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(54) **COVERED RADIUS HINGE**

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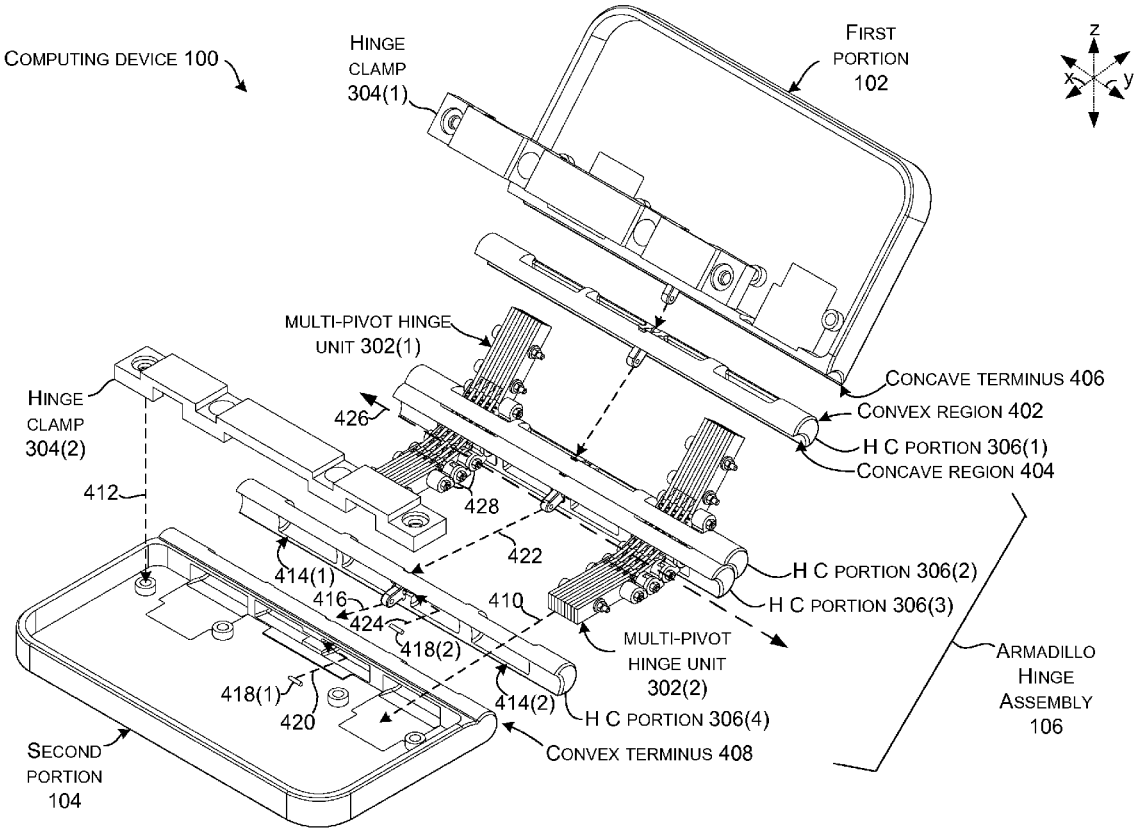
(57) **ABSTRACT**

The description relates to devices, such as computing devices that have hinged portions. One example can include a first portion and a second portion. This example can also include a multi-pivot hinge unit rotatably securing the first and second portions. This example can further include a set of rigid hinge cover portions that are configured to be able to rotate relative to one another while collectively covering the multi-pivot hinge unit.



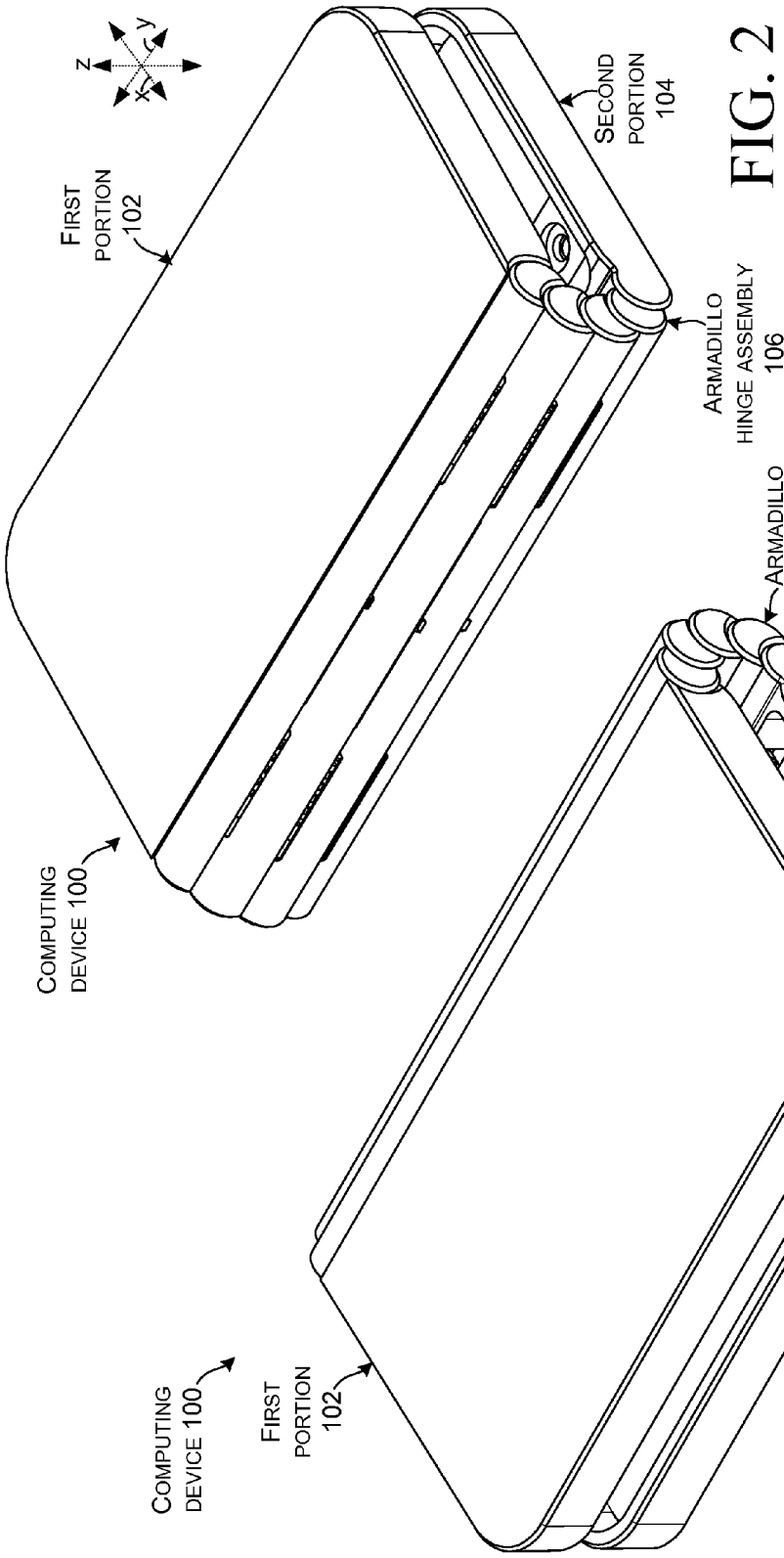

COMPUTING DEVICE 100
FIRST PORTION 102
SECOND PORTION 104
ARMADILLO HINGE ASSEMBLY 106
z
y
x

FIG. 1

COMPUTING DEVICE 100
FIRST PORTION 102
SECOND PORTION 104
ARMADILLO HINGE ASSEMBLY 106
z
y
x

FIG. 2

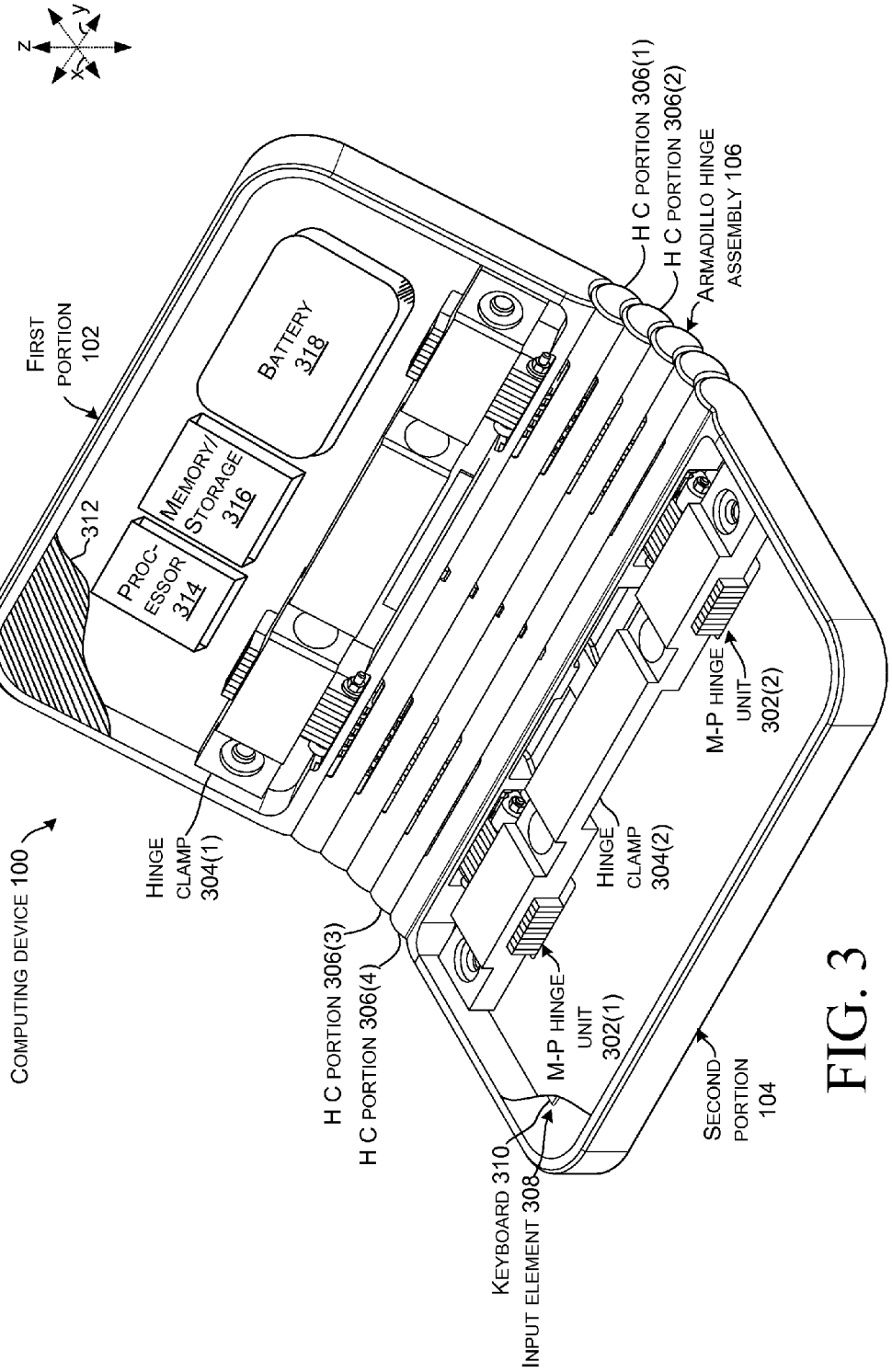

z
y
x
COMPUTING DEVICE 100
FIRST PORTION 102
312
PROC-ESSOR 314
MEMORY/ STORAGE 316
BATTERY 318
HINGE CLAMP 304(1)
H C PORTION 306(3)
H C PORTION 306(4)
KEYBOARD 310
INPUT ELEMENT 308
M-P HINGE UNIT 302(1)
HINGE CLAMP 304(2)
M-P HINGE UNIT 302(2)
H C PORTION 306(1)
H C PORTION 306(2)
ARMADILLO HINGE ASSEMBLY 106
SECOND PORTION 104

FIG. 3

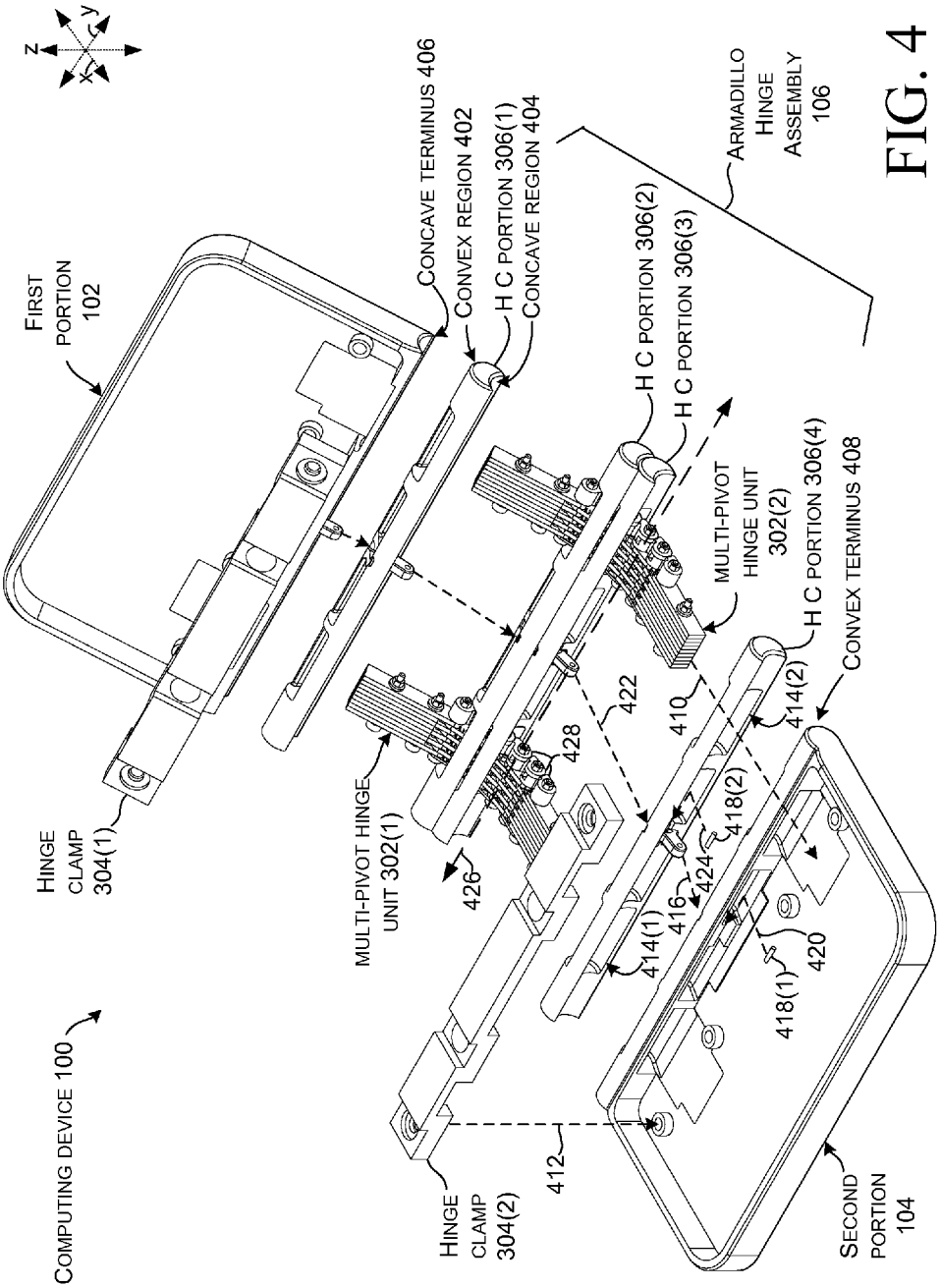
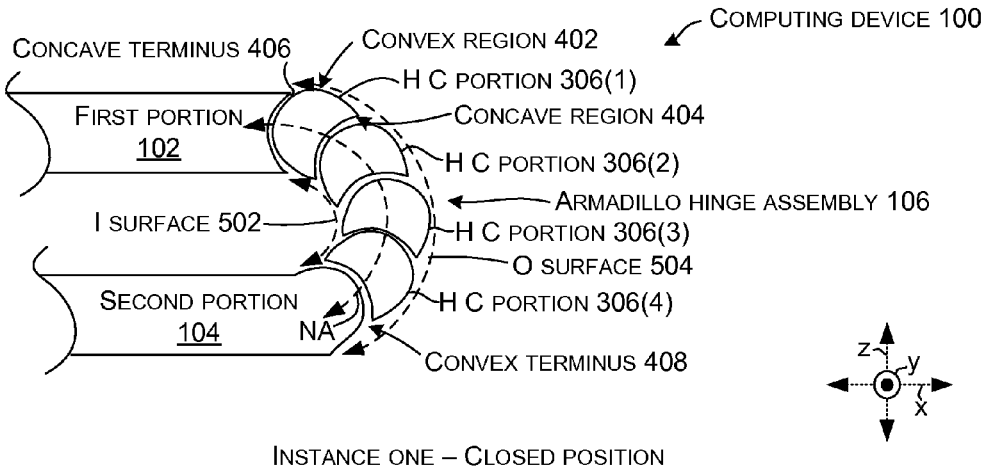
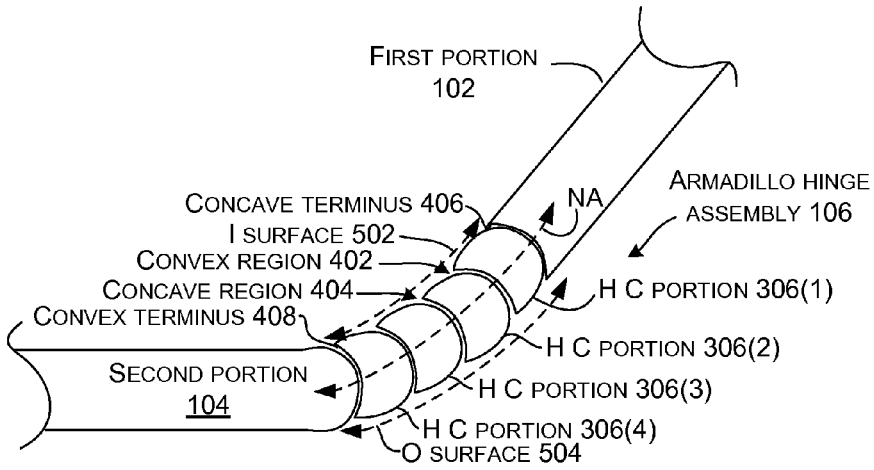

z
y
x
First Portion 102
Concave Terminus 406
Convex Region 402
H C Portion 306(1)
Concave Region 404
H C Portion 306(2)
H C Portion 306(3)
Armadillo Hinge Assembly 106
Hinge Clamp 304(1)
Multi-Pivot Hinge Unit 302(1)
Multi-Pivot Hinge Unit 302(2)
H C Portion 306(4)
Convex Terminus 408
428
422
410
414(2)
426
418(2)
424
416
414(1)
420
418(1)
Computing Device 100
Hinge Clamp 304(2)
412
Second Portion 104

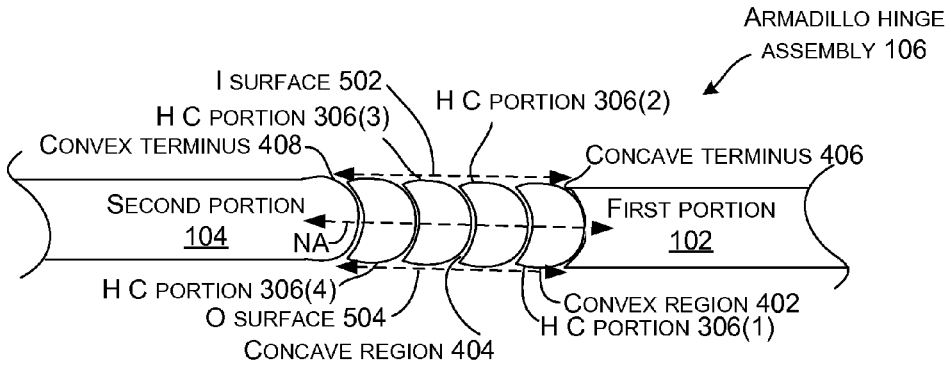
FIG. 4



INSTANCE ONE – CLOSED POSITION



INSTANCE TWO – VIEWING POSITION



INSTANCE THREE – FULL-OPEN POSITION

FIG. 5

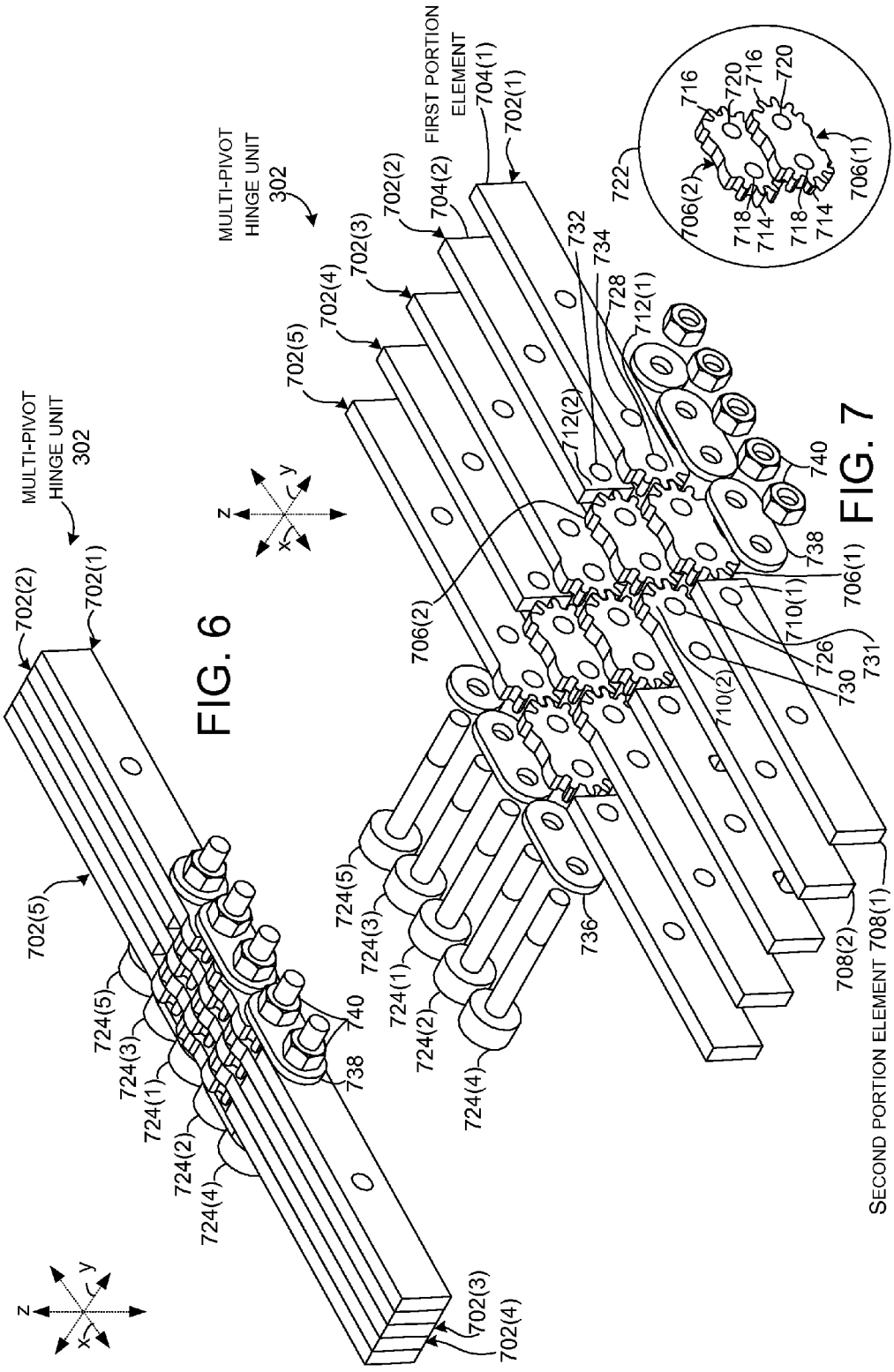

MULTI-PIVOT HINGE UNIT 302
702(1)
702(2)
702(3)
702(4)
702(5)
724(1)
724(2)
724(3)
724(4)
724(5)
738
740
z
y
x

FIG. 6

MULTI-PIVOT HINGE UNIT 302
FIRST PORTION ELEMENT
704(1)
704(2)
702(1)
702(2)
702(3)
702(4)
702(5)
706(1)
706(2)
708(1)
708(2)
710(1)
710(2)
712(1)
712(2)
714
716
718
720
722
724(1)
724(2)
724(3)
724(4)
724(5)
726
728
730
731
732
734
736
738
740
SECOND PORTION ELEMENT
z
y
x

FIG. 7

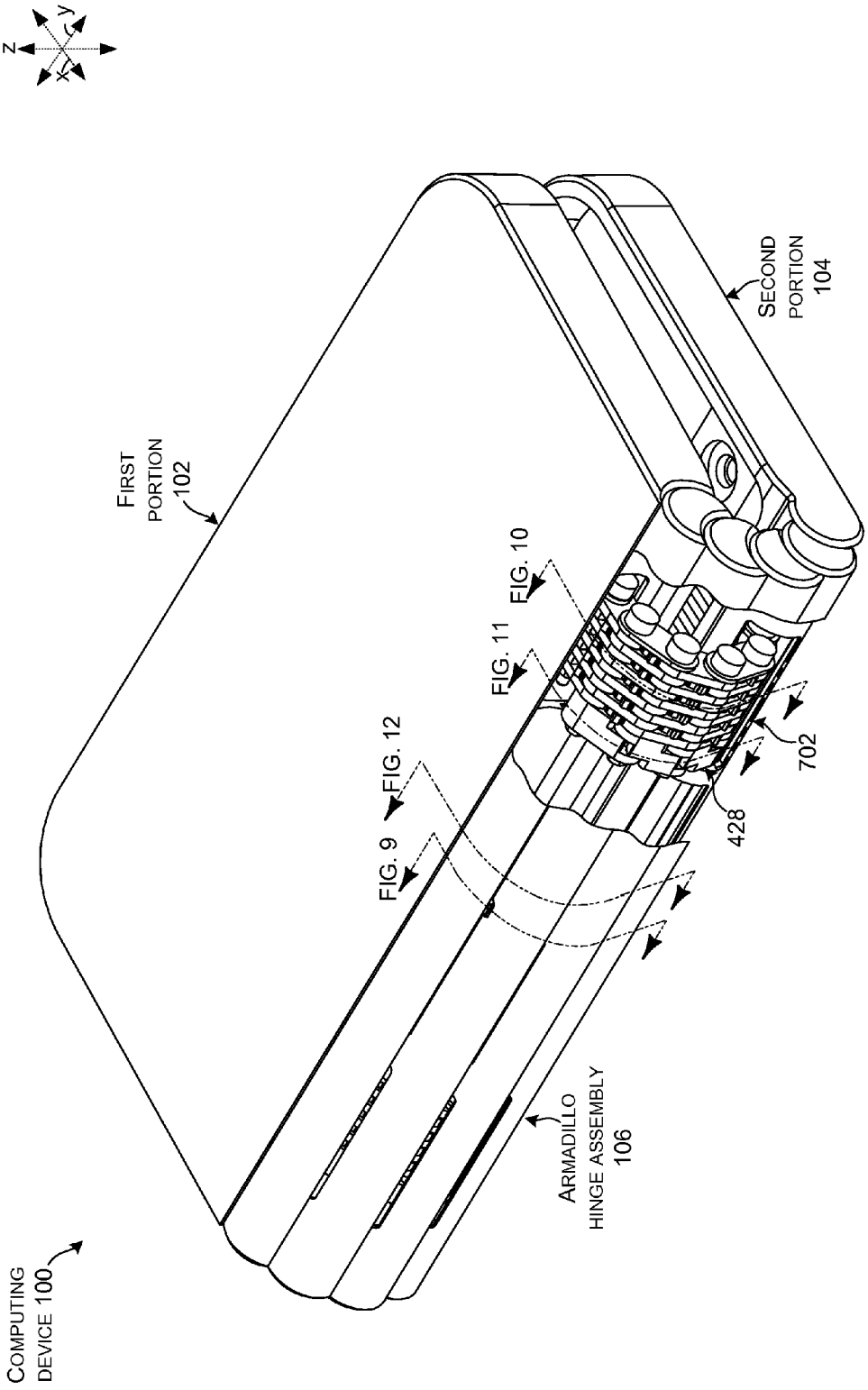

z
y
x
COMPUTING DEVICE 100
FIRST PORTION 102
SECOND PORTION 104
ARMADILLO HINGE ASSEMBLY 106
FIG. 9
FIG. 12
FIG. 11
FIG. 10
428
702

FIG. 8

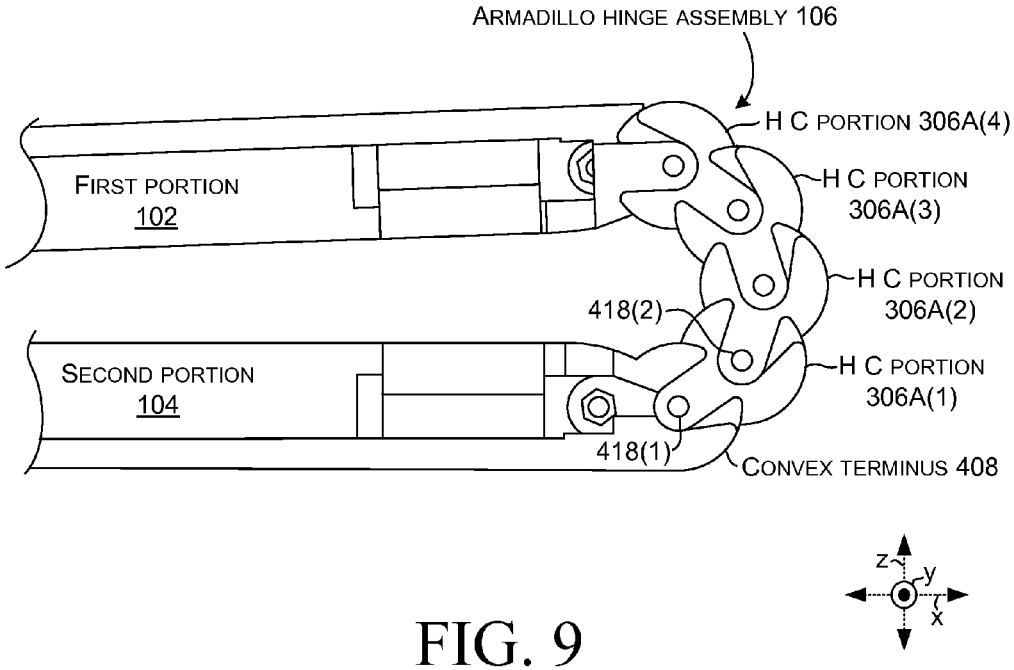

ARMADILLO HINGE ASSEMBLY 106
H C PORTION 306A(4)
H C PORTION 306A(3)
H C PORTION 306A(2)
H C PORTION 306A(1)
FIRST PORTION 102
SECOND PORTION 104
418(2)
418(1)
CONVEX TERMINUS 408
z
y
x

FIG. 9

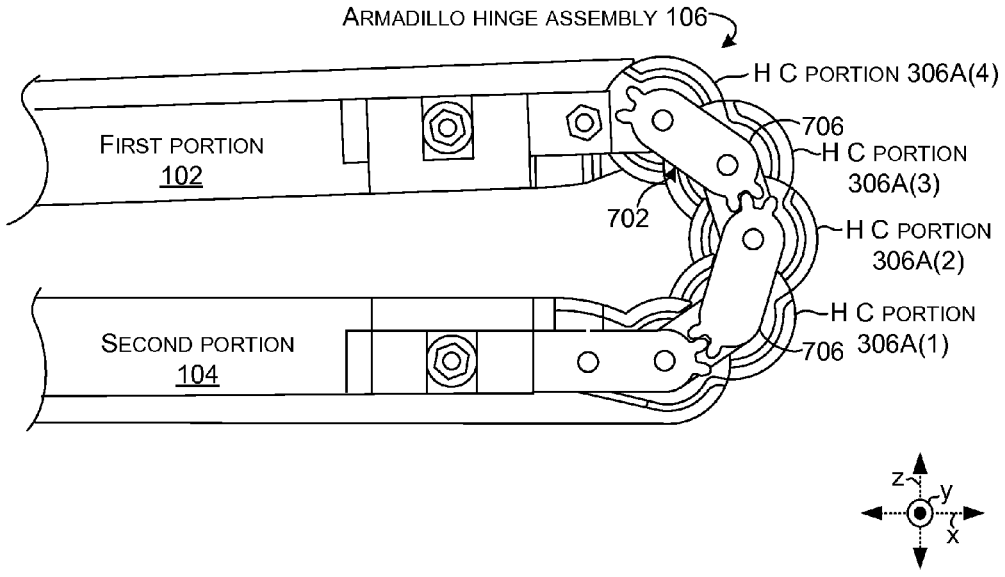

ARMADILLO HINGE ASSEMBLY 106
H C PORTION 306A(4)
706
H C PORTION 306A(3)
H C PORTION 306A(2)
H C PORTION 306A(1)
706
FIRST PORTION 102
SECOND PORTION 104
702
z
y
x

FIG. 10

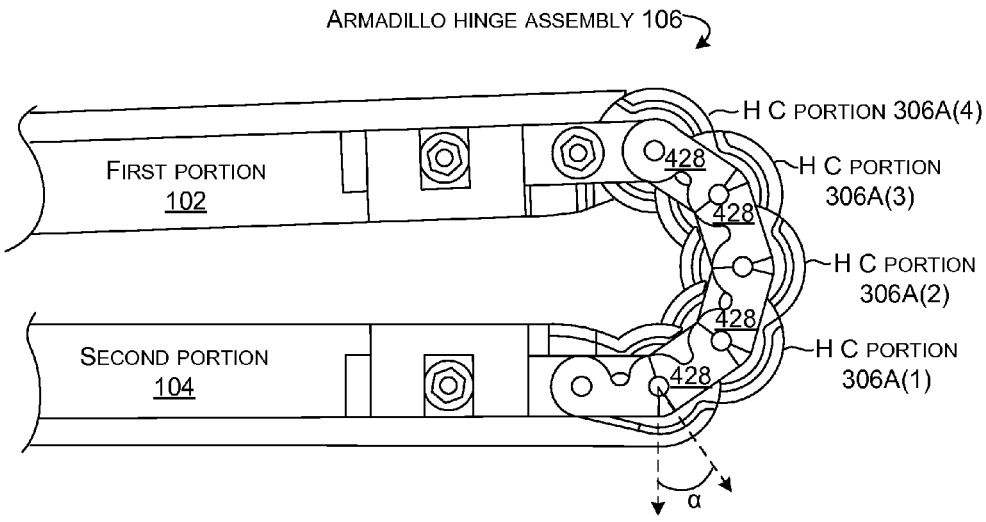
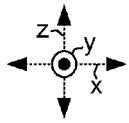

ARMADILLO HINGE ASSEMBLY 106
H C PORTION 306A(4)
FIRST PORTION
102
428
H C PORTION
306A(3)
428
H C PORTION
306A(2)
428
SECOND PORTION
104
H C PORTION
306A(1)
428
α

FIG. 11


z
y
x

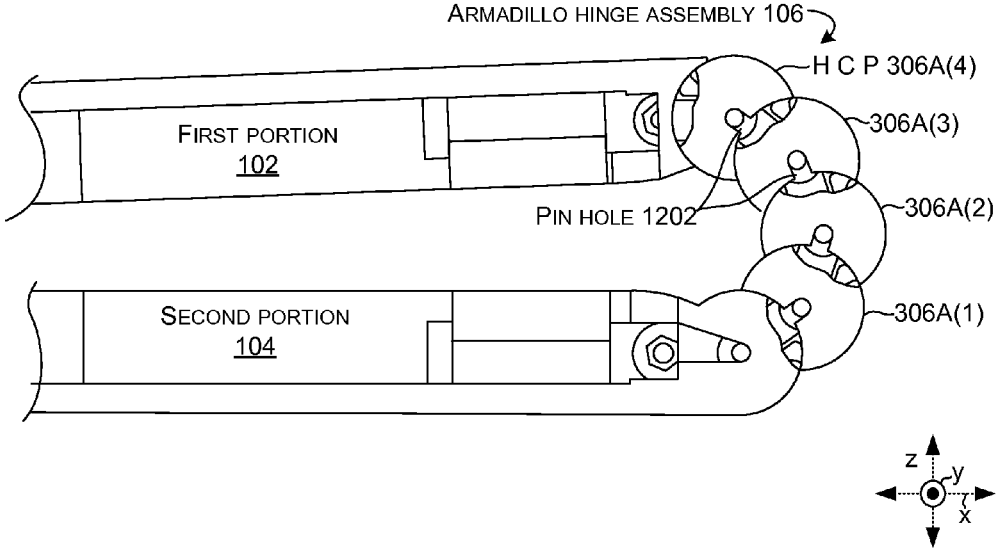

ARMADILLO HINGE ASSEMBLY 106
H C P 306A(4)
FIRST PORTION
102
306A(3)
PIN HOLE 1202
306A(2)
SECOND PORTION
104
306A(1)
z
y
x

FIG. 12

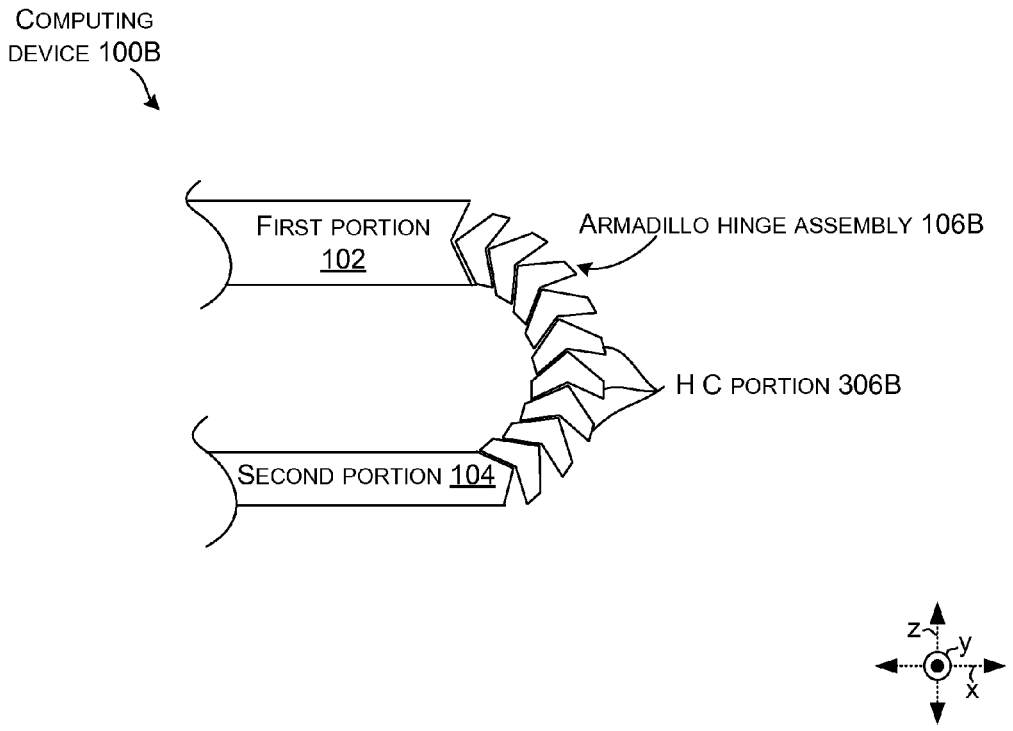

COMPUTING DEVICE 100B
FIRST PORTION 102
ARMADILLO HINGE ASSEMBLY 106B
H C PORTION 306B
SECOND PORTION 104
z
y
x

FIG. 13

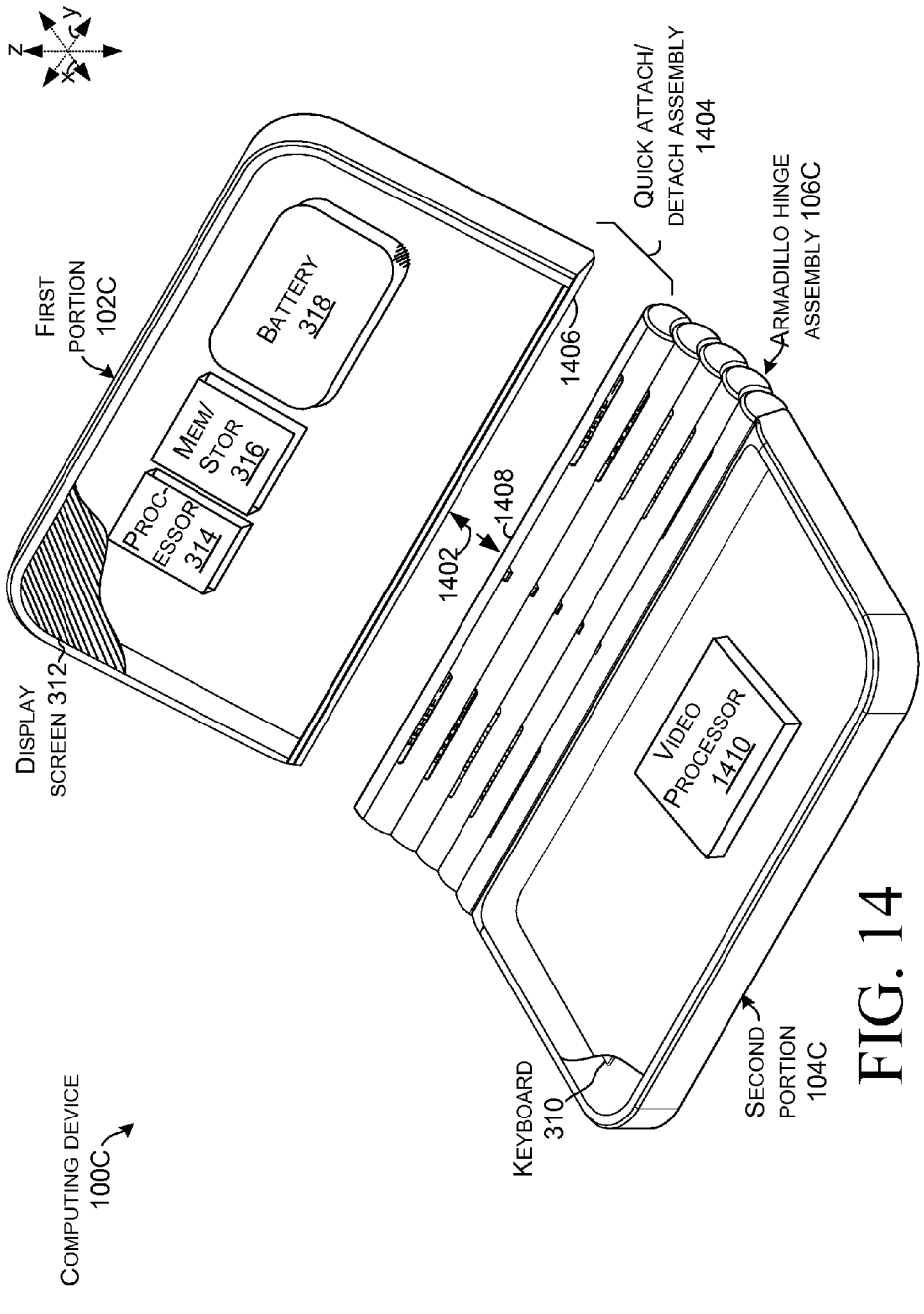

z
y
x
FIRST PORTION 102C
BATTERY 318
MEM/ STOR 316
PROC-ESSOR 314
DISPLAY SCREEN 312
1402
1408
1406
QUICK ATTACH/ DETACH ASSEMBLY 1404
ARMADILLO HINGE ASSEMBLY 106C
VIDEO PROCESSOR 1410
KEYBOARD 310
SECOND PORTION 104C
COMPUTING DEVICE 100C

FIG. 14

COVERED RADIUS HINGE

BRIEF DESCRIPTION OF THE DRAWINGS

[0001] The accompanying drawings illustrate implementations of the concepts conveyed in the present document. Features of the illustrated implementations can be more readily understood by reference to the following description taken in conjunction with the accompanying drawings. Like reference numbers in the various drawings are used wherever feasible to indicate like elements. Further, the left-most numeral of each reference number conveys the FIG. and associated discussion where the reference number is first introduced.

[0002] FIGS. **1-2** show perspective views of an example device that includes an armadillo hinge example in accordance with some implementations of the present concepts.

[0003] FIG. **3** shows a partial cut-away perspective view of an example device that includes an armadillo hinge example in accordance with some implementations of the present concepts.

[0004] FIG. **4** shows an exploded perspective view of an example device that includes an armadillo hinge example in accordance with some implementations of the present concepts.

[0005] FIG. **5** is an elevational view of an armadillo hinge example in accordance with some implementations of the present concepts.

[0006] FIG. **6** is a perspective view and FIG. **7** is an exploded perspective view of a multi-pivot hinge example in accordance with some implementations of the present concepts.

[0007] FIG. **8** shows a partial cut-away perspective view that is similar to FIG. **2** of an example device that includes an armadillo hinge example in accordance with some implementations of the present concepts.

[0008] FIGS. **9-12** are sectional views of armadillo hinge examples as indicated in FIG. **8** in accordance with some implementations of the present concepts.

[0009] FIG. **13** is an elevational view of an armadillo hinge example in accordance with some implementations of the present concepts.

[0010] FIG. **14** shows a partial cut-away perspective view of another example device that includes an armadillo hinge example in accordance with some implementations of the present concepts.

DESCRIPTION

[0011] The present concepts relate to computing devices employing multi-axis or multi-pivot hinges to rotatably secure portions of the computing device. The present concepts can provide articulating hinge cover portions over the multi-pivot hinges to protect the hinges from foreign objects and/or protect a user of the computing device from being pinched by the multi-pivot hinges during rotation.

[0012] Introductory FIGS. **1** and **2** collectively show an example of a computing device **100** in a 'closed' position. FIG. **1** shows the computing device **100** from the 'front' and FIG. **2** shows the computing device from the 'back.' In this example, computing device **100** has first and second portions **102** and **104** that are rotatably secured together by an armadillo hinge assembly **106**. Aspects of the armadillo hinge assembly are described in more detail below. The armadillo hinge assembly can include rigid articulating hinge covers that at least partially obscure and protect the underlying hinge.

[0013] FIGS. **3** and **4** collectively show computing device **100** in an 'open' position. FIG. **3** is a partial cut-away perspective view and FIG. **4** is an exploded perspective view. In this case, the armadillo hinge assembly **106** includes a multi-pivot hinge unit **302** (in this configuration two multi-pivot hinge units **302(1)** and **302(2)**). In this example, the multi-pivot hinge units **302** can be secured to the first portion **102** by a first hinge clamp **304(1)** and to the second portion **104** by second hinge clamp **304(2)**. The hinge clamps **304** can be secured to the respective first portion **102** and second portion **104** by various mechanisms, such as threaded fasteners (not shown). The armadillo hinge assembly **106** can also include multiple hinge cover portions **306** (in this configuration four hinge cover portions **306(1)-306(4)**). In this implementation, individual hinge cover portions can be generally elongate (e.g., extending along a long axis that is parallel to the y reference axis).

[0014] Armadillo hinge assembly **106** can be secured to the first and second portions **102** and **104** to allow rotation therebetween. The armadillo hinge assembly **106** can be secured to the first and second portions in a relatively permanent manner (e.g., in a manner that is not intended to be readily separable by an end use consumer), such as illustrated in FIGS. **3-4**. Alternatively, the armadillo hinge assembly **106** can be secured to the first and second portions in a relatively quickly attachable/detachable manner (e.g., in a manner that is intended to be readily separable by the end use consumer). One such example of this latter configuration is described below in more detail relative to FIG. **14**.

[0015] Computing device **100** can also include an input element or device **308**. In this case the input device **308** is manifest as a keyboard **310**. Other implementations can employ other input devices. In this example, the computing device can also include a display screen **312**, such as a touch sensitive display screen. The computing device can also include a processor **314**, memory/storage **316**, and/or a battery **318**, among other components. These elements can be positioned in the first portion **102** and/or second portion **104**. (These elements (**308-318**) are shown only in FIG. **3** and not FIG. **4**).

[0016] In this particular implementation, the individual hinge cover portions **306** can approximate a portion of a cylinder (e.g., extending parallel to the y reference axis). Other example hinge cover shapes are described below relative to FIG. **13**. As designated relative to FIG. **4**, the individual hinge cover portions **306** can define a generally convex region **402** and a generally concave region **404** (designated with specificity relative to hinge cover portion **306(1)**. In a similar fashion the first portion **102** can culminate in a concave terminus **406** and the second portion **104** can terminate in a convex terminus **408** (or vice versa depending on orientation). An example assembly process is described at this point to provide additional clarity about the structures of the described implementation.

[0017] During assembly, the multi-pivot hinge units **302** can be inserted into the second portion **104** as indicated by arrow **410**. The multi-pivot hinge units **302** can be secured with hinge clamp **304(2)** as indicated by arrow **412**. The hinge cover portions **306** can define ports or slots **414** (in this configuration two slots **414(1)** and **414(2)**) for receiving the multi-pivot hinge units **302**. Stated another way, the dimen-

sions of the slots **414** are as large as, or larger than, the outside dimensions of the multi-pivot hinge units **302** to allow the multi-pivot hinge units to pass through the slots in the hinge cover portions **306** and into the second portion **104** as indicated by arrow **410**.

[0018] Hinge cover portion **306(4)** can be positioned against the convex terminus **408** of the second portion **104** as indicated by arrow **416**. The hinge cover portion **306(4)** can be secured by a pin **418(1)** as indicated by arrow **420**. The pin **418(1)** can retain the hinge cover portion **306(4)** relative to the second portion **104** while allowing the hinge cover portion **306(4)** to rotate around the pin.

[0019] Hinge cover portion **306(3)** can be aligned with hinge cover portion **306(4)** as indicated by arrow **422**. Pin **418(2)** can retain the hinge cover portion **306(3)** as indicated by arrow **424**. This process can be repeated until concave terminus **406** of the first portion is secured to hinge cover portion **306(1)**.

[0020] Note that as indicated by reference line **426**, the above described implementation can provide a configuration where the axis of rotation of an individual hinge cover portion **306** is parallel to an axis of rotation (e.g., pivot or pivot axis) of the multi-pivot hinge unit **302**. In the illustrated configuration the axis of rotation is parallel to, and coextensive with, an individual axis of rotation of the multi-pivot hinge unit. Note further that in this implementation, the number of hinge axes and the number of hinge cover portions generally corresponds in a one-to-one manner. However, such need not be the case. For instance, another implementation might have twice as many hinge cover portions as axes of rotation.

[0021] Also note that in this implementation, the multi-pivot hinge units **302** include rotation limiters **428** that can define or limit the degree of rotation of each axis of rotation of the multi-pivot hinge unit. For example, this particular implementation can limit the rotation of each axis of rotation to about 36 degrees for each of the five axes of rotation to provide total rotation of the first and second portions from zero degrees to one hundred eighty degrees. Other implementations may omit the rotation limiters and/or limit the rotation to different angles. Further, in some implementations the hinge cover portions **306** may contribute to and/or provide the rotation limitation for the armadillo hinge assembly **106**.

[0022] FIG. **5** shows side views of a portion of computing device **100** to illustrate how the hinge cover portions **306** can be articulated to slide past one another during rotation of the armadillo hinge assembly **106**. Instance one can be thought of as a closed or storage position of the computing device. Instance two can be thought of as a viewing or deployed position. Instance three can be thought of as a full-open position (e.g., in this case 180 degrees from the closed position). During this rotation, the convex region **402** of an individual hinge cover portion **306** can rotate relative to (e.g., slide past) a concave region **404** of an adjacent hinge cover portion **306**. The end hinge cover portions can have a similar relationship with the concave terminus **406** of the first portion **102** and the convex terminus **408** of the second portion **104**.

[0023] Note further, that this configuration can allow the hinge cover portions **306** to rotate relative to one another to accommodate differences on inner surface **502** and outer surface **504** of the armadillo hinge assembly **106**. At Instance Three, the inner surface **502** and the outer surface **504** are generally equal lengths. As the first portion **102** is rotated toward the second portion **104** in Instance Two, the length of the inner surface **502** decreases (e.g., gets shorter) while the length of the outer surface **504** increases (e.g. gets longer). This process gets even more pronounced in Instance One. Thus, since the neutral axis (NA) remains between the inner and outer surface during rotation, the overlapping, articulating nature of the hinge cover portions allows these changing surface dimensions to be accommodated. Stated another way, the overlapping articulated nature of the hinge cover portions allows these changes in surface length to be accommodated while still covering the underlying hinge elements. In this example the changes in surface length can be accommodated by the overlapping concave and convex surfaces sliding past one another.

[0024] FIGS. **6** and **7** collectively show more details about one implementation of the multi-pivot hinge unit **302** introduced above relative to FIG. **3**. Note that the use of other multi-pivot hinges is contemplated.

[0025] In the illustrated implementation, multi-pivot hinge unit **302** may include at least first and second adjacent offset stacks **702**. The illustrated configuration includes five stacks **702(1)-702(5)**, however, more or less stacks may be employed. The number of stacks can be increased to add additional resistance to the multi-pivot hinge unit **302** as may be desired for a particular application. As may be most readily appreciated in the exploded view of FIG. **7**, individual stacks may include a first portion element **704** (for securing to first portion **102** (see FIG. **3**)), a timed link element **706**, and a second portion element **708** (for securing to second portion **104** (see FIG. **3**)). To improve readability of the drawing page only elements of the first two stacks **702(1)** and **702(2)** are designated. However, the stacks generally repeat themselves in an alternating manner. Thus, stack **702(3)** and **702(5)** are similar to stack **702(1)** and stack **702(4)** is similar to stack **702(2)**. Also, not every element is designated on each of FIGS. **6-7**. In this implementation each stack includes a single timed link element **706**. Other implementations may employ stacks that include multiple serially arranged timed link elements.

[0026] In the illustrated configuration of FIGS. **6-7**, relative to stacks **702(1)**, **702(3)**, and **702(5)** a terminal end **710** of the second portion element **708** is not geared to engage the timed link elements **706**. In contrast, relative to stacks **702(2)** and **702(4)** the terminal ends **710** are geared to engage the timed link elements **706**. Relative to stacks **702(1)**, **702(3)**, and **702(5)** a terminal end **712** of the first portion element **704** is geared to engage the timed link elements **706**. In contrast, relative to stacks **702(2)** and **702(4)** the terminal ends **712** are not geared to engage the timed link elements **706**.

[0027] The timed link elements **706** can have generally opposing first and second ends **714** and **716** and a first hole **718** formed through the first end **714** and a second hole **720** formed through the second end **716**. These elements are labeled without specificity in a callout **722** relative to FIG. **7** to avoid designator lines obscuring the main drawings. Note that in the illustrated configuration, individual timed link elements are geared on both ends. This configuration can allow multi-pivot hinge units **302** to be constructed with fewer different types of elements. However, note that the first end **714** of timed link element **706(1)** does not engage terminal end **710(1)** of second portion element **708(1)** and thus the gear teeth are not utilized and thus could be eliminated. Similarly, the second end **716** of timed link element **706(2)** could also eliminate the gear teeth because they do not engage terminal end **712(2)** of first portion element **704(2)**.

[0028] Multi-pivot hinge unit **302** may include a generally elongate axis pin **724**(**1**) that passes through the second hole **720** of the timed link element **706**(**1**) of the first stack **702**(**1**). The axis pin **724**(**1**) can also pass through the first hole **718** of the timed link element **706**(**2**) of the second stack **702**(**2**) to secure the second stack **702**(**2**) in an offset manner relative to the first stack **702**(**1**). In this case, the offset manner can be defined by a pitch diameter of the timed link elements.

[0029] The multi-pivot hinge unit **302** may include a second axis pin **724**(**2**) and a third axis pin **724**(**3**) that are generally parallel to the first axis pin **724**(**1**). The second axis pin **724**(**2**) can pass through a hole **726** in the second portion element **708**(**2**) of the second stack **702**(**2**) and the hole **718** in the first end of the timed link element **706**(**1**) of the first stack **702**(**1**). The third axis pin **724**(**3**) can pass through the hole **720** in the second end **716** of the timed link element **706**(**2**) of the second stack **702**(**2**) and a hole **728** in the first portion element **704**(**1**) of the first stack **702**(**1**).

[0030] In the present configuration, the second axis pin **724**(**2**) and the third axis pin **724**(**3**) are on opposite sides of the (first) axis pin **724**(**1**). This configuration may include a fourth axis pin **724**(**4**) that is adjacent to the second axis pin **724**(**2**) and distal to the axis pin **724**(**1**) and a fifth axis pin **724**(**5**) that is adjacent to the third access pin **724**(**3**) and distal to the axis pin **724**(**1**). The fourth axis pin **724**(**4**) can pass through a second hole **730** in the second portion element **708**(**2**) of the second stack **702**(**2**) and a hole **731** in the second portion element **708**(**1**) of the first stack **702**(**1**). The fifth axis pin **724**(**5**) can pass through a hole **732** in the second portion element **704**(**2**) of the second stack **702**(**2**) and a second hole **734** of the first portion element **704**(**1**) of the first stack **702**(**1**).

[0031] In this implementation, the axis pins **724** can be manifest as threaded bolts. The bolts can pass through link covers **736** (not all of which are designated with specificity) through the stacks **702**(**1**)-**702**(**5**) and through another set of link covers **738** and a set of threaded nuts **740**. In the implementation illustrated in FIGS. **3**-**4** the rotation limiters can be added to the axis pins between the link covers **738** and the threaded nuts **740**.

[0032] In the present configuration the second axis pin **724**(**2**) and the fourth axis pin **724**(**4**) share common link covers on each side of the first and fifth stacks and the axis pin **724**(**1**) and the third axis pin **724**(**3**) share other common link covers on each side of the first and fifth stacks. The threaded bolts, link covers **738**, and the nuts **740** may provide a compressive force to squeeze the stacks against one another to create friction between the adjacent elements. In some implementations, an axial load may be applied between elements through the use of a spring washer between the nuts **740** and the link covers **738** to create and maintain the desired friction interface between the stacks. The spring washer can help to maintain the axial load even as elements wear. At some point if the spring washer cannot maintain the load, these implementations can be readily adjusted by tightening the bolt/nuts to increase the friction.

[0033] The illustrated configuration may be viewed as employing axial friction to control hinge stiffness. Other types of axial friction configurations can be employed. An alternative configuration can utilize oversize axis pins **724** (relative to the holes). The oversize axis pins can be force fit through the holes in the stacks **702** to create a friction fit between the axis pin and the elements defining the holes. This configuration may be viewed as employing radial friction to control hinge stiffness and other configurations are contemplated.

[0034] In this implementation relative to the first stack **702**(**1**), the first end **714** of the timed link element **706**(**1**) does not engage the second portion element **708**(**1**). The second end **716** can engage the first portion element **704**(**1**) in a no-slip one-to-one rotational engagement. Relative to the second stack **702**(**2**), the first end **714** of the timed link element **706**(**2**) can engage the second portion element **708**(**2**) in a no-slip one-to-one rotational engagement and the second end **716** does not engage the first portion element **704**(**2**). In this case, the no-slip one-to-one rotational engagement is accomplished by intermeshing gears that cause the multi-pivot hinge unit **302** to rotate around axis pins **724**(**1**), **724**(**2**), and **724**(**3**) simultaneously. Other implementations can utilize other gear profiles and/or types of gears and/or can utilize non-geared solutions such as smooth but high friction radial surfaces. Characterized from one perspective, the multi-pivot hinge implementation illustrated in FIGS. **6**-**7** can simultaneously pivot around three axes (e.g., axis pins **724**(**1**), **724**(**2**), and **724**(**3**)). Other numbers of axis pins are contemplated for other implementations. Further, the multi-pivot hinge unit **302** can be thought of as a radius hinge unit in that the hinge unit can maintain a radius of curvature even in the closed position (the radius can expand as the hinge unit is opened). Further still, this implementation of the multi-pivot hinge unit can be thought as a controlled radial hinge in that the gears control the movement around the pivot axes. Other controlled and uncontrolled multi-pivot hinge implementations can be employed with the armadillo hinge cover concepts.

[0035] FIG. **8**-**12** collectively show additional details about computing device **100** and its armadillo hinge assemblies **106**. FIG. **8** shows a view of computing device **100** that is similar to FIG. **2**, except that a portion of the computing device is shown cutaway to expose underlying elements, such as rotation limiters **428** and stacks **702**. FIGS. **9**-**12** show cross sections of computing device **100** as indicated in FIG. **8**.

[0036] FIG. **9** shows hinge cover portions **306**A rotatably secured to one another by pins **418**. Pin **418**(**1**) is specifically designated securing the second portion's convex terminus **408** to hinge cover portion **306**A(**1**). Pin **418**(**2**) is specifically designated securing the hinge cover portion **306**A(**1**) to hinge cover portion **306**A(**2**).

[0037] FIG. **10** shows how hinge cover portions **306**A can float over the underlying hinge elements, such as stack **702**. In this example the underlying hinge elements are the stack's timed link elements **706** described above relative to FIGS. **6**-**7**).

[0038] FIG. **11** shows rotation limiters **428** of the armadillo hinge assembly **106**. (In FIG. **11**, the rotation limiters are indicated generally rather than specifically due to space constraints on the drawing page). An individual rotation limiter (or a pair of rotation limiters) can limit rotation of the corresponding hinge axis to a define angle of rotation a.

[0039] FIG. **12** shows how pin holes **1202** can be manufactured in the hinge cover portions **306**A. In this implementation, the hinge cover portions are held together in tension. As such, assembly can be accomplished with a pin hole in only one side of the hinge cover portion. This configuration can eliminate any need for a complicated slide for an injection molded part or an impractical feature for a machined part.

[0040] FIG. **13** shows an alternative configuration relating to computing device **100**B where hinge cover portions **306**B

of armadillo hinge assembly **106**B have generally linear profiles rather than the curvilinear profiles as shown relative to FIGS. **1-12**. Further, as mentioned above, the number of hinge cover portions does not need to correspond to the number of underlying hinge axes. For instance, the illustrated configuration has nine hinge cover portions and could have three of more underlying hinge axes.

[0041] FIG. **14** shows a view that is similar to the view of FIG. **3**. In this case, computing device **100**C includes first and second portions **102**C and **104**C that are rotatably secured by armadillo hinge assembly **106**C. In this example, the armadillo hinge assembly **106**C is configured to allow an end user consumer to easily detach either or both of the first and second portions **102**C and **104**C from the armadillo hinge assembly **106**C as indicated by arrow **1402**. In this example the armadillo hinge assembly **106**C can include a quick attach/detach assembly **1404**. The quick attach/detach assembly **1404** may include cooperatively operating elements **1406** and **1408** located on the first portion **102**C and the armadillo hinge assembly **106**C, respectively.

[0042] In one example, element **1406** can be manifest as a latch and element **1408** can be manifest as a receiver. The latch can engage the receiver to removeably couple the first portion **102**C with the armadillo hinge assembly **106**C. In another example, the elements **1406** and **1408** may magnetically couple to one another in a manner that can be overcome by the user to separate the first portion from the armadillo hinge assembly. Other quick attach/detach assemblies **1404** are contemplated. Note further that alternatively or additionally to mechanically coupling the armadillo hinge assembly **106**C to the first and/or second portions, the quick attach/detach assembly **1404** can detachably electrically couple electronic components of the first and second portions. For instance, the quick attach/detach assembly **1404** may electrically couple processor **314**, storage/memory **316**, and/or battery **318** from the first portion **102**C to a video processor **1410** in the second portion **104**C.

[0043] Thus, the quick attach/detach assembly **1404** can allow the user to be able to detach first portion **102**C or second portion **104**C to use either portion independent of the other. For example, first portion **102**C may be operated as a standalone tablet device, and then may be attached to second portion **104**C via armadillo hinge assembly **106**C to form a device more akin to a laptop device. A user may also be able to exchange first portion **102**C or second portion **104**C for application-specific devices. For example, an individual second portion may include a keyboard and/or a touchscreen. In certain scenarios, the user may attach a first touchscreen as the first portion and a second touchscreen as second portion, and utilize the device like a book. In other scenarios, a user may attach a touchscreen as the first portion and an input device, comprising a keyboard and trackpad, as the second portion, and utilize the device like a laptop. Other configurations and implementations are contemplated.

[0044] Individual elements of the multi-pivot hinge unit and/or the hinge cover portions can be made from various materials, such as sheet metals, die cast metals, and/or molded plastics, among others, or any combination of these materials.

[0045] Armadillo hinge assemblies can be utilized with any type of computing device, such as but not limited to notebook computers, smart phones, wearable smart devices, and/or other types of existing, developing, and/or yet to be developed computing devices.

Example Methods

[0046] Various methods of manufacture, assembly, and use for armadillo hinge assemblies are contemplated beyond those shown above relative to FIGS. **1-14**.

ADDITIONAL EXAMPLES

[0047] Various examples are described above. Additional examples are described below. One example is manifest as a device that has a first portion that includes a display screen and a second portion that includes an input device. The example can also include a multi-pivot hinge unit rotatably securing the first portion and the second portion and configured to rotate around multiple hinge axes to provide rotation between the first and second portions. The example can further include multiple hinge cover portions that collectively cover the multi-pivot hinge unit between the first portion and the second portion. An individual hinge cover portion can rotate around an axis of rotation that is parallel to a corresponding individual hinge axis.

[0048] Any combination of the above and/or below examples where the axis of rotation of the individual hinge cover portion is co-extensive to the corresponding individual hinge axis.

[0049] Any combination of the above and/or below examples where the multi-pivot hinge unit further comprises a rotation limiter to limit a degree of rotation of the first portion relative to the second portion.

[0050] Any combination of the above and/or below examples where the rotation limiter comprises multiple rotation limiters with individual rotation limiters associated with individual hinge axes.

[0051] Any combination of the above and/or below examples where the multiple rotation limiters are secured to the multi-pivot hinge unit.

[0052] Any combination of the above and/or below examples where the multiple hinge cover portions function as the multiple rotation limiters.

[0053] Any combination of the above and/or below examples where the multi-pivot hinge unit comprises first and second multi-pivot hinge units and wherein the multiple hinge cover portions include first and second parallel slots through which the respective first and second multi-pivot hinge units extend.

[0054] Any combination of the above and/or below examples where the multiple hinge cover portions are fastened to one another, but are not fastened to the multi-pivot hinge units.

[0055] Any combination of the above and/or below examples where the multiple hinge cover portions are pivotably fastened to one another.

[0056] Any combination of the above and/or below examples where the multiple hinge cover portions are fastened to either of the first portion or the second portion or wherein the multiple hinge cover portions are fastened to both of the first portion and the second portion.

[0057] Any combination of the above and/or below examples where the multiple hinge cover portions are articulated so that a first region of a first individual hinge cover portion can slide past a second region of a second adjacent individual hinge cover portion during rotation so that an underlying portion of the multi-pivot hinge unit is not exposed.

[0058] Any combination of the above and/or below examples where the first region comprises a convex region of the first individual hinge cover portion and the second region comprises a concave region of the second adjacent individual hinge cover portion.

[0059] Any combination of the above and/or below examples where the multi-pivot hinge unit comprises a radius hinge unit.

[0060] Any combination of the above and/or below examples where the individual hinge cover portion approximates a portion of a cylinder.

[0061] Another example is manifest as a first portion and a second portion. The example can include a multi-pivot hinge unit rotatably securing the first and second portions. The example can further include a set of rigid hinge cover portions that are configured to be able to rotate relative to one another while collectively covering the multi-pivot hinge unit.

[0062] Any combination of the above and/or below examples where a number of the rigid hinge cover portions in the set of rigid hinge cover portions equals a number of rotational axes in the multi-pivot hinge unit.

[0063] Any combination of the above and/or below examples where a number of the rigid hinge cover portions in the set of rigid hinge cover portions is greater than a number of rotational axes in the multi-pivot hinge unit.

[0064] Another example is manifest as a first portion and a second portion. The example can include an armadillo hinge assembly rotatably securing the first and second portions.

[0065] Any combination of the above and/or below examples where the armadillo hinge assembly comprises a multi-pivot hinge unit covered with overlapping, articulating, rigid hinge covers.

[0066] Any combination of the above and/or below examples where individual hinge covers extend along a long axis.

[0067] Any combination of the above and/or below examples where individual hinge covers approximate a portion of cylinder and include a concave region and a convex region and wherein the overlapping is achieved between the concave region of an individual hinge cover and the convex region of an adjacent individual hinge cover.

[0068] Any combination of the above and/or below examples where the armadillo hinge assembly is configured to be quickly attached and detached from either or both of the first and second portions.

CONCLUSION

[0069] Although techniques, methods, devices, systems, etc., pertaining to armadillo hinge assemblies are described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described. Rather, the specific features and acts are disclosed as exemplary forms of implementing the claimed methods, devices, systems, etc.

1. A computing device, comprising:

a first portion that includes a display screen and a second portion that includes an input device;

a multi-pivot hinge unit rotatably securing the first portion and the second portion and configured to rotate around multiple hinge axes to provide rotation between the first and second portions; and,

multiple hinge cover portions that collectively cover the multi-pivot hinge unit between the first portion and the second portion, an individual hinge cover portion rotating around an axis of rotation that is parallel to a corresponding individual hinge axis.

2. The computing device of claim **1**, wherein the axis of rotation of the individual hinge cover portion is co-extensive to the corresponding individual hinge axis.

3. The computing device of claim **1**, wherein the multi-pivot hinge unit further comprises a rotation limiter to limit a degree of rotation of the first portion relative to the second portion.

4. The computing device of claim **3**, wherein the rotation limiter comprises multiple rotation limiters with individual rotation limiters associated with individual hinge axes.

5. The computing device of claim **4**, wherein the multiple rotation limiters are secured to the multi-pivot hinge unit.

6. The computing device of claim **4**, wherein the multiple hinge cover portions function as the multiple rotation limiters.

7. The computing device of claim **1**, wherein the multi-pivot hinge unit comprises first and second multi-pivot hinge units and wherein the multiple hinge cover portions include first and second parallel slots through which the respective first and second multi-pivot hinge units extend.

8. The computing device of claim **7**, wherein the multiple hinge cover portions are fastened to one another, but are not fastened to the multi-pivot hinge units.

9. The computing device of claim **7**, wherein the multiple hinge cover portions are pivotably fastened to one another.

10. The computing device of claim **7**, wherein the multiple hinge cover portions are fastened to either of the first portion or the second portion or wherein the multiple hinge cover portions are fastened to both of the first portion and the second portion.

11. The computing device of claim **7**, wherein the multiple hinge cover portions are articulated so that a first region of a first individual hinge cover portion can slide past a second region of a second adjacent individual hinge cover portion during rotation so that an underlying portion of the multi-pivot hinge unit is not exposed.

12. The computing device of claim **11**, wherein the first region comprises a convex region of the first individual hinge cover portion and the second region comprises a concave region of the second adjacent individual hinge cover portion.

13. The computing device of claim **7**, wherein the multi-pivot hinge unit comprises a radius hinge unit.

14. The computing device of claim **1**, wherein the individual hinge cover portion approximates a portion of a cylinder.

15. A computing device, comprising:

a first portion and a second portion;

a multi-pivot hinge unit rotatably securing the first and second portions; and,

a set of rigid hinge cover portions that are configured to be able to rotate relative to one another while collectively covering the multi-pivot hinge unit.

16. The computing device of claim **15**, wherein a number of the rigid hinge cover portions in the set of rigid hinge cover portions equals a number of rotational axes in the multi-pivot hinge unit.

17. The computing device of claim **15**, wherein a number of the rigid hinge cover portions in the set of rigid hinge cover portions is greater than a number of rotational axes in the multi-pivot hinge unit.

18. A computing device, comprising:
a first portion and a second portion; and,
an armadillo hinge assembly rotatably securing the first and second portions.

19. The computing device of claim **18**, wherein the armadillo hinge assembly comprises a multi-pivot hinge unit covered with overlapping, articulating, rigid hinge covers.

20. The computing device of claim **19**, wherein individual hinge covers extend along a long axis.

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