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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
11 September 2009 (11.09.2009)

PCT

(10) International Publication Number
WO 2009/110890 A1

(51) International Patent Classification:
G06F 1/16 (2006.01) *G06F 1/00* (2006.01)

(21) International Application Number:
PCT/US2008/055793

(22) International Filing Date:
4 March 2008 (04.03.2008)

(25) Filing Language: English

(26) Publication Language: English

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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, BR, BW, BY, BZ, CA, CH, 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, IS, JP, KE, KG, KM, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE,

[Continued on next page]

(54) Title: COMPUTING DEVICES HAVING ROLLER FEET

(57) Abstract: A foot assembly for a computing device including a roller foot adapted to support the computing device and prevent sliding of the computing device across a support surface, and a roller foot socket in which the roller foot is provided and in which the roller foot can rotate when the roller foot is released by a user.

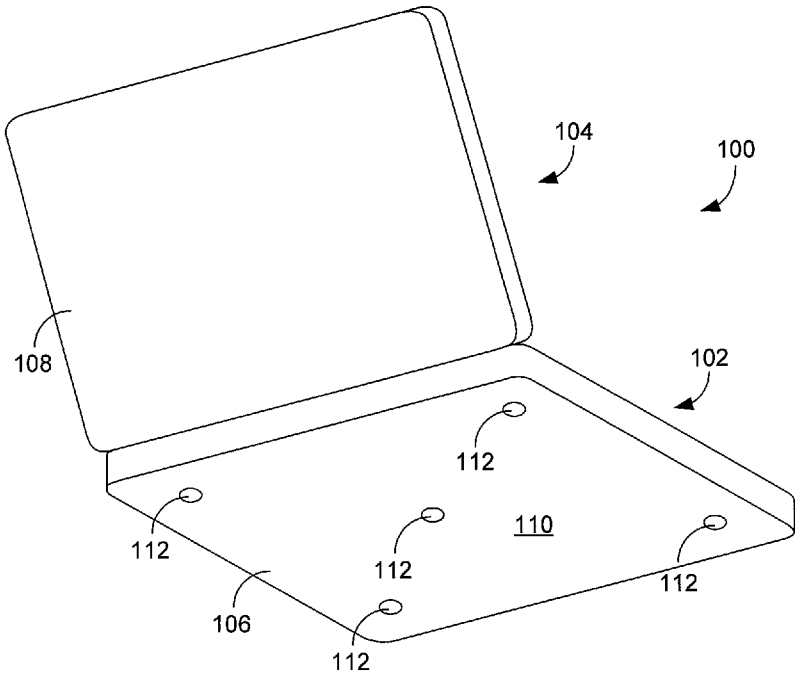

FIG. 1

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ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to the identity of the inventor (Rule 4.17(i))*

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

Published:

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

COMPUTING DEVICES HAVING ROLLER FEET

BACKGROUND

Notebook computers typically comprise anti-skid feet provided on the computer's base that prevent the computer from unintentionally sliding across a support surface, such as a table top. Although such feet reduce unintentional sliding, they typically do not prevent intentional movement of the computer by the user. Specifically, if the user wishes to reposition the computer, the user normally can push or pull the computer to move the computer across the support surface into a new position with little effort.

Notably, such repositioning is not always possible. For example, some manufacturers produce relatively large notebook computers that combine the portability of a typical notebook computer with the computing power and screen size of a typical desktop computer. Such computers may exceed ten or even fifteen pounds in weight. As a consequence, it can be difficult to slide such computers along a support surface. Moreover, even when such sliding can be performed, it can damage the support surface and/or the feet of the computer. Although repositioning of the computer can still be achieved in such cases by lifting the computer up off the support surface and placing the computer back down on the surface at another location, such a solution requires more effort from the user and is generally regarded as undesirable.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosed computing devices can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale.

FIG. 1 is a bottom perspective view of an embodiment of a computing device having at least one roller foot.

FIG. 2 is a partial front side view of an embodiment of a base of the computing device of FIG. 1.

FIGs. 3A and 3B are partial cross-sectional views of the base portion of FIG. 2, illustrating a first embodiment of a roller foot locking mechanism in a locked position and a released position, respectively.

FIGs. 4A and 4B are partial cross-sectional views of the base portion of FIG. 2, illustrating a second embodiment of a roller foot locking mechanism in a locked position and a released position, respectively.

FIG. 5A and 5B are schematic top views of the base portion of FIG. 2, illustrating a third embodiment of a roller foot locking mechanism in a locked position and a released position, respectively.

DETAILED DESCRIPTION

As described above, it can be difficult to move a relatively heavy notebook computer along a support surface and such movement can damage one or both of the support surface and the computer. As described in the following, however, such a computer can be moved along the support surface with relative ease and without causing damage when the computer is provided with at least one roller foot. In some embodiments, each roller foot comprises a ball or sphere positioned within a socket provided within the base of the computer. The sphere is normally prevented from rolling by a locking mechanism. In that manner, the sphere acts in the capacity of a conventional foot. When the locking mechanism is released by the user, however, the sphere is free to roll within its socket, thereby facilitating displacement of the computer along the support surface.

Referring now in more detail to the drawings in which like numerals indicate corresponding parts throughout the views, FIG. 1 illustrates a computing device 100 in the form of a notebook or "laptop" computer. Although a notebook computer has been explicitly illustrated and identified, it is noted that the notebook computer is cited only as an example. Therefore, the teachings of the present disclosure equally apply to other computing devices that can comprise feet upon which the computer is supported.

As indicated in FIG. 1, the computing device 100 includes a base 102 and a display portion 104 that are attached to each other with a hinge mechanism (not shown). The base 102 includes an outer housing 106 that surrounds various internal components of the computing device 100, such as a processor, memory, hard drive, and the like. The display portion 102 includes its own outer housing 108, which supports a display device (not visible in FIG. 1).

As depicted in FIG. 1, the base 102 comprises a bottom surface 110 and a plurality of anti-skid feet 112. In the embodiment of FIG. 1, the computing device 100 comprises five such feet 112. It is to be understood, however, that a fewer or a greater number of feet 112 can be provided, if desired. At least one of the feet 112 comprises a roller foot that extends out from an opening formed in the bottom surface 110. For example, the center foot 112 may comprise a roller foot. Alternatively, the two rear feet 112 (adjacent the display portion 104) may comprise roller feet. In a further alternative, each of the feet 112 may comprise a roller foot. As used herein, the term "roller foot" means a support foot of a computing device that can, at least when released, rotate relative to the computing device to facilitate movement of the computing device along a support surface. In embodiments in which movement in a single direction is desired, a roller foot can comprise a disc or wheel. In embodiments in which unilateral movement is desired, a roller foot can comprise a ball or sphere. Implementation of the latter type of roller foot is described in detail relative to FIGs. 3-5 below.

FIG. 2 illustrates an embodiment of the base 102 of the computing device 100 in which at least two of the anti-skid feet 112 are roller feet. As shown in FIG. 2, the at least two feet 112 are positioned on opposite sides of the base 102 (i.e., left and right sides) and each foot extends downward from the base 102 to a support surface 200. The feet 112 therefore support the base 102 above the support surface 200 such that the bottom surface 110 of the base does not contact the support surface. As indicated with dashed lines, a portion of each foot 112 resides within the housing 106.

FIGs. 3A and 3B illustrate a first embodiment of a roller foot assembly 300 that can be provided within the housing 106 of a computing device base 102.

Beginning with FIG. 3A, the roller foot assembly 300 generally comprises a roller foot 302, a roller foot socket 304, and a roller foot locking mechanism 306. In the embodiment of FIG. 3A, the roller foot 302 comprises a sphere formed at least in part of a material that is resilient enough to grip the support surface 200 well but firm enough to maintain the shape of the sphere and to enable rotation of the sphere within the socket 304 when the locking mechanism 306 released. By way of example, the sphere is formed from a relatively hard rubber material or a plastic material. In some embodiments, the sphere can comprise a hard plastic or metal core that is surrounded by a resilient rubber or plastic material.

The roller foot socket 304 comprises a continuous or semi-continuous roller foot contact surface 308 that surrounds a portion of the roller foot 302. In the embodiment of FIG. 3A, the surface 308 surrounds a central portion of the roller foot 302 such that a top portion and a bottom portion of the foot are exposed. Notably, however, the surface 308 surrounds a large enough portion of the roller foot 302 to prevent the foot from falling out of the socket 304 when the base 102 is lifted off of the support surface 200. In some embodiments, the surface 308 has a curvature that closely approximates the curvature of the roller foot 302.

In the illustrated embodiment, the roller foot socket 304 is provided or formed in a socket member 310 that is either integrated with the housing 106 or affixed thereto. By way of example, the socket member 310 is constructed of a plastic material. Optionally, the contact surface 308 can comprise an element that facilities free rotation of the roller foot 302 within the socket 304. For example, the contact surface 308 can comprise one or more wheels. In some embodiments, the contact surface 308 can comprise a friction-reducing insert, that is integrated into the socket member 310, such as a ball bearing race.

With further reference to FIG. 3A, the roller foot braking or locking mechanism 306 comprises a release button 312. As shown in the figure, the release button 312 can extend out from the housing 106 through an opening 314. Notably, however, the release button 312 need not extend out from the housing 106 as long as it is in some way accessible to a user. The release button 312 is provided on a shaft 316 on which is also provided a roller foot locking element 318 that prevents rotation of the roller foot 302 when the locking mechanism 306 is in the locked position shown in FIG. 3A. Provided on the locking element 318 is a roller foot contact surface 320 that contacts the top portion of the roller foot 302 when the locking mechanism 306 is in the locked position. More particularly, the contact surface 320 engages a side (right side in FIG. 3A) of the top portion of the roller foot 302. In some embodiments, the contact surface 320 has a curvature that closely approximates the curvature of the roller foot 302.

In some embodiments, the shaft 316 is constructed of metal and the release button 312 and the locking element 318 are constructed of plastic. In other embodiments, one or both of the release button 312 and the locking element 318 are unitarily formed with the shaft 316. For example, the release button 312, shaft 316, and locking element 318 can comprise a single piece of material, such as a plastic material. It is further noted that the material used to form the locking element 318 or its contact surface 320 can comprise a high-friction material to reduce or prevent slippage of the roller foot 302 when the locking mechanism 306 is in the locked position.

Further comprised by the locking mechanism 306 is a spring 322 that is positioned between the locking element 318 and a frame 324 of the roller foot assembly 300. In the embodiment of FIG. 3A, the spring 322 surrounds the shaft

316, which extends beyond the locking portion 318. In such a case, the frame 324 can include an opening 326 through which the shaft 316 can pass. The spring 322 is held in compression between the locking element 318 and the frame 324. Because the frame 324 is fixed within the housing 106, the spring 322 exerts force on the locking element 318 that urges it laterally (to the left in FIG. 3A) into firm contact with the roller foot 302, thereby preventing the roller foot from rolling.

FIG. 3B illustrates release of the roller foot 302 to facilitate movement (e.g., rolling) of the computing device 100. As indicated in FIG. 3B, the release button 312 has been pushed inward into the housing 106, thereby displacing the shaft 316 and the locking element 318 in the same direction (right in FIG. 3B). Such displacement disengages the locking element 318 from the roller foot 302, thereby enabling the roller foot to freely roll within the socket 304. With such operation, a user can depress and hold the release button 312 to release the roller foot 302 (FIG. 3B), move or roll the computing device 100 into a desired position on the support surface 200, and then release the button 312 to again lock the roller foot (FIG. 3A).

In FIGs. 3A and 3B, the release button 312 is used to release or unlock a single roller foot 302. In such cases, a release button 312 can be provided for each of multiple roller feet. For example, if a given computing device comprises two anti-skid conventional feet adjacent the front edge of its base and two roller feet adjacent the rear edge of the base (near the display portion), the user could simultaneously depress the release button associated with each of the roller feet to facilitate repositioning of the computing device. In other embodiments, a single release button can be used to release two or more roller feet. Examples of such embodiments are described in relation to FIGs. 4 and 5 in the following.

Beginning with FIG. 4A, illustrated is simultaneous release of two roller feet using a single release button. In the embodiment of FIG. 4A, the computing device base 102 comprises a roller foot assembly 400 that is similar in configuration to the roller foot assembly 300 shown in FIG. 3A. Therefore, the assembly 400 includes a roller foot 402 held within a socket 404. In addition, the assembly 400 includes a release button 406, a shaft 408, a locking element 410, and a spring 412, which are contained or supported by a frame 414. However, in this embodiment, the shaft 408 extends from the roller foot assembly 400 to a second roller foot assembly 414 provided on the opposite side (right side in FIG. 4B) of the housing 106. The roller foot assembly 414 is also similar to the roller foot assembly 300, and therefore also includes a roller foot 416 held within a socket 418, a locking element 420, a spring 422, and a frame 424.

As depicted in FIG. 4A, the locking element 410 prevents rotation of the roller foot 402 while the locking element 420 prevents rotation of the roller foot 416. With reference to FIG. 4B, the roller feet 402, 416 are released, however, when the release button 406 is depressed. As long as the button 406 is held in the position shown in FIG. 4B, the roller feet 402, 416 are free to roll and the computing device in which they are provided can be moved across the support surface 200 with relative ease.

FIGs. 5A and 5B schematically depict simultaneous release of four roller feet using a single release button. Beginning with FIG. 5A, a computing device base 500 comprises four roller feet 502, each positioned adjacent a corner of the base. Provided within the base 500 is a frame 504 that is urged into contact with each of the roller feet under the force of one or more springs 506. By way of example, the frame 504 comprises contact surfaces similar the contact surface 320 with which the

frame makes contact with the roller feet 502 when the feet are locked. As is further shown in FIG. 5A, a release button 508 provided on a side of the base 500 is connected to the frame 504.

When the user wishes to move the computing device, the user depresses the release button 508 as indicated in FIG. 5B. Such an action displaces the frame 504 (to the right in FIG. 5B) such that the frame comes out of contact with the roller feet 502, thereby enabling the feet to freely roll. At that point, the user can reposition the computing device as desired, and then release the button 508 to relock the roller feet 502 (FIG. 5A).

CLAIMS

Claimed are:

1. A foot assembly for a computing device, the foot assembly comprising:

a roller foot adapted to support the computing device and prevent sliding of the computing device across a support surface; and

a roller foot socket in which the roller foot is provided and in which the roller foot can rotate when the roller foot is released by a user.

2. The foot assembly of claim 1, wherein the roller foot is spherical.

3. The foot assembly of claim 1, wherein the roller foot is constructed of a rubber or a plastic material.

4. The foot assembly of claim 1, wherein the roller foot socket comprises a contact surface that contacts the roller foot and that prevents the roller foot from falling out of the socket.

5. The foot assembly of claim 4, wherein the contact surface surrounds a central portion of the roller foot.

6. The foot assembly of claim 4, wherein the contact surface has a curvature that approximates a curvature of the roller foot.

7. The foot assembly of claim 1, further comprising a locking mechanism that prevents rotation of the roller foot when the locking mechanism is in a locked position.

8. The foot assembly of claim 7, wherein the locking mechanism comprises a locking element that contacts the roller foot when the locking mechanism is in the locked position.

9. The foot assembly of claim 8, wherein the locking mechanism further comprises a spring that urges the locking element into contact with the roller foot.

10. The foot assembly of claim 7, further comprising a release button that disengages the locking element from the roller foot when the release button is pressed by a user.

11. The foot assembly of claim 10, wherein the release button and the locking element are provided on a shared shaft.

12. A computing device comprising:

a housing; and

a foot assembly provided in the housing, the assembly including a roller foot adapted to support the computing device and prevent sliding of the computing device across a support surface and a roller foot socket in which the roller foot is provided and in which the roller foot can rotate when released by a user.

13. The computing device of claim 12, wherein the roller foot is spherical.

14. The computing device of claim 12, wherein the roller foot socket comprises a contact surface that surrounds a central portion of the roller foot and prevents the roller foot from falling out of the socket.

15. The computing device of claim 12, further comprising a locking mechanism having a locking element that contacts the roller foot when the locking mechanism is in a locked position so as to prevent rotation of the roller foot.

16. The computing device of claim 15, wherein the locking mechanism further comprises a spring that urges the locking element into contact with the roller foot.

17. The computing device of claim 15, further comprising a release button that disengages the locking element from the roller foot when the release button is pressed by a user.

18. The computing device of claim 17, further comprising a second roller foot assembly that includes a second roller foot provided in a second roller foot socket and a second locking element that that contacts the second roller foot when the locking mechanism is in the locked position so as to prevent rotation of the second roller foot, wherein the release button further disengages the second locking element from the second roller foot when the release button is pressed by a user.

19. The computing device of claim 18, wherein the release button and the locking elements are provided on a shared shaft.

20. The computing device of claim 12, wherein the computing device is a notebook computer and wherein the housing is a housing of a base of the notebook computer.

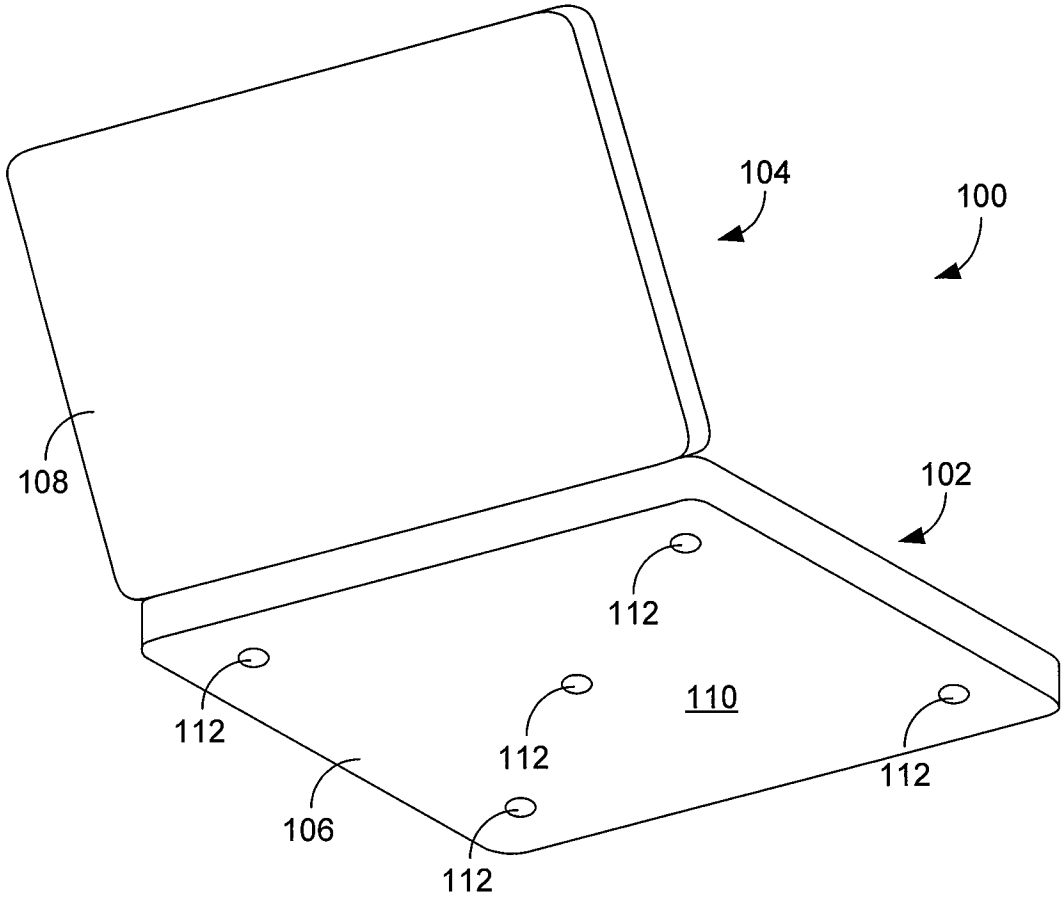
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FIG. 1

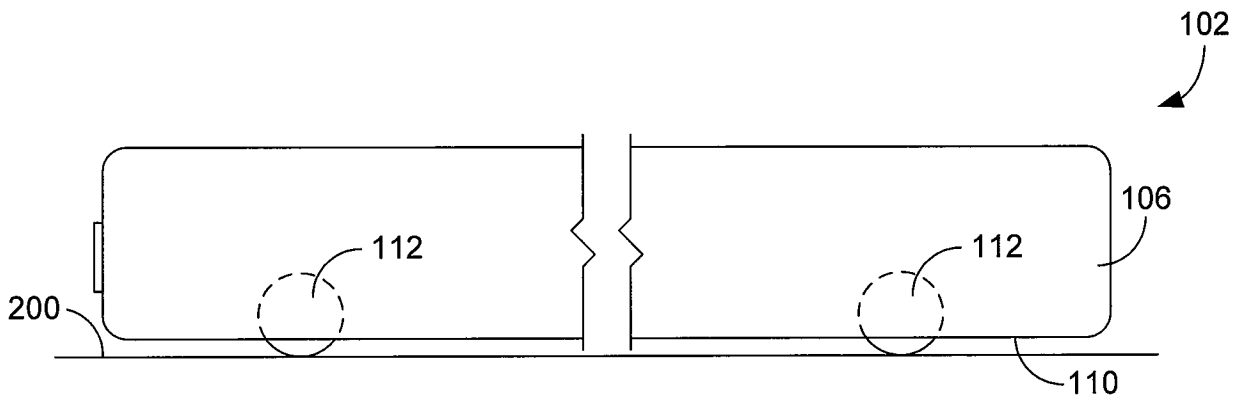
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FIG. 2

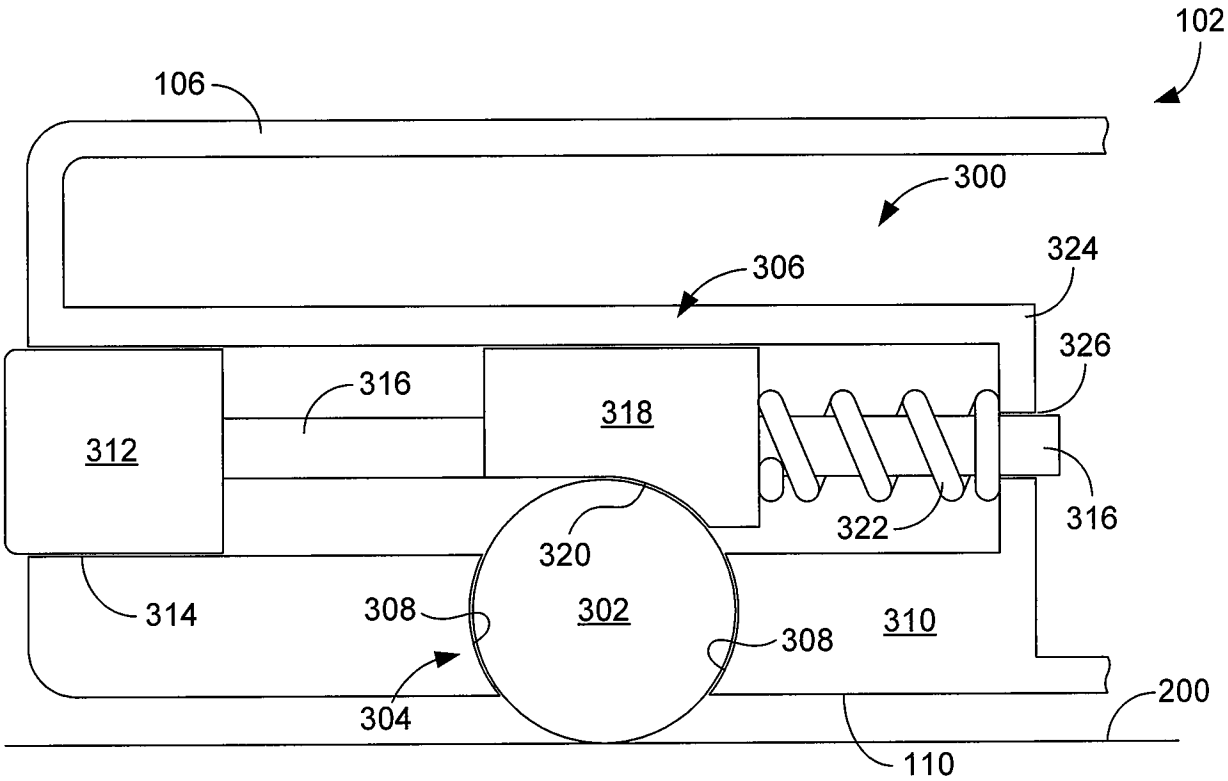
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FIG. 3A

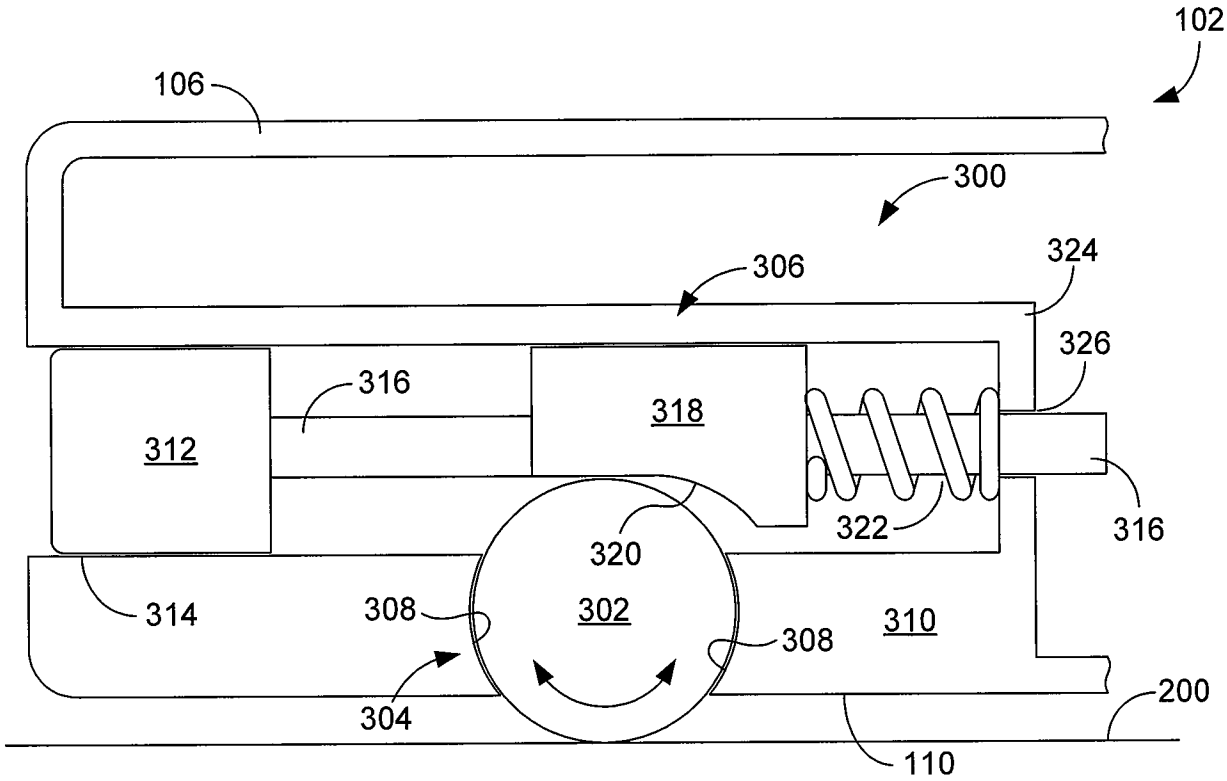
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FIG. 3B

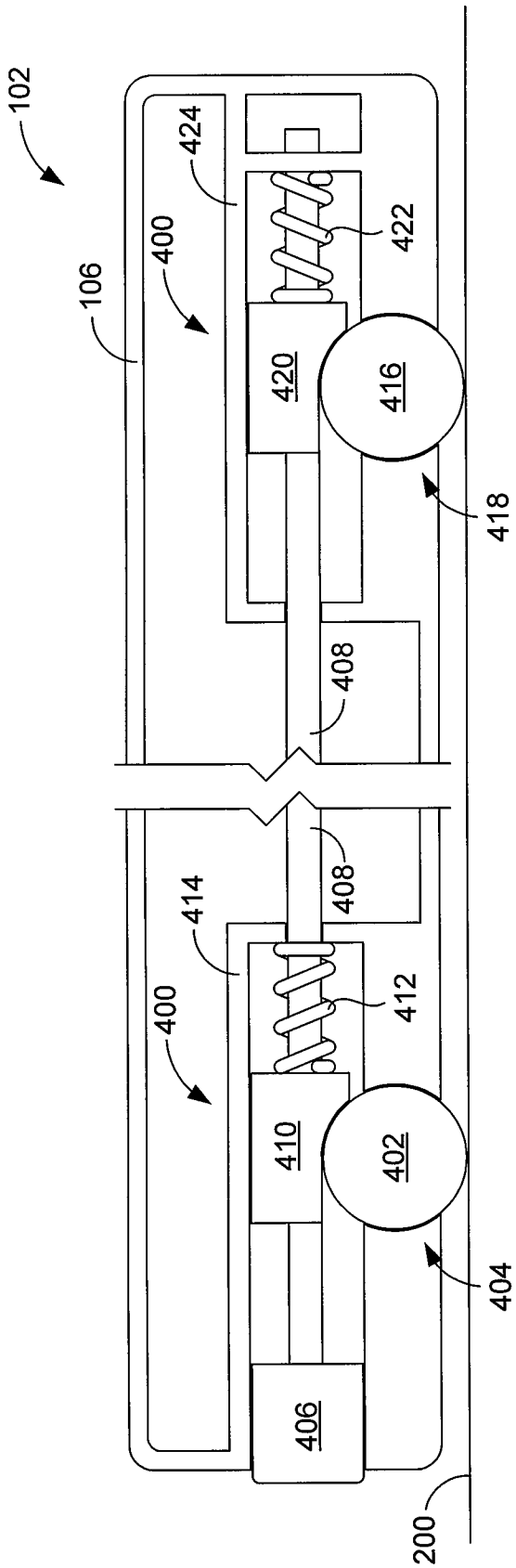
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FIG. 4A

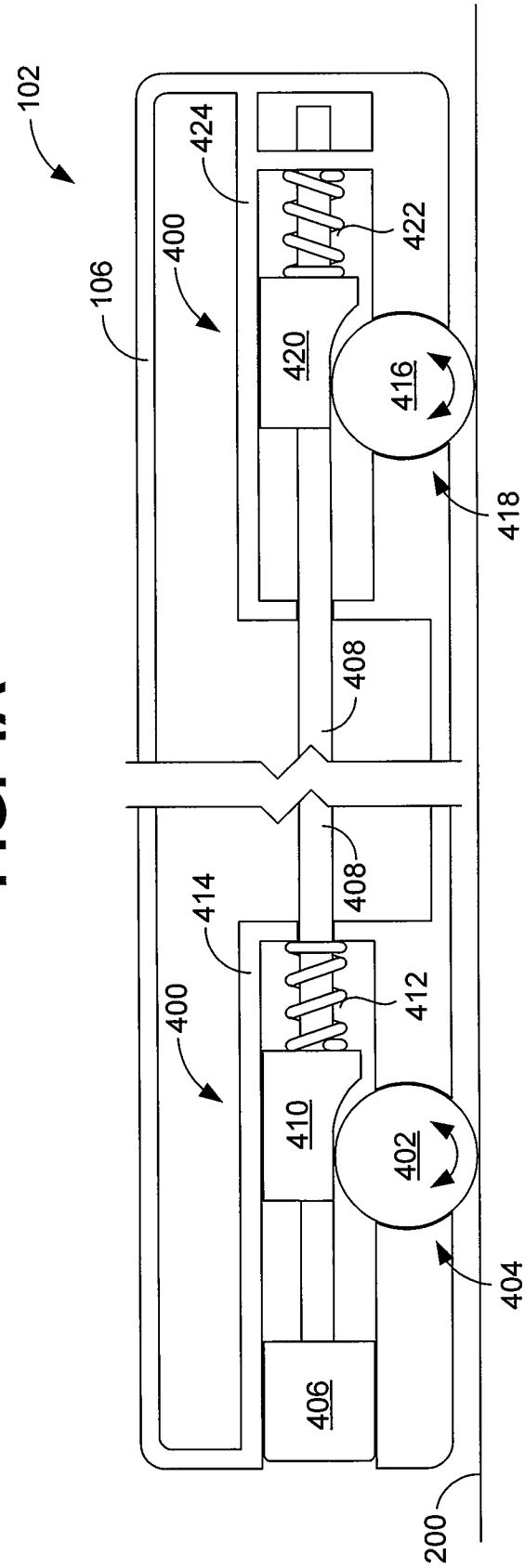
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FIG. 4B

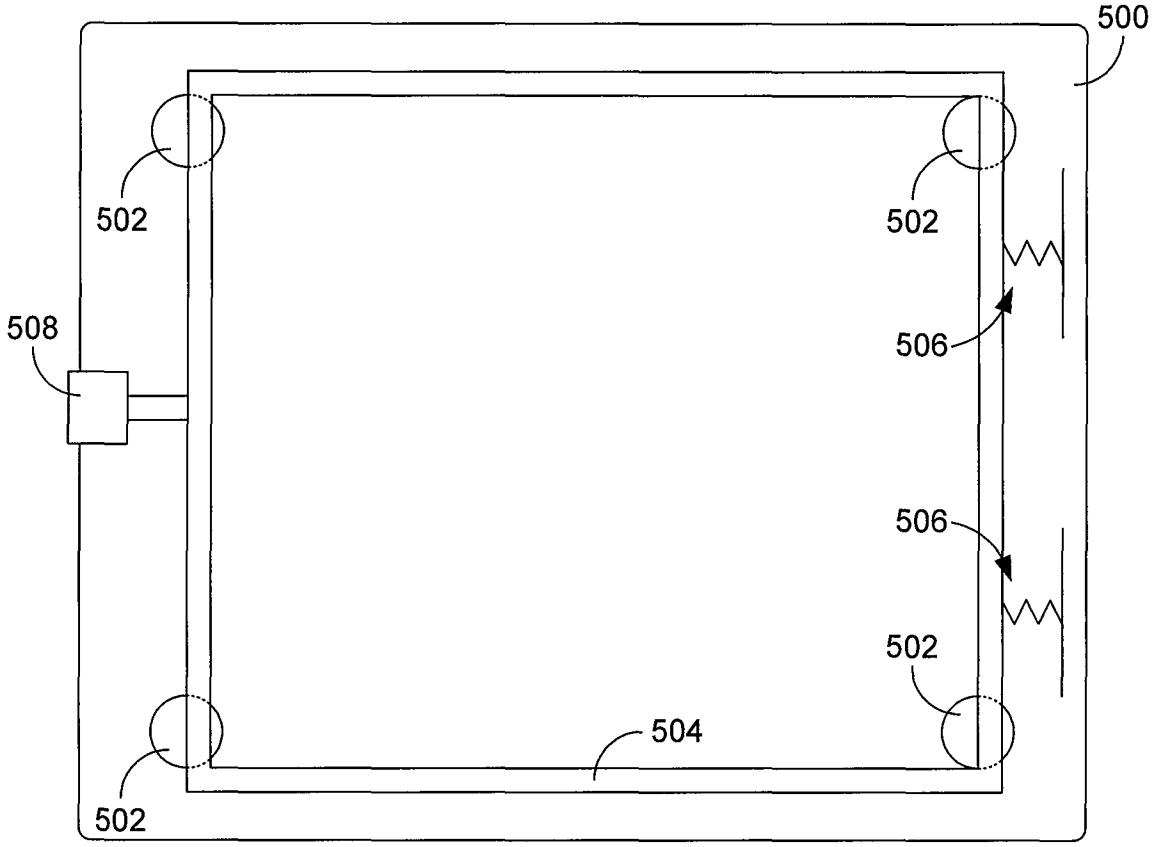
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FIG. 5A

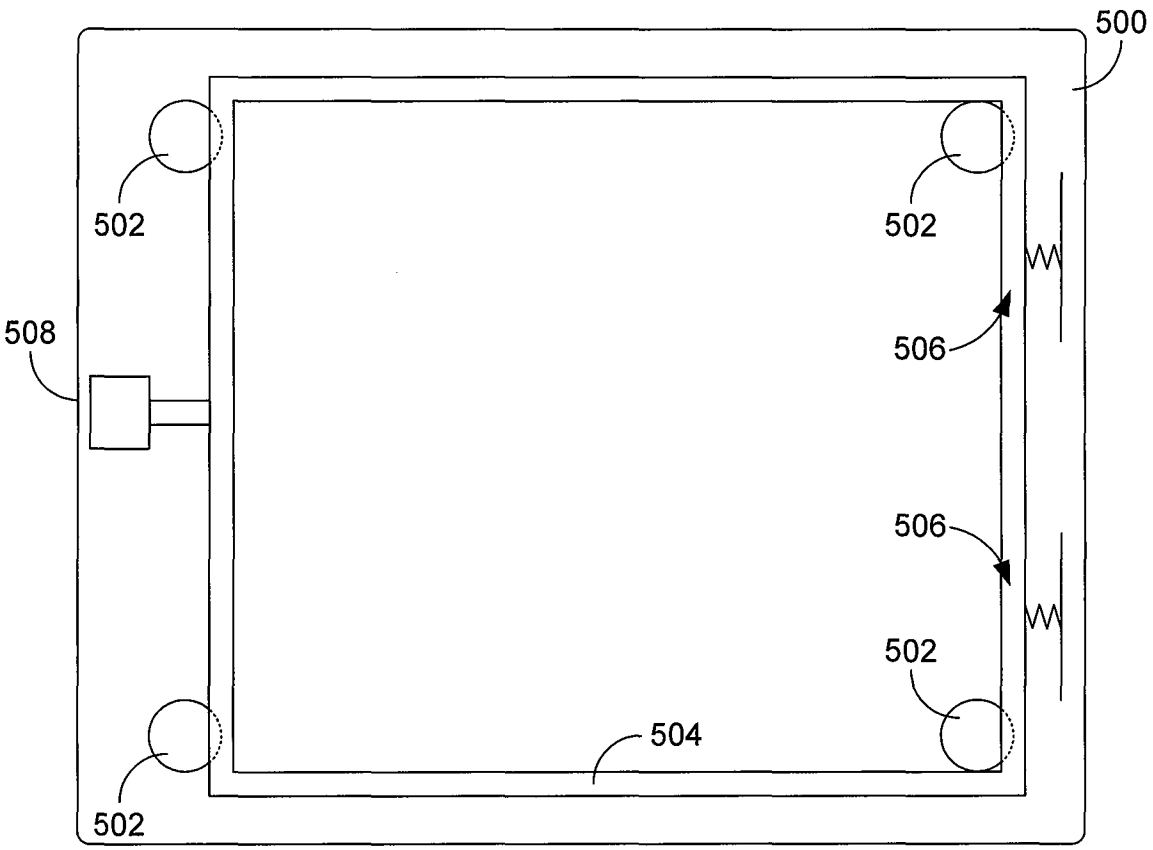
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FIG. 5B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/055793

A. CLASSIFICATION OF SUBJECT MATTER

G06F 1/16(2006.01)i, G06F 1/00(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8: G06F

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

Korean Utility models applications for Utility Models since 1975, IPC as above

Japanese Utility Models and application for Utility Models since 1975, IPC as above

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

eKIPASS, IEEExpl, Google; notebook computer; roller foot; locking; release button;

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US2007/0241452 A1(CHIEN-LI WU, et.al) 18 October 2007 See all documents.	1-9, 12-16, 20
Y		10-11, 17-19
X	KR10-2000-0041981 A (DAEWOO ELECTRONICS CO., LTD) 15 July 2000 See abstract, claims 1-2 and figures 4-6.	1-9, 12-16, 20
Y		10-11, 17-19
Y	US2006/0192070 A1(MAN-YAN CHAN) 31 August 2006 See abstract, paragraphs [0027]-[0029] and figure 3-6.	10-11, 17-19
A	US2007/0000086 A1(STEVE CHENG and TAO Y. SHIEN) 4 January 2007 See abstract, claims 1&9 and figures 1A-2.	1-20

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

☒ See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search	Date of mailing of the international search report
28 OCTOBER 2008 (28.10.2008)	**28 OCTOBER 2008 (28.10.2008)**

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Authorized officer

SEONG, KYOUNG A

Telephone No. 82-42-481-8171

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2008/055793

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007-0241452 A1	18.10.2007	None	
US 2006-0192070 A1	31.08.2006	None	
KR 10-2000-0041981 A	15.07.2000	None	
US 2007-000086 A1	04.01.2007	None	