



(11)

EP 4 559 351 A1

(12)

EUROPEAN PATENT APPLICATION

published in accordance with Art. 153(4) EPC

(43) Date of publication:
28.05.2025 Bulletin 2025/22

(51) International Patent Classification (IPC):
A44C 5/14^(2006.01) **G04B 37/14**^(2006.01)

(21) Application number: **23857536.9**

(52) Cooperative Patent Classification (CPC):
A44C 5/14; G04B 37/14

(22) Date of filing: 30.06.2023

(86) International application number:
PCT/KR2023/009270

(87) International publication number:
WO 2024/043498 (29.02.2024 Gazette 2024/09)

(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: 24.08.2022 KR 20220106414
15.09.2022 KR 20220116159

(71) Applicant: **Samsung Electronics Co., Ltd.**
Suwon-si, Gyeonggi-do 16677 (KR)

(72) Inventors:

- **JEONG, Yunho**
Suwon-si Gyeonggi-do 16677 (KR)
- **KIM, Junghun**
Suwon-si Gyeonggi-do 16677 (KR)
- **LEE, Kwangyong**
Suwon-si Gyeonggi-do 16677 (KR)
- **LEE, Jaechul**
Suwon-si Gyeonggi-do 16677 (KR)

(74) Representative: **HGF**
HGF Limited
1 City Walk
Leeds LS11 9DX (GB)

(54) **ELECTRONIC DEVICE COMPRISING STRAP INCLUDING STRUCTURE TO BE DETACHABLY COUPLED TO HOUSING**

(57) An electronic device according to one embodiment comprises: a housing including a pin; and a strap detachably coupled to the housing, wherein the strap comprises: a coupling groove having one end surrounding the pin and having the other end open toward one surface of the strap when the strap is coupled to the housing; and a button which includes an inclined surface that is sloped with respect to the one surface of the strap and that enables the pin to slide when the strap is coupled to the housing, and which has one portion arranged inside the coupling groove and has another portion arranged outside the coupling groove, wherein the gap between the one portion of the button and the pin expands according to movement in a first direction in which the button becomes closer to the other surface of the strap, which is opposite to the one surface of the strap, and shrinks as the button moves in a second direction, which is opposite to the first direction.

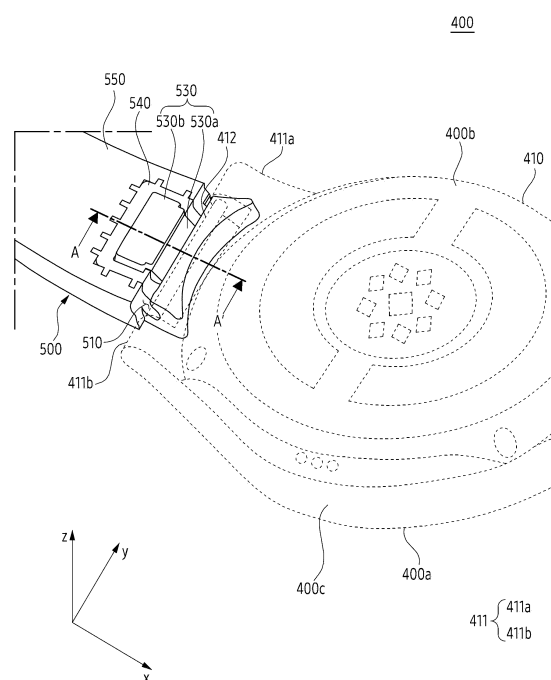


FIG. 4A

Description

[Technical Field]

[0001] The present disclosure relates to an electronic device comprising a strap including a structure to be detachably coupled to a housing.

[Background Art]

[0002] An electronic device may be carried by a user in various forms. For example, the electronic device may be carried by the user in a state of being worn by the user. As the electronic device is worn by the user, the electronic device may include a component for supporting the electronic device in the state of being worn by the user. The component may support the electronic device by surrounding a portion of a body of the user.

[Disclosure]

[Technical Solution]

[0003] An electronic device according to an embodiment may comprise a housing including a pin. According to an embodiment, the electronic device may comprise a strap detachably coupled to the housing. According to an embodiment, the strap may include a coupling groove in which, when the strap is coupled to the housing, an end surrounds the pin, and another end is open toward a surface of the strap. According to an embodiment, the strap may include a button including an inclined surface that has an incline with respect to the surface of the strap and is slidable relative to the pin when the strap is coupled to the housing, wherein a portion of the button is disposed inside the coupling groove and another portion of the button is disposed outside the coupling groove. According to an embodiment, a gap between the portion of the button and the pin may be expanded as the button moves in a first direction toward another surface of the strap opposite to the surface of the strap, and may be reduced as the button moves in a second direction opposite to the first direction.

[0004] An electronic device according to an embodiment may comprise a housing that includes a first surface facing a portion of a body of a user when the electronic device is worn by the user, a side surface surrounding the first surface, a protrusion extending from the side surface, and a pin penetrating the protrusion. According to an embodiment, the electronic device may comprise a strap detachably coupled to the housing, wherein a surface of the strap surrounds the portion of the body of the user when the electronic device is worn by the user. According to an embodiment, the strap may include a coupling groove, wherein, when the strap is coupled to the housing, an end of the coupling groove surrounds the pin, and another end of the coupling groove opens toward the surface of the strap. According to an embodiment, the

strap may include a button including an inclined surface that has an incline with respect to the surface of the strap and is slidable relative to the pin when the strap is coupled to the housing, and wherein a portion of the button is movable into or out of the coupling groove. According to an embodiment, the strap may include an elastic member, coupled to another portion of the button, deformable according to a movement of the button. According to an embodiment, a gap between the portion of the button and the pin may be expanded as the button moves in a first direction toward another surface of the strap opposite to the surface of the strap, and may be reduced as the button moves in a second direction opposite to the first direction.

[Description of the Drawings]

[0005]

FIG. 1 is a block diagram illustrating an electronic device in a network environment according to various embodiments.

FIG. 2A is a perspective view of an example electronic device according to an embodiment.

FIG. 2B is a perspective view of an example electronic device according to an embodiment.

FIG. 3 is an exploded perspective view of an example electronic device according to an embodiment.

FIG. 4A is a perspective view illustrating an example electronic device according to an embodiment.

FIG. 4B is a cross-sectional view illustrating an example of an example electronic device cut along line A-A' of FIG. 4A when an example strap according to an embodiment is in a first state.

FIG. 4C is a cross-sectional view illustrating an example of an example electronic device cut along line A-A' of FIG. 4A when an example strap according to an embodiment is in a second state.

FIG. 5A is a diagram illustrating a state in which an example electronic device according to an embodiment is worn by a user.

FIG. 5B is a cross-sectional view illustrating an example of cutting an example electronic device according to an embodiment.

FIG. 6A is an exploded perspective view of an example strap according to an embodiment.

FIG. 6B is a perspective view of a button of an example strap according to an embodiment.

[Mode for Invention]

[0006] FIG. 1 is a block diagram illustrating an electronic device 101 in a network environment 100 according to various embodiments.

[0007] Referring to FIG. 1, the electronic device 101 in the network environment 100 may communicate with an electronic device 102 via a first network 198 (e.g., a short-range wireless communication network), or at least one

of an electronic device 104 or a server 108 via a second network 199 (e.g., a long-range wireless communication network). According to an embodiment, the electronic device 101 may communicate with the electronic device 104 via the server 108. According to an embodiment, the electronic device 101 may include a processor 120, memory 130, an input module 150, a sound output module 155, a display module 160, an audio module 170, a sensor module 176, an interface 177, a connecting terminal 178, a haptic module 179, a camera module 180, a power management module 188, a battery 189, a communication module 190, a subscriber identification module (SIM) 196, or an antenna module 197. In some embodiments, at least one of the components (e.g., the connecting terminal 178) may be omitted from the electronic device 101, or one or more other components may be added in the electronic device 101. In some embodiments, some of the components (e.g., the sensor module 176, the camera module 180, or the antenna module 197) may be implemented as a single component (e.g., the display module 160).

[0008] The processor 120 may execute, for example, software (e.g., a program 140) to control at least one other component (e.g., a hardware or software component) of the electronic device 101 coupled with the processor 120, and may perform various data processing or computation. According to an embodiment, as at least part of the data processing or computation, the processor 120 may store a command or data received from another component (e.g., the sensor module 176 or the communication module 190) in volatile memory 132, process the command or the data stored in the volatile memory 132, and store resulting data in non-volatile memory 134. According to an embodiment, the processor 120 may include a main processor 121 (e.g., a central processing unit (CPU) or an application processor (AP)), or an auxiliary processor 123 (e.g., a graphics processing unit (GPU), a neural processing unit (NPU), an image signal processor (ISP), a sensor hub processor, or a communication processor (CP)) that is operable independently from, or in conjunction with, the main processor 121. For example, when the electronic device 101 includes the main processor 121 and the auxiliary processor 123, the auxiliary processor 123 may be adapted to consume less power than the main processor 121, or to be specific to a specified function. The auxiliary processor 123 may be implemented as separate from, or as part of the main processor 121.

[0009] The auxiliary processor 123 may control at least some of functions or states related to at least one component (e.g., the display module 160, the sensor module 176, or the communication module 190) among the components of the electronic device 101, instead of the main processor 121 while the main processor 121 is in an inactive (e.g., sleep) state, or together with the main processor 121 while the main processor 121 is in an active state (e.g., executing an application). According to an embodiment, the auxiliary processor 123 (e.g., an

image signal processor or a communication processor) may be implemented as part of another component (e.g., the camera module 180 or the communication module 190) functionally related to the auxiliary processor 123. According to an embodiment, the auxiliary processor 123 (e.g., the neural processing unit) may include a hardware structure specified for artificial intelligence model processing. An artificial intelligence model may be generated by machine learning. Such learning may be performed, e.g., by the electronic device 101 where the artificial intelligence is performed or via a separate server (e.g., the server 108). Learning algorithms may include, but are not limited to, e.g., supervised learning, unsupervised learning, semi-supervised learning, or reinforcement learning. The artificial intelligence model may include a plurality of artificial neural network layers. The artificial neural network may be a deep neural network (DNN), a convolutional neural network (CNN), a recurrent neural network (RNN), a restricted Boltzmann machine (RBM), a deep belief network (DBN), a bidirectional recurrent deep neural network (BRDNN), deep Q-network or a combination of two or more thereof but is not limited thereto. The artificial intelligence model may, additionally or alternatively, include a software structure other than the hardware structure.

[0010] The memory 130 may store various data used by at least one component (e.g., the processor 120 or the sensor module 176) of the electronic device 101. The various data may include, for example, software (e.g., the program 140) and input data or output data for a command related thereto. The memory 130 may include the volatile memory 132 or the non-volatile memory 134.

[0011] The program 140 may be stored in the memory 130 as software, and may include, for example, an operating system (OS) 142, middleware 144, or an application 146.

[0012] The input module 150 may receive a command or data to be used by another component (e.g., the processor 120) of the electronic device 101, from the outside (e.g., a user) of the electronic device 101. The input module 150 may include, for example, a microphone, a mouse, a keyboard, a key (e.g., a button), or a digital pen (e.g., a stylus pen).

[0013] The sound output module 155 may output sound signals to the outside of the electronic device 101. The sound output module 155 may include, for example, a speaker or a receiver. The speaker may be used for general purposes, such as playing multimedia or playing record. The receiver may be used for receiving incoming calls. According to an embodiment, the receiver may be implemented as separate from, or as part of the speaker.

[0014] The display module 160 may visually provide information to the outside (e.g., a user) of the electronic device 101. The display module 160 may include, for example, a display, a hologram device, or a projector and control circuitry to control a corresponding one of the display, hologram device, and projector. According to an

embodiment, the display module 160 may include a touch sensor adapted to detect a touch, or a pressure sensor adapted to measure the intensity of force incurred by the touch.

[0015] The audio module 170 may convert a sound into an electrical signal and vice versa. According to an embodiment, the audio module 170 may obtain the sound via the input module 150, or output the sound via the sound output module 155 or a headphone of an external electronic device (e.g., an electronic device 102) directly (e.g., via a wire) or wirelessly coupled with the electronic device 101.

[0016] The sensor module 176 may detect an operational state (e.g., power or temperature) of the electronic device 101 or an environmental state (e.g., a state of a user) external to the electronic device 101, and then generate an electrical signal or data value corresponding to the detected state. According to an embodiment, the sensor module 176 may include, for example, a gesture sensor, a gyro sensor, an atmospheric pressure sensor, a magnetic sensor, an acceleration sensor, a grip sensor, a proximity sensor, a color sensor, an infrared (IR) sensor, a biometric sensor, a temperature sensor, a humidity sensor, or an illuminance sensor.

[0017] The interface 177 may support one or more specified protocols to be used for the electronic device 101 to be coupled with the external electronic device (e.g., the electronic device 102) directly (e.g., via a wire) or wirelessly. According to an embodiment, the interface 177 may include, for example, a high definition multimedia interface (HDMI), a universal serial bus (USB) interface, a secure digital (SD) card interface, or an audio interface.

[0018] A connecting terminal 178 may include a connector via which the electronic device 101 may be physically connected with the external electronic device (e.g., the electronic device 102). According to an embodiment, the connecting terminal 178 may include, for example, an HDMI connector, a USB connector, a SD card connector, or an audio connector (e.g., a headphone connector).

[0019] The haptic module 179 may convert an electrical signal into a mechanical stimulus (e.g., a vibration or a movement) or electrical stimulus which may be recognized by a user via his tactile sensation or kinesthetic sensation. According to an embodiment, the haptic module 179 may include, for example, a motor, a piezoelectric element, or an electric stimulator.

[0020] The camera module 180 may capture a still image or moving images. According to an embodiment, the camera module 180 may include one or more lenses, image sensors, image signal processors, or flashes.

[0021] The power management module 188 may manage power supplied to the electronic device 101. According to an embodiment, the power management module 188 may be implemented as at least part of, for example, a power management integrated circuit (PMIC).

[0022] The battery 189 may supply power to at least

one component of the electronic device 101. According to an embodiment, the battery 189 may include, for example, a primary cell which is not rechargeable, a secondary cell which is rechargeable, or a fuel cell.

[0023] The communication module 190 may support establishing a direct (e.g., wired) communication channel or a wireless communication channel between the electronic device 101 and the external electronic device (e.g., the electronic device 102, the electronic device 104, or the server 108) and performing communication via the established communication channel. The communication module 190 may include one or more communication processors that are operable independently from the processor 120 (e.g., the application processor (AP)) and supports a direct (e.g., wired) communication or a wireless communication. According to an embodiment, the communication module 190 may include a wireless communication module 192 (e.g., a cellular communication module, a short-range wireless communication module, or a global navigation satellite system (GNSS) communication module) or a wired communication module 194 (e.g., a local area network (LAN) communication module or a power line communication (PLC) module). A corresponding one of these communication modules may communicate with the external electronic device via the first network 198 (e.g., a short-range communication network, such as Bluetooth™, wireless-fidelity (Wi-Fi) direct, or infrared data association (IrDA)) or the second network 199 (e.g., a long-range communication network, such as a legacy cellular network, a 5G network, a next-generation communication network, the Internet, or a computer network (e.g., LAN or wide area network (WAN))). These various types of communication modules may be implemented as a single component (e.g., a single chip), or may be implemented as multi components (e.g., multi chips) separate from each other. The wireless communication module 192 may identify and authenticate the electronic device 101 in a communication network, such as the first network 198 or the second network 199, using subscriber information (e.g., international mobile subscriber identity (IMSI)) stored in the subscriber identification module 196.

[0024] The wireless communication module 192 may support a 5G network, after a 4G network, and next-generation communication technology, e.g., new radio (NR) access technology. The NR access technology may support enhanced mobile broadband (eMBB), massive machine type communications (mMTC), or ultra-reliable and low-latency communications (URLLC). The wireless communication module 192 may support a high-frequency band (e.g., the mmWave band) to achieve, e.g., a high data transmission rate. The wireless communication module 192 may support various technologies for securing performance on a high-frequency band, such as, e.g., beamforming, massive multiple-input and multiple-output (massive MIMO), full dimensional MIMO (FD-MIMO), array antenna, analog beam-forming, or large scale antenna. The wireless communication mod-

ule 192 may support various requirements specified in the electronic device 101, an external electronic device (e.g., the electronic device 104), or a network system (e.g., the second network 199). According to an embodiment, the wireless communication module 192 may support a peak data rate (e.g., 20Gbps or more) for implementing eMBB, loss coverage (e.g., 164dB or less) for implementing mMTC, or U-plane latency (e.g., 0.5ms or less for each of downlink (DL) and uplink (UL), or a round trip of 1ms or less) for implementing URLLC.

[0025] The antenna module 197 may transmit or receive a signal or power to or from the outside (e.g., the external electronic device) of the electronic device 101. According to an embodiment, the antenna module 197 may include an antenna including a radiating element composed of a conductive material or a conductive pattern formed in or on a substrate (e.g., a printed circuit board (PCB)). According to an embodiment, the antenna module 197 may include a plurality of antennas (e.g., array antennas). In such a case, at least one antenna appropriate for a communication scheme used in the communication network, such as the first network 198 or the second network 199, may be selected, for example, by the communication module 190 (e.g., the wireless communication module 192) from the plurality of antennas. The signal or the power may then be transmitted or received between the communication module 190 and the external electronic device via the selected at least one antenna. According to an embodiment, another component (e.g., a radio frequency integrated circuit (RFIC)) other than the radiating element may be additionally formed as part of the antenna module 197.

[0026] According to various embodiments, the antenna module 197 may form a mmWave antenna module. According to an embodiment, the mmWave antenna module may include a printed circuit board, an RFIC disposed on a first surface (e.g., the bottom surface) of the printed circuit board, or adjacent to the first surface and capable of supporting a designated high-frequency band (e.g., the mmWave band), and a plurality of antennas (e.g., array antennas) disposed on a second surface (e.g., the top or a side surface) of the printed circuit board, or adjacent to the second surface and capable of transmitting or receiving signals of the designated high-frequency band.

[0027] At least some of the above-described components may be coupled mutually and communicate signals (e.g., commands or data) therebetween via an inter-peripheral communication scheme (e.g., a bus, general purpose input and output (GPIO), serial peripheral interface (SPI), or mobile industry processor interface (MIPI)).

[0028] According to an embodiment, commands or data may be transmitted or received between the electronic device 101 and the external electronic device 104 via the server 108 coupled with the second network 199. Each of the electronic devices 102 or 104 may be a device of a same type as, or a different type, from the electronic device 101. According to an embodiment, all or some of

operations to be executed at the electronic device 101 may be executed at one or more of the external electronic devices 102, 104, or 108. For example, if the electronic device 101 performs a function or a service automatically, or in response to a request from a user or another device, the electronic device 101, instead of, or in addition to, executing the function or the service, may request the one or more external electronic devices to perform at least part of the function or the service. The one or more external electronic devices receiving the request may perform the at least part of the function or the service requested, or an additional function or an additional service related to the request, and transfer an outcome of the performing to the electronic device 101. The electronic device 101 may provide the outcome, with or without further processing of the outcome, as at least part of a reply to the request. To that end, a cloud computing, distributed computing, mobile edge computing (MEC), or client-server computing technology may be used, for example. The electronic device 101 may provide ultra-low-latency services using, e.g., distributed computing or mobile edge computing. In another embodiment, the external electronic device 104 may include an internet-of-things (IoT) device. The server 108 may be an intelligent server using machine learning and/or a neural network. According to an embodiment, the external electronic device 104 or the server 108 may be included in the second network 199. The electronic device 101 may be applied to intelligent services (e.g., smart home, smart city, smart car, or healthcare) based on 5G communication technology or IoT-related technology.

[0029] FIG. 2A and FIG. 2B are perspective views of an electronic device according to an embodiment.

[0030] Referring to FIG. 2A and FIG. 2B, an electronic device 200 (e.g., the electronic device 101 of FIG. 1) according to an embodiment may include a housing 210 that includes a first surface 210A (or a front surface), a second surface 210B (or a rear surface), a side surface 210C surrounding a space between at least a portion of the first surface 210A and the second surface 210B, and attachment members 250 and 260 connected to at least a portion of the housing 210 and configured to detachably attach the electronic device 200 to a portion (e.g., a wrist, an ankle, and the like.) of a body of a user. In another embodiment (not illustrated), the housing may refer to a structure forming a portion of the first surface 210A, the second surface 210B, and the side surface 210C of FIG. 2A. According to an embodiment, at least a portion of the first surface 210A may be formed by a substantially transparent front plate 201 (e.g., a glass plate, or a polymer plate including various coating layers). The second surface 210B may be implemented by a substantially opaque rear plate 207. The rear plate 207 may be implemented, for example, by coated or colored glass, ceramic, polymer, metal (e.g., aluminum, stainless steel (STS), or magnesium), or a combination of at least two of the materials. The side surface 210C may be coupled to the front plate 201 and the rear plate 207, and may be

formed by a side bezel structure (or "side member") 206 including the metal and/or the polymer. In some embodiment, the rear plate 207 and the side bezel structure 206 may be integrally formed and include the same material (e.g., a metallic material such as the aluminum). The attachment members 250 and 260 may be formed of various materials and shapes. The attachment members 250 and 260 may be formed by a woven fabric, leather, rubber, urethane, the metal, the ceramic, or a combination of at least two of the above materials.

[0031] According to an embodiment, the electronic device 200 may include at least one of a display 220 (see FIG. 3), audio modules 205 and 208, a sensor module 211, key input devices 202, 203, and 204, and a connector hole 209. In some embodiment, the electronic device 200 may omit at least one of components (e.g., the key input devices 202, 203, and 204, the connector hole 209, or the sensor module 211) or may additionally include another component.

[0032] The display 220 may be exposed, for example, through a significant portion of the front plate 201. A shape of the display 220 may be a shape corresponding to a shape of the front plate 201, and may be various shapes such as a circle, an oval, or a polygon, and the like. The display 220 may be coupled to or disposed adjacent to touch detection circuitry, a pressure sensor capable of measuring intensity (a pressure) of a touch, and/or a fingerprint sensor.

[0033] The audio modules 205 and 208 may include a microphone hole 205 and a speaker hole 208. A microphone for obtaining external sound may be disposed inside the microphone hole 205, and, in some embodiment, a plurality of microphones may be disposed to detect a direction of sound. The speaker hole 208 may be used as an external speaker and a receiver for a call. In some embodiment, the speaker hole 208 and the microphone hole 205 may be implemented as one hole, or a speaker (e.g., a piezo speaker) may be included without the speaker hole 208.

[0034] The sensor module 211 may generate an electrical signal or a data value corresponding to an operating state inside the electronic device 200 or an external environmental state. The sensor module 211 may include, for example, a biometric sensor module 211 (e.g., a heart rate monitor (HRM) sensor) disposed in the second surface 210B of the housing 210. The electronic device 200 may further include at least one of a sensor module not illustrated, for example, a gesture sensor, a gyro sensor, a barometric pressure sensor, a magnetic sensor, an acceleration sensor, a grip sensor, a color sensor, an infrared (IR) sensor, a biometric sensor, a temperature sensor, a humidity sensor, or an illuminance sensor.

[0035] The sensor module 211 may include electrode areas 213 and 214 forming a portion of an external surface of the electronic device 200 and biometric signal detection circuitry (not illustrated) electrically connected to the electrode areas 213 and 214. For example, the

electrode areas 213 and 214 may include a first electrode area 213 and a second electrode area 214, disposed on the second surface 210B of the housing 210. The sensor module 211 may be configured such that the electrode areas 213 and 214 obtain an electrical signal from a portion of a body of the user, and the biometric signal detection circuitry detects biometric information of the user based on the electrical signal.

[0036] The key input devices 202, 203, and 204 may include a wheel key 202 disposed on the first surface 210A of the housing 210 and rotatable in at least one direction, and/or side key buttons 203 and 204 disposed on the side surface 210C of the housing 210. The wheel key may have a shape corresponding to the shape of the front plate 201. In another embodiment, the electronic device 200 may not include some or all of the key input devices 202, 203, and 204 mentioned above, and the key input devices 202, 203, and 204 that are not included may be implemented in another shape such as a soft key on the display 220. The connector hole 209 may accommodate a connector (e.g., a USB connector) for transmitting and receiving power and/or data with an external electronic device, and may include another connector hole (not illustrated) for transmitting and receiving an audio signal with the external electronic device. The electronic device 200 may further include, for example, a connector cover (not illustrated) covering at least a portion of the connector hole 209 and blocking introduction of an external foreign substance into the connector hole.

[0037] The attachment members 250 and 260 may be detachably attached to at least a partial area of the housing 210 by using locking members 251 and 261. The attachment members 250 and 260 may include one or more of a fixing member 252, a fixing member fastening hole 253, a band guide member 254, and a band fixing ring 255.

[0038] The fixing member 252 may be configured to fix the housing 210 and the attachment members 250 and 260 to the portion (e.g., the wrist, the ankle, and the like.) of the body of the user. The fixing member fastening hole 253 may fix the housing 210 and the attachment members 250 and 260 to the portion of the body of the user by corresponding to the fixing member 252. The band guide member 254 may be configured to limit a movement range of the fixing member 252 when the fixing member 252 is fastened to the fixing member fastening hole 253, such that the attachment members 250 and 260 is closely contact with and fastened to the portion of the body of the user. The band fixing ring 255 may limit a movement range of the attachment members 250 and 260 in a state in which the fixing member 252 and the fixing member fastening hole 253 are fastened.

[0039] FIG. 3 is an exploded perspective view of an electronic device according to an embodiment.

[0040] Referring to FIG. 3, an electronic device 300 (e.g., the electronic device 101 of FIG. 1, the electronic device 200 of FIG. 2A and/or the electronic device 200 of FIG. 2B) may include a side bezel structure 310, a wheel

key 320, a front plate 201, a display 220, a first antenna 350, a second antenna 355, a supporting member 360 (e.g., a bracket), a battery 370, a printed circuit board 380, a sealing member 390, a rear plate 393, and attachment members 395 and 397. At least one of components of the electronic device 300 may be the same as or similar to at least one of the components of the electronic device 200 of FIG. 1, 2A and/or 2B, and a redundant description will be omitted below. The supporting member 360 may be connected to the side bezel structure 310 by being disposed inside the electronic device 300, or may be integrally formed with the side bezel structure 310. The supporting member 360 may be formed of, for example, a metal material and/or a non-metal material (e.g., polymer). The display 220 may be coupled to a surface of the supporting member 360, and the printed circuit board 380 may be coupled to another surface of the supporting member 360. A processor, memory, and/or an interface may be mounted on the printed circuit board 380. The processor may include, for example, one or more of a central processing unit, an application processor, a graphic processing unit (GPU), an application processor sensor processor, or a communication processor.

[0041] The memory may include, for example, volatile memory or non-volatile memory. The interface may include, for example, a high definition multimedia interface (HDMI), a universal serial bus (USB), an SD card interface, and/or an audio interface. The interface may electrically or physically connect, for example, the electronic device 300 to an external electronic device, and may include a USB connector, an SD card/MMC connector, or an audio connector.

[0042] The battery 370 is a device for supplying power to at least one component of the electronic device 300, and may include, for example, a non-rechargeable primary battery, a rechargeable secondary battery, or a fuel cell. At least a portion of the battery 370 may be disposed, for example, on substantially the same plane as the printed circuit board 380. The battery 370 may be integrally disposed inside the electronic device 200 or may be detachably disposed with the electronic device 200.

[0043] The first antenna 350 may be disposed between the display 220 and the supporting member 360. The first antenna 350 may include, for example, a near field communication (NFC) antenna, a wireless charging antenna, and/or a magnetic secure transmission (MST) antenna. For example, the first antenna 350 may perform short-range communication with an external device, or wirelessly transmit and receive power required for charging, and transmit an electromagnetic signal including a short-range communication signal or payment data. In another embodiment, an antenna structure may be formed by at least a portion of the side bezel structure 310 and/or a portion of the supporting member 360 or a combination thereof. The second antenna 355 may be disposed between the printed circuit board 380 and the rear plate 393. The second antenna 355 may include, for example, the near field communication (NFC) antenna,

the wireless charging antenna, and/or the magnetic secure transmission (MST) antenna. The second antenna 355 may perform, for example, short-range communication with an external device, or wirelessly transmit and receive power required for charging, and transmit an electromagnetic signal including a short-range communication signal or payment data. In another embodiment, an antenna structure may be formed by a portion of the side bezel structure 310 and/or the rear plate 393 or a combination thereof.

[0044] The sealing member 390 may be positioned between the side bezel structure 310 and the rear plate 393. The sealing member 390 may be configured to block moisture and a foreign substance introduced from the outside into a space surrounded by the side bezel structure 310 and the rear plate 393.

[0045] FIG. 4A is a perspective view illustrating an example electronic device according to an embodiment, FIG. 4B is a cross-sectional view illustrating an example of an example electronic device cut along line A-A' of FIG. 4A when an example strap according to an embodiment is in a first state, and FIG. 4C is a cross-sectional view illustrating an example of an example electronic device cut along line A-A' of FIG. 4A when an example strap according to an embodiment is in a second state.

[0046] Referring to FIG. 4A, FIG. 4B, and FIG. 4C, an electronic device 400 according to an embodiment may include a housing 410 (e.g., the housing 210 of FIG. 2A and FIG. 2B), and/or a strap 500 (e.g., the attachment members 250 and 260 of FIG. 2A and FIG. 2B). According to an embodiment, the electronic device 400 may be worn by a user. For example, the electronic device 400 may be worn by a wrist of the user. The electronic device 400 may be referred to as a wearable device in terms of being worn by the user.

[0047] According to an embodiment, the housing 410 may define at least a portion of an outer surface of the electronic device 400. The housing 410 may support various components in the electronic device 400. For example, a first surface 410a (e.g., the first surface 210a of FIG. 2A) of the housing 410 may support a display (e.g., the display 220 of FIG. 3). The display 220 may be disposed on the first surface 410a of the housing 410. According to an embodiment, the housing 410 may face a portion of a body of the user when the electronic device 400 is worn by the user. For example, a second surface 410b (e.g., the second surface 210b of FIG. 2A) of the housing 410 may face the portion of the body of the user when the electronic device 400 is worn by the user. When the electronic device 400 is worn by the user, the second surface 410b of the housing 410 may be in contact with the portion of the body of the user. The second surface 410b of the housing 410 may be opposite to the first surface 410a of the housing 410. For example, a direction (e.g., +z direction) in which the second surface 410b of the housing 410 faces may be opposite to a direction (e.g., -z direction) in which the first surface 410a of the housing 410 faces. The second surface 410b of the

housing 410 may be spaced apart from the first surface 410a of the housing 410. According to an embodiment, a side surface 410c (e.g., the side surface 210c of FIG. 2A) of the housing 410 may be disposed between the first surface 410a and the second surface 410b of the housing 410. For example, the side surface 410c of the housing 410 may connect the first surface 410a and the second surface 410b. For example, the side surface 410c of the housing 410 may extend between the first surface 410a and the second surface 420b. For example, the side surface 410c of the housing 410 may surround the first surface 410a and the second surface 410b. As the side surface 410c of the housing 410 extends between the first surface 410a and the second surface 410b, the housing 410 may provide an inner space for accommodating components of the electronic device 400.

[0048] According to an embodiment, the housing 410 may include a protrusion 411. The protrusion 411 may extend from a periphery of the housing 410. A periphery of a component may mean an area of the component including a boundary capable of distinguishing another component different from the component among areas of the component. The protrusion 411 may be connected to the side surface 410c of the housing 410. For example, the protrusion 411 may extend from the side surface 410c of the housing 410. An end of the protrusion 411 may be spaced apart from the side surface 410c of the housing 410. According to an embodiment, the protrusion 411 may include a plurality of protrusions 411a and 411b spaced apart from each other.

[0049] According to an embodiment, the housing 410 may include a pin 412. The pin 412 may provide a rotation axis of the strap 500. For example, when the housing 410 and the strap 500 are coupled, the pin 412 may be surrounded by the strap 500. According to an embodiment, the pin 412 may penetrate the protrusion 411. For example, the pin 412 may penetrate the plurality of protrusions 411a and 411b. According to an embodiment, the pin 412 may have a linearly extended shape. For example, the pin 412 may extend between the plurality of protrusions 411a and 411b. The pin 412 may be spaced apart from the side surface 410c of the housing 410.

[0050] The strap 500 may be detachably coupled to the housing 410. For example, the strap 500 may be coupled to the housing 410 through the pin 412 of the housing 410. For example, the strap 500 may be separated from the housing 410 by being spaced apart from the pin 412. The strap 500 may surround the portion of the body of the user when the electronic device 400 is worn by the user. For example, a surface 500a of the strap 500 may face the portion of the body of the user when the electronic device 400 is worn by the user. The surface 500a of the strap 500 may surround the portion of the body of the user when the electronic device 400 is worn by the user. According to an embodiment, the strap 500 may be movable with respect to the housing 410. The strap 500 may be rotatable with respect to the housing 410 in a state of being coupled with the housing 410. For example, the strap 500 may be

rotatable with respect to the housing 410, based on the pin 412 of the housing 410 in the state of being coupled with the housing 410. According to an embodiment, the strap 500 may be deformable by an external force. For example, the strap 500 may be elastically deformable. According to an embodiment, the strap 500 may include a coupling groove 510, a receiving groove 520, a button 530, a receiving portion 540, a supporting portion 550, and/or an elastic member 560.

[0051] The coupling groove 510 may accommodate the pin 412 of the housing 410 when the strap 500 is coupled to the housing 410. The pin 412 may be inserted into the coupling groove 510 when the strap 500 is coupled to the housing 410. According to an embodiment, the coupling groove 510 may be formed by recessing a portion of the strap 500 into an inward side of the strap 500. For example, the coupling groove 510 may extend from the surface 500a of the strap 500 to the inside of the strap 500. According to an embodiment, an end 510a of the coupling groove 510 may accommodate the pin 412 when the strap 500 is coupled to the housing 410. For example, the end 510a of the coupling groove 510 may surround the pin 412 in a state in which the strap 500 is coupled to the housing 410. The end 510a of the coupling groove 510 may have a shape corresponding to a shape of the pin 412. According to an embodiment, another end 510b of the coupling groove 510 may be opened toward the outside of the strap 500. For example, the other end 510b of the coupling groove 510 may be opened toward the surface 500a of the strap 500. As the other end 510b of the coupling groove 510 is opened, the pin 412 may be accommodated in the coupling groove 510 by passing through the other end 510b of the coupling groove 510, when the strap 500 and the housing 410 are coupled. According to an embodiment, a portion of the coupling groove 510 may have an incline with respect to the surface 500a of the strap 500. The portion of the coupling groove 510 may be inclined with respect to the surface 500a of the strap 500.

[0052] According to an embodiment, the coupling groove 510 may accommodate a portion 530a of the button 530. The coupling groove 510 may surround the portion 530a of the button 530. The coupling groove 510 may provide a space in which the portion 530a of the button 530 may move.

[0053] The receiving groove 520 may accommodate the button 530. The receiving groove 520 may provide a space in which the button 530 may move. According to an embodiment, the receiving groove 520 distinguished from the coupling groove 510 may be connected to the coupling groove 510. The receiving groove 520 may contact the coupling groove 510. According to an embodiment, the receiving groove 520 may be formed by recessing another portion of the strap 500 into the inward side of the strap 500. For example, the receiving groove 520 may extend from the surface 500a of the strap 500 to the inside of the strap 500. According to an embodiment, the receiving groove 520 may surround another portion

530b of the button 530.

[0054] The button 530 may be movable in a direction toward the inward side of the strap 500 or in a direction toward an outward side of the strap 500 by the external force. For example, the button 530 may be movable with respect to the surface 500a of the strap 500. The button 530 may be movable with respect to another surface 500b of the strap 500. For example, the button 530 may be movable in a first direction (e.g., -z direction) toward the other surface 500b of the strap 500, or in a second direction (e.g., +z direction) opposite to the first direction. The second direction may be a direction away from the other surface 500b of the strap 500. According to an embodiment, the button 530 may be movable with respect to the coupling groove 510. The portion 530a of the button 530 may be movable with respect to the coupling groove 510. For example, the portion 530a of the button 530 may be movable into or out of the coupling groove 510. The other portion 530b of the button 530 may be movable in the receiving groove 520.

[0055] According to an embodiment, a state of the button 530 may include a first state in which the other portion 530b of the button 530 protrudes from the surface 500a of the strap 500, and a second state in which the other portion 530b of the button 530 is disposed inside the strap 500. In the first state of the button 530, the button 530 may be movable only in the first direction of the first direction and the second direction. In the first state of button 530, the button 530 may not be movable in the second direction. In the first state of the button 530, the strap 500 and the housing 410 may maintain a state of being coupled to each other. For example, when the state of the button 530 is the first state, the other portion 530b of the button 530 may protrude outside the receiving groove 520. When the state of the button 530 is the first state, the portion 530a of the button 530 may be disposed inside the coupling groove 510. For example, when the state of the button 530 is the first state, the portion 530a of the button 530 may face the pin 412 disposed inside the coupling groove 510. According to an embodiment, as the button 530 moves in the first direction, the state of the button 530 may change from the first state to the second state. In the second state of the button 530, the button 530 may be movable only in the second direction of the first direction and the second direction. In the second state of the button 530, the button 530 may not be movable in the first direction. The second state of the button 530 may mean a state for separating the strap 500 from the housing 410. The second state of the button 530 may mean a state for coupling the strap 500 to the housing 410. In the second state of button 530, the button 530 may be inserted into the inside of the strap 500. For example, in the second state of the button 530, the other portion 530b of the button 530 may be disposed inside the receiving groove 520. In the second state of the button 530, the portion 530a of the button 530 may be disposed outside the coupling groove 510. For example, in the second state of the button 530, the portion 530a of the button 530 may

be disposed only inside the receiving groove 520.

[0056] According to an embodiment, in a state in which the strap 500 and the housing 410 are coupled, the button 530 may be spaced apart from the pin 412. In the state in which the strap 500 and the housing 410 are coupled, a gap g1 may be formed between the button 530 and an inner surface 510c of the coupling groove 510 surrounding the pin 412. The inner surface 510c of the coupling groove 510 may mean an inner surface of the strap 500 forming the coupling groove 510. The inner surface 510c of the coupling groove 510 may mean an inner surface of the receiving portion 540 forming the coupling groove 510. In the state in which the strap 500 and the housing 410 are coupled, the inner surface 510c of the coupling groove 510 may surround at least a portion of the pin 412. As the gap g1 is formed between the button 530 and the inner surface 510c of the coupling groove 510, the strap 500 may be movable with respect to the housing 410.

[0057] According to an embodiment, in the state in which the strap 500 and the housing 410 are coupled, a size of the gap g1 between the pin 412 and the inner surface 510c of the coupling groove 510 may be changed by a movement of the button 530. For example, the gap g1 between the portion 530a of the button 530 and the inner surface 510c of the coupling groove 510 may expand as the button 530 moves in the first direction. For example, the gap g1 between the portion 530a of the button 530 and the inner surface 510c of the coupling groove 510 may be reduced as the button 530 moves in the second direction opposite to the first direction. According to an embodiment, in the first state of the button 530, the size of the gap g1 between the portion 530a of the button 530 and the inner surface 510c of the coupling groove 510 may be smaller than a size of the pin 412. For example, in the first state of the button 530, the size of the gap g1 between the portion 530a of the button 530 and the inner surface 510c of the coupling groove 510 may be smaller than a diameter of the pin 412. As the size of the gap g1 between the portion 530a of the button 530 and the inner surface 510c of the coupling groove 510 in the first state of the button 530 is smaller than the diameter of the pin 412, the pin 412 may not move to the outside of the coupling groove 510. As the pin 412 may not move to the outside of the coupling groove 510, in the first state of the button 530, the strap 500 and the housing 410 may maintain the state of coupled to each other. In the second state of the button 530, the size of the gap g1 between the portion 530a of the button 530 and the inner surface 510c of the coupling groove 510 may be greater than or equal to the size of the pin 412. For example, in the second state of the button 530, the size of the gap g1 between the portion 530a of the button 530 and the inner surface 510c of the coupling groove 510 may be greater than or equal to the diameter of the pin 412. In the second state of the button 530, as the size of the gap g1 is less than or equal to the size of the pin 412, the pin 412 may move to the outside of the coupling groove 510. As the pin 412 is movable to the outside of the coupling groove 510, in the

second state of the button 530, the strap 500 may be separated from the housing 410, or coupled to the housing 410. The electronic device 400 according to an embodiment may provide a structure in which the strap 500 and the housing 410 are easily separated or coupled by the button 530 movable in the first direction or the second direction. For example, the user may change the size of the gap g1 between the portion 530a of the button 530 and the inner surface 510c of the coupling groove 510 by pressing the other portion 530b of the button 530, thereby detaching or attaching the strap 500 to the housing 410.

[0058] According to an embodiment, the button 530 may include an inclined surface 531. The inclined surface 531 may guide a movement of the pin 412 of the housing 410 when the strap 500 is coupled to the housing 410. For example, the inclined surface 531 may be slidable with respect to the pin 412 when the strap 500 is coupled to the housing 410. According to an embodiment, the inclined surface 531 may have a slope with respect to the surface 500a of the strap 500. The inclined surface 531 may be inclined with respect to the surface 500a of the strap 500. For example, the inclined surface 531 may extend in a direction parallel to a portion of the coupling groove 510 inclined with respect to the surface 500a of the strap 500. According to an embodiment, in a process of coupling the strap 500 and the housing 410, the pin 412 inserted into the end 510a of the coupling groove 510 may slide with respect to the inclined surface 531 of the button 530. The pin 412 may compress the button 530 in the first direction (e.g., -z direction) while sliding with respect to the inclined surface 531. By the movement of the button 530 in the first direction, the pin 412 sliding with respect to the inclined surface 531 may be accommodated in the other end 510b of the coupling groove 510. The electronic device 400 according to an embodiment may provide a structure in which the strap 500 and the housing 410 are easily coupled by the button 530 including the inclined surface 531 that guides the movement of the pin 412 when the strap 500 and the housing 410 are coupled. For example, when coupling the strap 500 and the housing 410 to each other, since the button 530 is compressed while the pin 412 slides along the inclined surface 531, the user may couple the strap 500 to the housing 410 without directly compressing the button 530.

[0059] The receiving portion 540 may define a portion of an outer surface of the strap 500. According to an embodiment, the receiving portion 540 may define the coupling groove 510. The receiving portion 540 may surround at least a portion of the button 530. For example, the receiving portion 540 may define the receiving groove 520 surrounding the button 530. For example, in the first state of the button 530, the other portion 530b of the button 530 may protrude to the outside of the receiving portion 540. For example, in the second state of the button 530, the receiving portion 540 may surround both the portion 530a of the button 530 and the other portion 530b of the button 530. According to an embodiment, the receiving portion 540 may be manufactured by an injection process utilizing a molten resin. For example, the receiving portion 540 may include a through hole 541 and a plug 542. The through hole 541 may penetrate the receiving portion 540. The through hole 541 may be connected to the coupling groove 510. For example, an end of the through hole 541 may face the supporting portion 550 surrounding an outer surface of the receiving portion 540. Another end of the through hole 541 may face the coupling groove 510. The plug 542 may block introduction of the molten resin into the inside of the coupling groove 510 in a process of manufacturing the receiving portion 540. According to an embodiment, the plug 542 may be disposed inside the through hole 541. The plug 542 may fill at least a portion of the through hole 541. The plug 542 may be in contact with an inner surface of the through hole 541. The plug 542 may include a material different from the receiving portion 540. For example, the plug 542 may include urethane, but is not limited thereto.

[0060] The supporting portion 550 may define another portion of the outer surface of the strap 500. According to an embodiment, the supporting portion 550 may surround the receiving portion 540. The supporting portion 550 may include a material different from the receiving portion 540. The supporting portion 550 may be manufactured by an injection process utilizing a molten resin including a material different from a resin for manufacturing the receiving portion 540. According to an embodiment, the supporting portion 550 may have flexibility. For example, the supporting portion 550 may include a deformable material. The supporting portion 550 may be manufactured with rubber including fluorine, but is not limited thereto.

[0061] The elastic member 560 may provide an elastic force for restoring a position of the button 530 to the button 530. According to an embodiment, the elastic member 560 may be compressed or extended by the movement of the button 530. For example, the elastic member 560 may be referred to as a spring, but is not limited thereto. According to an embodiment, an end of the elastic member 560 may be in contact with the button 530. Another end of the elastic member 560 opposite to the end of the elastic member 560 may be spaced apart from the strap 500 in the first state of the button 530. The other end of the elastic member 560 may be in contact with the strap 500 in the second state of the button 530. When the strap 500 and the housing 410 are coupled, the button 530 may move in the first direction for expansion of the gap g1. The elastic member 560 may be pressed by the movement of the button 530 in the first direction (e.g., the -z direction). The elastic member 560 may compress the button 530 in the second direction when pressed by the button 530. As the button 530 moves in the second direction by compressing the elastic member 560, the gap g1 between the portion 530a of the button 530 and the inner surface 510c of the coupling groove 510 may be reduced. As the size of the gap g1 becomes smaller than the diameter of the pin 412, the coupling between the

strap 500 and the housing 410 may be completed.

[0062] As described above, the electronic device 400 according to an embodiment may provide a structure in which the housing 410 and the strap 500 are easily replaced by the button 530 that is movable in the first direction toward the other surface 500b of the strap 500 or in the second direction opposite to the first direction. The electronic device 400 according to an embodiment may provide a structure in which the strap 500 and the housing 410 may be coupled without compressing the button 530 by an external force transmitted directly from the user by the inclined surface 531 inclined with respect to the surface 500a of the strap 500.

[0063] FIG. 5A is a diagram illustrating a state in which an example electronic device according to an embodiment is worn by a user, and FIG. 5B is a cross-sectional view illustrating an example of cutting an example electronic device according to an embodiment.

[0064] Referring to FIG. 5A and FIG. 5B, according to an embodiment, in a state in which an electronic device 400 is worn by the user, a housing 410 may be in contact with a portion b1 of a body of the user. As the housing 410 is in contact with the portion b1 of the body of the user, the electronic device 400 may obtain data on the body of the user through the portion b1 of the body of the user.

[0065] According to an embodiment, in the state in which the electronic device 400 is worn by the user, a portion of a strap 500 may be spaced apart from the portion b1 of the body of the user. For example, in the state in which the electronic device 400 is worn by the user, a button 530 of the strap 500 may be spaced apart from the portion b1 of the body of the user.

[0066] According to an embodiment, the button 530 may include a first connection surface 532 and a second connection surface 533. The first connection surface 532 may be connected to an end 531a of an inclined surface 531. A pin 412 may be close to the end 531a of the inclined surface 531 among the end 531a of the inclined surface 531 and another end 531b of the inclined surface 531 opposite to the end 531a of the inclined surface 531. According to an embodiment, the first connection surface 532 may extend from the end 531a of the inclined surface 531 toward another surface 500b of the strap 500. For example, the first connection surface 532 may extend from the end 531a of the inclined surface 531 in a direction parallel to a first direction (e.g., -z direction). The first connection surface 532 may be parallel to the first direction. According to an embodiment, the first connection surface 532 may face the pin 412 in a first state of the button 530. The second connection surface 533 may be connected to the other end 531b of the inclined surface 531. The second connection surface 533 may extend in a second direction (e.g., +z direction) from the other end 531b of the inclined surface 531. The second connection surface 533 may be parallel to the second direction. The second connection surface 533 may be parallel to the first connection surface 532.

[0067] According to an embodiment, in a state in which

the strap 500 and the housing 410 are coupled, a distance d1 between a first point p1 of the pin 412 corresponding to a position of the end 531a of the inclined surface 531 and a second point p2 on an outer surface of the pin 412 may be greater than or equal to a radius of the pin 412. For example, in the first state of the button 530, the distance d1 between the first point p1 of the pin 412 and the second point p2 on the outer surface of the pin 412 may be greater than or equal to the radius of the pin 412. The first point p1 may mean a point spaced apart from the end 531a of the inclined surface 531 in a direction (e.g., +x direction) perpendicular to the first direction among points inside the pin 412. The first point p1 inside the pin 412 may be changed according to a movement of the button 530. For example, when the button 530 moves in the first direction, since the end 531a of the inclined surface 531 moves in the first direction, the first point p1 inside the pin 412 corresponding to the position of the end 531a of the inclined surface 531 may be changed. For example, the second point p2 may mean a point on the outer surface of the pin 412 spaced apart from the first point p1 in the first direction (e.g., -z direction). For example, the second point p2 may mean a point in contact with an inner surface of a coupling groove 510 among points on the outer surface of the pin 412. According to an embodiment, a center c1 of the pin 412 may be positioned on a straight line connecting the first point p1 and the second point p2. The second point p2 may be positioned on a straight line with the center c1 of the pin 412 and the first point p1.

[0068] According to an embodiment, the distance d1 between the first point p1 and the second point p2 may be 70% or more of a diameter of the pin 412. The distance d1 between the first point p1 and the second point p2 may be smaller than the diameter of the pin 412. For example, when the distance d1 between the first point p1 and the second point p2 is smaller in the first state of the button 530, the end 531a of the inclined surface 531 may be close to the other surface 500b of the strap 500. In case that the end 531a of the inclined surface 531 is closer to the other surface 500b of the strap 500, a size of a gap g1 between the button 530 and an inner surface 510c of the coupling groove 510 may increase. When the size of the gap g1 increases in the first state of the button 530, since the pin 412 may move to the outside of the coupling groove 510, the coupling between the strap 500 and the housing 410 may become unstable. Since the distance d1 between the first point p1 and the second point p2 is 70% or more of the diameter of the pin 412, the electronic device 400 according to an embodiment may provide a structure in which the coupling between the strap 500 and the housing 410 may be stably maintained.

[0069] According to an embodiment, the distance d1 between the first point p1 and the second point p2 may be changed according to the movement of the button 530. For example, the distance d1 between the first point p1 and the second point p2 may decrease as the button 530 moves in the first direction. The distance d1 between the

first point p1 and the second point p2 may increase as the button 530 moves in the second direction opposite to the first direction.

[0070] As described above, since the distance d1 between the first point p1 and the second point p2 is 70% or more of the diameter of the pin 412, the electronic device 400 according to an embodiment may provide a structure capable of blocking a movement of the pin 412 to the outside of the coupling groove 510 in the first state of the button 530.

[0071] FIG. 6A is an exploded perspective view of an example strap according to an embodiment. FIG. 6B is a perspective view of a button of an example strap according to an embodiment.

[0072] Referring to FIG. 6A and FIG. 6B, according to an embodiment, a strap 500 may include a fixing groove 543. The fixing groove 543 may couple a button 530 and a receiving portion 540. The fixing groove 543 may be disposed on an inner surface 500c of the strap 500. The inner surface 500c of the strap 500 may be perpendicular to a surface 500a of the strap 500. The inner surface 500c of the strap 500 may surround a receiving groove 520. For example, the fixing groove 543 may be formed as the inner surface 500c of the strap 500 is dented to the inside of the strap 500.

[0073] According to an embodiment, the button 530 may include a fixing protrusion 534, and a coupling protrusion 535. The fixing protrusion 534 may be coupled to the fixing groove 543. The fixing protrusion 534 may be accommodated inside the fixing groove 543. The fixing protrusion 534 may be disposed on a side surface 530c of the button 530. The side surface 530c of the button 530 may face the inner surface 500c of the strap 500. The fixing protrusion 534 may protrude from the side surface 530c of the button 530. For example, the fixing protrusion 534 may extend from the side surface 530c of the button 530 along a direction in which the side surface 530c of the button 530 faces. As the fixing protrusion 534 is inserted into the fixing groove 543, the button 530 may be coupled to the receiving portion 540.

[0074] The coupling protrusion 535 may couple an elastic member 560 and the button 530. The coupling protrusion 535 may extend in a first direction toward another surface 500b of the strap 500. The coupling protrusion 535 may be surrounded by the elastic member 560. The elastic member 560 may be coupled to the button 530 by winding the coupling protrusion 535.

[0075] As described above, an electronic device (e.g., the electronic device 400 of FIG. 4A, FIG. 4B, and FIG. 4C) according to an embodiment may provide a structure in which a strap 500 and a housing (e.g., the housing 410 of FIG. 4A, FIG. 4B, and FIG. 4C) are easily coupled, through a fixing protrusion 534 and a fixing groove 543 to prevent a button 530 from being separated.

[0076] The electronic device may include a strap for supporting the electronic device when the electronic device is worn by a user. The strap may surround a portion of a body of the user when the electronic device

is worn by the user. The strap may be detachably coupled to a housing of the electronic device. The electronic device may need a structure for easily separating or coupling the strap.

[0077] An electronic device (e.g., the electronic device 400 of FIG. 4A, FIG. 4B, and FIG. 4C) according to an embodiment may comprise a housing (e.g., the housing 410 of FIG. 4A, FIG. 4B, and FIG. 4C) including a pin (e.g., the pin 412 of FIG. 4A, FIG. 4B, and FIG. 4C). According to an embodiment, the electronic device may comprise a strap (e.g., the strap 500 of FIG. 4A, FIG. 4B, and FIG. 4C) detachably coupled to the housing. According to an embodiment, the strap may include a coupling groove (e.g., the coupling groove 510 of FIG. 4A, FIG. 4B and FIG. 4C) in which, when the strap is coupled to the housing, an end (e.g., the end 510a of FIG. 4B and FIG. 4C) surrounds the pin, and another end (e.g., the other end 510b of FIG. 4B and FIG. 4C) is open toward a surface (e.g., the surface 500a of FIG. 4A, FIG. 4B, and FIG. 4C) of the strap. According to an embodiment, the strap may include a button (e.g., the button 530 of FIG. 4B and FIG. 4C) including an inclined surface (e.g., the inclined surface 531 of FIG. 4B and FIG. 4C) that is inclined relative to the surface of the strap and is pressed by the pin when the strap is coupled to the housing, and wherein a portion (e.g., the portion 530a of FIG. 4B and FIG. 4C) of the button is disposed inside the coupling groove, and another portion of the button is disposed outside the coupling groove. According to an embodiment, a gap (e.g., the gap g1 of FIG. 4B and FIG. 4C) between the portion of the button and the pin may be expanded as the button moves in a first direction toward another surface (e.g., the other surface 500b of FIG. 4B and FIG. 4C) of the strap opposite to the surface of the strap, and may be reduced as the button moves in a second direction opposite to the first direction.

[0078] The electronic device according to an embodiment may provide a structure capable of easily coupling or separating the strap and the housing by the button that is movable in a direction toward the other surface of the strap or in a direction away from the other surface of the strap.

[0079] According to an embodiment, in a state where the strap and the housing are coupled, a distance (e.g., the distance d1 of FIG. 5B) between a first point (e.g., the first point p1 of FIG. 5B) of the pin corresponding to a position of an end (e.g., the end 531a of FIG. 5B) of the inclined surface, and a second point (e.g., the second point p2 of FIG. 5B) on an outer surface of the pin spaced apart from the first point in the first direction and positioned on a straight line with the first point and a center of the pin may be 70% or more of a diameter of the pin.

[0080] In the state where the strap and the housing are coupled, since the distance between the first point and the second point is 70% or more of the diameter of the pin, the electronic device according to an embodiment may provide a structure in which the coupling between the strap and the housing may be stably maintained.

[0081] According to an embodiment, the distance between the first point and the second point may be decreased as the button moves in the first direction, and increased as the button moves in the second direction.

[0082] The electronic device according to an embodiment may provide the structure capable of easily coupling or separating the strap and the housing by the button that is movable in the first direction or the second direction opposite to the first direction.

[0083] According to an embodiment, the strap may include an elastic member (e.g., the elastic member 560 of FIG. 4B and FIG. 4C) that presses the button in the second direction when compressed by the button.

[0084] The electronic device according to an embodiment may provide a structure in which a position of the button is restored in a state in which an external force is removed by the elastic member providing an elastic force to the button.

[0085] According to the embodiment, the button may include a coupling protrusion (e.g., the coupling protrusion 535 of FIG. 6B) extending in the first direction and surrounded by the elastic member.

[0086] The electronic device according to an embodiment may provide a structure capable of coupling the elastic member and the button, through the coupling protrusion.

[0087] According to an embodiment, a portion of the coupling groove may be inclined relative to the surface of the strap.

[0088] The electronic device according to an embodiment may provide a structure capable of guiding a movement of the pin when the strap and the housing are coupled, through the portion of the coupling groove inclined relative to the surface of the strap.

[0089] According to an embodiment, the strap may include a receiving portion (e.g., the receiving portion 540 of FIG. 4A, FIG. 4B, and FIG. 4C), surrounding the button, forming the coupling groove. According to an embodiment, the strap may include a supporting portion (e.g., the supporting portion 550 of FIG. 4A, FIG. 4B, and FIG. 4C), surrounding the receiving portion, including a different material from the receiving portion.

[0090] The electronic device according to an embodiment may provide the structure capable of easily coupling or separating the strap and the housing by the receiving portion and the supporting portion of the strap manufactured from different materials.

[0091] According to an embodiment, the receiving portion may include a through hole in which an end is connected to the supporting portion disposed on an outer surface of the receiving portion, and another end is connected to the coupling groove. According to an embodiment, the strap may include a plug (e.g., the plug 542 of FIG. 4B and FIG. 4C) disposed inside the through hole (e.g., the through hole 541 of FIG. 4B and FIG. 4C), including a different material from the receiving portion.

[0092] The electronic device according to an embodiment may provide a structure capable of blocking a

material for forming the supporting portion from introducing into the coupling groove in a manufacturing process of the strap, through the plug filling the through hole of the receiving portion.

[0093] According to an embodiment, the strap may include a fixing groove (e.g., the fixing groove 543 of FIG. 6A), disposed on an inner surface of the strap forming the coupling groove. According to an embodiment, the button may include a fixing protrusion (e.g., the fixing protrusion 534 of FIG. 6A), disposed on a side surface of the button facing the inner surface of the strap, and accommodated within the fixing groove.

[0094] The electronic device according to an embodiment may provide the structure capable of easily coupling or separating the strap and the housing by the fixing groove capable of fixing the button to the receiving portion.

[0095] According to an embodiment, a state of the button may be changeable between a first state in which another portion (e.g., the other portion 530b of FIG. 4A, FIG. 4B, and FIG. 4C) of the button protrudes from a surface of the strap, and a second state in which the other portion of the button is disposed inside the strap.

[0096] Since the button protrudes from the surface of the strap in the first state of the button, the electronic device according to an embodiment may provide a structure in which compressing of the button is easy.

[0097] According to an embodiment, the portion of the button may be accommodated inside the coupling groove when the state of the button is the first state. According to an embodiment, the portion of the button may be disposed outside the coupling groove when the state of the button is the second state.

[0098] The electronic device according to an embodiment may provide the structure capable of easily coupling or separating the strap and the housing by the button movable relative to the coupling groove.

[0099] According to an embodiment, the button may include a first connection surface (e.g., the first connection surface 532 of FIG. 5B), connected to the end (e.g., the end 531a of FIG. 5B) of the inclined surface, facing the pin, and parallel to the first direction. According to an embodiment, the button may include a second connecting surface (e.g., the second connection surface 533 of FIG. 5B), connected to another end (e.g., the other end 531b of FIG. 5B) of the inclined surface, parallel to the first direction.

[0100] The electronic device according to an embodiment may provide the structure capable of easily coupling or separating the strap and the housing by the button including a structure for guiding the movement of the pin when the strap and the housing are coupled.

[0101] According to an embodiment, the surface of the strap may be bent with a curvature.

[0102] Since the strap is bent, the electronic device according to an embodiment may have a shape corresponding to a body of a wearer.

[0103] According to an embodiment, the strap may be

rotatable with respect to the housing in a state when coupled to the housing.

[0104] Since the strap is rotatable with respect to the housing, the electronic device according to an embodiment may provide a structure in which a user may conveniently wear the electronic device.

[0105] According to an embodiment, the strap may have flexibility.

[0106] Since the strap has the flexibility, the electronic device according to an embodiment may provide the structure in which the user conveniently wears the electronic device.

[0107] An electronic device according to an embodiment may comprise a housing (e.g., the housing 410 of FIG. 4A, FIG. 4B, and FIG. 4C) that includes a first surface (e.g., the second surface 410b of FIG. 4A) facing a portion of a body of a user when the electronic device is worn by the user, a side surface (e.g., the side surface 410c of FIG. 4A) surrounding the first surface, a protrusion (e.g., the protrusion 411 of FIG. 4A) extending from the side surface, and a pin (e.g., the pin 412 of FIG. 4A, FIG. 4B, and FIG. 4C) penetrating the protrusion. According to an embodiment, the electronic device may comprise a strap (e.g., the strap 500 of FIG. 4A, FIG. 4B, and FIG. 4C) detachably coupled to the housing, wherein a surface of the strap surrounds the portion of the body of the user when the electronic device is worn by the user. According to an embodiment, the strap may include a coupling groove (e.g., the coupling groove 510 of FIG. 4A, FIG. 4B and FIG. 4C), wherein, when the strap is coupled to the housing, an end (e.g., the end 510a of FIG. 4B, and FIG. 4C) of the coupling groove surrounds the pin, and another end (e.g., the other end 510b of FIG. 4B, and FIG. 4C) of the coupling groove opens toward a surface (e.g., the surface 500a of FIG. 4A, FIG. 4B, and FIG. 4C) of the strap. According to an embodiment, the strap may include a button (e.g., the button 530 of FIG. 4B and FIG. 4C) including an inclined surface (e.g., the inclined surface 531 of FIG. 4B and FIG. 4C) that has an incline with respect to the surface of the strap and is slidable relative to the pin when the strap is coupled to the housing, and wherein a portion (e.g., the portion 530a of FIG. 4B and FIG. 4C) of the button is disposed inside the coupling groove and another portion of the button is disposed outside the coupling groove. According to an embodiment, the strap may include an elastic member (e.g., the elastic member 560 of FIG. 4B and FIG. 4C), coupled to another portion (e.g., the other portion 530b of FIG. 4A, FIG. 4B and FIG. 4C) of the button, deformable according to a movement of the button. According to an embodiment, a gap (e.g., the gap g1 of FIG. 4B and FIG. 4C) between the portion of the button and the pin may be expanded as the button moves in a first direction toward another surface (e.g., the other surface 500b of FIG. 4B and FIG. 4C) of the strap opposite to the surface of the strap, and may be reduced as the button moves in a second direction opposite to the first direction.

[0108] The electronic device according to an embodi-

ment may provide a structure capable of easily coupling or separating the strap and the housing by the button that is movable in a direction toward the other surface of the strap or in a direction away from the other surface of the strap.

[0109] According to an embodiment, in a state where the strap and the housing are coupled, a distance between a first point of the pin corresponding to a position of an end of the inclined surface and a second point on an outer surface of the pin spaced apart from the first point in the first direction may be 70% or more of a diameter of the pin.

[0110] In the state where the strap and the housing are coupled, since the distance between the first point and the second point is 70% or more of the diameter of the pin, the electronic device according to an embodiment may provide a structure in which the coupling between the strap and the housing may be stably maintained.

[0111] According to an embodiment, the button may include a coupling protrusion, extending in the first direction, surrounded by the elastic member.

[0112] The electronic device according to an embodiment may provide a structure capable of coupling the elastic member and the button through the coupling protrusion.

[0113] According to an embodiment, a portion of the coupling groove may be parallel to the inclined surface.

[0114] The electronic device according to an embodiment may provide a structure capable of guiding the movement of the pin when the strap and the housing are coupled through the portion of the coupling groove parallel to the inclined surface of the button.

[0115] According to an embodiment, the portion of the coupling groove may be parallel to the inclined surface.

[0116] According to an embodiment, the strap may include a fixing groove (e.g., the fixing groove 543 of FIG. 6A), disposed on an inner surface of the strap perpendicular to the surface of the strap. According to an embodiment, the button may include a fixing protrusion (e.g., the fixing protrusion 534 of FIG. 6A), disposed on a side surface of the button facing the inner surface of the strap, and accommodated within the fixing groove.

[0117] The electronic device according to an embodiment may provide the structure capable of easily coupling or separating the strap and the housing by the fixing groove capable of fixing the button to a receiving portion.

[0118] The electronic device according to various embodiments may be one of various types of electronic devices. The electronic devices may include, for example, a portable communication device (e.g., a smartphone), a computer device, a portable multimedia device, a portable medical device, a camera, a wearable device, or a home appliance. According to an embodiment of the disclosure, the electronic devices are not limited to those described above.

[0119] It should be appreciated that various embodiments of the present disclosure and the terms used therein are not intended to limit the technological features

set forth herein to particular embodiments and include various changes, equivalents, or replacements for a corresponding embodiment. With regard to the description of the drawings, similar reference numerals may be used to refer to similar or related elements. It is to be understood that a singular form of a noun corresponding to an item may include one or more of the things unless the relevant context clearly indicates otherwise. As used herein, each of such phrases as "A or B," "at least one of A and B," "at least one of A or B," "A, B, or C," "at least one of A, B, and C," and "at least one of A, B, or C," may include any one of or all possible combinations of the items enumerated together in a corresponding one of the phrases. As used herein, such terms as "1st" and "2nd," or "first" and "second" may be used to simply distinguish a corresponding component from another, and does not limit the components in other aspect (e.g., importance or order). It is to be understood that if an element (e.g., a first element) is referred to, with or without the term "operatively" or "communicatively", as "coupled with," or "connected with" another element (e.g., a second element), it means that the element may be coupled with the other element directly (e.g., via a wire), wirelessly, or via a third element.

[0120] As used in connection with various embodiments of the disclosure, the term "module" may include a unit implemented in hardware, software, or firmware, and may interchangeably be used with other terms, for example, "logic," "logic block," "part," or "circuitry". A module may be a single integral component, or a minimum unit or part thereof, adapted to perform one or more functions. For example, according to an embodiment, the module may be implemented in a form of an application-specific integrated circuit (ASIC).

[0121] Various embodiments as set forth herein may be implemented as software (e.g., the program 140) including one or more instructions that are stored in a storage medium (e.g., internal memory 136 or external memory 138) that is readable by a machine (e.g., the electronic device 101). For example, a processor (e.g., the processor 120) of the machine (e.g., the electronic device 101) may invoke at least one of the one or more instructions stored in the storage medium, and execute it, with or without using one or more other components under the control of the processor. This allows the machine to be operated to perform at least one function according to the at least one instruction invoked. The one or more instructions may include a code generated by a compiler or a code executable by an interpreter. The machine-readable storage medium may be provided in the form of a non-transitory storage medium. Wherein, the term "non-transitory" simply means that the storage medium is a tangible device, and does not include a signal (e.g., an electromagnetic wave), but this term does not differentiate between a case in which data is semi-permanently stored in the storage medium and a case in which the data is temporarily stored in the storage medium.

[0122] According to an embodiment, a method according to various embodiments of the disclosure may be included and provided in a computer program product. The computer program product may be traded as a product between a seller and a buyer. The computer program product may be distributed in the form of a machine-readable storage medium (e.g., compact disc read only memory (CD-ROM)), or be distributed (e.g., downloaded or uploaded) online via an application store (e.g., PlayStore™), or between two user devices (e.g., smart phones) directly. If distributed online, at least part of the computer program product may be temporarily generated or at least temporarily stored in the machine-readable storage medium, such as memory of the manufacturer's server, a server of the application store, or a relay server.

[0123] According to various embodiments, each component (e.g., a module or a program) of the above-described components may include a single entity or multiple entities, and some of the multiple entities may be separately disposed in different components. According to various embodiments, one or more of the above-described components may be omitted, or one or more other components may be added. Alternatively or additionally, a plurality of components (e.g., modules or programs) may be integrated into a single component. In such a case, according to various embodiments, the integrated component may still perform one or more functions of each of the plurality of components in the same or similar manner as they are performed by a corresponding one of the plurality of components before the integration. According to various embodiments, operations performed by the module, the program, or another component may be carried out sequentially, in parallel, repeatedly, or heuristically, or one or more of the operations may be executed in a different order or omitted, or one or more other operations may be added.

Claims

1. An electronic device (101; 200; 400), comprising:
 - a housing (410) including a pin (412); and
 - a strap (500) detachably coupled to the housing (410),
 - wherein the strap (500) includes:
 - a coupling groove (510) in which, when the strap (500) is coupled to the housing (410), an end (510a) surrounds the pin (412) and another end (510b) is open toward a surface (500a) of the strap (500); and
 - a button (530) including an inclined surface (531) that has an incline with respect to the surface (500a) of the strap (500) and is slidable relative to the pin (412) when the strap (500) is coupled to the housing (410),

- and wherein a portion (530a) of the button (530) is movable into or out of the coupling groove (510),
- wherein a gap (g1) between the portion (530a) of the button (530) and an inner surface (510c) of the coupling groove (510) is expanded as the button (530) moves in a first direction toward another surface (500b) of the strap (500) opposite to the surface (500a) of the strap (500), and is reduced as the button (530) moves in a second direction opposite to the first direction.
2. The electronic device (101; 200; 400) of claim 1, wherein, in a state where the strap (500) and the housing (410) are coupled, a distance between a first point (p1) of the pin (412) corresponding to a position of an end (531a) of the inclined surface (531) and a second point (p2) on an outer surface of the pin (412) spaced apart from the first point (p1) in the first direction is 70% or more of a diameter of the pin (412).
 3. The electronic device (101; 200; 400) of any one of claims 1 and 2, wherein the distance between the first point (p1) and the second point (p2) decreases as the button (530) moves in the first direction, and increases as the button (530) moves in the second direction.
 4. The electronic device (101; 200; 400) of any one of claims 1 to 3, wherein the strap (500) further includes an elastic member (560) that presses the button (530) in the second direction when compressed by the button (530).
 5. The electronic device (101; 200; 400) of any one of claims 1 to 4, wherein the button (530) further includes a coupling protrusion (535) extending in the first direction and surrounded by the elastic member (560).
 6. The electronic device (101; 200; 400) of any one of claims 1 to 5, wherein a portion of the coupling groove (510) is parallel to the inclined surface (531).
 7. The electronic device (101; 200; 400) of any one of claims 1 to 6, wherein the strap (500) further includes:

a receiving portion (540), surrounding the button (530), defining the coupling groove (510); and

a supporting portion (550), surrounding the receiving portion (540), including a different material from the receiving portion (540).
 8. The electronic device (101; 200; 400) of any one of claims 1 to 7, wherein the receiving portion (540) further includes a through hole (541), penetrating the receiving portion (540), connected to the coupling groove (510), wherein the strap (500) further includes a plug (542), disposed inside the through hole (541), including a different material from the receiving portion (540).
 9. The electronic device (101; 200; 400) of any one of claims 1 to 8, wherein the strap (500) further includes a fixing groove (543), disposed on an inner surface of the strap (500) perpendicular to a surface of the strap (500), wherein the button (530) further includes a fixing protrusion (534), disposed on a side surface of the button (530) facing the inner surface of the strap (500), and coupled within the fixing groove (543).
 10. The electronic device (101; 200; 400) of any one of claims 1 to 9, wherein a state of the button (530) is changeable between:

a first state in which another portion (530b) of the button (530) protrudes from a surface of the strap (500); and

a second state in which the another portion (530b) of the button (530) is disposed inside the strap (500).
 11. The electronic device (101; 200; 400) of any one of claims 1 to 10, wherein the portion (530a) of the button (530) is:

disposed inside the coupling groove (510) when the state of the button (530) is the first state; and

disposed outside the coupling groove (510) when the state of the button (530) is the second state.
 12. The electronic device (101; 200; 400) of any one of claims 1 to 11, wherein the button (530) further includes:

a first connection surface (532), connected to the end (531a) of the inclined surface (531), facing the pin (412), and parallel to the first direction; and

a second connecting surface (533), connected to another end of the inclined surface (531), parallel to the first direction.

13. The electronic device (101; 200; 400) of any one of claims 1 to 12, wherein the surface (500a) of the strap (500) is bent with a curvature. 5
14. The electronic device (101; 200; 400) of any one of claims 1 to 13, wherein the strap (500) is rotatable with respect to the housing (410) when coupled to the housing (410). 10
15. The electronic device (101; 200; 400) of any one of claims 1 to 14, wherein the strap (500) is deformable by an external force by including an elastically deformable material. 15

20

25

30

35

40

45

50

55

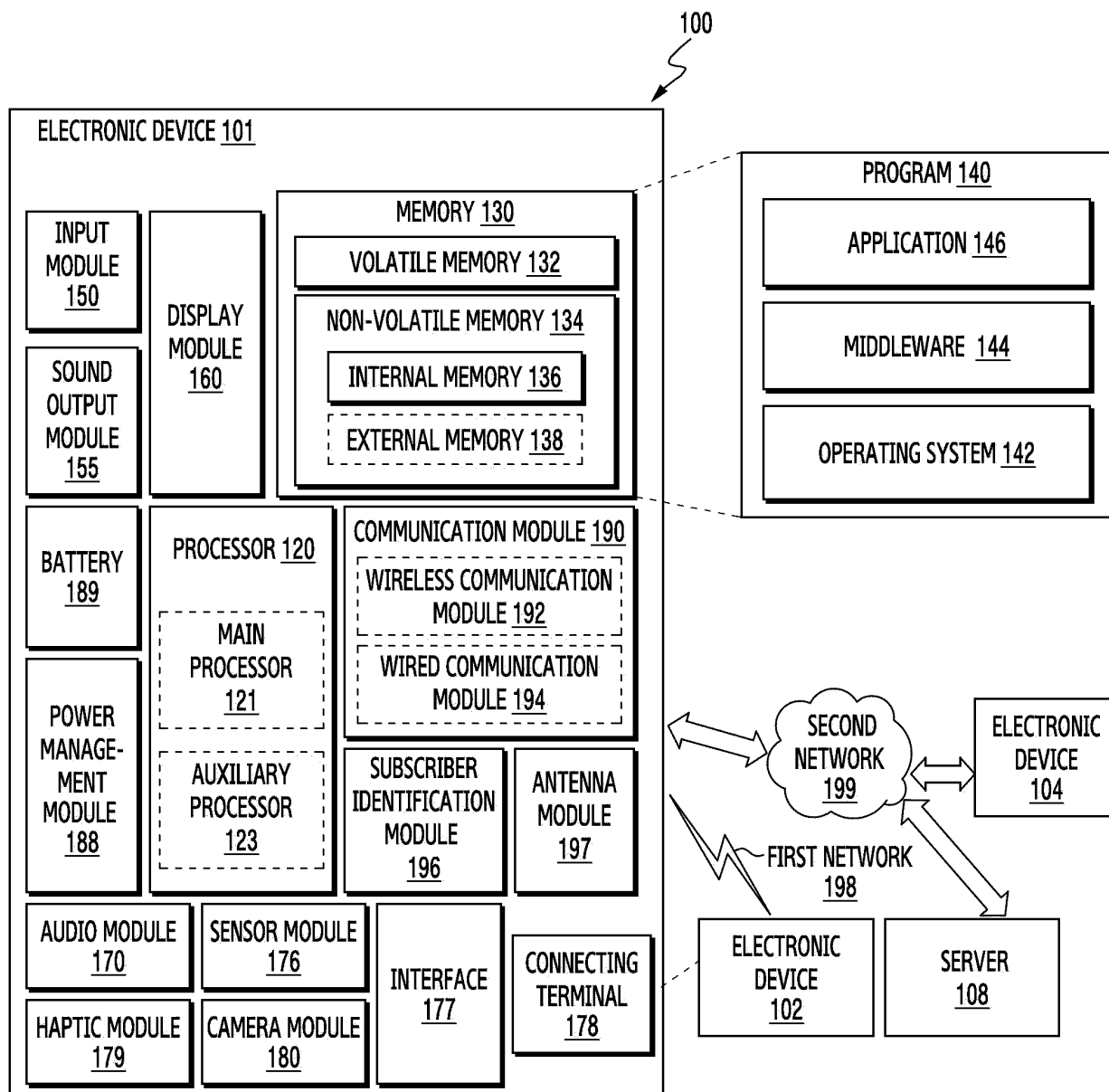


FIG. 1

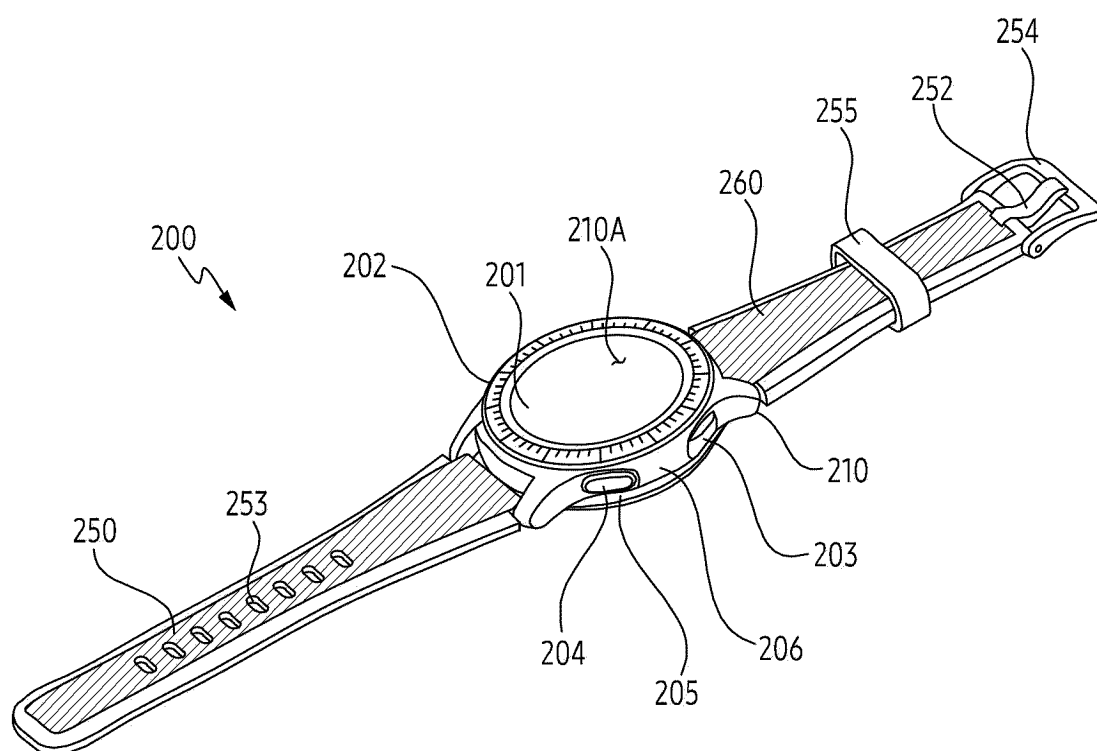


FIG. 2A

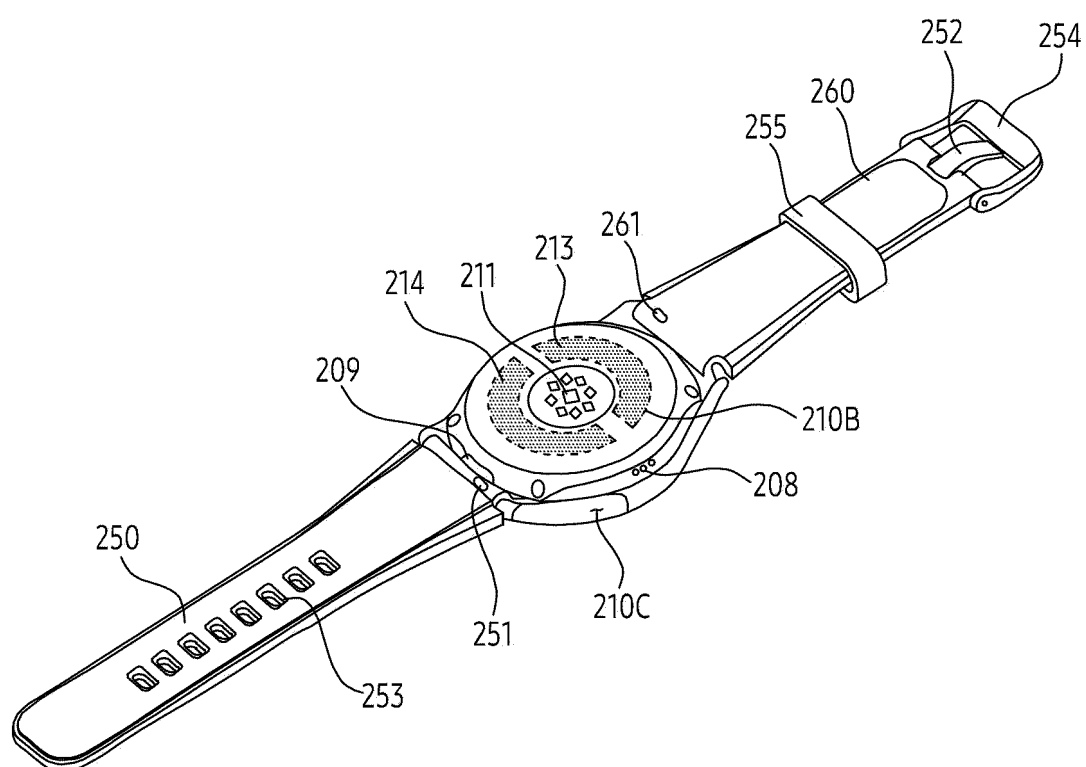


FIG. 2B

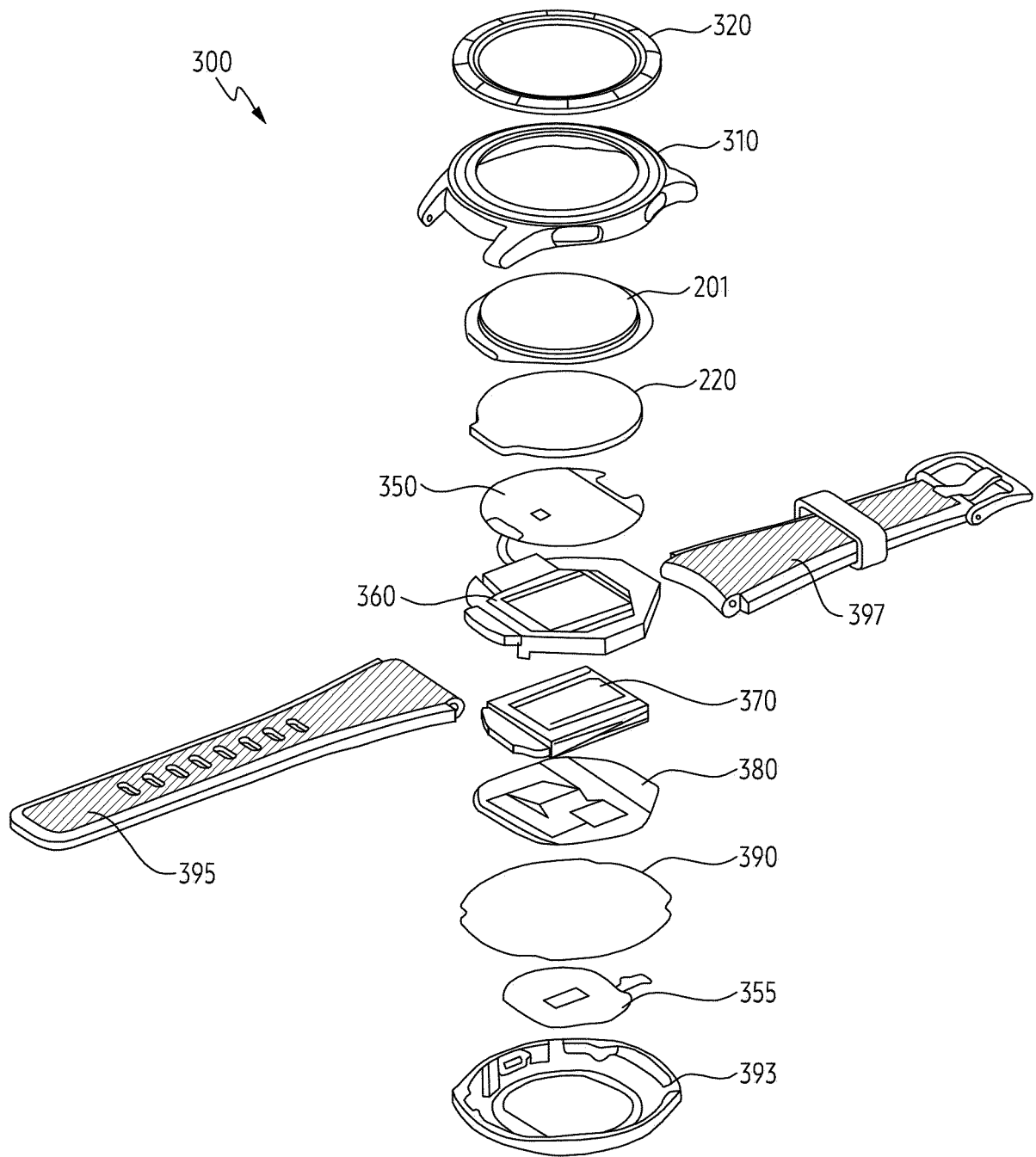


FIG. 3

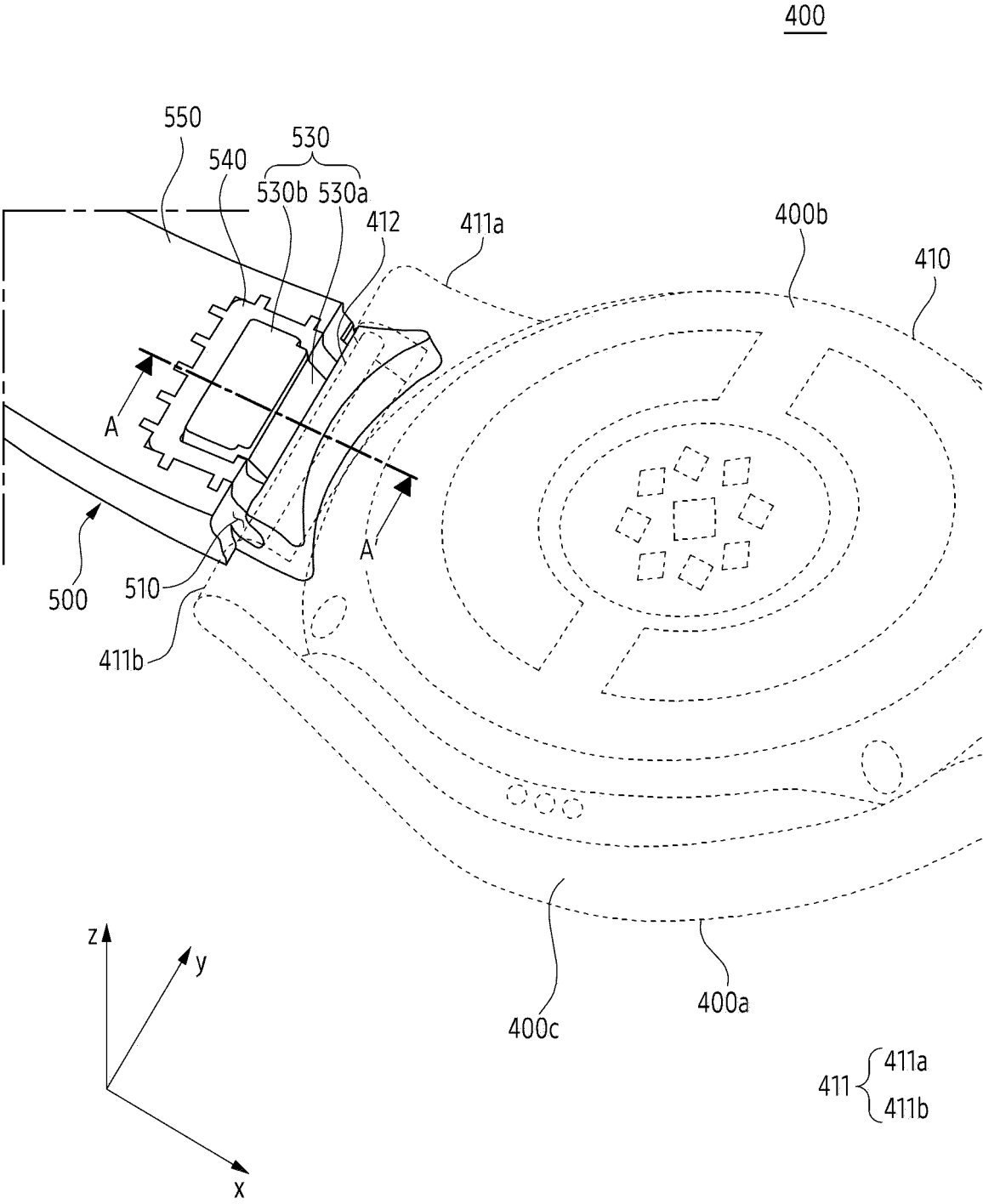


FIG. 4A

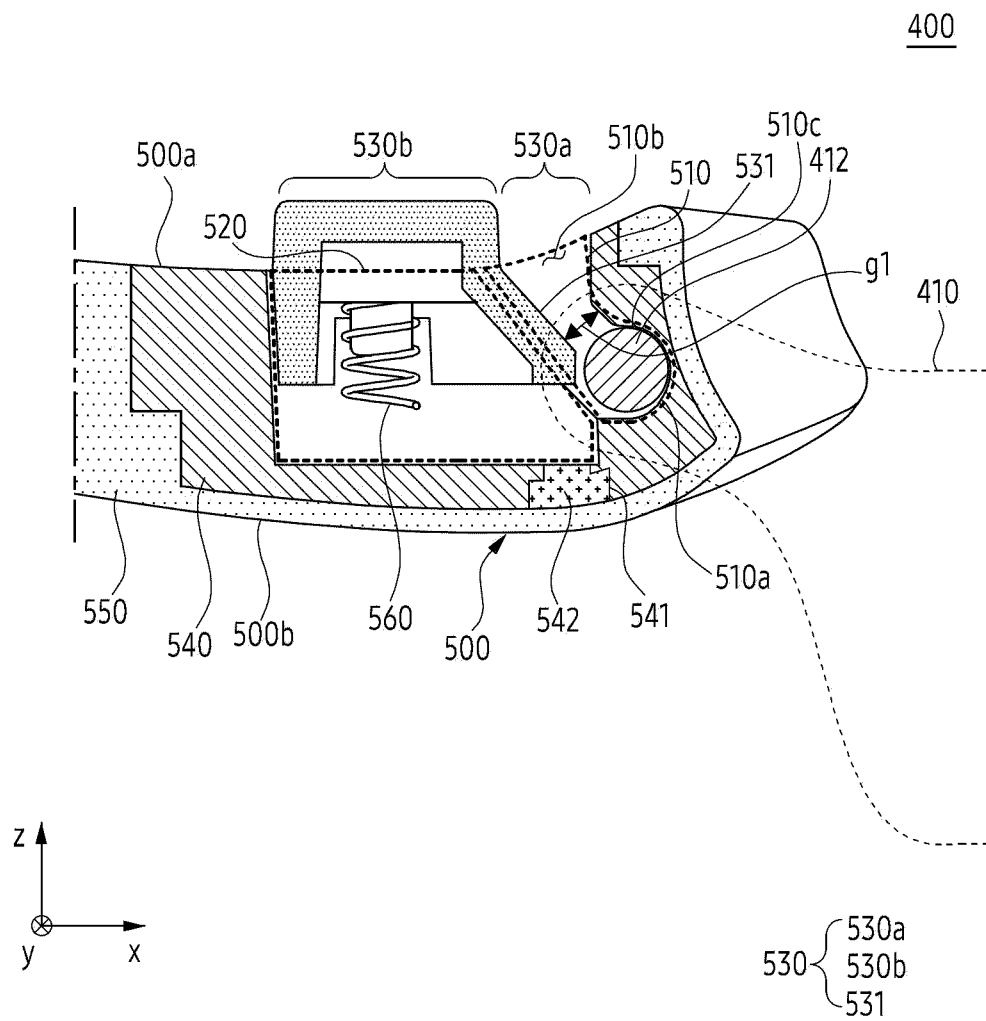


FIG. 4B

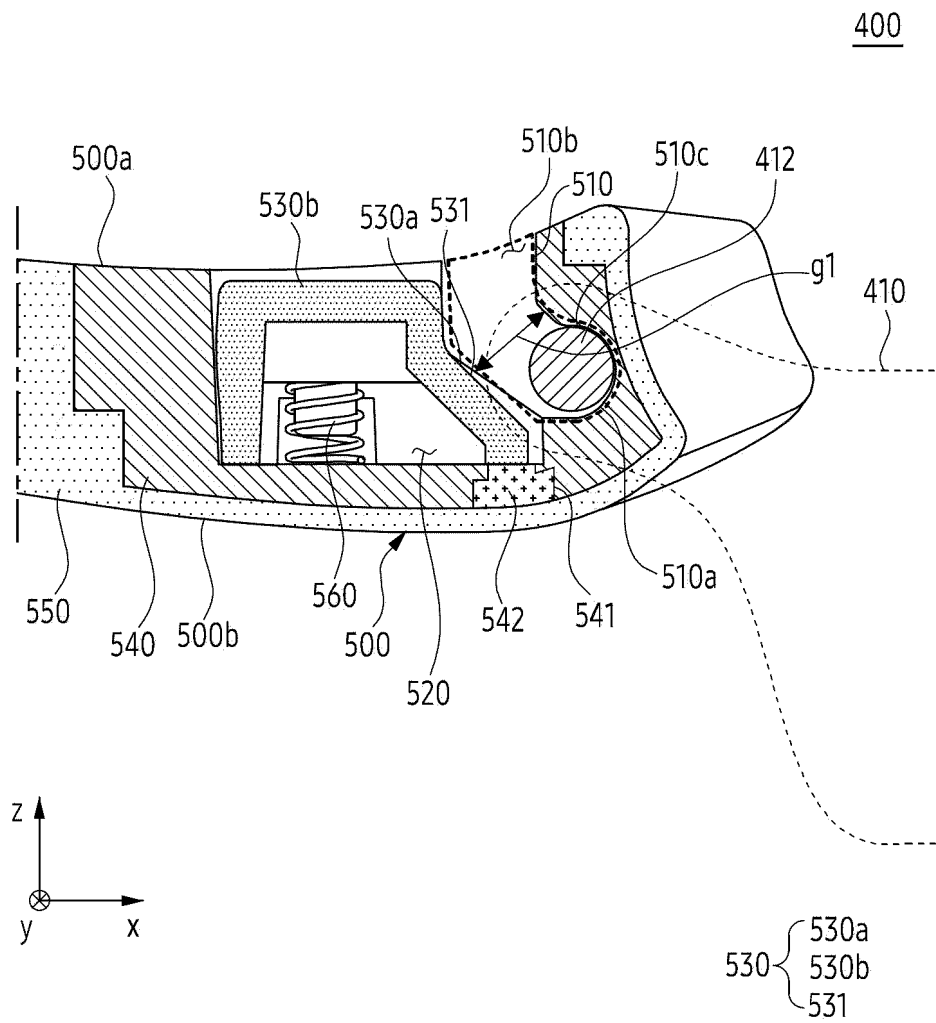


FIG. 4C

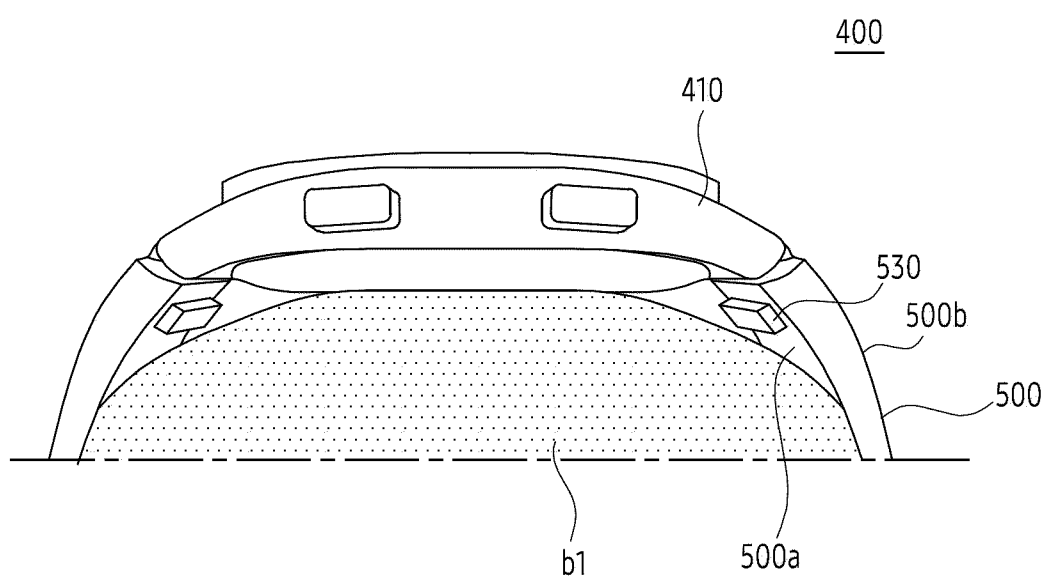


FIG. 5A

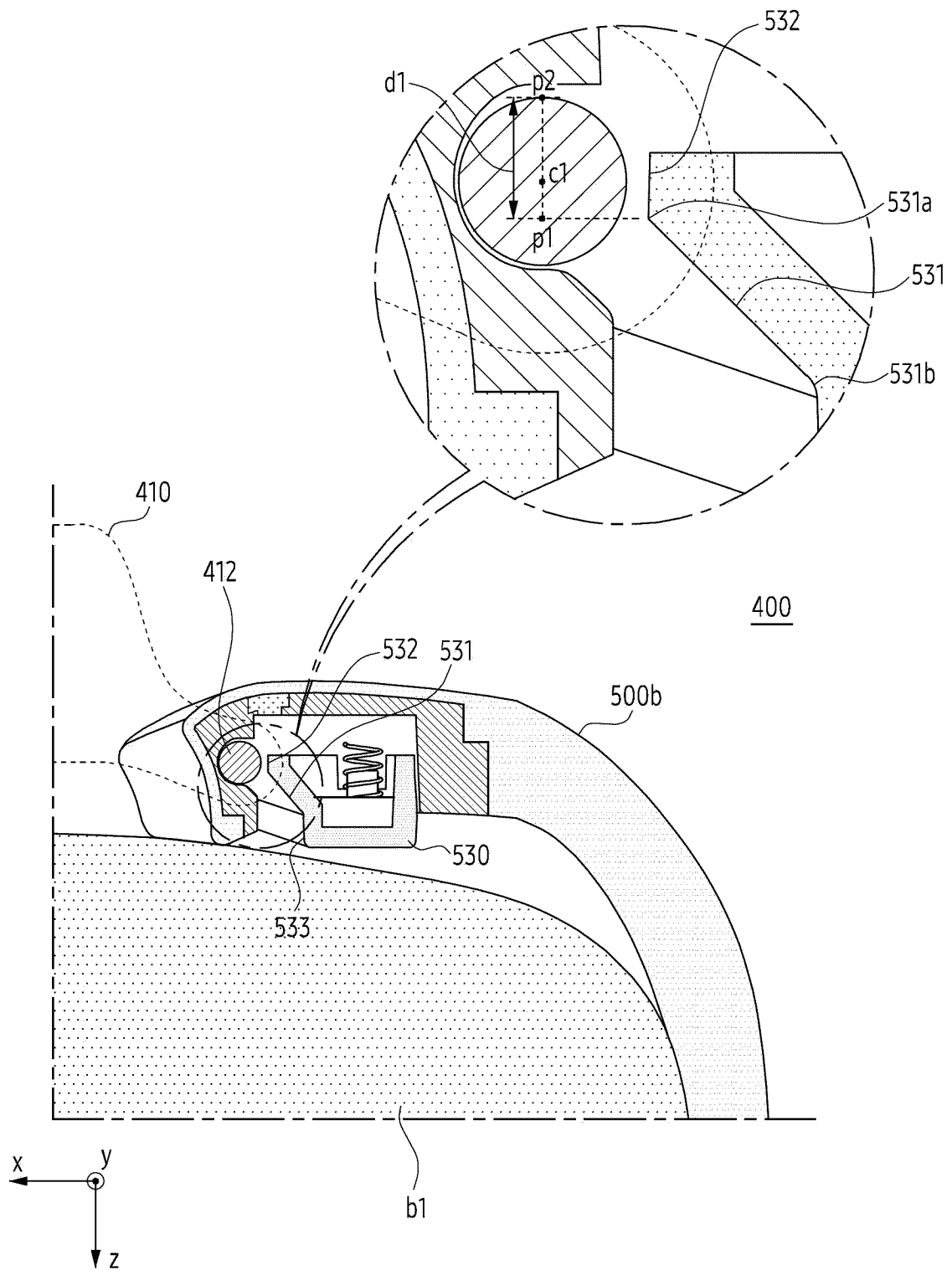


FIG. 5B

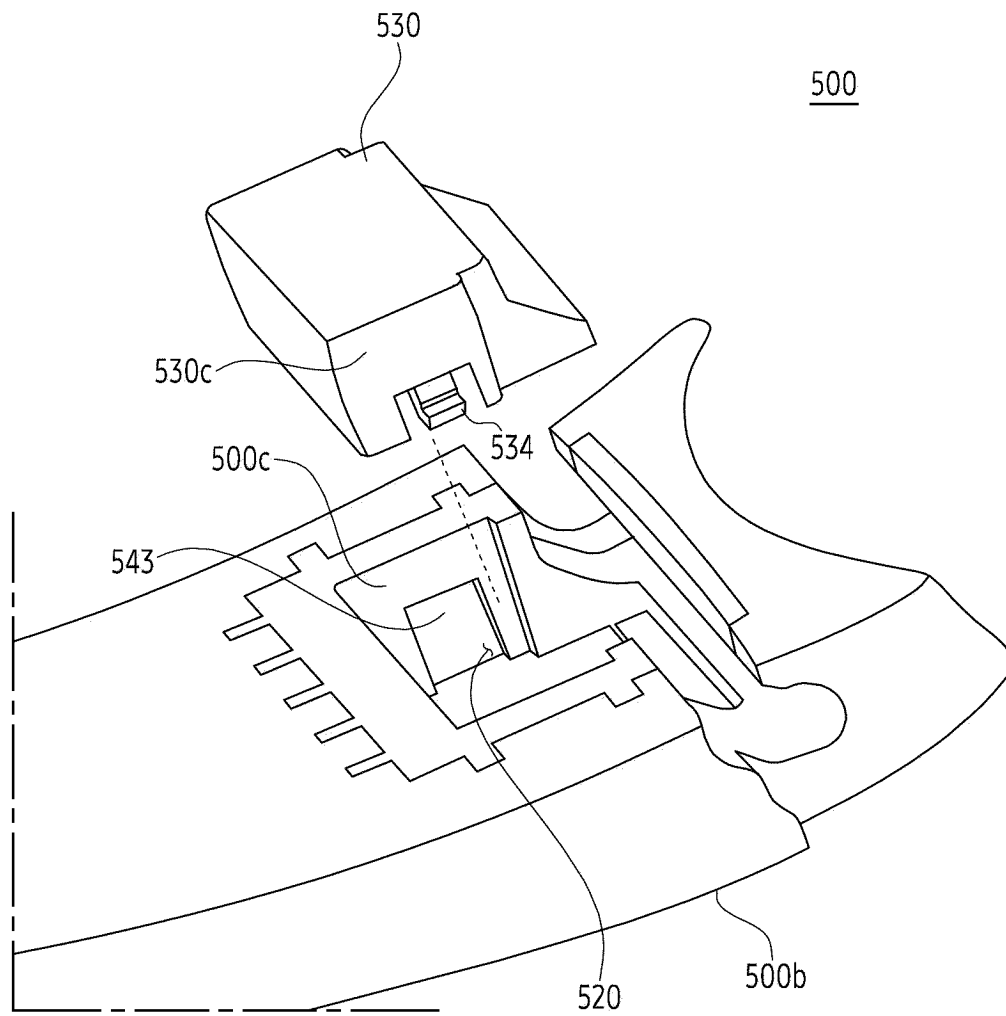


FIG. 6A

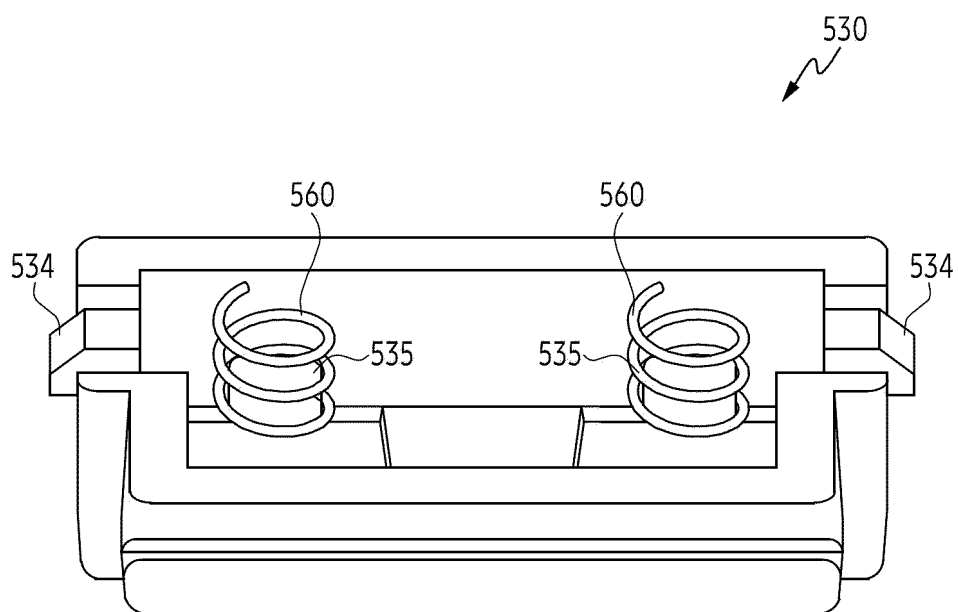


FIG. 6B

INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2023/009270

A. CLASSIFICATION OF SUBJECT MATTER

A44C 5/14(2006.01)i; G04B 37/14(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A44C 5/14(2006.01); A44B 11/00(2006.01); A44C 5/00(2006.01); A44C 5/18(2006.01); G04B 37/16(2006.01); G04G 17/00(2006.01); G06F 1/16(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above

Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & keywords: 시계(watch), 버튼(button), 스트랩(strap), 스프링(spring), 탈착(detachable)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2020-074841 A (SEIKO EPSON CORP.) 21 May 2020 (2020-05-21) See paragraphs [0019]-[0051] and figures 1-7.	1,4,6,10-15
Y		5,7-9
A		2-3
Y	KR 10-2234724 B1 (SAMSUNG ELECTRONICS CO., LTD.) 01 April 2021 (2021-04-01) See paragraph [0043] and figures 1-6.	5
Y	CN 112230533 A (GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.) 15 January 2021 (2021-01-15) See paragraphs [0065] and [0091]-[0094] and figures 4-5 and 13.	7-9
A	CN 112120364 A (GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.) 25 December 2020 (2020-12-25) See figures 1-4.	1-15

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“D” document cited by the applicant in the international application

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

19 October 2023

Date of mailing of the international search report

19 October 2023

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon Building 4, 189 Cheongsaro, Seo-gu, Daejeon 35208

Facsimile No. +82-42-481-8578

Authorized officer

Telephone No.

Form PCT/ISA/210 (second sheet) (July 2022)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2023/009270

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2020-0141163 A (SAMSUNG ELECTRONICS CO., LTD.) 18 December 2020 (2020-12-18) See figure 3.	1-15

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2023/009270

5

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2020-074841 A	21 May 2020	CN 111134428 A	12 May 2020
		CN 111134428 B	13 December 2022
		JP 7192410 B2	20 December 2022
		US 11460812 B2	04 October 2022
		US 2020-0142358 A1	07 May 2020
KR 10-2234724 B1	01 April 2021	CN 105433519 A	30 March 2016
		CN 105433519 B	24 April 2020
		EP 3000345 A1	30 March 2016
		EP 3000345 B1	26 April 2017
		US 2016-0081440 A1	24 March 2016
		US 9750316 B2	05 September 2017
CN 112230533 A	15 January 2021	None	
CN 112120364 A	25 December 2020	WO 2020-259158 A1	30 December 2020
KR 10-2020-0141163 A	18 December 2020	US 11564461 B2	31 January 2023
		US 2020-0383434 A1	10 December 2020

Form PCT/ISA/210 (patent family annex) (July 2022)