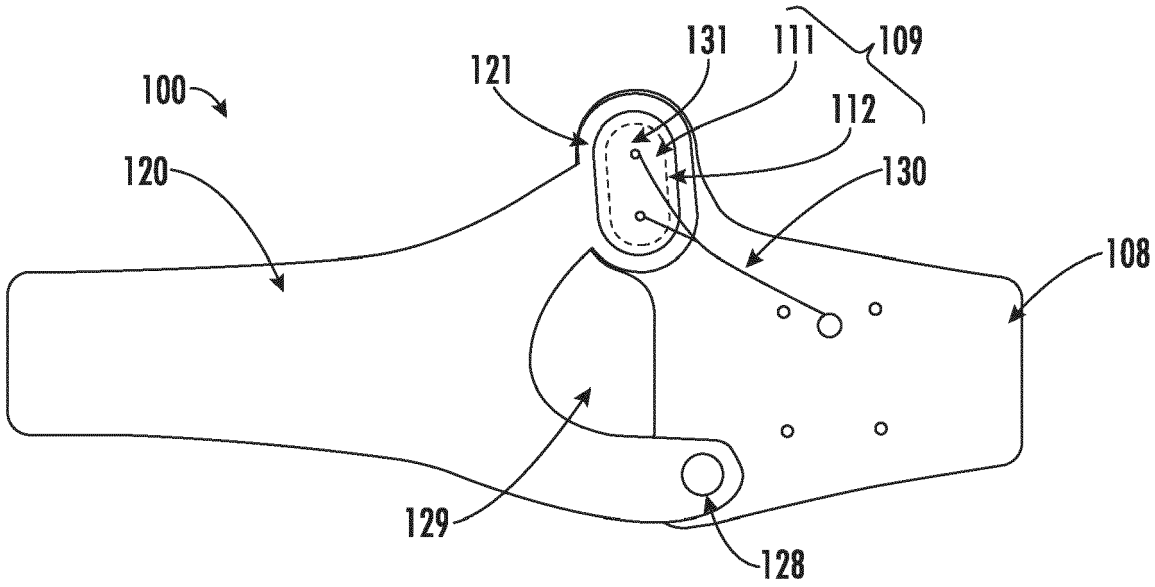
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FIG. 5B

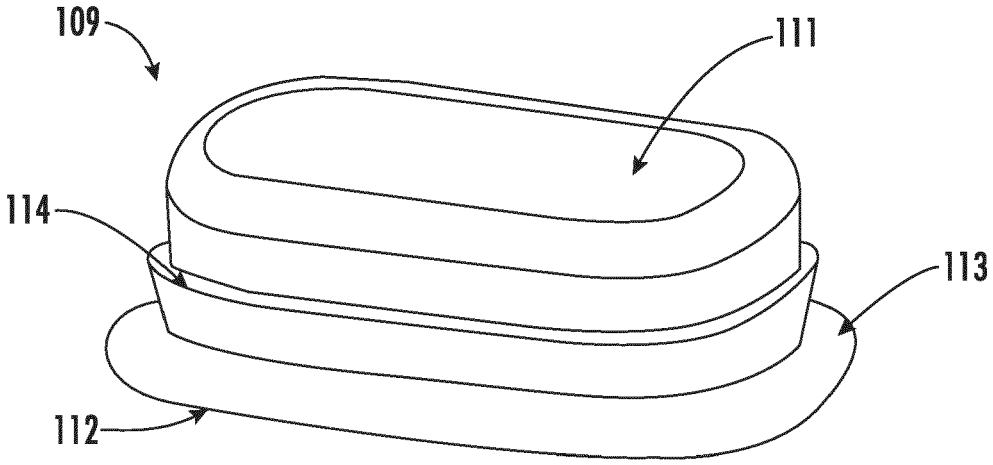

FIG. 6A

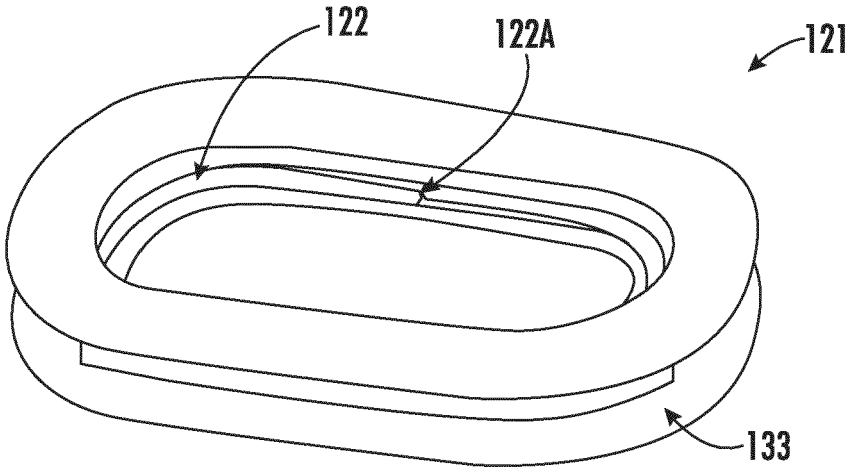

FIG. 6B

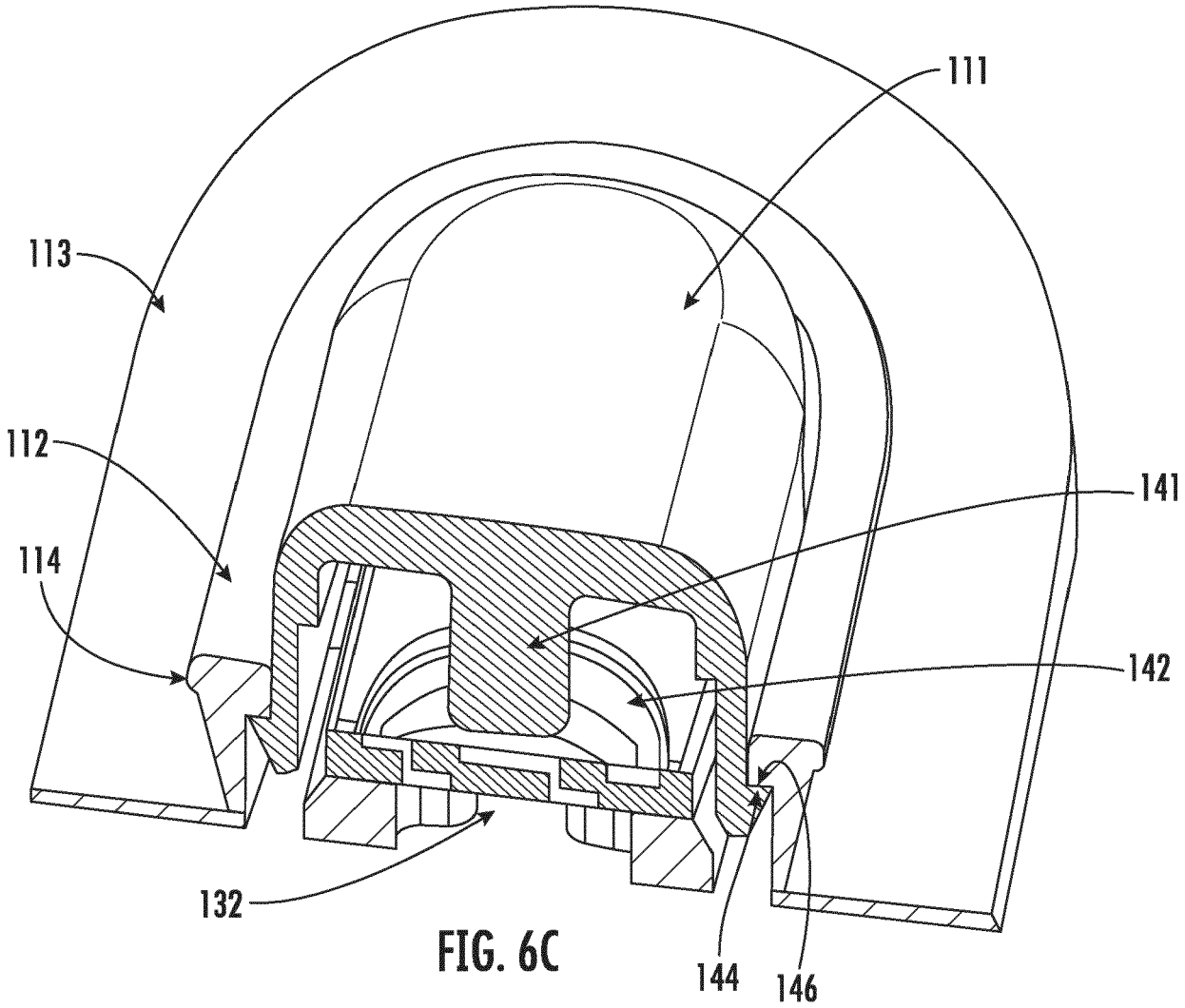

FIG. 6C

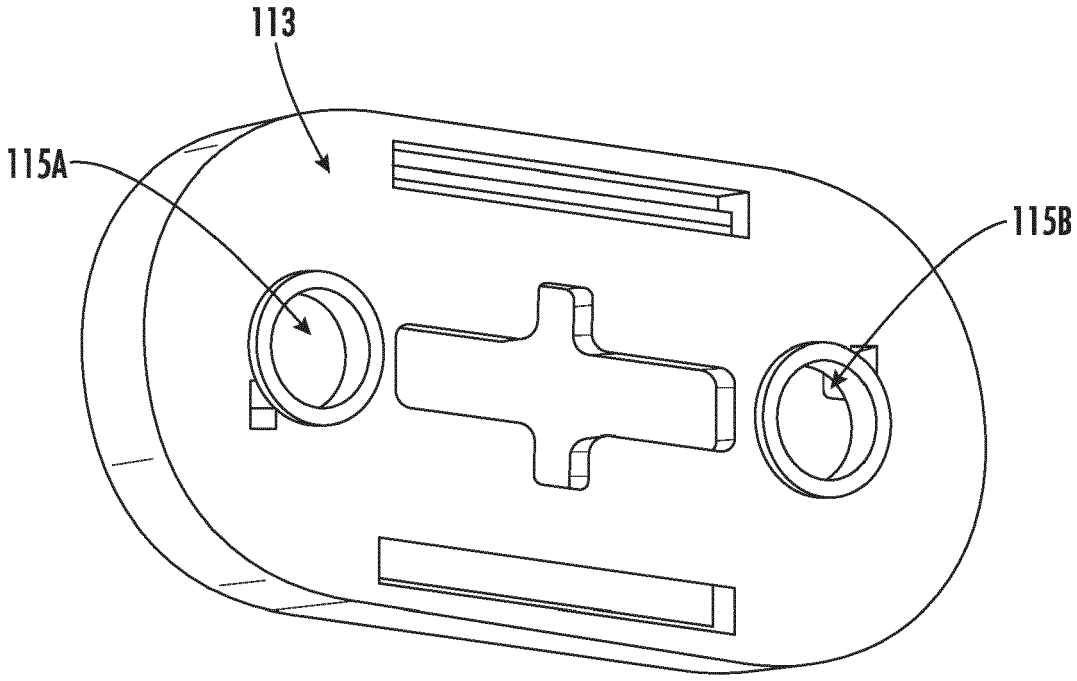

FIG. 6D

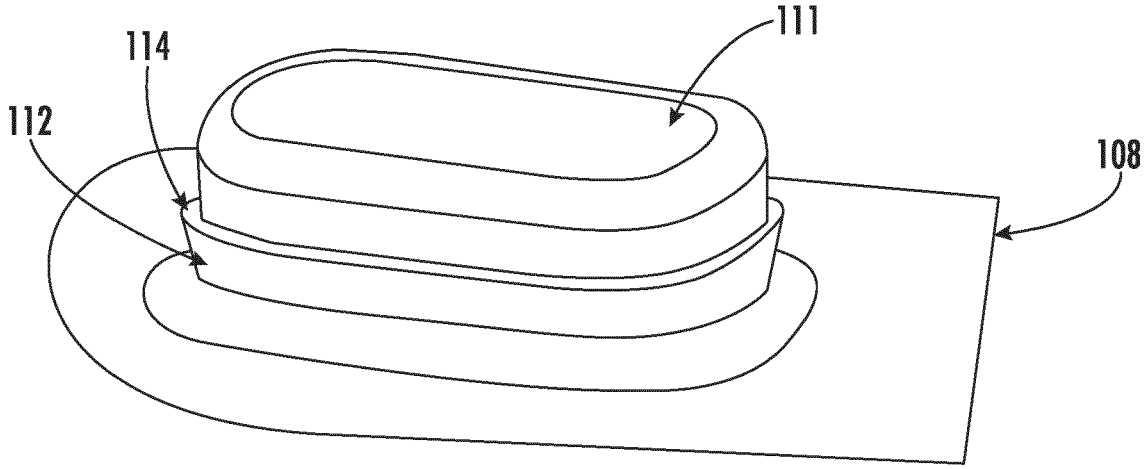

FIG. 7A

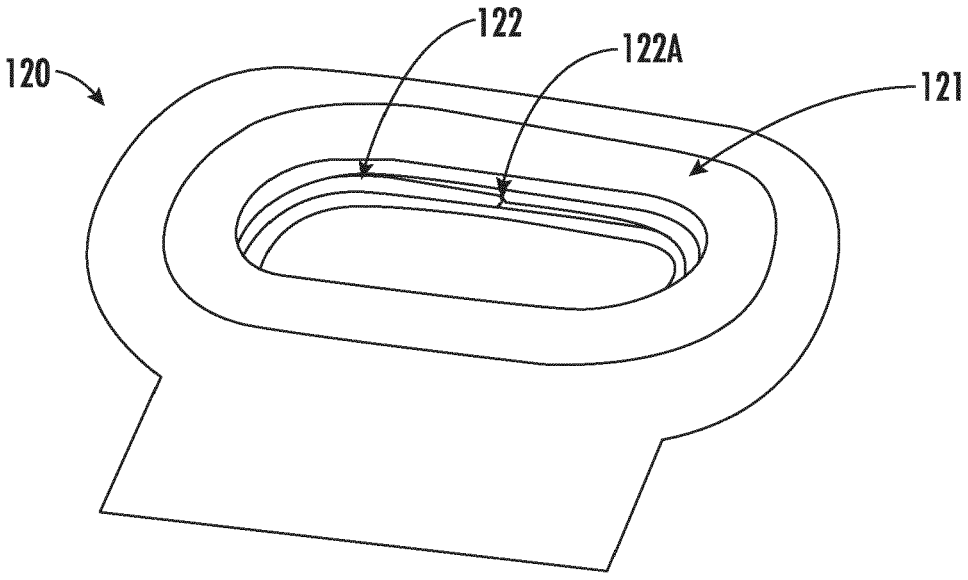

FIG. 7B

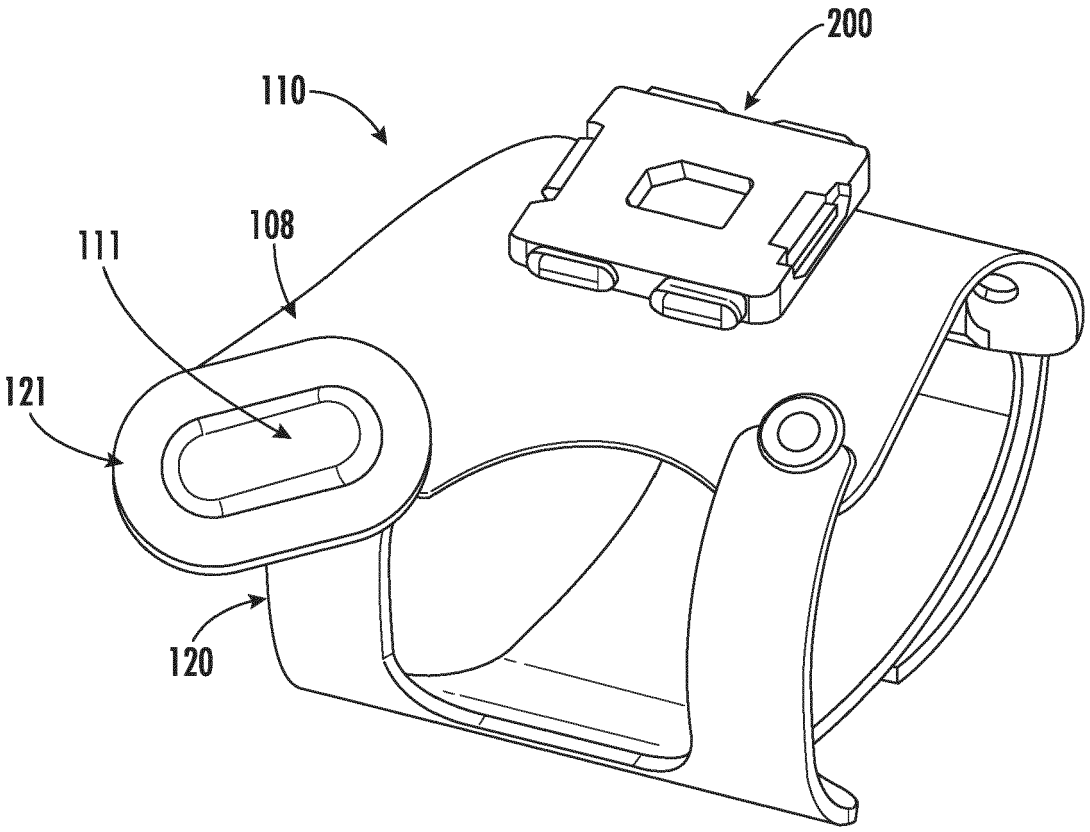

FIG. 8

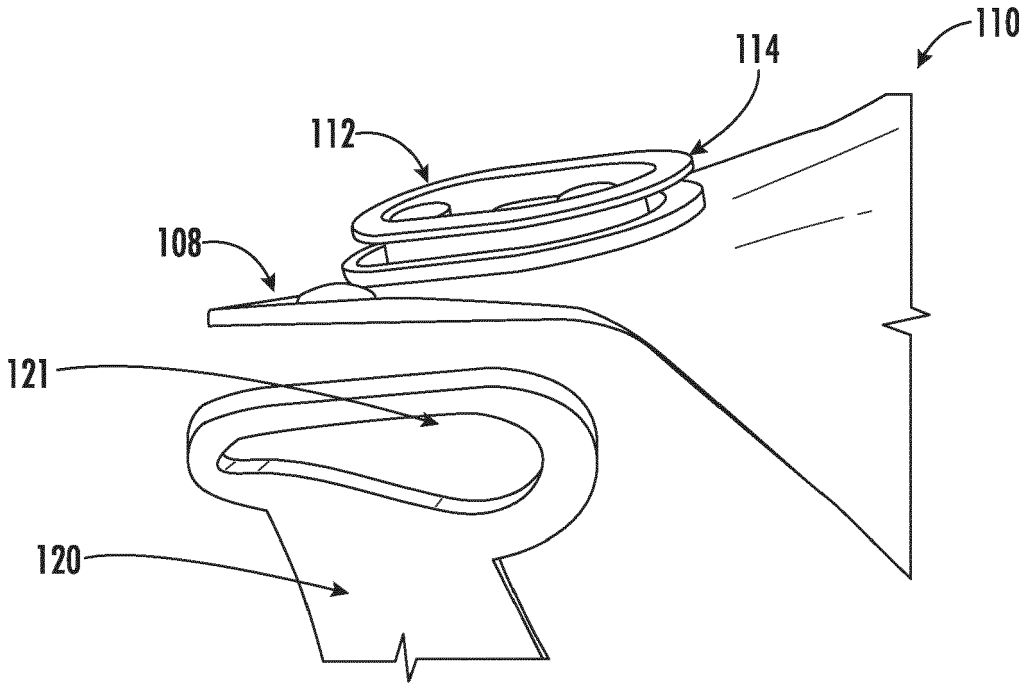

FIG. 9A

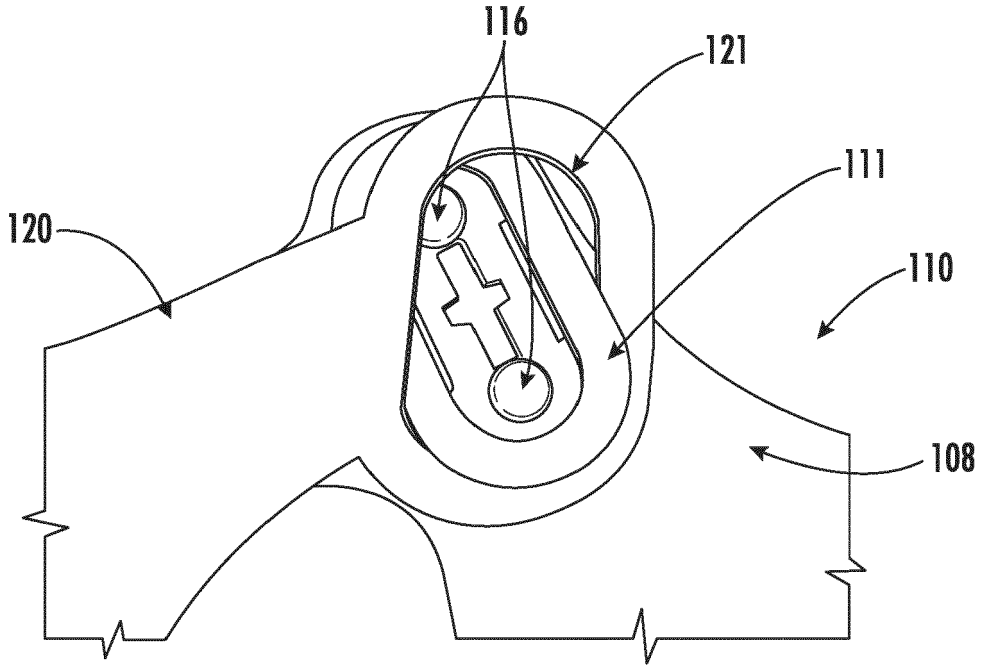

FIG. 9B

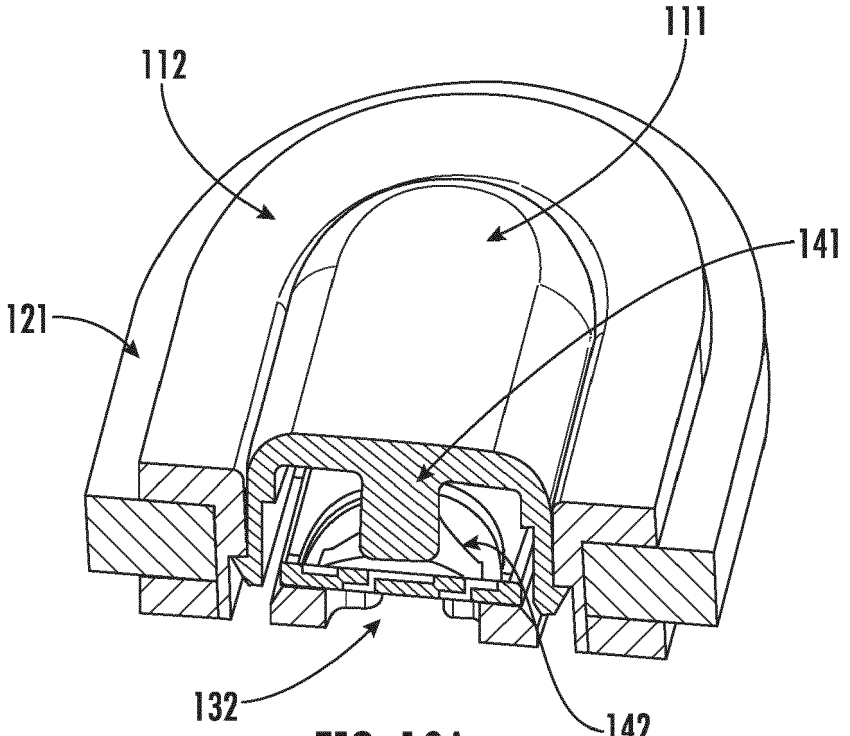

FIG. 10A

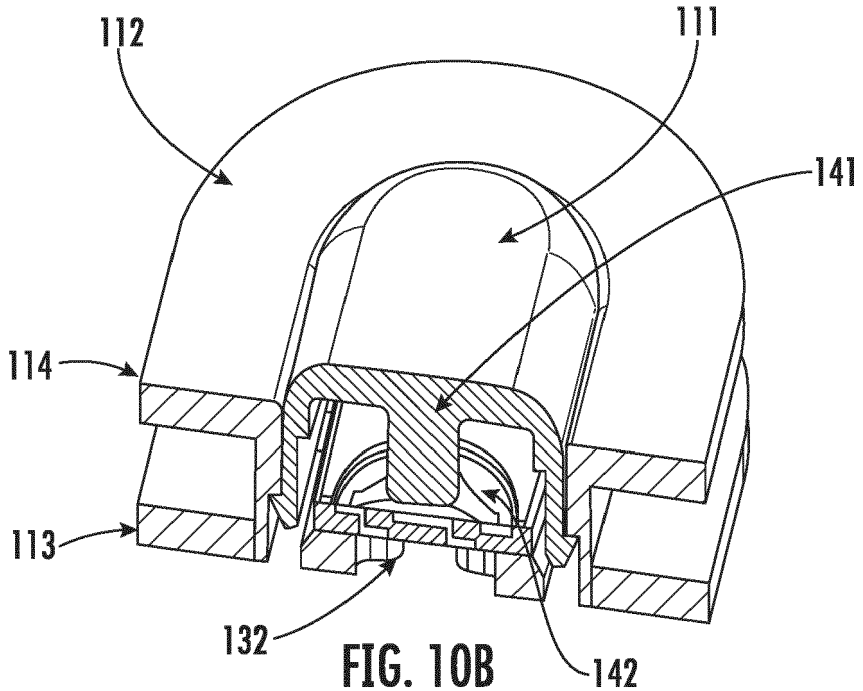

FIG. 10B

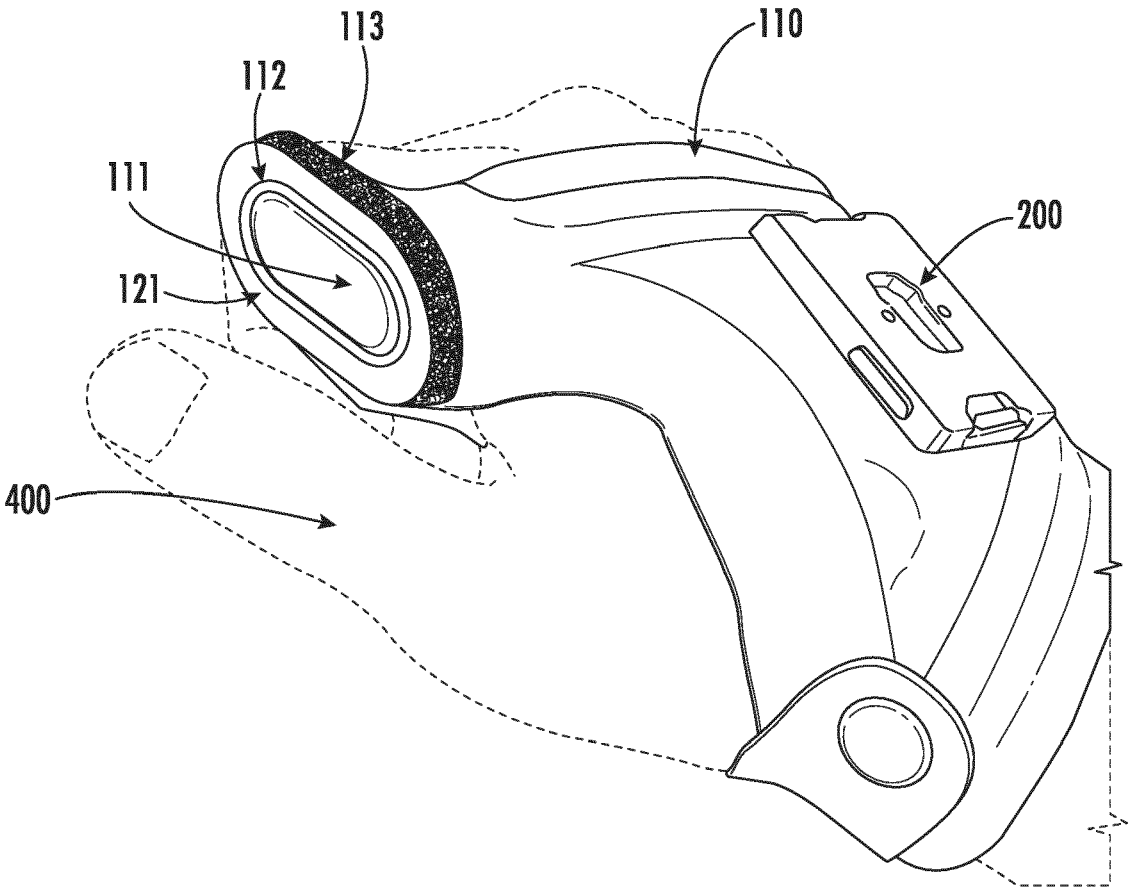

FIG. 11

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 23 20 3921

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2006/285404 A1 (ALEXANDER ALLEN K [US]) 21 December 2006 (2006-12-21)	1,4-9	INV. A45F5/00
A	* the whole document *	10-15	
X	US 2009/069060 A1 (KIM YOUNG S [US]) 12 March 2009 (2009-03-12)	1-3,5-8	
A	* the whole document *	10-15	
X	US 9 727 769 B2 (HAND HELD PROD INC [US]) 8 August 2017 (2017-08-08)	1-3,5-8	
A	* the whole document *	10-15	
A	US 10 817 689 B2 (DATALOGIC IP TECH SRL [IT]) 27 October 2020 (2020-10-27) * the whole document *	1,10	

TECHNICAL FIELDS SEARCHED (IPC)

A45F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 March 2024	Nicolás, Carlos

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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