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(54) Title: BRACKETS TO SECURE STORAGE DRIVES

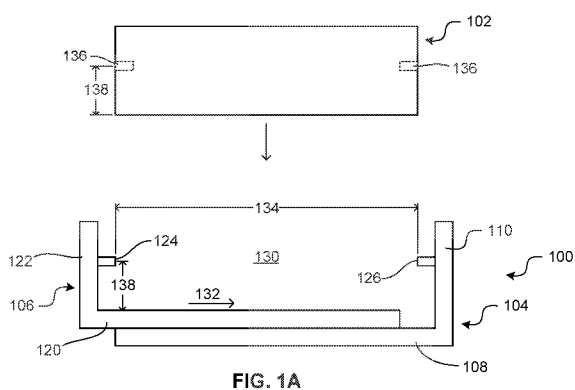


FIG. 1A

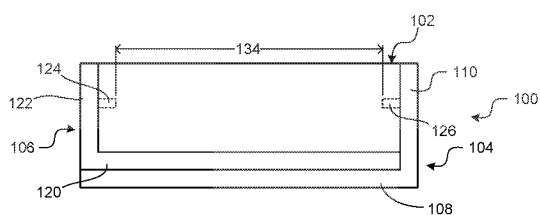


FIG. 1B

(57) Abstract: An example computing device includes a stationary bracket affixed to a chassis of the computing device, and a movable bracket slidable with respect to the stationary bracket. The movable bracket includes an engagement pin. The movable bracket is positionable with respect to the stationary bracket at a disengaged position and an engaged position. The disengaged position of the movable bracket provides clearance between the engagement pin and the stationary bracket to receive insertion and removal of a storage drive through the clearance. The engaged position of the movable bracket reduces the clearance to insert the engagement pin into an opening in the storage drive to secure the storage drive to the computing device.



BRACKETS TO SECURE STORAGE DRIVES

BACKGROUND

[0001] Computing devices often contain storage drives, such as a hard disc drive (HDD) or solid-state drive (SSD), to provide mass storage capabilities. A storage drive may be secured to the inside of a chassis of a computing device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] FIG. 1A is a schematic view of an example securement apparatus to releasably secure a storage drive with a moveable bracket, where the storage drive is shown disengaged from the apparatus.

[0003] FIG. 1B is a schematic view of the securement apparatus of FIG. 1A, where the storage drive is shown engaged by the apparatus.

[0004] FIG. 2 is a top perspective view of another example securement apparatus to releasably secure a storage drive with a moveable bracket.

[0005] FIG. 3 is a bottom perspective view of the securement apparatus of FIG. 2.

[0006] FIGs. 4A to 4E are perspective views illustrating a storage drive being installed in an example securement apparatus.

[0007] FIG. 5 is a perspective view of the securement apparatus of FIG. 2 installed in an example computing device.

[0008] FIG. 6 is a flowchart of an example method of installing a storage drive with an example securement apparatus.

DETAILED DESCRIPTION

[0009] It may be cumbersome and inconvenient to install and remove a storage drive from a computing device. Tools, such as a screwdriver, are often required. A so-called toolless carrier may be used. However, it is often the case that the storage drive must first be attached to such a carrier using a tool. This creates a two-step process, in which the user first installs the drive into the carrier, using a tool, and then installs the carrier with drive into receptacle at the computing device.

[0010] Use of tools may be avoided with an apparatus that includes a slidable bracket that may be positioned in a stationary bracket that is affixed to the chassis of a computing device. Protrusions may be positioned on the slidable bracket to selectively engage with a storage drive. The slidable bracket may be slid relative to the stationary bracket to provide clearance between the protrusions to allow quick insertion and removal of a storage drive. The slidable bracket may be biased to close the clearance and urge the protrusions to seat into standard side screw holes on the storage drive, so as to secure the storage drive in the computer.

[0011] Accordingly, no carrier need be secured to the storage drive in advance of inserting the drive into the computer. The storage drive may be inserted and removed quickly and easily, in one step, with little or no preparation.

[0012] FIGs. 1A and 1B show an example securement apparatus 100 to secure a storage drive 102, such as an HDD or SSD, inside a computing device. Other examples of storage drives include optical drives, magneto-optical disc drives, and magnetic tape drives. The securement apparatus 100 is particularly useful to removably secure storage drives as such devices tend to be uninstalled and replaced from time to time. For example, a storage drive used for archive or backup purposes may become filled and may therefore be swapped for an empty drive to continue with the archive or backup. In another example, a malfunctioning storage drive may be removed and replaced.

[0013] The securement apparatus 100 includes a first, stationary bracket 104 and a second, movable bracket 106.

[0014] The stationary bracket 104 may include a bottom member 108 and a first side member 110. The side member 110 may project upwardly from the bottom member 108. The bottom member 108 and side member 110 may be formed from the same metal plate. The stationary bracket 104 may be an L-bracket, as depicted, or a U-bracket that has another, opposite side member.

[0015] The stationary bracket 104 may be affixed to a chassis of a computing device. For example, the stationary bracket 104 may be secured by screws to an interior frame of a computer tower or case. The stationary bracket 104 may include screw holes in the bottom member 108 for this purpose.

[0016] The movable bracket 106 may include a bottom member 120 and a second side member 122. The side member 122 may project upwardly from the bottom member 120. The bottom member 120 and side member 122 may be formed from the same metal plate. The movable bracket 106 may be an L-bracket. The movable bracket 106 may be consider a tray that is nested in a larger tray, namely the stationary bracket 104, with some clearance to slide on or within the larger tray.

[0017] The moveable bracket 106 includes an inwardly projecting protrusion, such as an engagement pin 124. The engagement pin 124 may be attached to the side member 122. The stationary bracket 104 may include an inwardly projecting protrusion, such as another engagement pin 126 that may be attached to its side member 110.

[0018] The side members 110, 122 of the brackets 104, 106 may be positioned at opposite sides of the apparatus 100 and spaced apart to define a space 130 to fit and secure the storage drive 102. The engagement pins 124, 126 may be positioned on opposite sides of the apparatus 100 and may project into the space 130 in facing directions.

[0019] The movable bracket 106 is slidable with respect to the stationary bracket 104 to adjust the size of the space 130. The movable bracket 106 is movable in the direction of arrow 132 with respect to the stationary bracket 104 between a disengaged position, depicted in FIG. 1A, and an engaged position, depicted in FIG. 1B. The moveable bracket 106 may slide within the stationary bracket 104 between these positions.

[0020] In the disengaged position, the movable bracket 106 provides clearance 134 between the engagement pins 124, 126 with respect to the respective dimension of the storage drive 102. The clearance 134 allows for insertion and removal of the storage drive through the clearance 134 and past the pins 124, 126.

[0021] In the disengaged position, the engagement pins 124, 126 are withdrawn and the storage drive 102 is free to be moved into and out of the space 130. The bottom member 120 of the movable bracket 106 may support the storage drive 102 when the engagement pins 124, 126 are withdrawn. The bottom member 120 of the movable bracket 106 may itself be supported by the bottom member 108 of the stationary bracket 104. As such, the storage drive 102 may be rested in the space 130 before and after securement by the engagement pins 124, 126.

[0022] In the engaged position, the movable bracket 106 reduces the clearance 134 by moving the side member 122. This brings the side members 110, 122 closer together and thereby urges the engagement pins 124, 126 to become inserted into respective openings 136 in the storage drive 102. That is, a pin 124, 126 interferes with a corresponding feature in the outside of the storage drive 102, such as a hole or bore. This secures the secure the storage drive 102 to the securement apparatus 100 and thus to the computing device that holds the securement apparatus 100.

[0023] The movable bracket 106 may be biased into the engaged position, so that the storage drive 102 is secured in place unless a user wishes to release it. Any suitable biasing element may be used, such as a spring.

[0024] A suitable opening 136 in the storage drive 102 may be a standard threaded screw hole that is intended to receive screws to permanently secure the storage drive 102 to a frame or other part of a computing device. An engagement pin 124, 126 may be positioned to align with a standard threaded screw hole and further may be shaped and sized to fit within the standard threaded screw hole. An engagement pin 124, 126 may be unthreaded, so that it may be inserted into and removed from a standard threaded screw hole without being turned.

[0025] An engagement pin 124, 126 may be positioned at a height 138 from the bottom member 120 of the moveable bracket 106, so that the engagement pin 124, 126 is vertically aligned with a corresponding opening 136 in the storage drive 102 when the storage drive 102 rests on the bottom member 120. As such, a user may be free to rest the storage drive 102 in the apparatus while the moveable bracket 106 is in the disengaged position. The height 138 of an engagement pin 124, 126 from the bottom member 120 of the moveable bracket 106 may be the same as the height of the opening 136 from the bottom of the storage drive 102.

[0026] To install a storage drive 102, a user may manually move the movable bracket 106 into the disengaged position, insert the storage drive 102, and then move the movable bracket 106 into the engaged position. To remove a storage drive 102, a user may manually move the movable bracket 106 into the disengaged position and then remove the storage drive 102.

[0027] FIGs. 2 and 3 show another example securement apparatus 200. Features and aspects of the securement apparatus 200 are similar to the securement apparatus 100 with like terminology and reference numerals denoting like components. The description of the apparatus 100 may be referenced for details not repeated here.

[0028] The securement apparatus 200 includes a first, stationary bracket 204 and a second, movable bracket 206.

[0029] The stationary bracket 204 includes a bottom member 208 and opposing side members 210, 212 that extend upwardly from the bottom member 208. The bottom member 208 and side members 210, 212 may be shaped as a U-bracket and may be formed from the same metal plate.

[0030] The stationary bracket 204 may be affixed to a chassis of a computing device by screw holes 214, for example. Screw holes 214 may be provided on a flange 216 that extends from the stationary bracket 204.

[0031] The stationary bracket 204 includes a plurality of engagement pins 226 or other protrusions that project inwardly towards an adjustable space 130 that receives a storage drive. The engagement pins 226 are installed on a side member 210 that defines a boundary of the space 130.

[0032] The movable bracket 206 includes a bottom member 220 and a side member 222 that define other boundaries of the space 130. The side member 222 projects upwardly from the bottom member 220 and is positioned opposite the side member 210 of the stationary bracket 204. The bottom member 220 and side member 222 may be shaped as an L-bracket and may be formed from the same metal plate. The movable bracket 206 may be considered a tray that is nested within the stationary bracket 204 in a slidable manner so that the size of the space 130 may be adjusted.

[0033] The side member 222 of the movable bracket 206 includes a plurality of engagement pins 224 or other protrusions that project inwardly towards the adjustable space 130 that receives the storage drive.

[0034] An engagement pin 224, 226 may be carried by a grommet 240 that includes two wide sections joined by a narrow section. The wide sections fit into a wide portion of an opening 242 in the respective side member 210, 222 and the narrow section fits into a narrowed portion of the opening 242. As such, the grommet 240 may be inserted into the wide portion of the opening 242 and then slid and secured into the narrow portion of the opening 242, so as to affix the engagement pin 224, 226 to the respective side member 210, 222.

[0035] The movable bracket 206 is slidable with respect to the stationary bracket 204 to adjust the size of the space 130 by moving the side member 222 relative to the side member 210 to clamp and release a storage drive using the engagement pins 224, 226. The movable bracket 206 is slidable with respect to the stationary bracket 204 between a disengaged position, in which the engagement pins 224, 226 release the storage drive, and an engaged position, in which the engagement pins 224, 226 interfere with and thereby clamp the storage drive.

[0036] The side member 222 of the movable bracket 206 may be positioned adjacent the side member 212 of the stationary bracket 204 that does not carry an engagement pin. The side member 222 of the movable bracket 206 may include a first depression 250 shaped to fit a user's finger. The side member 212 of the stationary bracket 204 may include a second depression 252 shaped to fit the first depression 250 when the movable bracket 206 is in the disengaged position. A user may thus press their finger into the first depression 250 to move the movable bracket 206 from the engaged position to the disengaged position against a biasing force that urges the movable bracket 206 into the engaged position. A user may pinch the depressions 250, 252 to achieve this motion. A depression 250, 252 may be formed by a notch or bend in a plate that forms the respective side member 222, 210.

[0037] As shown in FIG. 3, the apparatus 200 may include a resilient member 260, such as a spring, to bias the movable bracket 206 to slide with respect to the stationary bracket 204 to urge the moveable bracket 206 into the engaged position and move the engagement pins 224, 226 in a direction that engages the storage drive. Any suitable number of resilient members 260 at various positions may be used.

[0038] The spring 260 may be a wire spring that is braced between a tab 262, 264 on the bottom member 208 of the stationary bracket 204 and a tab 266 on the bottom member 220 of the moveable bracket 206. The tab 266 on the moveable bracket 206 may be captured in a slot 268 in the bottom member 208

of the stationary bracket 204 to allow sliding motion of the moveable bracket 206 with respect to the stationary bracket 204 in the direction of arrow 270. The spring 260 may bias the tab 266, and thus the moveable bracket 206, to the engaged position shown in FIGs. 2 and 3. A user may manually apply a force to the moveable bracket 206 to move the moveable bracket 206 in the direction of arrow 270 against the biasing force of the spring 260 and into the disengaged position.

[0039] The bottom member 220 of the moveable bracket 206 may include a stud 280 that is captured in a slot 282 in the bottom member 208 of the stationary bracket 204 to promote sliding of the moveable bracket 206 with respect to the stationary bracket 204 in the direction 270.

[0040] With reference back to FIG. 2, the moveable bracket 206 may include a front member 290 or a rear member 292 (or both) to position a storage drive with respect to the moveable bracket 206 to align openings at the storage drive with the engagement pins 224, 226. Accordingly, the bottom member 220, front and rear members 290, 292, and side member 222 of the movable tray 206 may cooperate to with the side member 210 of the stationary tray 204 to form a five-sided tray having variable width to receive and secure a storage drive. A front or rear member 290, 292 may include an angled end to guide the storage drive into position within the tray.

[0041] FIGs. 4A to 4E illustrate a storage drive being installed in an example securement apparatus. The above description of the apparatus 200 may be referenced for details not repeated here.

[0042] FIG. 4A shows an engaged position without a storage drive installed. A biasing element, such as a spring, biases a moveable bracket 206 to slide with respect to a stationary bracket 204 to reduce a clearance 400 between respective side members 222, 210 that carry engaging protrusions, such as engagement pins 224, 226.

[0043] FIG. 4B shows a disengaged position. The moveable bracket 206 may be slid in a lateral direction 402 with respect to a stationary bracket 204 against the biasing force to open the clearance 404 between the side members 222, 210. This may be achieved by a user manually applying a force, such as by pinching finger-shaped depressions 252, 250 in the brackets 204, 206.

[0044] While the force is maintained to keep the moveable bracket 206 in the disengaged position, a storage drive 406 may be inserted into the clearance 404, as shown in FIG. 4C. Corresponding openings 408 in the storage drive 406 may be aligned with the engagement pins 224, 226 on the moveable and stationary brackets 206, 204.

[0045] The force on the moveable bracket 206 may be released to cause the biasing force to slide the moveable bracket 206 in direction 410 to close the clearance 404 and force the engagement pins 224, 226 into the openings 408 to secure the storage drive 406.

[0046] FIG. 4E shows the engaged position with the storage drive 406 installed. The clearance 400 is reduced so that the engagement pins 224, 226 are inserted into the openings 408 in the storage drive to secure the storage drive 406 between the brackets 204, 206.

[0047] To remove the storage drive 406, the process discussed above may be followed in reverse.

[0048] FIG. 5 shows an example computing device 500 including an example securement apparatus 200. The securement apparatus 200 may be affixed to chassis 502 of the computing device 500 by screws or other fasteners. The chassis 502 may be a frame or frame component of a tower or case that provides a housing for the internal components of the computing device 500, such as a mainboard, processor, memory, power supply, and so on.

[0049] FIG. 6 shows an example method 600 of installing a storage drive with an example securement apparatus. The above description of the apparatus 100, 200 may be referenced for details not repeated here. FIGs. 4A to 4E will be

referenced for convenience and it should be understood that the method 600 may be used with other apparatuses.

[0050] At block 602, a moveable bracket is slid with respect to a stationary bracket. The movable bracket is slid against a biasing force, such as may be provided by a spring, to open a clearance within a chassis of a computing device. A user may manually actuate the moveable bracket to move in this manner with, for example, their hand or finger. An example of block 602 is shown in FIGs. 4A and 4B.

[0051] At block 604, a storage drive is inserted into the clearance. Openings, such as threaded screw holes, in the storage drive are aligned with protrusions, such as posts or pins, on the moveable and stationary brackets. A user may hold the moveable bracket against the biasing force with one hand, while positioning the storage drive with the other hand. An example of block 604 is shown in FIGs. 4C and 4D.

[0052] At block 606, the moveable bracket is released to cause the biasing force to automatically close the clearance and force the protrusions on the moveable and stationary brackets into the openings on the storage drive to secure the storage drive to the computing device. A user may first let go of the moveable bracket, wait for engagement, and then let go of the storage drive to achieve this. If the storage drive is not seated to receive all the engagement pins into their respective openings, the user may wiggle or otherwise make a minor manual adjustment to the position of the storage drive to urge, via the biasing force, all the engagement pins to properly engage. An example of block 606 is shown in FIG. 4E.

[0053] To remove the storage drive, the method 600 is modified so that, at block 604, the storage drive is retrieved from the apparatus after disengagement of the pins at block 602. At block 606, the moveable bracket is released without the storage device present.

[0054] In view of the above, it should be apparent that a movable bracket may be nested in a stationary bracket that may be affixed to the chassis of a computing device. Protrusions may be positioned on the brackets to selectively engage with a storage drive. The movable bracket may be slid relative to the stationary bracket to provide clearance between the protrusions to allow quick insertion and removal of a storage drive. A biasing element may be provided to urge the clearance to close and to urge the protrusions to seat into standard side screw holes on the storage drive. The storage drive need not be secured to a bracket or other carrier in advance of insertion into the computer. The storage drive may be inserted and removed quickly and easily, in one step, with little or no preparation. One hand of the user may open and close the securement apparatus, while their other hand may position the storage drive in place.

[0055] It should be recognized that features and aspects of the various examples provided above can be combined into further examples that also fall within the scope of the present disclosure. In addition, the figures are not to scale and may have size and shape exaggerated for illustrative purposes.

CLAIMS

1. A computing device comprising:

a stationary bracket affixed to a chassis of the computing device; and

a movable bracket slidable with respect to the stationary bracket, the moveable bracket including an engagement pin, the movable bracket positionable with respect to the stationary bracket at a disengaged position and an engaged position;

wherein the disengaged position of the movable bracket provides clearance between the engagement pin and the stationary bracket to receive insertion and removal of a storage drive through the clearance; and

wherein the engaged position of the movable bracket reduces the clearance to insert the engagement pin into an opening in the storage drive to secure the storage drive to the computing device.

2. The computing device of claim 1, wherein the stationary bracket comprises another engagement pin positioned to provide the clearance when the moveable bracket is in the disengaged position and to fit into a second opening in the storage drive when the moveable bracket is in the engaged position to secure the storage drive to the computing device.

3. The computing device of claim 2, wherein the engagement pins are positioned on opposite sides of an apparatus formed of the stationary bracket and the moveable bracket.

4. The computing device of claim 2, further comprising a plurality of engagement pins at the movable bracket and a plurality of engagement pins at the stationary bracket.

5. The computing device of claim 1, wherein the engagement pin is unthreaded and is shaped and sized to fit within a threaded screw hole of the storage drive.

6. The computing device of claim 1, further comprising a spring between the movable bracket and the stationary bracket to bias the moveable bracket into the engaged position.

7. The computing device of claim 1, wherein the movable bracket includes a first depression shaped to fit a user's finger to slide the movable bracket, and wherein the stationary bracket includes a second depression shaped to fit the first depression when the movable bracket is in the disengaged position.

8. A computing device comprising:

a first bracket including a first side member;

a second bracket including a second side member positioned opposite the first side member and spaced apart from the first side member fit a storage drive; and

protrusions positioned on the first and second side members to engage with openings at the storage drive;

wherein the second bracket is slidable with respect to the first bracket to urge the protrusions into the openings to secure the storage drive between the first and second side members.

9. The computing device of claim 8, wherein the second bracket includes a bottom member to support the storage drive when a protrusion at the second side member is withdrawn from an opening of the storage drive to free the storage drive from the computing device.

10. The computing device of claim 9, wherein the first bracket includes a bottom member to support the bottom member of the second bracket.

11. The computing device of claim 8, further comprising a resilient member to bias the second bracket to slide with respect to the first bracket to urge the protrusions into the openings to secure the storage drive to the computing device.

12. The computing device of claim 8, wherein the second bracket includes a front member, a rear member, or both front and rear members to position the storage drive with respect to the second bracket to align the openings at the storage drive with the protrusions.

13. The computing device of claim 8, wherein the first bracket includes a first tray formed of flat plate, wherein the second bracket includes a second tray formed of flat plate, and wherein the second tray is nested within the first tray.

14. The computing device of claim 8, comprising multiple protrusions positioned on the first side member and multiple protrusions positioned on the second side member.

15. A method comprising:

sliding a moveable bracket with respect to a stationary bracket against a biasing force to open a clearance within a chassis of a computing device;

inserting a storage drive into the clearance and aligning openings in the storage drive with protrusions on the moveable and stationary brackets; and

releasing moveable bracket to cause the biasing force to close the clearance and force the protrusions into the openings to secure the storage drive to the computing device.

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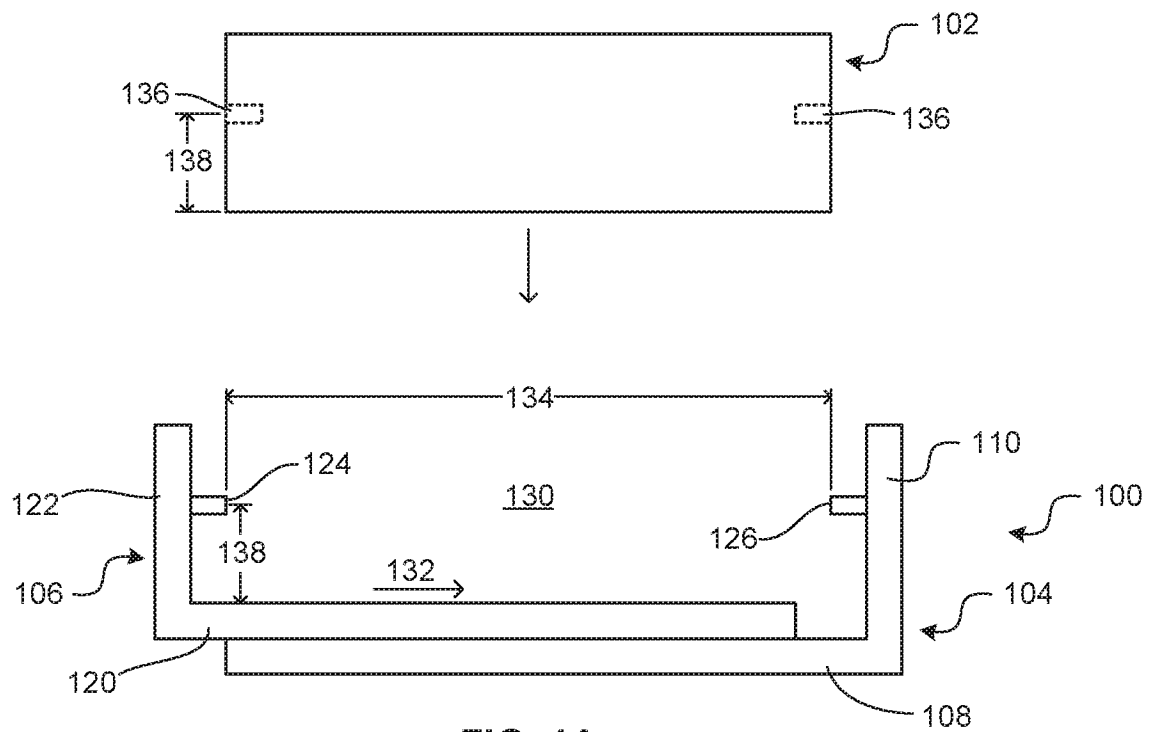


FIG. 1A

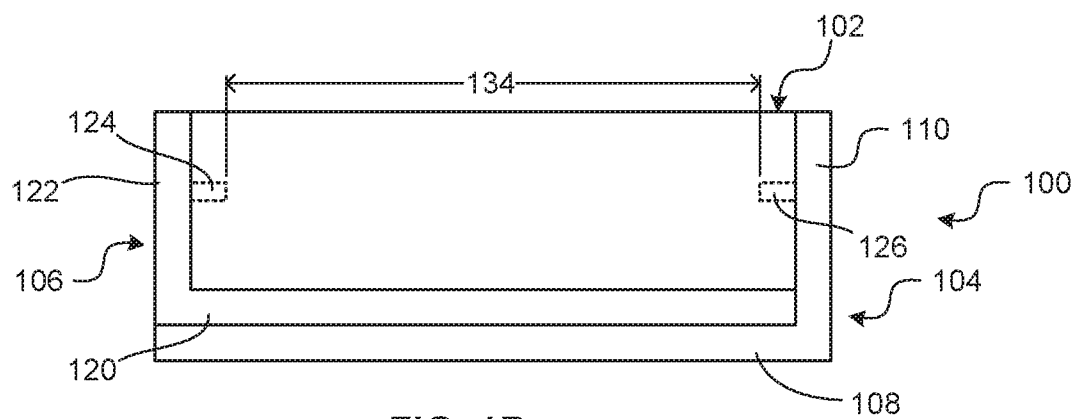


FIG. 1B

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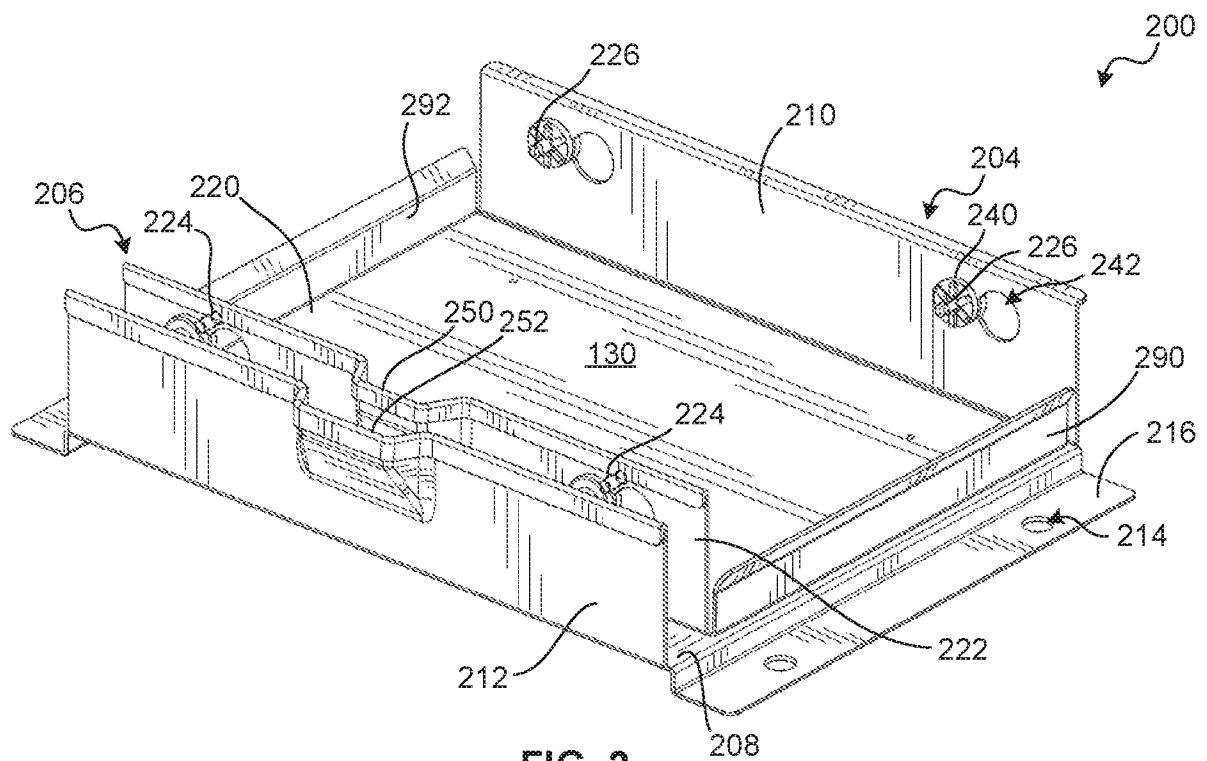


FIG. 2

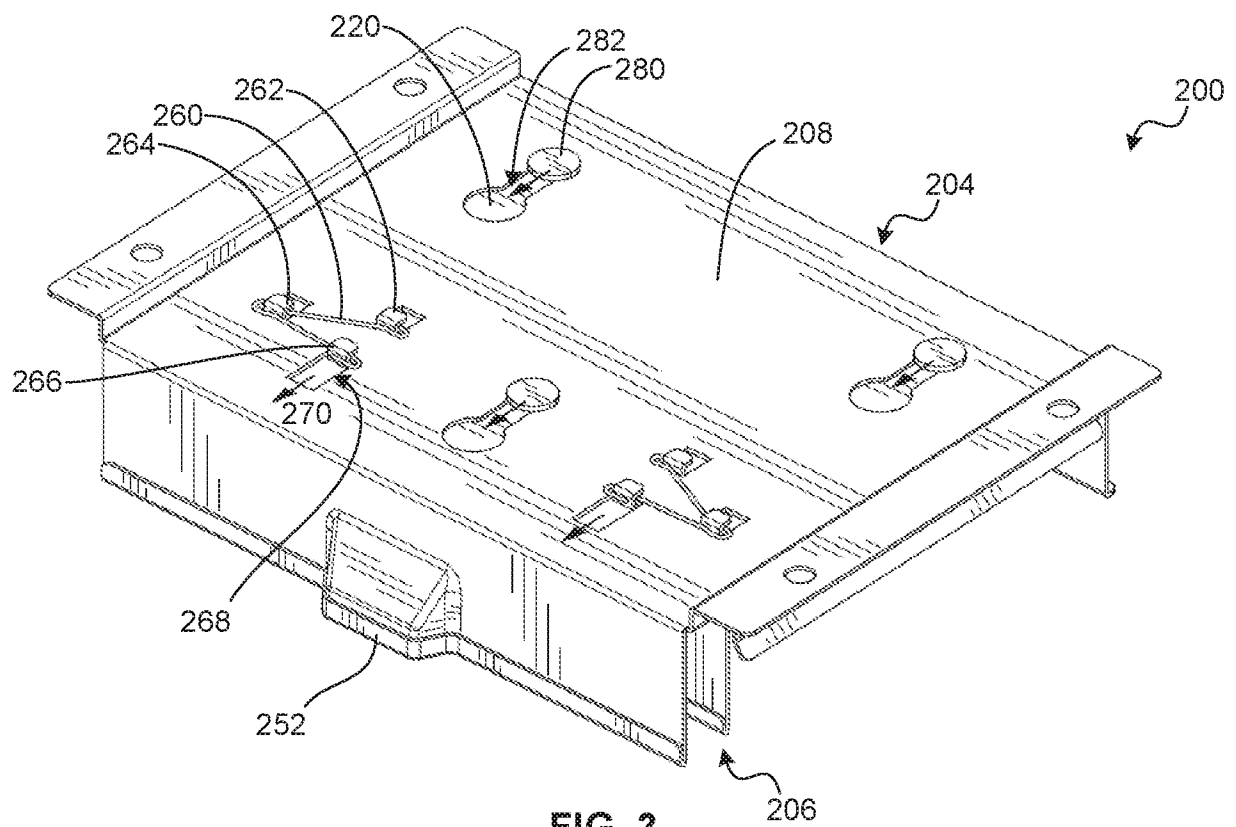


FIG. 3

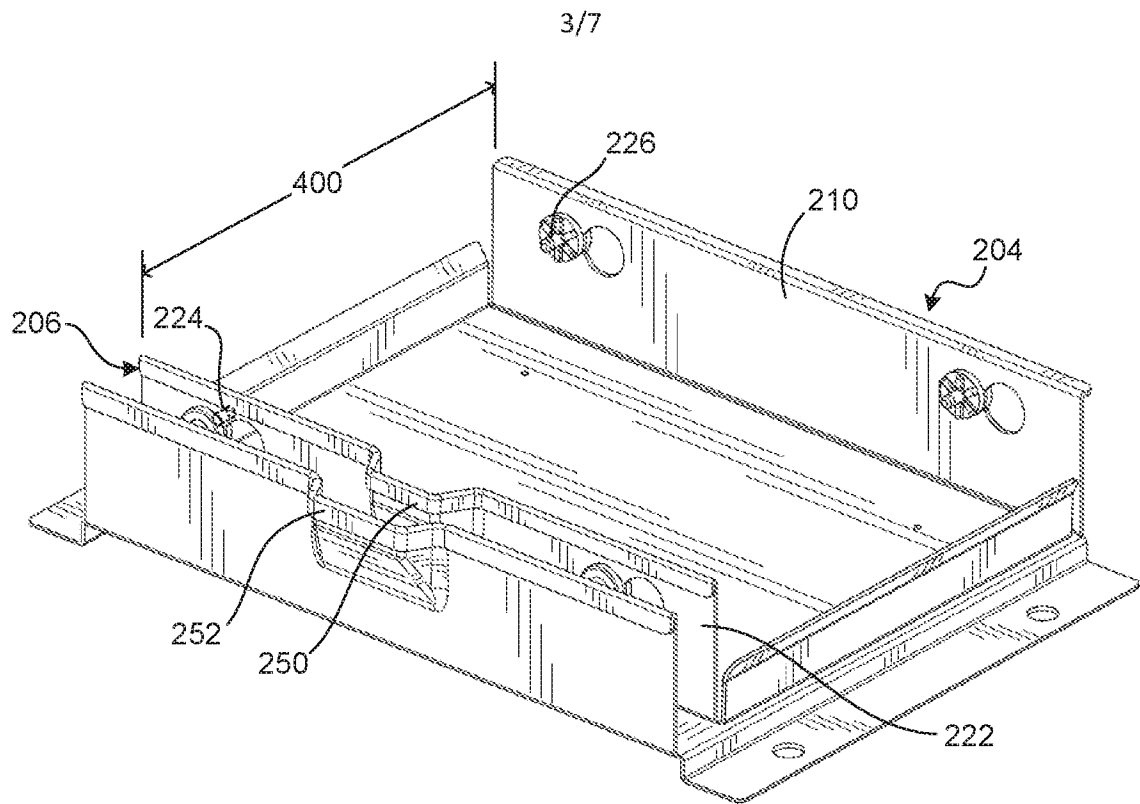


FIG. 4A

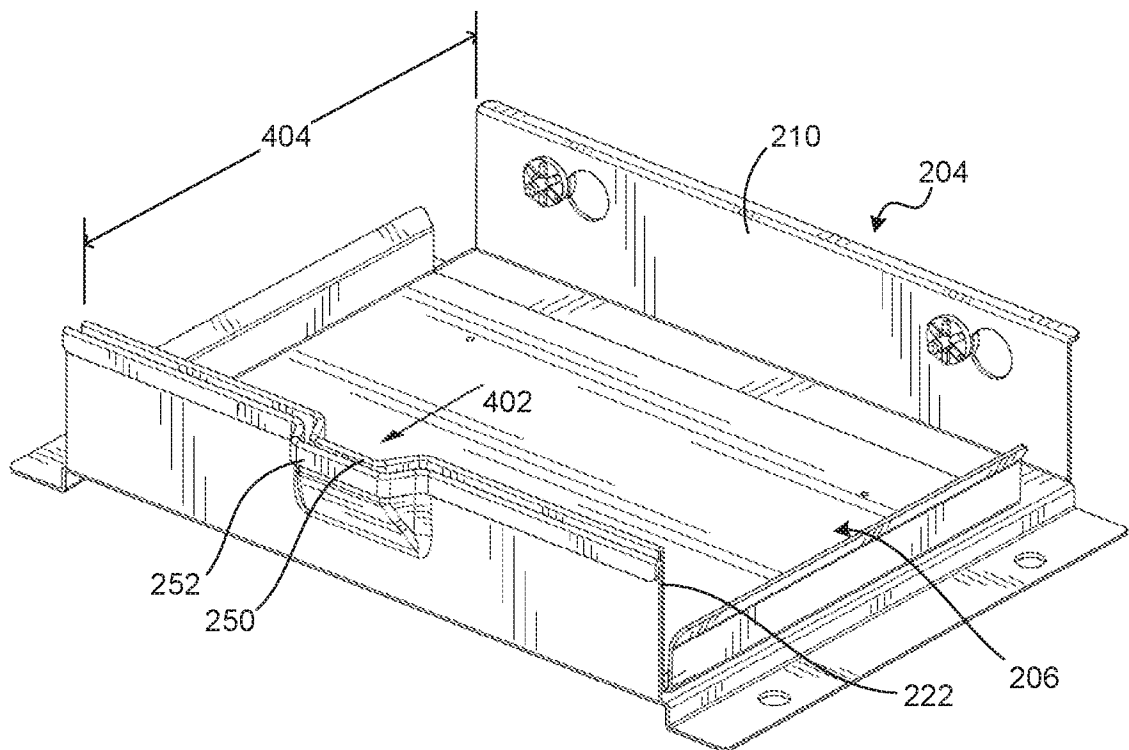


FIG. 4B

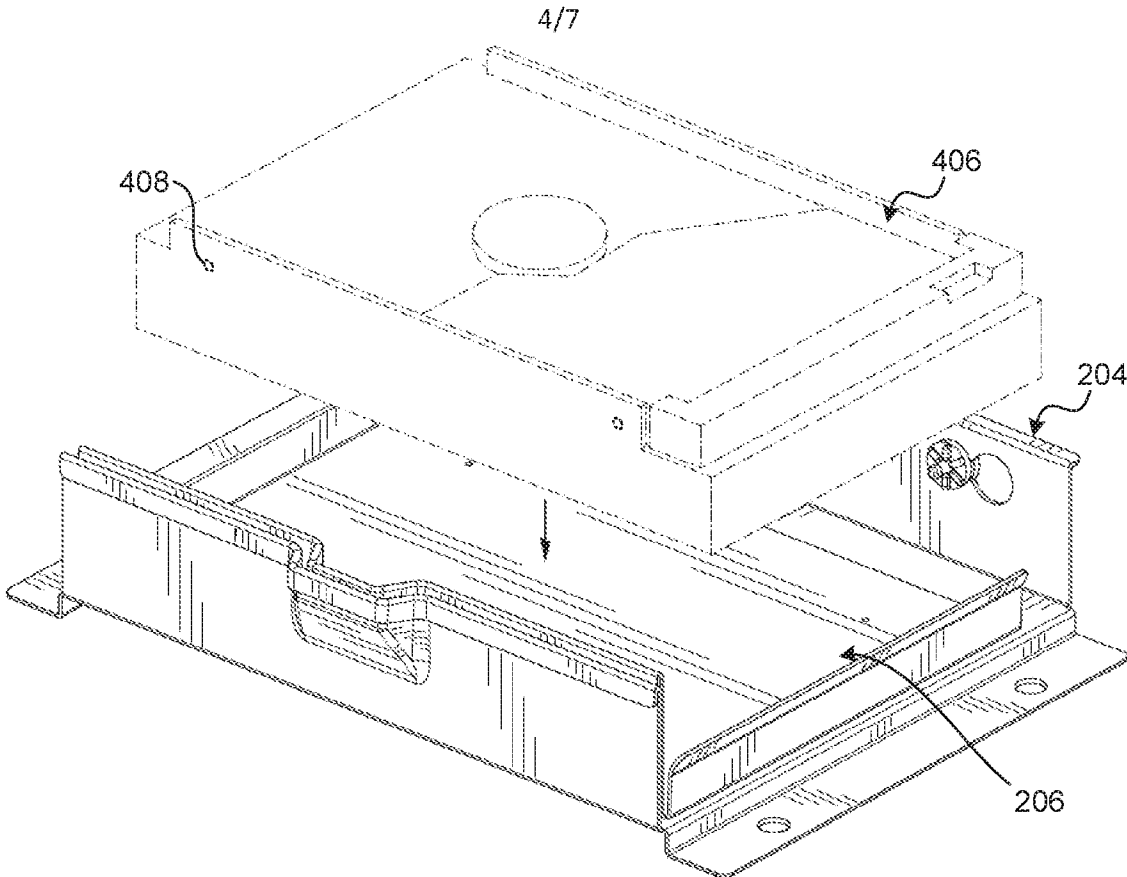


FIG. 4C

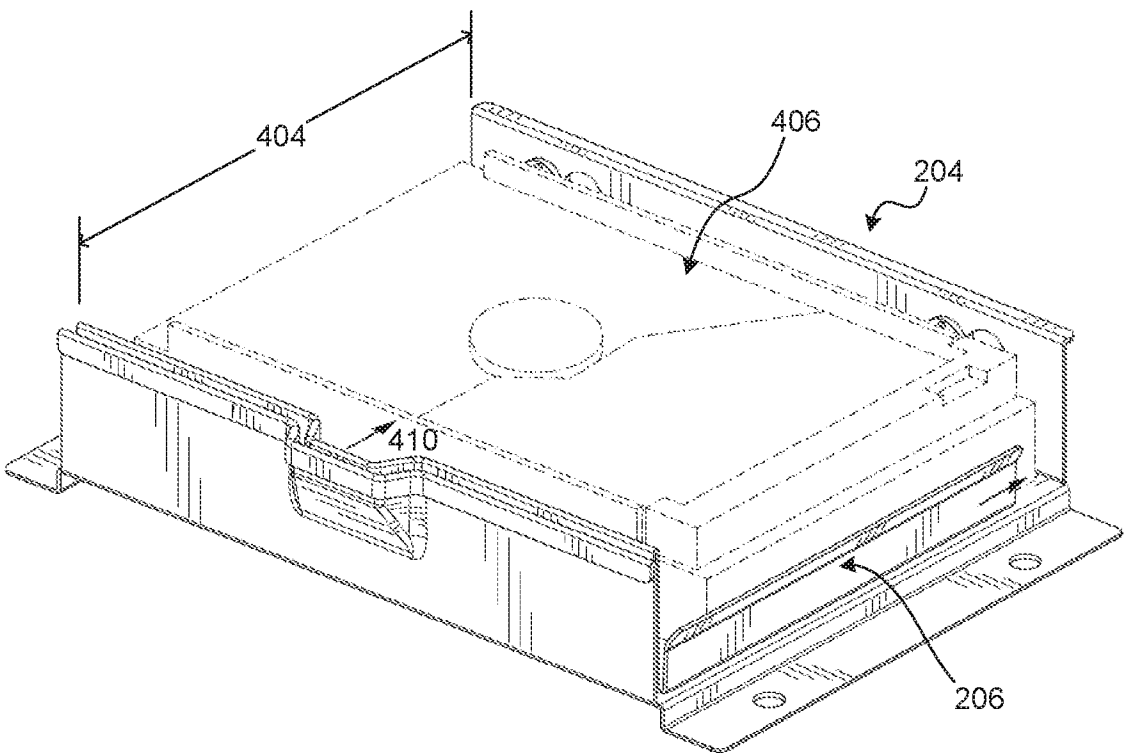


FIG. 4D

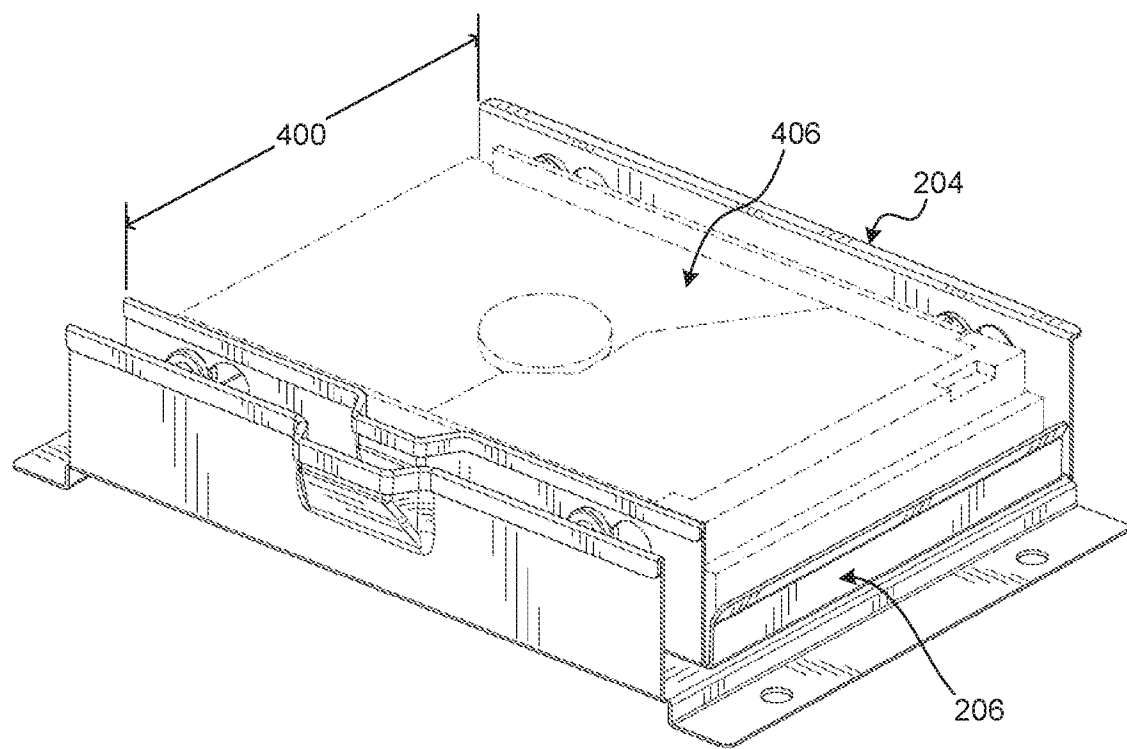


FIG. 4E

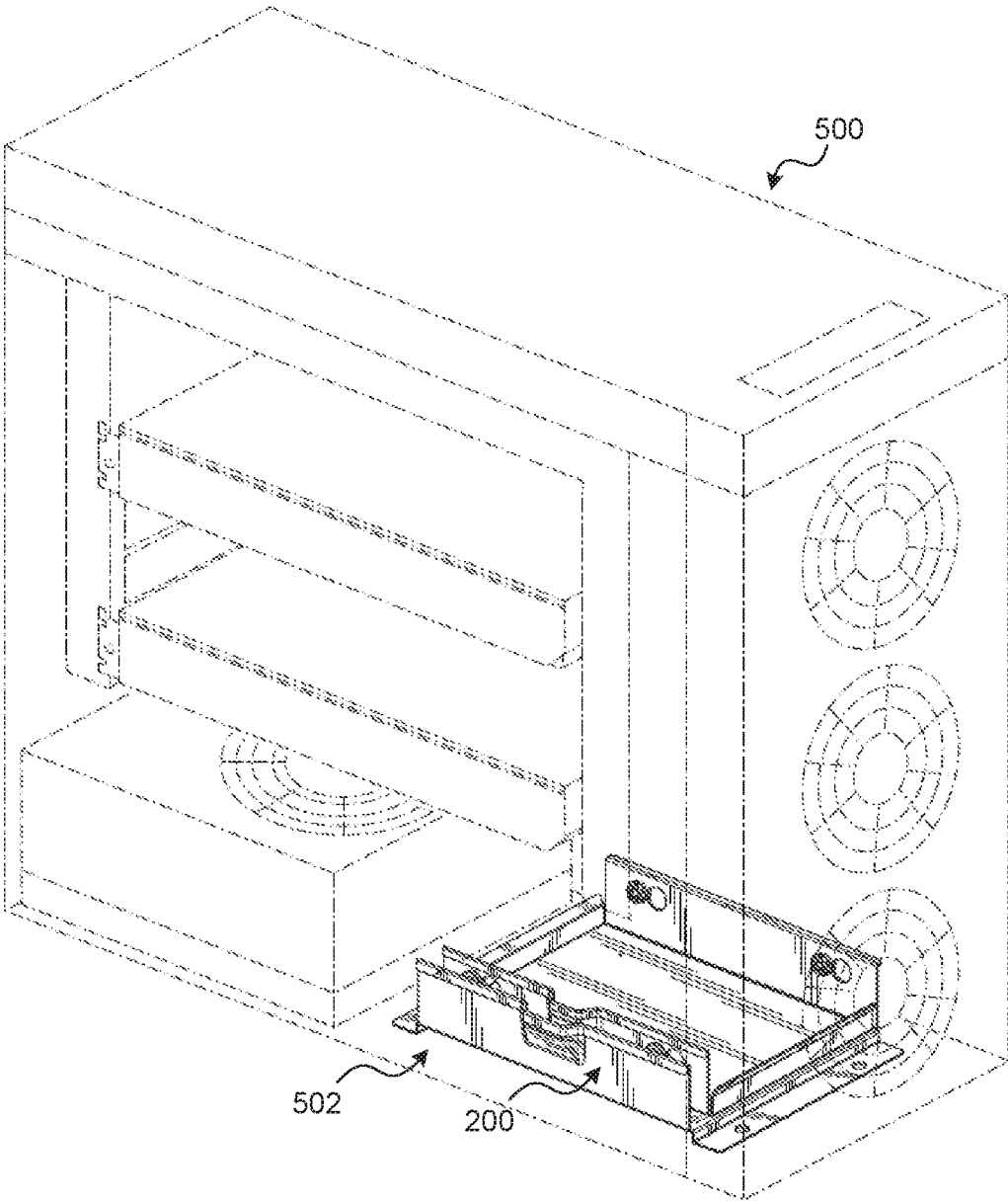


FIG. 5

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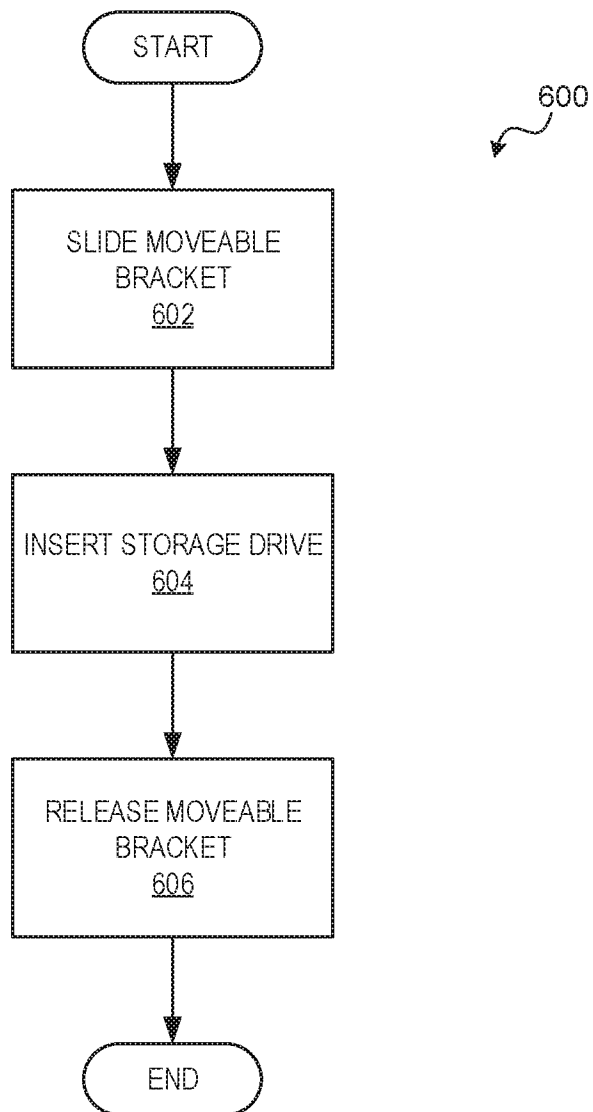


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 2020/043943

A. CLASSIFICATION OF SUBJECT MATTER		
G06F 1/16 (2006.01) G06F 1/26 (2006.01) H05K 5/00 (2006.01)		
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 1/00, 1/16, 1/26, H05K 5/00, 5/02, 5/04, 7/00, 7/18		
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)		
PatSearch (RUPTO Internal), USPTO, PAJ, Espacenet, Information Retrieval System of FIPS		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	RU 158402 U1 (AIC INC.) 27.12.2015, paragraphs [0019]-[0020], claim 1, figures 1-3, positions 150, 154, 190, 500, 550	1-6
A		7-15
Y	US 6217359 B1 (DEAN CHANG) 17.04.2001, claim 1, figure 2, positions 11a, 12a	1-6
A		7-15
Y	US 2008/0295123 A1 (TAKAYUKI FUJIMOTO et al.) 27.11.2008, paragraphs [0050]-[0051], figures 1-2, positions 1-3, 6	1-6
Y	US 2002/0035657 A1 (CHENG-CHUN CHANG) 21.03.2002, figures 1, 3	3, 4
A	US 6560099 B1 (CHENG-CHUN CHANG) 06.05.2003	1-15
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
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Date of the actual completion of the international search		Date of mailing of the international search report
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