US 20250267804A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2025/0267804 A1**

KANG et al. (43) **Pub. Date: Aug. 21, 2025**

(54) **ELECTRONIC DEVICE COMPRISING DRIVING MOTOR**

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(21) Appl. No.: **19/176,699**

(22) Filed: **Apr. 11, 2025**

Related U.S. Application Data

(63) Continuation of application No. PCT/KR2023/014976, filed on Sep. 27, 2023.

(30) **Foreign Application Priority Data**

Oct. 12, 2022 (KR) 10-2022-0130533
Dec. 2, 2022 (KR) 10-2022-0166853

Publication Classification

(51) **Int. Cl.**
H05K 5/02 (2006.01)

(52) **U.S. Cl.**
CPC ***H05K 5/0217*** (2013.01)

(57) **ABSTRACT**

An electronic device comprises: a first housing; a second housing slidably coupled to first housing; a flexible display having a display area that varies based on a slide-in or slide-out state of the second housing; a driving motor disposed in the second housing and including a pinion gear; a rack fixedly coupled to the first housing and including a rack gear driven by being gear-coupled to the pinion gear; a rack guide disposed in the second housing and protecting the rack; a multi-bar supporting the rear surface of one portion of the flexible display; and a driving belt connected to one end of the multi-bar and one end of the second housing, wherein the rack guide is disposed on the side of the driving motor to spatially overlap with electrical components disposed in the second housing, and the second housing is configured to be driven to slide-in or slide-out.

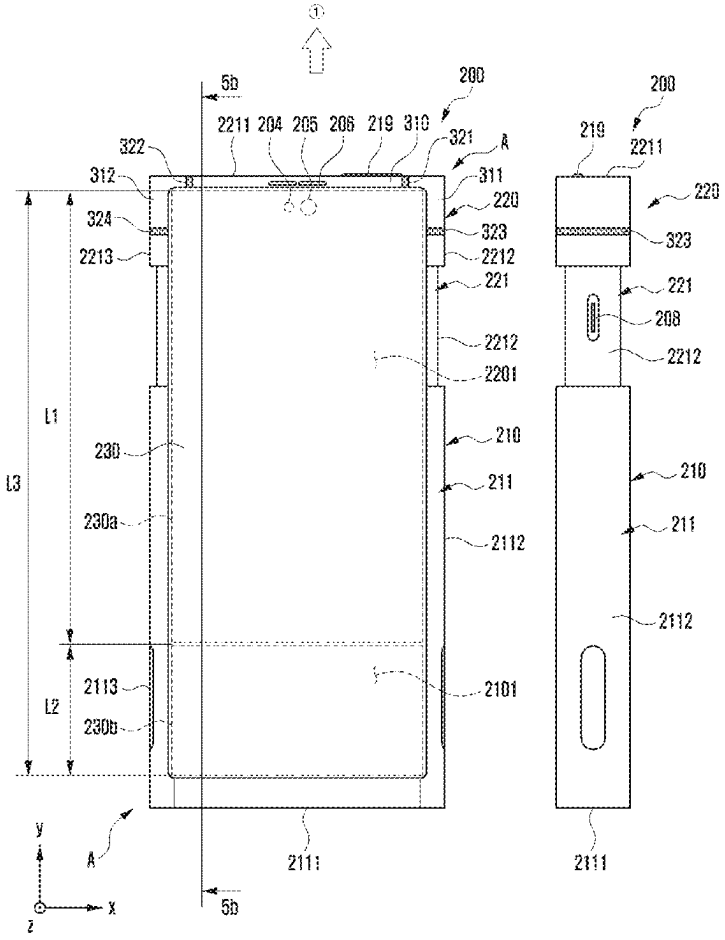


FIG. 1

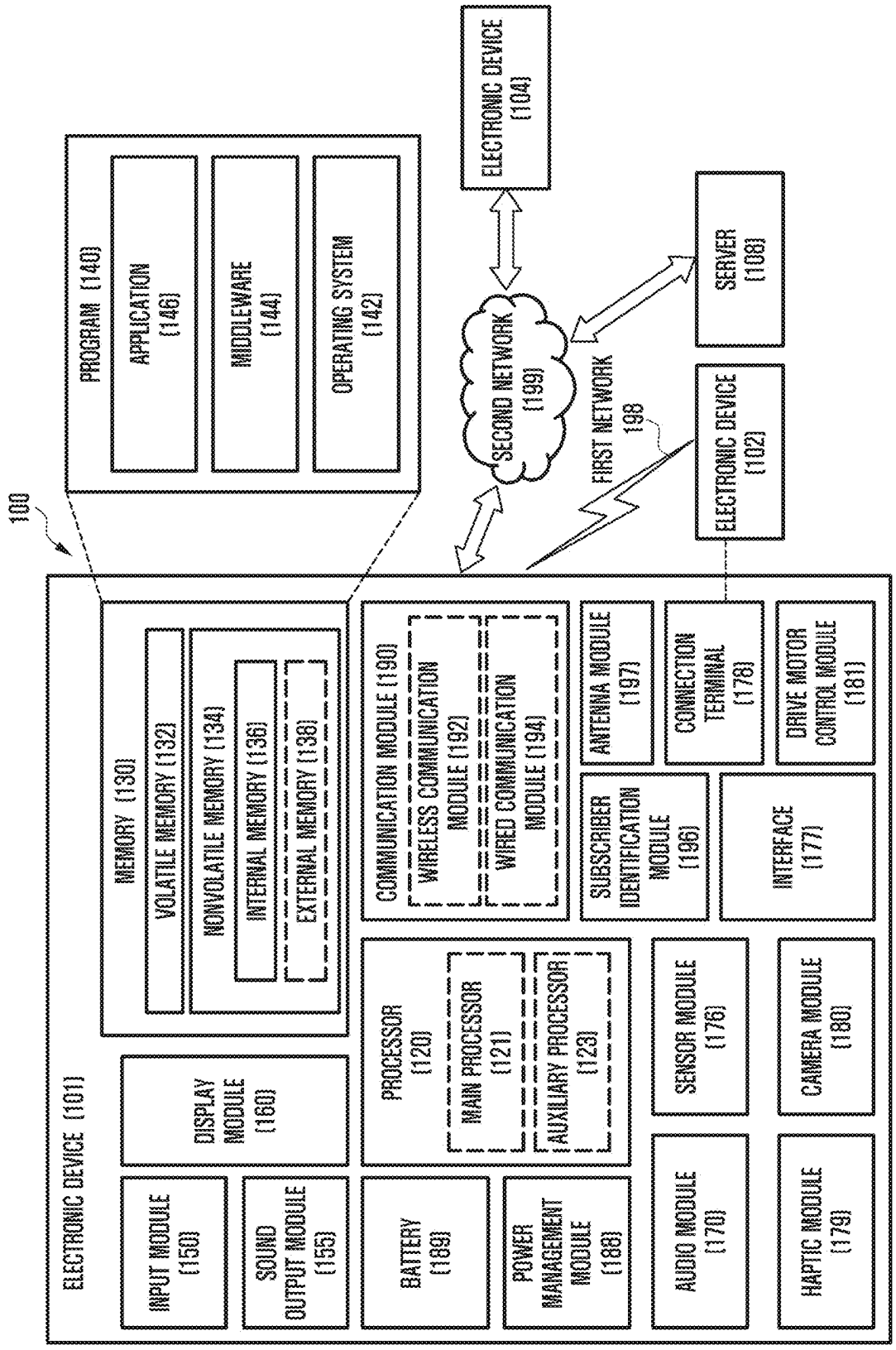
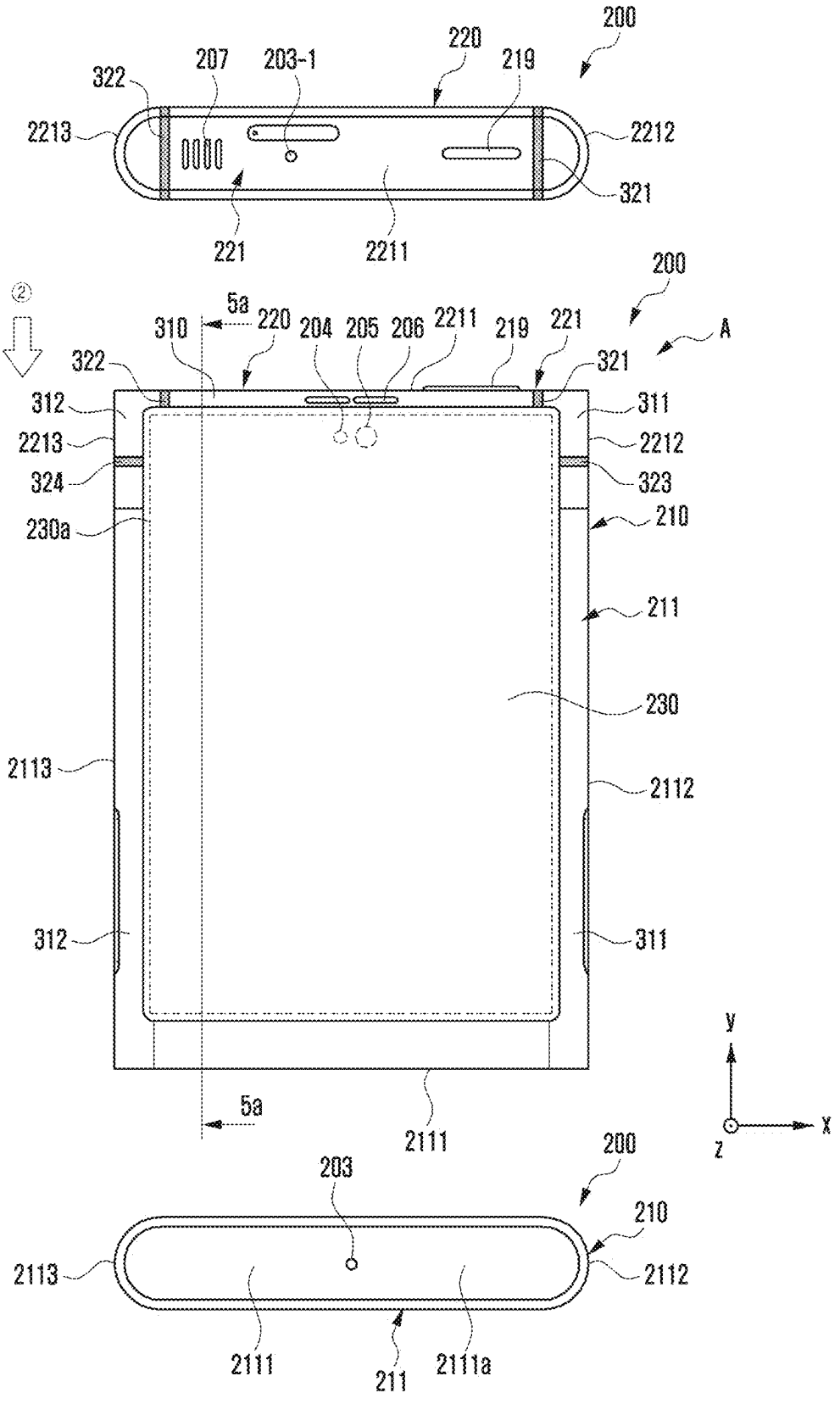

100
ELECTRONIC DEVICE (101)
PROGRAM (140)
APPLICATION (146)
MIDDLEWARE (144)
OPERATING SYSTEM (142)
ELECTRONIC DEVICE (104)
SECOND NETWORK (199)
FIRST NETWORK 198
SERVER (108)
ELECTRONIC DEVICE (102)
MEMORY (130)
VOLATILE MEMORY (132)
NONVOLATILE MEMORY (134)
INTERNAL MEMORY (136)
EXTERNAL MEMORY (138)
COMMUNICATION MODULE (190)
WIRELESS COMMUNICATION MODULE (192)
WIRED COMMUNICATION MODULE (194)
ANTENNA MODULE (197)
CONNECTION TERMINAL (178)
DRIVE MOTOR CONTROL MODULE (181)
SUBSCRIBER IDENTIFICATION MODULE (196)
INTERFACE (177)
INPUT MODULE (150)
DISPLAY MODULE (160)
SOUND OUTPUT MODULE (155)
PROCESSOR (120)
MAIN PROCESSOR (121)
AUXILIARY PROCESSOR (123)
SENSOR MODULE (176)
CAMERA MODULE (180)
BATTERY (189)
POWER MANAGEMENT MODULE (188)
AUDIO MODULE (170)
HAPTIC MODULE (179)

FIG. 2A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322
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321
221
2211
200
②
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204
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2211
219
221
A
322
321
312
311
2213
2212
324
323
230a
210
211
230
2113
2112
312
311
y
5a
2111
x
z
200
203
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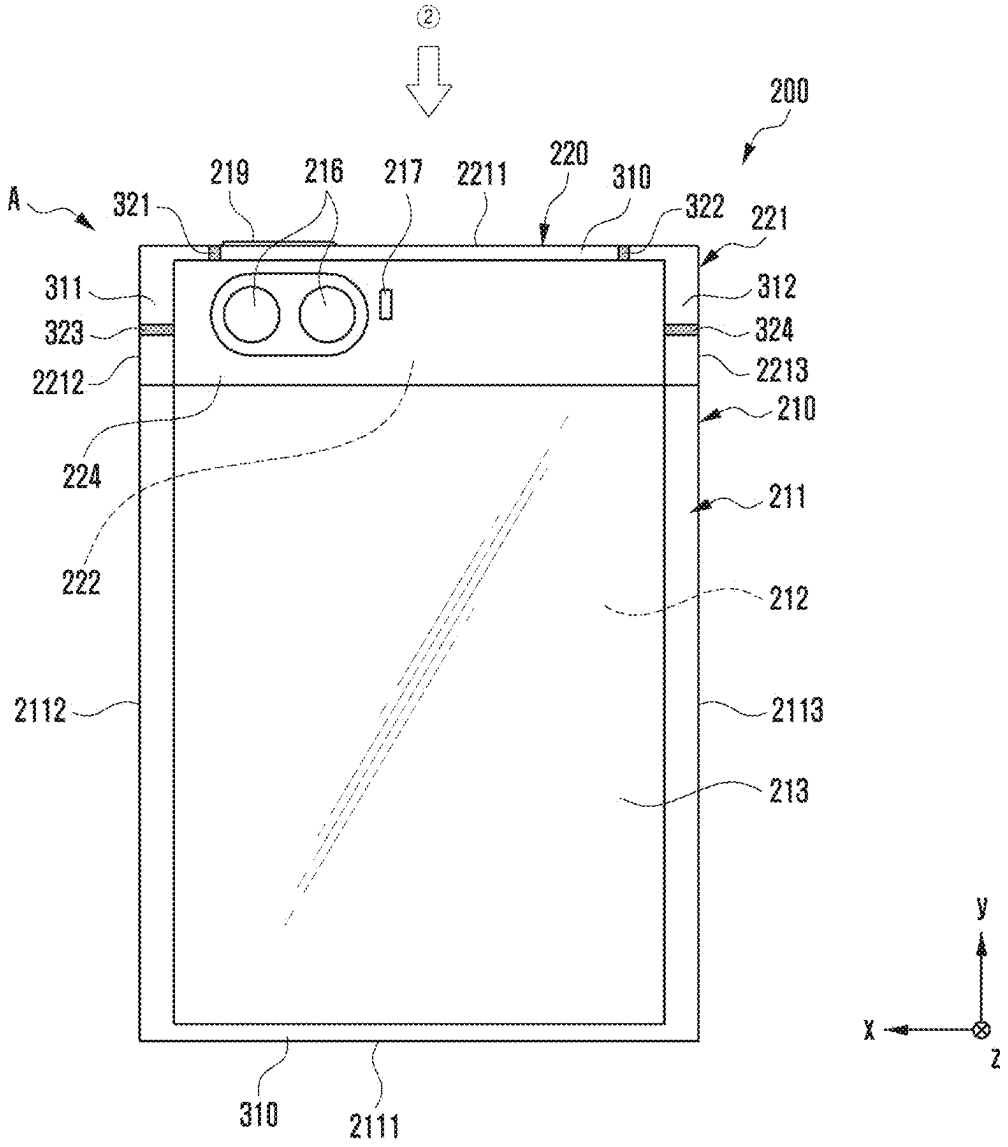
2111
211
2111a

FIG. 2B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211
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212
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2113
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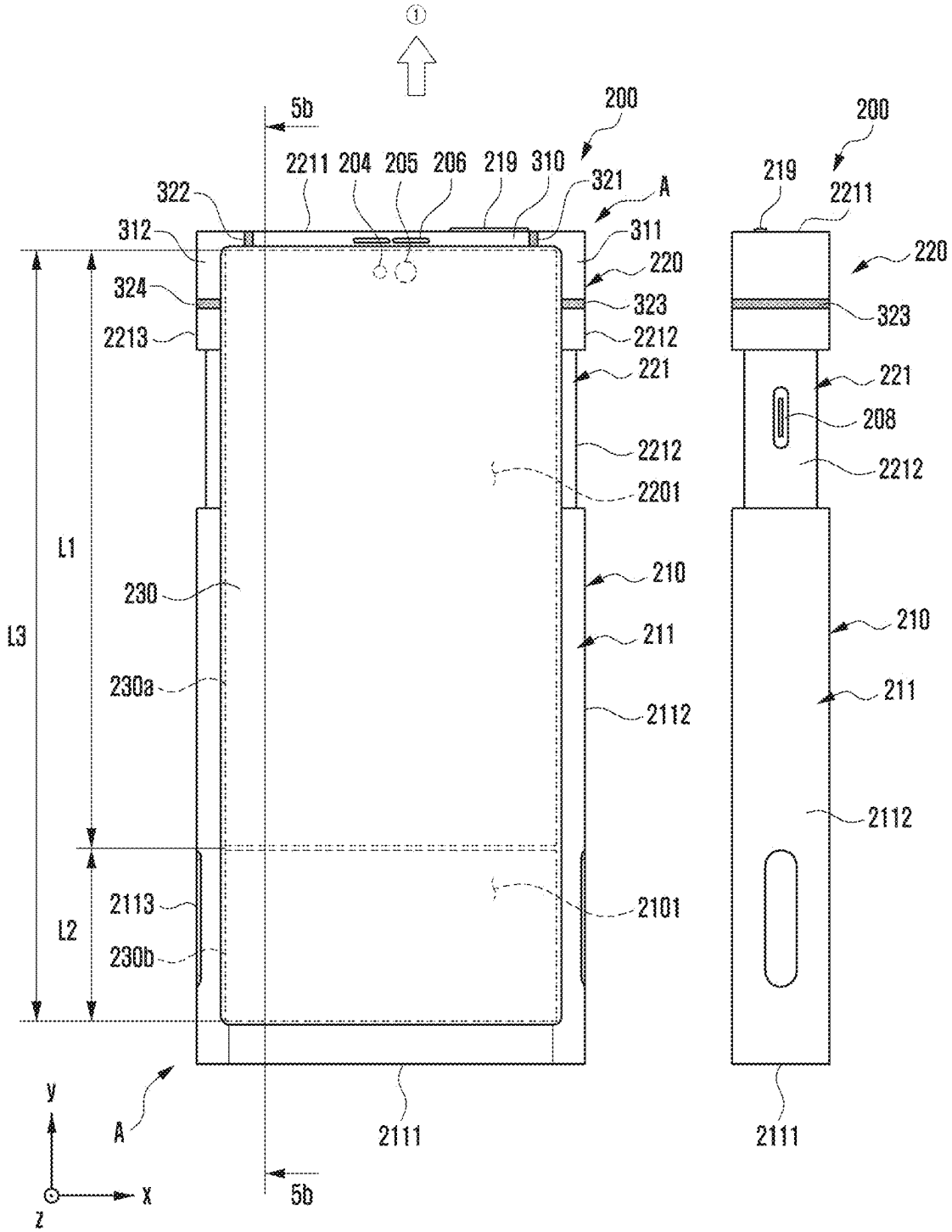
y
x
z
310
2111

FIG. 3A


①
5b
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2211 204 205 206 219 310
321
A
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2212
221
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L1
230
210
L3
211
230a
2112
2113
2101
L2
230b
y
x
z
A
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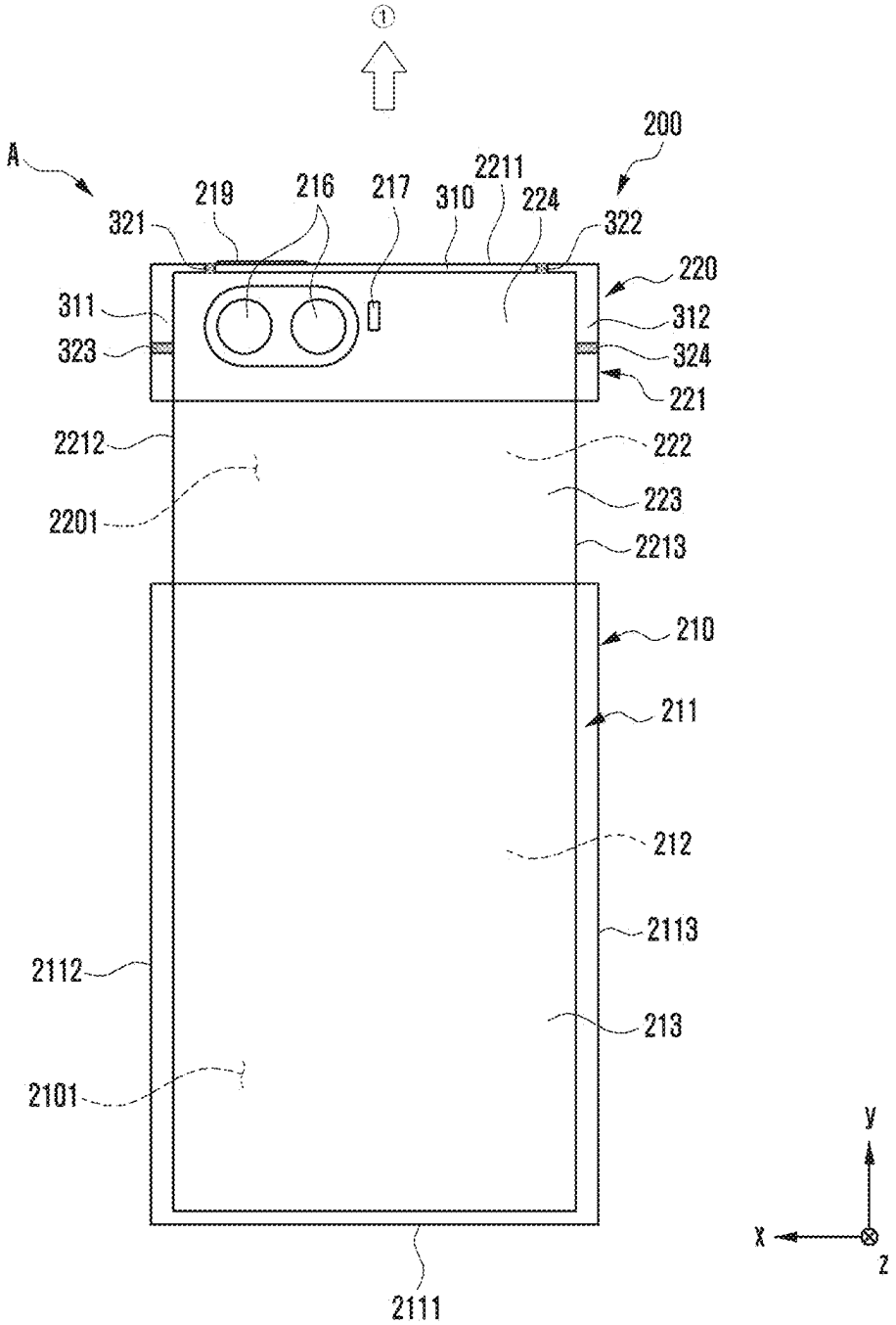
2212
210
211
2112
2111

FIG. 3B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A
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324
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223
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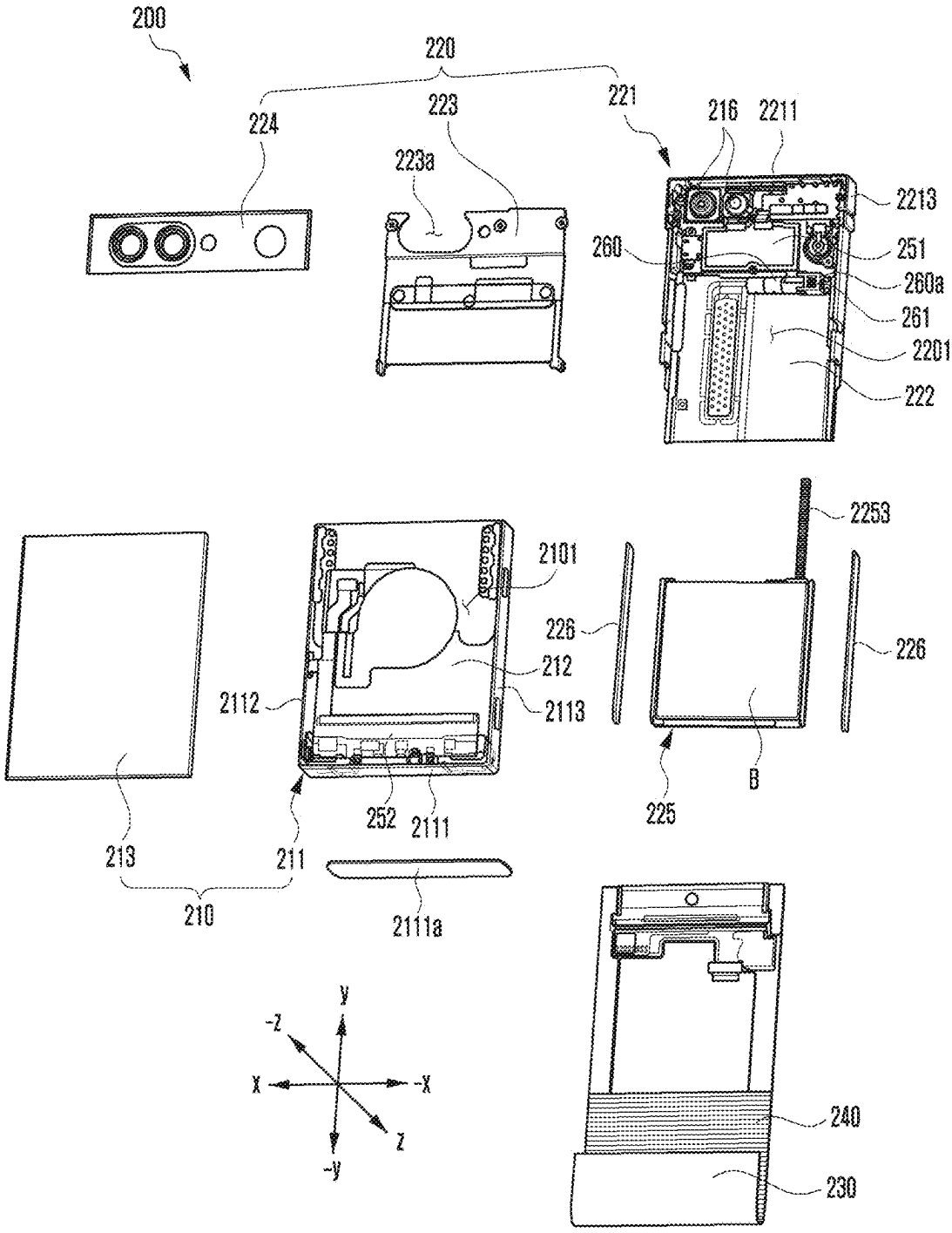
212
2113
2112
213
2101
2111
y
x
z

FIG. 4A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251
260a
261
2201
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2253
2101
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212
2112
2113
226
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2111a
y
-z
x
-x
z
-y
240
230

FIG. 4B

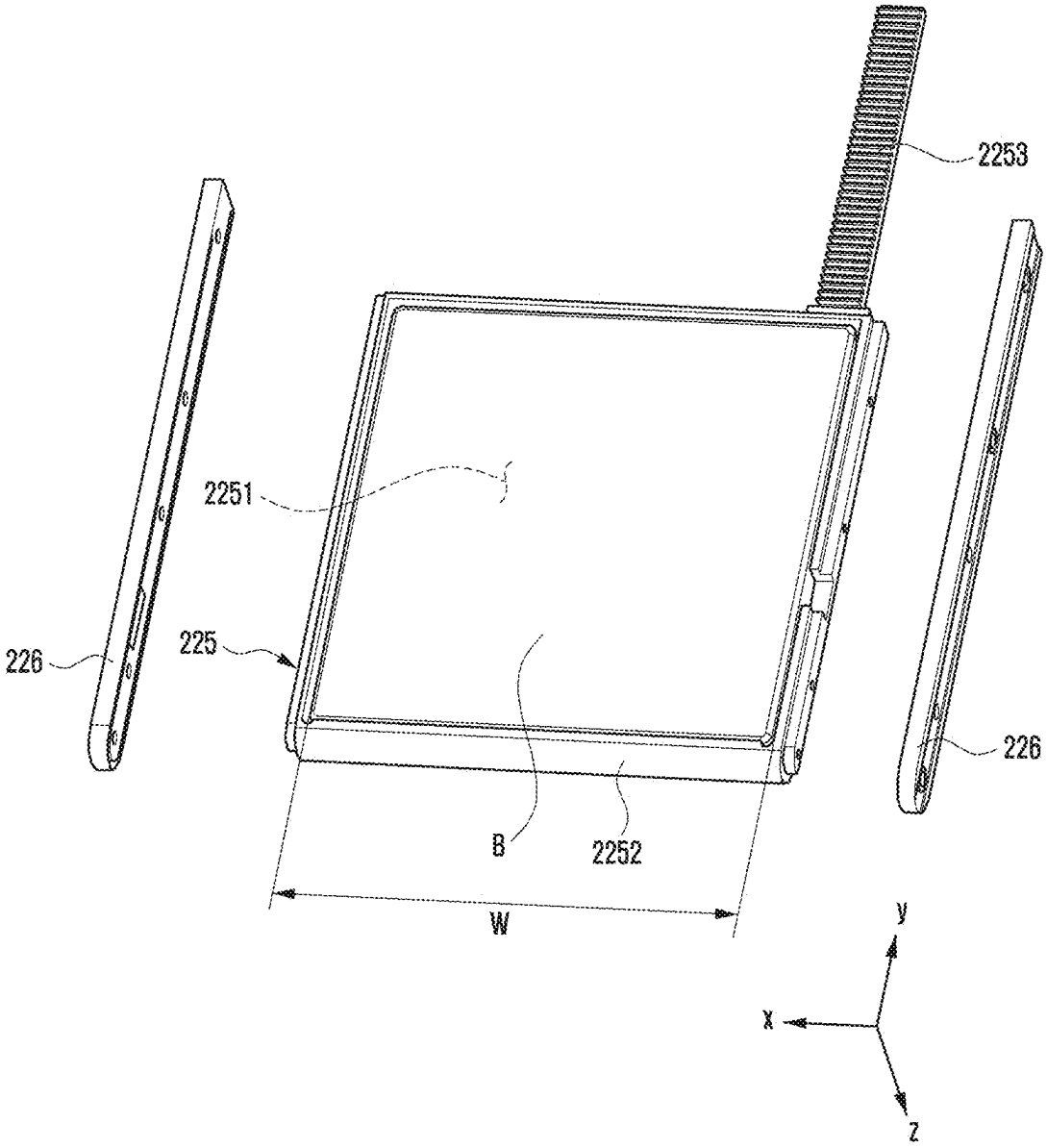
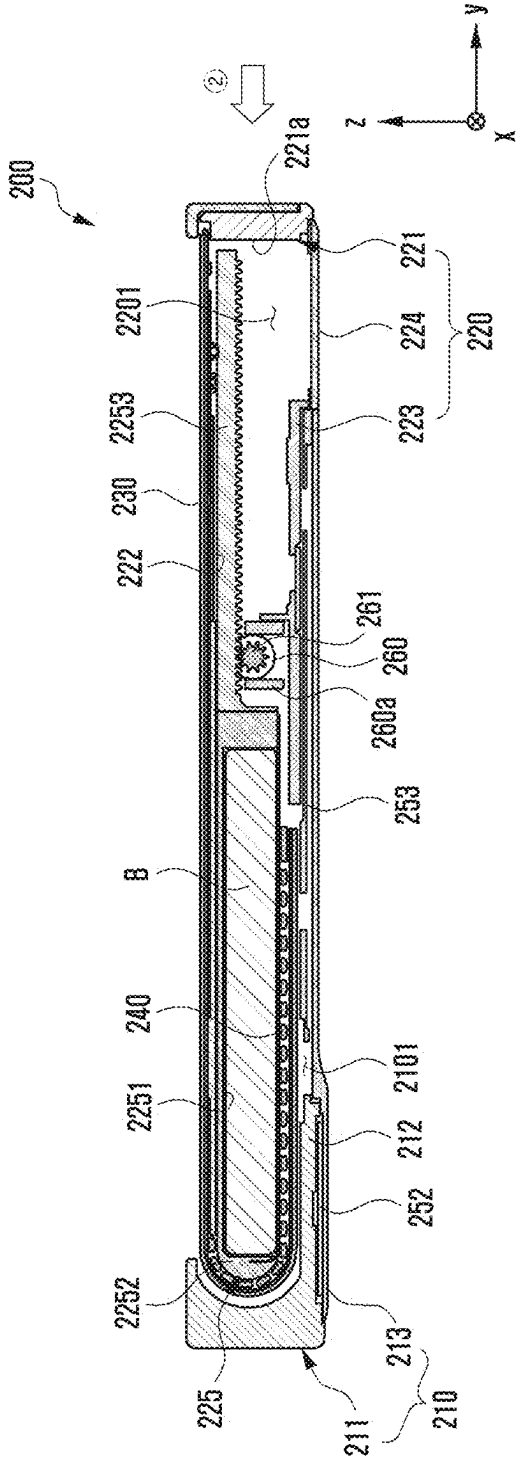


FIG. 5A


200
221a
221
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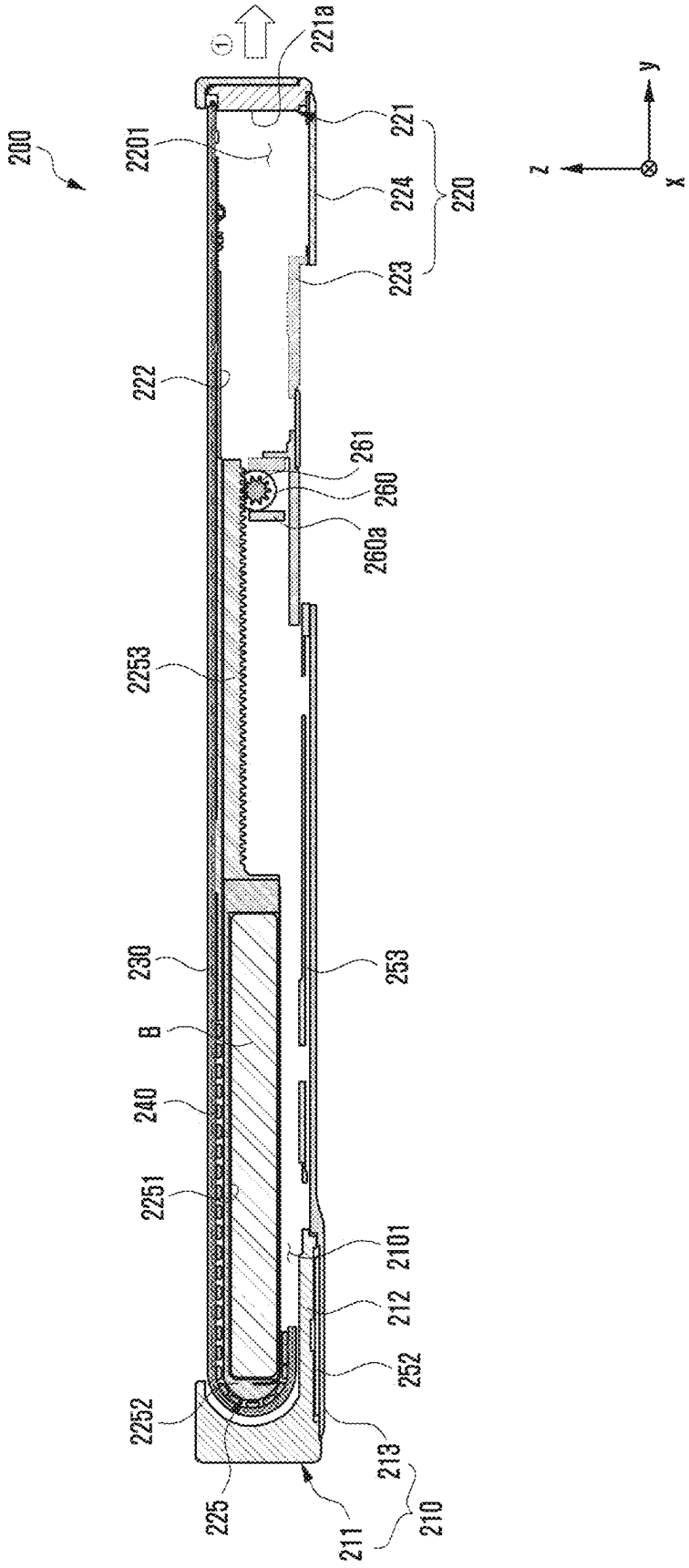
224
223
2201
2253
230
222
261
260
260a
253
B
240
2101
2251
212
252
2252
213
210
211
225
②
z
y
x

FIG. 5B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260
260a
2253
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212
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2252
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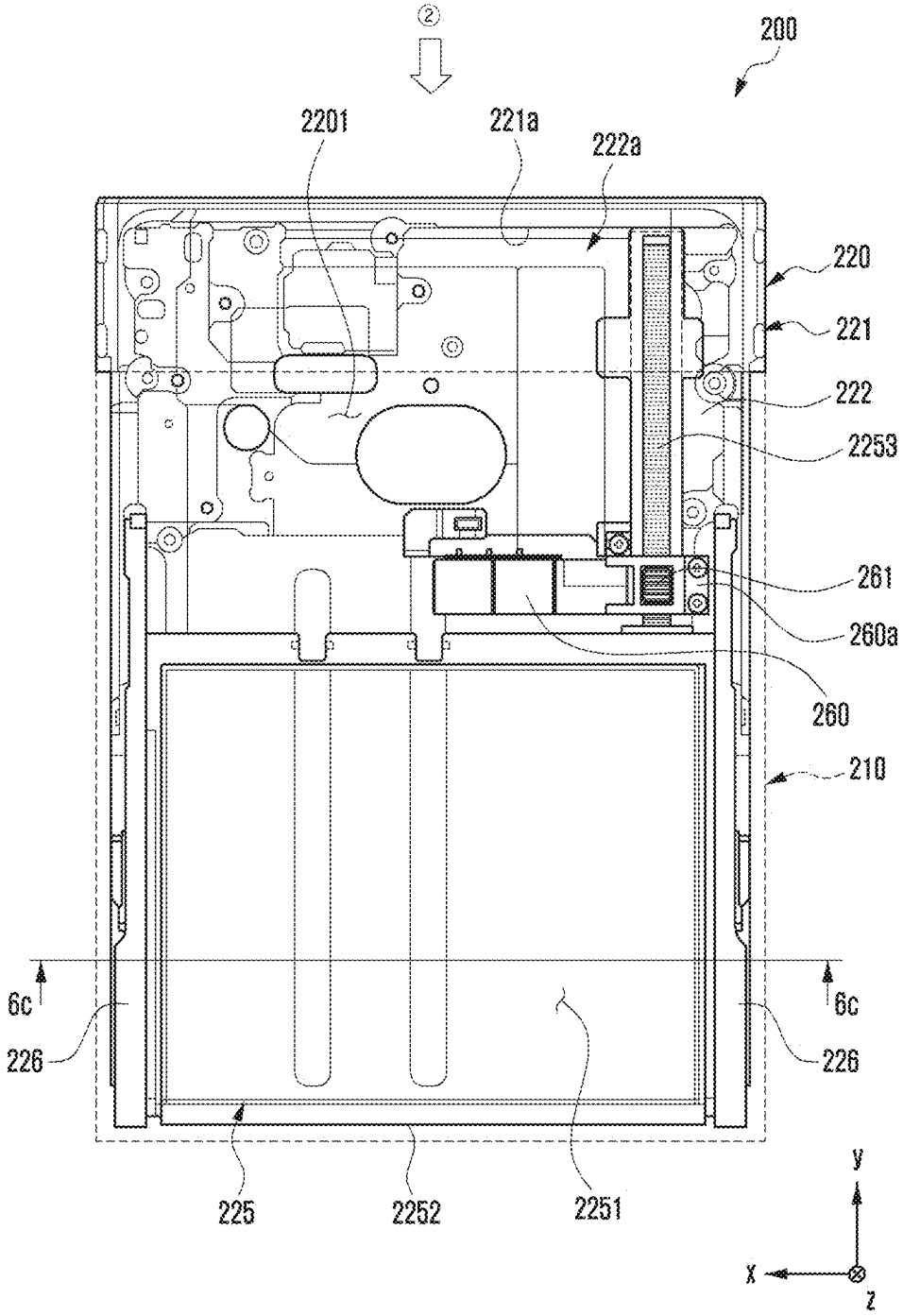
210
225
211
y
z
x

FIG. 6A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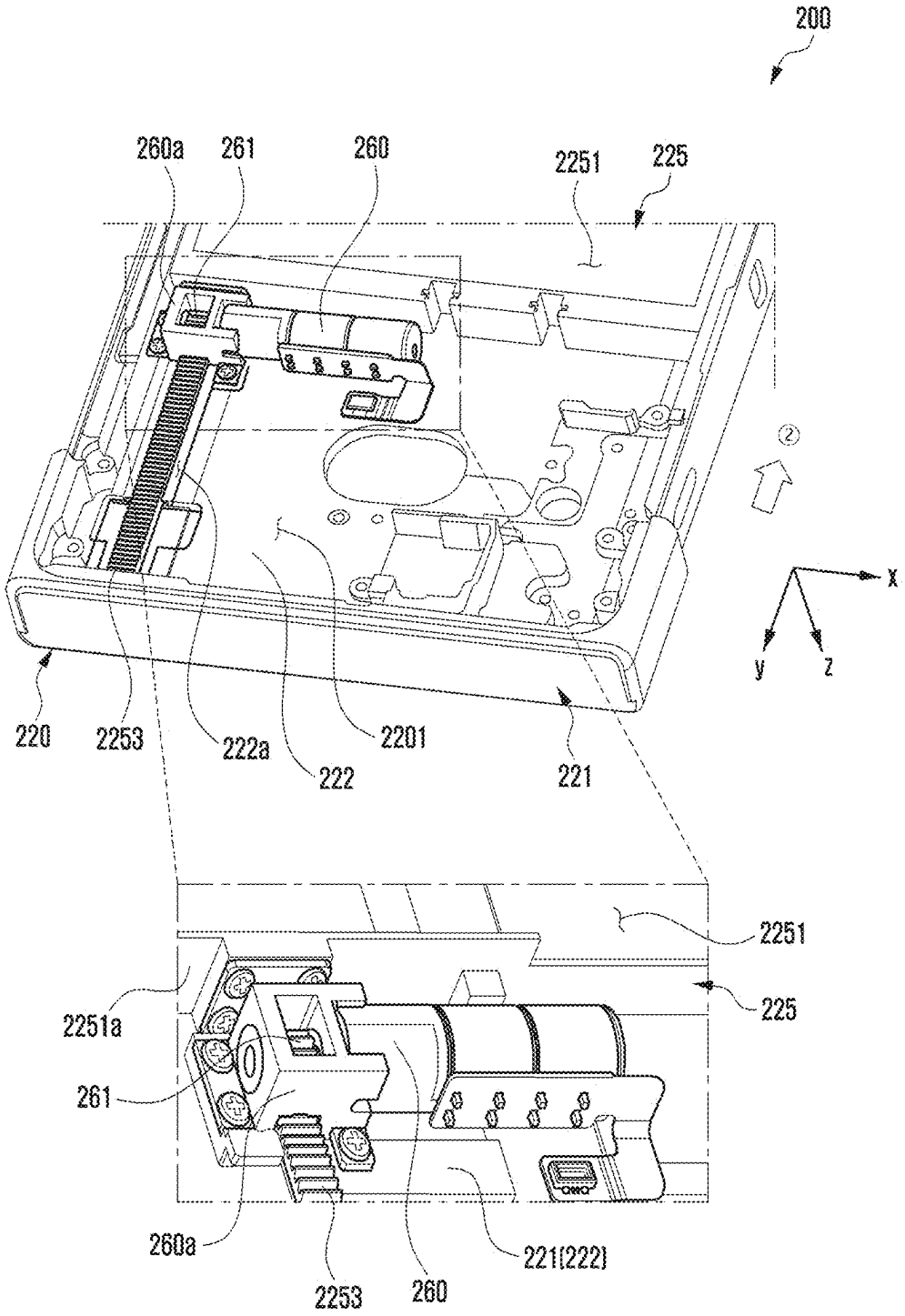
2201
221a
222a
220
221
222
2253
261
260a
260
210
6c
6c
226
226
225
2252
2251
y
X
z

FIG. 6B


200
260a
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2251
225
220
2253
222a
222
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221
x
y
z
2251
225
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261
260a
2253
260
221(222)

FIG. 6C

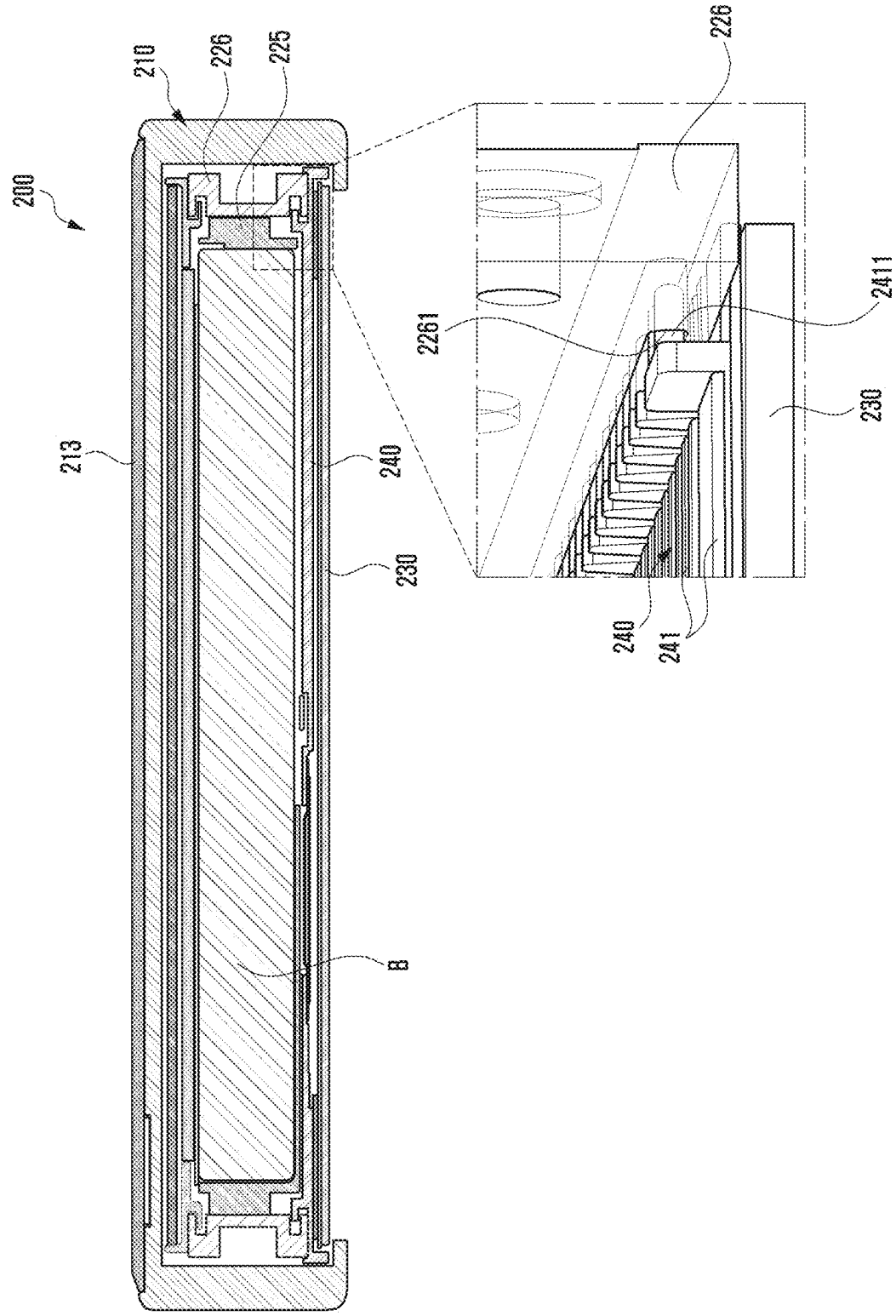
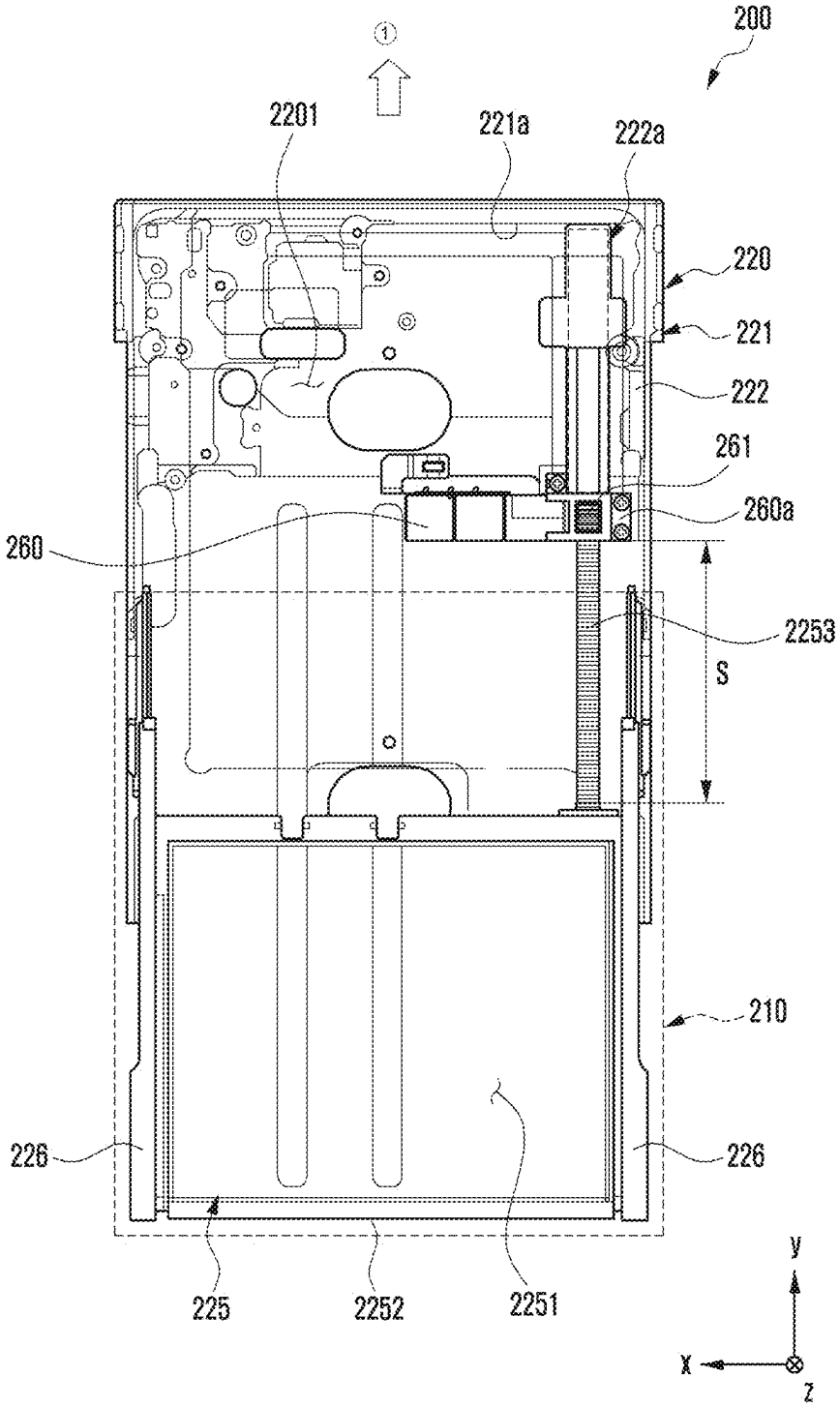


FIG. 7A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①
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221a
222a
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226
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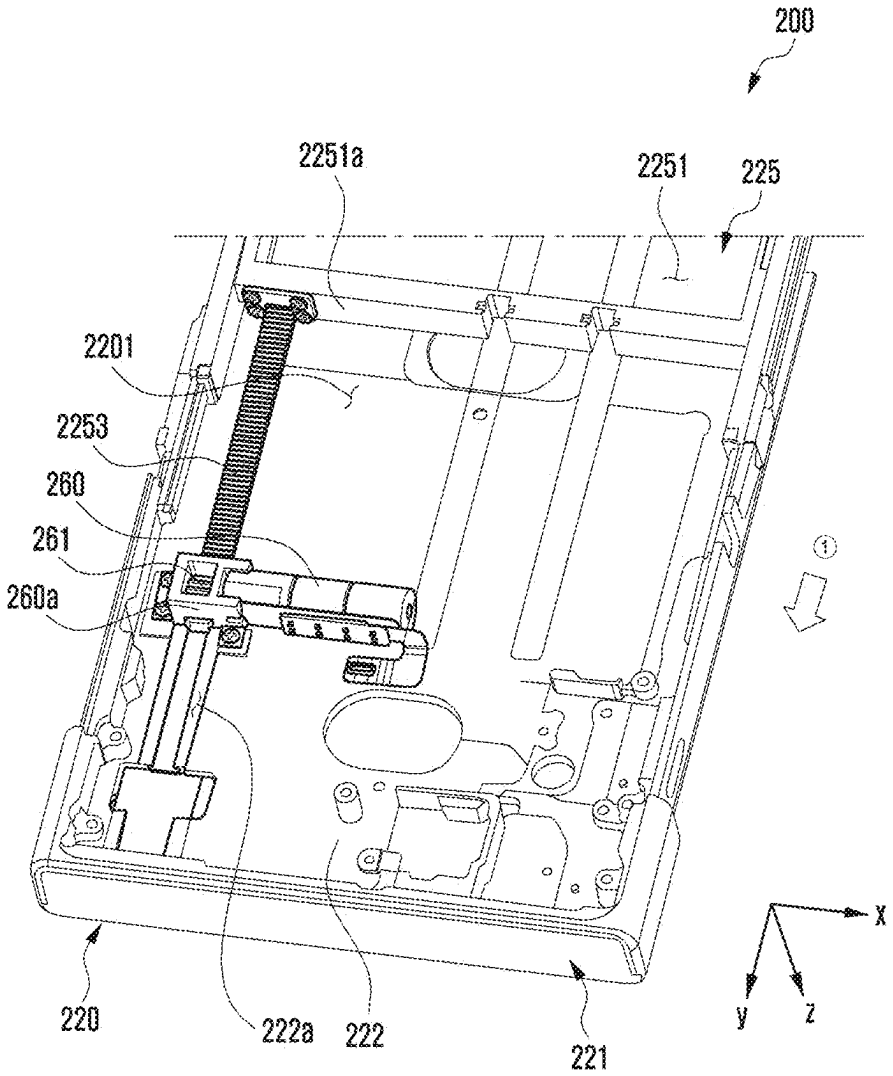
2252
2251
y
x
z

FIG. 7B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2251
225
2201
2253
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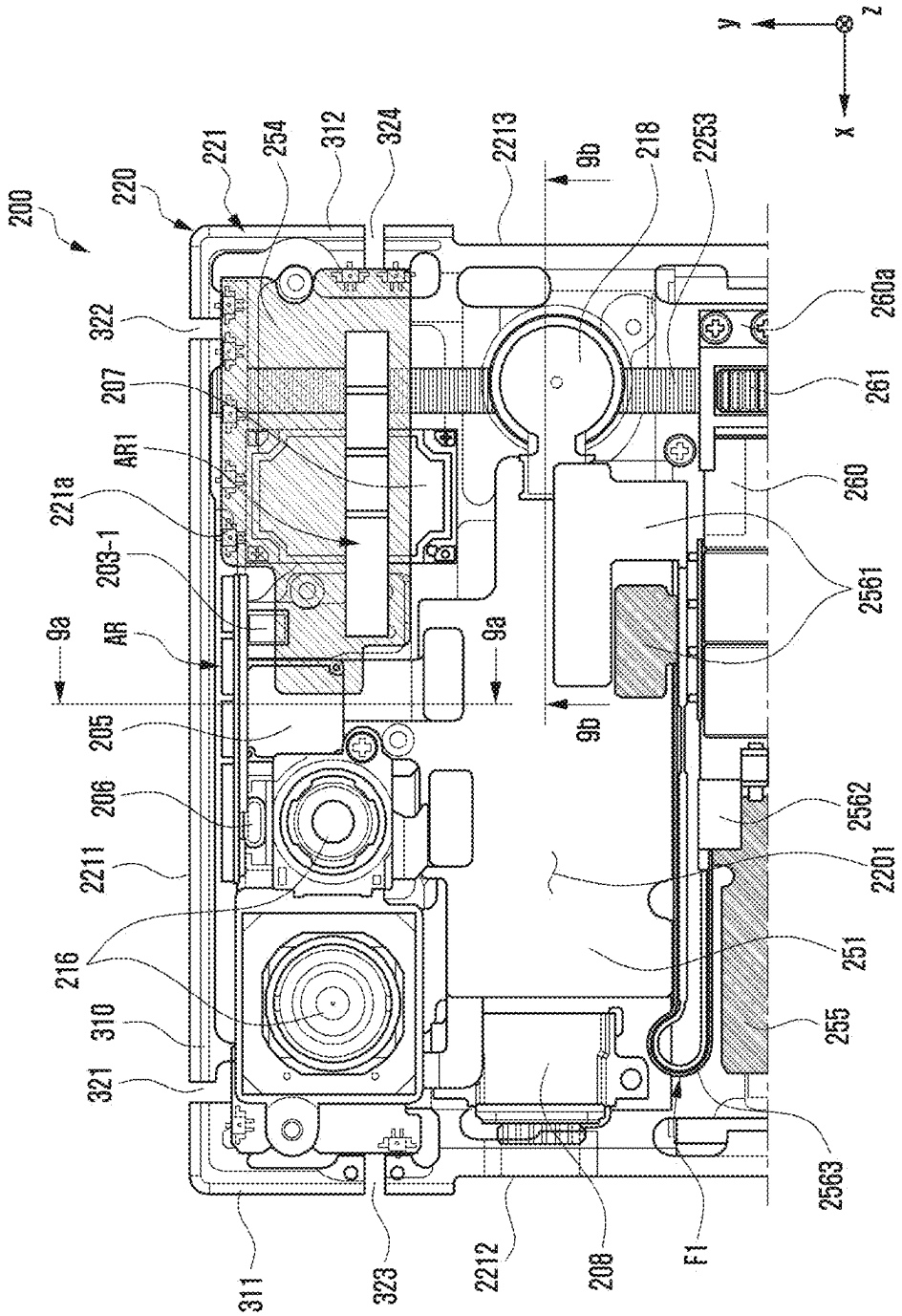
261
260a
①
220
222a
222
221
x
y
z

FIG. 8A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9b
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2253
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322
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AR1
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9a
AR
9a
9b
205
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216
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255
321
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311
323
2212
208
F1

FIG. 8B

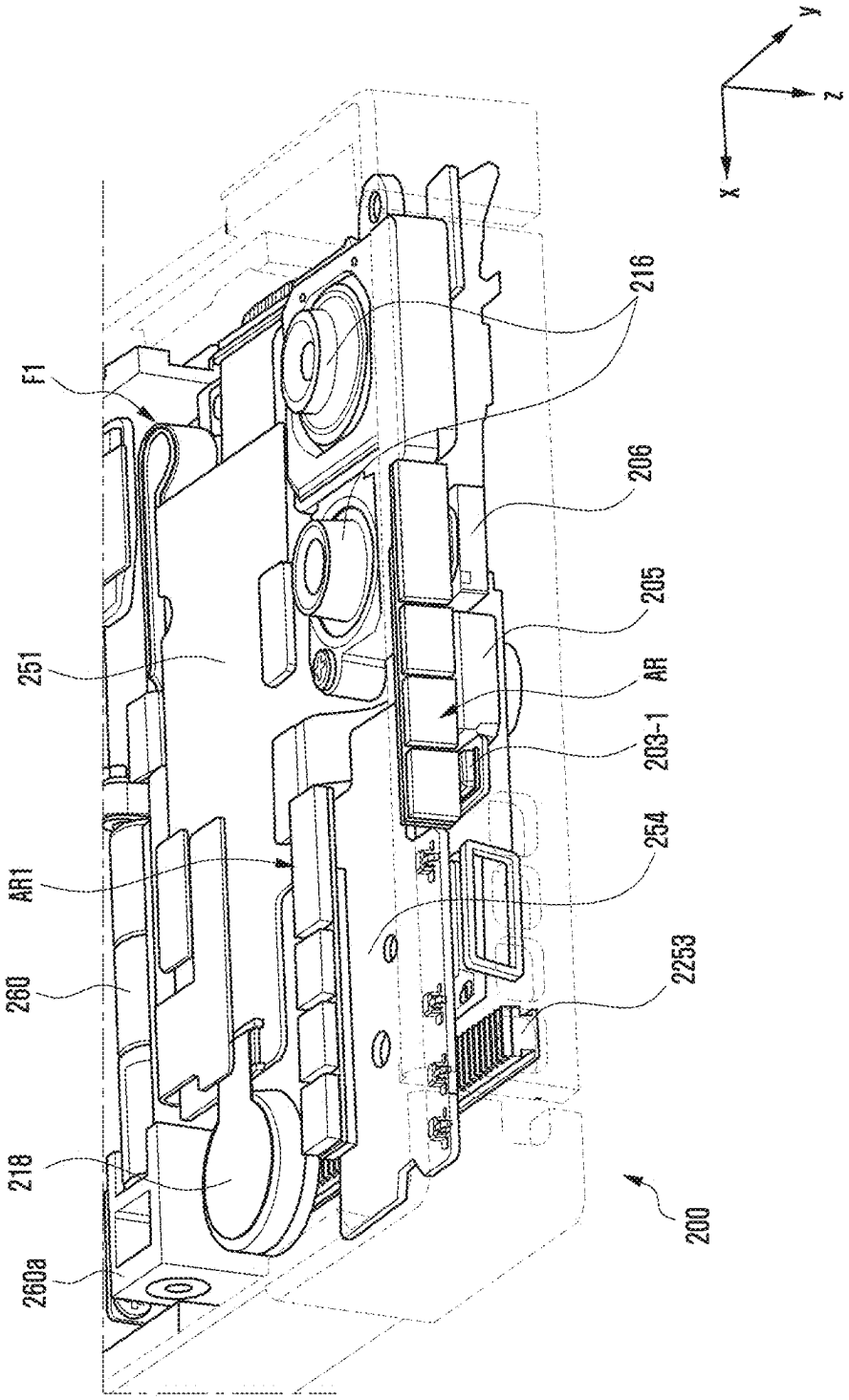
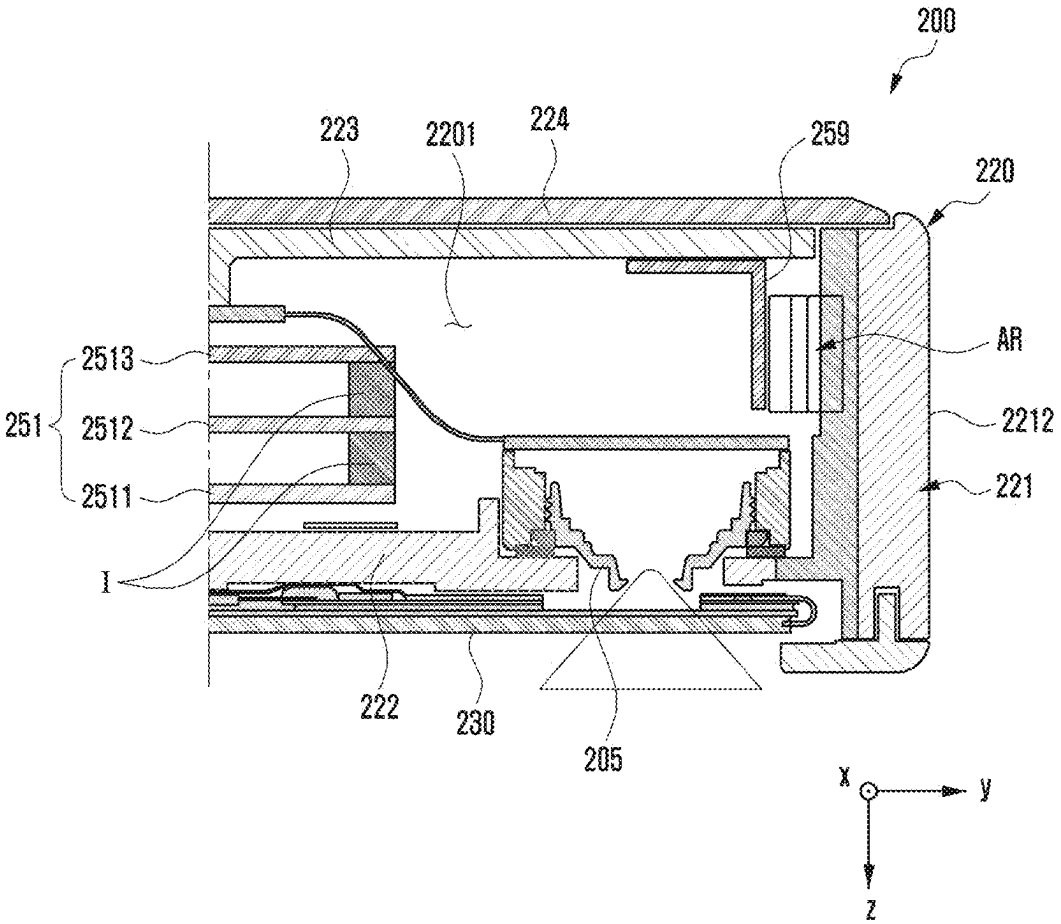


FIG. 9A


200
223
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I
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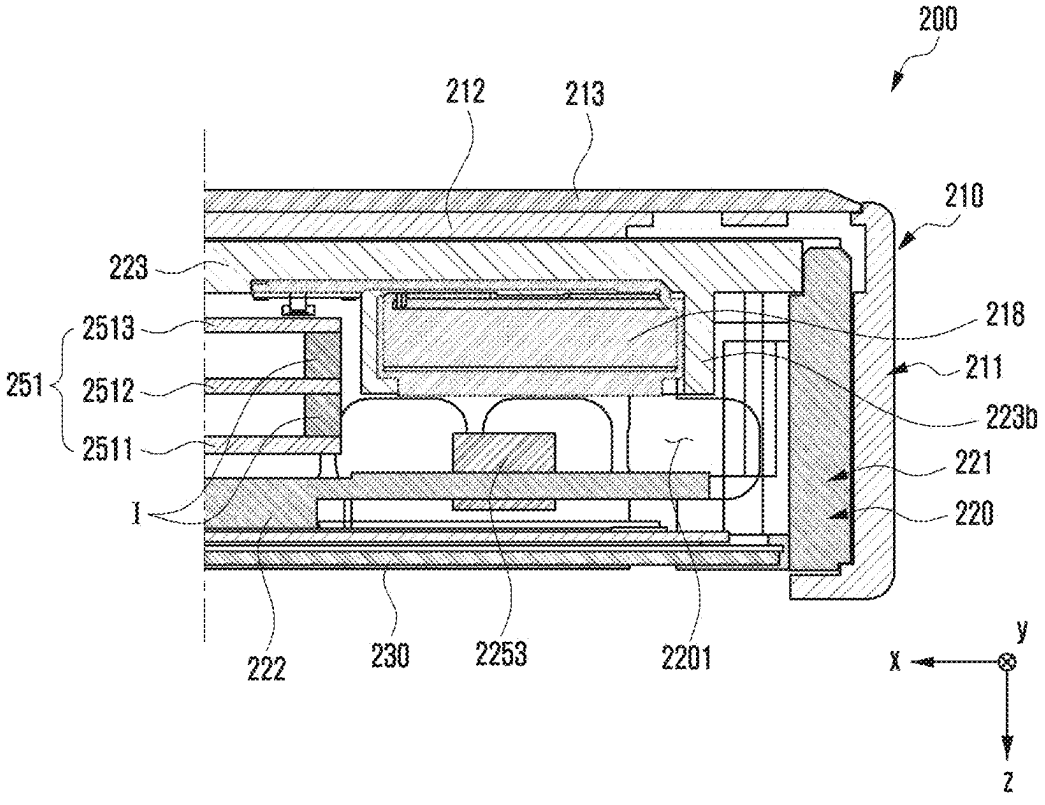
205
x
y
z

FIG. 9B


200
212
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210
223
2513
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2512
2511
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218
211
223b
221
220
222
230
2253
2201
y
x
z

FIG. 9C

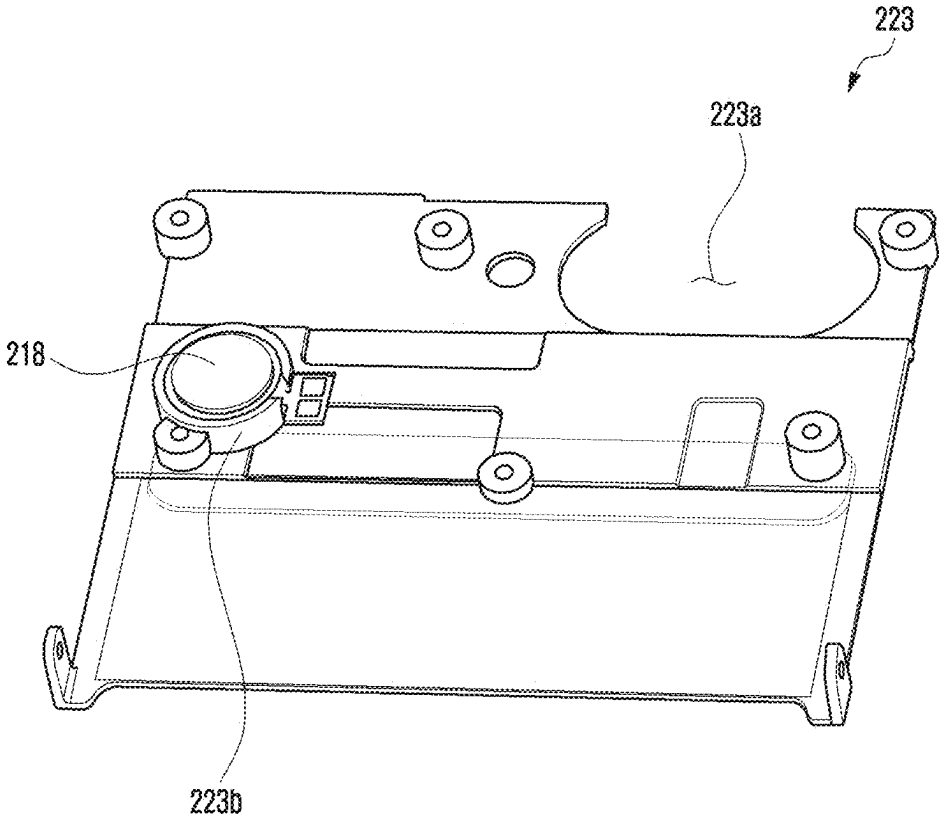
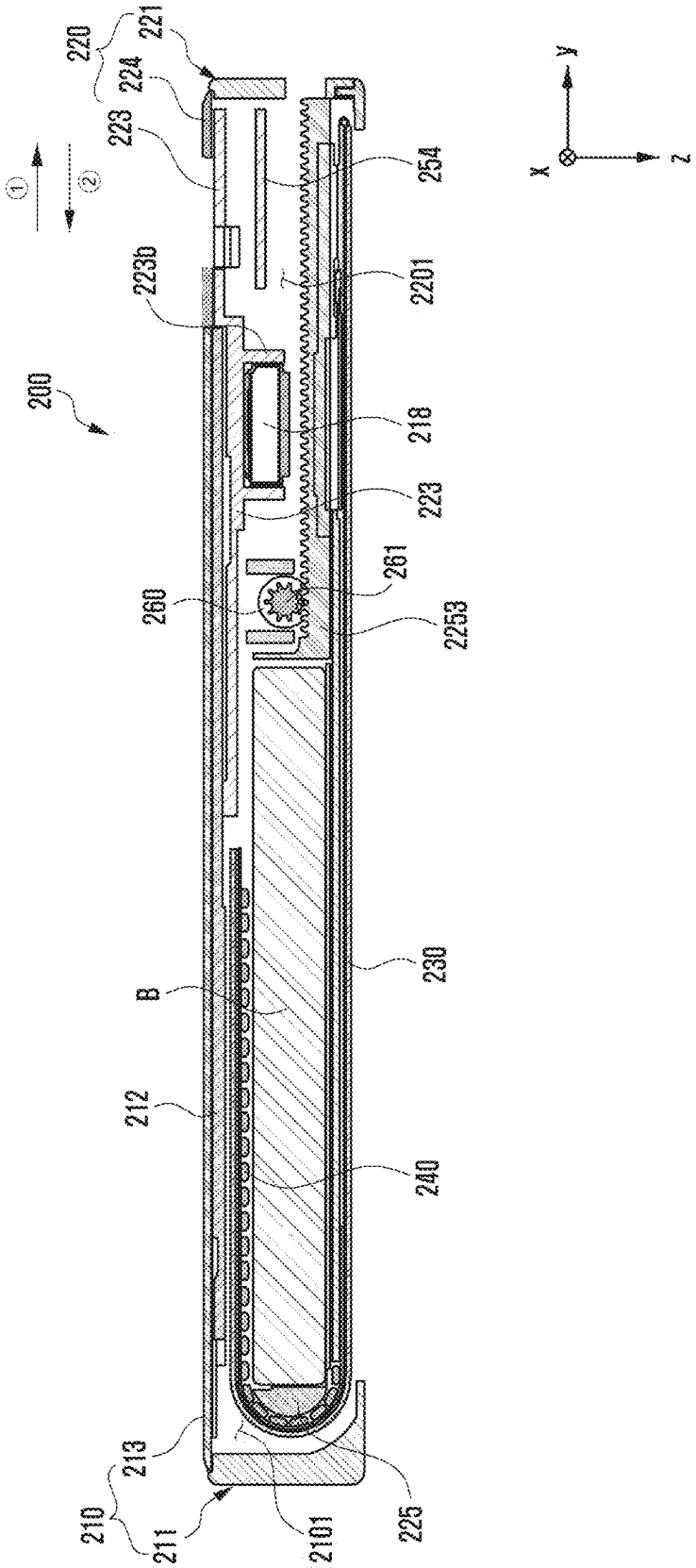


FIG. 9D


220
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223b
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223
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211
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225
①
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y
x
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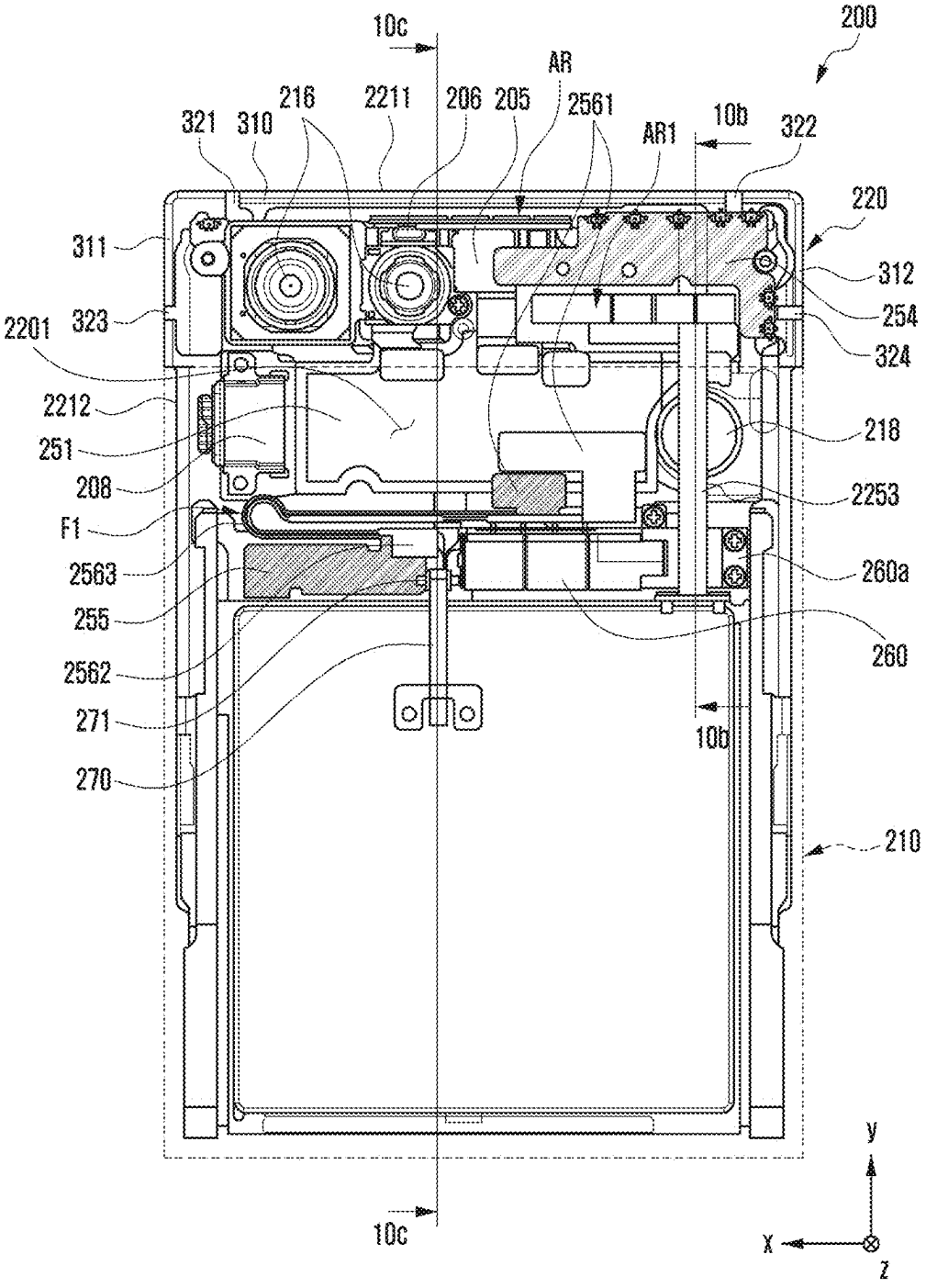
FIG. 10A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2212
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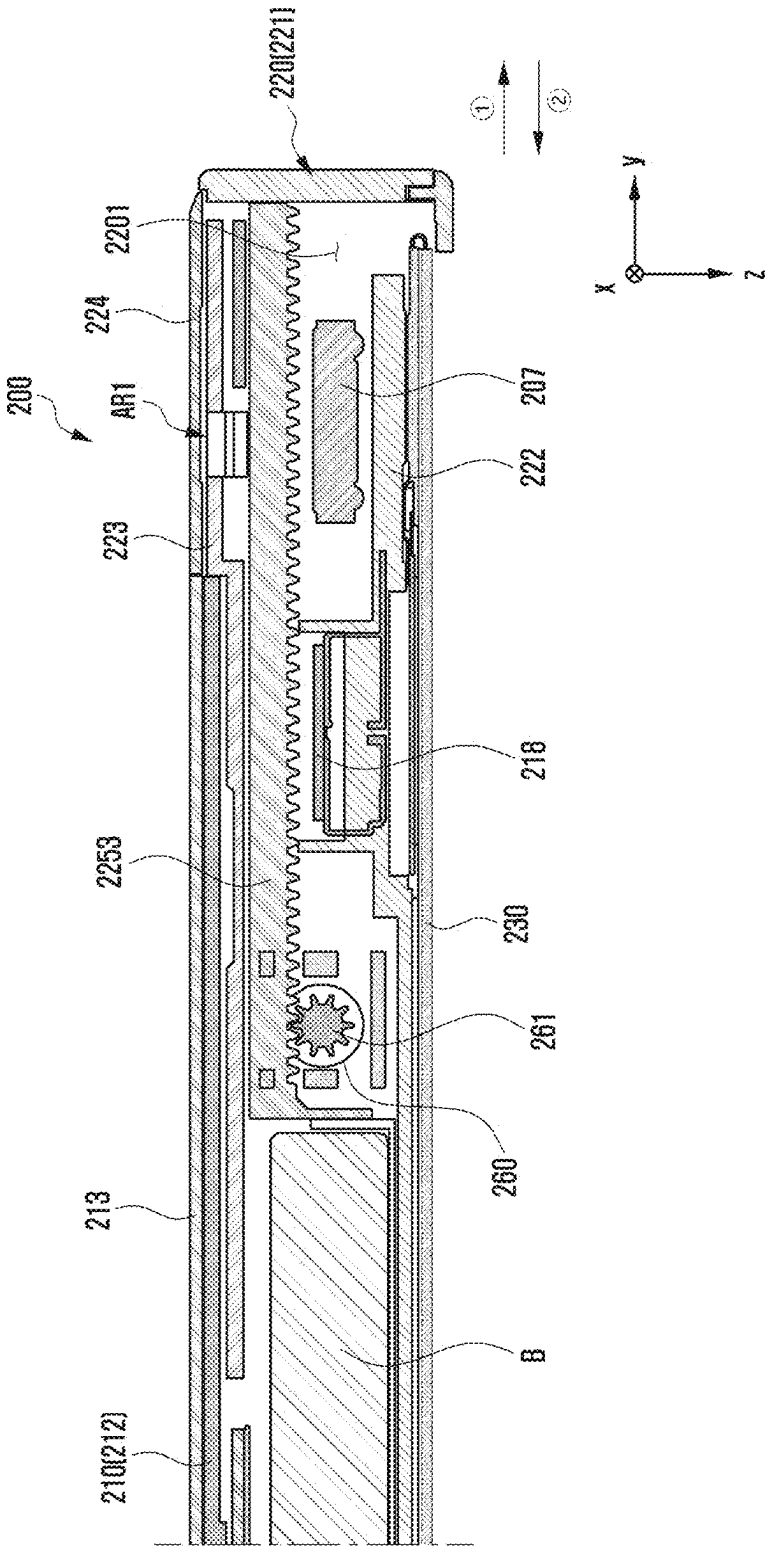
2562
271
10b
270
210
y
10c
x
z

FIG. 10B


220(2211)
①
②
y
x
z
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213
B
210(212)

FIG. 10C

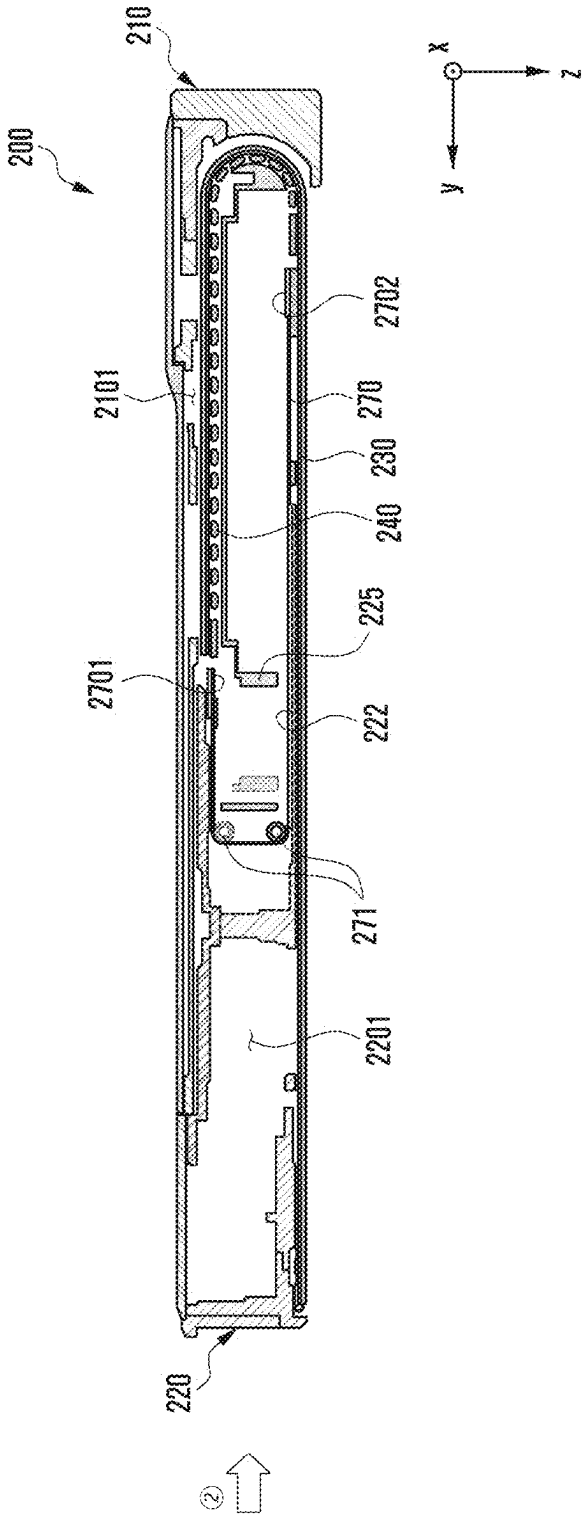


FIG. 10D

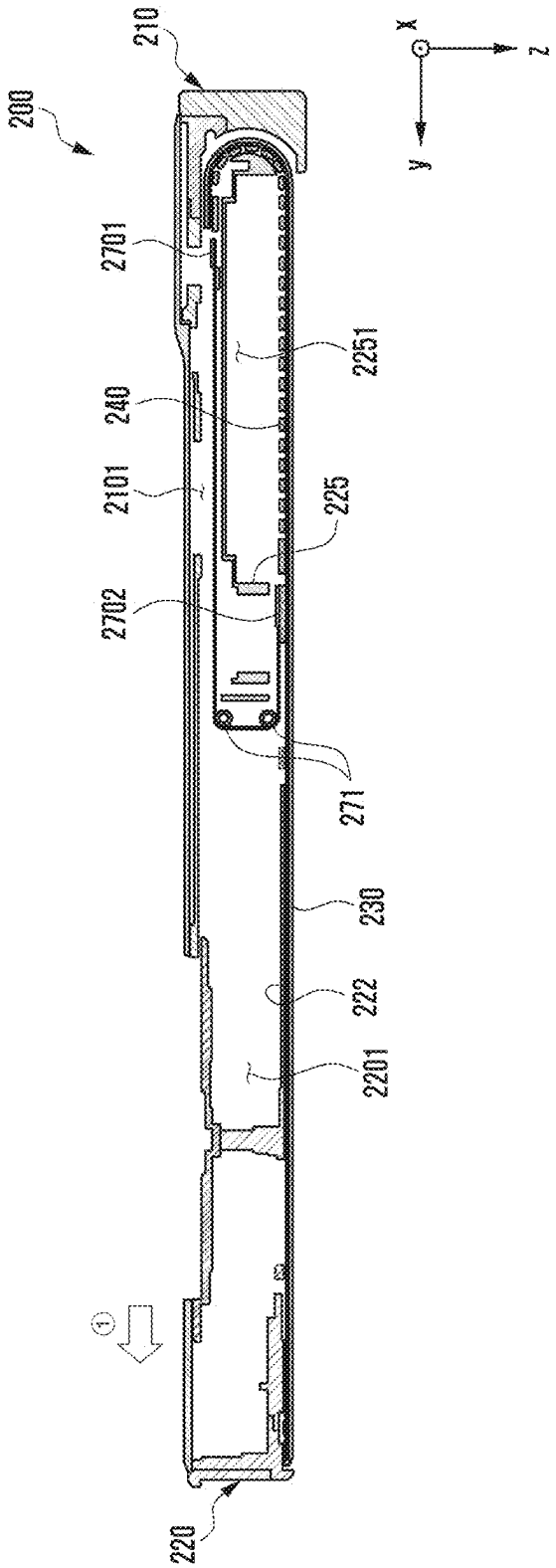
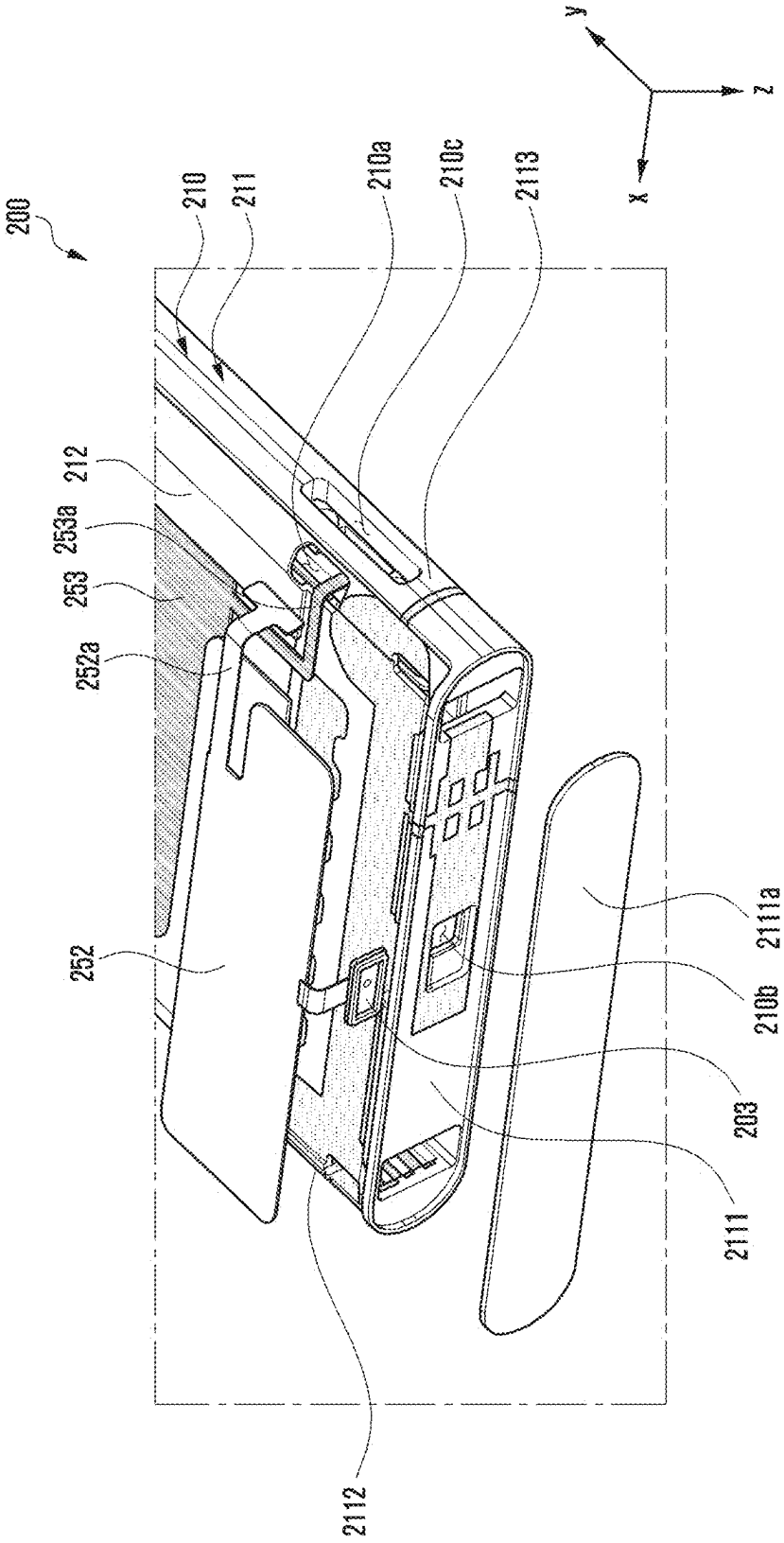


FIG. 11


y
z
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210a
210c
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253a
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252a
252
2111a
210b
203
2111
2112

ELECTRONIC DEVICE COMPRISING DRIVING MOTOR

BACKGROUND

(1) Technical Field

[0001] Various embodiments of the present disclosure relate to an electronic device including a driving motor.

(2) Related Art

[0002] Electronic devices are gradually becoming slimmer, more rigid, more design-oriented, and more differentiated in terms of their functional elements. Electronic devices are gradually changing from a uniform rectangular shape to various shapes. Electronic devices may have a deformable structure that is convenient to carry and may utilize a large-screen display. Electronic devices may have a structure (e.g., the rollable structure or a slidable structure) that can vary the display area of a flexible display (e.g., the rollable display) by supporting housings that slide relative to each other. Such electronic devices may require an efficient disposition structure of a driving module that allows the rest of the housing to slide automatically relative to one housing.

SUMMARY

[0003] According to various embodiments, an electronic device may comprise: a first housing; a second housing slidably coupled to the first housing; a flexible display having a display area that is variable on the basis of the slide-in or slide-out of the second housing; a driving motor disposed in the second housing and including a pinion gear; a rack fixedly coupled to the first housing and including a rack gear driven by being gear-coupled to the pinion gear; a rack guide disposed in the second housing and protecting the rack from external impact; a multi-bar supporting the rear surface of one portion of the flexible display; and a driving belt connected to one end of the multi-bar and one end of the second housing, wherein the rack guide may be disposed on the right side of the driving motor to spatially overlap with electrical components disposed at the second housing, and the second housing may be configured to be driven to slide-in or slide-out on the basis of the reciprocating movement of the rack into the rack guide. Various other embodiments are possible.

[0004] According to various embodiments, an electronic device may comprise: a first housing; a second housing slidably coupled to the first housing; a flexible display having a display area that is variable on the basis of the slide-in or slide-out of the second housing; a driving motor disposed in the second housing and including a pinion gear; a rack fixedly coupled to the first housing and including a rack gear driven by being gear-coupled to the pinion gear; and a battery disposed in parallel with the rack, wherein, when viewing the side surface of the first housing from the outside in a direction perpendicular to the sliding direction, the rack and the battery may be disposed so as not to overlap each other.

[0005] An electronic device according to exemplary embodiments of the present disclosure may help slim down (e.g., reduce in size) the electronic device through an efficient disposition structure of electrical components overlapping with the rack. In addition, the electronic device may help secure the capacity of the battery to the maximum (e.g., utilize a larger battery with a greater capacity) by having a disposition structure in which a drive motor including a rack and a pinion gear coupled thereto is disposed so as not to overlap with a battery, thereby helping improve the operating time of the electronic device.

[0006] In addition, various effects may be provided that are directly or indirectly identified through this document.

[0007] The effects obtainable from the present disclosure are not limited to the effects mentioned above, and other effects not mentioned will be clearly understood by a person skilled in the art to which the present disclosure belongs from the description below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] In connection with the description of the drawings, the same or similar reference numerals may be used for identical or similar components.

[0009] FIG. **1** is a block diagram of an electronic device within a network environment according to various embodiments of the present disclosure.

[0010] FIGS. **2**A and **2**B are diagrams illustrating front and rear views of an electronic device in a slide-in state according to various embodiments of the present disclosure.

[0011] FIGS. **3**A and **3**B are diagrams illustrating front and rear views of an electronic device in a slide-out state according to various embodiments of the present disclosure.

[0012] FIG. **4**A is an exploded perspective view of an electronic device according to various embodiments of the present disclosure.

[0013] FIG. **4**B is a perspective view of a support bracket on which a battery mounted according to various embodiments of the present disclosure.

[0014] FIG. **5**A is a cross-sectional view of an electronic device as viewed along line **5***a*-**5***a* of FIG. **2**A according to various embodiments of the present disclosure.

[0015] FIG. **5**B is a cross-sectional view of an electronic device as viewed along line **5***b*-**5***b* of FIG. **3**A according to various embodiments of the present disclosure.

[0016] FIG. **6**A is a schematic diagram of an electronic device illustrating the disposition structure of a driving motor and a rack in a slide-in state according to various embodiments of the present disclosure.

[0017] FIG. **6**B is a perspective view of a portion of an electronic device illustrating a disposition configuration of a rack accommodated in a second housing in a slide-in state according to various embodiments of the present disclosure.

[0018] FIG. **6**C is a cross-sectional view of an electronic device as viewed along line **6***c*-**6***c* of FIG. **6**A according to various embodiments of the present disclosure.

[0019] FIG. **7**A is a block diagram of an electronic device illustrating the disposition structure of a driving motor and a rack in a slide-out state according to various embodiments of the present disclosure.

[0020] FIG. **7**B is a perspective view of a portion of an electronic device illustrating a disposition configuration of a rack accommodated in a second housing in a slide-out state according to various embodiments of the present disclosure.

[0021] FIG. **8**A is a schematic diagram of a portion of an electronic device including electrical components according to various embodiments of the present disclosure.

[0022] FIG. **8**B is a perspective view of a portion of an electronic device including electrical components according to various embodiments of the present disclosure.

[0023] FIG. **9**A is a cross-sectional view of an electronic device as viewed along line **9***a*-**9***a* of FIG. **8**A according to various embodiments of the present disclosure.

[0024] FIG. **9**B is a cross-sectional view of a portion of an electronic device as viewed along line **9***b*-**9***b* of FIG. **8**A according to various embodiments of the present disclosure.

[0025] FIG. **9**C is a perspective view of the rear surface of the second rear cover according to various embodiments of the present disclosure.

[0026] FIG. **9**D is a cross-sectional view of an electronic device according to various embodiments of the present disclosure.

[0027] FIG. **10**A is a schematic diagram of an electronic device including a rack according to various embodiments of the present disclosure.

[0028] FIG. **10**B is a cross-sectional view of a portion of an electronic device as viewed along line **10***b*-**10***b* of FIG. **10**A according to various embodiments of the present disclosure.

[0029] FIG. **10**C is a cross-sectional view of a portion of an electronic device as viewed along line **10***c*-**10***c* of FIG. **10**A according to various embodiments of the present disclosure.

[0030] FIG. **10**D is a cross-sectional view illustrating a slide-out state of the electronic device of FIG. **10**A according to various embodiments of the present disclosure.

[0031] FIG. **11** is a block diagram of an electronic device illustrating the disposition structure of an antenna member and a first substrate according to various embodiments of the present disclosure.

DETAILED DESCRIPTION

[0032] An electronic device may include a rollable electronic device (e.g., the slidable electronic device) in which a display area of a flexible display (e.g., the rollable display) may be expanded and/or contracted depending on the operating state. The rollable electronic device may include a first housing and a second housing that are movably coupled with respect to one another in a manner that is at least partially fitted together. For example, the first housing and the second housing may be slidably operated with respect to one another and support at least a portion of a flexible display (e.g., the rollable display, an expandable display, or a stretchable display), such that the flexible display is induced to have a first display area in a slide-in state, and to have a second display area larger than the first display area in a slide-out state.

[0033] The electronic device may include a driving motor including a pinion gear that automatically operates a second housing to slide a designated reciprocating distance on the basis of a first housing that is disposed in an inner space and is gripped by a user as a driving module, and a rack including a rack gear that is gear-coupled to the pinion gear. For example, when the driving motor is disposed in the first housing or the second housing, a rack that has a length along the sliding direction and is gear-coupled to the pinion gear may be disposed in the remaining housing.

[0034] However, since the rack must have a length at least corresponding to the sliding distance of the electronic device, there may be a problem that the surrounding electrical components must be designed to avoid the rack installation space and/or the rack accommodation space. In addition, if the battery among the electrical components is designed to avoid the rack installation space or the accommodation space, its size may be reduced, and the usage time of the electronic device may be reduced because of the reduced battery capacity.

[0035] Various embodiments of the present disclosure may provide an electronic device including a drive motor that can help make the electronic device slimmer through an efficient disposition structure between a drive module (e.g., a rack) and peripheral electrical components.

[0036] Various embodiments may provide an electronic device including a drive motor having a disposition structure for securing (e.g., improving) battery capacity.

[0037] However, the problem to be solved in the present disclosure is not limited to the problem mentioned above, and may be expanded in various ways without departing from the spirit and scope of the present disclosure.

[0038] FIG. **1** is a block diagram illustrating an electronic device **101** in a network environment **100** according to various embodiments.

[0039] With reference 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**).

[0040] 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**.

[0041] 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.

[0042] 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**.

[0043] 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**.

[0044] 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).

[0045] 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.

[0046] 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 strength of force incurred by the touch.

[0047] 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., wiredly) or wirelessly coupled with the electronic device **101**.

[0048] 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.

[0049] 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., wiredly) 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.

[0050] 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, a HDMI connector, a USB connector, a SD card connector, or an audio connector (e.g., a headphone connector).

[0051] 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.

[0052] 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.

[0053] 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).

[0054] 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.

[0055] 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**.

[0056] 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 module **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., 20 Gbps or more) for implementing eMBB, loss coverage (e.g., 164 dB or less) for implementing mMTC, or U-plane latency (e.g., 0.5 ms or less for each of downlink (DL) and uplink (UL), or a round trip of 1 ms or less) for implementing URLLC.

[0057] 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**.

[0058] 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, a 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 lateral) of the printed circuit board, or adjacent to the second surface and capable of transmitting or receiving signals of the designated high-frequency band.

[0059] 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).

[0060] 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 device **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 device **102**, **104**, or **108**. For example, if the electronic device **101** should perform 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 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) on the basis of 5G communication technology or IoT-related technology.

[0061] According to various embodiments, the sensor module **176** may include a movement distance detection sensor to detect a movement distance of a second housing (e.g., a second housing **220** in FIG. **4**) from a first housing (e.g., a first housing **210** in FIG. **4**) of an electronic device (e.g., an electronic device **200** of FIG. **4**). In one embodiment, through movement of the second housing **220** from the first housing **210**, the sensor module **176** may detect a slide-in state being a first state, a slide-out state being a second state, or an intermediate state being a third state between the slide-in state and the slide-out state. In a certain embodiment, the processor **120** may detect the movement distance in real time through the sensor module **176** while the second housing **220** is moved from the first housing **210**, and control the display module **160** to display an object in correspondence to the changing display area through a flexible display (e.g., flexible display **230** in FIG. **4**). In one embodiment, the electronic device **101** may include a drive motor control module **181** to control the operation of a drive motor (e.g., DC motor or stepping motor) (e.g., drive motor **260** in FIG. **4**) disposed inside the electronic device. In an embodiment, the drive motor control module **181** may be replaced by the processor **120**.

[0062] FIGS. **2**A and **2**B are diagrams illustrating front and rear views of an electronic device in a slide-in state according to various embodiments of the present disclosure. FIGS. **3**A and **3**B are diagrams illustrating front and rear views of an electronic device in a slide-out state according to various embodiments of the present disclosure.

[0063] The electronic device **200** of FIGS. **2**A to **3**B may be at least partially similar to the electronic device **101** of FIG. **1** or may further include other embodiments of the electronic device.

[0064] With reference to FIGS. **2**A to **3**B, the electronic device **200** may include a first housing **210**, a second housing **220** that is slidably coupled to the first housing **210** in a specified direction (e.g., the direction ① or the direction ②) (e.g., the ±y-axis direction), and a flexible display **230** (e.g., the rollable display, the expandable display, or the stretchable display) that is disposed to be supported by at least a portion of the first housing **210** and the second housing **220**. In one embodiment, the second housing **220** may be slidably coupled to the first housing **210** so as to be slid out in a first direction (e.g., the direction ①) or slid in a second direction (e.g., the direction ②) that is opposite to the first direction (e.g., the direction ①). In one embodiment, the electronic device **200** may be changed into a slide-in state (e.g., the retracted state) by accommodating at least a portion of the second housing **220** in at least a portion of the first space **2101** formed by the first housing **210**. In one embodiment, the electronic device **200** may be changed into a slide-out state (e.g., the extended state) by moving at least a portion of the second housing **220** outwardly (e.g., the direction of ①) from the first space **2101**. In one embodiment, the electronic device **200** may include a support member (e.g., the support member **240** of FIG. **4**A) (e.g., the bendable member, the articulating hinge module, the multi-bar assembly, or the multi-bar) that, in a slide-out state, forms at least partially the same plane as at least a portion of the second housing **220**, and, in a slide-in state, is accommodated at least partially into the first space **2101** of the first housing **210** in a bendable manner. The support member **240** can include an arrangement of multiple bars structured to support the flexible display **230**. FIG. **4**A depicts the support member **240** in a partially bent or rolled state. In one embodiment, at least a portion of the flexible display **230** may be disposed to be supported by at least a portion of the second housing **220**. In one embodiment, at least a portion of the remaining portion of the flexible display **230** may be disposed to be supported by the support member **240** (e.g., the support member **240** of FIG. **4**A). In one embodiment, the support member **240** may be disposed in a manner that it is attached to the rear surface of the display **230**. In one embodiment, at least a portion of the flexible display **230** may be accommodated in a bendable manner into the first space **2101** of the first housing **210** while being supported by the support member (e.g., the support member **240** of FIG. **4**A) in a slide-in state so that it is not visible from the outside (e.g., not seen when viewing the electronic device **200**). In one embodiment, at least a portion of the flexible display **230** may be moved so that it is visible from the outside (e.g., can be seen when viewing the electronic device **200**) while being supported by the support member (e.g., the support member **240** of FIG. **4**A) that forms at least partially the same plane as the second housing **220** in a slide-out state.

[0065] According to various embodiments, the electronic device **200** may include a first housing **210** including a first lateral member **211** and a second housing **220** including a second lateral member **221**. In one embodiment, the first lateral member **211** may be disposed on a lower side of the electronic device **200** and may include a first side surface **2111** having a first length, a second side surface **2112** extending in a vertical direction (e.g., the y-axis direction) from one end of the first side surface **2111** and having a second length, and a third side surface **2113** extending parallel to the second side surface **2112** from the other end of the first side surface **2111** and having a second length. In one embodiment, the first lateral member **211** may be at least partially formed of a conductive material (e.g., metal). In some embodiments, the first lateral member **211** may be formed by combining a conductive member and a non-conductive member (e.g., polymer). In one embodiment, the first housing **210** may include a first extension member **212** that extends from at least a portion of the first lateral member **211** to at least a portion of the first space **2101**. In one embodiment, the first extension member **212** may be formed integrally with the first lateral member **211**. In some embodiments, the first extension member **212** may be formed separately from the first lateral member **211** and structurally coupled to the first lateral member **211**.

[0066] According to various embodiments, the second lateral member **221** may be disposed on an upper side of the electronic device **200** and may include a fourth side surface **2211** having a third length, a fifth side surface **2212** extending in a direction parallel to the second side surface **2112** from one end of the fourth side surface **2211** (e.g., the −y-axis direction) and having a fourth length, and a sixth side surface **2213** extending in a direction parallel to the fifth side surface **2212** from the other end of the fourth side surface **2211** and having a fourth length and corresponding to the third side surface **2113**. In one embodiment, the second lateral member **221** may be formed at least partially of a conductive member (e.g., metal). In some embodiments, the second lateral member **221** may be formed by combining

a conductive member and a non-conductive member (e.g., polymer). In one embodiment, at least a portion of the second lateral member **221** may include a second extension member **222** that extends to at least a portion of the second space **2201** of the second housing **220**. In one embodiment, the second extension member **222** may be formed integrally with the second lateral member **221**. In some embodiments, the second extension member **222** may be formed separately from the second lateral member **221** and structurally coupled to the second lateral member **221**.

[0067] According to various embodiments, the second side surface **2112** and the fifth side surface **2212** may be slidably coupled with respect to each other. In one embodiment, the third side surface **2113** and the sixth side surface **2213** may be slidably coupled with respect to each other. In one embodiment, in the slide-in state, a portion of the fifth side surface **2212** may be disposed to overlap with the second side surface **2112** so as to be substantially invisible from the outside (e.g., not seen when viewing the electronic device **200** externally). In one embodiment, in the slide-in state, a remaining portion of the fifth side surface **2212** may be disposed to be visible from the outside. In some embodiments, in the slide-in state, the fifth side surface **2212** may be disposed to overlap with the second side surface **2112** so as to be substantially invisible from the outside. In one embodiment, in the slide-in state, a portion of the sixth side surface **2213** may be disposed to overlap with the third side surface **2113** so as to be substantially invisible from the outside. In one embodiment, in the slide-in state, the remaining portion of the sixth side surface **2213** may be disposed to be visible from the outside. In some embodiments, in the slide-in state, the sixth side surface **2213** may be disposed to overlap with the third side surface **2113** so as to be substantially invisible from the outside. In one embodiment, a portion of the second extension member **222** may be disposed to be visible from the outside in the slide-in state. In some embodiments, in the slide-in state, the second extension member **222** may be disposed to overlap with the first extension member **212** so as to be substantially invisible from the outside.

[0068] According to various embodiments, the first housing **210** may include a first rear cover **213** coupled to at least a portion of the first lateral member **211**. In one embodiment, the first rear cover **213** may be disposed in such a way that it is coupled to at least a portion of the first extension member **212**. In some embodiments, the first rear cover **213** may be formed integrally with the first lateral member **211**. In one embodiment, the first rear cover **213** may be formed of a polymer, a coated or colored glass, a ceramic, a metal (e.g., aluminum, stainless steel (STS), or magnesium), or a combination of at least two of these materials. In some embodiments, the first rear cover **213** may extend to at least a portion of the first lateral member **211**. In some embodiments, the first rear cover **213** may be omitted and at least a portion of the first extension member **212** may be replaced with the first rear cover **213**.

[0069] According to various embodiments, the second housing **220** may include a second rear cover **223** coupled to at least a portion of the second lateral member **221**. In one embodiment, the second rear cover **223** may be disposed so as to be coupled to at least a portion of the second extension member **222**. In one embodiment, the second rear cover **223** may be formed integrally with the second lateral member **221**. In one embodiment, the second rear cover **223** may be formed of a polymer, a coated or colored glass, a ceramic, a metal (e.g., aluminum, stainless steel (STS), or magnesium), or a combination of at least two of these materials. In some embodiments, the second rear cover **223** may extend to at least a portion of the second lateral member **221**. In some embodiments, the second rear cover **223** may be omitted, and at least a portion of the second extension member **222** may be replaced with the second rear cover **223**. In some embodiments, the second extension member **222** may be omitted, and the second rear cover **223** may be replaced with the second extension member **222**. In one embodiment, the second housing **220** may include a window cover **224** disposed on at least a portion of the second rear cover **223**. In one embodiment, the window cover **224** may be disposed in an area exposed to the outside of the second housing **220** in a slide-in state, and may be formed of a material that facilitates detection of an external environment through at least one camera module **216** and/or sensor module **217** disposed in an inner space **2201** of the second housing **220**. For example, the window cover **224** may be formed of glass and/or polymer material in which at least an area corresponding to the camera module **216** and/or sensor module **217** is formed transparently.

[0070] According to various embodiments, the flexible display **230** may include a first portion **230***a* (e.g., the flat portion) that is always visible from the outside, and a second portion **230***b* (e.g., the bendable portion or a bending portion) that extends from the first portion **230***a* and is accommodated in a manner that is at least partially bent into the first space **2101** of the first housing **210** so as not to be visible from the outside in a slide-in state. In one embodiment, at least a portion of the first portion **230***a* may be disposed to be supported by the second housing **220**, and at least a portion of the first portion **230***a* and the second portion **230***b* may be disposed to be at least partially supported by a support member (e.g., the support member **240** of FIG. **4**A). In one embodiment, the second part **230***b* of the flexible display **230** may be disposed to form substantially the same plane as the first portion **230***a* while being supported by a support member (e.g., the support member **240** of FIG. **4**A) when the second housing **220** is slid out along the first direction (direction ①) and may be visible from the outside. In one embodiment, the second portion **230***b* of the flexible display **230** may be accommodated in a manner of bending into the first space **2101** of the first housing **210** when the second housing **220** is slid in along the second direction (direction ②) and may be disposed so as not to be visible from the outside (e.g., not seen when viewing the electronic device **200** externally). Accordingly, the flexible display **230** may have a variable display area as the second housing **220** slides along a specified direction (e.g., ±y-axis direction) from the first housing **210**.

[0071] According to various embodiments, the flexible display **230** may have a variable length in a sliding direction (e.g., direction ① or direction ②) according to the sliding movement of the second housing **220** relative to the first housing **210**. For example, the flexible display **230** may have a first display area (e.g., the area corresponding to the first portion **230***a*) corresponding to a first length L**1** in a slide-in state. In one embodiment, the flexible display **230** may be expanded to have a second display area (e.g., the area including the first portion **230***a* and the second portion **230***b*) corresponding to a third length L**3** longer than the first length

L1 and larger than the first display area, according to the movement distance of the second housing **220** moved by the second length L2 relative to the first housing **210** in a slide-out state.

[0072] According to various embodiments, the electronic device **200** may include at least one of an input device (e.g., the microphone **203-1**), an audio output device (e.g., the call receiver **206** and/or a speaker **207**), a sensor module **204** and **217**, a camera module (e.g., the first camera module **205** or the second camera module **216**), a connector port **208**, a key input device **219**, or an indicator (not shown) disposed in the second space **2201** of the second housing **220**. In one embodiment, the electronic device **200** may include another input device (e.g., the microphone **203**) disposed in the first housing **210**. In some embodiments, the electronic device **200** may be configured such that at least one of the above-described components is omitted, or other components are additionally included. In some embodiments, at least one of the components described above may be disposed in the first space **2101** of the first housing **210**.

[0073] According to various embodiments, the input device may include a microphone **203-1**. In some embodiments, the input device (e.g., the microphone **203-1**) may include a plurality of microphones disposed to detect the direction of sound. The audio output device may include, for example, a call receiver **206** and a speaker **207**. In one embodiment, the speaker **207** may be in contact with the outside through at least one speaker hole formed in the second housing **220** at a position that is always exposed to the outside (e.g., the fourth side surface **2211**), regardless of the slide-in/slide-out state. In one embodiment, the connector port **208** may be in contact with the outside through a connector port hole formed in the second housing **220** in the slide-out state. In one embodiment, the connector port **208** may be covered so as not to be visible from the outside in the slide-in state. In some embodiments, the connector port **208** may be formed in the first housing **210** in a slide-in state and may be externally responsive through an opening formed to correspond with the connector port hole. In some embodiments, the call receiver **206** may include a speaker (e.g., the piezo speaker) that is operated without a separate speaker hole.

[0074] According to various embodiments, the sensor modules **204** and **217** may generate electrical signals or data values corresponding to an internal operating state of the electronic device **200** or an external environmental state. In one embodiment, the sensor modules **204** and **217** may include, for example, a first sensor module **204** (e.g., the proximity sensor or the ambient light sensor) disposed on the front surface of the electronic device **200** and/or a second sensor module **217** (e.g., the heart rate monitoring (HRM) sensor) disposed on the rear surface of the electronic device **200**. In one embodiment, the first sensor module **204** may be disposed on the front surface of the electronic device **200** under the flexible display **230**. In one embodiment, the first sensor module **204** and/or the second sensor module **217** may include at least one of a proximity sensor, an ambient light sensor, a time of flight (TOF) sensor, an ultrasonic sensor, a fingerprint recognition sensor, 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, or a humidity sensor.

[0075] According to various embodiments, the camera module may include a first camera module **205** disposed on the front surface of the electronic device **200** and a second camera module **216** disposed on the rear surface of the electronic device **200**. In one embodiment, the electronic device **200** may also include a flash (not shown) disposed near the second camera module **216**. In one embodiment, the camera modules **205** and **216** may include one or more lenses, an image sensor, and/or an image signal processor. In one embodiment, the first camera module **205** may be disposed under the flexible display **230** and configured to capture a subject through a portion of an active area (e.g., the display area) of the flexible display **230**.

[0076] According to various embodiments, among the camera modules, the first camera module **205** and, among the sensor modules **204** and **217**, the first sensor module **204** may be disposed to detect an external environment through the flexible display **230**. For example, the first camera module **205** or the first sensor module **204** may be disposed in the second space **2201** of the second housing **220** so as to be in contact with the external environment through a transparent area or a perforated opening formed in the flexible display **230**. In one embodiment, an area of the flexible display **230** facing the first camera module **205** may be formed as a transparent area having a designated transmittance as part of an active area that displays content. In one embodiment, the transparent area may be formed to have a transmittance in a range of about 5% to about 20%. Such a transparent area may include an area overlapping with an effective area (e.g., the field of view area) of the first camera module **205** through which light passes to be imaged by the image sensor to generate an image. For example, the transparent area of the flexible display **230** may include an area having a lower pixel disposition density and/or lower wiring density than the surrounding area. For example, the transparent area may be replaced with the opening described above. For example, some camera modules **205** may include an under display camera (UDC). In some embodiments, some sensor modules **204** may be disposed to perform their functions without being visually exposed through the flexible display **230** in the second space **2201** of the second housing **220**.

[0077] According to various embodiments, the slide-in operation and/or the slide-out operation of the electronic device **200** may be performed automatically. For example, the slide-in operation and/or the slide-out operation of the electronic device **200** may be performed through gear engagement between a driving motor (e.g., the driving motor **260** of FIG. **4**) including a pinion gear (e.g., the pinion gear **261** of FIG. **4**) disposed in a second space **2201** of the second housing **220** and a rack (e.g., the rack **2253** of FIG. **4**) disposed in the first space **2101** of the first housing **210**, extending to at least a portion of the second space **2201**, and including a rack gear coupled to the pinion gear **261**. For example, when a processor (e.g., the processor **120** of FIG. **1**) of the electronic device **200** detects a triggering signal for transitioning from a slide-in state to a slide-out state or from a slide-out state to a slide-in state, the processor may drive a driving motor (e.g., the driving motor **260** of FIG. **4**) disposed inside the electronic device **200**. In one embodiment, the triggering signal may include a signal according to selection (e.g., touch) of an object displayed on the flexible

display **230** or a signal according to operation (e.g., pressing) of a physical button (e.g., the key button) included in the electronic device **200**.

[0078] According to various embodiments, the electronic device **200** may have a structure in which the second housing **220** slides in and/or out relative to the first housing **210** along a longitudinal direction (e.g., vertical direction) (e.g., ±y-axis direction) of the electronic device **200**, but is not limited thereto. For example, the electronic device **200** may have a structure in which the second housing **220** slides in and/or out relative to the first housing **210** along a width direction (e.g., horizontal direction) (e.g., the ±x-axis direction) perpendicular to the longitudinal direction of the electronic device **200**, according to one or more embodiments. In some embodiments, the electronic device **200** may be formed such that the length of the first side surface **2111** of the first housing **210** is longer than the length of the second side surface **2112**. In this case, the length of the fourth side surface **2211** of the second housing **220** may also be formed to be longer than the length of the fifth side surface **2212**.

[0079] According to various embodiments, the electronic device **200** may include at least one antenna A disposed through at least a portion of a second lateral member **221** of the second housing **220**. In one embodiment, the electronic device **200** may include at least one unit conductive portion **310**, **311**, and **312** formed through at least one segmentation portion **321**, **322**, **323**, and **324**. In one embodiment, the electronic device **200** may include a first conductive portion **310** disposed through a first segmentation portion **321** and a second segmentation portion **322** spaced apart from each other by a specified interval on a fourth side surface **2211** of the second lateral member **221**. In one embodiment, the electronic device **200** may include a first segmentation portion **321** and a second conductive portion **311** disposed through a third segmentation portion **323** formed on a fifth side surface **2212**. In one embodiment, the electronic device **200** may include a second segmentation portion **322** and a third conductive portion **312** disposed through a fourth segmentation portion **324** formed on a sixth side surface **2213**. In one embodiment, at least one conductive portion among the first conductive portion **310**, the second conductive portion **311**, or the third conductive portion **312** may be electrically connected to a wireless communication circuit of the electronic device **200** (e.g., the wireless communication module **192** of FIG. **1**) so as to be used as at least one antenna A operating in at least one designated frequency band (e.g., the legacy band or a New Radio (NR) band). For example, the at least one designated frequency band may cover a range of about 600 MHz to 9000 MHz.

[0080] FIG. **4**A is an exploded perspective view of an electronic device according to various embodiments of the present disclosure. FIG. **4**B is a perspective view of a support bracket on which a battery is mounted according to various embodiments of the present disclosure.

[0081] In describing the electronic device **200** of FIG. **4**A, components that are substantially the same as those of the electronic devices **200** of FIGS. **2**A to **3**B are given the same reference numerals, and a detailed description thereof may be omitted.

[0082] With reference to FIGS. **4**A and **4**B, the electronic device **200** may include a first housing **210** including a first space **2101**, a second housing **220** that is slidably coupled to the first housing **210** and includes a second space **2201**, a support member **240** (e.g., the bendable member or a multi-bar assembly) that is fixed to at least a portion of the second housing **220** and is at least partially bendably accommodated into the first space **2101** according to a slide-in motion, a flexible display **230** that is disposed to receive support from at least a portion of the support member **240** and the second housing **220**, and a drive module (e.g., the drive mechanism) that drives the second housing **220** from the first housing **210** in a slide-in direction (e.g., the −y-axis direction) and/or a slide-out direction (e.g., the y-axis direction). In one embodiment, the first housing **210** may include a first lateral member **211** and a first rear cover **213** coupled to at least a portion of the first lateral member **211** (e.g., at least a portion of the first extension member **212**). In one embodiment, the first space **2101** may be formed by the coupling of the first lateral member **211** and the first rear cover **213**. In one embodiment, the second housing **220** may include a second lateral member **221**, a second rear cover **223** coupled to at least a portion of the second lateral member **221** (e.g., at least a portion of the second extension member **222**), and a window cover **224** coupled to the second rear cover **223**. In one embodiment, the second space **2201** may be formed by combining the second lateral member **221**, the second rear cover **223**, and the window cover **224**. In one embodiment, a portion of the second rear cover **223** may include a notch area **223***a* formed to expose the second camera module **216** disposed in the second space **2201**. In one embodiment, the notch area **223***a* may be protected from the outside by the window cover **224** disposed thereon. In one embodiment, the first housing **210** may further include a cover member **2111***a* disposed to cover at least a portion of the first side surface **2111**.

[0083] According to various embodiments, the drive module may include a driving motor **260** disposed in the second space **2201** and including a pinion gear **261**, and a rack **2253** fixed to the support bracket **225** and extending from the first space **2101** to the second space **2201**, and including a rack gear disposed to engage the pinion gear **261**. In one embodiment, the electronic device **200** may further include a reduction module (e.g., the reduction gear assembly) disposed to engage with the driving motor **260** to reduce the rotational speed and increase the driving force. In one embodiment, the driving motor **260** may be disposed in the second space **2201** of the second housing **220** to be supported by a second extension member **222**. In one embodiment, the driving motor **260** may be disposed to be supported by a motor bracket **260***a* fixed to the second extension member **222**. In some embodiments, the motor bracket **260***a* may further include a guide structure that guides the rack **2253** in a sliding direction. Accordingly, when the electronic device **200** is assembled, the pinion gear **261** may maintain a state of gear engagement with the rack **2253**, and the pinion gear **261** provided with the driving force of the driving motor **260** may move along the rack **2253**, thereby causing the second housing **220** to move relative to the first housing **210**.

[0084] According to various embodiments, the electronic device **200** may include a support bracket **225** fixed to the first space **2101** of the first housing **210**. In one embodiment, the support bracket **225** may include a battery mounting portion **2251** for accommodating a battery B and a support portion **2252** formed on the lower side of the battery mounting portion **2251** and supporting a rear surface of a support member **240** that is bent during a sliding motion

transitioning from a slide-out state to a slide-in state. In one embodiment, the support portion **2252** may have an outer surface formed to be curved for smooth guidance of the support member **240**. In one embodiment, the electronic device **200** may include a pair of guide rails **226** that are fixed to both sides of the support bracket **225** to guide both ends of the support member **240** in a sliding direction while simultaneously guiding the second housing **220** in a sliding direction. In one embodiment, the support bracket **225** and the guide rails **226** may be fixed in the inner space **2101** of the first housing **210** through a fastening member, such as a screw.

[0085] According to various embodiments, the electronic device **200** may include at least one electrical component disposed in the second space **2201**. In one embodiment, the at least one electrical component may include a substrate assembly **251** (e.g., the main substrate) (e.g., stacked substrates or a main PCB) and a second camera module **216** disposed around the substrate assembly **251**. In one embodiment, the at least one electrical component may include at least one of a microphone (e.g., the microphone **203-1** of FIG. **8**A), a first camera module (e.g., the first camera module **205** of FIG. **8**A), a receiver (e.g., the receiver **206** of FIG. **8**A), a speaker (e.g., the speaker **207** of FIG. **8**A), a vibration motor (e.g., the vibration motor **218** of FIG. **8**A), or a connector port (e.g., the connector port of FIG. **8**A) disposed around the substrate assembly **251**. In some embodiments, at least one electrical component may be disposed in the first space **2101** of the first housing **210**. In one embodiment, the substrate assembly **251** may be disposed generally centrally in the second space **2201** of the second housing **220**, with the at least one electrical component disposed along the periphery thereof, thereby enabling efficient electrical connection between the substrate assembly **251** and the at least one electrical component.

[0086] According to various embodiments, the electronic device **200** may include a first substrate **252** (e.g., the first sub-substrate) and an antenna member (e.g., the antenna member **253** of FIG. **11**) disposed between a first extension member **212** and a first rear cover **213** in a first housing **210**. In one embodiment, the first substrate **252** and the antenna member (e.g., the antenna member **253** of FIG. **11**) may be disposed between the first extension member **212** and the first rear cover **213**. In one embodiment, the first substrate **252** and the antenna member **253** may be electrically connected to a substrate assembly **251** through a flexible substrate (e.g., the flexible substrate F**1** of FIG. **8**A) (e.g., the FPCB, flexible printed circuit board or FRC, flexible RF cable). In one embodiment, the antenna member (e.g., the antenna member **253** of FIG. **11**) may include a multi-function coil (or multi-function core) antenna for performing a wireless charging function, a near field communication (NFC) function, and/or an electronic payment function. In some embodiments, the antenna member (e.g., the antenna member **253** of FIG. **11**) may be electrically connected to a third substrate (e.g., the third substrate **255** of FIG. **8**A) disposed around the driving motor **260**, thereby being electrically connected to the substrate assembly **251**.

[0087] According to an exemplary embodiment of the present disclosure, the battery B disposed in the battery mounting portion **2251** of the support bracket **225** may be designed to expand in size as much as possible in the width direction (e.g., the ±x-axis direction) without any separate component disposition other than the guide structure (e.g., the guide structure of the guide rail **226** and the second housing **220**) between the support bracket **225** and the second housing **220**. For example, the width W of the battery B disposed in the battery mounting portion **2251** may be similar to or the same as the width of the electronic device **200** (e.g., the width of the electronic device in the x-axis direction). Such an expansion in the size of the battery B may help improve the reliability of the electronic device **200** by increasing the usage time of the device. In some embodiments, the battery B may be directly mounted on the battery mounting portion formed through a structural change of the first extension member **212** of the first housing **210** without the support bracket **225**. In this case, the rack **2253** may be fixed to at least a portion of the first housing **210**, and the size of the battery B may be further expanded in the width direction (e.g., the ±x-axis direction).

[0088] According to an exemplary embodiment of the present disclosure, the electronic device **200** may include a rack **2253** that is fixed to the support bracket **225**, has a length in the direction of the second housing **220** (e.g., the y-axis direction), and extends into the second space **2201**. In one embodiment, when a side surface (e.g., the second side surface **2112** or the third side surface **2113**) of the first housing **210** is viewed from the outside, the rack **2253** and the battery B may be disposed so as not to overlap each other. In one embodiment, when the flexible display **230** is viewed from above, the rack **2153** and the battery B may be disposed so as not to overlap each other. In one embodiment, a sliding distance (e.g., the sliding distance S of FIG. **7**A) of the second housing **220** may be determined through the length of the rack **2253** or at least a portion of the rack **2253**. In one embodiment, the rack **2253** may be determined to have a length corresponding to a distance from the support bracket **225** to an upper inner surface (e.g., the inner surface **221***a* of FIG. **5**A) (e.g., the inner surface corresponding to the fourth side surface **2211** of the second housing **220**) of the second space **2201** when the electronic device **200** is in a slide-in state. For example, when the distance from the support bracket **225** to the upper inner surface **221***a* of the second space **2201** becomes shorter in the slide-in state, the length of the rack **2253** may also become shorter, and the sliding distance of the second housing **220** may also become shorter in proportion thereto. In one embodiment, in the slide-in state, when the distance from the support bracket **225** to the upper inner surface **221***a* of the second space **2201** becomes longer, the length of the rack **2253** may also become longer, and the sliding distance of the second housing **220** may also become longer in proportion thereto. Accordingly, the length of the rack **2253** may be determined by the size of the battery B mounted on the battery mounting portion **2251** of the support bracket **225**. This may mean that when the sliding distance of the second housing **220** is determined, the size of the battery B may be designed to be as expandable (or large) as possible to correspond to the first space **2101**.

[0089] According to an exemplary embodiment of the present disclosure, the rack **2253** may be disposed to be generally biased to one side on the basis of the width direction (e.g., the x-axis direction) of the electronic device **200**. For example, the rack **2253** may be disposed to be biased to the left side (e.g., the −x-axis direction) of the electronic device **200** when the flexible display **230** is viewed from the front. This biased disposition structure of

the rack **2253** may help secure the size of the substrate assembly **251** (e.g., main substrate) disposed in the second space **2201**.

[0090] FIG. **5**A is a cross-sectional view of an electronic device as viewed along line **5***a*-**5***a* of FIG. **2**A according to various embodiments of the present disclosure. FIG. **5**B is a cross-sectional view of an electronic device as viewed along line **5***b*-**5***b* of FIG. **3**A according to various embodiments of the present disclosure.

[0091] In describing the electronic device **200** of FIGS. **5**A and **5**B, components that are substantially the same as those of the electronic device **200** of FIGS. **4**A and **4**B are given the same reference numerals, and a detailed description thereof may be omitted.

[0092] With reference to FIGS. **5**A and **5**B, the electronic device **200** may include a first housing **210** having a first space **2101**, a second housing **220** having a second space **2201**, a support member **240** connected to the second housing **220** and at least partially accommodated into the first space **2101** in a slide-in state, a flexible display **230** disposed to receive support from at least a portion of the support member **240** and at least a portion of the second housing **220**, and a driving motor **260** including a pinion gear **261** fixed to the first space **2101** and gear-coupled to a rack **2253** extending into the second space **2201**. In one embodiment, the driving motor **260** may automatically move the second housing **220** in a slide-out direction (direction ①) or a slide-in direction (direction ②) on the basis of (or with respect to) the first housing **210** through the gear engagement of the pinion gear **261** and the rack **2253**. In one embodiment, the electronic device **200** may include a first rear cover **213** coupled to a first extension member **212** extended from a first lateral member **211** of the first housing **210**. In one embodiment, the electronic device **200** may include a first substrate **252** and an antenna member **253** disposed in a space between the first extension member **212** and the first rear cover **213**. In one embodiment, the electronic device **200** may include a second rear cover **223** coupled to a second extension member **222** extending from a second lateral member **221** and a window cover **224** coupled to a portion of the second rear cover **223**.

[0093] According to various embodiments, a portion of the second housing **220** may be accommodated in the first space **2101** of the first housing **210** in the slide-in state (state of FIG. **5**A) of the electronic device **200**. In one embodiment, at least a portion of the flexible display **230** may be accommodated in a manner of being bent into the first space **2101** together with the support member **240**, thereby being disposed so as not to be visible from the outside. In this case, the flexible display **230** may have a first display area (e.g., the display area corresponding to the first portion **230***a* of FIG. **3**A) exposed to the outside.

[0094] According to various embodiments, at least a portion of the second housing **220** may be transitioned to a slide-out state in which it moves outwardly from the first housing **210** at least partially along the first direction (direction ①) by driving the driving motor **260**. In one embodiment, the flexible display **230** may be supported by the support bracket **225** and moved together with the support member **240** in the slide-out state (state of FIG. **5**B) of the electronic device **200**, such that a portion that has slid into the first space **2101** may be exposed so as to be at least partially visible from the outside (e.g., seen when viewing the electronic device **200** externally). In this case, the flexible display **230** may be exposed to the outside with a second display area that is expanded more than the first display area (e.g., the display area including the first portion **230***a* and the second portion **230***b* of FIG. **3**A).

[0095] According to various embodiments, the electronic device **200** may include a battery B disposed through a battery mounting portion **2251** of a support bracket **225** fixed to a first space **2101** of a first housing **210**. In one embodiment, the battery B may be disposed in the first housing **210** through the support bracket **225**, and be expanded in thickness in a manner such that it is proximate to or in contact with a rear surface of a support member **240** from the battery mounting portion **2251** of the support bracket **225**, so that the battery volume relatively increases in the −z-axis direction, and the support member **240** that moves in the first space **2101** is supported.

[0096] According to an exemplary embodiment of the present disclosure, in the slide-in state, as the second housing **220** moves in the second direction (direction ②), the end of the rack **2253** may be disposed to be in contact with or proximate to the upper inner surface **221***a* of the second space **2201**. In one embodiment, in the slide-out state, as the second housing **220** moves in the first direction (direction ①), the end of the rack **2253** may be disposed to move away from the upper inner surface **221***a* of the second space **2201**, and at least a portion of the rack **2253** may still be disposed to receive support (e.g., guide) from the second housing **220** (e.g., the second extension member **222**) in the second space **2201**. In one embodiment, the rack **2253** may be formed to have a length corresponding to the distance from the support bracket **225** to the upper inner surface **221***a* of the second space **2201** in the slide-in state. In one embodiment, the rack **2253** may have an interworking disposition structure that is fixed to the first space **2101** and accommodated (e.g., guided) in the second space **2201** of the second housing **220** according to a sliding motion. This interworking disposition structure prevents the rack **2253** and the battery B from overlapping when the side surface of the first housing **210** (e.g., the second side surface **2112** or the third side surface **2113**) is viewed from the outside and when the flexible display **230** is viewed from above, thereby maximizing the size (e.g., battery capacity) of the battery B in the width direction (e.g., the ±x-axis direction) and/or length direction (e.g., ±y-axis direction) of the first housing **210**, thereby helping increase the usage time of the electronic device **200** and improve the reliability of the device.

[0097] FIG. **6**A is a schematic diagram of an electronic device illustrating the disposition structure of a driving motor and a rack in a slide-in state according to various embodiments of the present disclosure. FIG. **6**B is a perspective view of a portion of an electronic device illustrating the disposition configuration of a rack accommodated in a second housing in a slide-in state according to various embodiments of the present disclosure.

[0098] In describing the electronic device **200** of FIGS. **6**A and **6**B, components that are substantially the same as those of the electronic device **200** of FIGS. **4**A and **4**B are given the same reference numerals, and a detailed description thereof may be omitted.

[0099] With reference to FIGS. **6**A and **6**B, the electronic device **200** may include a first housing **210** having a first space **2101** and a second housing **220** that is slidably coupled to the first housing **210** and has a second space **2201**. In one embodiment, the electronic device **200** may

include a support bracket **225** fixed to the first housing **210**. In one embodiment, the electronic device **200** may include a pair of guide rails **226** fixed to both ends of the support bracket **225**. In one embodiment, the second housing **220** may be slidably coupled in a specified direction (e.g., the ±y-axis direction) through the guide rails **226**.

[0100] According to various embodiments, the electronic device **200** may include a driving motor **260** including a pinion gear **261** disposed in a second space **2201** of the second housing **220**. In one embodiment, the electronic device **200** may include a rack **2253** that is fixed to a support bracket **225** disposed in the first space **2101** of the first housing **210** and is disposed in the second space **2201** in a slide-in state. In one embodiment, the rack **2253** may be fixed to a side wall **2251***a* formed on at least a portion of the support bracket **225** through a screw. In one embodiment, the pinion gear **261** may be gear-coupled to the rack **2253**, and by rotating the driving motor **260**, the pinion gear **261** may move along the rack **2253**, thereby allowing the second housing **220** to slide in a specified direction (e.g., the ±y-axis direction) from the first housing **210**. In one embodiment, the driving motor **260** may be disposed to be supported by a motor bracket **260***a* that is fixed to a second extension member **222** of the second housing **220** through a fastening member, such as a screw. In one embodiment, the motor bracket **260***a* may guide at least a portion of the rack **2253**. For example, the rack **2253** may be guided in a manner of passing between the motor bracket **260***a* and the second extension member **222**.

[0101] According to various embodiments, the rack **2253** may be disposed such that, in a slide-in state, the second housing **220** moves in the second direction (direction ②), such that its end is in contact with or proximate to the upper inner surface **221***a* of the second space **2201**. In one embodiment, the rack **2253** may be moved while being guided by a rack guide **222***a* provided on the second extension member **222** according to the movement of the second housing **220**. In one embodiment, the rack guide **222***a* may help reduce unintended deformation or movement of the rack **2253** during a sliding motion of the electronic device **200**. In one embodiment, the rack guide **222***a* may include a recess formed lower than a surface of the second extension member **222** in the longitudinal direction (e.g., the ±y-axis direction) along the accommodating trajectory of the rack **2253**. For example, at least a portion of the rack **2253** may be accommodated in the recess, thereby reducing left-right movement that may occur during a sliding motion. In some embodiments, the rack guide **222***a* may be disposed on or formed integrally with the second extension member **222** and may include a guide structure (e.g., a boss) that supports and guides at least the left and right side surfaces of the rack **2253**. In some embodiments, the rack guide **222***a* may be omitted. In one embodiment, the pinion gear **261** and the rack **2253** coupled thereto may be disposed to be biased to one side with respect to the width direction (e.g., the ±x-axis direction) of the electronic device **200**, thereby helping secure the size of the substrate assembly **251** (e.g., main substrate) generally disposed in the center of the second space **2201**.

[0102] FIG. **6**C is a cross-sectional view of an electronic device as viewed along line **6***c*-**6***c* of FIG. **6**A according to various embodiments of the present disclosure.

[0103] With reference to FIG. **6**C, the electronic device **200** may include a support member **240** for supporting a flexible display **230** and a pair of guide rails **226** for guiding both ends of the support member **240**. In one embodiment, the support member **240** may include a plurality of multi-bars **241** that are rotatably coupled to each other and guide protrusions **2411** that are protruded at (or protrude from) both ends of each of the multi-bars **241**. In one embodiment, the guide rails **226** may be fixed to both sides of a support bracket **225** disposed in a first space **2101** of the first housing **210**. In one embodiment, the guide rails **226** may include guide slits **2261** formed at positions corresponding to the movement trajectories of the support member **240**. In one embodiment, a guide structure in which a guide protrusion **2411** of a support member **240** fixed in a manner of being at least partially attached to a rear surface of a flexible display **230** moves along a guide slit **2611** formed in a guide rail **226** may help reduce a phenomenon (or potential) in which the flexible display **230** is detached or deformed during operation.

[0104] FIG. **7**A is a block diagram of an electronic device illustrating the disposition structure of a driving motor and a rack in a slide-out state according to various embodiments of the present disclosure. FIG. **7**B is a perspective view of a portion of an electronic device illustrating the disposition configuration of a rack accommodated in a second housing in a slide-out state according to various embodiments of the present disclosure.

[0105] In describing the electronic device **200** of FIGS. **7**A and **7**B, components that are substantially the same as those of the electronic device **200** of FIGS. **6**A and **6**B are given the same reference numerals, and a detailed description thereof may be omitted.

[0106] With reference to FIGS. **7**A and **7**B, the rack **2253** may be disposed so that its end is away from the upper inner surface **221***a* of the second space **2201** when the second housing **220** is moved in the first direction (direction ①) in the slide-out state. In one embodiment, at least a portion of the rack **2253** may be disposed to be guided by the rack guide **222***a* of the second housing **220** in the slide-out state. In one embodiment, at least a portion of the rack **2253** may be disposed to be guided by the rack guide **222***a* provided in the second housing **220** even when transitioning from the slide-in state to the slide-out state, thereby ensuring operational stability.

[0107] According to various embodiments, the sliding distance S (sliding stroke) for the second housing **220** to transition from a slide-in state to a slide-out state may be determined by the length of the rack **2253**. In one embodiment, the length of the rack **2253** may be determined by the distance from the support bracket **225** to the upper inner surface **221***a* of the second space **2201** when the electronic device **200** is in the slide-in state. In one embodiment, the length and/or the sliding distance S of the rack **2253** may be determined by the size of the battery B mounted on the battery mounting portion **2251** of the support bracket **225**. In some embodiments, the size of the battery B along the longitudinal direction (e.g., ±y-axis direction) of the electronic device **200** may be determined by the sliding distance S of the second housing **220**. For example, when the sliding distance S of the second housing **220** is determined, the size of the battery B is designed to be maximally expandable to correspond to (e.g., to fit) the first space **2101** in response thereto, thereby helping extend the usage time of the electronic device **200**. In one embodiment, the battery B and the rack **2253** may have a structure in which they are disposed

side by side without overlapping each other when viewing the side surface of the first housing **210** (e.g., the second side surface **2112** or the third side surface **2113** of FIG. **3**A) from the outside and when viewing the flexible display **230** from above, so that the battery B is designed to be maximally expandable to a size substantially equal to or similar to the width of the first housing **210** along the width direction (e.g., the ±x-axis direction) of the electronic device **200**, thereby helping extend the usage time of the electronic device.

[0108] FIG. **8**A is a schematic diagram of a portion of an electronic device including electrical components according to various embodiments of the present disclosure. FIG. **8**B is a perspective view of a portion of an electronic device including electrical components according to various embodiments of the present disclosure.

[0109] The electronic device of FIGS. **8**A and **8**B may be similar to the electronic device of FIGS. **2**A to **3**B, or may further include other embodiments of the electronic device. In one embodiment, FIGS. **8**A and **8**B are drawings illustrating the rear surface of the second housing **220** with the second rear cover **223** and the window cover **224** removed.

[0110] With reference to FIGS. **8**A and **8**B, the electronic device **200** may include a first housing **210** and a second housing **220** slidably coupled to the first housing. In one embodiment, the second housing **220** may include a second lateral member **221** and a second extension member **222** extending from the second lateral member **221** to a second space **2201**. In one embodiment, the second lateral member **221** may include a fourth side surface **2211**, a fifth side surface **2212** and a sixth side surface **2213** extending vertically from opposite ends of the fourth side surface **2211**, respectively. In one embodiment, the second lateral member **221** and/or the second extension member **222** may be formed of at least a partially disposed conductive member (e.g., metal) and a non-conductive member (e.g., polymer) that is injection-molded with the conductive member. In one embodiment, the second lateral member **221** may include conductive portions **310**, **311**, and **312** segmented by segmentation portions **321**, **322**, **323**, and **324**. In one embodiment, the second lateral member **221** may include a first conductive portion **310** segmented through a first segmentation portion **321** and a second segmentation portion **322** disposed at a specified interval on the fourth side surface **2211**, a second conductive portion **311** segmented through a third segmentation portion **323** disposed between the first segmentation portion **321** and the fifth side surface **3212**, and a third conductive portion **312** segmented through the second segmentation portion **322** and a fourth segmentation portion **324** disposed on the sixth side surface **2213**. In one embodiment, at least one of the first conductive portion **310**, the second conductive portion **311**, or the third conductive portion **312** is electrically connected to a wireless communication circuit of the electronic device **200** (e.g., the wireless communication module **192** of FIG. **1**) so as to be used as at least one antenna operating in at least one designated frequency band (e.g., a legacy band).

[0111] According to various embodiments, the electronic device **200** may include at least one electrical component disposed in the second space **2201** of the second housing **220**. In one embodiment, the at least one electrical component may include a substrate assembly **251** (e.g., a main substrate) substantially disposed in a central portion of the second space **2201**. In one embodiment, the at least one electrical component may include at least one of a microphone **203-1**, a first camera module **205**, a second camera module **216**, a receiver **206**, a speaker **207**, a connector port **208**, a vibration motor **218** (vibrator), or an array antenna (AR) disposed around the substrate assembly **251**. In one embodiment, the substrate assembly **251** is disposed generally centrally in the second space **2201** of the second housing **220**, and at least one electrical component is disposed along the periphery thereof, so that efficient electrical connection between the substrate assembly **251** and the at least one electrical component can be possible. In one embodiment, the electronic device **200** may include a second substrate **254** (e.g., a sub-substrate) disposed in the second space **2201**. In some embodiments, the second substrate **254** may also be composed of stacked substrates (e.g., a substrate assembly using an interposer), similar to the substrate assembly **251**. In one embodiment, the second substrate **254** may be disposed so as not to overlap with the substrate assembly **251** when viewing the second rear cover (e.g., the second rear cover **223** of FIG. **4**A) from above. In one embodiment, at least a portion of the second substrate **254** may be disposed so as to overlap with the rack **2253** when viewing the rear cover **223** from above. In some embodiments, the second substrate **254** may also be disposed so as to overlap with at least a portion of the substrate assembly **251**. In one embodiment, the electronic device **200** may include an additional array antenna (AR**1**) disposed on the second substrate **254**. In one embodiment, the array antenna (AR) may form a directional beam in the direction (e.g., the y-axis direction) toward the fourth side surface **2211** in the second space **2201**, and the additional array antenna (AR**1**) may be disposed to form a directional beam in the direction (e.g., the −z-axis direction) that the rear cover (e.g., the rear cover **223** of FIG. **4**A) faces.

[0112] According to various embodiments, the electronic device **200** may include a rack **2253** that is fixed to the support bracket **225** of the first housing **210** and extends into the second space **2201** of the second housing **220**. In one embodiment, the rack **2253** may be disposed to be in contact with or proximate to the upper inner surface **221***a* of the second space **2201** when the electronic device **200** is in a slide-in state. Accordingly, the rack **2253** may have an overlapping structure that overlaps with at least one electrical component (e.g., a vibration motor **218**) disposed in the second space **2201** when the second rear cover **223** is viewed from above. Exemplary embodiments of the present disclosure may provide an efficient stacking structure to reduce the thickness increase (e.g., to reduce or prevent an increase in the thickness) of an electronic device **200** because of the overlapping disposition of the rack **2253** and at least one electrical component. In one embodiment, some of the at least one electrical component may be disposed in an avoidance area (e.g., a non-overlapping area) that does not overlap with the rack **2253** when the second rear cover **223** is viewed from above. In one embodiment, a microphone **203-1**, a first camera module **205**, a second camera module **216**, a receiver **206**, a speaker **207**, a connector port **208**, or an array antenna (AR) may be disposed in a second space **2201** so as not to overlap with the rack **2253**. In this case, the disposition position of at least one electrical component may be changed. For example, the array antenna (AR) may be disposed in a central portion of an inner surface **221***a* of the second space **2201** to avoid the rack **2253**. In one embodiment, the speaker **207** may be disposed (e.g., vertically) to

have a length in the sliding direction (e.g., the ±y axis direction) to avoid the rack **2253**.

[0113] FIG. **9**A is a cross-sectional view of an electronic device as viewed along line **9***a*-**9***a* of FIG. **8**A according to various embodiments of the present disclosure.

[0114] With reference to FIGS. **8**A and **9**A, the electronic device **200** may include an array antenna (AR) disposed in a second space **2201** of a second housing **220**. In one embodiment, the array antenna (AR) may be disposed at a position proximate to the center of the upper inner surface **221***a* while considering the disposition of the rack **2253** and avoiding the substrate assembly **251** and/or the speaker **207** disposed in the second space **2201**. In one embodiment, the array antenna (AR) may be disposed at a position proximate to the second rear cover **223** while avoiding the first camera module **205** disposed at the upper center. In one embodiment, the array antenna (AR) may include a substrate and a plurality of antenna elements disposed at a specified interval on the substrate, and the plurality of antenna elements may be configured to form a directional beam generally in a direction (e.g., the y-axis direction) toward which the fourth side surface **2211** faces by being electrically connected to a wireless communication circuit (e.g., the wireless communication module **192** of FIG. **1**). In one embodiment, the array antenna (AR) may be configured to transmit or receive a wireless signal in a range of about 3 GHz to 100 GHz as a mmWave module.

[0115] According to various embodiments, the array antenna (AR) may be disposed at a position proximate to the second rear cover **223** while avoiding the first camera module **205** disposed at the upper center in the second space **2201**. In one embodiment, the electronic device **200** may include a heat dissipation structure for diffusing heat generated from the array antenna (AR) to the periphery. In one embodiment, the electronic device **200** may include a heat transfer member **259** disposed such that one end is proximate to or in contact with the array antenna (AR) and the other end is proximate to or in contact with the second rear cover **223**. This is to transfer heat to the second rear cover **223** proximate thereto, considering the disposition position of the array antenna (AR). In one embodiment, the heat transfer member **259** and/or the second rear cover **223** may be formed of a metal material that is advantageous for heat diffusion.

[0116] According to various embodiments, the substrate assembly **251** may be disposed in a manner that a plurality of printed circuit boards (PCBs) **2511**, **2512**, and **2513** are stacked through an interposer I in the second space **2201**. In one embodiment, the substrate assembly **251** may include a first printed circuit board **2511**, a second printed circuit board **2512**, and a third printed circuit board **2513** that are sequentially stacked from the second extension member **222** in a direction (e.g., the −z-axis direction) toward the second rear cover **223**. In one embodiment, each of the printed circuit boards **2511**, **2512**, and **2513** may be electrically connected to each other through the interposer I. In one embodiment, each of the printed circuit boards **2511**, **2512**, and **2513** may be disposed to at least partially overlap with the second rear cover **223** when viewed from above.

[0117] FIG. **9**B is a cross-sectional view of a portion of an electronic device as viewed along line **9***b*-**9***b* of FIG. **8**A according to various embodiments of the present disclosure. FIG. **9**C is a perspective view of the rear surface of the second rear cover according to various embodiments of the present disclosure.

[0118] With reference to FIGS. **9**B and **9**C, the electronic device **200** may include at least one electrical component disposed in the second space **2201** of the second housing **220** and disposed to overlap with a portion of the rack **2253** when the second rear cover **223** or the flexible display **230** is viewed from above. In one embodiment, the at least one electrical component may include a vibration motor **218**. In one embodiment, the vibration motor **218** may be fixed to the rear surface of the second rear cover **223** considering the disposition of the rack **2253**. In one embodiment, the second rear cover **223** may include a fixing portion **223***b* for fixing the vibration motor **218** to the rear surface. In one embodiment, the fixing portion **223***b* may be formed integrally with the second rear cover **223** or may be structurally connected to the second rear cover **223**. In one embodiment, the vibration motor **218** may be fixed to the fixing portion **223***b* through at least one of a force-fitting, taping, or bonding process. In some embodiments, if a speaker (e.g., the speaker **207** of FIG. **8**A) also needs to be disposed to overlap with the rack **2253**, it may be disposed on the rear surface of the second rear cover **223** in a similar manner to the vibration motor **218**.

[0119] According to an exemplary embodiment of the present disclosure, the electronic device **200** may be made slimmer by having a disposition structure in which at least one electrical component (e.g., a vibration motor **218** and/or a speaker **207**) disposed to extend into the second space **2201** of the second housing **220** is moved to the second rear cover **223** rather than the second extension member **222**.

[0120] FIG. **9**D is a cross-sectional view of an electronic device according to various embodiments of the present disclosure.

[0121] In describing the electronic device of FIG. **9**D, components that are substantially the same as those of the electronic device of FIG. **9**B are given the same reference numerals, and a detailed description thereof may be omitted.

[0122] With reference to FIG. **9**D, the electronic device **200** may include a first housing **210** and a second housing **220** slidably coupled to the first housing **210**. In one embodiment, the electronic device **200** may include a rack **2253** disposed closer to the flexible display **230** (or the second extension member **222**) than the rear cover **223** in the second space. In one embodiment, the electronic device **200** may include a vibration motor **218** that is disposed to overlap with the rack **2253** when the flexible display **230** is viewed from above in a slide-in state. In one embodiment, the vibration motor **218** may be disposed through the second rear cover **223** coupled to the second lateral member **221**. In one embodiment, the second rear cover **223** may be disposed to overlap with at least a portion of the first extension member **212** of the first housing **210** when the electronic device **200** is in a slide-in state. In one embodiment, at least a portion of the second rear cover **223** may be disposed to be in contact with or proximate to at least a portion of the first extension member **212** when the electronic device **200** is in a slide-in state. In this case, the vibration of the vibration motor **218** disposed in the second rear cover **223** may be more advantageously transmitted to the user through the first extension member **212** of the first housing **210** that is in contact with or proximate to the second rear cover **223**.

In one embodiment, the vibration motor **218** may include a vertical vibration motor that vibrates in a vertical direction (e.g., the z-axis direction).

[0123] FIG. **10**A is a schematic diagram of an electronic device including a rack according to various embodiments of the present disclosure. FIG. **10**B is a cross-sectional view of a portion of the electronic device as viewed along line **10***b*-**10***b* of FIG. **10**A according to various embodiments of the present disclosure.

[0124] With reference to FIGS. **10**A and **10**B, the electronic device **200** may include a first housing **210** and a second housing **220** slidably coupled to the first housing **210**. In one embodiment, the electronic device **200** may include a rack **2253** fixed to a first space **2101** of the first housing **210** and extended to a second space **2201** of the second housing **220**. In one embodiment, the rack **2253**, in a slide-in state, may be spaced apart in a vertical direction (e.g., the −z-axis direction) from the second extension member **222** and disposed closer to the second rear cover **223** than to the second extension member **222** (or the flexible display **230**) in the second space **2201**. In this case, the vibration motor **218** and the speaker **207** may be disposed on the second extension member **222** in the second space **2201**, even if they are disposed to overlap with the rack **2253**. In addition, since the rack **2253** is disposed at a position proximate to the second rear cover **223** (e.g., at a position proximate to the rear of the electronic device **200**), the rack **2253** can be repaired or replaced without interference (or interfering) with surrounding electrical components by only separating the second rear cover **223**, thereby helping in smooth (or efficient) maintenance of the electronic device **200**.

[0125] According to various embodiments, the electronic device **200** may include a flexible substrate F**1** for electrically connecting a substrate assembly **251** disposed in a second space **2201** of a second housing **220** and a third substrate **255** (e.g., a small PCB) disposed in a first space **2101** of a first housing **210**. In one embodiment, the third substrate **255** may be fixed in the first space **2101** through a support bracket **225** and may be electrically connected to the first substrate **252** and/or the antenna member **253** disposed in the first housing **210**. Accordingly, the first substrate **252** and the antenna member **253** may be electrically connected to the substrate assembly **251** through the third substrate **255** and the flexible substrate F**1**. In one embodiment, the third substrate **255** may be disposed around the drive motor **260** and may include a charging integrated circuit (IC) for the battery B and/or a control circuit for the drive motor.

[0126] According to various embodiments, the flexible substrate F**1** may be disposed to have a length or shape capable of accommodating a sliding distance of the electronic device **200**. In one embodiment, the flexible substrate F**1** may be formed of an elastic material or shape that expands in a slide-out state and returns to its original position in a slide-in state. In one embodiment, the flexible substrate F**1** may include a first connector portion **2561** for electrically connecting to the substrate assembly **251**, a second connector portion **2562** for electrically connecting to the third substrate **255**, and a connecting portion **2563** that connects the first connector portion **2561** and the second connector portion **2562** and is formed so as to be able to return to its original shape from an expanded state. In one embodiment, the connecting portion **2563** may be provided with a length capable of accommodating a sliding distance even in a relatively small space through a shape that is bent at least once in different directions. In one embodiment, the flexible substrate F**1** may include a flexible printed circuit board (FPCB) or a flexible RF cable (FRC).

[0127] FIG. **10**C is a cross-sectional view of a portion of an electronic device as viewed along line **10***c*-**10***c* of FIG. **10**A according to various embodiments of the present disclosure. FIG. **10**D is a cross-sectional view illustrating a slide-out state of the electronic device of FIG. **10**A according to various embodiments of the present disclosure.

[0128] With reference to FIGS. **10**A, **10**C, and **10**D, the electronic device **200** may include at least one driving belt **270** (e.g., a life belt or a tension belt) to support the flexible display **230** and reduce lifting of the flexible display **230** by providing uniform tension during operation. In one embodiment, the driving belt **270** may help reduce driving resistance because of eccentricity (or irregularity) of the second housing **220** moved by driving of the drive motor **260**. In one embodiment, at least one driving belt **270** may be disposed such that it is biased to one side (e.g., the right side) of the electronic device **200** and the other side (e.g., the left side) symmetrically with respect to the center, thereby assisting in the smooth operation of the flexible display **230** in a balanced manner. In some embodiments, the driving belt **270** may be disposed so as to be located at the center of the electronic device **200**. In one embodiment, one end **2701** of the driving belt **270** may be fixed to an end of the support member **240**, and the other end **2702** may be fixed to at least a portion of the second extension member **222** of the second housing **220**. In one embodiment, the driving belt **270** may be disposed in a manner such that it is wound around at least one rotary roller **271** rotatably disposed on the support bracket **225**. In one embodiment, when the second housing **220** transitions from a slide-in state to a slide-out state, one end **2701** of the driving belt **270** may move along the support member **240** in a first spatial direction (e.g., the −y-axis direction), and the other end **2702** of the driving belt **270** may move along the second housing **220** in a second spatial direction (e.g., the y-axis direction) by a corresponding amount of movement. For example, the driving belt **270** may move while being supported by at least one rotary roller **271** and the support member **2252** of the support bracket **225**, but may be moved from one end **2701** fixed to the support member **240** to the second housing **220**. The distance to the other end **2702** may not change. Accordingly, the driving belt **270** may help the flexible display **230** to always remain tight even during a sliding motion.

[0129] FIG. **11** is a block diagram of an electronic device illustrating the disposition structure of an antenna member and a first substrate according to various embodiments of the present disclosure.

[0130] With reference to FIG. **11**, the electronic device **200** may include a first substrate **252** and an antenna member **253** disposed in a space between a first extension member **212** and a first rear cover **213**. In one embodiment, the antenna member **253** may include a coil member disposed through a dielectric film. In one embodiment, the antenna member **253** may include a multi-function coil or multi-function core (MFC) antenna for performing a wireless charging function, a near field communication (NFC) function, and/or an electronic payment function. In one embodiment, the first substrate **252** may be disposed in such a way that a connector portion **252***a* extended from the first substrate **252** passes through a first through-hole **210***a* formed

in the first extension member **212** and is then electrically connected to a flexible substrate (e.g., the flexible substrate F**1** of FIG. **8**A) disposed in the first space **2101**. In one embodiment, the antenna member **253** may also be disposed in such a way that a connector portion **253***a* extended from the antenna member **253** passes through a first through-hole **210***a* and is then electrically connected to a flexible r-substrate F**1** disposed in the first space **2101**. In some embodiments, the first substrate **251** and the antenna member **253** may be disposed to be electrically connected to the flexible substrate F**1** in the first space **2101** after each of the first substrate **251** and the antenna member **253** passes through different through-holes disposed in the first extension member **212**.

[0131] According to various embodiments, the electronic device **200** may include a microphone **203** as an input device that extends from the first substrate **251** and is disposed through a second through-hole **210***b* formed in the second side **2112** of the first housing **210**. In one embodiment, the first housing **210** may include a third through-hole **210***c* disposed in the second side **2112** and/or the third side **2113**. The third through-hole **210***c* may be formed in a manner that connects the first space **2101** from the outside, and thus may be used as a fastening path for fastening a guide rail (e.g., the guide rail **226** of FIGS. **4**A and **4**B) to a support bracket (e.g., the support bracket **225** of FIGS. **4**A and **4**B) through a fastening member such as a screw through the third through-hole **210***c*.

[0132] According to various embodiments, an electronic device (e.g., an electronic device **200** of FIG. **4**A) may comprise: a first housing (e.g., the first housing **210** of FIG. **4**A); a second housing (e.g., the second housing **220** of FIG. **4**A) slidably coupled to the first housing; a flexible display (e.g., the flexible display **230** of FIG. **4**A) having a display area that is variable on the basis of the slide-in or slide-out of the second housing; a drive motor (e.g., the drive motor **260** of FIG. **4**A) disposed in the second housing and including a pinion gear (e.g., the pinion gear **261** of FIG. **4**A); a rack (e.g., the rack **2253** of FIG. **4**A) fixedly coupled to the first housing and including a rack gear driven by being gear-coupled to the pinion gear; a rack guide (e.g., the rack guide **222***a* of FIG. **7**A) disposed in the second housing and protecting the rack from external impact; a multi-bar (e.g., the support member **240** of FIG. **4**A) for supporting the rear surface of one portion of the flexible display; and a driving belt connected to one end of the multi-bar and one end of the second housing, wherein the rack guide may be disposed on the right side of the driving motor to spatially overlap with electrical components disposed in the second housing, and the second housing may be configured to be driven to slide-in or slide-out on the basis of the reciprocating movement of the rack into the rack guide.

[0133] According to various embodiments, the driving belt may be disposed to be located in a central portion of the electronic device.

[0134] According to various embodiments, the electrical component may include a vibration motor (e.g., the vibration motor **218** of FIG. **9**B), and the vibration motor may be disposed on a rear surface of a rear cover (e.g., the rear cover **223** of FIG. **9**B) of the second housing, which is disposed in an opposite direction to the flexible display.

[0135] According to various embodiments, in the slide-in state, at least a portion of the rear cover may be disposed to contact or overlap with at least a portion of the first housing.

[0136] According to various embodiments, the vibration motor may be disposed so as to overlap with an area where the rear cover and the first housing partially contact or overlap each other when the rear cover is viewed from above.

[0137] According to various embodiments, the vibration motor may include a vertical motor that vibrates in a direction perpendicular to a surface of the flexible display.

[0138] According to various embodiments, the rack may be disposed closer to the rear cover than to the flexible display in the slide-in state.

[0139] According to various embodiments, the electrical component may be disposed between the flexible display and the rack when viewing the side surface of the second housing from the outside.

[0140] According to various embodiments, the electrical component may include an array antenna (e.g., the array antenna (AR) of FIG. **9**A) configured to form a directional beam through a side surface of the second housing, and heat generated from the array antenna may be transferred to a rear cover (e.g., the rear cover **223** of FIG. **9**A) made of a metal material disposed on the second housing through a heat transfer member (e.g., the heat transfer member **259** of FIG. **9**A).

[0141] According to various embodiments, the electrical component may include at least one of a substrate assembly (e.g., the substrate assembly **251** of FIG. **8**A) disposed substantially centrally, at least a microphone disposed surrounding the substrate assembly (e.g., the microphone **203-1** of FIG. **8**A), at least one camera module (e.g., the first camera module **205** and second camera module **216** of FIG. **8**A), a receiver (e.g., the receiver **206** of FIG. **8**A), a speaker (e.g., the speaker **207** of FIG. **8**A), a connector port (e.g., the connector port **208** of FIG. **8**A), a vibration motor (e.g., the vibration motor **218** of FIG. **8**A), or an antenna module (e.g., the array antenna (AR) of FIG. **9**A).

[0142] According to various embodiments, the rack may include a battery (e.g., the battery B of FIG. **4**A) disposed parallel to the rack, and when a side surface (e.g., the second side surface **2112** or third side surface **2113** of FIG. **4**A) of the first housing is viewed from the outside in a direction perpendicular to the sliding direction, the rack and the battery may be disposed so as not to overlap each other.

[0143] According to various embodiments, when viewing the flexible display from above, the rack and the battery may be disposed so as not to overlap.

[0144] According to various embodiments, the sliding distance of the second housing (e.g., the sliding distance S of FIG. **7**A) may be determined through the length of the rack.

[0145] According to various embodiments, the length of the rack may be determined as the distance from the fixed portion of the rack to the upper inner surface of the second housing (e.g., the inner surface **221***a* of FIG. **5**A) in the slide-in state.

[0146] According to various embodiments, the rack may be disposed so as to be proximate to or in contact with an upper inner surface of the second housing in the slide-in state.

[0147] According to various embodiments, the length of the rack may be determined by the size of the battery.

[0148] According to various embodiments, an electronic device (e.g., an electronic device **200** of FIG. **4**A) may comprise: a first housing (e.g., the first housing **210** of FIG.

4A); a second housing (e.g., the second housing **220** of FIG. **4**A) slidably coupled to the first housing; a flexible display (e.g., the flexible display **230** of FIG. **4**A) having a display area that is variable on the basis of the slide-in or slide-out of the second housing; a drive motor (e.g., the drive motor **260** of FIG. **4**A) disposed in the second housing and including a pinion gear (e.g., the pinion gear **261** of FIG. **4**A); a rack (e.g., the rack **2253** of FIG. **4**A) fixedly coupled to the first housing and a rack gear driven by being gear-coupled to the pinion gear; and a battery (e.g., the battery B of FIG. **4**A) disposed parallel to the rack in the first space, wherein, when the side surface (e.g., the second side surface **2112** or the third side surface **2113** of FIG. **4**A) of the first housing is viewed from the outside in a direction perpendicular to the sliding direction, the rack and the battery may be disposed so as not to overlap each other.

[0149] According to various embodiments, when viewing the flexible display from above, the rack and the battery may be disposed so as not to overlap.

[0150] According to various embodiments, the rack may be disposed so as to be proximate to or in contact with an upper inner surface of the second housing in the slide-in state.

[0151] According to various embodiments, the size of the battery may be determined by the length of the rack.

[0152] And the embodiments of the present disclosure disclosed in this specification and drawings are only specific examples presented to easily explain the technical contents according to the embodiments of the present disclosure and to help understand the embodiments of the present disclosure, and are not intended to limit the scope of the embodiments of the present disclosure. Therefore, the scope of the various embodiments of the present disclosure should be interpreted as including all changes or modified forms derived on the basis of the technical ideas of the various embodiments of the present disclosure in addition to the embodiments disclosed herein.

What is claimed is:

1. An electronic device comprising:

a first housing;

a second housing slidably coupled to the first housing;

a flexible display having a display area that varies in accordance with a slide-in state or a slide-out state of the second housing;

a driving motor disposed in the second housing and including a pinion gear;

a rack fixedly coupled to the first housing and including a rack gear gear-coupled to the pinion gear;

a rack guide disposed in the second housing;

a multi-bar supporting a rear surface of a portion of the flexible display; and

a driving belt connected to one end of the multi-bar and one end of the second housing, wherein:

the rack guide is disposed on a side of the driving motor to spatially overlap with an electrical components disposed in the second housing, and

the second housing is configured to be driven to slide-in or slide-out in accordance with reciprocating movement of the rack into the rack guide.

2. The electronic device of claim **1**, wherein

the driving belt is disposed to be located in a central portion of the electronic device.

3. The electronic device of claim **1**, wherein

an electrical component disposed in the second housing comprises a vibration motor, and

the vibration motor is disposed on a rear surface of a rear cover of the second housing in an opposite direction to the flexible display.

4. The electronic device of claim **3**, wherein

in the slide-in state, at least a portion of the rear cover is overlapped and disposed to be in contact with or proximate to at least a portion of the first housing.

5. The electronic device of claim **3**, wherein

the vibration motor is disposed so as to overlap with an area where the rear cover and the first housing partially contact or overlap each with respect from a perspective above the rear cover.

6. The electronic device of claim **3**, wherein

the vibration motor comprises a vertical motor that vibrates in a direction perpendicular to a surface of the flexible display.

7. The electronic device of claim **3**, wherein

the rack, in the slide-in state, is disposed closer to the rear cover than the flexible display.

8. The electronic device of claim **7**, wherein

the electrical component is disposed between the flexible display and the rack with respect from a perspective external to a side surface of the second housing.

9. The electronic device of claim **1**, wherein:

an electrical component disposed in the second housing comprises an array antenna (AR) configured to form a directional beam through a side surface of the second housing, and

heat generated from the array antenna is transferred through a heat transfer member to a rear cover made of a metal material disposed in the second housing.

10. The electronic device of claim **1**, further comprising electrical components, wherein the electrical components comprise at least one of a substrate assembly substantially centrally disposed, at least one microphone, at least one camera module, a receiver, a speaker, a connector port, at least one vibration motor, or an antenna module (AR) disposed to surround the substrate assembly.

11. The electronic device of claim **1**, further comprising a battery disposed parallel to the rack, wherein the rack and the battery are disposed so as not to overlap each other from a perspective of a side surface of the first housing in a direction perpendicular to a sliding direction of the slide-in state or the slide-out state.

12. The electronic device of claim **11**, wherein

the rack and the battery are disposed so as not to overlap with respect to a perspective above the flexible display.

13. The electronic device of claim **11**, wherein

a sliding distance of the second housing is determined by a length of the rack.

14. The electronic device of claim **11**, wherein

a length of the rack is determined as a distance from a fixed portion of the rack to an upper inner surface of the second housing in the slide-in state.

15. The electronic device of claim **11**, wherein

the rack is disposed so as to be proximate to or in contact with an upper inner surface of the second housing in the slide-in state.

16. The electronic device of claim **11**, wherein the length of the rack is determined by the size of the battery.

17. An electronic device comprising:

a first housing;

a second housing slidably coupled to the first housing; a flexible display having a display area that is variable on the basis of the slide-in or slide-out of the second housing;

a drive motor disposed in the second housing and including a pinion gear;

a rack fixedly coupled to the first housing and a rack gear driven by being gear-coupled to the pinion gear; and

a battery disposed parallel to the rack in the first space,

wherein the rack and the battery may be disposed so as not to overlap each other when the side surface of the first housing is viewed from the outside in a direction perpendicular to the sliding direction.

18. The electronic device of claim **17**, wherein the rack and the battery are disposed so as not to overlap when viewing the flexible display from above.

19. The electronic device of claim **17**, the rack is disposed so as to be proximate to or in contact with an upper inner surface of the second housing in the slide-in state.

20. The electronic device of claim **17**, wherein the size of the battery is determined by the length of the rack.

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