(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
2 October 2014 (02.10.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/160620 A1

(51) International Patent Classification:
G06F 1/16 (2006.01) *F16M 13/00* (2006.01)
E05D 11/10 (2006.01)

(21) International Application Number:
PCT/US2014/031531

(22) International Filing Date:
24 March 2014 (24.03.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
13/852,848 28 March 2013 (28.03.2013) US

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

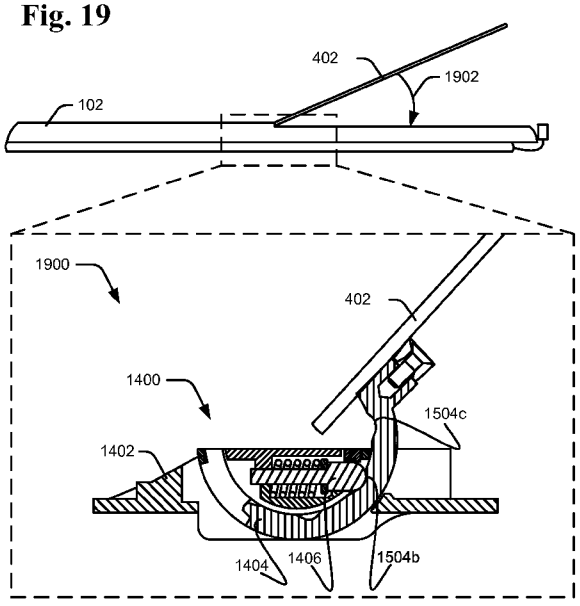
— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

— *with international search report (Art. 21(3))*

(54) Title: HINGE MECHANISM FOR ROTATABLE COMPONENT ATTACHMENT

Fig. 19



(57) Abstract: A hinge mechanism for rotatable component attachment is described. In at least some implementations, the hinge mechanism enables a support component to be adjustably attached to an apparatus, such as a computing device. For example, the hinge mechanism (1900) can be employed to rotatably attach a kickstand (402) to a mobile computing device (102). The kickstand can be rotated via the hinge mechanism to various positions to provide support for different orientations of the computing device. For example, the kickstand can be positioned to support the computing device in a typing orientation such that input can be provided via an associated input device. As another example, the kickstand can be positioned to enable viewing and/or interaction with the computing device, such as in a portrait viewing orientation.

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HINGE MECHANISM FOR ROTATABLE COMPONENT ATTACHMENT

BACKGROUND

[0001] Mobile computing devices have been developed to increase the functionality that is made available to users in a mobile setting. For example, a user may interact with a mobile phone, tablet computer, or other mobile computing device to check email, surf the web, compose texts, interact with applications, and so on.

[0002] Because mobile computing devices are configured to be mobile, however, the devices are typically designed to be used in a handheld manner. Typical ways of adapting mobile devices for other uses (e.g., on a table or other surface) tend to be awkward and detract from the mobile aesthetic associated with mobile devices.

SUMMARY

[0003] This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

[0004] A hinge mechanism for rotatable component attachment is described. In at least some implementations, the hinge mechanism enables a support component to be adjustably attached to an apparatus, such as a computing device. For example, the hinge mechanism can be employed to rotatably attach a kickstand to a mobile computing device. The kickstand can be rotated via the hinge mechanism to various positions to provide support for different orientations of the computing device. For example, the kickstand can be positioned to support the computing device in a typing orientation such that input can be provided via an associated input device. As another example, the kickstand can be positioned to enable viewing and/or interaction with the computing device, such as in a portrait viewing orientation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The detailed description is described with reference to the accompanying figures. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The use of the same reference numbers in different instances in the description and the figures may indicate similar or identical items. Entities represented in the figures may be indicative of one or more entities and thus reference may be made interchangeably to single or plural forms of the entities in the discussion.

[0006] FIG. 1 is an illustration of an environment in an example implementation that is operable to employ the techniques described herein in accordance with one or more embodiments.

[0007] FIG. 2 depicts an example implementation of an input device of FIG. 1 as showing a flexible hinge in greater detail in accordance with one or more embodiments.

[0008] FIG. 3 depicts an example orientation of the input device in relation to the computing device as covering a display device of the computing device in accordance with one or more embodiments.

[0009] FIG. 4 depicts an example orientation of the input device in relation to the computing device as assuming a typing orientation in accordance with one or more embodiments.

[0010] FIG. 5 depicts an example orientation of the input device in relation to the computing device as covering a rear housing of the computing device 102 and exposing a display device of the computing device in accordance with one or more embodiments.

[0011] FIG. 6 depicts an example orientation of the input device as including a portion configured to cover a rear of the computing device, which in this instance is used to support a kickstand of the computing device in accordance with one or more embodiments.

[0012] FIG. 7 depicts an example orientation in which the input device including the portion of FIG. 6 are used to cover both the front and back of the computing device in accordance with one or more embodiments.

[0013] FIG. 8 depicts an example orientation of a computing device with a kickstand in accordance with one or more embodiments.

[0014] FIG. 9 depicts an example orientation of a computing device with a kickstand in accordance with one or more embodiments.

[0015] FIG. 10 depicts an example orientation of a computing device with a kickstand in accordance with one or more embodiments.

[0016] FIG. 11 depicts a rear view of an example orientation of a computing device with a kickstand in accordance with one or more embodiments.

[0017] FIG. 12 depicts an example inner surface of a kickstand in accordance with one or more embodiments.

[0018] FIG. 13 depicts an example exploded view of a computing device with a kickstand in accordance with one or more embodiments.

[0019] FIG. 14 illustrates components of an example hinge mechanism in accordance with one or more embodiments.

[0020] FIG. 15 illustrates a section view of a hinge ring in accordance with one or more embodiments.

[0021] FIG. 16 illustrates a section view of a ring support in accordance with one or more embodiments.

[0022] FIG. 17 illustrates a partial section view of a computing device in accordance with one or more embodiments.

[0023] FIG. 18 illustrates a section view of a hinge in a closed position in accordance with one or more embodiments.

[0024] FIG. 19 illustrates a section view of a hinge in an open position in accordance with one or more embodiments.

[0025] FIG. 20 illustrates a section view of a hinge in a first open position in accordance with one or more embodiments.

[0026] FIG. 21 illustrates an overhead view of a hinge in a first open position in accordance with one or more embodiments.

[0027] FIG. 22 illustrates a section view of a hinge in a second open position in accordance with one or more embodiments.

[0028] FIG. 23 illustrates a section view of a hinge in a second open position in accordance with one or more embodiments.

[0029] FIG. 24 illustrates an overhead view of a hinge in a second open position in accordance with one or more embodiments.

[0030] FIG. 25 illustrates a section view of a hinge in a third open position in accordance with one or more embodiments.

[0031] FIG. 26 illustrates a section view of a hinge in a third open position in accordance with one or more embodiments.

[0032] FIG. 27 illustrates an overhead view of a hinge in a third open position in accordance with one or more embodiments.

[0033] FIG. 28 illustrates a section view of a hinge in a fourth open position in accordance with one or more embodiments.

[0034] FIG. 29 illustrates a section view of a hinge in a fourth open position in accordance with one or more embodiments.

[0035] FIG. 30 illustrates an overhead view of a hinge in a fourth open position in accordance with one or more embodiments.

[0036] FIG. 31 illustrates a rear view of a hinge ring and a ring support in accordance with one or more embodiments.

[0037] FIG. 32 illustrates a rear view of a hinge ring and a ring support in accordance with one or more embodiments.

[0038] FIG. 33 illustrates a rear view of a hinge ring and a ring support in accordance with one or more embodiments.

[0039] FIG. 34 illustrates a rear view of a hinge ring and a ring support in accordance with one or more embodiments.

[0040] FIG. 35 illustrates an example system including various components of an example device that can be implemented as any type of computing device as described with reference to FIGS. 1-34 to implement embodiments of the techniques described herein.

DETAILED DESCRIPTION

Overview

[0041] A variety of different devices may be physically attached to a mobile computing device to provide a variety of functionality. For example, a device may be configured to provide a cover for at least a display device of the computing device to protect it against harm. Other devices may also be physically attached to the mobile computing device, such as an input device (e.g., keyboard having a track pad) to provide inputs to the computing device. Further, functionality of these devices may be combined, such as to provide a combination cover and input device.

[0042] A hinge mechanism for rotatable component attachment is described. In at least some implementations, the hinge mechanism enables a support component to be adjustably attached to an apparatus, such as a computing device. For example, the hinge mechanism can be employed to rotatably attach a kickstand to a mobile computing device. The kickstand can be rotated via the hinge mechanism to various positions to provide support for different orientations of the computing device. For example, the kickstand can be positioned to support the computing device in a typing orientation such that input can be provided via an associated input device. As another example, the kickstand can be positioned to enable viewing and/or interaction with the computing device, such as in a portrait viewing orientation.

[0043] In at least some embodiments, a hinge mechanism utilizes preset hinge positions that enable a kickstand to be placed at different preset positions. Further, an example hinge mechanism includes a center of rotation that coincides with a seam between abutting edges of the kickstand and the computing device. Thus, the kickstand can conform to a contour of the computing device when in a closed position, and the seam can be maintained when the kickstand is open.

[0044] In the following discussion, an example environment is first described that may employ the techniques described herein. Embodiments discussed herein are not limited to the example environment, and the example environment is not limited to embodiments discussed herein. Next, example device orientations are discussed in accordance with one or more embodiments. Following this, an example kickstand is described in accordance with one or more embodiments. Next, example hinges for kickstand attachment are discussed in accordance with one or more embodiments. Finally, an example system and device are discussed that may implement various techniques described herein. Further, although an input device is described herein, other devices are also contemplated that do not include input functionality, such as covers.

Example Environment

[0045] FIG. 1 is an illustration of an environment 100 in an example implementation that is operable to employ the techniques described herein. The illustrated environment 100 includes an example of a computing device 102 that is physically and communicatively coupled to an input device 104 via a flexible hinge 106. The computing device 102 may be configured in a variety of ways. For example, the computing device 102 may be configured for mobile use, such as a mobile phone, a tablet computer as illustrated, and so on. Thus, the computing device 102 may range from full resource devices with substantial memory and processor resources to a low-resource device with limited memory and/or processing resources. The computing device 102 may also relate to software that causes the computing device 102 to perform one or more operations. An example implementation of the computing device 102 is discussed below with reference to FIG. 35.

[0046] The computing device 102, for instance, is illustrated as including an input/output module 108. The input/output module 108 is representative of functionality relating to processing of inputs and rendering outputs of the computing device 102. A variety of different inputs may be processed by the input/output module 108, such as inputs relating to functions that correspond to keys of the input device 104, keys of a virtual keyboard displayed by the display device 110 to identify gestures and cause operations to be performed that correspond to the gestures that may be recognized through the input device 104 and/or touchscreen functionality of the display device 110, and so forth. Thus, the input/output module 108 may support a variety of different input techniques by recognizing and leveraging a division between types of inputs including key presses, gestures, and so on.

[0047] In the illustrated example, the input device 104 is configured as having an input portion that includes a keyboard having a QWERTY arrangement of keys and track pad although other arrangements of keys are also contemplated. Further, other non-conventional configurations are also contemplated, such as a game controller, configuration to mimic a musical instrument, and so forth. Thus, the input device 104 and keys incorporated by the input device 104 may assume a variety of different configurations to support a variety of different functionality.

[0048] As previously described, the input device 104 is physically and communicatively coupled to the computing device 102 in this example through use of a flexible hinge 106. The flexible hinge 106 is flexible in that rotational movement supported by the hinge is achieved through flexing (e.g., bending) of the material forming the hinge as opposed to mechanical rotation as supported by a pin, although that embodiment is also contemplated. Further, this flexible rotation may be configured to support movement in one or more directions (e.g., vertically in the figure) yet restrict movement in other directions, such as lateral movement of the input device 104 in relation to the computing device 102. This may be used to support consistent alignment of the input device 104 in relation to the computing device 102, such as to align sensors used to change power states, application states, and so on.

[0049] The flexible hinge 106, for instance, may be formed using one or more layers of fabric and include conductors formed as flexible traces to communicatively couple the input device 104 to the computing device 102 and vice versa. This communication, for instance, may be used to communicate a result of a key press to the computing device 102, receive power from the computing device, perform authentication, provide supplemental power to the computing device 102, and so on. The flexible hinge 106 may be configured in a variety of ways, further discussion of which may be found in relation to the following figure.

[0050] FIG. 2 depicts an example implementation 200 of the input device 104 of FIG. 1 as showing the flexible hinge 106 in greater detail. In this example, a connection portion 202 of the input device is shown that is configured to provide a communicative and physical connection between the input device 104 and the computing device 102. The connection portion 202 as illustrated has a height and cross section configured to be received in a channel in the housing of the computing device 102, although this arrangement may also be reversed without departing from the spirit and scope thereof.

[0051] The connection portion 202 is flexibly connected to a portion of the input device 104 that includes the keys through use of the flexible hinge 106. Thus, when the connection

portion 202 is physically connected to the computing device the combination of the connection portion 202 and the flexible hinge 106 supports movement of the input device 104 in relation to the computing device 102 that is similar to a hinge of a book.

[0052] The connection portion 202 is illustrated in this example as including magnetic coupling devices 204, 206, mechanical coupling protrusions 208, 210, and communication contacts 212. The magnetic coupling devices 204, 206 are configured to magnetically couple to complementary magnetic coupling devices of the computing device 102 through use of one or more magnets. In this way, the input device 104 may be physically secured to the computing device 102 through use of magnetic attraction.

[0053] The connection portion 202 also includes mechanical coupling protrusions 208, 210 to form a mechanical physical connection between the input device 104 and the computing device 102. The communication contacts 212 are configured to contact corresponding communication contacts of the computing device 102 to form a communicative coupling between the devices as shown.

Example Device Orientations

[0054] Through rotational movement of the flexible hinge 106, a variety of different orientations of the input device 104 in relation to the computing device 102 may be supported. For example, rotational movement may be supported by the flexible hinge 106 such that the input device 104 may be placed against the display device 110 of the computing device 102 and thereby act as a cover as shown in the example orientation 300 of FIG. 3. Thus, the input device 104 may act to protect the display device 110 of the computing device 102 from harm.

[0055] As shown in the example orientation 400 of FIG. 4, a typing arrangement may be supported. In this orientation, the input device 104 is laid flat against a surface and the computing device 102 is disposed at an angle to permit viewing of the display device 110, e.g., such as through use of a kickstand 402 disposed on a rear surface of the computing device 102.

[0056] In the example orientation 500 of FIG. 5, the input device 104 may also be rotated so as to be disposed against a back of the computing device 102, e.g., against a rear housing of the computing device 102 that is disposed opposite the display device 110 on the computing device 102. In this example, through orientation of the connection portion 202 to the computing device 102, the flexible hinge 106 is caused to "wrap around" the connection portion 202 to position the input device 104 at the rear of the computing device 102.

[0057] This wrapping causes a portion of a rear of the computing device 102 to remain exposed. This may be leveraged for a variety of functionality, such as to permit a camera 502 positioned on the rear of the computing device 102 to be used even though a significant portion of the rear of the computing device 102 is covered by the input device 104 in this example orientation 500. Although configuration of the input device 104 to cover a single side of the computing device 102 at any one time was described above, other configurations are also contemplated.

[0058] In the example orientation 600 of FIG. 6, the input device 104 is illustrated as including a portion 602 configured to cover a rear of the computing device. This portion 602 is also connected to the connection portion 202 using a flexible hinge 604.

[0059] The example orientation 600 of FIG. 6 also illustrates a typing arrangement in which the input device 104 is laid flat against a surface and the computing device 102 is disposed at an angle to permit viewing of the display device 110. This is supported through use of the kickstand 402 disposed on a rear surface of the computing device 102 to contact the portion 602 in this example.

[0060] FIG. 7 depicts an example orientation 700 in which the input device 104 including the portion 602 are used to cover both the front (e.g., display device 110) and back (e.g., opposing side of the housing from the display device) of the computing device 102. In one or more implementations, electrical and other connectors may also be disposed along the sides of the computing device 102 and/or the input device 104, e.g., to provide auxiliary power when closed.

[0061] Naturally, a variety of other orientations are also supported. For instance, the computing device 102 and input device 104 may assume an arrangement such that both are laid flat against a surface as shown in FIG. 1. Other instances are also contemplated, such as a tripod arrangement, meeting arrangement, presentation arrangement, and so forth.

Kickstand

[0062] The described kickstand can be employed to enable a variety of different orientations for the computing device 102. For instance, consider the following implementations of a kickstand in accordance with various embodiments.

[0063] FIG. 8 illustrates the orientation 300, and includes the kickstand 402 in a closed position. In the closed position, the kickstand 402 forms a portion of a rear surface 802 of the computing device 102 such that the kickstand 402 conforms to a surface contour of the computing device 102. For instance, when the kickstand 402 is in the closed position, the

kickstand 402 integrates into the computing device 102 and does not protrude from a plane formed by the rear surface 802.

[0064] FIG. 9 illustrates that the kickstand 402 can be rotated away from the rear surface 802 of the computing device 102 to a position 900. For instance, the kickstand 402 can be rotatably attached to the computing device 102 along a seam 902 via a hinge mechanism. Examples of such a hinge mechanism are detailed below.

[0065] In at least some implementations, the position 900 corresponds to a preset position for the kickstand 402. For instance, when a user applies pressure to the kickstand 402 away from the rear surface 802, the kickstand 402 can snap into the position 900. As detailed below, a hinge mechanism employed to attach the kickstand 402 to the computing device 102 can utilize spring pressure and detent settings to provide preset open positions for the kickstand 402. In this example, the position 900 is associated with an angle 904 between the rear surface of the computing device 102, and the kickstand 402. For instance, the angle 904 can range from 20 degrees (20°) to 30 degrees (30°). Any suitable range of angles may be employed, however.

[0066] With the kickstand 402 in the position 900, the computing device 102 can be rotated away from the input device 104 and supported by the kickstand 402, such as illustrated in the orientation 400 of FIG. 4. Thus, the position 900 can enable the display device 110 to be viewed, and input to be provided to the computing device 102 via the input device 104.

[0067] FIG. 10 illustrates that the kickstand 402 can be rotated away from the rear surface 802 of the computing device 102 to a position 1000. For instance, the kickstand 402 can be rotated further past the position 900 to the position 1000.

[0068] In at least some implementations, the position 1000 corresponds to a preset position for the kickstand 402. For example, when a user applies pressure to the kickstand 402 away from the rear surface 802, the kickstand 402 can snap into the position 1000. In this example, the position 1000 is associated with an angle 1002 between the rear surface of the computing device 102, and the kickstand 402. For instance, the angle 1002 can range from 65 degrees (65°) to 75 degrees (75°). Any suitable range of angles may be employed, however. Further, the seam 902 can be maintained (e.g., the width of the seam) during rotation to the position 1000.

[0069] With the kickstand 402 in the position 1000, the computing device 102 can be rotated sideways (e.g., to a portrait viewing position) and supported via the kickstand 402. For instance, consider an orientation 1100 illustrated in FIG. 11.

[0070] FIG. 11 illustrates a rear view of the computing device 102 in the orientation 1100, showing that the computing device 102 is rotated to a portrait viewing position, such as 90 degrees (90°) to the orientation illustrated in FIG. 1. Further, the kickstand 402 is positioned in the position 1000 such that the computing device 102 reclines back and is supported by the kickstand 402 on a surface 1102. Although not illustrated here, placing the computing device 102 in the orientation 1100 can cause a view orientation of the display device 110 to be rotated to a portrait view.

[0071] In FIG. 11, the computing device 102 is illustrated without the input device 104. Thus, in at least some embodiments the input device 104 can be separated from the computing device 102 such that the computing device 102 has functionality independent of the input device 104. For example, the flexible hinge 106 can employ a magnetic attachment mechanism that holds the input device 104 to the computing device 102 via magnetic force. Thus, a user can grasp the computing device 102 and the input device 104, and can pull the two apart by overcoming the magnetic attraction between them.

[0072] When separate from the input device 104, the computing device 102 can provide various functionality. For example, a user can view content via the computing device 102, such as movies and/or streaming content. Further, a user can interact with touch screen functionality of the display device 110. Thus, placing the kickstand 402 in the position 1000 can enable a user to place the computing device in a portrait orientation, and to view and/or interact with the computing device in such an orientation.

[0073] As further illustrated in FIG. 11, the computing device 102 includes a beveled edge 1104 between the rear surface 802 and a front surface 1106. The beveled edge 1104 is angled such that the width of the rear surface 802 is narrower than the width of a front surface 1106. The kickstand 402 is integrated into the rear surface 802, and has substantially the same width as the rear surface 802. Thus, the kickstand 402 has a narrower width than the front surface 1106.

[0074] Accordingly, when the computing device is positioned in the orientation 1100, and the kickstand 402 is placed in the position 1000, the computing device 102 leans back away from the front surface 1106 and rests on a corner 1108 of the kickstand 402. The corner 1108 can employ some form of cushioning material to reduce sliding of the corner 1108 on the surface 1102, and to reduce the transmission of vibrations between the surface 1102 and the computing device 102.

[0075] FIG. 12 illustrates a view of an inner surface 1200 of the kickstand 402 in accordance with one or more embodiments. In this example, the kickstand 402 is illustrated in the context of an outline of the computing device 102.

[0076] The inner surface 1200 includes surface contacts 1202a and 1202b, which function as surface contact points when the kickstand 402 is in an open position. The surface contacts 1202a, 1202b can be formed using a variety of types of skid-resistant materials, and can be positioned within a notch in the inner surface 1200. For example, the surface contacts 1202a, 1202b can be formed from an elastic material and can be substantially dovetail shaped such that the surface contacts can be held within a notch in the rear surface 1200 via elastic pressure. Additionally or alternatively, the surface contacts 1202a, 1022b can be affixed to the inner surface 1200 via a suitable adhesive.

[0077] The surface contacts 1202a, 1202b are positioned on a bottom edge of the kickstand 402 such that when the kickstand 402 is open and resting on a surface, the surface contacts 1202a, 1202b serve as insulators between the kickstand 402 and the surface. For example, the surface contacts 1202a, 1202b can reduce the transmission of vibrations between the kickstand 402 and an adjacent surface. Further, the surface contacts 1202a, 1202b can reduce slippage of the kickstand 402 on a surface. For instance, the surface contacts 1202a, 1202b can be formed from a rubberized material that resists slippage on a variety of different surfaces. Thus, when the computing device 102 is supported by the kickstand 402 (e.g., in the orientation 400 discussed above), the surface contacts 1202a, 1202b can assist in stabilizing the computing device 102 and reduce noise that can be caused by vibration of the kickstand 402 on a surface.

[0078] Further included on the inner surface 1200 are a stabilizer plate 1204a and a stabilizer plate 1204b, which are placed along a lower edge of the inner surface 1200 and formed from a material (e.g., ferromagnetic) that is attracted to a magnetic field. When the kickstand 402 is in a closed position, the stabilizer plates 1204a, 1204b are attracted to magnets placed along an adjacent edge of the computing device 102. Thus, in the closed position the magnetic force exerted by the magnets on the stabilizer plates 1204a, 1204b can assist in holding the lower edge of the kickstand 402 against the computing device 102.

[0079] The inner surface 1200 further includes peripheral hinge mounts 1206a, 1206b, which function as mounting points for hinge mechanisms that are employed to attach the kickstand 402 to the computing device 102. Examples of hinge mechanisms are discussed below. A center hinge key 1208 is also included, which functions as slidable attachment to a center hinge employed between the kickstand 402 and the computing device 102.

[0080] A damper 1210a and a damper 1210b are fastened (e.g., using a suitable adhesive) to the inner surface 1200, and function to suppress vibration of the kickstand 402. For example, the dampers 1210a, 1210b can be formed from a material that absorbs and/or dissipates vibrations of the kickstand 402. Examples of such materials include urethane foam, rubber, neoprene, silicone, and so on. Thus, the dampers 1210a, 1210b can reduce noise caused by vibration of the kickstand 402, such as when the kickstand 402 is being opened and closed.

Hinges for Component Attachment

[0081] A variety of different hinge mechanisms can be employed for attaching various components in accordance with various embodiments. Some example hinge mechanisms and hinge arrangements are discussed below.

[0082] FIG. 13 illustrates an exploded rear view 1300 of the computing device 102 and the kickstand 402. Included in the rear view 1300 are peripheral hinges 1302a and 1302b, which can be employed to attach the kickstand 402 to the computing device 102. The peripheral hinges 1302a, 1302b are configured to be installed internally in the computing device 102, such as via a suitable attachment method and/or device.

[0083] The kickstand 402 can be attached to a pivoting portion of the peripheral hinges 1302a, 1302b via the peripheral hinge mounts 1206a, 1206b, discussed above with reference to FIG. 12. Thus, attachment to the peripheral hinges 1302a, 1302b enables the kickstand 402 to pivot between various positions with reference to the computing device 102.

[0084] Further illustrated is a center hinge 1304, which is also configured to be installed internally in the computing device 102, such as via a suitable attachment method and/or device. The center hinge key 1208 of the kickstand 402 can be engaged in the center hinge 1304.

[0085] The peripheral hinges 1302a, 1302b and the center hinge 1304 are installed in the computing device 102 such that when the kickstand 402 is rotated on the hinges to a closed position, the hinges are not visible and the kickstand 402 forms a smooth contour with the chassis of the computing device 102. For example, see the closed position illustrated and discussed with reference to FIG. 8.

[0086] Also illustrated in the rear view 1300 are the surface contacts 1202a, 1202b. As discussed above, the surface contacts 1202a, 1202b can stabilize the kickstand 402 and the computing device 102 when the kickstand 402 is in an open position and resting on a surface. In at least some embodiments, the surface contacts 1202a, 1202b are positioned in a groove

in an inner surface of the kickstand 402 such that the surface contacts 1202a, 1202b are not externally visible when the kickstand 402 is in a closed position.

[0087] To assist a user in opening the kickstand 402 from a closed position, a notch 1306 is formed in an edge of the computing device 102. For instance, the notch 1306 can enable a user to insert a small portion of a finger behind the closed kickstand 402, and apply pressure to rotate the kickstand 402 to an open position. Additionally or alternatively, a notch can be formed in an edge of the kickstand 402 to assist in opening the kickstand 402.

[0088] FIG. 14 illustrates components of an example hinge 1400 in accordance with one or more embodiments. The hinge 1400, for instance, can represent an implementation of the peripheral hinges 1302a, 1302b discussed above. This is not intended to be limiting, however, and the hinge 1400 can be employed as a hinge mechanism for a variety of different components and attachment scenarios. Further, the hinge 1400 and its various components can be formed using any suitable material, such as metals, plastics, polymers, alloys, and so forth.

[0089] Components of the hinge 1400 include a hinge frame 1402 in which various other components of the hinge 1400 can be disposed. For example, the hinge frame 1402 can be mounted to a device (e.g., the computing device 102) and function as a support structure for other components of the hinge 1400.

[0090] Further included is a hinge ring 1404, which can be rotatably and/or movably positioned within the hinge frame 1402. In at least some embodiments, a kickstand (e.g., the kickstand 402) can be attached to the hinge ring 1404. Movement of the hinge ring 1404 within the hinge frame 1402 can enable an attached kickstand to be placed in various positions relative to an attached device.

[0091] Operably associated with the hinge ring 1404 are a hinge ring follower 1406 and a hinge ring spring 1408, which can be positioned relative to the hinge ring 1404 to apply pressure to the hinge ring 1404. As detailed below, pressure from the hinge ring spring 1408 and the hinge ring follower 1406 can enable the hinge ring 1404 (and thus an attached kickstand) to maintain preset positions relative to an attached device.

[0092] The hinge 1400 further includes a ring support 1410, which can be movably positioned within the hinge frame 1402. In at least some embodiments, the ring support 1410 provides structural support for the hinge ring 1404. For instance, when the hinge ring 1404 is pivoted open to certain positions, the ring support 1410 can stabilize the hinge ring 1404 and thus an attached component, e.g., a kickstand. Stabilization of the hinge ring 1404 via the ring support 1410 is discussed in more detail below.

[0093] Operably associated with the ring support 1410 are a ring support follower 1412 and a ring support spring 1414, which can be positioned relative to the ring support 1410 to apply pressure to the ring support 1410. As detailed below, pressure from the ring support spring 1414 and the ring support follower 1412 can enable the ring support 1410 and the hinge ring 1404 to maintain preset positions relative to an attached device.

[0094] The hinge 1400 includes a hinge cap 1416, which can be attached to the hinge frame 1402 to secure other components of the hinge 1400 within the hinge frame 1402.

[0095] FIG. 15 illustrates a section view of the hinge ring 1404 in accordance with one or more embodiments. The hinge ring 1404 includes a hinge ring mount 1500, to which various components can be mounted. For example, the kickstand 402 can be attached to the hinge ring mount 1500.

[0096] Various attachment techniques can be utilized to attach components to the hinge ring mount 1500. For instance, the hinge ring mount 1500 can be threaded to accept a screw, bolt, or other threaded fastener. With reference to the kickstand 402, for example, a threaded fastener can be used to attach one of the peripheral hinge mounts 1206a, 1206b to the hinge ring mount 1500. Other types of attachment techniques may alternatively or additionally be employed.

[0097] For instance, in at least some embodiments magnetic force may be employed to hold a peripheral hinge mount to the hinge ring mount 1500. A peripheral hinge mount and the ring mount 1500, for example, can include magnetic material, e.g., magnets, ferromagnetic materials, and so forth. Thus, in such embodiments, when a peripheral hinge mount is aligned with the ring mount 1500, magnetic force can removably bind the peripheral hinge mount to the ring mount 1500.

[0098] Magnets can thus be employed in some embodiments to attach the kickstand 402 to hinge assemblies (e.g., the hinge 1400) such that kickstand 402 can be detached from an associated device. This can enable a device (e.g., the computing device 102) to be customized in various ways, such as by replacing the kickstand 402 with a different kickstand of a different color, different graphics, different materials, and so forth.

[0099] The hinge ring 1404 further includes ring notches 1502a, 1502b, and 1502c. In at least some implementations, the ring notches 1502a, 1502b, and 1502c correspond to preset positions for the hinge ring 1404. For instance, when the hinge ring rotates within the hinge 1400, pressure from the hinge ring spring 1408 can cause the hinge ring follower 1406 to catch in a respective notch of the ring notches 1502a, 1502b, and 1502c. The ring notches 1502a, 1502b, and 1502c, for example, can correspond to preset positions for the kickstand

402. While the hinge ring 1404 is illustrated as included three ring notches, it is to be appreciated that embodiments can include any suitable number of ring notches in accordance with the claimed embodiments. Further example features of the hinge ring 1404 are presented below.

[00100] FIG. 16 illustrates a section view of the ring support 1410 in accordance with one or more embodiments. The ring support 1410 further includes support notches 1600a, 1600b, and 1600c. In at least some implementations, the support notches 1600a, 1600b, and 1600c correspond to preset positions for the ring support 1410. For instance, when the ring support 1410 rotates within the hinge 1400, pressure from the ring support spring 1414 can cause the ring support follower 1412 to catch in a respective notch of the support notches 1600a, 1600b, and 1600c. The support notches 1600a, 1600b, and 1600c, for example, can correspond to preset positions for the kickstand 402.

[00101] While the ring support 1410 is illustrated as included three support notches, it is to be appreciated that embodiments can include any suitable number of support notches in accordance with the claimed embodiments. Further example features of the ring support 1410 are presented below.

[00102] FIG. 17 illustrates a partial section view of the computing device 102, generally at 1700. The view 1700 includes a cross section of the hinge 1400 with the kickstand 402 is in a closed position.

[00103] As illustrated, the kickstand 402 can be attached to the hinge ring mount 1500 using a screw 1702. However, a wide variety of attachment techniques may be employed in accordance with the claimed embodiments, examples of which are discussed above.

[00104] Further illustrated in the view 1700 is that the hinge ring follower 1406 is positioned in the ring notch 1502c of the hinge ring 1404. Pressure from the hinge ring follower 1406 against the ring notch 1502c holds the hinge 1400, and thus the kickstand 402, in a closed position. A user may open the kickstand 402 by applying pressure to the kickstand 402 sufficient to overcome the static friction applied by the hinge ring follower 1406 against the ring notch 1502c.

[00105] FIG. 18 illustrates a section view 1800 of the hinge 1400 in a closed position, such as illustrated with reference to FIG. 17. For ease of viewing, the hinge 1400 is illustrated separate from an attached device and kickstand.

[00106] Illustrated as part of the view 1800 are the hinge frame 1402, the hinge ring 1404, and the ring support 1410. Further illustrated is that the hinge ring spring 1408 applies pressure to the hinge ring follower 1406, which in turn applies pressure to the hinge ring

1404 at the ring notch 1502c. As discussed above, pressure on the ring notch 1502c holds the hinge 1400 in a closed position, and thus holds an attached component (e.g., the kickstand 402) in a closed position.

[00107] FIG. 19 illustrates a section view 1900 of the hinge 1400 in an open position. For example, the view 1900 can correspond to an open position of the kickstand 402 relative to the computing device 102. For ease of viewing, the hinge 1400 is illustrated with the kickstand 402 attached but separate from the computing device 102.

[00108] Further to the view 1900, the hinge ring follower 1406 has been disengaged from the ring notch 1502c of the hinge ring 1404, and engaged with the ring notch 1502b. For example, a user can apply pressure to the kickstand 402 away from the computing device 102 to cause the kickstand 402 to transition to a first open position. Thus, engagement of the hinge ring follower 1406 with the ring notch 1502b can correspond to a first open position for the hinge 1400, and thus the kickstand 402. Pressure applied by the hinge ring spring 1408 against the hinge ring follower 1406 holds the hinge ring follower in the ring notch 1502b, and thus holds the kickstand 402 in the first open position.

[00109] In at least some embodiments, the first open position can correspond to an angle 1902 with reference to the kickstand 402 and the computing device 102. For example, the angle 1902 can correspond to angle from 40 degrees to 50 degrees, e.g., 45 degrees.

[00110] FIG. 20 illustrates a section view 2000 of the hinge 1400 in the first open position, as discussed above with reference to FIG. 19. For ease of viewing, the hinge 1400 is illustrated in the view 2000 separate from an associated device and kickstand.

[00111] The view 2000 illustrates that in the first open position, the hinge ring 1404 is rotated to an open position. The ring support 1410, however, remains in a closed position within the hinge frame 1402. For instance, in the first open position of the hinge 1400, the ring support follower 1412 remains engaged in the support notch 1600c of the ring support 1410.

[00112] FIG. 21 illustrates an overhead view 2100 of the hinge 1400 in the first open position, as discussed above with reference to FIGS. 19 and 20. For ease of viewing, the hinge 1400 is illustrated in the view 2100 separate from an associated device and kickstand. Further, the hinge frame 1402 is illustrated via dashed lines.

[00113] The view 2100 illustrates that in the first open position for the hinge 1400, the hinge ring follower 1406 is engaged in the ring notch 1502b of the hinge ring 1404. Further illustrated is that the ring support follower 1412 is engaged in the support notch 1600c of the ring support 1410.

[00114] FIG. 22 illustrates a section view 2200 of the hinge 1400 in a second open position. For example, the view 2200 can correspond to a second open position of the kickstand 402 relative to the computing device 102. For ease of viewing, the hinge 1400 is illustrated with the kickstand 402 attached but separate from the computing device 102.

[00115] Further to the view 2200, the hinge ring follower 1406 has been disengaged from the ring notch 1502b of the hinge ring 1404, and engaged with the ring notch 1502a. For example, a user can apply pressure to the kickstand 402 to cause the kickstand 402 to transition to a second open position. Thus, engagement of the hinge ring follower 1406 with the ring notch 1502a can correspond to a second open position for the hinge 1400, and thus the kickstand 402. Pressure applied by the hinge ring spring 1408 against the hinge ring follower 1406 holds the hinge ring follower 1406 in the ring notch 1502a, and thus holds the kickstand 402 in the second open position.

[00116] In at least some embodiments, the second open position can correspond to an angle 2202 with reference to the kickstand 402 and the computing device 102. For example, the angle 2202 can correspond to angle from 85 degrees to 95 degrees, e.g., 90 degrees.

[00117] FIG. 23 illustrates a section view 2300 of the hinge 1400 in the second open position, as discussed above with reference to FIG. 22. For ease of viewing, the hinge 1400 is illustrated in the view 2300 separate from an associated device and kickstand.

[00118] The view 2300 illustrates that in the second open position, the hinge ring 1404 is rotated to the second open position as discussed above. Similar to the first open position, the ring support 1410 remains in a closed position within the hinge frame 1402. For instance, in the second open position of the hinge 1400, the ring support follower 1412 remains engaged in the support notch 1600c of the ring support 1410.

[00119] FIG. 24 illustrates an overhead view 2400 of the hinge 1400 in the second open position, as discussed above with reference to FIGS. 22 and 23. For ease of viewing, the hinge 1400 is illustrated in the view 2400 separate from an associated device and kickstand. Further, the hinge frame 1402 is illustrated via dashed lines.

[00120] The view 2400 illustrates that in the second open position for the hinge 1400, the hinge ring follower 1406 is engaged in the ring notch 1502a of the hinge ring 1404. Further illustrated is that the ring support follower 1412 is engaged in the support notch 1600c of the ring support 1410. Thus, in the second open position, the ring support 1410 remains in a closed position within the hinge frame 1402.

[00121] FIG. 25 illustrates a section view 2500 of the hinge 1400 in a third open position. For example, the view 2500 can correspond to a third open position of the kickstand 402

relative to the computing device 102. For ease of viewing, the hinge 1400 is illustrated with the kickstand 402 attached but separate from the computing device 102. Further to the view 2500, the hinge ring follower 1406 is disengaged from the ring notch 1502a of the hinge ring 1404 to enable the kickstand 402 to be positioned in the third open position.

[00122] In at least some embodiments, the third open position can correspond to an angle 2502 with reference to the kickstand 402 and the computing device 102. For example, the angle 2502 can correspond to angle from 130 degrees to 140 degrees, e.g., 135 degrees.

[00123] FIG. 26 illustrates a section view 2600 of the hinge 1400 in the third open position, as discussed above with reference to FIG. 25. For ease of viewing, the hinge 1400 is illustrated in the view 2600 separate from an associated device and kickstand.

[00124] The view 2600 illustrates that in the third open position, the hinge ring 1404 is rotated as discussed above. Further to the third open position, the ring support 1410 is rotated within the hinge frame 1402 such that the ring support follower 1412 disengages from the support notch 1600c, and engages with the support notch 1600b. For instance, when the hinge ring 1404 rotates from the second open position to the third open position, a catch mechanism on the hinge ring 1404 can engage the ring support 1410 and cause the ring support 1410 to rotate within the hinge frame 1402 to the third open position. An example catch mechanism is illustrated below with reference to FIGS. 31 and 32.

[00125] FIG. 27 illustrates an overhead view 2700 of the hinge 1400 in the third open position, as discussed above with reference to FIGS. 25 and 26. For ease of viewing, the hinge 1400 is illustrated in the view 2700 separate from an associated device and kickstand. Further, the hinge frame 1402 is illustrated via dashed lines.

[00126] The view 2700 illustrates that in the transition to the third open position, the hinge ring 1404 catches the ring support 1410 and causes the ring support 1410 to rotate within the hinge frame 1402 to an open position. As a result, the ring support follower 1412 disengages from the support notch 1600c, and engages with the support notch 1600b. In the third open position, the ring support 1410 serves as a stabilizing structure for the hinge ring 1404. Thus, an attached component (e.g., the kickstand 402) can be stabilized in the third open position.

[00127] FIG. 28 illustrates a section view 2800 of the hinge 1400 in a fourth open position. For example, the view 2800 can correspond to a fourth open position of the kickstand 402 relative to the computing device 102. For ease of viewing, the hinge 1400 is illustrated in the view 2800 with the kickstand 402 attached but separate from the computing device 102. Further to the view 2800, the hinge ring 1404 is rotated to enable the kickstand 402 to be

positioned in the fourth open position. As further discussed below, rotation of the hinge ring 1404 to the fourth open position causes the ring support 1410 to rotate within the hinge frame 1402 to the fourth open position for the hinge 1400.

[00128] In at least some embodiments, the fourth open position can correspond to an angle 2802 with reference to the kickstand 402 and the computing device 102. For example, the angle 2802 can be 180 degrees. In the fourth open position, for example, the kickstand 402 can be positioned against a rear surface of the computing device 102.

[00129] FIG. 29 illustrates a section view 2900 of the hinge 1400 in the fourth open position, as discussed above with reference to FIG. 28. For ease of viewing, the hinge 1400 is illustrated in the view 2900 separate from an associated device and kickstand.

[00130] The view 2900 illustrates that in the fourth open position, the hinge ring 1404 is rotated to the fourth open position as discussed above. Further to the fourth open position, the ring support 1410 is rotated within the hinge frame 1402 such that the ring support follower 1412 disengages from the support notch 1600b, and engages with the support notch 1600a. For instance, when the hinge ring 1404 rotates from the third open position to the fourth open position, a catch mechanism on the hinge ring 1404 that engages the ring support 1410 causes the ring support 1410 to rotate within the hinge frame 1402 to the fourth open position. An example catch mechanism is illustrated below with reference to FIGS. 31 and 32.

[00131] FIG. 30 illustrates an overhead view 3000 of the hinge 1400 in the fourth open position, as discussed above with reference to FIGS. 28 and 29. For ease of viewing, the hinge 1400 is illustrated in the view 3000 separate from an associated device and kickstand. Further, the hinge frame 1402 is illustrated via dashed lines.

[00132] The view 3000 illustrates that in the transition to the fourth open position, a catch mechanism on the hinge ring 1404 pulls the ring support 1410 and causes the ring support 1410 to rotate within the hinge frame 1402 to the fourth open position. As a result, the ring support follower 1412 disengages from the support notch 1600b, and engages with the support notch 1600a. In the fourth open position, the ring support 1410 serves as a stabilizing structure for the hinge ring 1404. Thus, an attached component (e.g., the kickstand 402) can be stabilized in the fourth open position.

[00133] FIG. 31 illustrates a rear view 3100 of the hinge ring 1404 and the ring support 1410. For ease of viewing, the hinge ring 1404 and the ring support 1410 are illustrated separately from other components of the hinge 1400. In at least some embodiments, the view 3100 represents a position of the hinge ring 1404 and the ring support 1410 when the

hinge 1400 is in an open position, e.g., one of the open position one or open position two, discussed above. As discussed above, when the hinge 1400 is in a closed position, the open position one, or the open position two, the ring support follower 1412 is engaged in the support notch 1600c, as illustrated in the view 3100.

[00134] In the view 3100, the hinge ring 1404 includes a support catch 3102, which functions as a catch mechanism for engaging the ring support 1410 when the hinge ring 1404 is rotated to certain positions. The support catch 3102 is slidably disposed in a support slot 3104 of the ring support. In certain positions the hinge ring 1404 can slide within the support slot 3104 without causing movement of the ring support 1410, e.g., between a closed position and the open position two of the hinge 1400.

[00135] FIG. 32 illustrates a rear view 3200 of the hinge ring 1404 and the ring support 1410. For ease of viewing, the hinge ring 1404 and the ring support 1410 are illustrated separately from other components of the hinge 1400. In at least some embodiments, the view 3200 represents a position of the hinge ring 1404 and the ring support 1410 when the hinge 1400 is in an open position, e.g., one of the open position three or open position four, discussed above.

[00136] In the view 3200, the hinge ring 1404 slides within the support slot 3104 such that the support catch 3102 engages a slot stop 3202 in the support slot 3104. As illustrated, the slot stop 3202 is narrower than the support catch 3102, and thus the support catch 3102 engages with the slot stop 3202 in certain open positions of the hinge 1400. When the hinge ring 1404 rotates within the hinge 1400 in a direction such that the support catch 3102 engages with the slot stop 3202, further movement in that direction causes the ring support 1410 to rotate within the hinge 1400. For example, when a user repositions a kickstand that is mounted to the hinge ring 1404 with the support catch 3102 engaged in the slot stop 3202, resulting rotation of the hinge ring 1404 causes the ring support 1410 to rotate.

[00137] In this particular example, the view 3200 represents the fourth open position of the hinge 1400, as indicated by the engagement of the ring support follower 1412 with the support notch 1600a of the ring support 1410. Thus, force applied by the support catch 3102 against the slot stop 3202 causes the ring support 1410 to rotate between various positions.

[00138] In at least some embodiments, the ring support 1410 may also include a lower catch mechanism such that when the hinge ring 1404 is rotated towards a closed position (e.g., from the fourth open position), the support catch 3102 engages the lower catch mechanism such that the ring support 1410 is corresponding rotated towards a closed position within the hinge 1400. For instance, consider the following embodiments.

[00139] FIG. 33 illustrates a rear view 3300 of portions of the ring support 1410 and the hinge ring 1404. Further illustrated is a return catch 3302, which is attached to and/or formed as a portion of the ring support 1410. The return catch 3302 protrudes inward into the support slot 3104. The return catch 3302 can be formed from various materials, such as rubber and/or other elastically deformable materials. In at least some embodiments, the return catch 3302 can be formed as a portion of the ring support 1410, and can thus be formed from the same material as the ring support 1410.

[00140] In at least some embodiments, when the hinge ring 1404 rotates towards an open position (e.g., towards the fourth open position discussed above), the support catch 3102 engages the return catch 3302. For instance, pressure from the support catch 3102 against the return catch 3302 can cause a slight deformation of the return catch 3302 such that the support catch 3102 can slide past the return catch 3302 to engage the slot stop 3202. For instance, consider the following illustration.

[00141] FIG. 34 illustrates a rear view 3400 of portions of the ring support 1410 and the hinge ring 1404. In the view 3400, the hinge ring 1404 is rotated within the support slot 3104 past the return catch 3302 such that the support catch 3102 engages the slot stop 3202. As referenced above, the return catch 3302 can be formed from an elastic material. Thus, pressure from the support catch 3102 causes an elastic deformation of the return catch 3302 such that the support catch 3102 can rotate past the return catch 3302. The view 3400, for example, can represent an orientation of the ring support 1410 and the hinge ring 1402 in the fourth open position, discussed above.

[00142] As illustrated in the view 3400, the return catch 3302 is positioned on the ring support 1410 such that when the support catch 3102 is engaged with the slot stop 3202, a rear edge of the return catch 3302 applies pressure to the support catch 3102. Accordingly, when the hinge ring 1402 is rotated back towards a closed position, pressure from the support catch 3102 against the return catch 3302 causes the ring support 1410 to rotate towards a closed position within the hinge 1400. In at least some embodiments, this can enable the ring support 1410 to return from a fully open position (e.g., the fourth open position) such that the ring support 1410 can engage with the ring support follower 1412 (discussed above) in various positions of the hinge 1400.

[00143] Thus, embodiments discussed herein provide a stable hinge mechanism that enables an attached component (e.g., a kickstand) to be adjusted between multiple preset positions. It is to be appreciated that the example device orientations, kickstand positions, hinge positions, hinge stop positions, and so forth discussed above are presented for

purposes of example only. Thus, a wide variety of different device orientations, kickstand positions, hinge positions, and hinge stop positions not specifically mentioned herein may be implemented within the spirit and scope of the claimed embodiments. For instance, an attachment mechanism used to attach a kickstand to a computing device (e.g., the peripheral hinges discussed above) can include any number and/or configuration of suitable stop positions to enable the kickstand to be opened to a variety of different positions to support various orientations of a computing device. Further, example hinges can be attached at any suitable position and/or portion of a kickstand and/or computing device in accordance with the claimed embodiments.

Example System and Device

[00144] FIG. 35 illustrates an example system generally at 3500 that includes an example computing device 3502 that is representative of one or more computing systems and/or devices that may implement the various techniques described herein. The computing device 3502 may be, for example, be configured to assume a mobile configuration through use of a housing formed and size to be grasped and carried by one or more hands of a user, illustrated examples of which include a mobile phone, mobile game and music device, and tablet computer although other examples are also contemplated.

[00145] The example computing device 3502 as illustrated includes a processing system 3504, one or more computer-readable media 3506, and one or more I/O interface 3508 that are communicatively coupled, one to another. Although not shown, the computing device 3502 may further include a system bus or other data and command transfer system that couples the various components, one to another. A system bus can include any one or combination of different bus structures, such as a memory bus or memory controller, a peripheral bus, a universal serial bus, and/or a processor or local bus that utilizes any of a variety of bus architectures. A variety of other examples are also contemplated, such as control and data lines.

[00146] The processing system 3504 is representative of functionality to perform one or more operations using hardware. Accordingly, the processing system 3504 is illustrated as including hardware element 3510 that may be configured as processors, functional blocks, and so forth. This may include implementation in hardware as an application specific integrated circuit or other logic device formed using one or more semiconductors. The hardware elements 3510 are not limited by the materials from which they are formed or the processing mechanisms employed therein. For example, processors may be comprised of

semiconductor(s) and/or transistors (e.g., electronic integrated circuits (ICs)). In such a context, processor-executable instructions may be electronically-executable instructions.

[00147] The computer-readable storage media 3506 is illustrated as including memory/storage 3512. The memory/storage 3512 represents memory/storage capacity associated with one or more computer-readable media. The memory/storage component 3512 may include volatile media (such as random access memory (RAM)) and/or nonvolatile media (such as read only memory (ROM), Flash memory, optical disks, magnetic disks, and so forth). The memory/storage component 3512 may include fixed media (e.g., RAM, ROM, a fixed hard drive, and so on) as well as removable media (e.g., Flash memory, a removable hard drive, an optical disc, and so forth). The computer-readable media 3506 may be configured in a variety of other ways as further described below.

[00148] Input/output interface(s) 3508 are representative of functionality to allow a user to enter commands and information to computing device 3502, and also allow information to be presented to the user and/or other components or devices using various input/output devices. Examples of input devices include a keyboard, a cursor control device (e.g., a mouse), a microphone, a scanner, touch functionality (e.g., capacitive or other sensors that are configured to detect physical touch), a camera (e.g., which may employ visible or non-visible wavelengths such as infrared frequencies to recognize movement as gestures that do not involve touch), and so forth. Examples of output devices include a display device (e.g., a monitor or projector), speakers, a printer, a network card, tactile-response device, and so forth. Thus, the computing device 3502 may be configured in a variety of ways to support user interaction.

[00149] The computing device 3502 is further illustrated as being communicatively and physically coupled to an input device 3514 that is physically and communicatively removable from the computing device 3502. In this way, a variety of different input devices may be coupled to the computing device 3502 having a wide variety of configurations to support a wide variety of functionality. In this example, the input device 3514 includes one or more keys 3516, which may be configured as pressure sensitive keys, mechanically switched keys, and so forth.

[00150] The input device 3514 is further illustrated as include one or more modules 3518 that may be configured to support a variety of functionality. The one or more modules 3518, for instance, may be configured to process analog and/or digital signals received from the keys 3516 to determine whether a keystroke was intended, determine whether an input is

indicative of resting pressure, support authentication of the input device 3514 for operation with the computing device 3502, and so on.

[00151] Various techniques may be described herein in the general context of software, hardware elements, or program modules. Generally, such modules include routines, programs, objects, elements, components, data structures, and so forth that perform particular tasks or implement particular abstract data types. The terms "module," "functionality," and "component" as used herein generally represent software, firmware, hardware, or a combination thereof. The features of the techniques described herein are platform-independent, meaning that the techniques may be implemented on a variety of commercial computing platforms having a variety of processors.

[00152] An implementation of the described modules and techniques may be stored on or transmitted across some form of computer-readable media. The computer-readable media may include a variety of media that may be accessed by the computing device 3502. By way of example, and not limitation, computer-readable media may include "computer-readable storage media" and "computer-readable signal media."

[00153] "Computer-readable storage media" may refer to media and/or devices that enable persistent storage of information in contrast to mere signal transmission, carrier waves, or signals per se. Thus, computer-readable storage media refers to non-signal bearing media. The computer-readable storage media includes hardware such as volatile and non-volatile, removable and non-removable media and/or storage devices implemented in a method or technology suitable for storage of information such as computer readable instructions, data structures, program modules, logic elements/circuits, or other data. Examples of computer-readable storage media may include, but are not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical storage, hard disks, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or other storage device, tangible media, or article of manufacture suitable to store the desired information and which may be accessed by a computer.

[00154] "Computer-readable signal media" may refer to a signal-bearing medium that is configured to transmit instructions to the hardware of the computing device 3502, such as via a network. Signal media typically may embody computer readable instructions, data structures, program modules, or other data in a modulated data signal, such as carrier waves, data signals, or other transport mechanism. Signal media also include any information delivery media. The term "modulated data signal" means a signal that has one or more of its characteristics set or changed in such a manner as to encode information in the signal.

By way of example, and not limitation, communication media include wired media such as a wired network or direct-wired connection, and wireless media such as acoustic, RF, infrared, and other wireless media.

[00155] As previously described, hardware elements 3510 and computer-readable media 3506 are representative of modules, programmable device logic and/or fixed device logic implemented in a hardware form that may be employed in some embodiments to implement at least some aspects of the techniques described herein, such as to perform one or more instructions. Hardware may include components of an integrated circuit or on-chip system, an application-specific integrated circuit (ASIC), a field-programmable gate array (FPGA), a complex programmable logic device (CPLD), and other implementations in silicon or other hardware. In this context, hardware may operate as a processing device that performs program tasks defined by instructions and/or logic embodied by the hardware as well as a hardware utilized to store instructions for execution, e.g., the computer-readable storage media described previously.

[00156] Combinations of the foregoing may also be employed to implement various techniques described herein. Accordingly, software, hardware, or executable modules may be implemented as one or more instructions and/or logic embodied on some form of computer-readable storage media and/or by one or more hardware elements 3510. The computing device 3502 may be configured to implement particular instructions and/or functions corresponding to the software and/or hardware modules. Accordingly, implementation of a module that is executable by the computing device 3502 as software may be achieved at least partially in hardware, e.g., through use of computer-readable storage media and/or hardware elements 3510 of the processing system 3504. The instructions and/or functions may be executable/operable by one or more articles of manufacture (for example, one or more computing devices 3502 and/or processing systems 3504) to implement techniques, modules, and examples described herein.

CONCLUSION

[00157] Although the example implementations have been described in language specific to structural features and/or methodological acts, it is to be understood that the implementations 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 example forms of implementing the claimed features.

CLAIMS

1. An apparatus comprising:

a kickstand configured to be rotatably attached to a rear portion of a computing device; and

at least one hinge mechanism that attaches a portion of the kickstand to the rear portion of the computing device, the hinge mechanism being configured with two or more preset open positions such that the kickstand is positionable relative to the computing device according to the two or more preset open positions.

2. An apparatus as recited in claim 1, wherein the hinge mechanism comprises a hinge ring that attaches the kickstand to the hinge mechanism, the hinge ring being rotatable within the hinge mechanism to assume at least some of the two or more preset open positions.

3. An apparatus as recited in claim 1, wherein the hinge mechanism comprises:

a hinge frame;

a ring support rotatably disposed at least partially within the hinge frame; and

a hinge ring that attaches the kickstand to the hinge mechanism and enables rotation of the kickstand relative to the hinge mechanism, the hinge ring being rotatably disposed relative to the ring support such that rotation of the hinge ring to a particular position relative to the ring support causes the hinge ring to engage the ring support, and further rotation of the hinge ring beyond the particular position causes corresponding rotation of the ring support with respect to the hinge frame.

4. An apparatus as recited in claim 3, wherein the hinge ring is rotatably disposed at least partially within the ring support.

5. An apparatus as recited in claim 3, wherein the hinge mechanism comprises a hinge ring follower that applies to pressure to the hinge ring to hold the hinge ring in at least some of the two or more preset open positions.

6. An apparatus as recited in claim 3, wherein the hinge mechanism comprises a ring support follower that applies to pressure to the ring support to hold the ring support in at least some of the two or more preset open positions.

7. A hinge mechanism comprising:

a hinge frame;

a ring support rotatably disposed at least partially within the hinge frame; and

a hinge ring being attachable to a component to enable rotation of the component relative to the hinge mechanism, the hinge ring being rotatably disposed relative to the ring

support such that rotation of the hinge ring to a particular position relative to the ring support causes the hinge ring to engage the ring support, and further rotation of the hinge ring beyond the particular position causes corresponding rotation of the ring support with respect to the hinge frame.

8. A hinge mechanism as recited in claim 7, comprising:

a hinge ring follower that applies pressure to the hinge ring to hold the hinge ring in at least some of two or more preset positions of the hinge mechanism; and

a ring support follower that applies pressure to the ring support to hold the ring support in others of the two or more preset positions.

9. A computing device comprising:

a housing; and

at least one hinge mechanism attached to the housing and a kickstand such that the kickstand is positionable via the hinge mechanism at preset positions to support multiple orientations of the computing device relative to an adjacent surface, the hinge mechanism including:

a hinge frame;

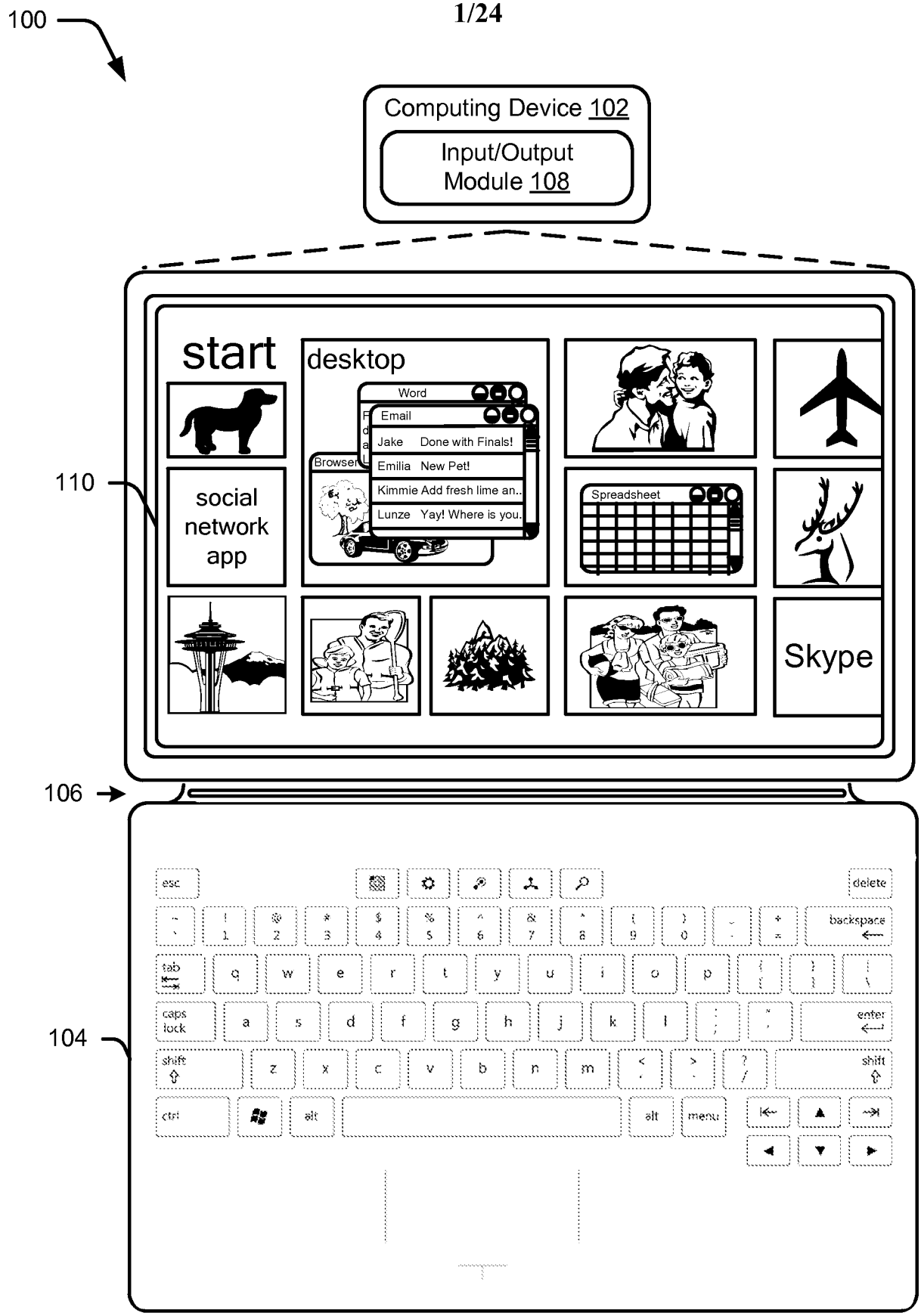
a ring support rotatably disposed at least partially within the hinge frame; and

a hinge ring attached to the kickstand such that the kickstand is rotatable relative to the housing, the hinge ring being rotatably disposed relative to the ring support such that rotation of the hinge ring to a particular position relative to the ring support causes the hinge ring to engage the ring support, and further rotation of the hinge ring beyond the particular position causes corresponding rotation of the ring support with respect to the hinge frame.

10. A computing device as described in claim 9, wherein the hinge mechanism comprises:

a hinge ring follower that applies pressure to the hinge ring to hold the hinge ring in at least some of two or more preset positions of the hinge mechanism; and

a ring support follower that applies pressure to the ring support to hold the ring support in others of the two or more preset positions.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Computing Device 102
Input/Output Module 108
110
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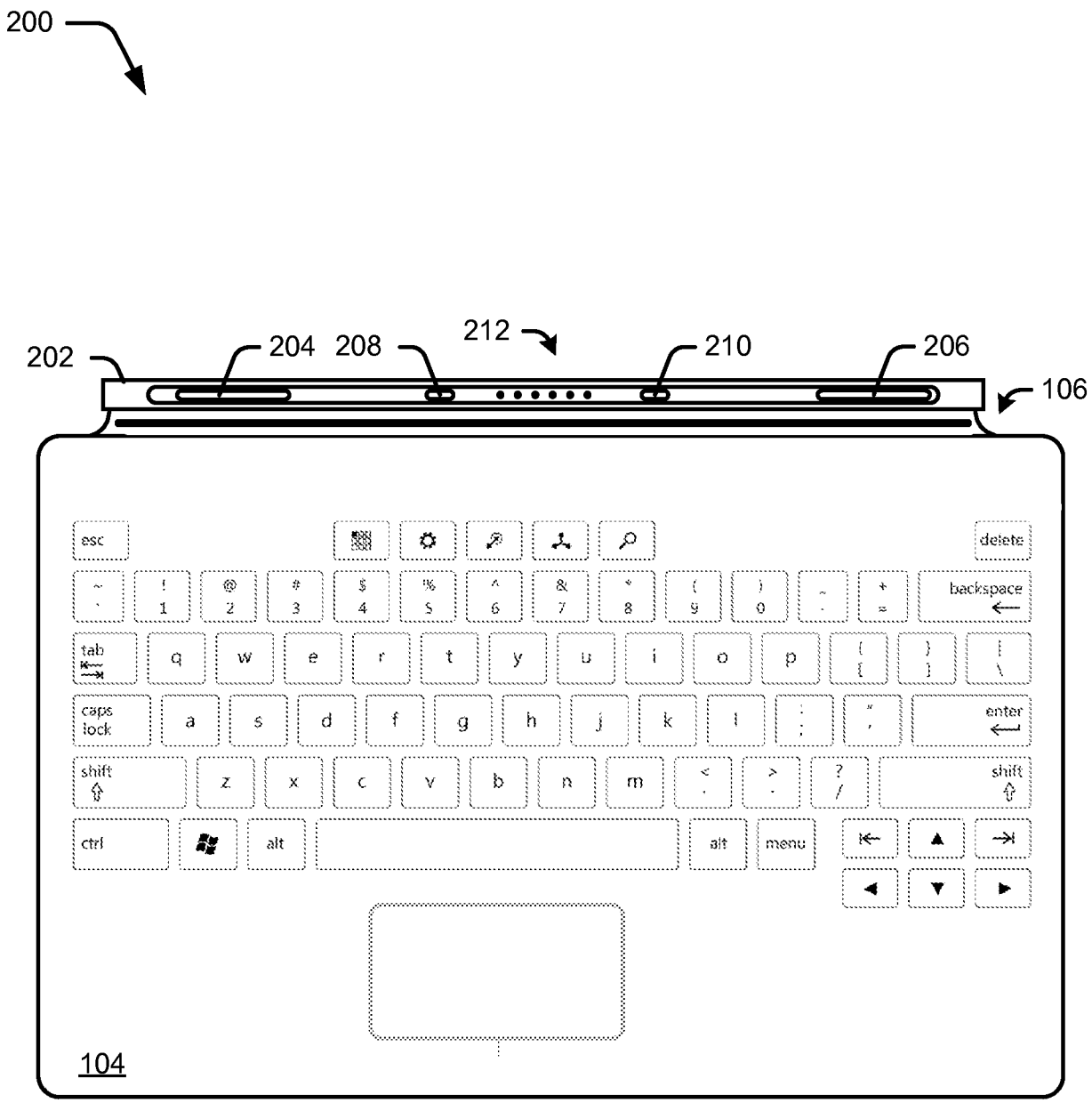
desktop
Word
Email
Jake Done with Finals!
Emilia New Pet!
Kimmie Add fresh lime an..
Lunze Yay! Where is you.
Spreadsheet
social network app
Skype
106
104

Fig. 1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q
w
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t
y
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caps lock
a
s
d
f
g
h
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k
l
enter
shift
z
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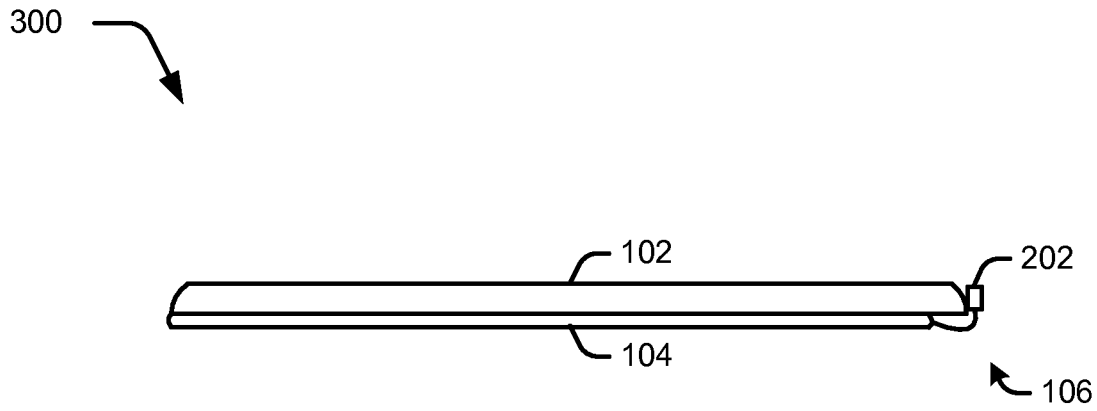
c
v
b
n
m
shift
ctrl
alt
alt
menu
104

Fig. 2



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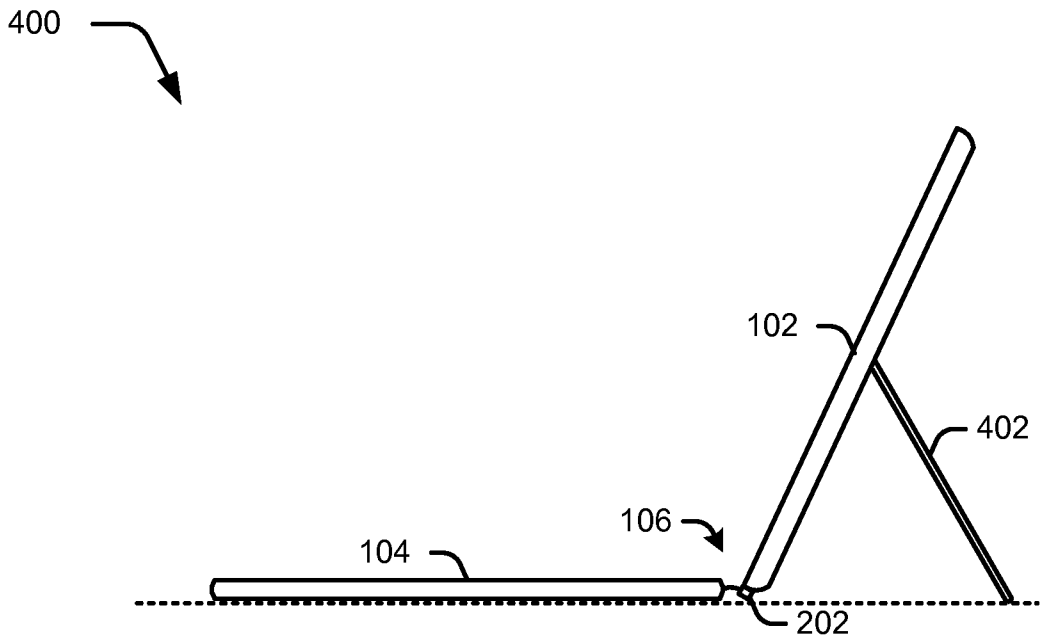


Fig. 4

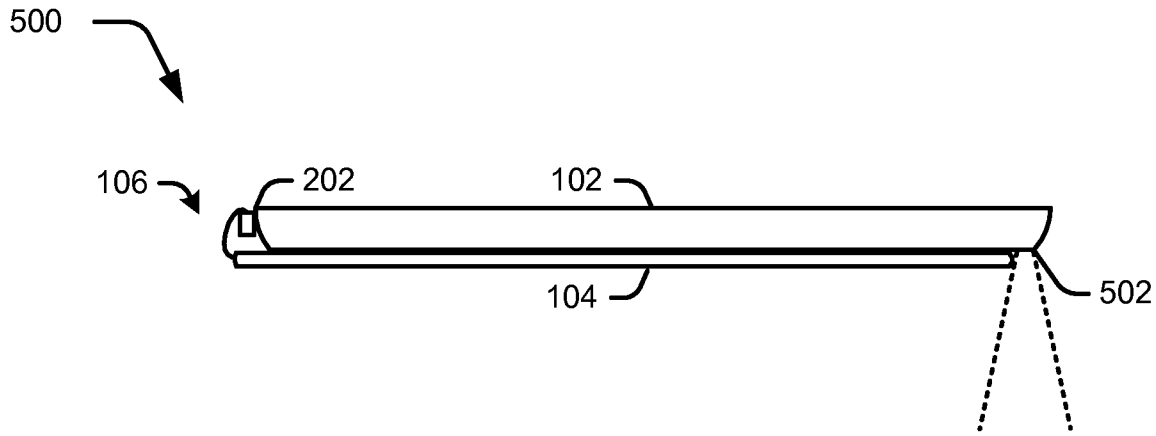
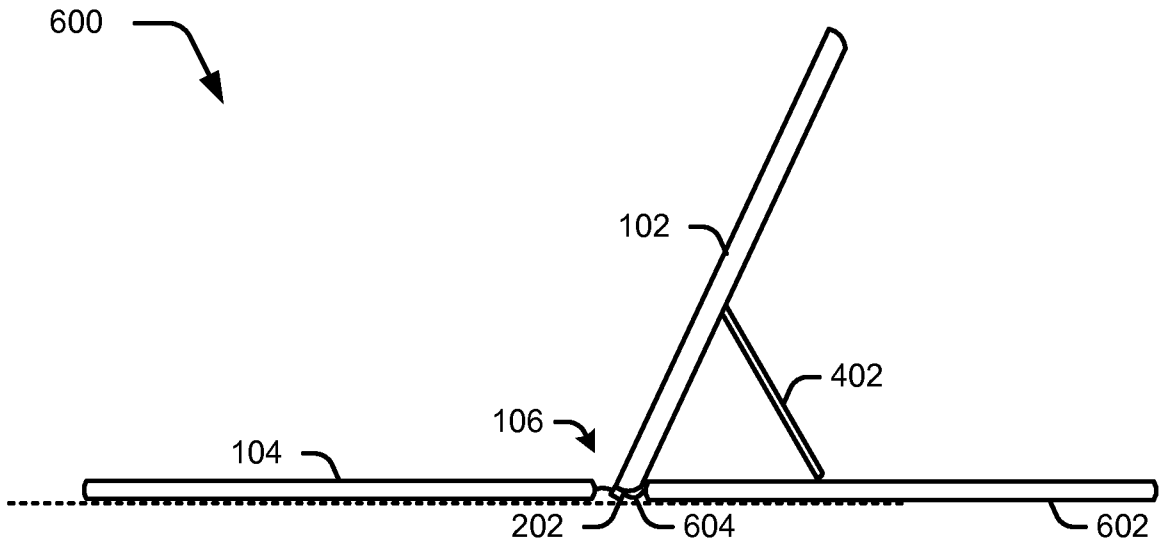


Fig. 5



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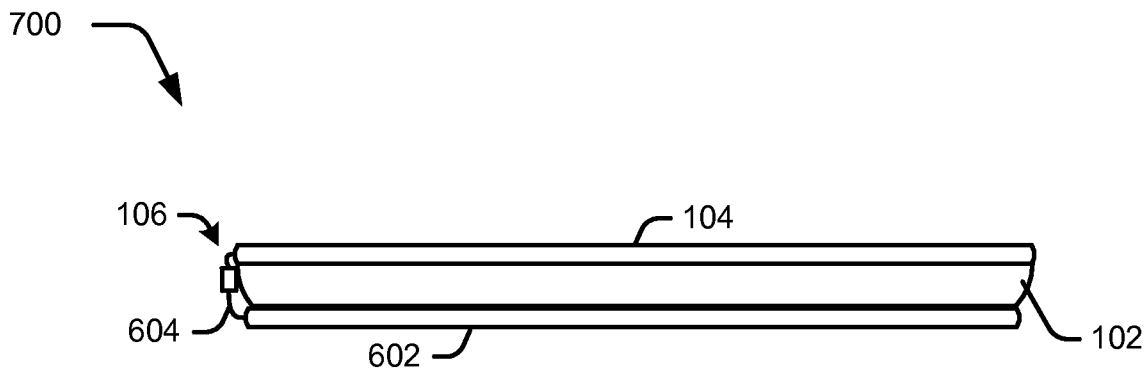

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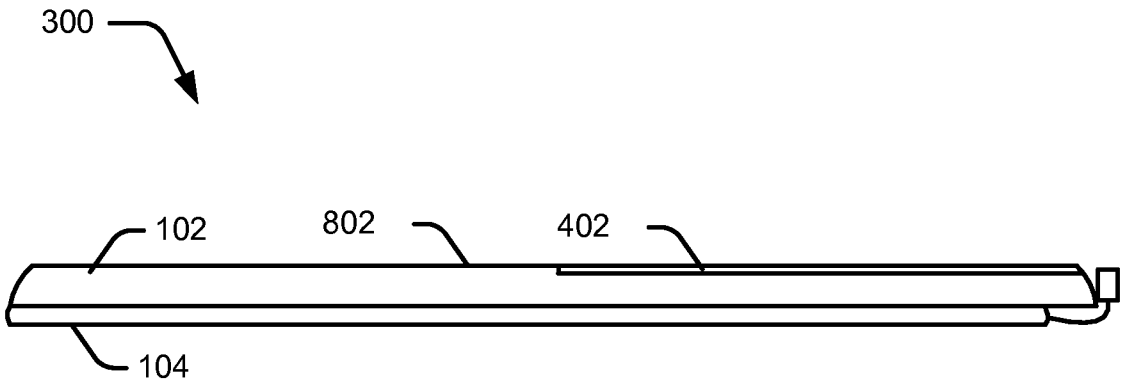

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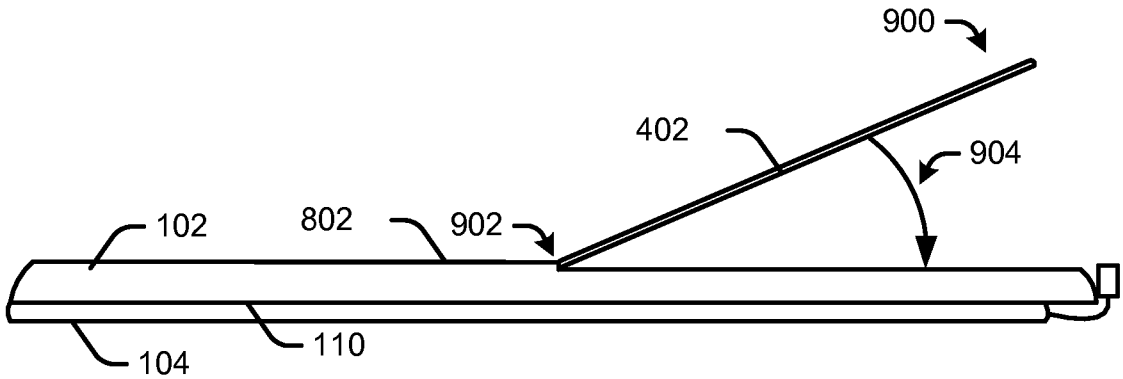

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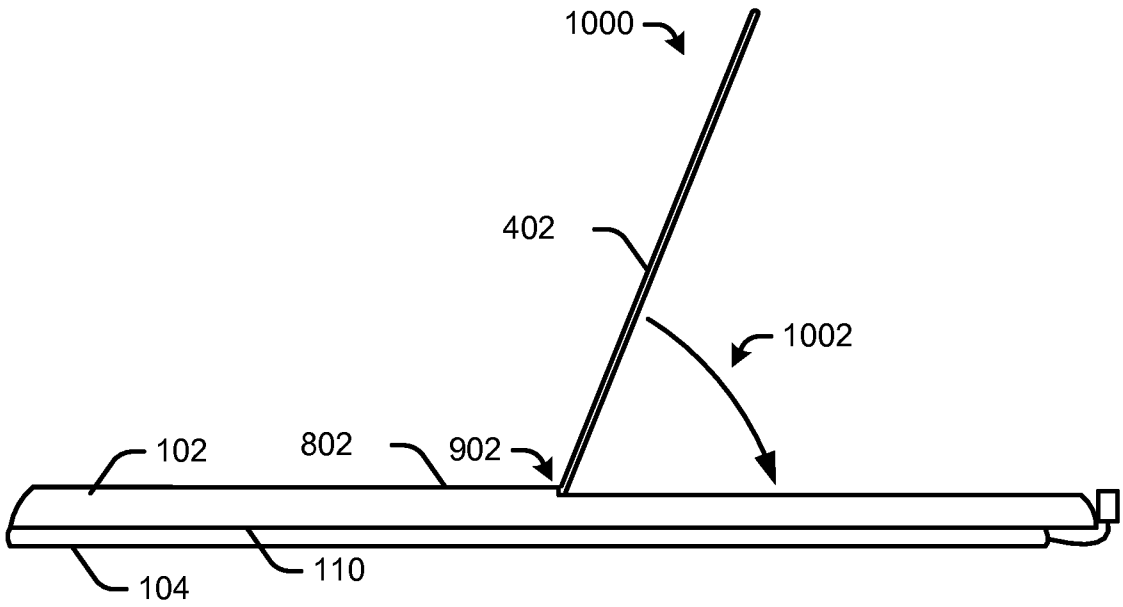
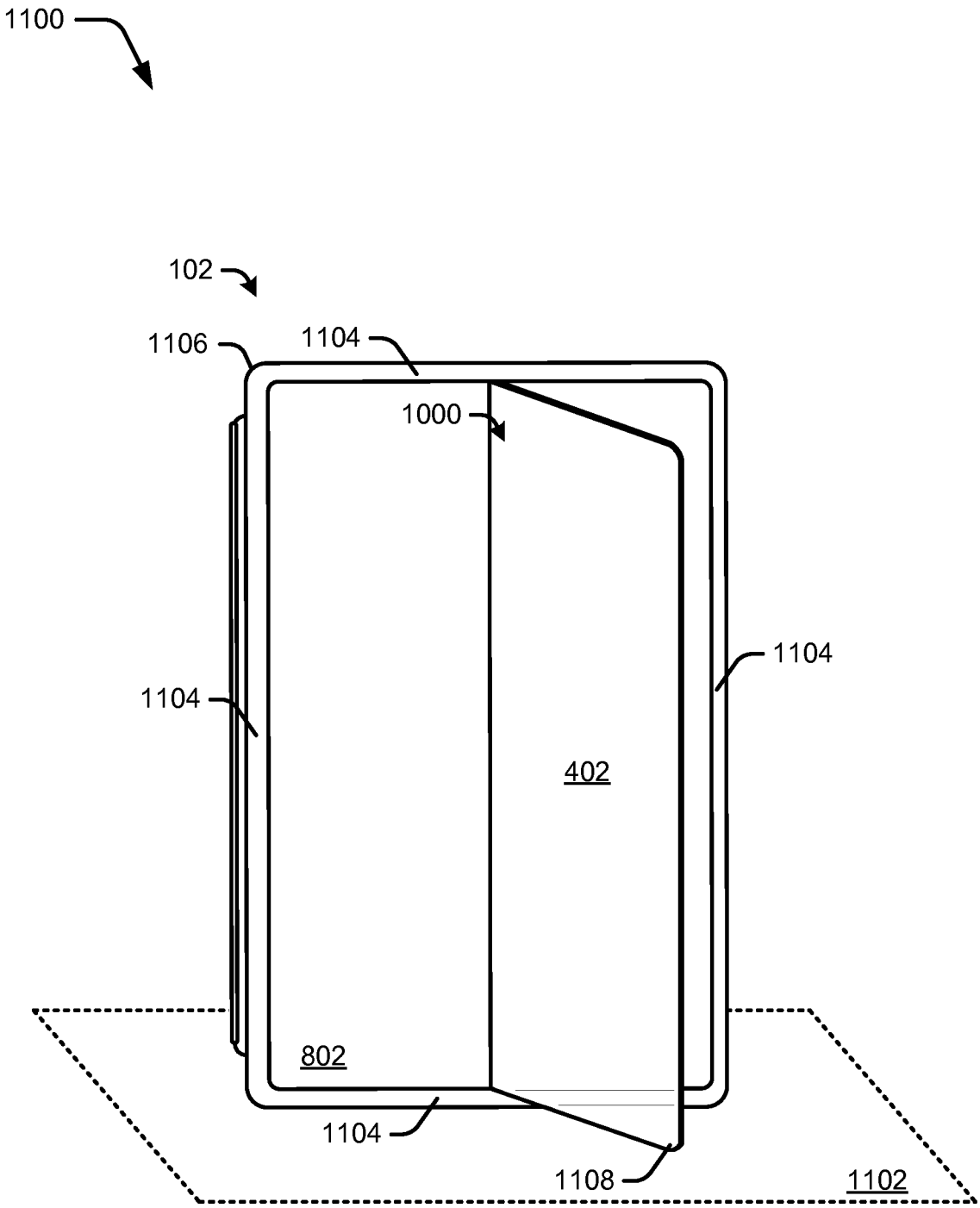


Fig. 10



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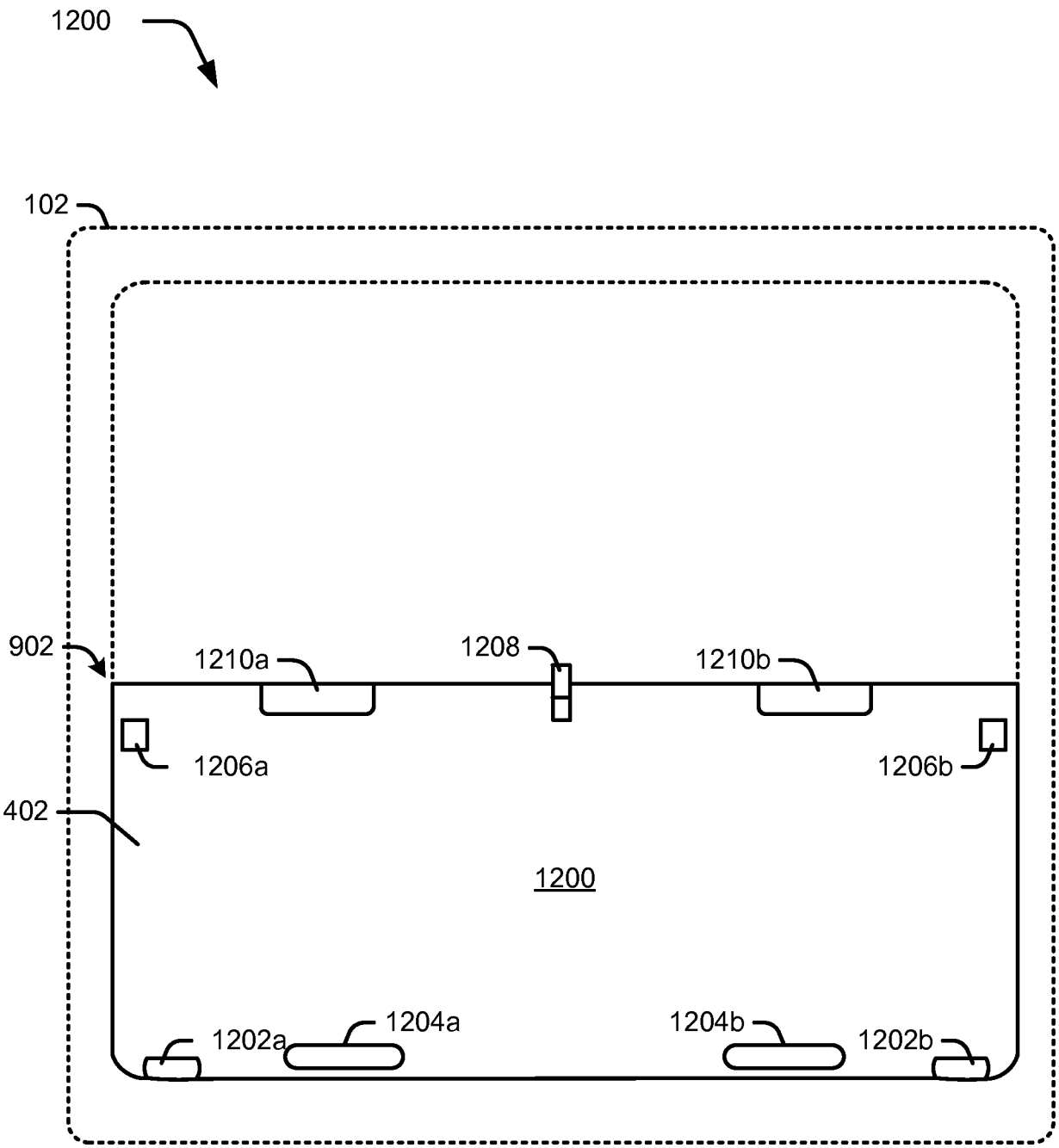
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1204b
1202b

Fig. 12

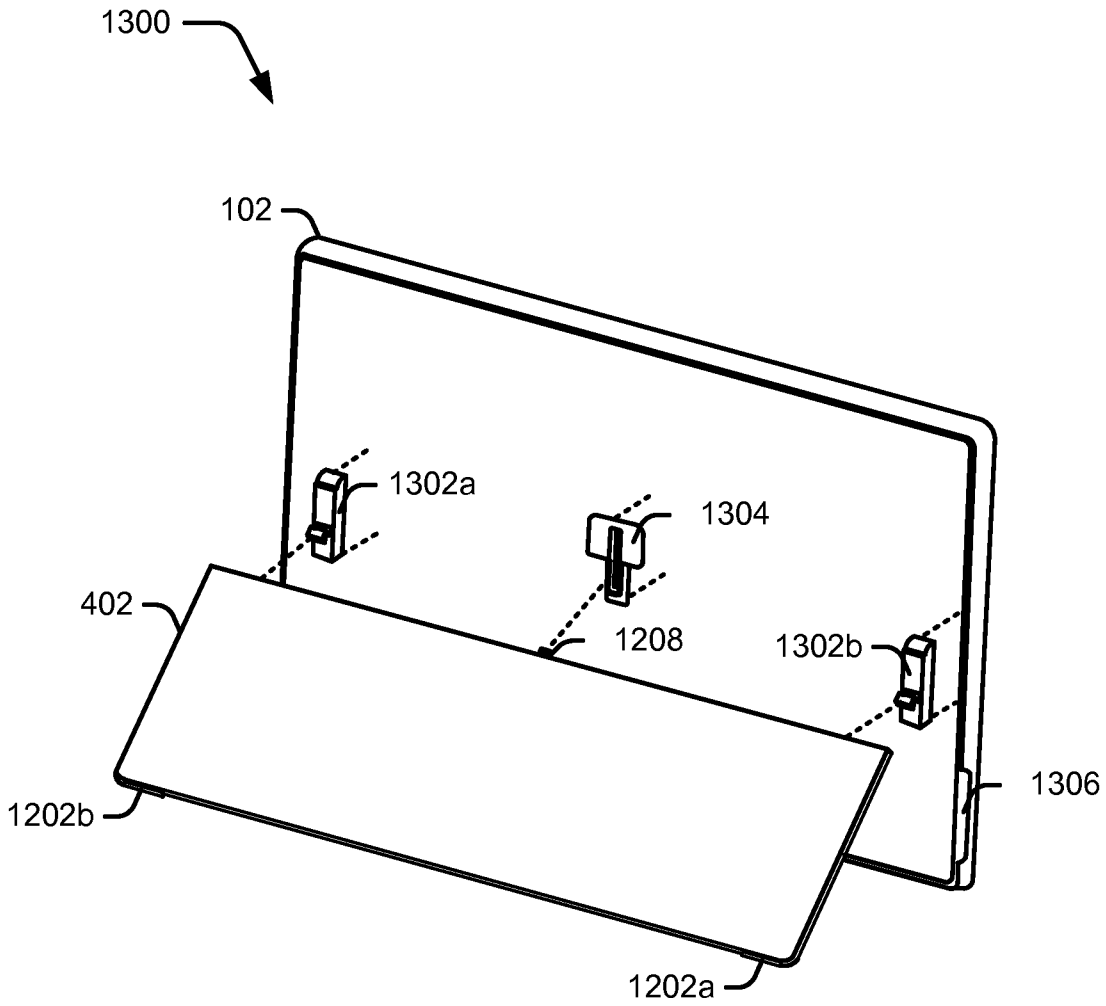


Fig. 13

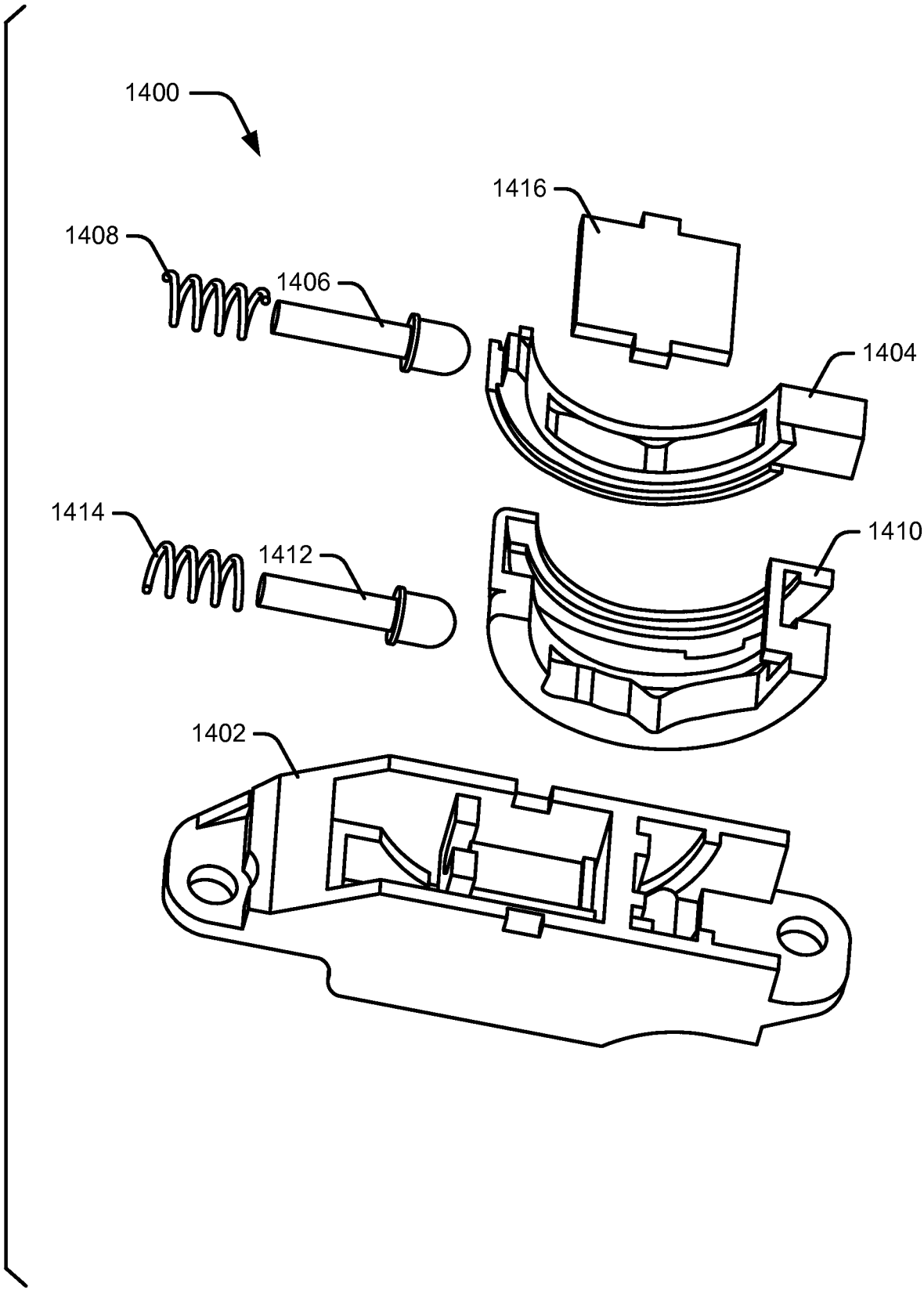
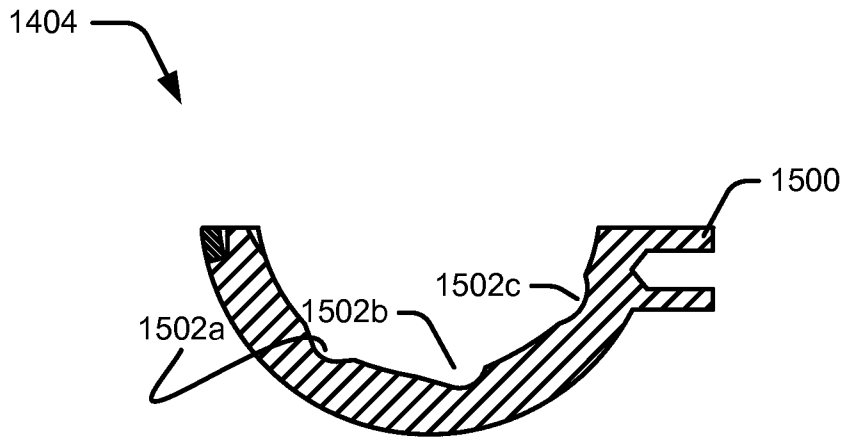


Fig. 14



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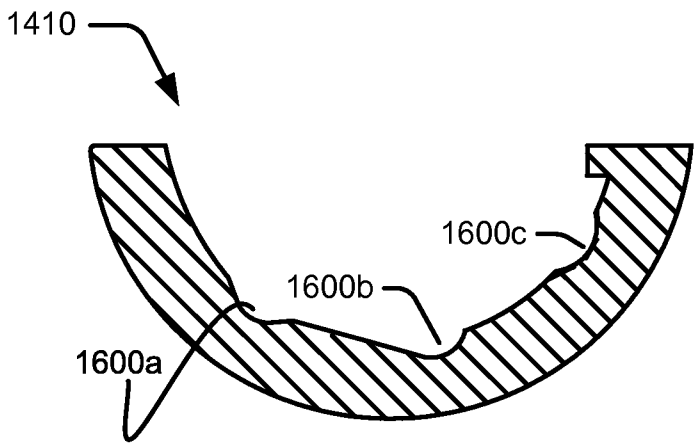


Fig. 16

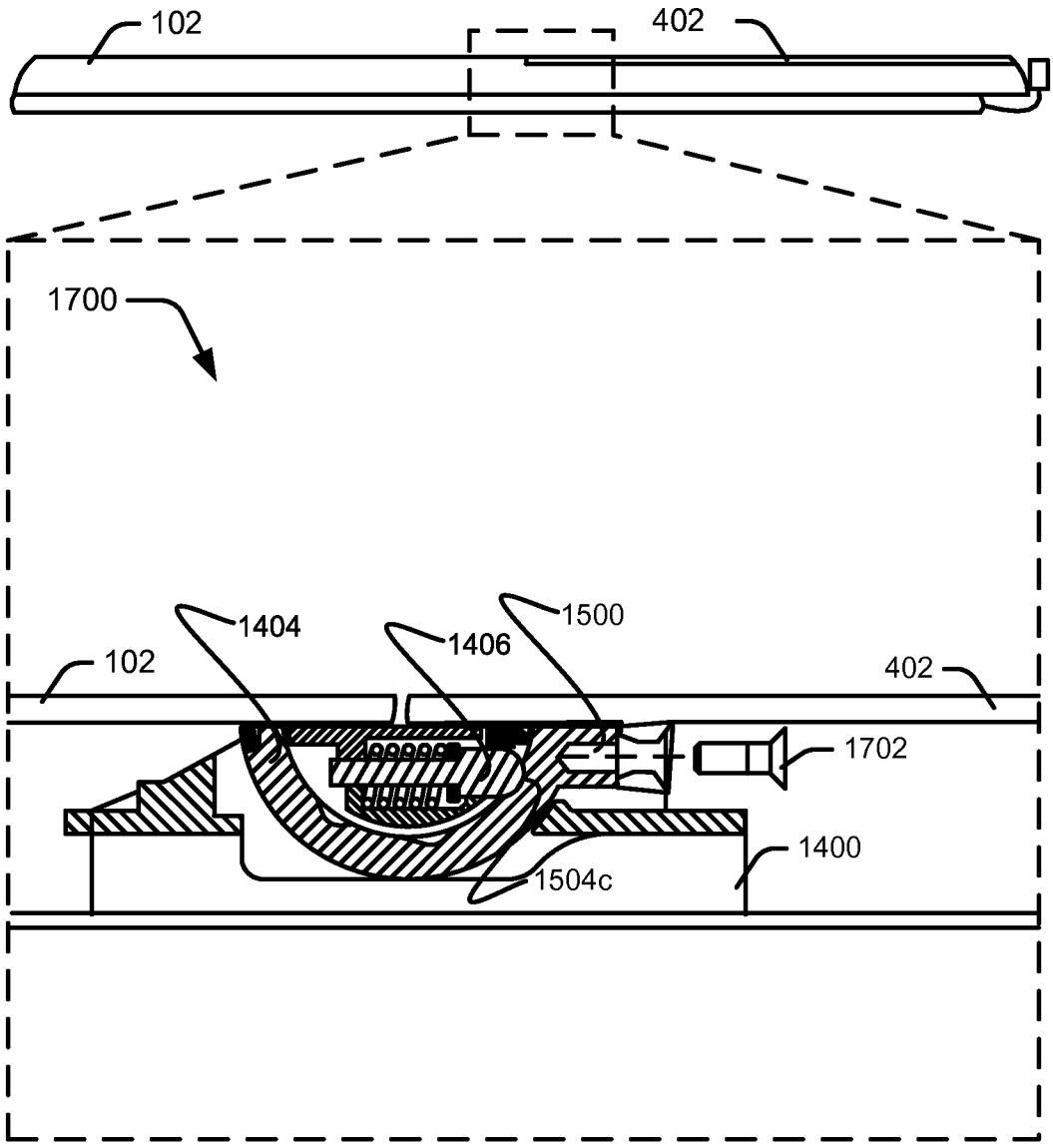


Fig. 17

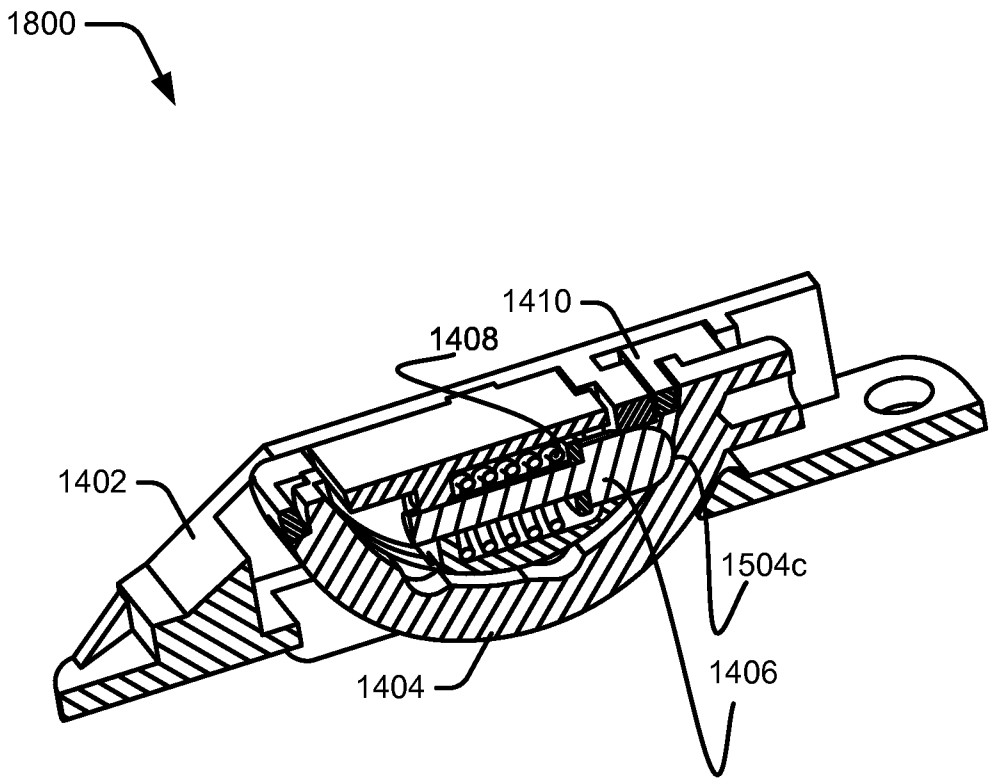
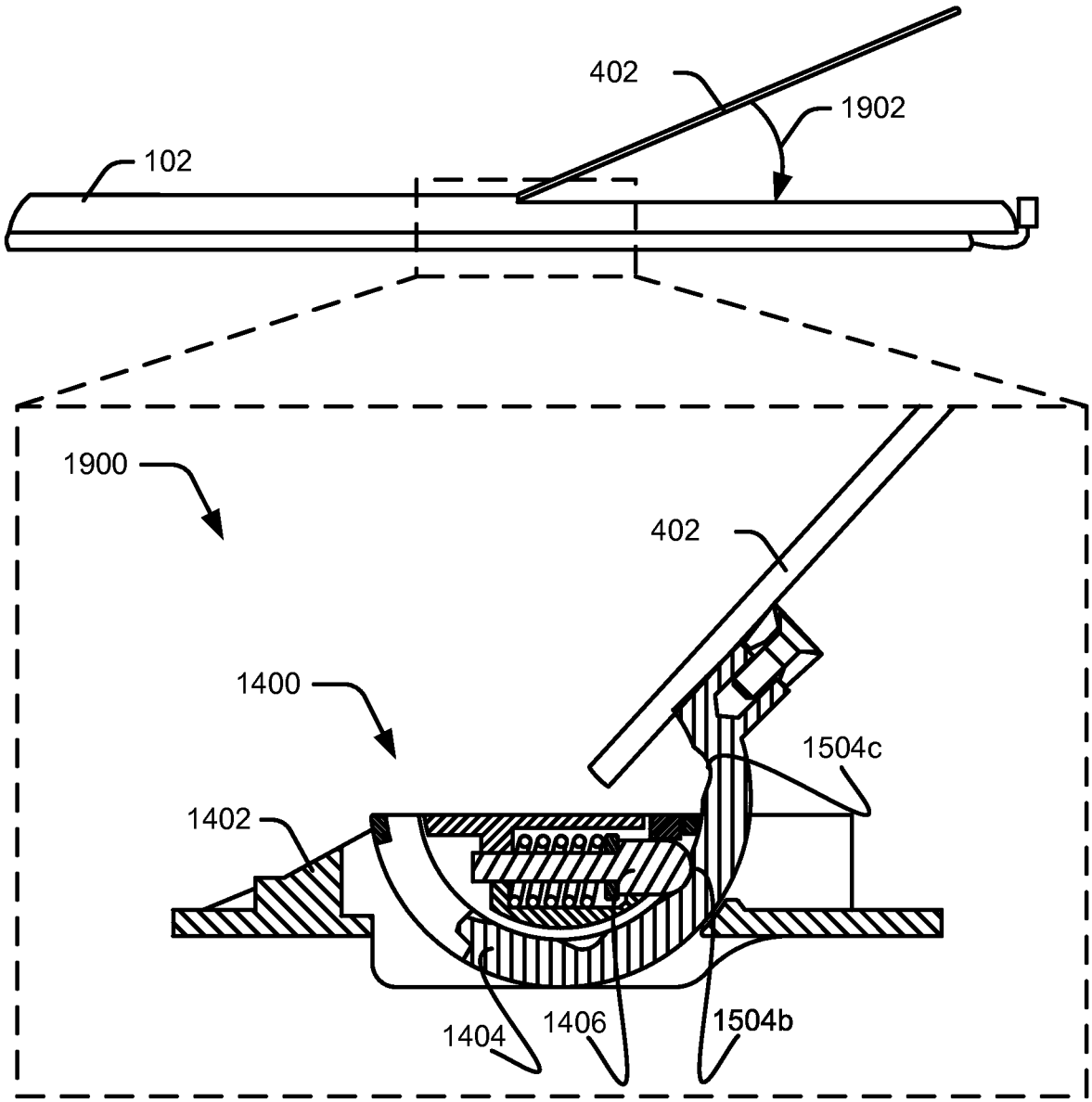


Fig. 18



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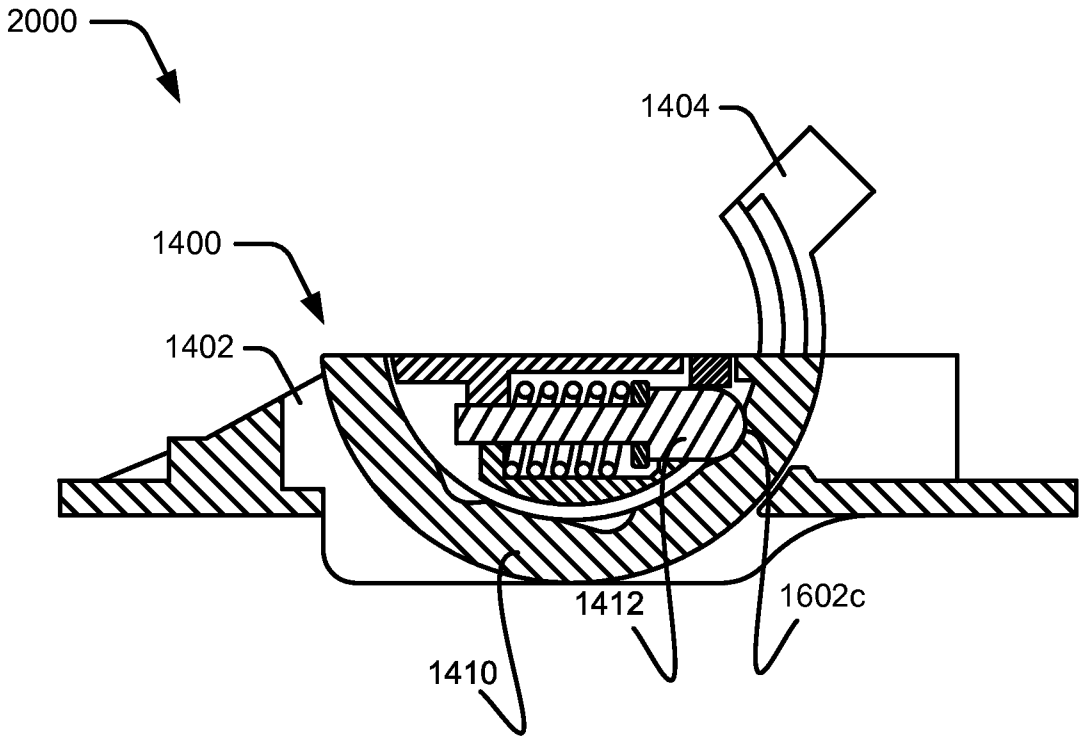
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1410

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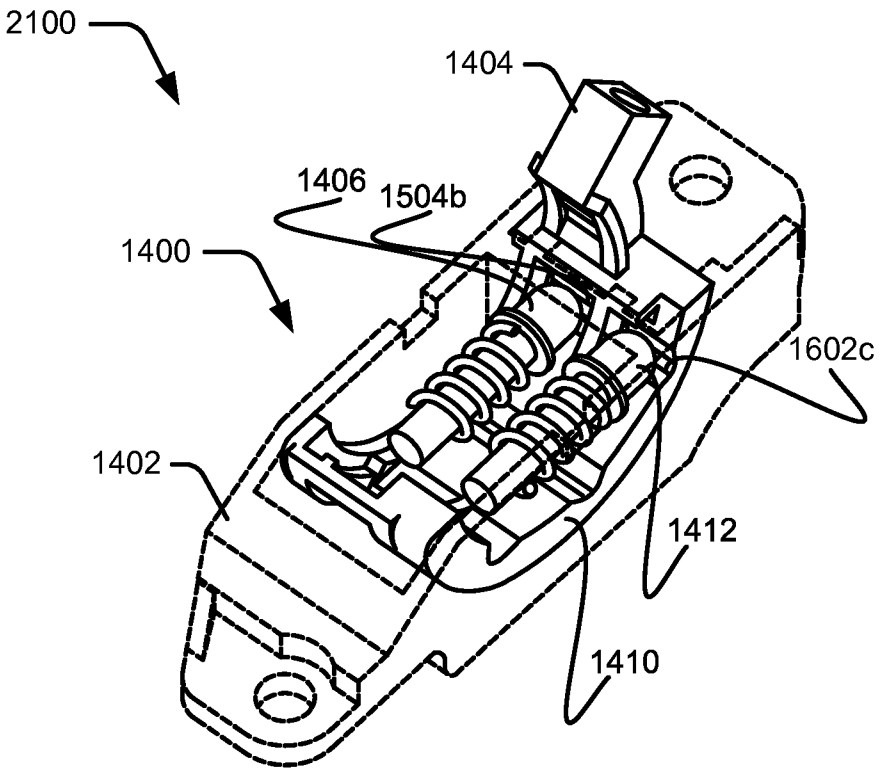
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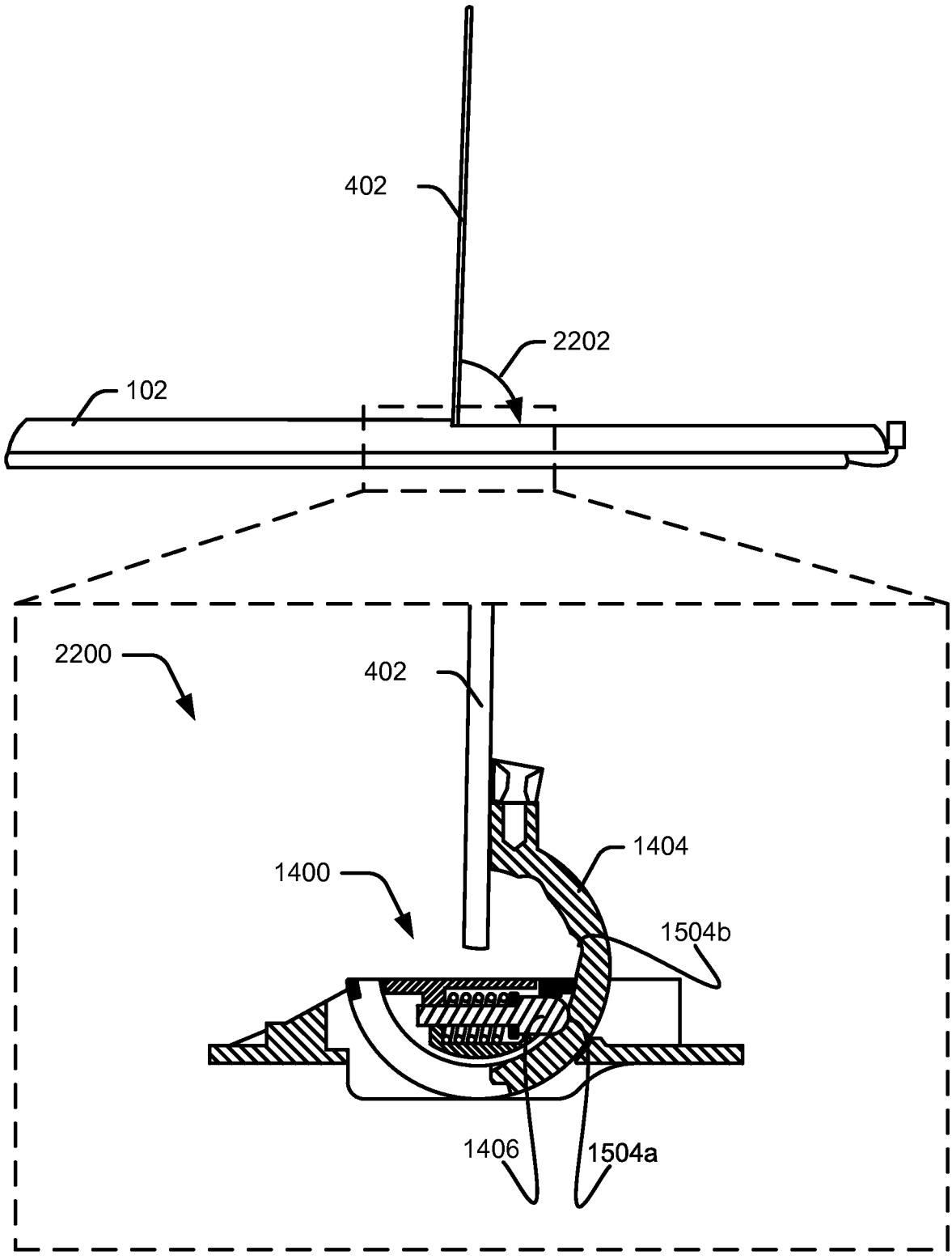
Fig. 21



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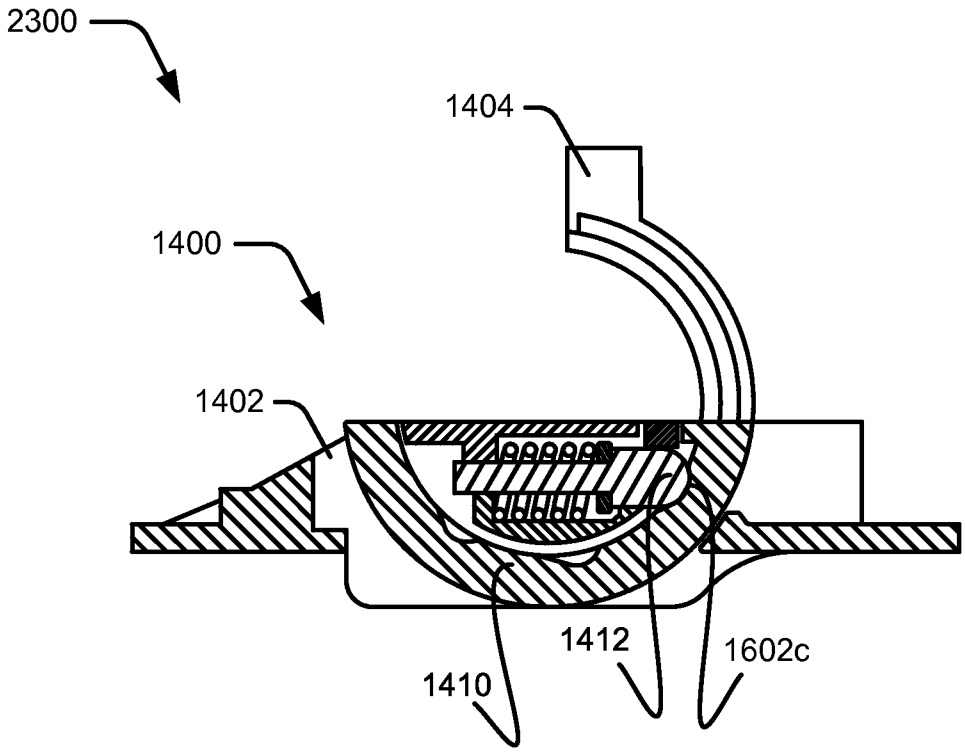
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Fig. 23

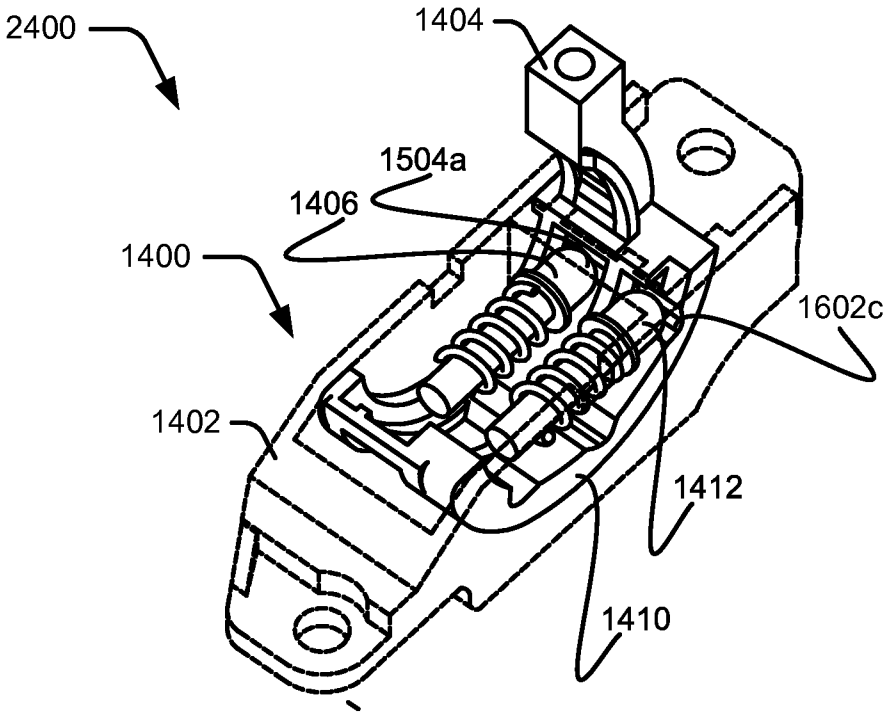
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Fig. 24

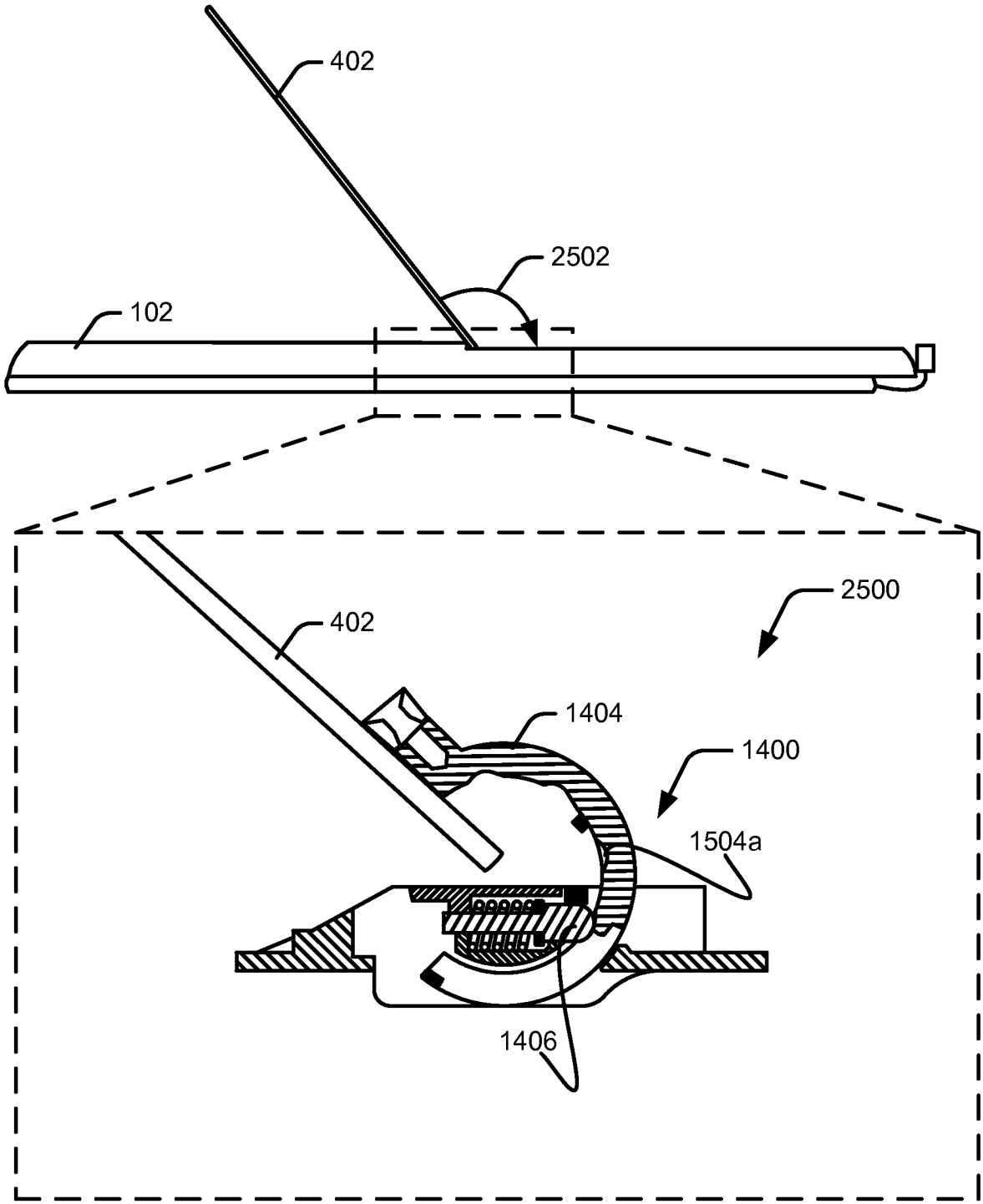

Fig. 25

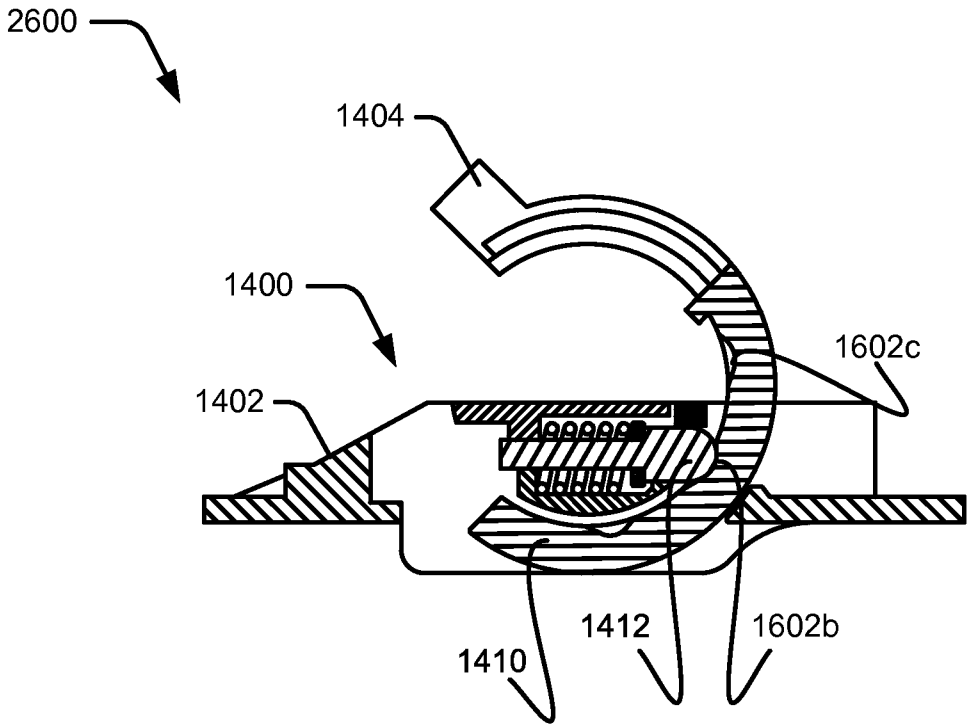
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Fig. 26

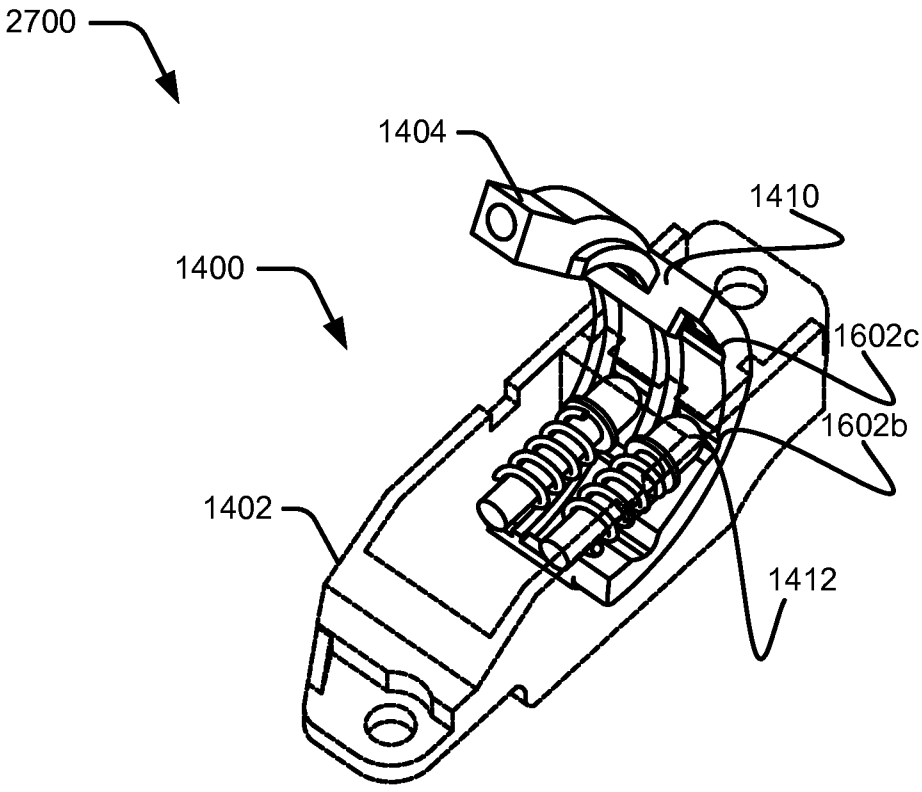
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Fig. 27

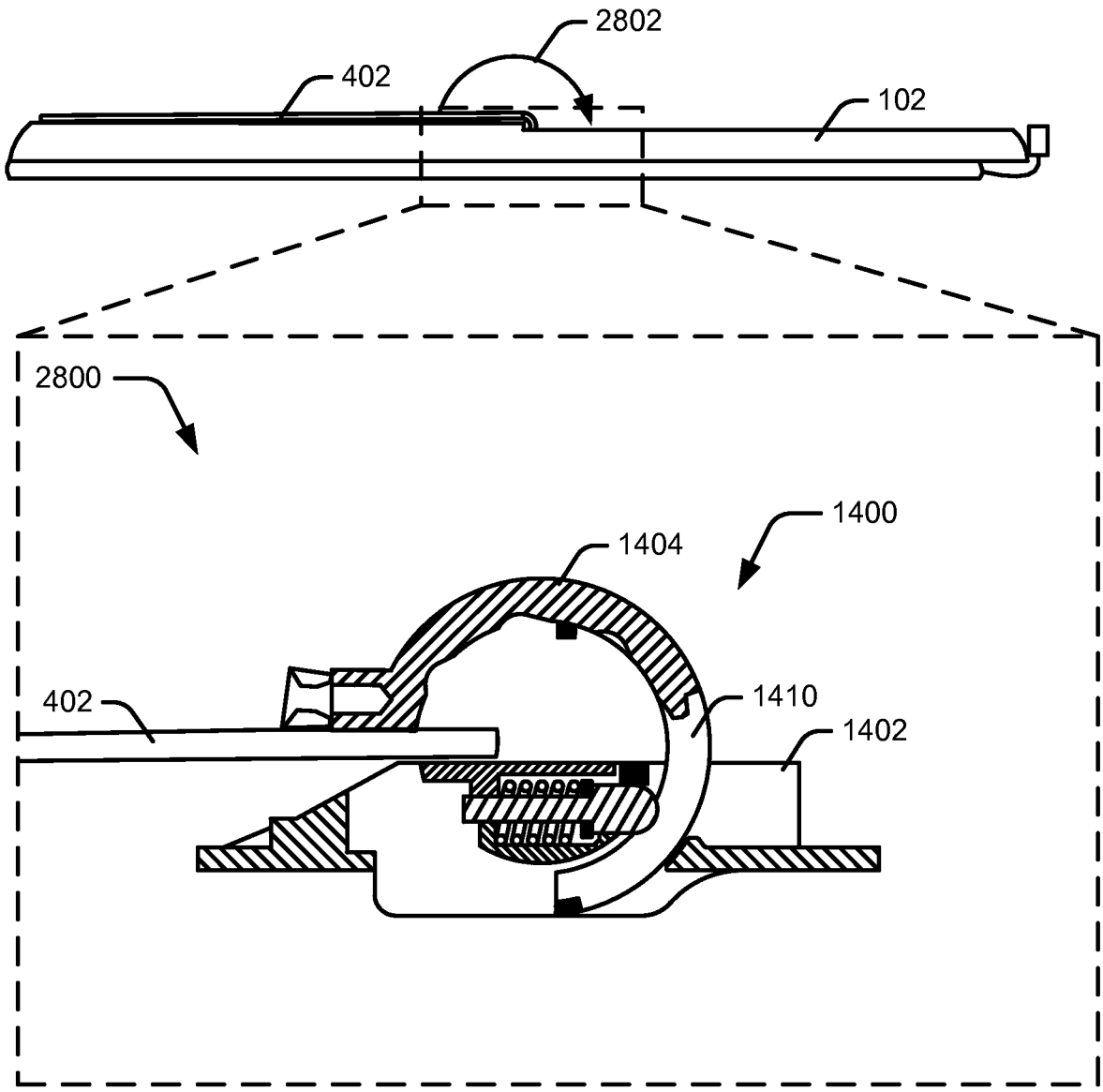

Fig. 28

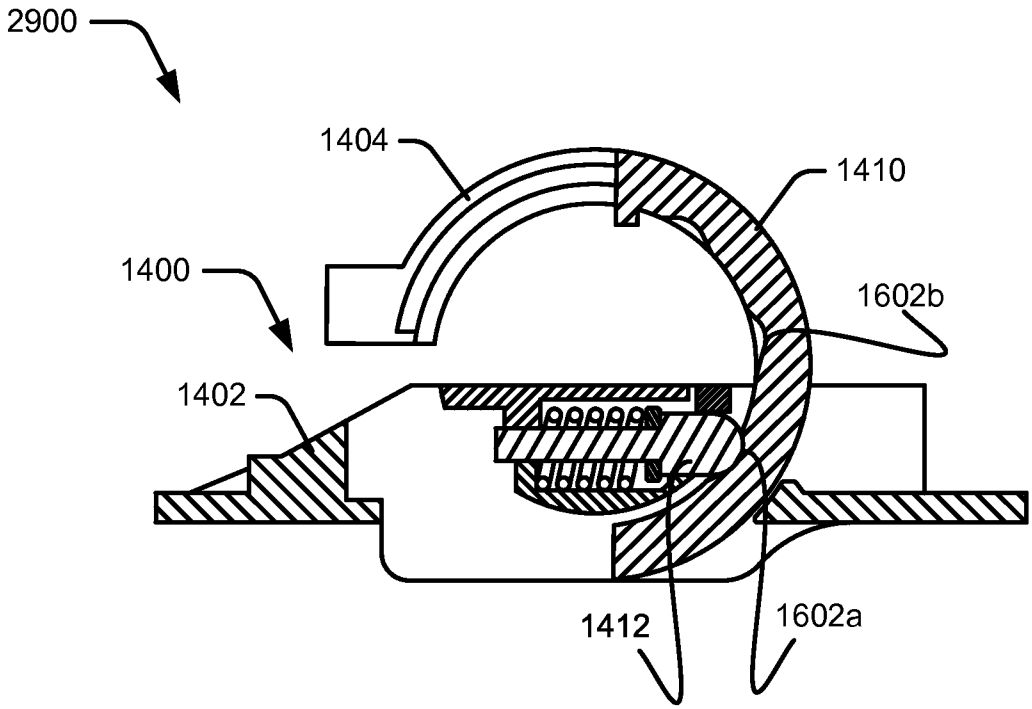
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Fig. 29

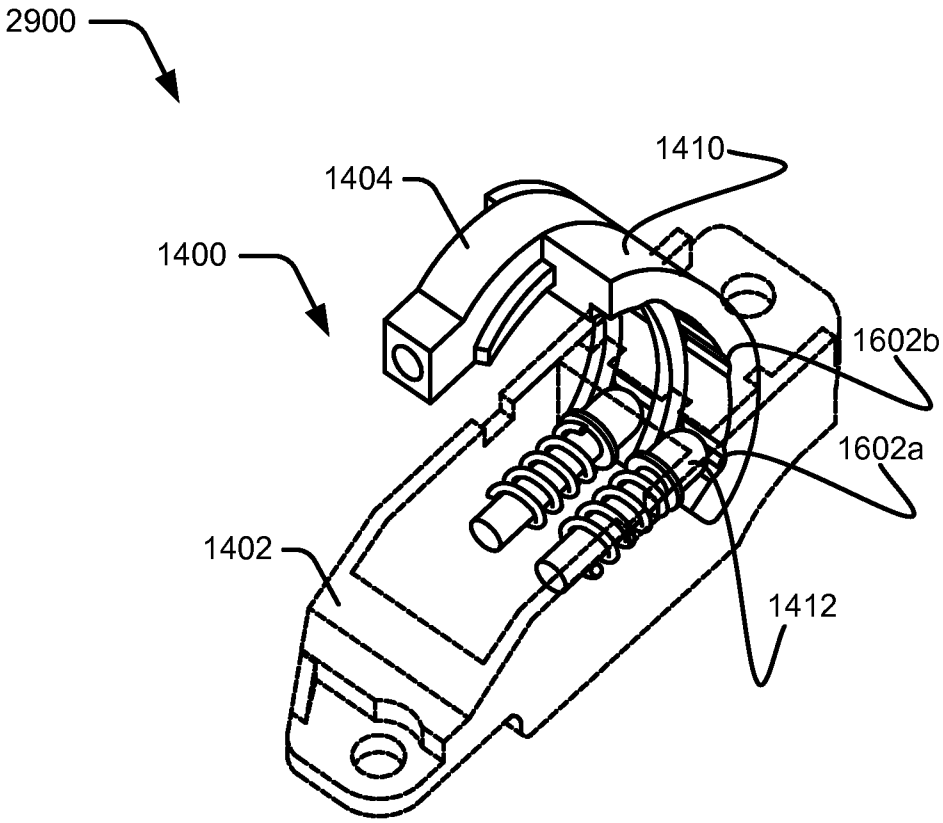
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Fig. 30

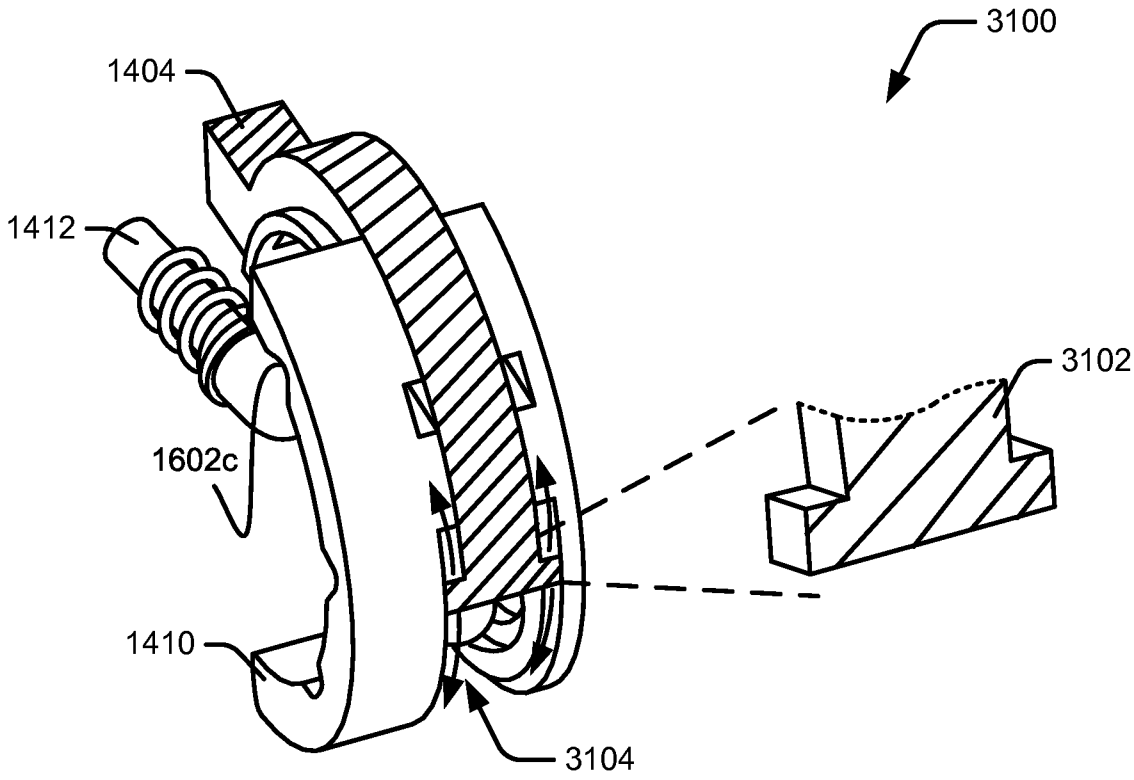
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Fig. 31

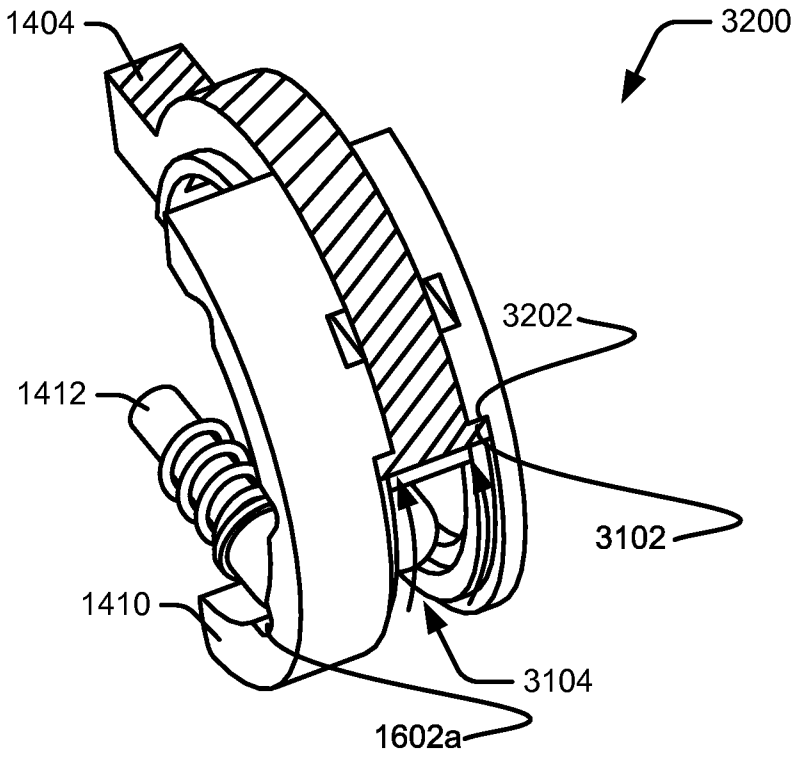
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Fig. 32

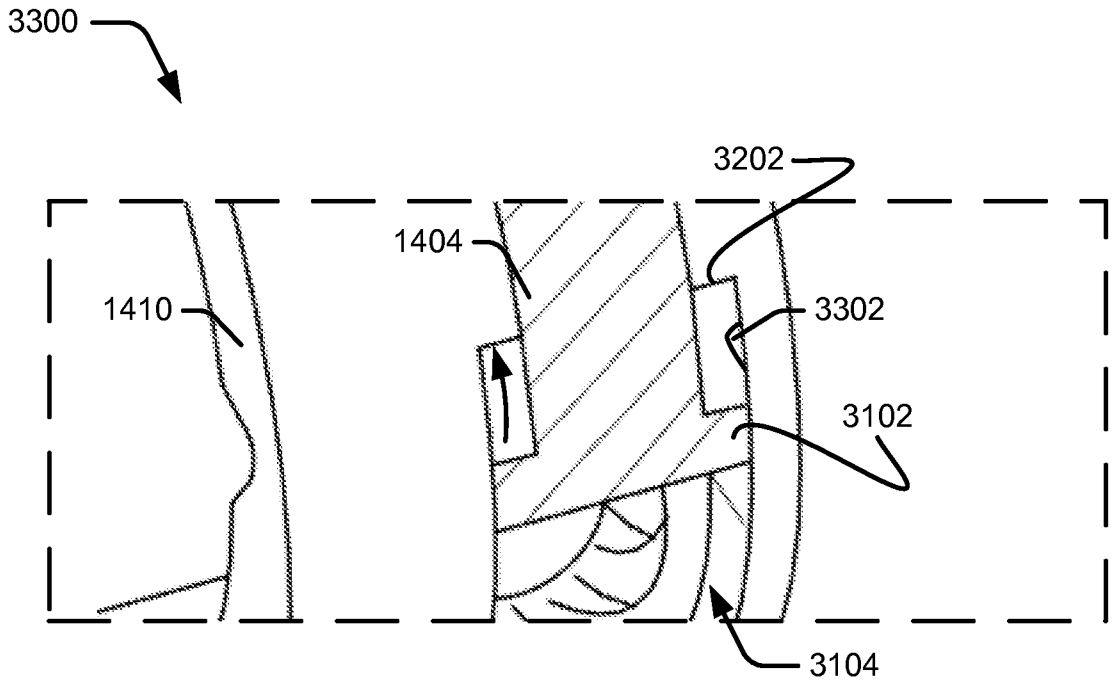
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Fig. 33

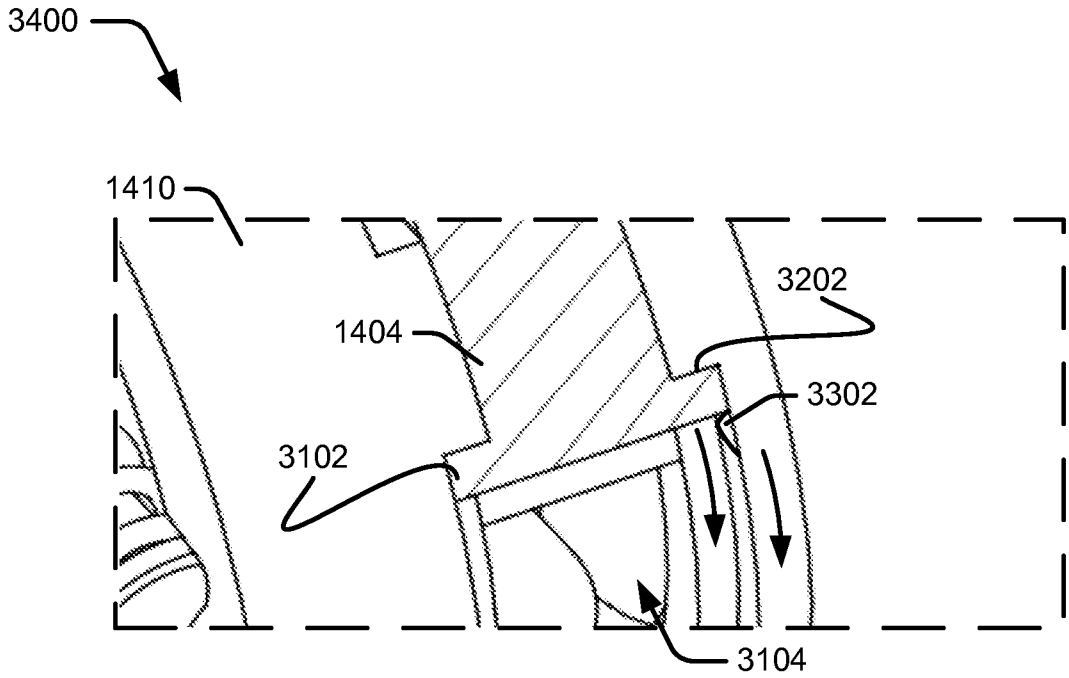
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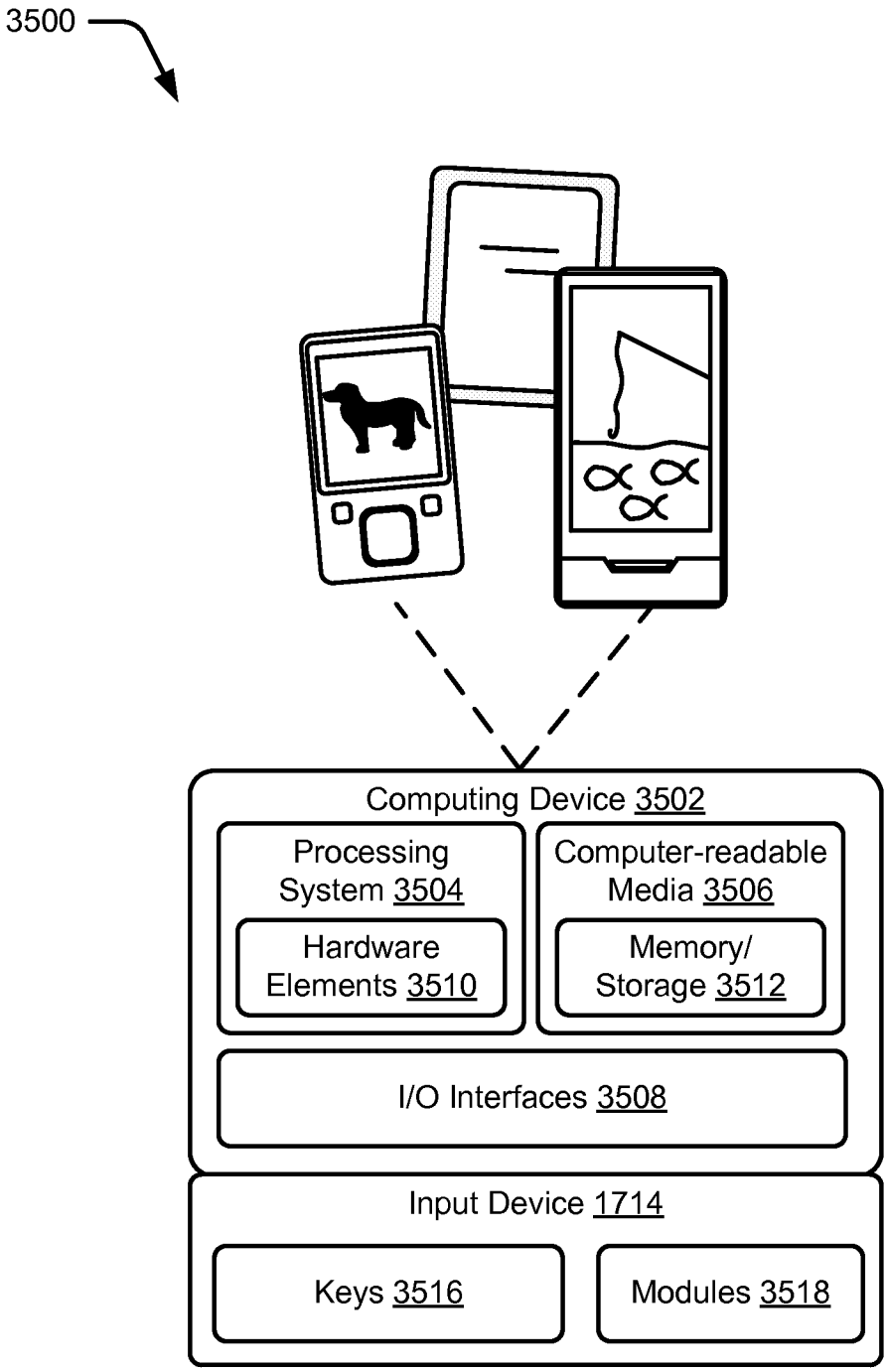
Fig. 34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Processing System 3504
Hardware Elements 3510
Computer-readable Media 3506
Memory/ Storage 3512
I/O Interfaces 3508
Input Device 1714
Keys 3516
Modules 3518

Fig. 35

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/031531

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F1/16 E05D11/10 F16M13/00
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04M E05D F16M G06F

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/236873 A1 (YUKAWA SHUHEI [JP] ET AL) 11 October 2007 (2007-10-11) the whole document	1-10
A	WO 2009/034484 A2 (SONY ERICSSON MOBILE COMM AB [SE]; XING WEISEN [CN]; YUAN TAO [CN]) 19 March 2009 (2009-03-19) page 19, line 10 - page 20, line 42; figures 42-52	3,7,9
A	US 2008/186660 A1 (YANG LAI [CN]) 7 August 2008 (2008-08-07) figure 10 paragraph [0041]	5,6,8,10
A	CA 990 023 A1 (MAYER OTTO) 1 June 1976 (1976-06-01) figures 1-8 page 1, line 1 - page 1, line 10	3,5-10

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 June 2014	20/06/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	De Meyer, Arnaud

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2014/031531

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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