



(51) International Patent Classification:

H02G 3/04 (2006.01) *H05K 7/02* (2006.01)

(21) International Application Number:

PCT/CN2017/112264

(22) International Filing Date:

22 November 2017 (22.11.2017)

(25) Filing Language:

English

(26) Publication Language:

English

(71) Applicant (for all designated States except US): **GENERAL ELECTRIC COMPANY** [US/US]; 1 River Road, SchenctadY, New York 12345 (US).

(72) Inventors; and

(71) Applicants (for US only): **RINDY, Ryan Walter** [US/US]; 3030 Ohmeda Drive, Madison, Wisconsin 53718-6704 (US). **YAO, Qiang** [CN/CN]; National Hi-Tech Development Zone, 19 Changjiang Road, Wuxi, Jiangsu 214028 (CN). **LONYAY, Janos Gyorgy** [US/US]; 3030 Ohmeda Drive, Madison, Wisconsin 53718-6704 (US). **BLAIR, Mark Steven** [US/US]; 3030 Ohmeda Drive, Madison, Wisconsin 53718-6704 (US). **HYTTIAINEN, Eero Tapio** [FI/FI]; Kuortaneenkatu 2, Helsinki, 00510 (FI). **ZHANG, Wei** [CN/CN]; No.1800, Cailun Road, Pudong District,

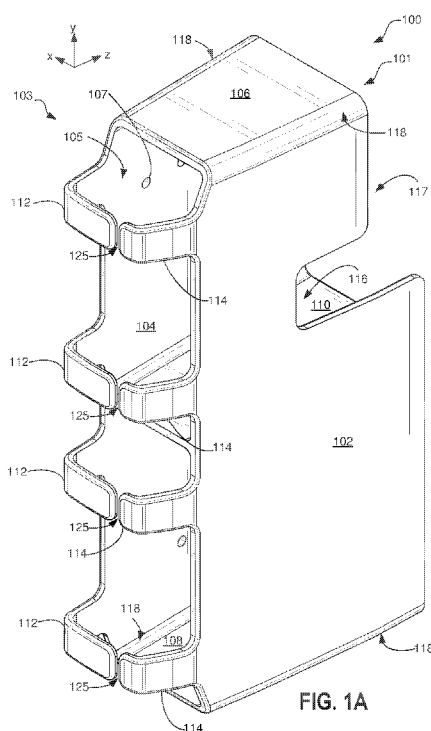
Shanghai 201203 (CN). **HOU, Jun** [CN/CN]; No.1800, Cailun Road, Pudong District, Shanghai 201203 (CN).

(74) Agent: **SHANGHAI PATENT & TRADEMARK LAW OFFICE, LLC**; 435 Guiping Road, Shanghai 200233 (CN).

(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, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, 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, ST, 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,

(54) Title: CABLE MANAGEMENT SYSTEM



(57) Abstract: Methods and systems are provided for a cable management system. In one embodiment, a method comprises a cable management unit with an integrated cable channel and a cable storage portion.

TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

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

CABLE MANAGEMENT SYSTEM

FIELD

[1] Embodiments of the subject matter disclosed herein relate to cable management, and more particularly, to cable management in healthcare.

BACKGROUND

[2] In integrated healthcare systems, a medical workstation often includes medical devices interconnected with plurality of other devices such as computing devices, electrical devices, etc., for patient monitoring, diagnostic, and treatment purposes. Multiple cables and/or wires are utilized for connecting the various devices. Typically, the connecting cables are long, and a user has to identify potential storage options for extra cable length. As a result, medical workstations are often cluttered with cables and wires bundled up in a disorganized manner. Further, time required for setting-up the workstation is long. Consequently, efficiency of the workstation is reduced, as the user has to navigate around the cabling or move the cabling to perform a certain task. Thus, a dedicated storage space for the cables and/or wires at locations that do not interfere with workstation performance is required. In addition, a system that allows faster cabling for workstation set-up is required.

BRIEF DESCRIPTION

[3] In one embodiment, a cable management unit comprises a cable storage portion including a left side wall, a right side wall, a top end wall, and a bottom end

wall with an open front; and a cable channel portion including one or more flexible fingers extending outward from the right side wall and the left side wall.

[4] In this way, an integrated cable routing and cable storage solution for cable management is achieved via the cable management unit. For example, the cable channel portion provides a dedicated cable routing path, while the cable channel portion provides a dedicated cable storage space for securing and storing excess cable length. Further, the cable management unit with the flexible fingers also allows for easier reorganization and dismantling cables and/or wires. Further, multiple cable management units can be arranged on a medical workstation, such as a medical cart, to achieve a desired cable routing path that provides minimal interference with workflow and excess cable length can be stored within the integrated cable storage portions. As a result, interconnecting cables may be secured and stored in an organized manner. Further, faster cabling times during workstation set up can be achieved.

[5] It should be understood that the brief description above is provided to introduce in simplified form a selection of concepts that are further described in the detailed description. It is not meant to identify key or essential features of the claimed subject matter, the scope of which is defined uniquely by the claims that follow the detailed description. Furthermore, the claimed subject matter is not limited to implementations that solve any disadvantages noted above or in any part of this disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[6] The present invention will be better understood from reading the following description of non-limiting embodiments, with reference to the attached drawings, wherein below:

[7] FIG. 1A shows a front perspective view of a cable management unit, according to the present disclosure.

[8] FIG. 1B shows a front perspective view of the cable management unit of FIG. 1A including an example cable.

[9] FIG. 1C shows a back perspective view of the cable management unit of FIG. 1A.

[10] FIG. 1D shows a right side view of the cable management unit of FIG. 1A.

[11] FIG. 1E shows a left side view of the cable management unit of FIG. 1A.

[12] FIG. 1F shows a top view of the cable management unit of FIG. 1A.

[13] FIG. 2 shows an example cable management system including a cable management unit, such as cable management unit of FIG. 1A.

[14] FIG. 3 shows the cable management system of FIG. 2 including a door and an access door, where the access door is shown in an open position.

[15] FIG. 4 shows the cable management system of FIG. 2 including the door and the access door in closed positions.

[16] FIG. 5 shows another example cable management system with a door and an access door in closed positions.

[17] FIG. 6 shows an example cable management system utilized on a medical workstation, including routing and storage of one or more cables and wires.

[18] FIG. 7 - 10 show perspective views of example cable management units including one or more configurations for routing and storing cables and/or wires.

DETAILED DESCRIPTION

[19] The following description relates to various embodiments of a cable management system. In particular, systems and methods are provided for managing cable routing and storage in an integrated medical workstation including multiple devices. For example, integrated cable routing and storage may be provided by a cable management unit, as shown in FIGS. 1A – 1F. A cable management system including the cable management unit is shown in FIG. 2. The cable management system may be equipped with a door and an access door as shown in FIGS. 3 – 5. Further, an example arrangement, including routing and storage, of cables in a medical workstation, specifically, a respiratory workstation, by utilizing the cable management unit of FIGS 1A – 1F is shown in FIG. 6. Furthermore, different storage, cable routing, and cable retaining configurations of the cable management unit are illustrated in FIGS. 7 – 10.

FIGURE DESCRIPTIONS

[20] A technical effect of the disclosure is improved storage solution for cables and/or wires in an integrated workstation including multiple interconnected devices. Another technical effect of the disclosure is easier and faster cabling process during workstation set-up.

[21] In one embodiment, a cable management unit comprises a cable storage portion including a left side wall, a right side wall, a top end wall, and a bottom end

wall with an open front; and a cable channel portion including one or more flexible fingers extending outward from one or more of the right side wall and the left side wall. The cable management unit further includes, wherein the cable storage portion includes one or more dividers separating the cable storage portion into two or more compartments, wherein the divider is a horizontal divider positioned perpendicular to the left and right side walls. The cable management unit further includes wherein the divider is a vertical divider positioned parallel to the left and right side walls. The cable management unit further includes wherein, the one or more fingers extend outward in front of the cable storage portion; wherein the one or more flexible fingers are arranged in pairs; wherein each pair includes a first finger and a second finger, and further includes include a gap between the first finger and the second finger. The cable management unit further includes wherein the right side wall includes a recessed portion at the back, and wherein the recessed portion includes a recessed opening, wherein the cable storage portion includes one or more retainers for securing cables within the cable storage portion; and wherein the cable storage portion includes an open back. The cable management unit further comprises a second cable channel portion including one or more second flexible fingers extending outward from a back edge of the right side wall and a back edge of the left side wall. The cable management unit further includes, wherein the cable storage portion includes a tab with one or more screw holes for mounting the cable management unit, and wherein the one or more fingers extend outward sideways from the cable storage portion such that the one or more fingers form a channel for routing one or more cables and wires on the side.

[22] In another embodiment, a cable management system for a medical cart comprises a panel; and one or more cable management units and one or more horizontal bridge portions positioned on the panel, each of the one or more cable management units including a cable storage portion and a cable channel portion, wherein the cable storage portion includes a left side wall, a right side wall, a top end wall, and a bottom end wall with an open front, and wherein the cable channel portion includes one or more sets of fingers extending forward from a front edge of the right side wall and a front edge of the left side wall. The cable management system further comprises one or more twist ties positioned on the panel, wherein the positioning of the one or more cable management units, the one or more horizontal bridge, and the one or more twist ties defines a curved cable pathway, wherein the curved cable pathway has a figure eight pattern. The cable management further comprises one or more clips positioned on the panel, a first door for covering the panel, and a second access door within the first door, and wherein the first door opens sideways; and wherein, the second check door opens downwards. The cable management system further includes wherein the cable storage portion includes a divider that separates the cable storage portion into two compartments.

[23] In another embodiment, a modular cable management system for a medical workstation comprises: a cart including a rear panel; a lower middle compartment for storing one or more cylinders; a right compartment including one or more cable management units; a left compartment including the one or more cable management units and one or more twist ties; and a horizontal routing bridge positioned above the lower middle compartment; wherein, each of the one or more cable management unit includes a cable storage portion and a cable channel portion; and wherein an

arrangement of the one or more cable management units, the one or more twist ties, and the horizontal routing bridge on the rear panel defines a figure eight cable pathway with an intersection at the horizontal routing bridge. The modular cable management system further comprises a first door for covering the rear panel, and a second access door within the first door for accessing an upper portion of the one or more cylinders, wherein the rear panel includes one or more openings configured as cable entry or cable exit ports.

[24] FIG. 1A shows a front perspective view of a cable management unit 100. Cable management unit 100 is configured to guide one or more cables or wires through a channel while storing excess cable. Cable management unit 100 includes a cable storage portion 101 and a cable channel portion 103. Cable storage portion 101 includes a right side wall 102, a left side wall 104, a first end wall 106, and a second end wall 108 forming an enclosure with an open front and an open back. In one example, cable storage portion 101 may include a back wall in addition to right side wall 102, left side wall 104, first end wall 106, and second end wall 108, thus forming an enclosure with an open front.

[25] Right side wall 102 and left side wall 104 are contiguous at the top and bottom with first end wall 106 and second end wall 108 respectively. Right side wall 102 and left side wall 104, each include a recessed portion 117 at the back. While the present example includes the recessed portion for each side wall, it will be appreciated that examples where left side wall 104 and/or right side wall may not include recessed portion 117 are also within the scope of the disclosure. In other words, a back edge of each right side wall 102 and left side wall 104 may be a planar edge, where the planar edge is defined as an edge lacking any recessed portion or folding.

[26] Right side wall 102 includes a recessed opening 116 within recessed portion 17, which may be utilized as an inlet through which cables and/or wires can be threaded into the cable storage portion 101. Further, recessed opening 116 may be utilized as an outlet for cables and/or wires. A boundary of recessed opening 116 includes a top surface 116a, a side surface 116b, and a bottom surface 116c, where top and bottom surfaces 116a and 116c are perpendicular to side surface 116b. In some examples, recessed opening 116 may be circular, semi-circular, triangular or any other geometric shape. While the present example shows recessed opening 116 on the right side wall 102, in some examples, recessed opening 116 may be provided on one or more of left side wall 104, first end wall 106, and second end wall 108. Further, while the present example shows one recessed opening for cable storage portion 101, in some examples, more than one recessed opening may be included. Further, edges 118 of cable storage portion 101 are rounded. In some examples, edges 118 may be sharp.

[27] Left side wall 104 may include one or more openings 107. In one example, one or more openings 107 may be utilized as entrance and/or exit portals for cables and/or wires. In another example, one or more openings 107 may be used to secure the cable management unit to a panel or wall.

[28] Cable storage portion 101 further includes a divider 110 that separates cable storage portion 101 into two compartments. Divider 110 is coupled to right side wall 102 and left side wall 104. Further, divider 110 is positioned perpendicular to both right side wall 102 and left side wall 104. Thus, divider 110 is configured as a horizontal divider that separates cable storage portion 101 into an upper compartment and a lower compartment.

[29] In one example, divider 110 may be immovably coupled with right and left side walls 102 and 104, thus position of divider 110 may be fixed. In another example, divider 110 may be configured as a movable plate. In the above example, volumes of the upper and lower compartments may be adjusted based on the position of divider 110. For example, when a larger upper or lower compartment is desired, divider 110 may be moved towards bottom or top respectively.

[30] In another example, divider 110 may be coupled to first end wall 106 and second end wall 108, and positioned perpendicular to first end wall 106 and second wall 108. In this example, divider 110 may be configured as a vertical divider, separating cable storage portion into a right compartment and a left compartment. Further, when configured as a vertical divider, divider 110 may be fixed to provide equal volumes for the left and right compartments, or movably coupled to adjust the volumes of the left and right compartment as desired. For example, when a larger left or right compartment is desired, divider 110 may be moved towards right or left respectively.

[31] In yet another example, divider 110 may be coupled to right side wall 102 and left side wall 104. However, divider 110 may be positioned at an angle with respect to both right side wall 102 and left side wall 104 such that divider 110 is not perpendicular to left side wall 102 and right side wall 104. Thus, divider 110 may be configured as a first angular divider.

[32] In another example, divider 110 may be coupled to first end wall 106 and second end wall 108, and positioned at an angle with respect to first end wall 106 and second end wall 108 such that divider 110 is not perpendicular to the first and second end walls. Thus, divider may be configured as a second angular divider.

[33] Further, when configured as the horizontal divider or the first angular divider, divider 110 may extend up to the entire width of left side wall 104 and right side wall 102. In some examples, divider 110 may not extend up to a back edge of the left and side walls, which may provide a back channel for excess cable length to move from the upper compartment to the lower compartment and vice versa.

[34] Further, when configured as the vertical divider or the second angular divider, divider 110 may extend up to the entire length of first end wall 106 and second end wall 108. In some examples, divider 110 may not extend up to the back edge of top end wall 106 and bottom end wall 108, thereby creating a gap at the back of the enclosure, which may provide a second back channel for cables to move from the left compartment to the right compartment and vice versa.

[35] Further, while the present example shows a single divider 110, examples where plurality of dividers are included are also within the scope of this disclosure. The plurality of dividers may separate the enclosure into multiple compartments for storing excess cables and/or wires. In some examples, the plurality of dividers may be configured as horizontal dividers. In some other examples, the plurality of dividers may be configured as vertical dividers. In still further examples, a portion of the plurality of dividers may be configured as horizontal dividers while a remaining portion of the plurality of dividers may be configured as vertical dividers. Furthermore, in some examples, cable management unit 100 may not include any divider, and hence, the cable storage portion may comprise only one compartment for cable storage.

[36] First end wall 106 is perpendicular to right side wall 102 and left side wall 104. That is, right side wall 102 and left side wall 104 extend vertically along y-axis,

and first end wall 106 extends horizontally along x-axis. Further, a length of right side wall 102 equals a length of left side wall 104. In some examples, length of right side wall 102 may be greater than length of left side wall 104, with right side wall 102 extending over left side wall 104 towards the top. In such examples, first end wall 106 may be positioned at an acute angle (less than 90 degrees) with respect to right side wall 102 on the right side and positioned at an obtuse angle (greater than degrees) with respect to left side wall 104. In this example, cable storage portion 101 may be trapezoid in shape. Such a configuration may provide additional space for storing extra cable and/or wire length in the vertical direction (y-axis) towards the top. Alternatively, length of left side wall 104 may be greater than length of right side wall, with left side wall extending over the right side wall towards the top. In the above example, first end wall 106 may be positioned at an acute angle (less than 90 degrees) with respect to left side wall 104 on the left side and positioned at an obtuse angle (greater than degrees) with respect to right side wall 102 on the right side. The above configuration may also provide additional space for storing cables and/or wires in the vertical direction.

[37] Second end wall 108 is positioned at right angles (90 degrees) with respect to right side wall 102 on the right side and also, positioned at right angles (90 degrees) with respect to left side wall 104. That is, right side wall 102 and left side wall 104 extend vertically along y-axis, and second end wall 108 extends horizontally along x-axis.

[38] In some examples, length of right side wall 102 may be greater than length of left side wall 104, with right side wall 102 extending further below left side wall 104. In such examples, second end wall 108 may be positioned at an acute angle

(less than 90 degrees) with respect to right side wall 102 on the right side and positioned at an obtuse angle (greater than degrees) with respect to left side wall 104 in order to allow additional space for storing extra cables and/or wires in the vertical direction (y-axis) towards the bottom. Alternatively, in some examples, when length of left side wall 104 is greater than length of right side wall 102, left side wall 104 may extend below the right side wall. In such examples, second end wall 108 may be positioned at an acute angle (less than 90 degrees) with respect to left side wall 104 on the right side and positioned at an obtuse angle (greater than degrees) with respect to left side wall 102. Such a configuration may also allow additional space for storage in the vertical direction towards the bottom.

[39] In examples where right side wall 102 is greater than left side wall 104 in length and extends above and/or below left side wall 104, and top end wall 106 and/or bottom end wall 108 are at acute angles with respect to right side wall 102 and obtuse angles with respect to left side wall 104, cable storage portion 101 is trapezoid in shape.

[40] Further, first end wall 106 and second end wall 108 are trapezoid in shape, where the back portions of first end wall 106 and second end wall 108 are wider than the front portions of first end wall 106 and second end wall 108. Thus, a back portion of the cable storage portion 101 is wider than the front portion, which provides more room for storing excess cable. In some examples, first end wall 106 and second end wall 108 may be configured in a rectangular or square shape.

[41] Cable channel portion 103 includes a channel 105 formed by plurality of first fingers 112 extending from a front edge of left side wall 104 and a plurality of second fingers 114 extending from a front edge of right side wall 102. Plurality of

first fingers 112 and plurality of second fingers 114 are coupled with the left and right side walls 104 and 102 respectively. In this way, cable channel portion 103 is coupled with cable storage portion 101. In one example, plurality of first fingers 112 and left side wall 104 may be directly coupled. Similarly, plurality of second fingers 114 and right side wall 102 may be directly coupled. Thus, cable channel portion 103 may be directly coupled with cable storage portion 101 via plurality of first fingers 112, plurality of second fingers 114, left side wall 104 and right side wall 102. Direct coupling may include manufacturing cable storage portion 101 and cable channel portion 103 independently, and directly attaching the cable channel portion 103 to the cable storage portion 101. For example, cable channel portion 103 may be molded with cable storage portion 101. In another example, cable storage portion 101 and cable channel portion 103 may be manufactured as a single unit. In yet another example, plurality of first fingers 112 and left side wall 104 may be indirectly coupled. Similarly, plurality of second fingers 114 and right side wall 102 may be indirectly coupled. Thus, in the above example, cable channel portion 103 may be indirectly coupled with cable storage portion 101 via plurality of first fingers 112, plurality of second fingers 114, left side wall 104 and right side wall 102.

[42] Channel 105 is defined a passage through which one or more cables or wires or the like may be routed. First and second fingers 112 and 114 are L-shaped protrusions extending in front of cable storage portion 101 from left side wall 104 and right side wall 102 respectively. Each first finger 112 includes a first stem portion, which is coupled with left side wall 104, and a first extension, which is bent at an angle (90 degrees or less than 90 degrees) with respect to the stem portion. Similarly, each second finger 114 includes a second stem portion, which is coupled with right

side wall 102, and a second extension, which is bent at an angle (90 degrees or less than 90 degrees) with respect to the stem portion. While the present example shows first and second fingers 112 and 114 as L-shaped protrusions, in some examples each of plurality of first fingers 112 and each of plurality of second fingers 114 may be curved (e.g., an arc shaped or a semi-circle shaped protrusion).

[43] Further, a vertical edge (that is, edge parallel to y-axis) of the first extension and a vertical edge (parallel to y-axis) of the second extension is aligned parallel to each other with a gap 125 in between. Further, plurality of first fingers 112 and plurality of second fingers 114 may be arranged in pairs. Thus, a number of first fingers 112 is equal to a number of second fingers 114. In the present example, each pair of first finger 112 and second finger 114 may be positioned in the same plane with gap between their vertical edges. In another example, plurality of first fingers 112 and plurality of second fingers 114 may be arranged in a staggered pattern. In the above example, the number of first fingers 112 may or may not be equal to the number of second fingers 114.

[44] Further, a perimeter of first finger 112 is greater than a perimeter of second finger 114. However, examples where the perimeters of first finger 112 and second finger 114 are equal are also within the scope of the disclosure.

[45] Further, plurality of first fingers 112 and plurality of second fingers 114 may be made of flexible material. The flexibility of first fingers 112 and second fingers 114 in combination with gap 125 allows a user to guide or route a cable through the channel by pushing the cable through the gap between the first and second fingers 112 and 114. Thus, when an end portion of a cable is not available, flexible first and second fingers 112 and 114, and gap 125 can be utilized to organize, guide,

and store the cable. Further, plurality of first fingers 112 and second fingers 114 are configured to retain the cables and/or wires within channel 105.

[46] Further, in one example, additionally, plurality of first fingers 112 and plurality of second fingers 114 may be provided at the back of cable storage portion 101. That is, cable management unit 100 may include one cable storage portion 101 and two cable channel portions 103, one cable channel portion at the front of cable storage portion 101 and another cable channel portion at the back of cable storage portion 101. Thus, in the above example, cable management system may include two channels for guiding cables or wires with cable storage in the middle.

[47] Further, in one example, cable management unit 100 may include a cable channel portion where only one set of fingers extend from right side wall 102 or left side wall 104 of cable storage portion 101.

[48] An example usage of cable management unit 100 is illustrated in FIG. 1B. Turning to FIG. 1B, it shows cable management unit 100 routing and storing a cable 120. Cable 120 may be routed through channel 105 via a top end of channel 105. The top end of channel 105 may include a short front edge of first end wall 106 as a boundary. Excess cable 122 may be stored in the lower compartment of cable storage portion 101. Excess cable 122 is indicated with broken lines. In some examples, excess cable 122 may be stored in the upper and lower compartment, or upper compartment only. Cable 120 may exit cable management unit 100 via a bottom end of channel 105. The bottom end may include a short front edge of second end wall 108 as a boundary. While the present example shows a single cable 120, cable channel 105 and cable storage portion 101 may be configured to route and store a plurality of cables and/or wires. In another example, cable 120 may be routed into

channel 105 via the bottom end, and may exit via the top end. In still another example, cable 120 may be pushed into channel 105 via gap 125 by bending flexible first and second fingers 112 and 114.

[49] In one example, one or more cables and wires may enter or exit the cable channel 105 via recessed opening 116. In another example, one or more cables may enter or exit the cable channel 105 via one or more opening on one or more of left side wall 104, right side wall 102, first end wall 106, and second end wall 108.

[50] In this way, cable management unit 100 provides a dedicated cable channel integrated with a dedicated cable storage portion, and may be used to route cables and/or wires and the like via cable channel portion while storing excess cable length in cable storage portion.

[51] Next, FIG. 1C shows a back perspective view of cable management unit 100. The back perspective view illustrates a back portion of cable storage portion 101. The back portion of cable management unit 100 may include plurality of holes 130 in tabs 131 for securing the cable management unit 100 to a panel or a wall. Further, the back portion of cable management unit 100 includes recessed portions 117 on each left side wall 104 and right side wall 102, and recessed opening 116, as described above with respect to FIG. 1A.

[52] Next, FIG. 1D shows a right side view of cable management unit 100. The right side view illustrates right side wall 102 and plurality of second fingers 114 extending from right side wall 102. The right side view further illustrates recessed portion 117 and recessed opening 116 on right side wall 102. Furthermore, right side view illustrates arrangement of plurality of second fingers 114, in particular, separation between two second fingers 114. Four second fingers 114 extend from

right side wall 102. In particular, second fingers 114 extend from a front edge of right side wall 102. Among the four fingers, the middle two fingers (positioned second and third from the top) are placed closer to each other (with a first separation X in between) than the first and the second (from the top), and the third and the fourth fingers (from the top). That is, first separation X between the middle two fingers is less than a second separation Y between the first and the second, and the third and the fourth fingers. The second and third fingers are closer to divider 110. The greater separation between the first and second fingers, and the second and third fingers may provide easier access to upper and lower compartment respectively, for guiding the cables into the storage portion, for example. The greater separation also provides increased space (not restricted or interrupted by second fingers 114) for storing excess cables and/or wires. In another example, all of plurality of second fingers 114 may be positioned equidistant from each other.

[53] Next, FIG. 1E shows a left side view of cable management unit 100. The left side view illustrates left side wall 104 and plurality of first fingers 112 extending from right side wall 102. The left side view further illustrates recessed portion 117. Similar to second fingers 114, first fingers 112 are positioned such that a first separation X between the second and third fingers is less than a second separation Y between the first and the second, and the third and the fourth fingers.

[54] Next, FIG. 1F shows a top view of cable management unit 100. Top view illustrates a shape of first end wall 106, and gap 125 between plurality of first fingers 112 and plurality of second fingers 112.

[55] In this way, cable management unit 100 may be utilized to route cables and/or wires and the like via cable channel portion 103 while storing excess cable

length in cable storage portion 101. Hence, during a cabling process, such as connecting a plurality of devices via cables and/or wires, by utilizing the cable management unit, a user may not spend excess time bundling up cables and identifying a storage space, and may be able to quickly store the excess cable length within the cable storage portion. For example, the flexible fingers may be used for retaining the cable bundle while allowing easy access (no tools required) to adjust length/reorganize or replace a cable. Further, as the cable channel is integrated to the cable storage portion, with the cable storage portion at the back, excess cable length may be stored without the excess cable length interfering with workflow. Furthermore, the excess cable length stored within the cable storage portion may not be visible to a user, and thus provide increase aesthetic value. Further still, the cable management unit 100 is modular, and hence, multiple cable management units may be arranged on a panel to provide a desired cable route that includes vertical, horizontal and angular paths. Example cable management systems with one or more cable management units arranged to provide a desired cable path is discussed below with respect to Figs. 2 – 6.

[56] Further, the cable storage and cable channel portions of the cable management unit may be configured in one or more ways. Additional configurations of the cable management unit are illustrated in Figs. 7 -10. Turning to Fig. 7, an example cable management unit 700 is shown. Cable management unit 700 includes a cable storage portion 701 and a side cable channel portion 703.

[57] Cable storage portion 701 includes a right side wall 702, a left side wall 704, a first end wall 706, and a second end wall 708. Further, cable storage portion 701 includes a plurality of dividing walls 710 separating the interior space of the cable management unit into multiple compartments. While the present example shows five

equal sized compartments, it will be appreciated that the cable management unit may include any number of compartments (one or greater than one).

[58] Side cable channel portion 703 includes a cable channel 705, which is arranged on the left side of the unit 700. That is, cable channel 705 is positioned adjacent to left side wall 704. Cable channel 705 is formed by a flexible finger 709 directly coupled to and extending outward sideways from an outer surface of left side wall 704. Flexible finger 709 may be U- shaped and may be used to guide and retain cables and/or wires within cable channel 705.

[59] Further, cable management unit 700 includes plurality of notches 707 at the edge of left side wall 104. Notches 707 may be utilized for guiding the cables and/or wires into and out of the compartments of cable storage portion 701 from cable channel portion 703. Thus, notches 707 may be positioned on the side adjacent to cable channel portion. For example, embodiments where cable channel 705 is arranged on the right side, adjacent to right side wall 702, are also possible. In such embodiments, notches 707 may be arranged on right side wall 702.

[60] Further, examples where cable channel 705 is present on both sides of unit 700 are also within the scope of the disclosure. In such examples, notches 707 may be present on both side walls of cable storage portion 707.

[61] In this way, a cable management unit may be configured with a cable storage portion for storing excess cable length, and a cable channel arranged on a side for routing and retaining cables and/or wires along a channel path.

[62] Further, additional configurations of cable management unit 100 is shown in Fig. 8. Turning now to Fig. 8, it shows an example cable management unit 800 including different configurations for cable storage portion 801. Specifically, cable

management unit 800 is shown including a first cable storage portion configuration 850 and a second cable storage portion configuration 860. Cable management unit 800 is shown with a break in between the two cable storage portion configurations to illustrate that cable storage portion 801 may be configured in any one of the configurations 850 and 860, or combination thereof. In examples where both configurations are used, the configurations may be arranged in any order.

[63] In first configuration 850, cable storage portion 801 may include one or more detachable and adjustable cubbies 811. Each cubby 811 may include a horizontal wall 100 forming a bottom portion of cubby 811 and a vertical door 809. Vertical door 809 may be configured as a retainer for securing cables within the cable storage portion. Each cubby 811 may be removable, and may be inserted into cable storage portion 801 via slots 815 on the inner surfaces of left side wall 804 and right side wall 802. Further, vertical door 809 may include openings, such as an oblong opening 819, that may be utilized as entrance or exit for cables and/or wires, as well as handles for removing and attaching cubby 811. Further, it will be appreciated that cable management unit 800 may include a side cable channel portion (not shown), such as cable channel portion 703 at Fig. 7, integrated with unit 800 for guiding and retaining cable along the channel.

[64] In second configuration 860, cable storage portion 801 may include one or more compartments, each compartment including a door 813. Door 813 may be configured as a retainer for securing cables within the cable storage portion. Further, in this configuration, cable storage portion 801 may include at least a notch 807 on a side wall for each compartment for guiding the cables and/or wires into and out of the compartments. Further, notch 807 may be positioned on the side wall that is opposite

to a hinge of door 813. Thus, in this example, notch 807 is shown on left side wall 804. In one example, the hinge may be configured as a living hinge, which may be a flexible hinge, joining door 813 with side wall 802. In another example, the hinge may be any other type of hinge, such as a case hinge, bi-fold hinge, butt hinge, etc.

[65] Further, in configuration 860, each compartment is enclosed with a door. However, it will be appreciated that a single door may cover one or more compartments of cable storage unit 801.

[66] In this way, a cable management unit may be configured with a cable storage portion including doors for the one or more compartments. The cable management unit may further include a cable channel portion, such as side cable channel portion 703 at Fig. 7, arranged on a side for routing and retaining cables and/or wires along a channel path.

[67] Further example configurations of cable storage portion are shown in Fig. 9. Specifically, Fig. 9 shows a cable management unit 900 including a third cable storage portion configuration 950, a fourth cable storage portion configuration 960, and a fifth cable storage portion configuration 970. Cable management unit 900 is shown with breaks in between the three cable storage portion configurations to illustrate that cable storage portion 901 may be configured in any one of the configurations 950, 960, and 970, or combination thereof. In examples where more than one configuration is used, the configurations may be arranged in any order.

[68] In third configuration 950, cable storage portion 901 may include one or more elastic cords 931, such as bungee cords, configured as a retainer for retaining and securing cables and/or wires within cable storage portion 901. In the present example, two elastic cords are shown arranged vertically, parallel to left and right side

walls 902 and 904. It will be appreciated that other arrangements of the elastic cords, such as a horizontal parallel arrangement (that is parallel to first end wall 906), a cross arrangement (with one cord vertical and the other cord horizontal), or an angled parallel arrangement (where the cords are arranged diagonally) are also within the scope of this disclosure. An example angular arrangement of cords 931 is shown in fifth configuration 970. In this configuration (that is, configuration 970), cords in subsequent compartments for a crisscross pattern.

[69] In fourth configuration 960, cable storage portion 901 may include one or more straps 913 configured as retainers for retaining cables and/or wires 922 within one or more compartments of cable storage portion 901. In one example, straps 913 may be made of silicone. In other examples, straps 913 may be made of any flexible material, such as a thermoplastic polymer. Each strap 913 may include a slot 919 that may be utilized to attach the strap to hook-like structures on side wall 904 to provide closure for the compartment. Further, in this configuration, left side wall 904 may include openings 907 for guiding the cables and/or wires into and out of the cable storage portion 901.

[70] Further, in each of the above configurations of cable management unit 900, a side cable channel portion (not shown), such as cable channel portion 703 at Fig. 7, may be included for routing and retaining cable along the channel. In one example, the side cable channel portion may be integrated with unit 900.

[71] A sixth configuration is shown in Fig. 10. In this figure, a portion 1000 of a cable management unit, such as cable management unit 100 at Fig. 1, is shown. Portion 1000 may be a compartment of the cable management unit. In this configuration, a snap portion 1011 including a slot 1007 cut out in shape of a cross

with a rectangular center is shown. Snap portion 1107 may be configured as a retainer for securing cables within the cable storage portion while slot 1007 may be used to guide cables and/or wires into and out of the compartment.

[72] Snap portion 1011 may be configured to attach to the compartment such that a front open portion of the compartment is covered with snap 1011. In one example, snap portion 1011 may include one or more protrusions around the edge (not shown) that may be used to attach the snap portion 1011, via slots 1009, to the compartment of the cable management unit. Snap portion may be made of a flexible material, such as a poly propylene or rigid elastomer.

[73] In this way, the cable management unit may include a snap portion configured to cover the compartment of the cable management unit and retain the cables and/or wires within the storage unit. Further, it will be appreciated that a side cable channel portion (not shown), such as cable channel portion 703 at Fig. 7, may be included for routing and retaining cable along the channel.

[74] Further, with respect to the configurations discussed above in Figs. 8 – 10, in one example, the cable storage units may be utilized as stand-alone storage units without the cable channel portion. In another example, in each of the configurations discussed in Figs. 8 – 10, a side cable channel portion may be integrated with the cable storage portion. The cable storage portion and the cable channel portion, either individually, or in the integrated combination, may be used in cable management systems to route cables and/wires while storing excess cable lengths.

[75] Together, the various configurations of the cable management unit discussed above facilitate more efficient and faster organization, dismantling, and

reorganization of cables and/or wires. For example, in order to remove the cables and/or wires, a user may simply pull the cables with reduced entanglement issues.

[76] Turning next to Fig. 2, it shows an example cable management system 200 utilized on a workstation, such as a cart 210. In one example, the workstation may be a medical workstation, and cart 210 may be a medical cart. Cart 210 may include a plurality of devices (not shown) interconnected with cables and wires. Cable management system 200 may be utilized to organize (route and store) one or more cables and wires used for interconnecting the devices.

[77] Cart 210 includes a base 218 and wheels 216. Examples where a cart does not include wheels are also within the scope of the disclosure.

[78] Cable management system 200 includes a plurality of cable management units 100, a horizontal bridge 202, a plurality of twist ties 208, a plurality of routing clips 224, and a rear door 204. Plurality of cable management units 100, horizontal bridge 202, and plurality of twist ties 208 are positioned on a rear panel 212 of cart 210. The positioning of plurality of cable management units 100, horizontal bridge 202, and plurality of twist ties 208 provide a cable pathway for routing the cables and/or wires, while providing a storage space for storing excess cable length. It will be appreciated that plurality of cable management units 100 either individually or in combination with one or more of horizontal bridge 202, plurality of twist ties 208, and plurality of routing clips 224 may be utilized for managing, organizing, and routing cables in different systems, such as medical systems, computing systems, telecommunication systems, etc. As an example, when used in a medical system, a medical cart may include one or more devices, such as medical devices, electrical, and/or computing devices, including displays, processors, etc., that may be used for

healthcare purposes. Multiple cables and/or wires from these devices may be efficiently and quickly organized (including routing and storing) with the cable management system 200.

[79] Rear panel 212 may include a lower compartment 222 for storing one or more equipment, such as cylinders in a medical cart. Cable management units 100 may be arranged on either side of lower compartment in order to provide a vertical channel for cables and/or wires from the one or more devices on cart 210 to a power strip 220. For example, cable management units 100 may be vertically stacked one upon another, thus creating a longer channel for routing cables and/or wires. A number of cable management units 100 may be based on a desired routing distance for the cables and/or wires. The present example shows two cable management units 100 stacked vertically on one side of rear panel 212. It will be appreciated that more or less number of cable management units 100 may be utilized depending on the desired routing distance. In some examples, plurality of cable management units 100 may be positioned horizontally, and stacked sideways to provide horizontal routing.

[80] Further, recessed openings 116 on cable storage portions 101 of cable management units 100 may function as inlet/outlet for one or more cables and wires. Further, cable management units 100 may be arranged such that recessed openings 116 on the cable management units 100 are facing outside and not facing the lower compartment 222, so that the recessed openings may function as inlets/outlets. For example, when positioned on either side of lower compartment 222, cable management units 100 may be positioned such that right side wall 102 including recessed opening 116 faces outside and left side wall 104 faces lower compartment

222. In order to position the recessed openings as discussed above, cable management units positioned on the right side of cart 210 may be rotated by 180 degrees.

[81] Further, as discussed above with respect to FIGS. 1A – 1F, excess cable length may be stored within cable storage portion 101 of cable management unit 100. By utilizing the cable storage portion of the cable management unit, excess cable and/or wire length may be efficiently and quickly stored. In another example, when diagonal routing is desired, plurality cable management units 100 may be positioned diagonally and stacked to provide diagonal routing.

[82] Further, horizontal bridge 202 is positioned above lower compartment 222 to provide horizontal routing for the cables and wires from the one or more devices on the cart. For example, cables and/or wires from devices on an upper left portion of the cart 210 may be routed via horizontal bridge to power strip 220. While the present example shows a single horizontal bridge, it will be appreciated that more than one horizontal bridges may be utilized. In one example, plurality of horizontal bridges may be positioned to increase horizontal routing distance. In another example, horizontal bridges may be vertically stacked one above another. In yet another example, horizontal bridges may be arranged in a staggered configuration.

[83] In portions where positioning cable management unit 100 may block access to certain areas, such as power strip 220, a side wall 214 including plurality of twist ties 208 may be used for providing a channel and securing the cables. Plurality of twist ties 208 may be arranged vertically. In some examples, plurality of twist ties 208 may be arranged horizontally or in a diagonal manner.

[84] Further, plurality of routing clips 224 may be utilized for routing cable and/or wires in combination with twist ties 208, units 100, and horizontal bridge 202.

Specifically, plurality of routing clips 224 may be utilized in an upper portion of rear panel 212 as routing clips 224.

[85] The positioning or arrangement of the one or more cable management units 100, horizontal bridge 202, and twist ties 208 may provide a curved channel for routing cables. In one example, the arrangement of the one or more cable management units 100, horizontal bridge 202, and twist ties 208 may define a figure eight configuration for routing cables and/or wires, including an intersection at horizontal bridge 202.

[86] By utilizing cable management units for managing cables, excess cable length can be stored in the cable storage portion. The cable storage portion reduces bundling of cables and wires at places that interfere with workflow.

[87] Rear door 204 may be utilized to conceal the cables and/or wires on rear panel 212, thus improving aesthetic value and appearance. Rear door 204 also provides protection for the cables and/or wires from the surrounding environment. For example, For example, in a hospital environment, fluids, such as body fluids, etc., may collect on surfaces of equipment. Rear door 204 may reduce dust and moisture from settling on the cables and/or wires, and thus reduce damage. Further, rear door 204 may facilitate easier cleaning of cart 210.

[88] A smaller check access door 206 (also referred to interchangeably as access door, or check door) is positioned within rear door 204. Check door 206 allows easy access to a portion of lower compartment 222 that requires more regular monitoring and adjustment. For example, when cart 210 is used as a medical cart for a respiratory system, lower compartment 222 may include one or more cylinders. A user may monitor one or more parameters of the cylinder, such as pressure inside the

cylinders, volume of gases within the cylinders, temperature etc. frequently. When opened, check door 206 allows the user to access a top portion of the cylinders for monitoring the one or more parameters of the cylinders. Thus, the user may not be required to open rear door 204, which may require the user to adjust the cables and wires during every cylinder check. The user may simply open check door 206 and monitor the one or more parameters of the cylinders. An example cable management system 300, with check door 206 in an open configuration is described with respect to FIG. 3. Rear door 204 may be opened when there is a need to replace the cylinders, or adjust cable and/or wire routing or arrangement.

[89] By utilizing cable management system 200, amount of cables and/or wires that are rolled or bundled up on hooks, protrusions etc., are reduced which allows easy, less cumbersome, and quick transport of the cart in addition to improved workflow, improved aesthetic value, and easier cleaning.

[90] Turning to FIG. 3, a perspective view of cart 210 with rear door 204 in an open configuration is shown. When check door 206 is open, the user may access a portion 304 above cylinder 306. Thus, check door 206 allows quick and easy access to portion 304. Check door 206 may further include a hook 302 for holding one or more cables and wires, such as power cables for connecting with an external power source. Cable management system 200, with rear door 204 and check door 206 in closed configuration is shown in FIG. 4. An example cable management system with a rear door and a check door in closed configuration and holding one or more cables and wires is shown in FIG. 5.

[91] Turning to FIG. 5, it shows a perspective view of an example cable management system 500 including a rear door 504 and a check door 506 in a closed

configuration. Check door 506 is configured with a hook 502 for holding one or more cables and wires 512. Rear door 504 may include one or more openings 511, which may be utilized as inlets for routing cables and wires from one or more devices on cart 510 (including base 518 and wheels 516) via cable management system 500. Cable management system 500 may be similar to cable management system 200 discussed with respect to FIG. 2. Further, one or more openings 511 may be utilized as outlets for cables and wires from cable management system 500.

[92] Next, FIG. 6 shows an example routing of cables and/or wires in a cable management system 600 for a medical workstation. The medical workstation may be utilized as respiratory workstation. The medical workstation may include a mobile medical cart 601 that includes a plurality of interconnected devices. Specifically, medical cart 601 may include one or more devices 602, 604, 606, 608, 610, 612, 614, 616, and 617. The one or more devices may include medical, electrical, and/or computing devices. Medical cart 601 further includes cylinders 622 positioned within a lower compartment at the back.

[93] Medical cart 601 includes a rear panel 603 on which one or more modular units for cable management are arranged. The one or more modular units include cable management units 636 and horizontal bridge 638. Cable management units 636 and horizontal bridge 638 may be arranged such that cable management units 636 are positioned on either sides of cylinders and horizontal bridge is positioned above the cylinders.

[94] Cable management units 636 may be similar to cable management unit 100 discussed with respect to FIGS. 1A – 1F. Specifically, cable management units 636 may include a cable storage portion for storing excess cable length, which is

indicated at 630 by dashed lines. Further, cable management units 636 may include a cable channel portion formed by flexible fingers for routing cables and/or wires. The one or more devices 602, 604, 606, 608, 610, 612, 614, 616, and 617 may include plurality of cables and/or wires that may be routed via a curved cable pathway to one or more destinations, such as power strip 620 and destination 621, within cart 601.

[95] Rear panel 603 further includes an inlet 632 for routing cables and/or wires from the one or more devices. For example, cables and/or wires from device 610 may be routed through inlet 632 into cable management unit 636 on a left side of medical cart 601. Excess cable length 630, indicated by dashed lines, may be stored in a cable storage portion of cable management unit 636. The cables and/or wires from device 610 may then exit via a cable channel opening at the bottom of cable management unit 636 before reaching the destination 620.

[96] As another example, cables and/or wires from devices 602 and 604 may be routed into the cable management system 600 through inlet 633. Subsequently, the cables and/or wires may be routed vertically along the rear panel, and then routed horizontally through horizontal bridge 638. From the horizontal bridge, the cables may be routed via a cable channel portion of cable management unit 636 on a right side of cart 601 before reaching destination 620. In this way, the cables may be routed via a curved cable path. In yet another example, cables and/or wires from device 613 may be routed via cable management unit 636 to destination 621. In another example, cables and/or wires from device 616 may be routed via cable management unit 636 on the right to horizontal bridge 638 and subsequently to cable management unit 636 on the left before reaching destination 620. Together, routing of the cables and/or wires from the one or more devices via the cable management

system 600 to destinations 620 and/or 621 may resemble a figure eight configuration. In this way, cable management system 600 including cable management units 636 and horizontal bridge 638 define a curved cable pathway. The curved cable pathway may have an intersection at horizontal bridge 638. The curved cable pathway may allow easier access to cylinders 622 in the lower compartment. Specifically, cables may be routed via the curved cable pathway and stored within cable management units 636 such that access to cylinders 622 is not impeded by cables hanging loosely on the cart.

[97] As used herein, an element or step recited in the singular and proceeded with the word “a” or “an” should be understood as not excluding plural of said elements or steps, unless such exclusion is explicitly stated. Furthermore, references to “one embodiment” of the present invention are not intended to be interpreted as excluding the existence of additional embodiments that also incorporate the recited features. Moreover, unless explicitly stated to the contrary, embodiments “comprising,” “including,” or “having” an element or a plurality of elements having a particular property may include additional such elements not having that property. The terms “including” and “in which” are used as the plain-language equivalents of the respective terms “comprising” and “wherein.” Moreover, the terms “first,” “second,” and “third,” etc. are used merely as labels, and are not intended to impose numerical requirements or a particular positional order on their objects.

[98] This written description uses examples to disclose the invention, including the best mode, and also to enable a person of ordinary skill in the relevant art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those of ordinary

skill in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

CLAIMS:

1. A cable management unit, comprising:
a cable storage portion including a left side wall, a right side wall, a top end wall, and a bottom end wall with an open front; and
a cable channel portion including one or more flexible fingers extending outward from one or more of the right side wall and the left side wall.
2. The cable management unit of claim 1, wherein the cable storage portion includes one or more dividers separating the cable storage portion into two or more compartments.
3. The cable management unit of claim 2, wherein the divider is a horizontal divider positioned perpendicular to the left and right side walls.
4. The cable management unit of claim 2, wherein the divider is a vertical divider positioned parallel to the left and right side walls.
5. The cable management unit of claim 1, wherein, the one or more fingers extend outward in front of the cable storage portion; wherein the one or more flexible fingers are arranged in pairs; wherein each pair includes a first finger and a second finger and further includes a gap between the first finger and the second finger.
6. The cable management unit of claim 1, wherein the right side wall includes a recessed portion at the back, and wherein the recessed portion includes a recessed

opening; and wherein the cable storage portion includes a tab with one or more screw holes for mounting the cable management unit.

7. The cable management unit of claim 1, wherein the cable storage portion includes one or more retainers for securing cables within the cable storage portion; and wherein the cable storage portion includes an open back.

8. The cable management unit of claim 1, further comprising a second cable channel portion including one or more second flexible fingers extending outward from a back edge of the right side wall and a back edge of the left side wall.

9. The cable management unit of claim 1, wherein the one or more fingers extend outward sideways from the cable storage portion such that the one or more fingers form a channel for routing one or more cables and wires on the side..

10. A cable management system for a medical cart, comprising:
a panel; and
one or more cable management units, each of the one or more cable management units including a cable storage portion and a cable channel portion.

11. The cable management system of claim 10, wherein the cable storage portion includes a left side wall, a right side wall, a top end wall, and a bottom end wall with an open front, and wherein the cable channel portion includes one or more sets of

fingers extending forward from a front edge of the right side wall and a front edge of the left side wall.

12. The cable management system of claim 10, further comprising one or more horizontal bridge portions positioned on the panel and one or more twist ties positioned on the panel.

13. The cable management system of claim 12, wherein the positioning of the one or more cable management units, the one or more horizontal bridge, and the one or more twist ties defines a curved cable pathway.

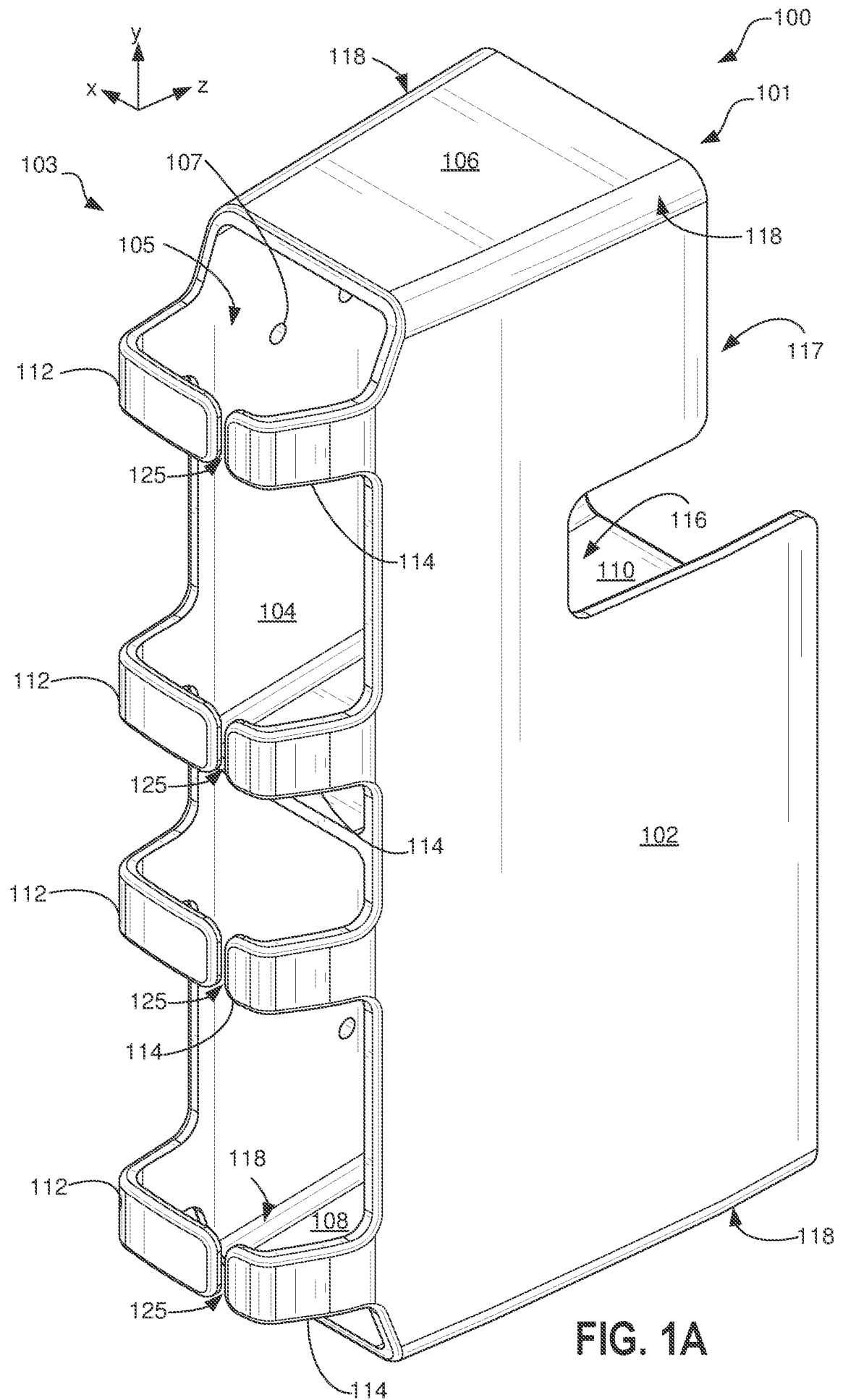
14. The cable management of claim 13, wherein the curved cable pathway has a figure eight pattern.

15. The cable management system of claim 12, further comprising one or more clips positioned on the panel.

16. The cable management system of claim 10, further comprising a first door for covering the panel, and a second access door within the first door, and wherein the first door opens sideways; and wherein, the second check door opens downwards.

17. The cable management system of claim 11, wherein the cable storage portion includes one or more dividers that separate the cable storage portion into two or more compartments.

18. A modular cable management system for a medical workstation, comprising:
- a cart including a rear panel;
 - a lower middle compartment;
 - a right compartment including one or more cable management units;
 - a left compartment including the one or more cable management units and one or more twist ties; and
 - a horizontal routing bridge positioned above the lower middle compartment;
- wherein, each of the one or more cable management unit includes a cable storage portion and a cable channel portion; and
- wherein an arrangement of the one or more cable management units, the one or more twist ties, and the horizontal routing bridge on the rear panel defines a figure eight cable pathway with an intersection at the horizontal routing bridge.
19. The modular cable management system of claim 1, further comprising a first door for covering the rear panel, and a second access door within the first door for accessing an upper portion of the lower middle compartment.
20. The modular cable management system of claim 1, wherein the rear panel includes one or more openings configured as cable entry or cable exit ports.



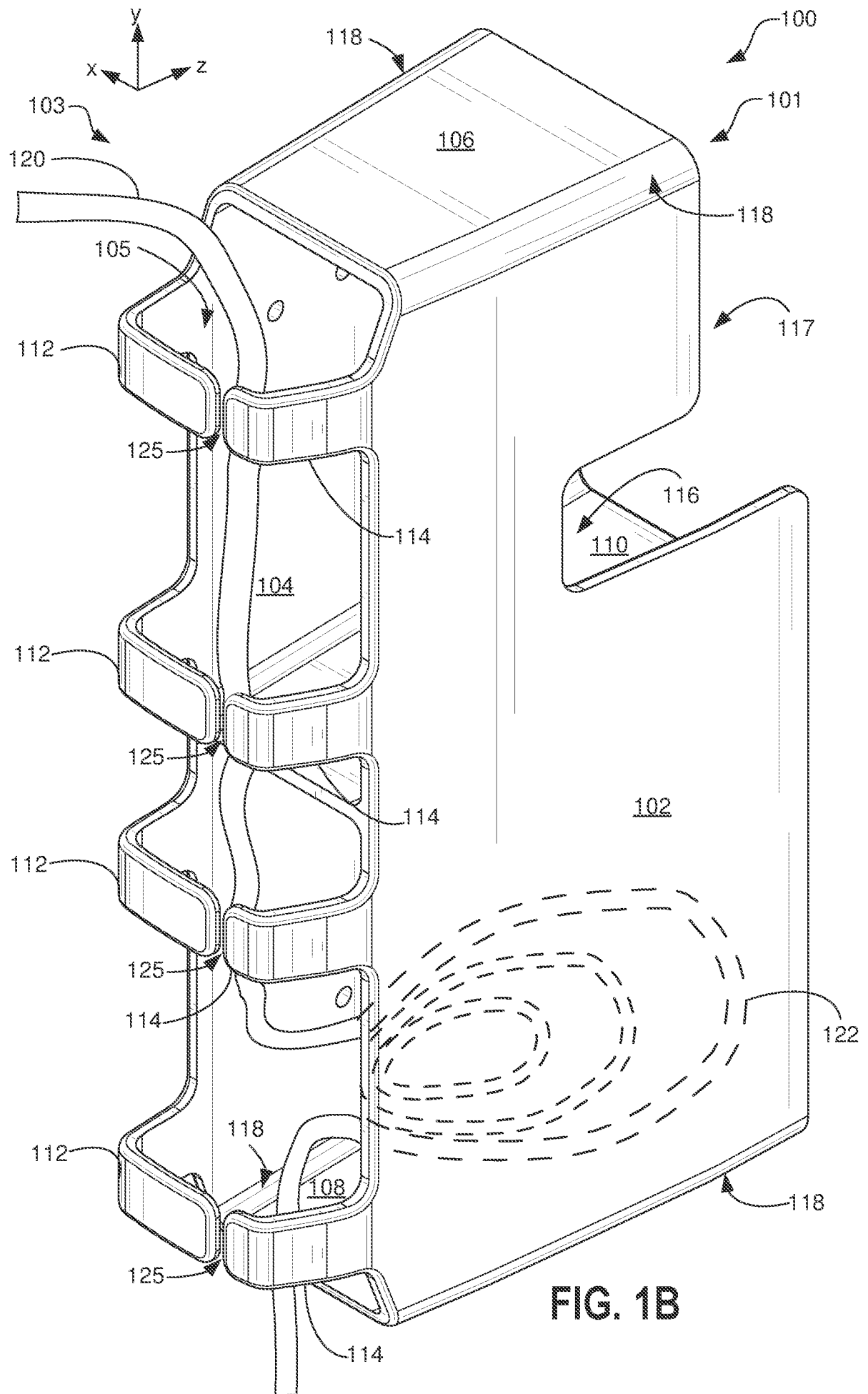
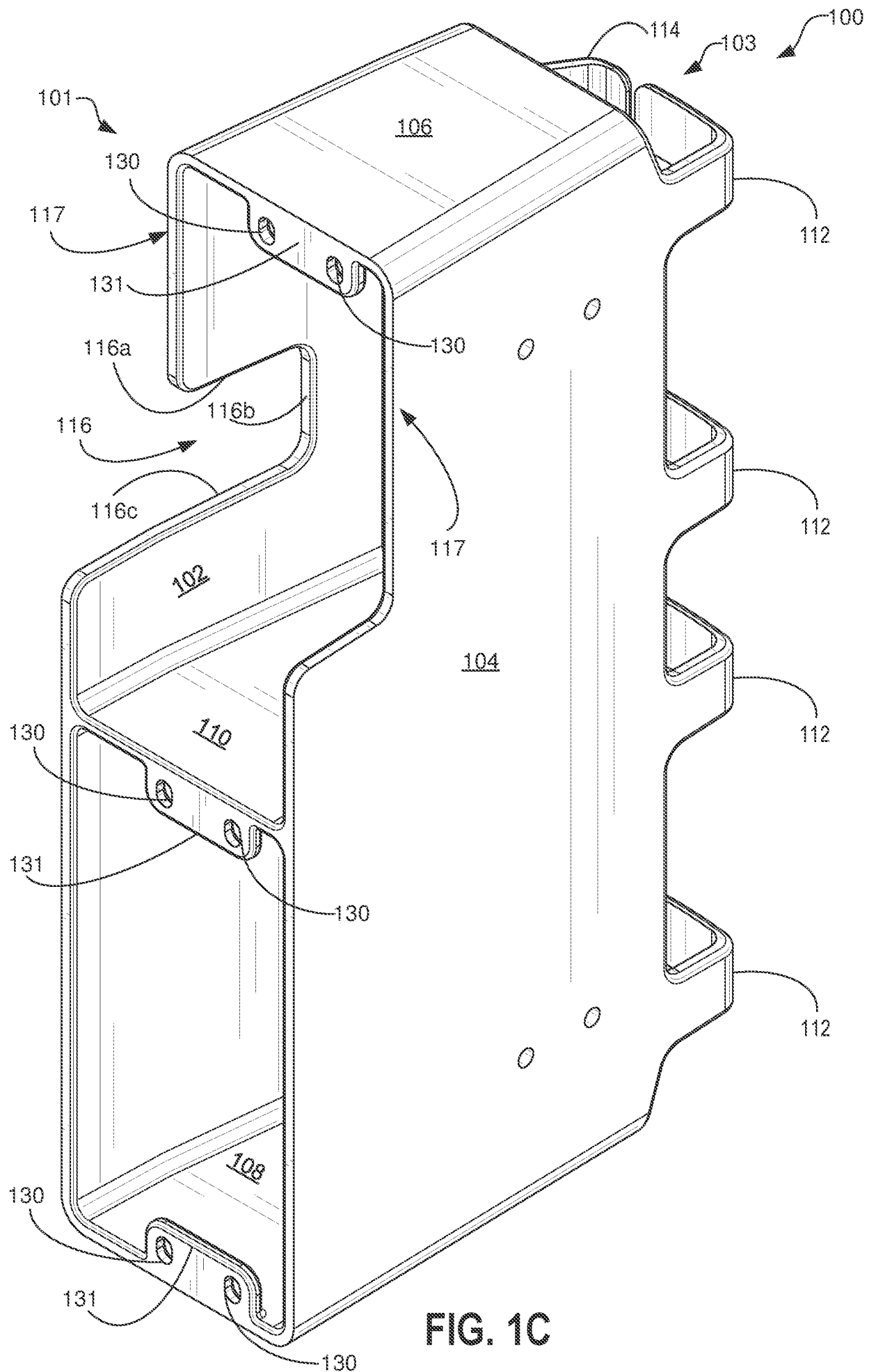
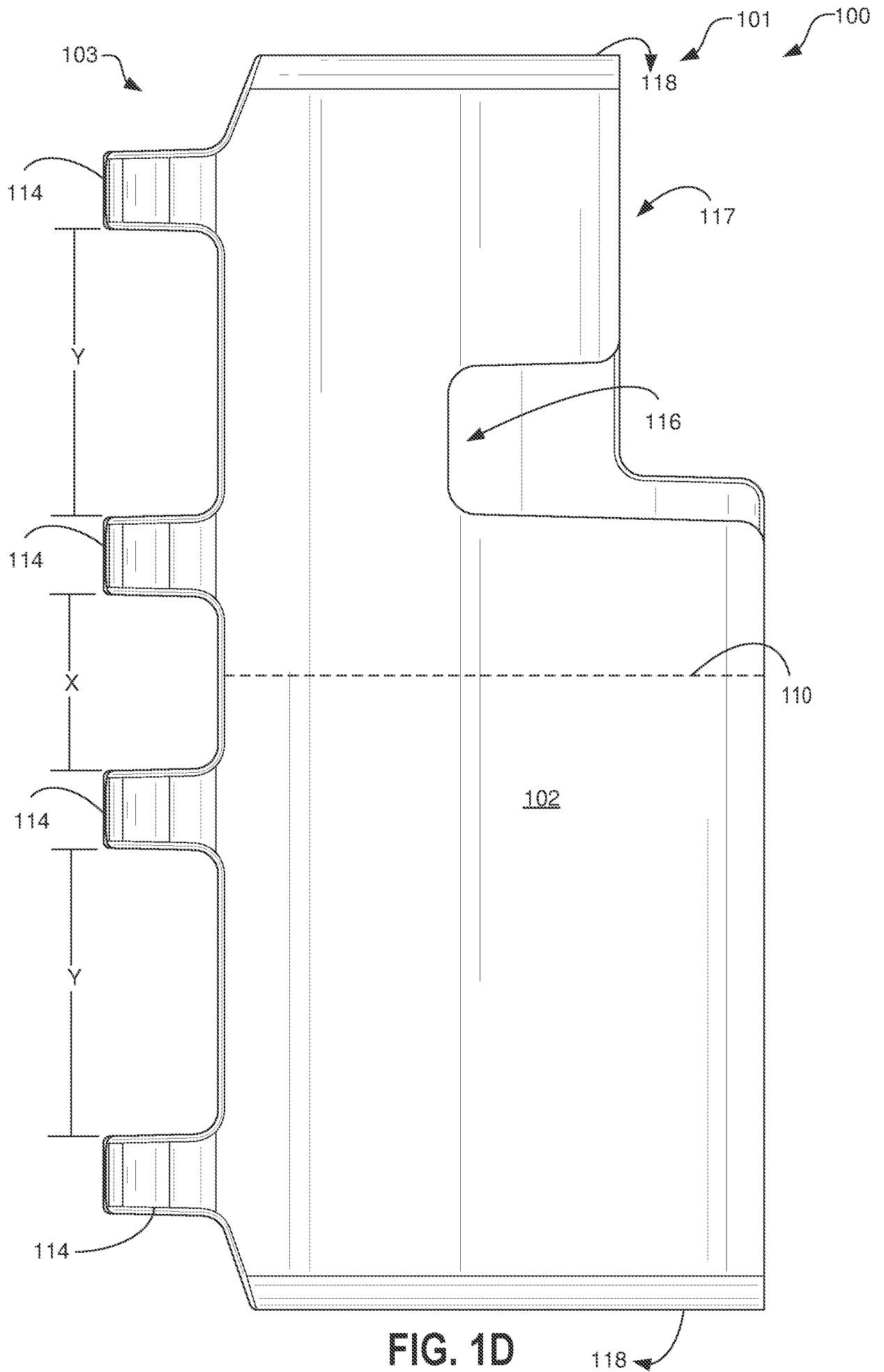


FIG. 1B





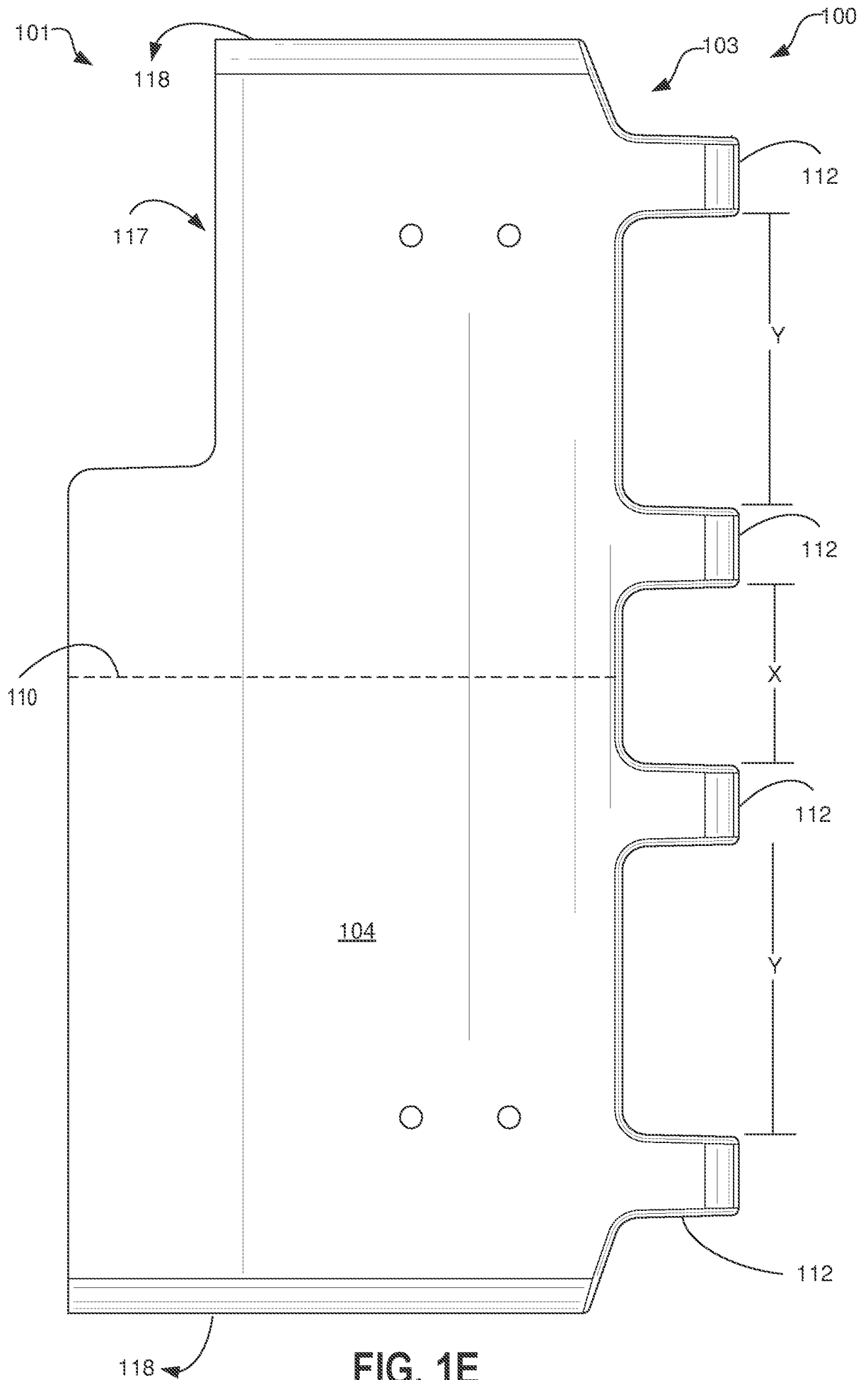


FIG. 1E

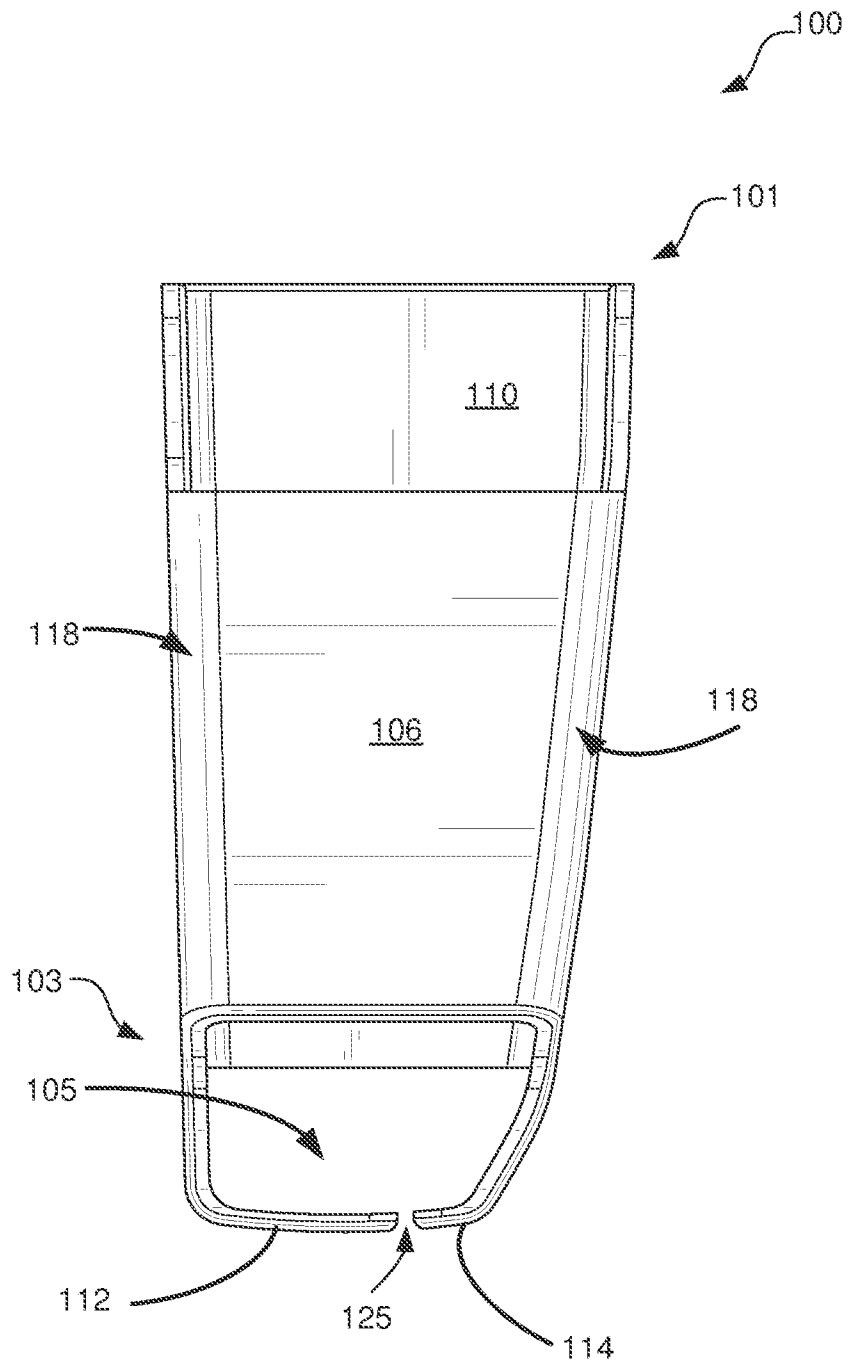


FIG. 1F

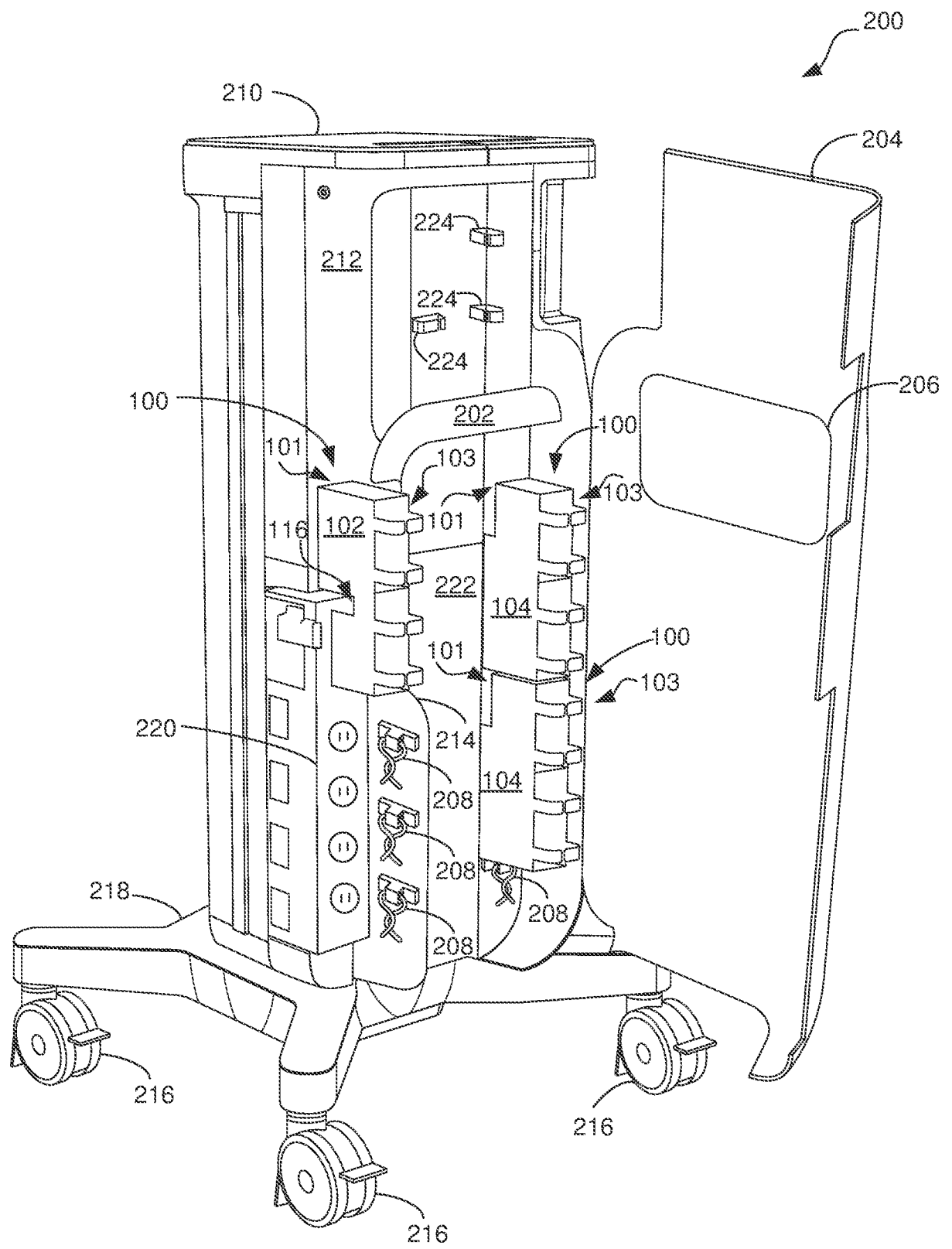


FIG. 2

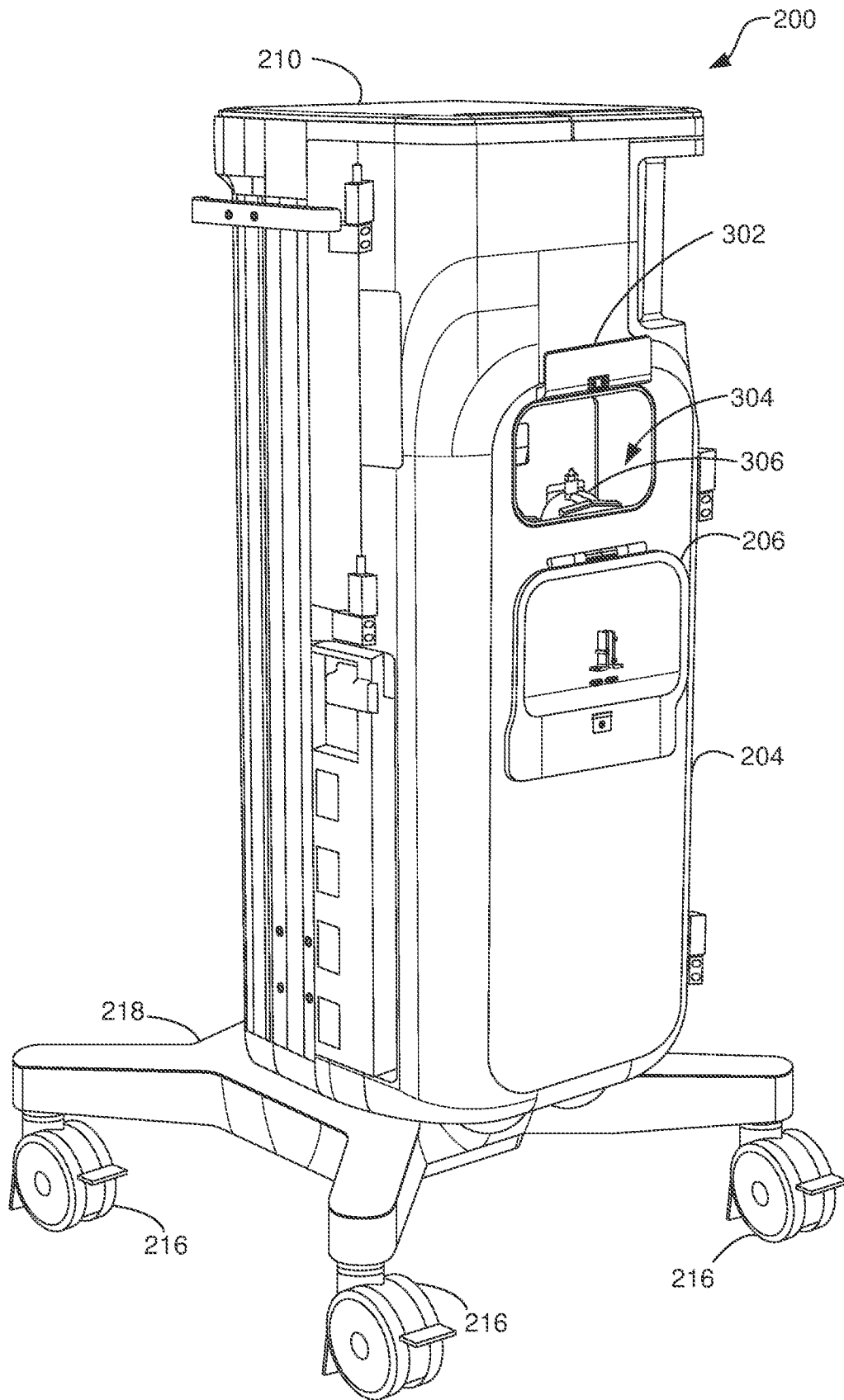
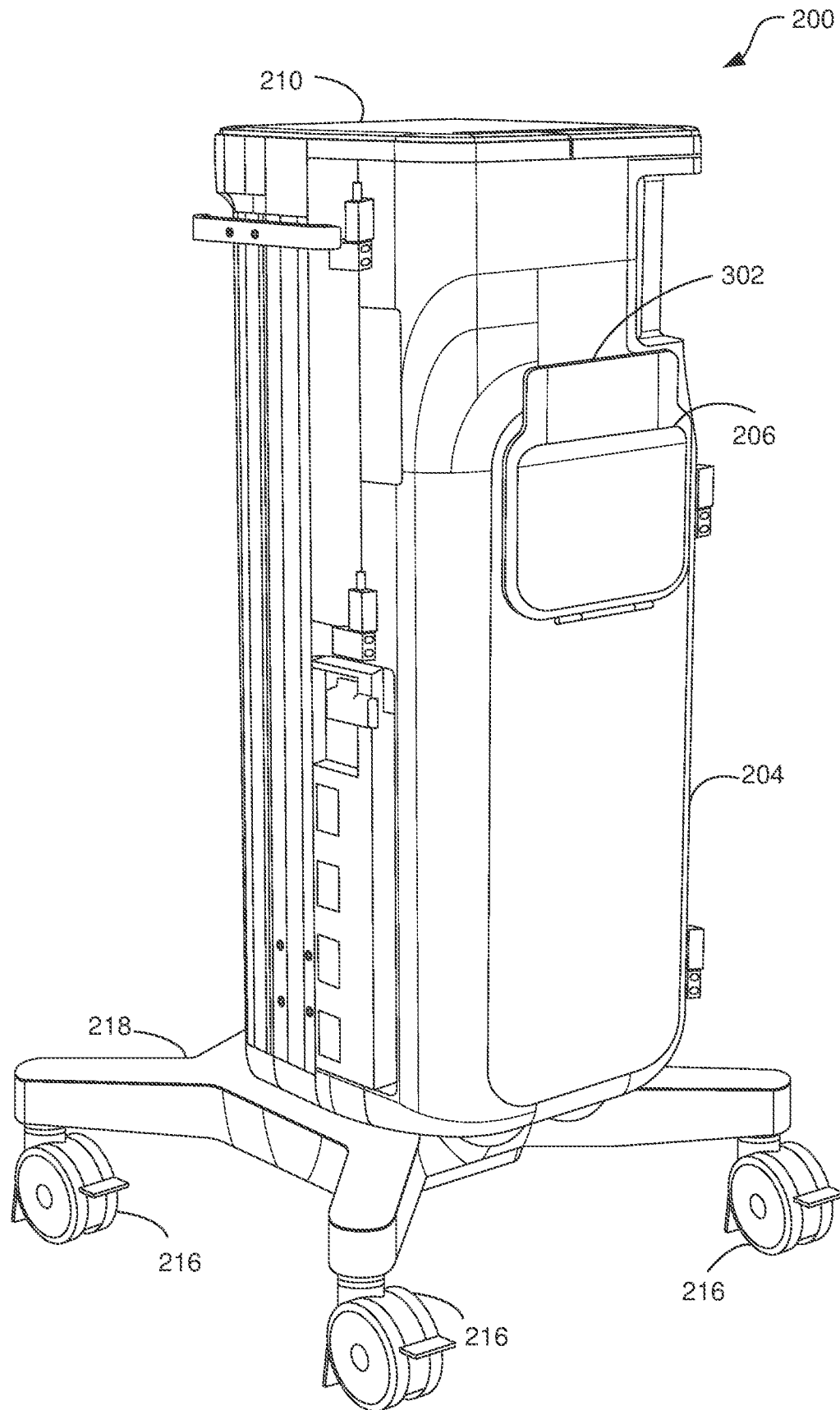


FIG. 3

**FIG. 4**

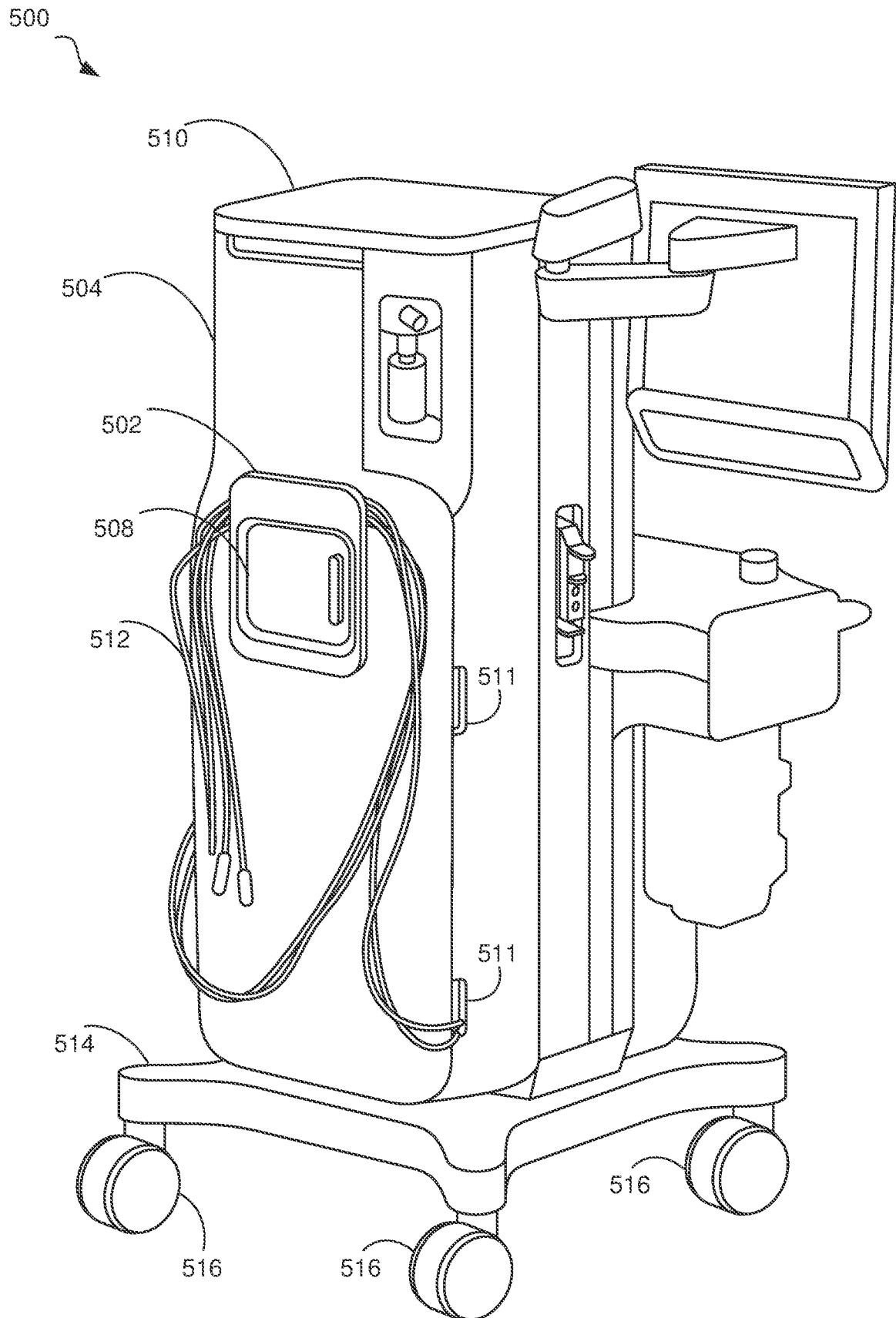


FIG. 5

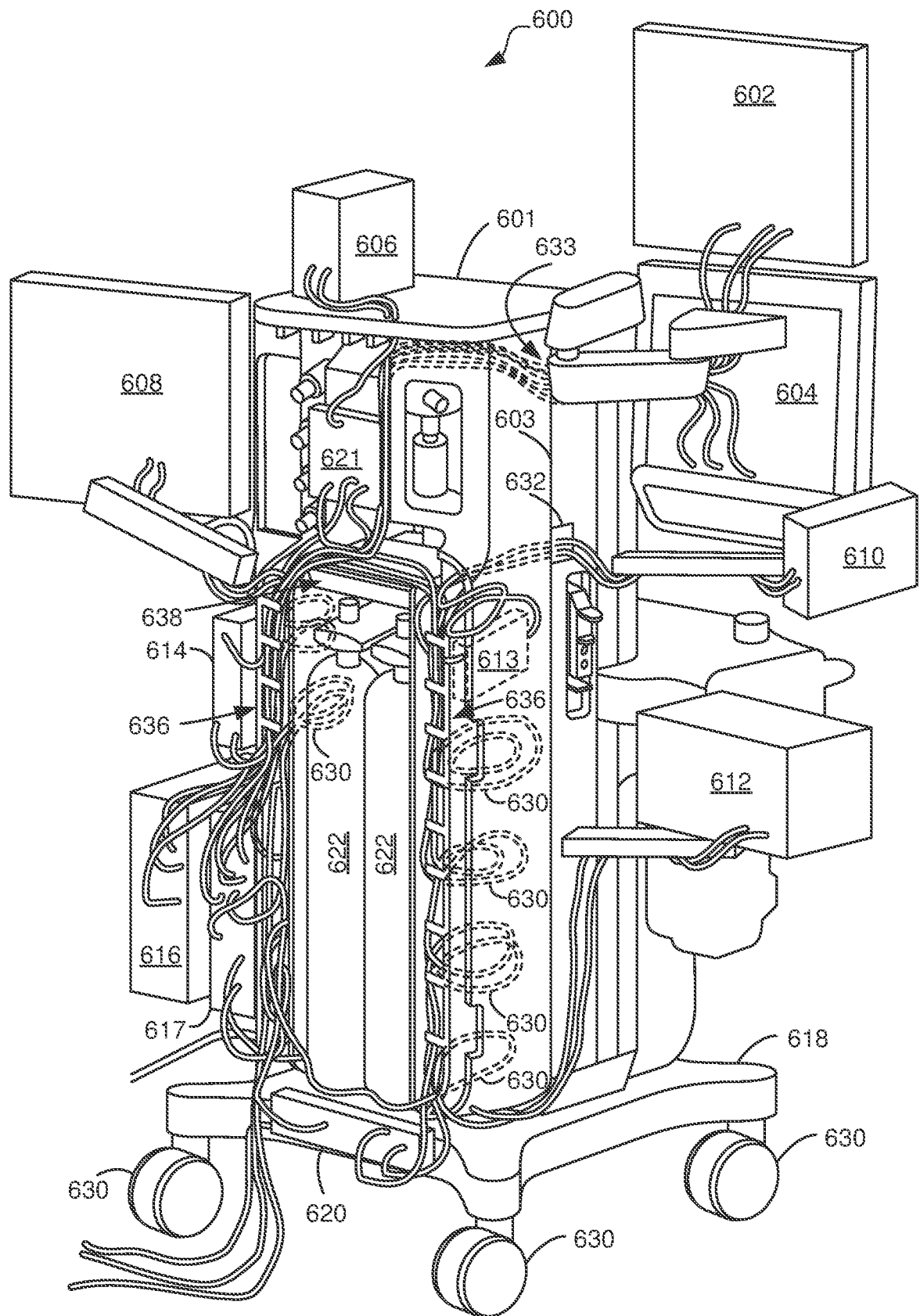


FIG. 6

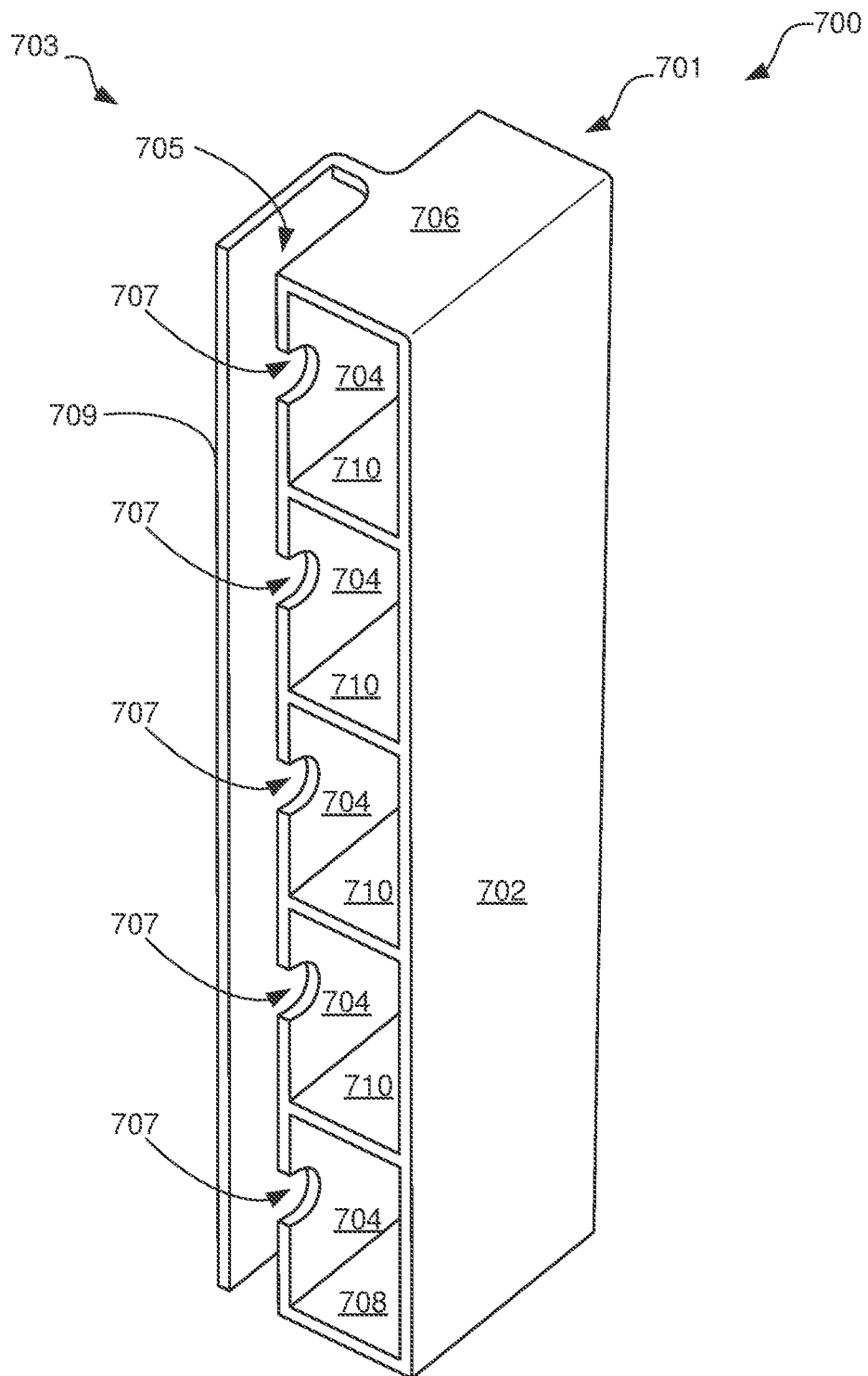


FIG. 7

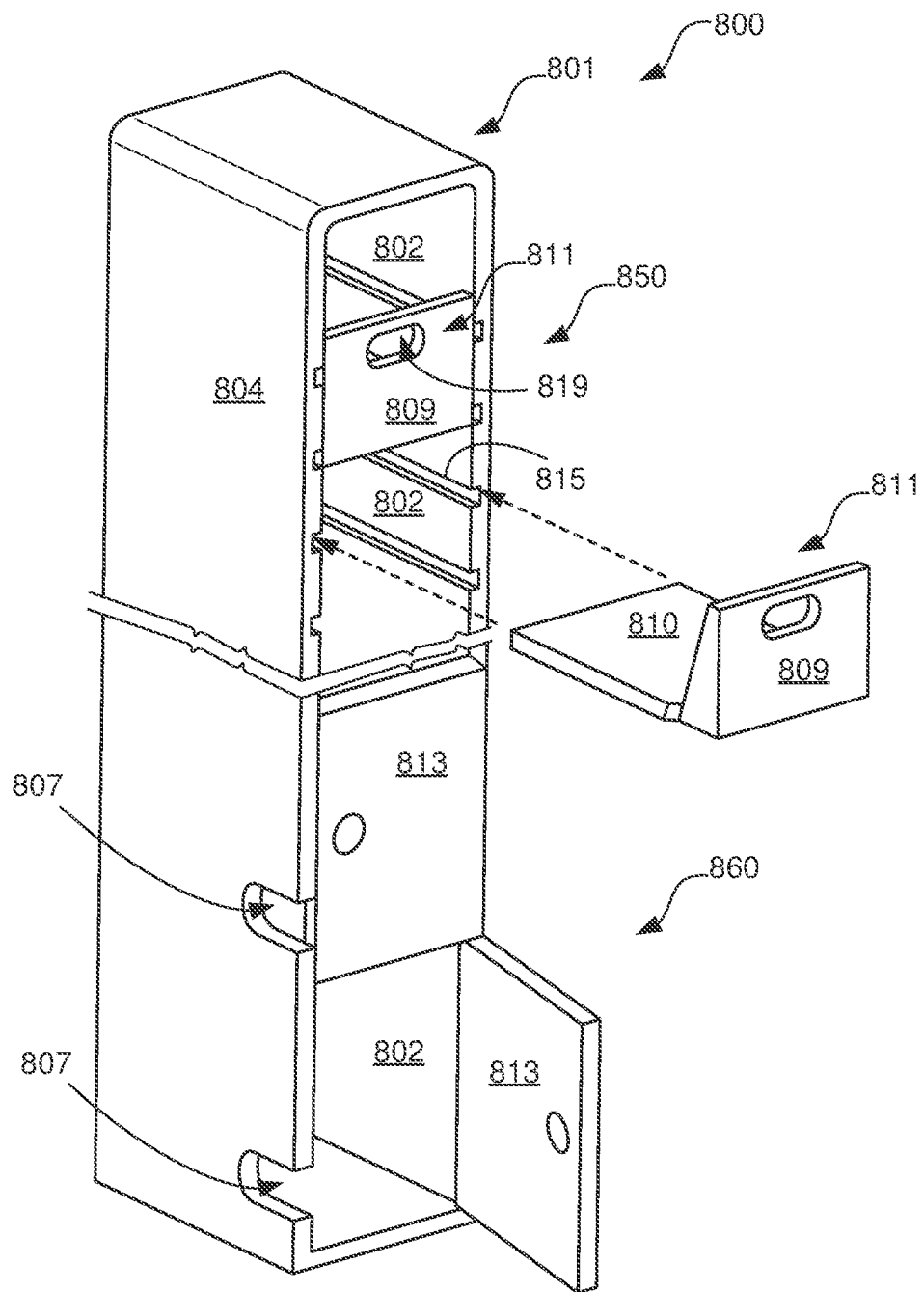


FIG. 8

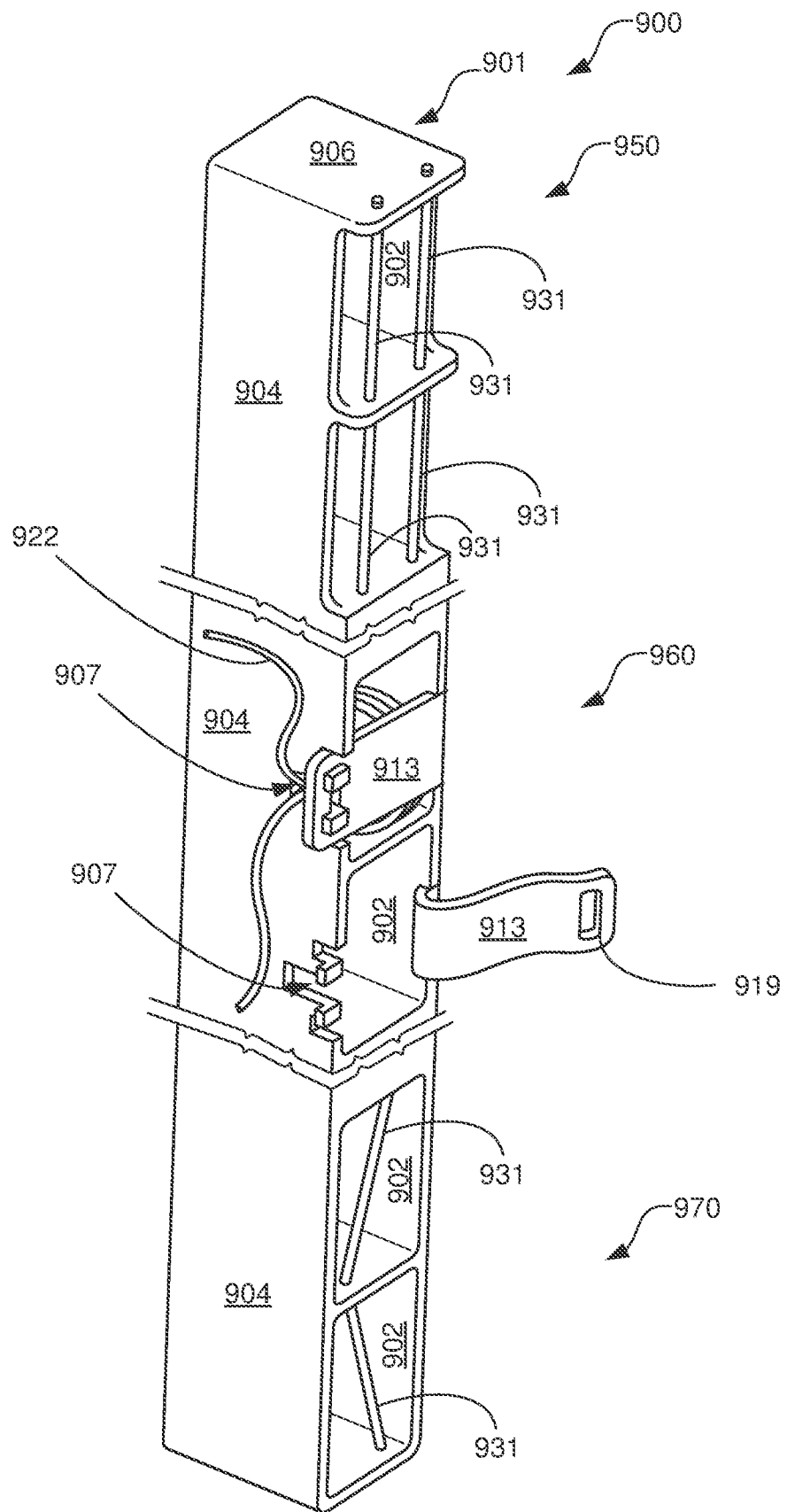


FIG. 9

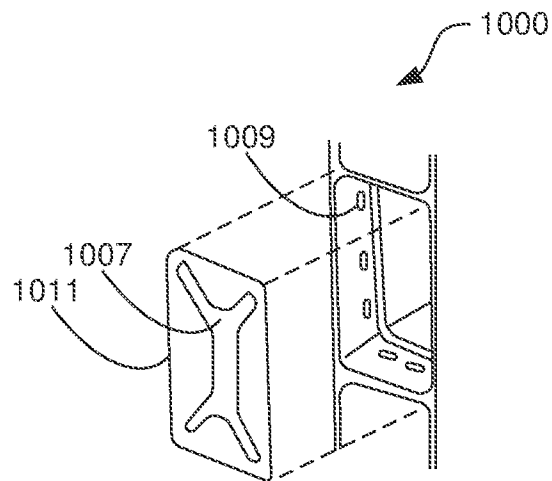


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2017/112264

A. CLASSIFICATION OF SUBJECT MATTER		
H02G 3/04(2006.01)i; H05K 7/02(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)		
H02G; H05K		
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)		
EPODOC,WPI,CNPAT,USTXT,CNKI,IEEE:cable, wire, manag+, stor+, channel, housing, wall, medical, finger+, flexible, elastic		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 102640027 A (COMMSCOPE INC. OF NORTH CAROLINA) 15 August 2012 (2012-08-15) description, paragraphs [0032]-[0050] and figures 1-21	10, 12-16
Y	CN 102640027 A (COMMSCOPE INC. OF NORTH CAROLINA) 15 August 2012 (2012-08-15) description, paragraphs [0032]-[0050] and figures 1-21	1-9, 11, 17
Y	US 2008099635 A1 (LEVITON MANUFACTURING CO., INC.) 01 May 2008 (2008-05-01) description, paragraphs [0018]-[0023] and figures 1-3	1-9, 11, 17
A	CN 102762068 A (PANDUIT CORP.) 31 October 2012 (2012-10-31) the whole document	1-20
A	CN 106972431 A (HUZHOU RY-IT CO., LTD.) 21 July 2017 (2017-07-21) the whole document	1-20
A	CN 107249277 A (SUZHOU KAISHUN ELECTRIC APPLIANCE CO., LTD.) 13 October 2017 (2017-10-13) the whole document	1-20
☐ 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		Date of mailing of the international search report
16 July 2018		31 July 2018
Name and mailing address of the ISA/CN		Authorized officer
STATE INTELLECTUAL PROPERTY OFFICE OF THE P.R.CHINA 6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088 China		PAN,Xiaoming
Facsimile No. (86-10)62019451		Telephone No. 86- (10) -53961267

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2017/112264

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	102640027	A	15 August 2012	BR	112012004133	A2	25 July 2017
				CN	102640027	B	11 July 2017
				US	8472774	B2	25 June 2013
				US	2013266283	A1	10 October 2013
				EP	2470934	A1	04 July 2012
				US	2011051341	A1	03 March 2011
				US	8655137	B2	18 February 2014
				WO	2011025762	A1	03 March 2011
US	2008099635	A1	01 May 2008	US	8464984	B2	18 June 2013
CN	102762068	A	31 October 2012	US	2012273627	A1	01 November 2012
				CN	202949671	U	22 May 2013
				EP	2518846	A2	31 October 2012
				JP	2012231144	A	22 November 2012
CN	106972431	A	21 July 2017	CN	106972431	B	22 May 2018
CN	107249277	A	13 October 2017	CN	207070546	U	02 March 2018