



(43) International Publication Date
14 January 2016 (14.01.2016)

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

(21) International Application Number:
PCT/US2014/045786

(22) International Filing Date:
8 July 2014 (08.07.2014)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant: **HEWLETT-PACKARD DEVELOPMENT COMPANY, L.P.** [US/US]; 11445 Compaq Center Drive W., Houston, Texas 77070 (US).

(72) Inventor: **MOORE, Earl W.**; 11445 Compaq Center Drive W., Houston, Texas 77070 (US).

(74) Agents: **COXE, Angela Mae** et al.; Hewlett-Packard Company, Intellectual Property Administration, 3404 E. Harmony Rd. MS:35, Fort Collins, Colorado 80528 (US).

(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 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))

(54) Title: MOUNTING ASSEMBLY

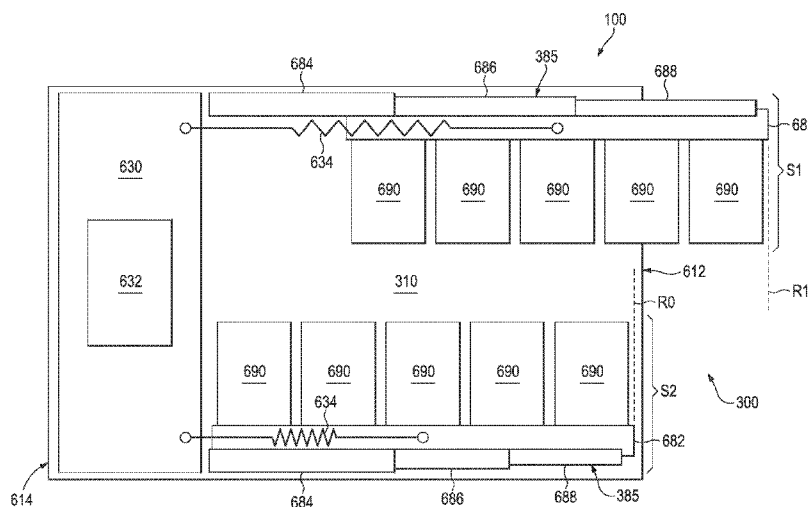


FIG. 6

(57) Abstract: An example mounting assembly is provided herein. The mounting assembly includes a mounting rail member, a support member, and a retention member. The mounting rail member to mount to a rack. The support member extending from the mounting rail member to support a chassis. The retention member extending from the mounting rail member to retain the chassis and a cage rail therein.



WO 2016/007143 A1

MOUNTING ASSEMBLY

BACKGROUND

[0001] Computing systems include hard disk drives. The hard disk drives are typically attached to a hard disk drive carrier then inserted into a computing system. For example, a hard disk drive is attached to a hard disk drive carrier and then inserted into a shelf in a computing system where it is connected to other electronic components.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] Non-limiting examples of the present disclosure are described in the following description, read with reference to the figures attached hereto and do not limit the scope of the claims. In the figures, identical and similar structures, elements or parts thereof that appear in more than one figure are generally labeled with the same or similar references in the figures in which they appear. Dimensions of components and features illustrated in the figures are chosen primarily for convenience and clarity of presentation and are not necessarily to scale. Referring to the attached figures:

[0003] FIG. 1 illustrates a block diagram of a mounting assembly according to an example;

[0004] FIG. 2 illustrates an isometric view of the assembly of FIG. 1 according to an example;

[0005] FIG. 3 illustrates a block diagram of a system according to an example;

[0006] FIG. 4 illustrates an isometric view of the system of FIG. 3 according to an example;

[0007] FIG. 5 illustrates a cross-sectional view of the system of FIG. 3 according to an example; and

[0008] FIG. 6 illustrates a top view of the system of FIG. 3 according to an example.

DETAILED DESCRIPTION

[0009] In the following detailed description, reference is made to the accompanying drawings which form a part hereof, and in which is depicted by way of illustration specific examples in which the present disclosure may be practiced. It is to be understood that other examples may be utilized and structural or logical changes may be made without departing from the scope of the present disclosure.

[0010] Computing system designs determine requirements for components in the computing system. Space, thermal constraints, cost, and ease of use are some factors that determine the type of mounting assemblies and cages used with electronic components, such as hard disk drives.

[0011] In examples, a mounting assembly is provided. The mounting assembly includes a mounting rail member, a support member, and a retention member. The mounting rail member to mount to a rack. The support member extending from the mounting rail member to support a chassis. The retention member extending from the mounting rail member to retain the chassis and a cage rail therein. The mounting assembly transfers a load from a cage to a support structure. The support member provides support to the cage from a bottom end and the retention member provides support from a top end to prevent rotation or twisting when a rail is attached and extended.

[0012] The phrase “disk drive” refers to a device to read data from and write data to a disk. For example, a hard disk drive uses a program to read data from and write data to a disk. Examples of a disk drive include a large form factor hard disk drive and a small form factor hard disk drive

[0013] FIG. 1 illustrates a block diagram of a mounting assembly 100 according to an example. The mounting assembly 100 includes a mounting rail member 120, a support member 140, and a retention member 160. The

mounting rail member 120 to mount to a support structure. The support member 140 extending from the mounting rail member 120 to support a chassis. The retention member 180 extending from the mounting rail member 120 to retain the chassis and a cage rail member therein.

[0014] FIG. 2 illustrates an isometric view of the mounting assembly 100 of FIG. 1 according to an example. The mounting assembly 100 illustrates the mounting rail member 120, the support member 140, and the retention member 160. The mounting rail member 120 is formed of a planar member and may include apertures 222 therein to connect the mounting rail member 120 to a support structure, such as a rack.

[0015] The support member 140 extends from the mounting rail member 120. The support member 140 may extend from one end of the mounting rail member 120 in a position approximately perpendicular to the mounting rail member 120. The support member 140 may include for example, a shelf, a ledge, and/or a wall to receive, hold, and/or support a chassis and/or drive cage.

[0016] The retention member 160 may include one or more walls extending from the other end of the mounting rail member 120. For example, the retention member 160 may include a first retention member 262 extending approximately perpendicular to the mounting rail member 120 and a second retention member 264 extending from the first member 262 approximately parallel to the mounting rail member 120. The first retention member 262 and/or the second retention member 264 may be formed of a flexible member, such as a cantilever spring, or a rigid member, such as a steel plate. FIGS. 3-6 below illustrate the mounting assembly 100 usable with a chassis and a drive cage.

[0017] FIG. 3 illustrates a block diagram of a system 300 according to an example. The system includes a chassis 310, a cage 380, and the mounting assembly 100. The chassis 310 to support an electronic component. The cage 380 connected to the chassis 310 to receive and/or secure the electronic component. The cage 380 includes a cage rail member 385.

[0018] The mounting assembly 100 including a mounting rail member 120, a support member 140, and a retention member 160. The mounting rail

member 120 to mount to a support structure and receive the cage rail member. The support member 140 extending from the mounting rail member 120 to support a chassis 310. The retention member 160 extending from the mounting rail member 120 to retain the chassis 310 and the cage rail member 385 therein.

[0019] FIG. 4 illustrates an exploded view of the system 300 of FIG. 3 according to an example. The mounting assembly 100 illustrated in FIG. 4, is similar to the mounting assembly 100 illustrated in FIG. 2. The chassis 310 and drive cage 380 connect to the mounting assembly 100 via the cage rail member 385.

[0020] The chassis 310 includes a base 412 and a pair of side walls 414. The base 412 to receive and support the cage 380. The pair of side walls 414 extending from opposite sides of the base 412. The pair of side walls 414 to mate with the mounting assembly 100. The mounting assembly 100 and the cage rail member 385 to engage. For example, the retention member 160 applies a first force, F_1 , to the cage rail member 385 to maintain a planar or straight path and prevent rotation of the cage rail member 385 as the cage rail member 385 expanded.

[0021] The cage rail member 385 may include, for example, three rails that may extend and retract. The three rails may include a telescoping rail that to extend and retract based on a second force, F_a , applied thereto. When the cage rail member 385 is extended the cage rail member 385 engages with the mounting rail member 120 and the second retention member 264, such that, engagement provides support and alignment for the cage rail member 385 and prevents the twisting, turning, or rotation of the cage rail member 385. When the cage rail member 385 is retracted, the three rails may be nested in one another. The three rails are further illustrated in FIG. 6.

[0022] The system 300 may further include a support structure 450 to receive the rail assembly 100. For example, the support structure 450 includes a rack. The mounting rail member 120 may connect to the support structure 450. For example, the mounting rail member 120 may include a set of rail

members that connect to opposite sides of the support structure 450 or rack along a longitudinal plane, L.

[0023] FIG. 5 illustrates a cross-sectional view of the system 300 of FIG. 3 according to an example. Referring to FIG. 5, the system 300 is illustrated in an assembled position with the mounting assembly 100, the chassis 310, and the cage 380 connected.

[0024] As illustrated the mounting rail member 120 is formed of a planar member attachable to a support structure, such as a rack. The support member 140 extends from the mounting rail member 120. The support member 140 may extend from one end of the mounting rail member 120 in a position approximately perpendicular to the mounting rail member 120. The support member 140 may include for example, a shelf, a ledge, and/or a wall to receive, hold, and/or support a chassis 310 and/or a cage 380. The support member 140 to transfer the weight or load of the chassis 310 and/or the cage 380 to the support structure 450, such as a rack. The retention member 160 may include one or more walls extending from the other end of the mounting rail member 120. For example, the retention member 160 may include a first retention member 262 extending approximately perpendicular to the mounting rail member 120 and a second retention member 264 extending from the first member 262 approximately parallel to the mounting rail member 120.

[0025] The chassis 310 is illustrated as holding a cage 380, such as a drive cage. The cage 380 includes a cage rail member 385 that is connected to the cage 380 and includes a portion thereof extending between the mounting rail member 120 and the retention member 160. Specifically, the cage rail member 385 is positioned between the mounting rail member 120 and the second retention member 264, such that, the mounting rail member 120 engages with the cage rail member 385 when the cage rail member 385 is extended. The engagement provides support and alignment for the cage rail member 385 and prevents the twisting, turning, or rotation of the cage rail member 385.

[0026] FIG. 6 illustrates a top view of the system 300 of FIG. 3 according to an example. The system 300 is illustrated to include the chassis 310, the

cage 380, and the mounting assembly 100. The chassis 310 includes a plurality of cages 380 connected thereto. The plurality of cages 380 to receive electronic components 690, such as large form factor hard disk drives. The electronic components 690 are illustrated as large form factor hard disk drive cages, each cage 380 may hold, for example two to three hard disk drives. The hard disk drives may be hot pluggable.

[0027] The chassis 310 also includes a backplane 682 connectable to the plurality of cages 380 and the electronic components 690 therein. A set of cables 634 may be used to connect the backplane 682 to a back side 630 of the chassis 310. For example, the back side 630 of the chassis 310 may include a power supply 632 and circuit boards 636. The back side 630 may further include fans or other cooling devices.

[0028] The mounting assembly 100 illustrated includes a set of mounting rail members 120. The mounting rail members 120 are illustrated as having three rails: a first rail 684, a second rail 686, and a third rail 688. The mounting rail members 120 may include telescoping rails having axial telescoping movement. For example, the set of rail members are illustrated as two mounting rail members 120 connected to each chassis 310. The two mounting rail members 120 are mounted on opposite sides of the support structure 450 or rack. The mounting rail members 120 are designed to operate independent of one another. For example, the electronic components 690 on a first side may be accessed via one of the mounting rail without moving the other mounting rail.

[0029] Referring to FIG. 6, a first side S_1 of the chassis 310 includes a first mounting assembly 100A and a second side S_2 of the chassis 310 includes a second mounting assembly 100B. The first side S_1 is illustrated with the cage rail member 385 partially extended R_1 . For example, when the first side S_1 is partially extended R_1 the second rail 686 and the third rail 688 are extended from the first rail 684. In the extended position, the cages 380 extend beyond the chassis 510 and are accessible for repair and/or replacement. The second rail 686 and the third rail 688 may further be extended to allow access to each of the cages 380 on the first side S_1 . In the extended position R_1 , the first cage with large form factor hard disk drive cages 380 is accessible via the front 612

of the chassis 310. The first side S_1 may be pushed back to a retracted position R_0 when access is no longer required or desired.

[0030] The second side S_2 is illustrated with the cage rail member 385 in the retracted position R_0 . For example, in the retracted position R_0 , the second side S_2 is illustrated with the first rail 684, the second rail 686, and the third rail 688 retracted or nested in one another. In the retracted position R_0 , the cages on the second side S_2 remain within the chassis 310. The second side S_2 may similarly be extended as illustrated with reference to the first side S_1 . As illustrated, the mounting rail member **120** expands and retracts in an axial telescoping movement. Access to the electronic components are provided through the front 612 of the chassis 310, which provides a simple and easy way to access the electronic components without having to access the rear 614 of the chassis 310. Moreover, since the system 300 is compatible with hot pluggable electronic components, the access may be provided without shutting down the whole electronic system.

[0031] The present disclosure has been described using non-limiting detailed descriptions of examples thereof and is not intended to limit the scope of the present disclosure. It should be understood that features and/or operations described with respect to one example may be used with other examples and that not all examples of the present disclosure have all of the features and/or operations illustrated in a particular figure or described with respect to one of the examples. Variations of examples described will occur to persons of the art. Furthermore, the terms "comprise," "include," "have" and their conjugates, shall mean, when used in the present disclosure and/or claims, "including but not necessarily limited to."

[0032] It is noted that some of the above described examples may include structure, acts or details of structures and acts that may not be essential to the present disclosure and are intended to be exemplary. Structure and acts described herein are replaceable by equivalents, which perform the same function, even if the structure or acts are different, as known in the art. Therefore, the scope of the present disclosure is limited only by the elements and limitations as used in the claims.

CLAIMS

WHAT IS CLAIMED IS:

1. A mounting assembly comprising:
 - a mounting rail member to mount to a support member;
 - the support member extending from the mounting rail member to support a chassis;
 - a retention member extending from the mounting rail member to retain the chassis and a cage rail member therein.
2. The mounting assembly of claim 1, wherein the mounting rail member comprises a planar member.
3. The mounting assembly of claim 1, wherein the retention member comprises a first retention member extending approximately perpendicular to the mounting rail member and a second retention member extending from the first retention member approximately parallel to the mounting rail member.
4. The mounting assembly of claim 1, wherein the support member extends approximately perpendicular to the mounting rail member.
5. The mounting assembly of claim 1, wherein the retention member comprises a cantilever spring.
6. A system comprising:
 - a chassis to support an electronic component;
 - a cage connected to the chassis to receive the electronic component, the cage including a cage rail member; and
 - a mounting assembly including:
 - a mounting rail member to mount to a support member and receive the cage rail member;

a support wall extending from the mounting rail member to support the chassis;

a retention member extending from the mounting rail member to retain the chassis and the cage rail member therein.

7. The system of claim 6, further comprising a support structure to receive the mounting assembly.
8. The system of claim 7, wherein the mounting assembly connects to the support structure along a longitudinal plane.
9. The system of claim 7, wherein the support structure comprises a rack.
10. The system of claim 8, wherein the mounting rail member comprises a set of rail members connected to opposing sides of the rack.
11. The system of claim 9, wherein the set of rail members operate independent of one another.
12. The system of claim 6, wherein the mounting rail member and the cage rail member engage.
13. The system of claim 6, wherein the cage rail member comprises a telescoping rail.
14. The system of claim 6, wherein the cage rail member comprises three rails nested in one another.
15. The system of claim 6, wherein the retention member applies a force to the cage rail member to maintain a planar path.

1/5

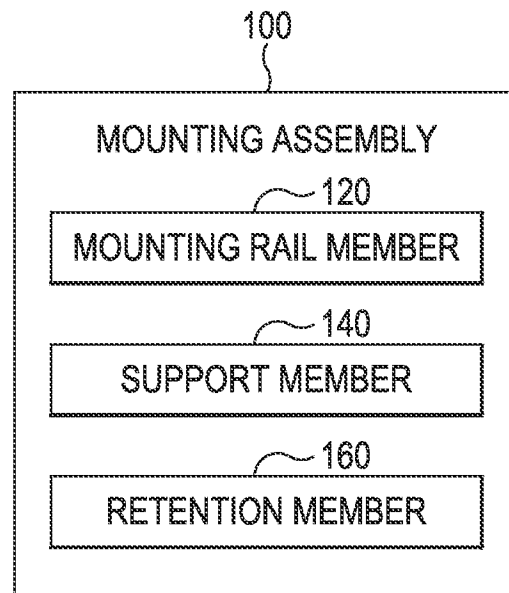


FIG. 1

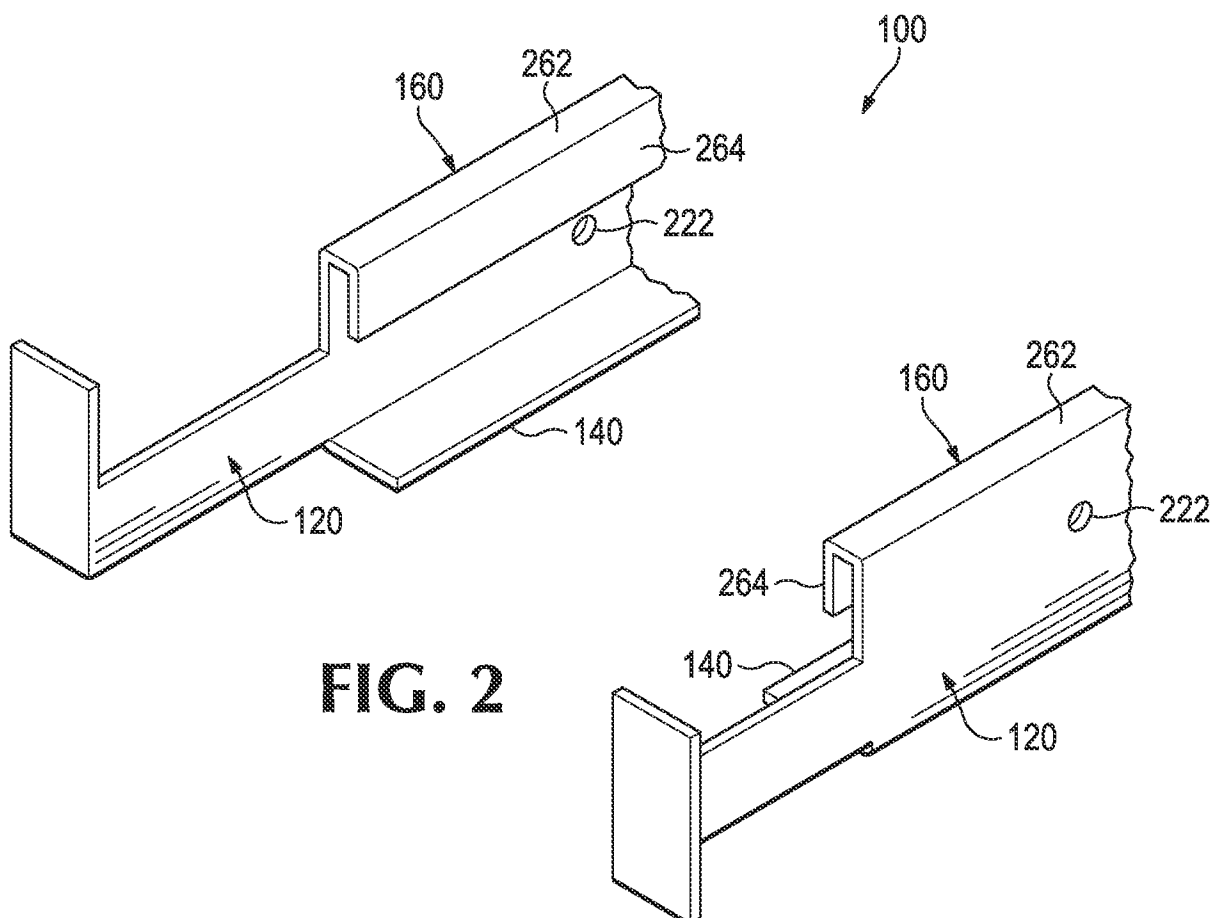
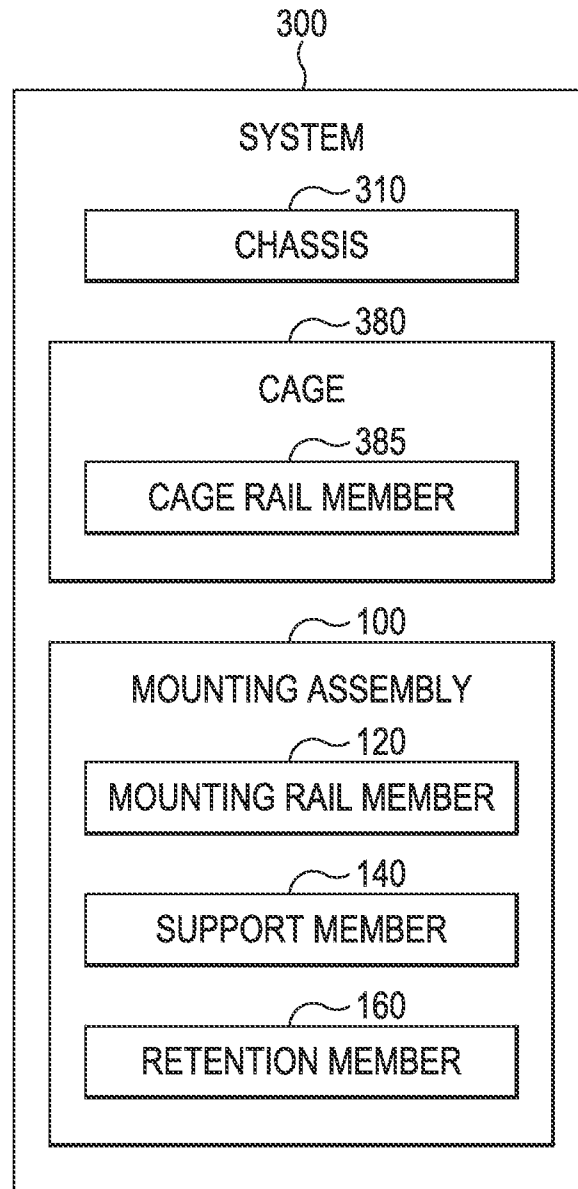
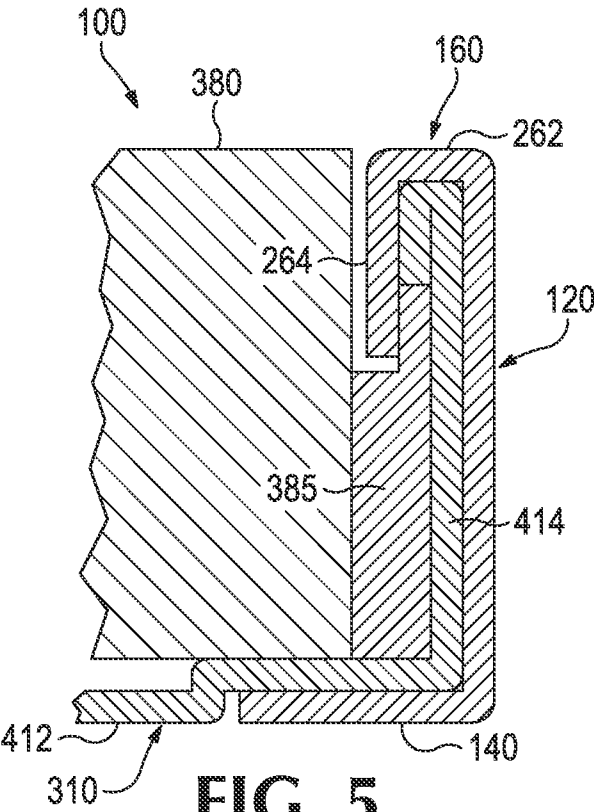
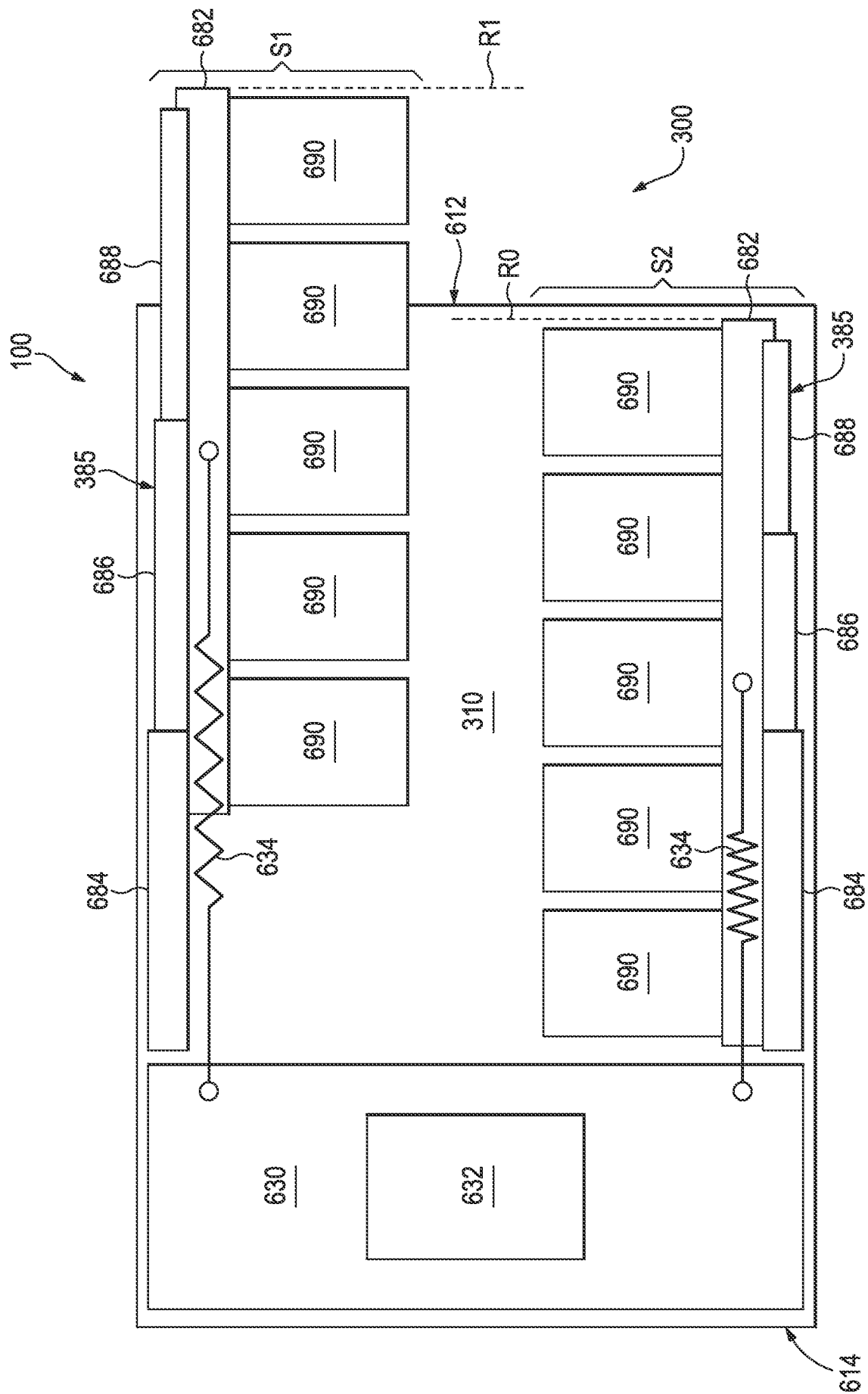


FIG. 2

2/5

**FIG. 3**





உள்ளு

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/045786**A. CLASSIFICATION OF SUBJECT MATTER****G06F 1/16(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)

G06F 1/16; H05K 7/16; H05K 7/20; H05K 7/14; G06F 1/20; H05K 7/00; H01R 13/73

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & keywords: mounting rail member, support member, retention member, chassis, cage, cage rail member

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004-0120123 A1 (DAVID W. MAYER) 24 June 2004 See paragraphs [0019]–[0028]; and figures 1–5.	1–10, 12–15
Y		11
Y	US 2011-0007464 A1 (KEVIN B. LEIGH) 13 January 2011 See paragraphs [0036]–[0043]; and figures 7–8.	11
A	US 2003-0147211 A1 (ROBERT FAIRCHILD) 07 August 2003 See paragraphs [0036]–[0040]; and figure 2.	1–15
A	US 2011-0090637 A1 (KENICHI HIYAMA) 21 April 2011 See paragraphs [0101]–[0103]; and figures 20–21.	1–15
A	US 2014-0160666 A1 (WEN-TANG PENG et al.) 12 June 2014 See paragraphs [0014]–[0016]; and figures 1–2.	1–15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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

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

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

26 February 2015 (26.02.2015)

Date of mailing of the international search report

27 February 2015 (27.02.2015)

Name and mailing address of the ISA/KR

International Application Division
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701,
Republic of Korea

Facsimile No. ++82 42 472 3473

Authorized officer

LEE, Dong Yun

Telephone No. +82-42-481-8734



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2014/045786

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004-0120123 A1	24/06/2004	US 2005-0162838 A1 US 7012808 B2 US 7218526 B2	28/07/2005 14/03/2006 15/05/2007
US 2011-0007464 A1	13/01/2011	CN 101960677 A EP 2248230 A1 EP 2248230 A4 EP 2248230 B1 WO 2009-108205 A1	26/01/2011 10/11/2010 10/10/2012 16/04/2014 03/09/2009
US 2003-0147211 A1	07/08/2003	DE 60317389 D1 DE 60317389 T2 DE 60330283 D1 EP 1333442 A2 EP 1333442 A3 EP 1333442 B1 EP 1881502 A1 EP 1881502 B1 JP 2003-242770 A US 2004-0066621 A1 US 6618249 B2 US 6778387 B2	27/12/2007 11/09/2008 07/01/2010 06/08/2003 28/01/2004 14/11/2007 23/01/2008 25/11/2009 29/08/2003 08/04/2004 09/09/2003 17/08/2004
US 2011-0090637 A1	21/04/2011	CN 102045980 A JP 2011-086346 A US 8670228 B2	04/05/2011 28/04/2011 11/03/2014
US 2014-0160666 A1	12/06/2014	CN 103853256 A TW 201424542 A	11/06/2014 16/06/2014