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(54) **CONTAINER WITH A SLIDING MANWAY GATE**

BEHÄLTER MIT EINER GLEITENDEN MANNLOCHTÜR

CONTENEUR AVEC UNE PORTE COULISSANTE POUR PASSAGE D'ACCÈS

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Description

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Application No. 61/755,416, filed January 22, 2013, and entitled "Sliding - Locking Below Liquid Manway Door".

BACKGROUND

[0002] Below liquid manways (BLMs) exist that are used as access points for tanks or containers. For example, BLMs exist that are used in fermentation and storage tanks as access points to empty and/or clean bottoms of the tanks. These types of BLMs provide liquid-tight seals, and contain head pressures from vertical columns of liquid contained in the tanks.

[0003] A typical BLM has a hinged door, swing bolts, and a seal. Because this type of BLM has hinges pivotably fixing the door to the tank, it is difficult to manage a flow rate of product emptying out of the tank. Moreover, the BLM has hinges pivotably fixing the door to the tank, the interface between the BLM and the tank creates interferences (e.g., lips, walls, bridges) across the opening of the BLM. Thus, the BLM impedes the flow of product emptying from the tank and/or builds up (e.g., bridges) product across the opening of the BLM, making the removal and/or cleaning of the product from the bottom of the tank more labor intensive, time consuming, and costly. While, existing BLMs may provide liquid tight seals for containing products in tanks, they are unable to manage flow rates of products emptying out of the tanks, and impede the flow of products emptying from the tanks, which make them more labor intensive, time consuming, and costly.

[0004] Sliding gate BLMs also exist that are used as access points for tanks or containers. However, these types of BLMs are not liquid tight and have a short useable life. For example, sliding gate BLMs tend to leak product under pressure. Moreover, because the sliding gate BLM's slide along seals, the sliding gate BLMs aggressively abrade the seals, shortening the useable life of the seals. Tanks or pressure vessels having sliding gates are known, for example, from US 2,652,946 A, FR 2 348 268 A1, US 3,386,206 A or GB 2 128 246 A.

[0005] Accordingly there remains a need in the art for a BLM that easily opens and closes to manage a flow rate of product emptying out of a tank, does not impede the flow rate of product emptying out the tank, and provides a liquid tight seal under pressure of a vertical column of product contained in the tank.

SUMMARY

[0006] This need has now been addressed by the container of the present invention as defined in claim 1. Further embodiments are covered by the subject-matter of the dependent claims.

[0007] Depending on the desired esthetic and mechanical properties of the manway gate assembly and/or the tank, and a substance that the tank is intended to hold, components may comprise metal, plastic, and/or ceramic. For example, in some embodiments, the manway gate assembly and/or the tank may comprise steel (e.g., stainless steel), copper, and/or aluminum.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The detailed description is set forth with reference to the accompanying figures. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The use of the same reference numbers in different figures indicates similar or identical items.

FIG. 1A illustrates a front view of an example manway gate assembly coupled to a tank.

FIG. 1B illustrates a side view of the example manway gate assembly and tank shown in FIG. 1A.

FIG. 2 illustrates a front view, side view, and perspective view of the example manway gate assembly shown in FIGS. 1 and 2.

FIG. 3 illustrates a detail view of a rod connection of the example manway gate assembly shown in the front view of FIG. 2 taken at location A.

FIG. 4 illustrates a detail view of a locking member of the example manway gate assembly shown in the front view of FIG. 2 taken at location D.

FIG. 5 illustrates a detail section view of the example manway gate assembly shown in the front view of FIG. 2 taken along line B-B.

FIG. 6 illustrates a detail section view of the example manway gate assembly shown in the front view of FIG. 2 taken along line C-C, and a detail view of a receiver cooperating with a bottom edge of a gate shown in the detail section view of FIG. 6 taken at location E.

FIG. 7 is a flow diagram illustrating an example process of closing and locking a tank via the example manway gate assembly shown in FIGS. 1 and 2.

FIG. 8 illustrates a front view, side view, and perspective view of another example manway gate assembly.

FIG. 9 illustrates a detail view of a rod connection of the example manway gate assembly shown in the perspective view of FIG. 8 taken at location F.

FIG. 10 illustrates a detail view of a locking member of the example manway gate assembly shown in the front view of FIG. 8 taken at location G.

FIG. 11 illustrates a detail view of the locking member of the example manway gate assembly shown in the side view of FIG. 8 taken at location H.

FIG. 12 illustrates a detail section view of the example manway gate assembly shown in the front view of FIG. 8 taken along line I-I.

FIG. 13 illustrates a detail section view of the example manway gate assembly shown in the front view of FIG. 8 taken along line J-J.

FIG. 14 is a flow diagram illustrating an example process of closing and locking a tank via the example manway gate assembly shown in FIG. 8.

DETAILED DESCRIPTION

[0009] This detailed description is not intended to identify essential features of the claimed subject-matter, nor it is intended for use in determining the scope of the claimed subject-matter.

Overview

[0010] This disclosure is directed to manway gate assemblies for containing products in tanks that are liquid tight under pressure of vertical columns of products in the tanks. A manway gate assembly according to one example embodiment may include a gate slideable between an open position, a closed position, and/or an intermediate position between the open position and the closed position. Such an example manway gate provides control to manage a flow rate of product emptying out of the tank, without abrading a seal between the slideable gate and the tank. For example, a user may simply activate an actuator connected to the gate to slideably displace the gate between the open position, the closed position, and/or the intermediate position between the open position and the closed position along a surface of the tank, but without the gate coming in contact with or abrading the seal between the gate and the tank. Stated otherwise, the gate is spaced from and avoids contact with the seal surface during the linear displacement of the gate, thus eliminating any abrasion of the seal between the gate and the tank. In one example, the closed position of the gate may be when a bottom edge of the gate engages with a receiver. In another example, the closed position of the gate may be when a bottom edge of the gate engages with one or more pads or stops. In another example, the closed position of the gate may be when the gate is in contact with the seal surface.

[0011] The manway gate assembly may include one or more locking members arranged adjacent to the gate. For example, the manway gate assembly may include one or more pins or bolts arranged adjacent to the gate. Further, the one or more pins or bolts may be arranged adjacent to an exterior surface of the gate. As another example, the one or more pins or bolts may be arranged adjacent to a surface of the tank. For example, the one or more pins or bolts may be arranged adjacent to an exterior surface of the tank. The one or more locking members may be slideably displaced between a locked position and an un-locked position, which will in turn apply a biasing force to the gate in a direction perpendicular to a sealing surface of the tank to seal the gate to the sealing surface in the locked position. For example, the gate may selectively slide in a first linear direction, between an open position, a closed position, and/or an intermediate position between the open position and the closed position. Then, moving the one or more pins slideably arranged adjacent to the gate may displace the gate in a second linear direction perpendicular to the first linear direction and may seal the gate to the sealing surface of the tank. When in the locked position the one or more pins lock or fix the gate in the sealed position such that the gate cannot inadvertently be opened or moved. In another example, the manway gate assembly may include one or more locking members (e.g., pins or bolts) rotatably arranged adjacent to the gate. Additional details regarding this particular manway gate assembly are provided below in the discussion of FIG. 8 through FIG. 14.

[0012] In some examples, the manway gate assembly may include a frame arranged around the gate. The frame may comprise one or more apertures arranged in the frame. In one example, the one or more apertures may removeably receive the one or more locking members. For example, the one or more apertures arranged in the frame may cooperate with one or more pins to displace the gate in the second linear direction perpendicular to the first linear direction to seal the gate to the seal surface of the tank. For example, the one or more apertures may cooperatively receive tapered ends of the one or more pins to apply a biasing force to the gate in the second linear direction. For example, when the one or more pins are in the locked position (e.g., fully engaged with the one or more apertures), the one or more tapered pins tightly press the gate door against an elastomeric seal thus creating a liquid tight seal capable of not leaking under pressure (e.g., up to at least about 117211 Pa (17 psi)). In another example, the one or more apertures arranged in the frame may slideably receive the one or more locking members to guide the gate in the first linear direction.

[0013] In some embodiments, the manway gate assembly may include a cam coupled to the gate and connected to the one or more locking members. In one example, the cam may be connected to one or more locking members to slideably displace the one or more locking members between the locked position and the un-locked position. For example, the gate may include a manual cam (e.g., camlock) that when manually rotated by a user slideably displaces the one or more locking members between the locked position and the un-locked position. Moreover, the gate may include an actuator coupled to the cam that when actuated (e.g., energized) by a user, slideably displaces the one or more pins between the locked position and the un-locked position. In another example, the cam may be connected to one or more pins to rotate the one or more pins between the locked position and the un-locked position. For example, the gate may include an actuator coupled to a cam that when actuated (e.g., energized) by a user rotating the one or more pins between the locked position and the un-locked position. Further, the gate may include more than one cam and/or

eccentric to displace the one or more locking members between the locked position and the un-locked position.

Illustrative Manway Gate Assembly

[0014] FIG. 1A illustrates a front view of an example manway gate assembly 102 coupled to a tank 104. In one example, the tank 104 may be a fermentation tank. For example, the tank 104 may be a wine fermenter for holding a juice. The tank 104 may be a self-emptying or self-cleaning tank. For example, once the fermentation process has been completed, and the wine (juice) removed, the pomace remains in the bottom of the tank (e.g., tank 104). The pomace consists of grape skins, seeds, and spent yeast. This must be removed from the tank where it will be subsequently pressed of any remaining juice and disposed of. Typically the pomace is removed manually with rakes and shovels, requiring considerable time and manpower. For example, cleaning a tank may take several workers several hours. Moreover, some of the workers would have to enter the tank and be exposed to a potential health hazard from carbon dioxide (as a by-product from fermentation) poisoning. Self-emptying tanks are sometimes used and are faster and less labor intensive to empty the pomace from the self-emptying tanks. The tank 104 may have a volume of about 113562 L (30,000 gallons) and ferment about 100 tons of grapes. However, in other embodiments larger or smaller tanks may be used. In the illustrated example, the tank 104 has an outside diameter 106 of about 449.6 cm (177 inches). The tank 104 may take less than an hour (e.g., about 45 minutes) to self-empty the pomace from tank 104, and not require a single worker to enter the tank 104.

[0015] FIG. 1B illustrates a side view of the example manway gate assembly 102 and tank 104 shown in FIG. 1. FIG. 1B illustrates the tank 104 includes a bottom surface 108 opposite a top surface 110. The bottom surface 108 may have a non-zero slope 112 relative to a horizontal support surface (e.g., surface of ground). For example, the bottom surface 108 may have a slope to provide for the pomace having somewhat the consistency of jam to slide out easily. In most examples, the slope of the bottom surface 108 may be at least about a 0.254 cm (0.1 inch) rise to a 30.5 cm (12 inch) run, up to at most about a 5.1 cm (2 inch) rise to a 30.5 cm (12 inch) run. However, in some instances, slopes above or below this range may also be used.

[0016] FIG. 1B illustrates a tank having a height 114 of about 919.5 cm (362 inches) from surface of ground 116 to a top 118 of the tank 104. The lowest portion 120 of the slope 112 of the bottom surface 108 of the tank 104 may be arranged a distance 122 above the ground 116. For example, the lowest portion 120 of the slope 112 of the bottom surface 108 of the tank 104 may be arranged about 106.7 cm (42 inches) above the ground 116 to provide for placing a receptacle (e.g., box, container, bin) under the manway gate assembly 102. While the tank and manway gated assemblies are described having certain shapes, sizes, and configurations they are simply specific illustrated embodiments and other dimensions are possible. For example, a tank may range from about a 1136 L (300 gallon) tank up to about a 158987 L (42,000 gallon) tank. In another example, a tank may have a height of about 127 cm (50 inches) up to about 1219 cm (480 inches).

[0017] The manway gate assembly 102 may be coupled to the tank 104 proximate to the lowest portion 120 of the slope 112 of the bottom surface 108 of the tank 104 configured to provide for controlling the flow rate of product (e.g., pomace) emptying from the tank 104 to the receptacle. FIGS. 1A and 1B illustrates a wall 124 fixed between the bottom surface 108 and the top surface 110. An aperture may be arranged in the wall 124 of the tank 104 proximate to the lowest portion 120 of the slope 112 of the bottom surface 108 of the tank 104. The aperture may comprise a sealing surface arranged around a perimeter of the aperture. A neck 126 may be arranged around the aperture and coupled to the wall 124 of the tank 104 proximate to the lowest portion 120 of the slope 112 of the bottom surface 108 of the tank 104. The neck 126 may comprise a sealing surface arranged distal to an outside surface of the wall 124 of the tank 104. FIGS. 1A and 1B illustrate the manway gate assembly 102 arranged around the neck 126 configured to empty the product held in the tank 104. Depending on the size of a tank, the manway gate assembly 102 may be required to provide a liquid tight seal against a head pressure of about 117211 Pa (17 psi).

[0018] FIG. 2 illustrates a front view 202, side view 204, and perspective view 206 of the example manway gate assembly 102 shown in FIGS. 1 and 2 with the tank omitted for clarity. Front view 202 illustrates the manway gate assembly 102 comprising a gate 208 configured to selectively slide in a first linear direction 210 between an open position, a closed position, and/or an intermediate position between the open position and the closed position. In one example, the gate 208 may comprise a substantially planar rectangular shaped plate. In another example, the gate 208 may comprise a curvilinear rectangular shaped plate to match a radius of the tank. One or more locking members 212 may be slideably arranged adjacent to the gate 208. The one or more locking members 212 may be configured to slideably displace between a locked position and an un-locked position. The one or more locking members 212 apply a biasing force to the gate in a direction perpendicular the first linear direction 210 in the locked position. The one or more locking members 212 may be pins, rods, bolts, bars etc.

[0019] Front view 202 illustrates a frame 214 arranged around the gate 208. Side view 204 illustrates the frame 214 comprising one or more apertures 216 arranged in the frame 214 configured to removeably receive the one or more locking members 212. Side view 204 illustrates the one or more apertures 216 may cooperate with the one or more locking members 212 configured to displace

the gate in a second linear direction 218 perpendicular to the first linear direction 210. For example, the one or more apertures 216 may cooperatively receive tapered ends of the one or more locking members 212 to displace the gate 208 in the second linear direction 218 to tightly press the gate 208 against a gasket (e.g., an elastomeric seal) thus creating a liquid tight seal.

[0020] Front view 202 illustrates an actuator 220 (e.g., a pneumatic cylinder, a hydraulic cylinder, an electric motor with a linear gear, etc.) coupled to the frame 214 and connected to the gate 208. The actuator 220 is configured to selectively slide the gate 208 along a sealing surface 222 of the neck 126 between the open position, the closed position, and/or an intermediate position between the open position and the closed position. The neck 126 may comprise a wall 224 fixed perpendicular to the surface of the tank 104. As discussed above with regard to FIGS. 1A and 1B, the neck 126 may be coupled to the wall 124 of the tank 104 proximate to the lowest portion 120 of the slope 112 of the bottom surface 108 of the tank 104, and the sealing surface 222 may be arranged distal to an outside surface of the wall 124 of the tank 104. For example the wall 224 of the neck 126 may be fixed to the wall 124 of the tank 104 proximate to the lowest portion 120 of the slope 112 of the bottom surface 108 of the tank 104. The wall 224 of the neck 126 may have an outer edge (e.g., sealing surface 222) arranged around a perimeter of the wall 224 of the neck 126 and distal to the surface of the tank 104. The one or more locking members 212 may apply a biasing force to the gate 208 in the second linear direction 218 perpendicular to the sealing surface 222 to seal the gate to the sealing surface 222 of the neck 126 in the locked position.

[0021] The gate 208 may be arranged to selectively slide parallel to the sealing surface 222 of the neck 126 between the open position, the closed position, and/or an intermediate position between the open position and the closed position. The gate 208 may be slideably disposed in a first plane adjacent to a surface (e.g., wall 124) of the tank 104, and the gate 208 may slideably displace in the first plane along the surface of the tank 104 between an open position, a closed position, and/or an intermediate position between the open position and the closed position. The gate 208 comprises a gasket 226 coupled to the gate 208 to seal the gate 208 to the sealing surface 222 of the neck 126 in the locked position. The gasket 226 covers the entire rear face of the gate 208. The gasket 226 may comprise a plastic gasket, a rubber gasket, a paper gasket, metal gasket, a cork gasket, etc. Depending on the material and intended use, gaskets may be elastomeric, flexible, semi- rigid, etc.

[0022] Front view 202 illustrates a cam 228 connected to the one or more locking members 212 to slideably displace the one or more locking members 212 between the locked position and the un-locked position. While front view 202 illustrates the cam 228 coupled to the gate 208 and connected to the one or more locking members 212 to slideably displace the one or more locking members between the locked position and the un-locked position, the cam 228 may be coupled to the wall 124 of the tank 104. Further, while front view 202 illustrates a single cam 228 coupled to the gate 208, the gate 208 may include more than one cam to slideably displace the one or more locking members between the locked position and the un-locked position. Moreover, the gate 208 may not include a cam coupled to the gate 208. For example, the actuator may be coupled to the one or more locking members 212 and the gate 208 and provide for selectively sliding the gate 208 between the open position, the closed position, and/or the intermediate position between the open position and the closed position, and slideably displace the one or more locking members between the locked position and the un-locked position. While front view 202 illustrates a manually operated cam 228, the manway gate assembly 102 may comprises an actuator connected with the cam 228. For example, a linear actuator may be coupled to the cam 228 and operate the cam 228 to slideably displace the one or more locking members between the locked position and the un-locked position.

[0023] Front view 202 illustrates the manway gate assembly 102 may comprise one or more guide tracks 230 configured to guide the gate 208 in the first linear direction 210. Front view 202 illustrates the frame 214 has a height 232 of about 183 cm (72 inches) and the gate 208 has a height 234 of about 81 cm (32 inches). The frame 214 may have a width 236 of about 122 cm (48 inches). One or more sleeves 238 may be coupled to the gate 208 to slideably receive the one or more locking members 212. The one or more sleeves 238 may have an outside diameter 240 of about 3.3 cm (1.3 inches) and the one or more locking members 212 have an outside diameter 242 of about 2.54 cm (1 inch).

[0024] FIG. 3 illustrates a detail view of a typical rod connection of the example manway gate assembly 102 shown in the front view 202 of FIG. 2 taken at location A. FIG. 3 illustrates one or more rods 302 connected to one or more cams 304. The one or more cams 304 may be connected to the one or more locking members 212. The one or more cams 304 may be connected to the cam 228. Thus, when the cam 228 is displaced (e.g., rotated), the cam 228 displaces the one or more cams 304, and the one or more rods 302 slideably displace the one or more locking members 212.

[0025] FIG. 4 illustrates a detail view of a sleeve of the one or more sleeves 238 coupled to the gate 208 of the example manway gate assembly 102 shown in the front view 202 of FIG. 2 taken at location D. FIG. 4 illustrates a pin of the one or more locking members 212 slideably received by the sleeve and in the locked position. For example, FIG. 4 illustrates the tapered pin in the locked position (e.g., fully engaged with the one of the one or more apertures 216). The pin is shown connected to one of the one or more push rods 302.

[0026] FIG. 5 illustrates a detail section view of the example manway gate assembly 102 shown in the front

view 202 of FIG. 2 taken along line B-B. FIG. 5 illustrates the wall 224 of the neck 126 may have an outer edge 502 arranged around a perimeter of the wall 224 of the neck 126 and distal to the surface of the tank 104. As discussed above, the outer edge 502 may provide for a sealing surface (e.g., sealing surface 222) configured to seal the gate 208 to the tank 104. For example, and as discussed above with regard to FIG. 2, the gate 208 includes the gasket 226 covering the entire rear face of the gate 208. Moreover, the tapered ends of the one or more locking members 212 may apply a biasing force to the gate 208 in the second linear direction 218 to tightly press (e.g., squeeze, pinch, squish, deform, etc.) the gasket 226 between the gate 208 and the outer edge 502 of the neck 126, thus creating a liquid tight seal. While FIG. 5 illustrates the one or more locking members 212 displacing the gate 208 in the second linear direction 218 to tightly press (e.g., squeeze, pinch, squish, deform, etc.) the gasket 226 to create a liquid tight seal capable not leaking under pressure of about 117211 Pa (17 psi), the one or more locking members 212 may create a liquid tight seal capable not leaking under pressure of more than 117211 Pa (17 psi). For example, the manway gate assembly 102 may include more and/or larger pins configured to provide a greater compression force to create a liquid tight seal capable not leaking under pressure of more than about 172369, 344738, 517107 or 689476 Pa (25, 50, 75, or 100 psi).

[0027] FIG. 6 illustrates a detail section view 602 of the example manway gate assembly 102 shown in the front view of FIG. 2 taken along line C-C, and a detail view 604 of a receiver 606 cooperating with a bottom edge 608 of the gate 208 shown in the detail section view 602 of FIG. 7 taken at location E. Detail section view 602 illustrates a passageway 610 having a substantially uniform planar surface 612 that provides for not impeding the flow of product emptying from the tank 104. For example, the substantially uniform planar surface 612 of the passageway 610 doesn't build up product across an opening of the manway gate assembly 102. The detail view 604 illustrates the bottom edge 608 of the gate 208 securely seats in the receiver 606 and also provides for not impeding the flow of product emptying from the tank 104.

Example Method of Using a Manway Gate Assembly

[0028] FIG. 7 illustrates an example method 700 of closing and locking a tank (e.g., tank 104) via an example manway gate assembly (e.g., manway gate assembly 102). For instance, this process may be performed to empty and/or clean a self-emptying or self- cleaning tank, which has a bottom surface (e.g., bottom surface 108) having a slope (e.g., slope 112), which provides for a more efficient removal of pomace in the bottom of the tank. While FIG. 7 illustrates a method of using an example manway gate assembly configured to provide a liquid tight seal for a fermentation tank, this method may apply to using the manway gate assembly with any type of container. For example, the manway gate assembly may be used with a mash tank, a petroleum tank, a milk tank, a septic tank, a gas tank, etc.

[0029] Method 700 may include an operation 702, which represents selectively sliding a gate (e.g., gate 208) in a first linear direction (e.g., first linear direction 210). For example, a user may selectively slide the gate in the first linear direction between an open position, a closed position, and/or an intermediate position between the open position and the closed position. A user may selectively slide the gate in the first linear direction between an open position, a closed position, and/or an intermediate position between the open position and the closed position to control a flow rate of product (e.g., pomace) emptying from the tank. The gate may be selectively moved between the open, closed, and/or an intermediate positions via an actuator (e.g., actuator 220). Method 700 may proceed to operation 704, which represents selectively sliding the gate in the first linear direction to the closed position. For example, subsequent to emptying and/or cleaning the product from the tank, a user may selectively close the gate to the closed position. For example, a user may selectively close the gate such that a receiver (e.g., receiver 606) cooperatively receives a bottom edge (e.g., bottom edge 608) of the gate.

[0030] Method 700 may be complete at operation 706, which represents slideably displacing one or more locking members (e.g., one or more locking members 212) to a locked position, where the one or more locking members apply a biasing force to the gate in a second linear direction 218 perpendicular to the first linear direction.

[0031] FIG. 8 illustrates a front view 802, a side view 804, and a perspective view 806 of another example manway gate assembly 808. The front view 802, side view 804, and perspective view 806 show the manway gate assembly 808 apart from a wall of a tank for clarity. Front view 802 illustrates the manway gate assembly 808 comprising a gate 810 to selectively slide in the first linear direction 210 between an open position, a closed position, and/or an intermediate position between the open position and the closed position. In one example, the gate 810 may comprise a substantially planar rectangular shaped plate. In another example, the gate 810 may comprise a curvilinear rectangular shaped plate to match a radius of the tank. The manway gate assembly 808 may include one or more locking members 812 having a longitudinal axis 814 that rotate in the second plane parallel to the first plane. For example, the one or more locking members 812 may be rotatably disposed adjacent to the gate 810, each of the one or more rotatable locking members 812 configured to rotate about the longitudinal axis 814 of each of the one or more rotatable locking members 812 between the locked position and the un-locked position. The one or more locking members 812 may apply a biasing force to the gate 810 in a direction perpendicular to the sealing surface of the aperture to seal the gate to the sealing surface of the neck in the locked position.

[0032] Front view 802 illustrates a frame 816 arranged around the gate 810. Side view 804 illustrates that the frame 816 comprises one or more apertures 818 arranged in the frame 816 to slideably receive the one or more locking members 812 to guide the gate in the first linear direction 210 along the frame 816. Side view 804 illustrates one or more apertures 818 arranged along the frame 816, which may cooperate with the one or more locking members 812 to displace the gate in the second linear direction 218 perpendicular to the first linear direction 210. For example, the one or more apertures 818 arranged in the frame 816 may comprise one or more bearing surfaces 820, and the one or more locking members 812 may comprise one or more cams 822 to bear on the one or more bearing surfaces 820 to displace the gate 810 perpendicular to the first and second planes to seal the gate 810 to a surface of a tank. For example, the one or more locking members may rotate the one or more cams 822 (e.g., round projection, protrusion, bump, lobe, etc.) in a direction towards the bearing surfaces 820 such that the one or more cams 822 bear on the bearing surfaces 820 and apply a biasing force to the gate 810 in the second linear direction 218 to tightly press the gate 810 against the gasket 226 thus creating a liquid tight seal. Further, the one or more locking members may rotate the one or more cams 822 in a direction towards the bearing surfaces 820 to the locked position. Similarly, the one or more locking members 812 may rotate the one or more cams 822 in a direction away from the bearing surfaces 820 to the un-locked position. The one or more cams 822 may be coupled to the ends of the locking members 812. For example, the one or more cams 822 may comprise a collar or eccentric member mechanically fastened to the ends of a shaft, a pin, a bolt, a rod, or the like. Alternatively, one or more of the cams 822 may be formed integrally with the ends of the one or more locking members.

[0033] Front view 802 illustrates the actuator 220 coupled to the frame 816 and connected to the gate 810. As discussed above, the actuator 220 may be configured to selectively slide the gate 810 along a sealing surface 222 of an aperture arranged in the wall of the tank proximate to the lowest portion of the slope of the bottom surface of the tank. For example, the actuator 220 may be configured to selectively slide the gate 810 along a sealing surface 222 of an aperture arranged in the wall of the tank between the open position, the closed position, and/or the intermediate position between the open position and the closed position. Further, the actuator 220 may be configured to selectively slide the gate 810 along a sealing surface 222 of a neck 126. The neck 126 may comprise a wall 224 fixed perpendicular to the surface of the tank 104. As discussed above with regard to FIGS. 1A and 1B, the neck 126 may be coupled to the wall 124 of the tank 104 proximate to the lowest portion 120 of the slope 112 of the bottom surface 108 of the tank 104, and the sealing surface 222 may be arranged distal to an outside surface of the wall 124 of the tank 104. For example the wall 224 of the neck 126 may be fixed to the wall 124 of the tank 104 proximate to the lowest portion 120 of the slope 112 of the bottom surface 108 of the tank 104. The wall 224 of the neck 126 may have an outer edge (e.g., sealing surface 222) arranged around a perimeter of the wall 224 of the neck 126 and distal to the surface of the tank 104. The one or more locking members 812 may displace the gate 810 in the second linear direction 218 perpendicular to the sealing surface 222 to seal the gate to the sealing surface 222 of the neck 126 in the locked position.

[0034] The gate 810 may be arranged to selectively slide parallel to the sealing surface 222 of the neck 126 between the open position, the closed position, and/or the intermediate position between the open position and the closed position. The gate 810 may be slideably disposed in a first plane adjacent to a surface (e.g., wall 124) of the tank 104, and the gate 810 may slideably displace in the first plane along the surface of the tank 104 between an open position, a closed position, and/or an intermediate position between the open position and the closed position. The gate 810 comprises a gasket 226 coupled to the gate 810 to seal the gate 810 to the sealing surface 222 of the neck 126 in the locked position. The gasket 226 covers the entire rear face of the gate 810. The gasket 226 may comprise an elastomeric gasket, a paper gasket, metal gasket, a cork gasket, etc.

[0035] Front view 802 illustrates cams 824 and 826 connected to the one or more locking members 812 to rotatably displace the one or more locking members 812 between the locked position and the un-locked position. While front view 802 illustrates the actuator 220 connected with the cams 824 and 826, the manway gate assembly 808 may comprise manually operated cams. For example, one or more levers may be coupled to the cams 824 and 826 to operate the cams 824 and 826 to rotatably 812 the one or more locking members between the locked position and the un-locked position.

[0036] Perspective view 806 illustrates the cams 824 and 826 may be linked together via a rod 828. The rod 828 may be coupled to both the cams 824 and 826 such that cams 824 and 826 are displaced together. For example, the rod 828 may be coupled between the cams 824 and 826 such that when the linear actuator 220 selectively displaces the rod 828 in the first linear direction 210, the cams 824 and 826 are rotated in unison with each other. Further, when the rod 828 is displaced in the first linear direction 210 the cams 824 and 826 are selectively rotated about the longitudinal axes 814 of the locking members 812. The manway gate assembly 808 may include one or more bearing surfaces 830, and the rod 828 may bear on the bearing surfaces 830 when the rod 828 is displaced in the first linear direction 210. For example, when the rod 828 is selectively actuated in the first linear direction 210 to displace the gate to the closed position, the rod 828 may be slideably displaced along the bearing surfaces 830 in the first linear direction 210. As the rod 828 bears on the bearing surfaces 830 and

slides in the first linear direction, the rod 828 selectively rotates the cams 824 and 826 about the longitudinal axes 814 of the one or more locking members 812. When the cams 824 and 826 are selectively rotated about the longitudinal axes 814 of the one or more locking members 812, the one or more locking members 812 rotate between the locked position and the un-locked position. In one example, when the cams 824 and 826 are selectively rotated about the longitudinal axes 814 of the one or more locking members 812, the one or more locking members 812 rotate the one or more cams 822 to bear on the one or more bearing surfaces 820 to apply a biasing force to the gate 810 perpendicular to the first and second planes to seal the gate 810 to a surface of a tank. The bearing surfaces 830 may comprise a bolt, a pin, a rolling pin, a smooth plate (e.g., a smooth nylon plate) arranged to cooperate with the rod 828.

[0037] The manway gate assembly 808 may include one or more stop surfaces 832, that when the rod 828 is selectively actuated in the first linear direction 210 to displace the gate to the open position, the rod 828 may bear on the stop surfaces 832. For example, when the rod 828 is selectively actuated in the first linear direction 210 to displace the gate to the open position, the rod 828 may be displaced on the bearing surfaces 830 as the gate is displaced in the first linear direction 210 to the open position. Stated otherwise, the stop surfaces 832 may stop the rod 828 from being displaced relative to the gate 810 to provide for raising the gate 810 to the open position. The stop surfaces 832 may comprise a bolt, a pin, a rolling pin, a smooth plate (e.g., a smooth nylon plate) arranged to come in contact with the rod 828.

[0038] FIG. 9 illustrates a detail view 902 of the cam 824 of the example manway gate assembly 808 shown in the perspective view 806 of FIG. 8 taken at location F. FIG. 9 illustrates the rod 828 connected to a lever 904. The lever 904 may be pivotably connected to the rod 828 and the locking member 812. For example, one end of the lever 904 may be pivotably connected to the rod 828, and the other end of the lever 904 may be pivotably connected to a lobe 906. The lobe 906 may be irremovably or removably coupled to the locking member 812. In one example, the lobe 906 may comprise a clamping device. Thus, when the rod 828 is displaced via a rod 908 of the actuator 222 in the first linear direction 210, the cam lever 904 displaces (e.g., rotates) the lobe 906, and the lobe 906 displaces (e.g., rotates) the locking member 812. Cam 826 may be similar to cam 824. For example, the rod 828 may be connected to a lever, and the lever may be pivotably connected the locking member 812. For example, one end of the lever may be pivotably connected to the rod 828, and the other end of the lever may be pivotably connected to a lobe.

[0039] FIG. 10 illustrates a detail view 1002 of the locking member 812 of the example manway gate assembly 808 shown in the front view of FIG. 8 taken at location G. FIG. 10 illustrates a bearing of one or more bearings 1004 arranged in the frame 816. The bearings 1004 may cooperate with the one or more locking members 812 to provide for displacing (e.g., rotating) the one or more locking members 812 about their longitudinal axes 814 between a locked position and an un-locked position.

[0040] FIG. 11 illustrates a detail view 1102 of the locking member 812 of the example manway gate assembly 808 shown in the side view of FIG. 8 taken at location H. FIG. 11 illustrates the cam 822 coupled to the locking member 812. As discussed above, the cam 822 may bear on the one or more bearing surfaces 820 to displace the gate 810 perpendicular to the first and second planes to seal the gate 810 to a surface of a tank. For example, the one or more cams 822 may comprise a lobe portion 1104 (e.g. round projection, protrusion, bump, etc.) arranged to bear on the bearing surface 820. For example, when the lobe portion 1104 is displaced (e.g., rotated) in a direction towards the bearing surface 820, the lobe portion 1104 may come in contact with, and bear on, the bearing surface 820 to apply a biasing force to the gate 810 in the second linear direction 218 to tightly press the gate 810 against a gasket (e.g., an elastomeric seal) thus creating a liquid tight seal. For example, one or more cams 822 of the one or more rotatable locking members 812 may bear on the one or more bearing surfaces 820 to apply a biasing force to the gate 810 in the direction 218 perpendicular to the sealing surface of the aperture to seal the gate 810 to the sealing surface of the aperture in the locked position. Further, the one or more cams 822 may comprise a planar portion 1106 arranged to not bear on (e.g., be free of contact with) the bearing surface 820. For example, when the planar portion 1106 is displaced (e.g., rotated) in a direction towards the bearing surface 820, the planar portion 1106 may be arranged parallel with, and be free of contact with the bearing surface 820 to provide for displacing the gate 810 in the first linear direction 210 between the open position, the closed position, and/or the intermediate position between the open position and the closed position.

[0041] FIG. 12 illustrates a detail section view 1202 of the example manway gate assembly 808 shown in the front view 802 of FIG. 8 taken along line I-I. Detail section view 1202 illustrates the manway gate assembly 808 comprising the passageway 610 having the substantially uniform planar surface 612 that provides for not impeding the flow of product emptying from the tank 104. The gate 810 may comprise the gasket 226 coupled to the gate 810 to seal the gate 810 to the sealing surface 222 of the neck 126 in the locked position.

[0042] FIG. 13 illustrates a detail section view 1302 of the example manway gate assembly 808 shown in the front view 802 of FIG. 8 taken along line J-J. Detail section view 1302 illustrates the cams 824 and 826 connected to the one or more locking members 812 to rotatably displace the one or more locking members 812 between the locked position and the un-locked position. Detail section view 1302 illustrates the ends of the levers 904 may be pivotably connected to the rods 828, and the other ends of the levers 904 may be pivotably connected to the lobes

906.

Example Method of Using a Manway Gate Assembly

[0043] FIG. 14 illustrates an example method 1400 of closing and locking a tank (e.g., tank 104) via an example manway gate assembly (e.g., manway gate assembly 808). For instance, this process may be performed to empty and/or clean a self-emptying or self-cleaning tank, which has a bottom surface (e.g., bottom surface 108) having a non-zero slope (e.g., non-zero slope 112), which provides for a more efficient removal of pomace in the bottom of the tank. While FIG. 14 illustrates a method of using an example manway gate assembly configured to provide a liquid tight seal for a fermentation tank, this method may apply to using the manway gate assembly with any type of container. For example, the manway gate assembly may be used with a mash tank, a petroleum tank, a milk tank, a septic tank, a gas tank, etc.

[0044] Method 1400 may include an operation 1402, which represents selectively sliding a gate (e.g., gate 810) in a first linear direction (e.g., first linear direction 210). For example, a user may selectively slide the gate in the first linear direction between an open position, a closed position, and/or an intermediate position between the open position and the closed position. A user may selectively slide the gate in the first linear direction between an open position, a closed position, and/or an intermediate position between the open position and the closed position to control a flow rate of product (e.g., pomace) emptying from the tank. The gate may be selectively moved between the open, closed, and/or an intermediate positions via an actuator (e.g., actuator 220). Method 1400 may proceed to operation 1404, which represents selectively sliding the gate in the first linear direction to the closed position. For example, subsequent to emptying and/or cleaning the product from the tank, a user may selectively close the gate to the closed position.

[0045] Method 1400 may be complete at operation 1406, which represents rotatably displacing one or more locking members (e.g., one or more locking members 812) to a locked position, where the one or more locking members apply a biasing force to the gate in a second linear direction (e.g., second linear direction 218) perpendicular to the first linear direction. For example, a user may selectively rotate the one or more locking members to apply a biasing force to the gate perpendicular to a first plane adjacent to a surface of the tank to tightly press the gate against a gasket (e.g., gasket 226) thus creating a liquid tight seal.

Claims

1. A container comprising:

a tank (104) for holding a product; and
a gate assembly (102, 808) coupled to the tank (104), the gate assembly (102, 808) comprising:

a gate (208, 810) comprising a gasket (226) coupled to the gate (208, 808), the gate (208, 808) being slideably disposed in a first plane adjacent to a surface of the tank, the gate (208, 810) further being configured for being slideably displaced in the first plane along the surface of the tank (104) between an open position and a closed position; and
one or more locking members (212, 812) having a longitudinal axis movably disposed in a second plane parallel to the first plane, the one or more locking members (212, 812) being movable between a locked position and an unlocked position,
wherein the one or more locking members (212, 812) are configured to apply a biasing force to the gate (208, 810) in a direction perpendicular to the first and second planes to seal the gate (208, 810) to the surface of the tank in the locked position,
characterized in that the gasket (226) covers the entire rear face of the gate (208, 810).

2. The container of claim 1, wherein the one or more locking members (812) are rotatable in the second plane parallel to the first plane between the locked position and the unlocked position; and
wherein the gate assembly (808) further comprises a frame (816) arranged around the gate (810), the frame (816) comprising one or more bearing surfaces (820), and the one or more rotatable locking members (812) comprising one or more cams (822) to bear on the one or more bearing surfaces (820) to apply a biasing force to the gate (810) perpendicular to the first and second planes to seal the gate (810) to the surface of the tank (104) in the locked position.

3. The container of claim 1, wherein the one or more locking members (212) slide in the second plane parallel to the first plane between the locked position and the unlocked position; and
wherein the gate assembly (102) further comprises a frame (214) arranged around the gate (208), the frame (214) comprising one or more apertures (216) to removeably receive the one or more locking members (212), the one or more apertures (216) to cooperate with the one or more locking members (212) to apply a biasing force to the gate (208) perpendicular to the first and second planes to seal the gate (208) to the surface of the tank (104) in the locked position.

4. The container of claim 1, further comprising a scraper blade assembly rotatably coupled to a bottom surface (108) of the container to displace solids depos-

ited on the bottom surface (108) of the container through the gate assembly (102, 808) when the gate (208, 810) is in the open position and/or an intermediate position between the open position and the closed position.

5. The container of claim 1, wherein the gate (208, 810) is movable in the first plane along the surface of the tank (104) to an intermediate position between the open position and the closed position.

6. The container of claim 2, wherein the gate assembly (808) further comprises:
a linear actuator (220) coupled to the frame (816) and to the gate (810), the linear actuator (220) to selectively slide the gate (810) between the open position, the closed position, and/or an intermediate position between the open position and the closed position.

7. The container of claim 2, wherein the gate assembly (808) further comprises a linkage connected to the one or more locking members (812) to rotate the one or more rotatable locking members (812) between the locked position and the unlocked position.

8. The container of claim 2, wherein each of the one or more locking members is rotatable about a longitudinal axis of the respective one or more locking members between the locked position and the unlocked position.

9. The container of claim 7, wherein the gate assembly (808) further comprises:
an actuator connected with the linkage connected to the one or more locking members (812) to rotate the one or more locking members (812) between the locked position and the unlocked position.

10. The container of claim 3, wherein the gate assembly (102) further comprises:
a cam (228) coupled to the gate (208) and connected to the one or more locking members (212) to slideably displace the one or more locking members (212) between the locked position and the unlocked position.

11. The container of claim 10, wherein the gate assembly (102) further comprises:
an actuator (220) connected with the cam (228) coupled to the gate (208) and connected to the one or more locking members (212) to slideably displace the one or more locking members (212) between the locked position and the unlocked position.

Patentansprüche

1. Behälter, Folgendes umfassend:

einen Tank (104) zum Aufnehmen eines Produkts; und
eine Torbaugruppe (102, 808), die an den Tank (104) gekoppelt ist, wobei die Torbaugruppe (102, 808) Folgendes umfasst:

ein Tor (208, 810) mit einer Dichtung (226), die an das Tor (208, 808) gekoppelt ist, wobei das Tor (208, 808) in einer ersten Ebene benachbart zu einer Fläche des Tanks verschiebbar angeordnet ist, wobei das Tor (208, 810) ferner dazu ausgestaltet ist, in der ersten Ebene entlang der Fläche des Tanks (104) zwischen einer offenen Stellung und einer geschlossenen Stellung verschiebbar verlagert zu werden; und
ein oder mehrere Verriegelungselemente (212, 812) mit einer Längsachse, die beweglich in einer zweiten Ebene parallel zur ersten Ebene angeordnet ist, wobei das eine oder die mehreren Verriegelungselemente (212, 812) zwischen einer verriegelten Stellung und einer entriegelten Stellung beweglich sind,
wobei das eine oder die mehreren Verriegelungselemente (212, 812) dazu ausgestaltet sind, in einer Richtung senkrecht zur ersten und zweiten Ebene eine Vorspannkraft auf das Tor (208, 810) auszuüben, um das Tor (208, 810) in der verriegelten Stellung zur Fläche des Tanks abzudichten,
dadurch gekennzeichnet, dass die Dichtung (226) die gesamte Rückseitenfläche des Tors (208, 810) abdeckt.

2. Behälter nach Anspruch 1, wobei das eine oder die mehreren Verriegelungselemente (812) in der zweiten Ebene parallel zur ersten Ebene zwischen der verriegelten Stellung und der entriegelten Stellung drehbar sind; und
wobei die Torbaugruppe (808) ferner einen Rahmen (816) umfasst, der um das Tor (810) herum angeordnet ist, wobei der Rahmen (816) eine oder mehrere Auflageflächen (820) umfasst und das eine oder die mehreren drehbaren Verriegelungselemente (812) einen oder mehrere Nocken (822) zum Aufliegen auf der einen oder die mehreren Auflageflächen (820) umfassen, um senkrecht zur ersten und zweiten Ebene eine Vorspannkraft auf das Tor (810) auszuüben, um das Tor (810) in der verriegelten Stellung zur Fläche des Tanks (104) abzudichten.

3. Behälter nach Anspruch 1, wobei das eine oder die mehreren Verriegelungselemente (212) in der zwei-

ten Ebene parallel zur ersten Ebene zwischen der verriegelten Stellung und der entriegelten Stellung gleiten; und
wobei die Torbaugruppe (102) ferner einen Rahmen (214) umfasst, der um das Tor (208) herum angeordnet ist, wobei der Rahmen (214) eine oder mehrere Öffnungen (216) zum entfernbaren Aufnehmen des einen oder der mehreren Verriegelungselemente (212) umfasst, wobei die eine oder die mehreren Öffnungen (216) mit dem einen oder den mehreren Verriegelungselementen (212) zusammenwirken, um senkrecht zur ersten und zweiten Ebene eine Vorspannkraft auf das Tor (208) auszuüben, um das Tor (208) in der verriegelten Stellung zur Fläche des Tanks (104) abzudichten.

4. Behälter nach Anspruch 1, ferner umfassend eine Abstreifklingenbaugruppe, die drehbar an eine Bodenfläche (108) des Behälters gekoppelt ist, um an der Bodenfläche (108) des Behälters abgelagerte Feststoffe durch die Torbaugruppe (102, 808) zu verlagern, wenn sich das Tor (208, 810) in der geöffneten Stellung und/oder einer Zwischenstellung zwischen der geöffneten Stellung und der geschlossenen Stellung befindet.

5. Behälter nach Anspruch 1, wobei das Tor (208, 810) in der ersten Ebene entlang der Fläche des Tanks (104) in eine Zwischenstellung zwischen der geöffneten Stellung und der geschlossenen Stellung beweglich ist.

6. Behälter nach Anspruch 2, wobei die Torbaugruppe (808) ferner Folgendes umfasst:
ein Linearstellglied (220), das an den Rahmen (816) und an das Tor (810) gekoppelt ist, wobei das Linearstellglied (220) dazu dient, das Tor (810) selektiv zwischen der offenen Stellung, der geschlossenen Stellung und/oder einer Zwischenstellung zwischen der geöffneten Stellung und der geschlossenen Stellung zu verschieben.

7. Behälter nach Anspruch 2, wobei die Torbaugruppe (808) ferner eine Verbindung umfasst, die mit dem einen oder den mehreren Verriegelungselementen (812)
verbunden ist, um das eine oder die mehreren drehbaren Verriegelungselemente (812) zwischen der verriegelten Stellung und der entriegelten Stellung zu drehen.

8. Behälter nach Anspruch 2, wobei jedes von dem einen oder den mehreren Verriegelungselementen um eine Längsachse des jeweiligen einen oder der jeweiligen mehreren Verriegelungselemente zwischen der verriegelten Stellung und der entriegelten Stellung drehbar ist.

9. Behälter nach Anspruch 7, wobei die Torbaugruppe (808) ferner Folgendes umfasst:
ein Stellglied, das mit der Verbindung verbunden ist, die mit dem einen oder den mehreren Verriegelungselementen (812) verbunden ist, um das eine oder die mehreren Verriegelungselemente (812) zwischen der verriegelten Stellung und der entriegelten Stellung zu drehen.

10. Behälter nach Anspruch 3, wobei die Torbaugruppe (102) ferner Folgendes umfasst:
einen Nocken (228), der an das Tor (208) gekoppelt ist und mit dem einen oder den mehreren Verriegelungselementen (212) verbunden ist, um das eine oder die mehreren Verriegelungselemente (212) gleitend zwischen der verriegelten Stellung und der entriegelten Stellung zu verlagern.

11. Behälter nach Anspruch 10, wobei die Torbaugruppe (102) ferner Folgendes umfasst:
ein Stellglied (220), das mit dem Nocken (228) verbunden ist, der an das Tor (208) gekoppelt ist und mit dem einen oder den mehreren Verriegelungselementen (212) verbunden ist, um das eine oder die mehreren Verriegelungselemente (212) gleitend zwischen der verriegelten Stellung und der entriegelten Stellung zu verlagern.

Revendications

1. Conteneur comprenant:

un réservoir (104) pour contenir un produit ; et
un ensemble à porte (102, 808) couplé au réservoir (104), où l'ensemble à porte (102, 808) comprend :

une porte (208, 810) comprenant un joint d'étanchéité (226) couplé à la porte (208, 808), la porte (208, 808) étant disposée de façon coulissante dans un premier plan adjacent à la surface du réservoir, la porte (208, 810) étant configurée en outre pour pouvoir coulisser dans le premier plan le long de la surface du réservoir (104) entre une position ouverte et une position fermée ; et
un ou plusieurs éléments de verrouillage (212, 812) équipés d'un axe longitudinal mobile disposé dans un second plan parallèle au premier plan, l'élément ou les éléments (212, 812) étant mobiles entre une position verrouillée et une position déverrouillée,
dans lequel un ou plusieurs éléments de verrouillage (212, 812) sont configurés pour permettre l'application d'une force de con-

trainte à la porte (208, 810) en direction perpendiculaire au premier et deuxième plans, afin de sceller la porte (208, 810) sur la surface du réservoir en position fermée,
caractérisé en ce que le joint d'étanchéité (226) recouvre toute la surface arrière de la porte (208, 810).

2. Conteneur selon la revendication 1, dans lequel le ou les éléments de verrouillage (812) peuvent tourner dans le deuxième plan parallèle au premier plan entre la position verrouillée et la position déverrouillée ; et
dans lequel l'ensemble à porte (808) comporte en outre un cadre (816) disposé autour de la porte (810), où le cadre (816) comprend une ou plusieurs surfaces d'appui (820), et où le ou les éléments de verrouillage rotatifs (812) comprennent une ou plusieurs cames (822) appuyant sur la ou les surfaces d'appui (820), afin d'appliquer une force de contrainte à la porte (810) perpendiculaire au premier et deuxième plans pour sceller la porte (810) sur la surface du réservoir (104) en position fermée.

3. Conteneur selon la revendication 1, dans lequel le ou les éléments de verrouillage (212) coulissent dans le deuxième plan parallèle au premier plan entre une position verrouillée et une position déverrouillée ; et
dans lequel l'ensemble à porte (102) comprend en outre un cadre (214) disposé autour de la porte (208), où le cadre (214) comprend une ou plusieurs ouvertures (216) permettant de recevoir de façon amovible le ou les éléments de verrouillage (212), la ou les ouvertures (216) coopérant avec le ou les éléments de verrouillage (212) pour appliquer une force de contrainte à la porte (208) perpendiculaire au premier et deuxième plans pour sceller la porte (208) sur la surface du réservoir (104) en position fermée.

4. Conteneur selon la revendication 1, comprenant en outre un ensemble à lame de raclage couplé en rotation à la surface du fond (108) du conteneur, afin de déplacer les solides déposés sur la surface du fond (108) du conteneur à travers l'ensemble à porte (102, 808) lorsque la porte (208, 810) est en position ouverte et / ou en position intermédiaire entre la position ouverte et la position fermée.

5. Conteneur selon la revendication 1, dans lequel la porte (208, 810) est mobile dans le premier plan le long de la surface du réservoir (104) vers une position intermédiaire entre la position ouverte et la position fermée.

6. Conteneur selon la revendication 2, dans lequel l'ensemble à porte (808) comprend en outre :
un actionneur linéaire (220) couplé au cadre (816) et à la porte (810), où l'actionneur linéaire (220) fait coulisser la porte (810) de façon sélective entre la position ouverte, la position fermée et / ou une position intermédiaire entre la position ouverte et la position fermée.

7. Conteneur selon la revendication 2, dans lequel l'ensemble à porte (808) comprend en outre une liaison reliant le ou les éléments de verrouillage (812) permettant la rotation du ou des éléments de verrouillage rotatifs (812) entre la position verrouillée et la position déverrouillée.

8. Conteneur selon la revendication 2, dans lequel l'élément ou chacun des éléments de verrouillage peut tourner autour d'un axe longitudinal du ou des éléments de verrouillage respectifs entre la position verrouillée et la position déverrouillée.

9. Conteneur selon la revendication 2, dans lequel l'ensemble à porte (808) comprend en outre :
un actionneur relié à la liaison reliée à l'élément ou aux éléments de verrouillage (812), afin de tourner le ou les éléments de verrouillage (812) entre la position verrouillée et la position déverrouillée.

10. Conteneur selon la revendication 3, dans lequel l'ensemble à porte (102) comprend en outre :
une came (228) couplée à la porte (208) et reliée à l'élément ou aux éléments de verrouillage (212), afin de déplacer de façon coulissante le ou les éléments de verrouillage (212) entre la position verrouillée et la position déverrouillée.

11. Conteneur selon la revendication 10, dans lequel l'ensemble à porte (102) comprend en outre :
un actionneur (220) relié à la came (228) couplée à la porte (208) et relié à l'éléments ou aux éléments de verrouillage (212), afin de déplacer de façon coulissante le ou les éléments de verrouillage (212) entre la position verrouillée et la position déverrouillée.

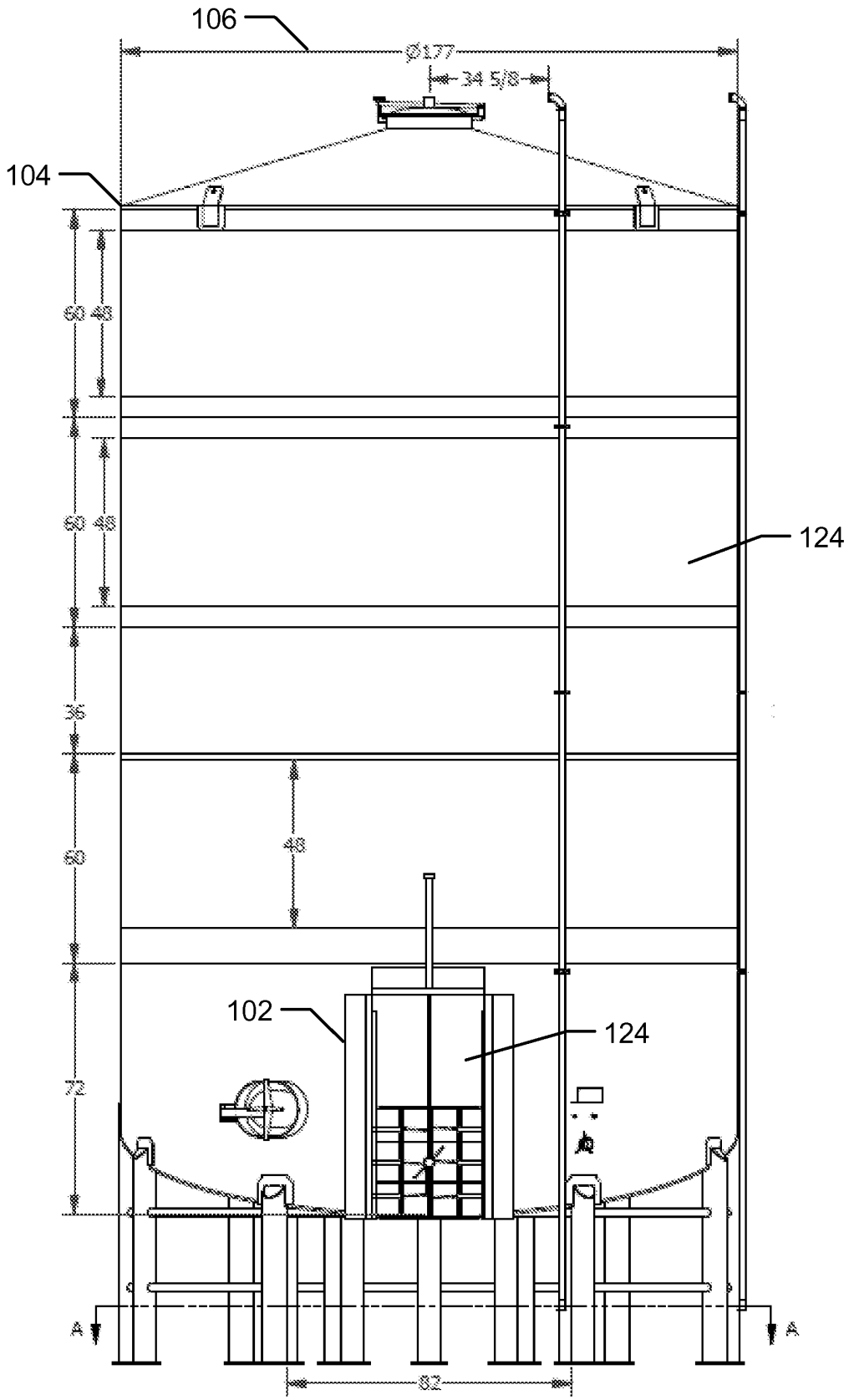

FIG. 1A

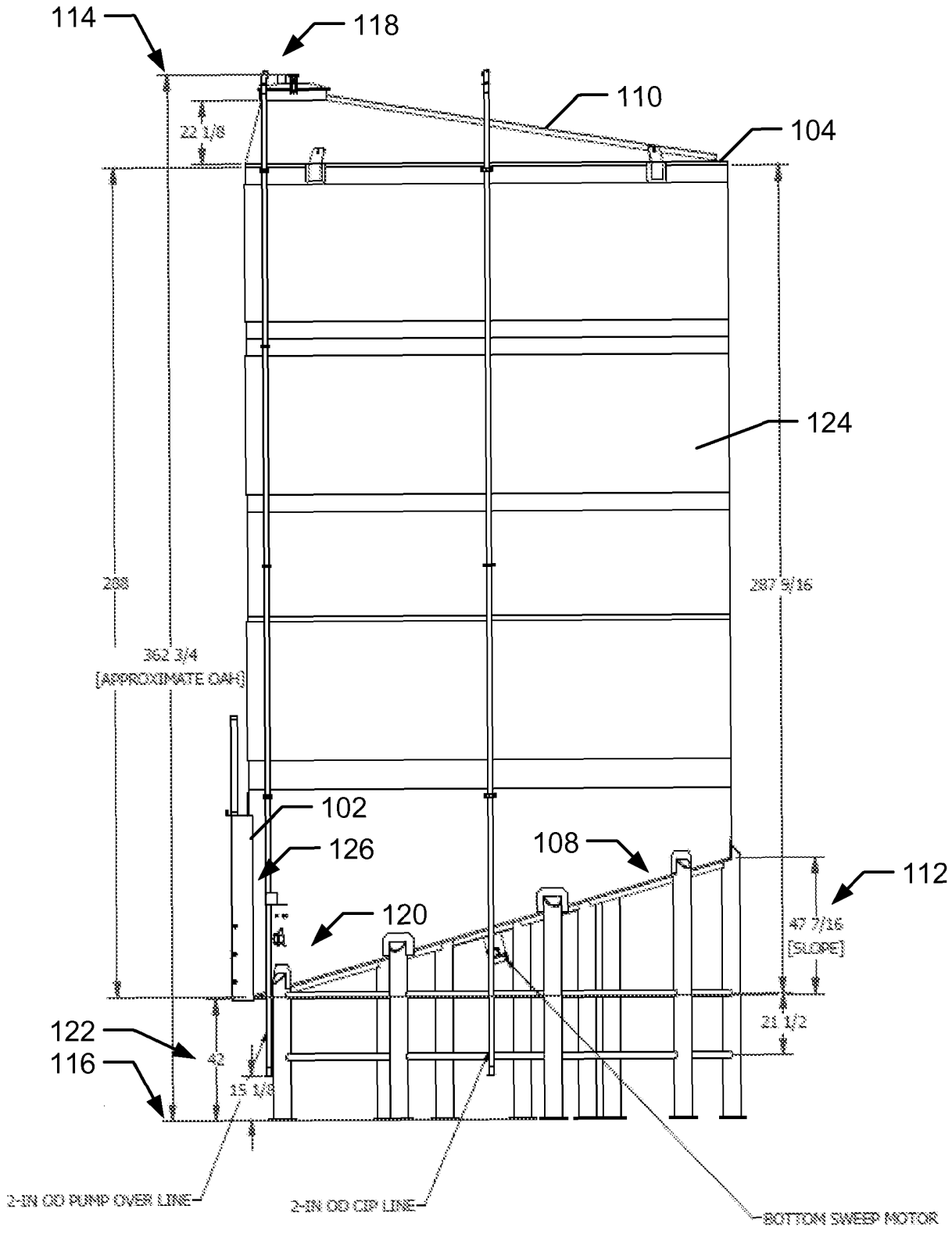
114
118
110
104
22 1/8
124
288
287 9/16
362 3/4
[APPROXIMATE OAH]
102
126
108
112
120
47 7/16
[SLOPE]
21 1/2
122
116
42
15 1/8
2-IN OD PUMP OVER LINE
2-IN OD CIP LINE
BOTTOM SWEEP MOTOR

FIG. 1B

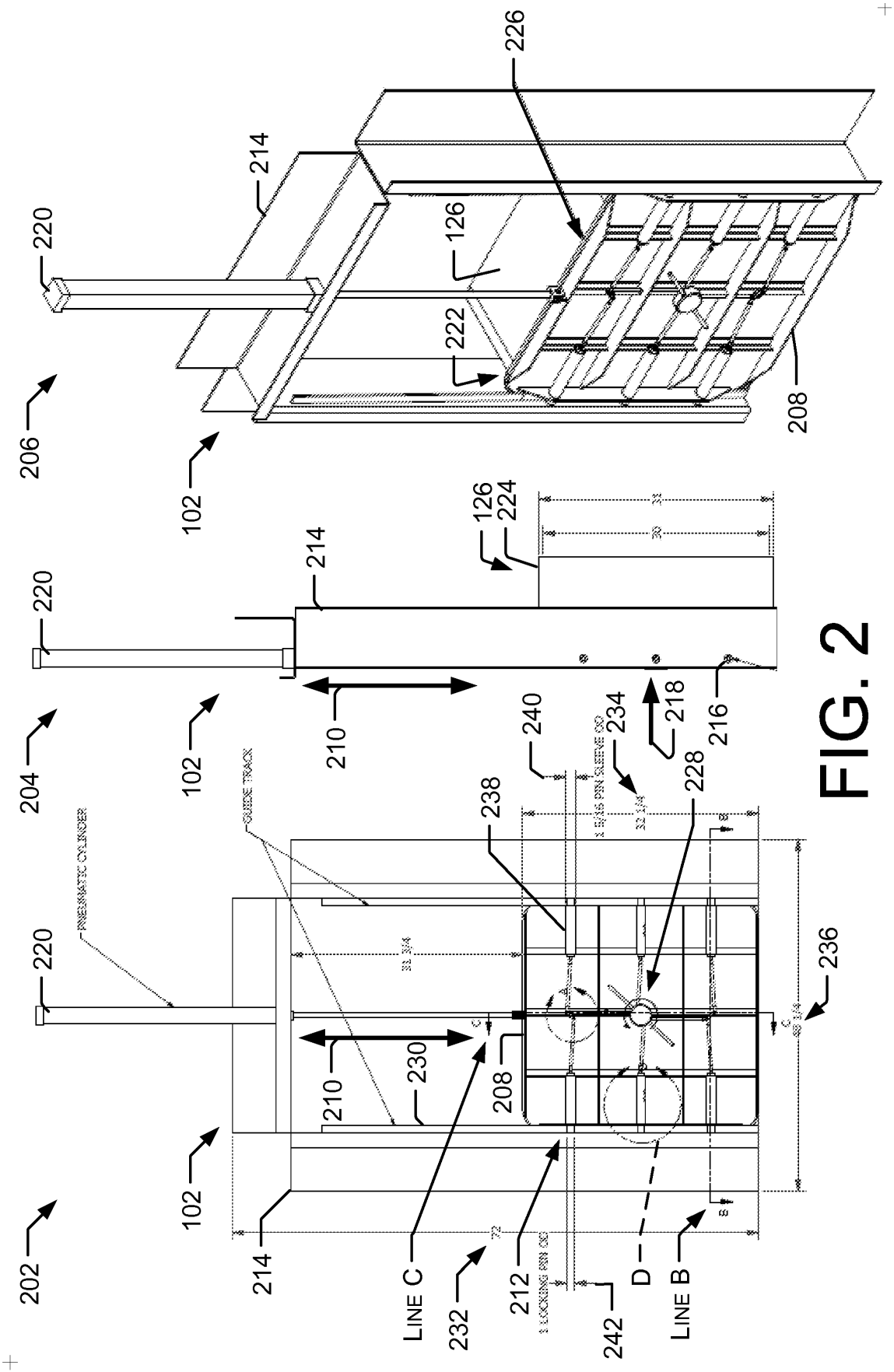
226
214
220
126
222
208
206
102
126
224
214
220
204
102
210
240
234
218
216
228
238
220
236
210
230
208
102
214
202
LINE C
232
212
242
D
LINE B

FIG. 2

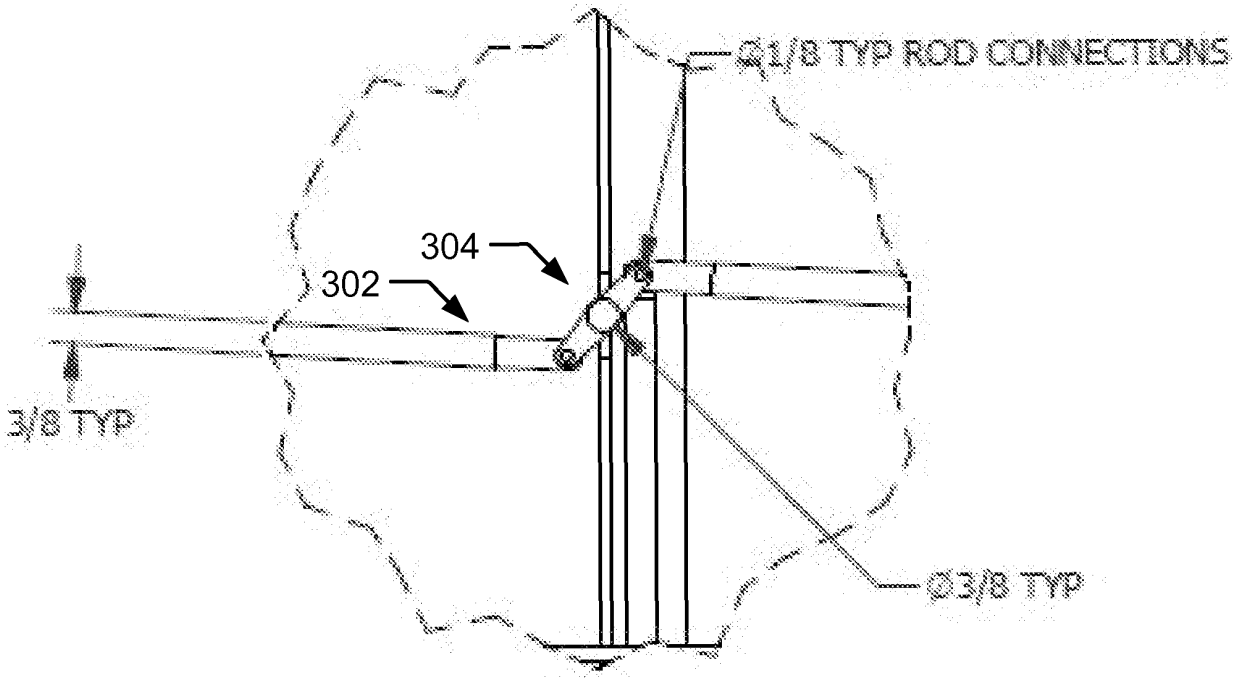

FIG. 3

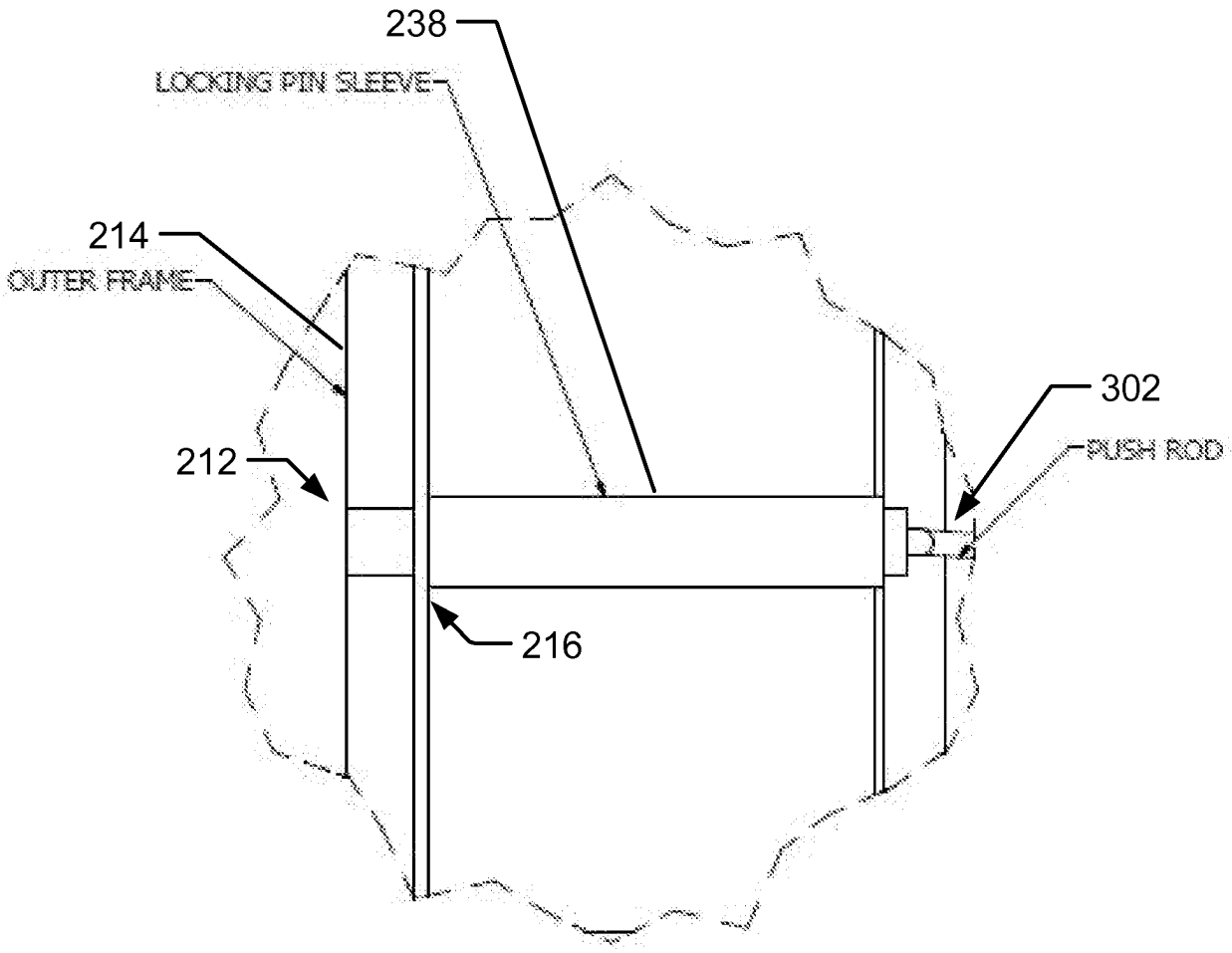

FIG. 4

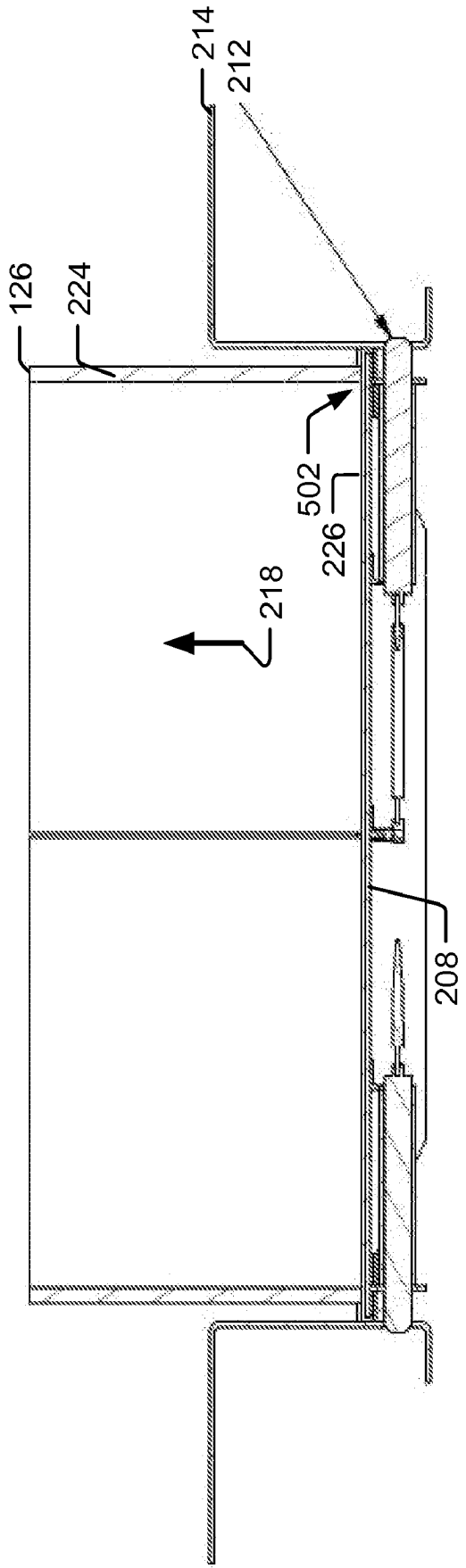

FIG. 5

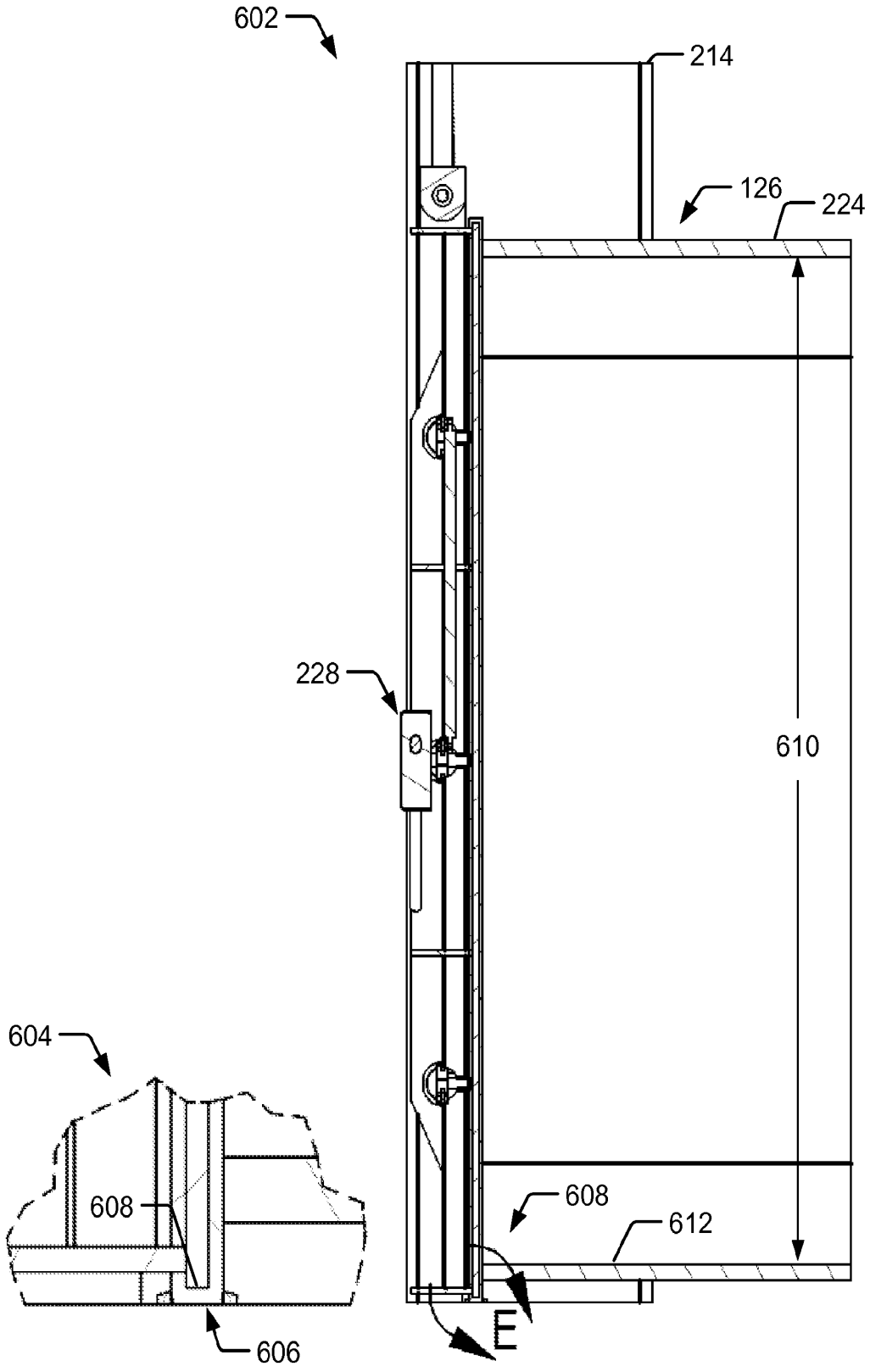

FIG. 6

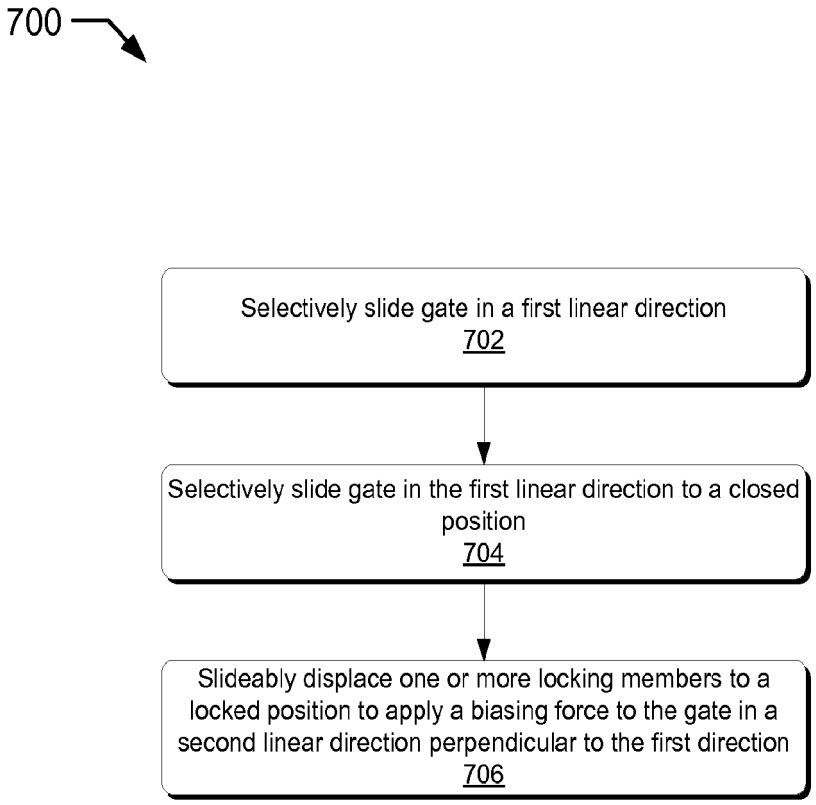
700
Selectively slide gate in a first linear direction
702
Selectively slide gate in the first linear direction to a closed position
704
Slideably displace one or more locking members to a locked position to apply a biasing force to the gate in a second linear direction perpendicular to the first direction
706

FIG. 7

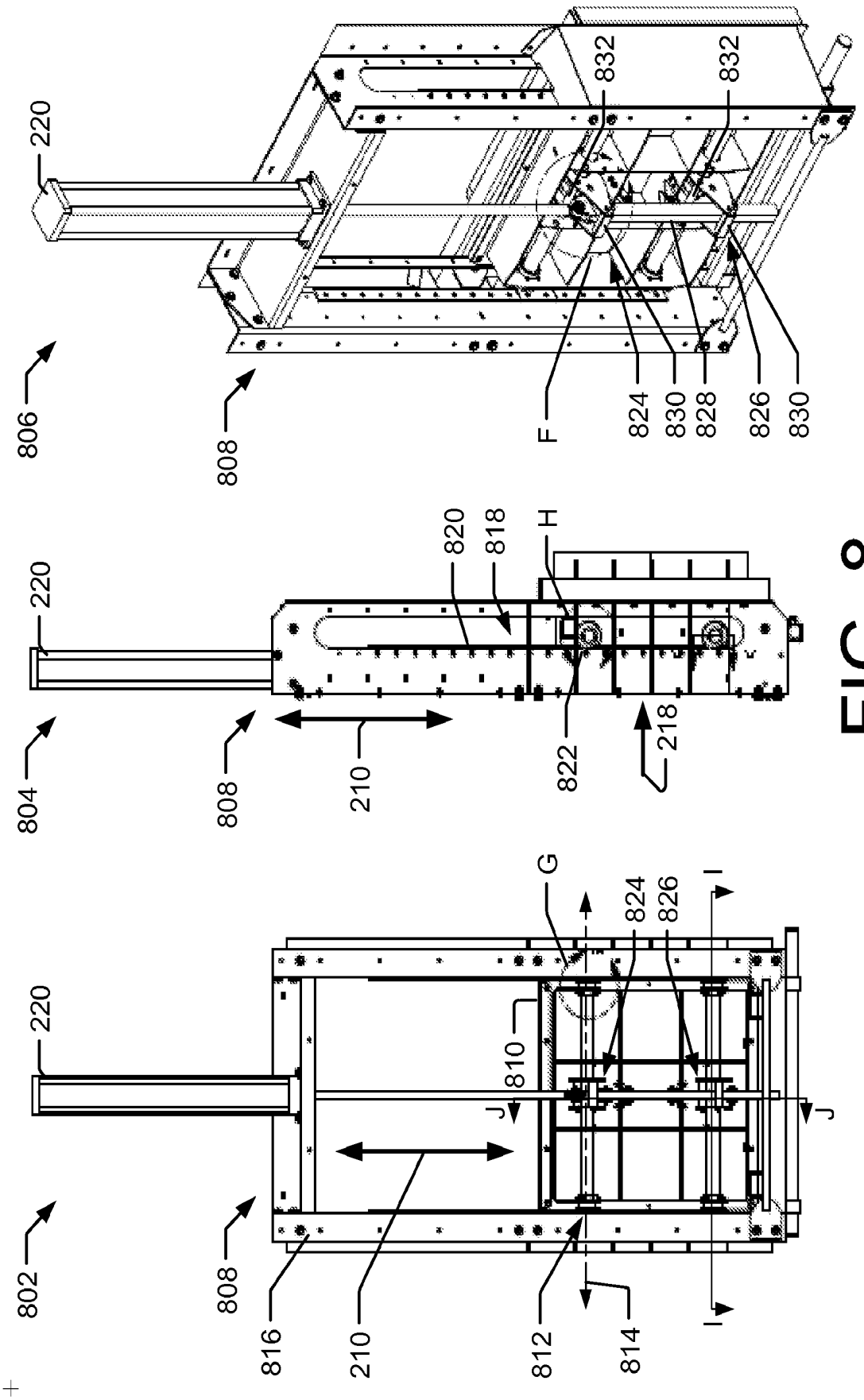
220
832
832
806
808
F
824
830
828
826
830
804
820
818
H
822
218
210
802
G
824
826
I
810
J
J
I
816
812
814

FIG. 8

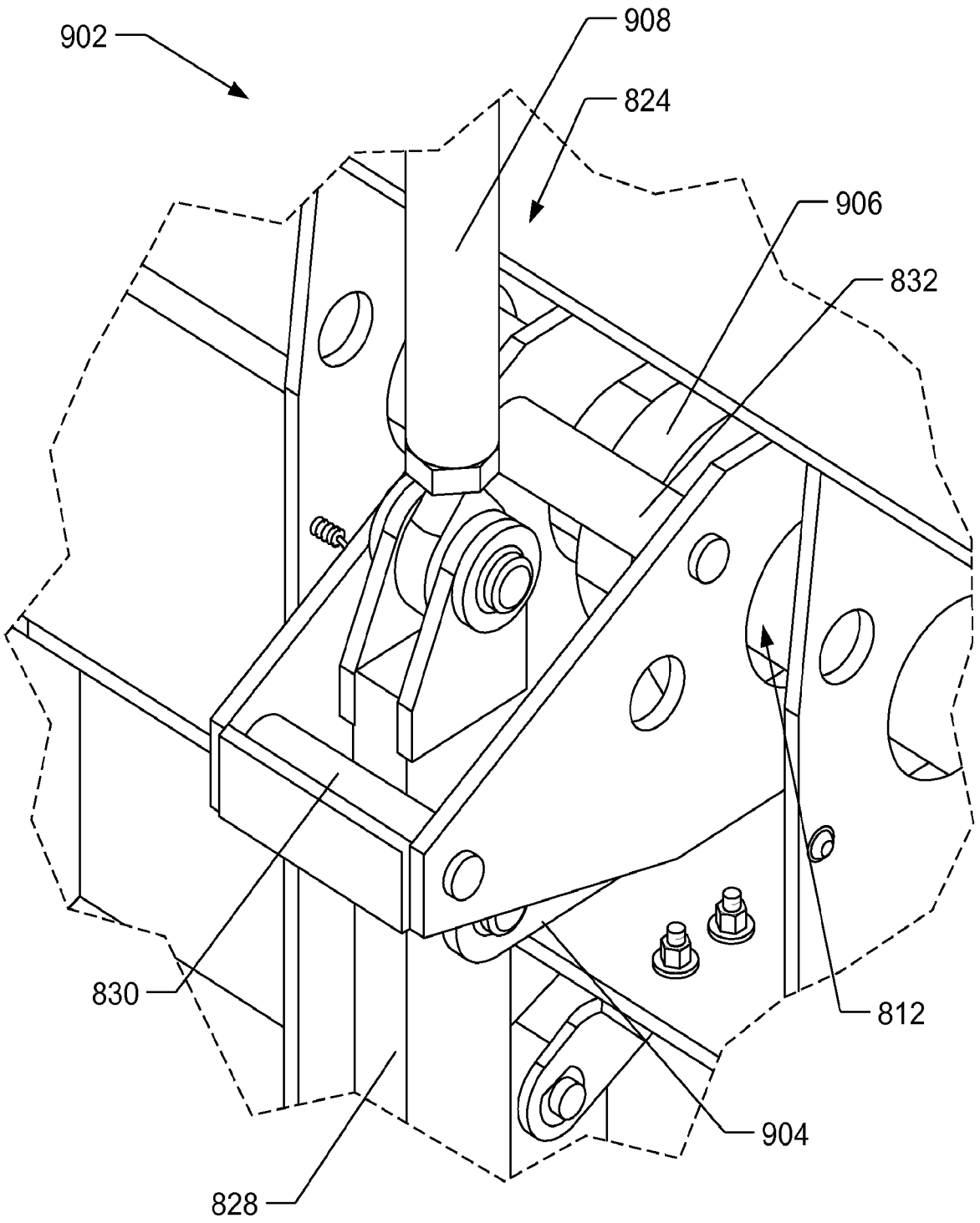

FIG. 9

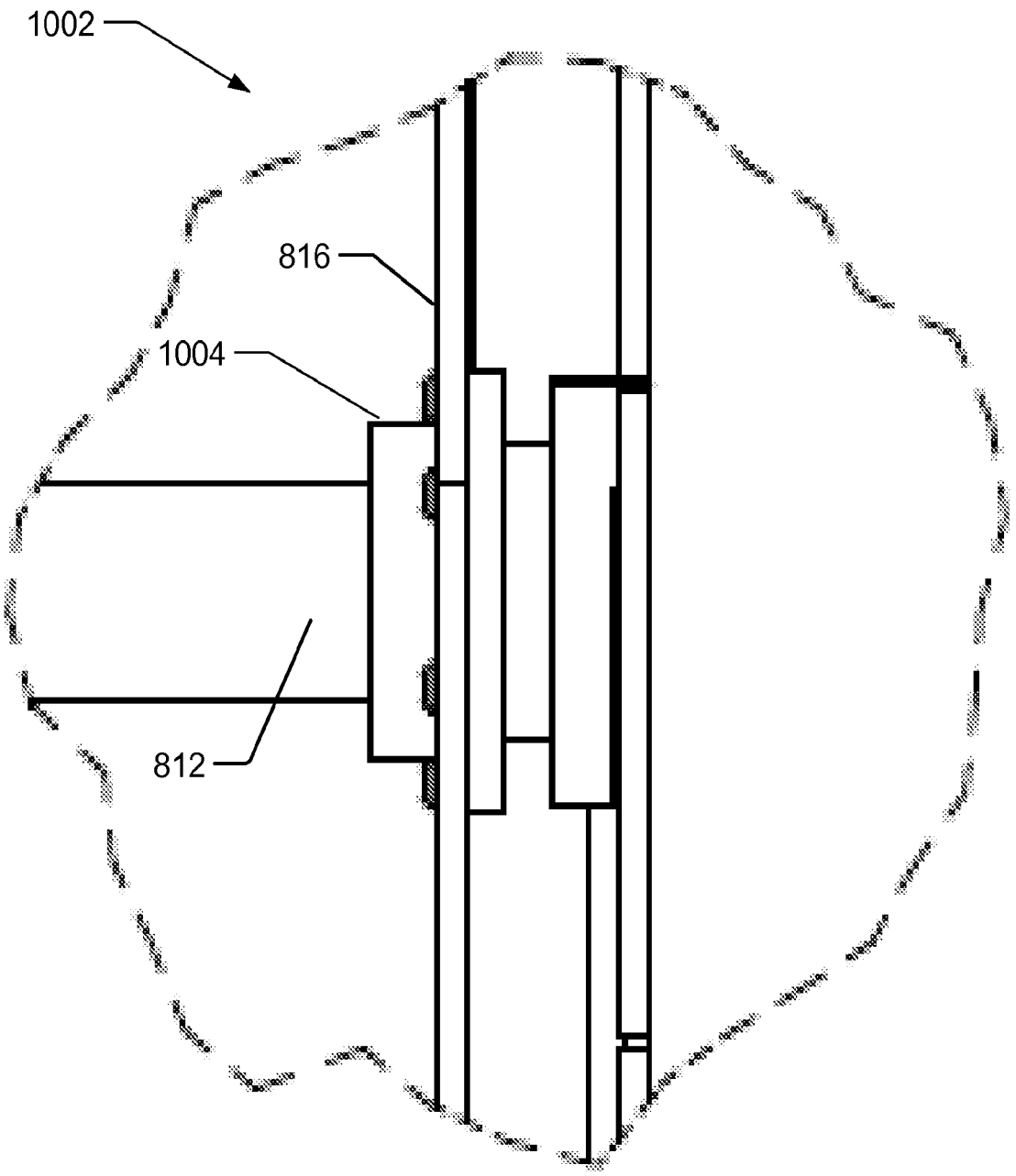

FIG. 10

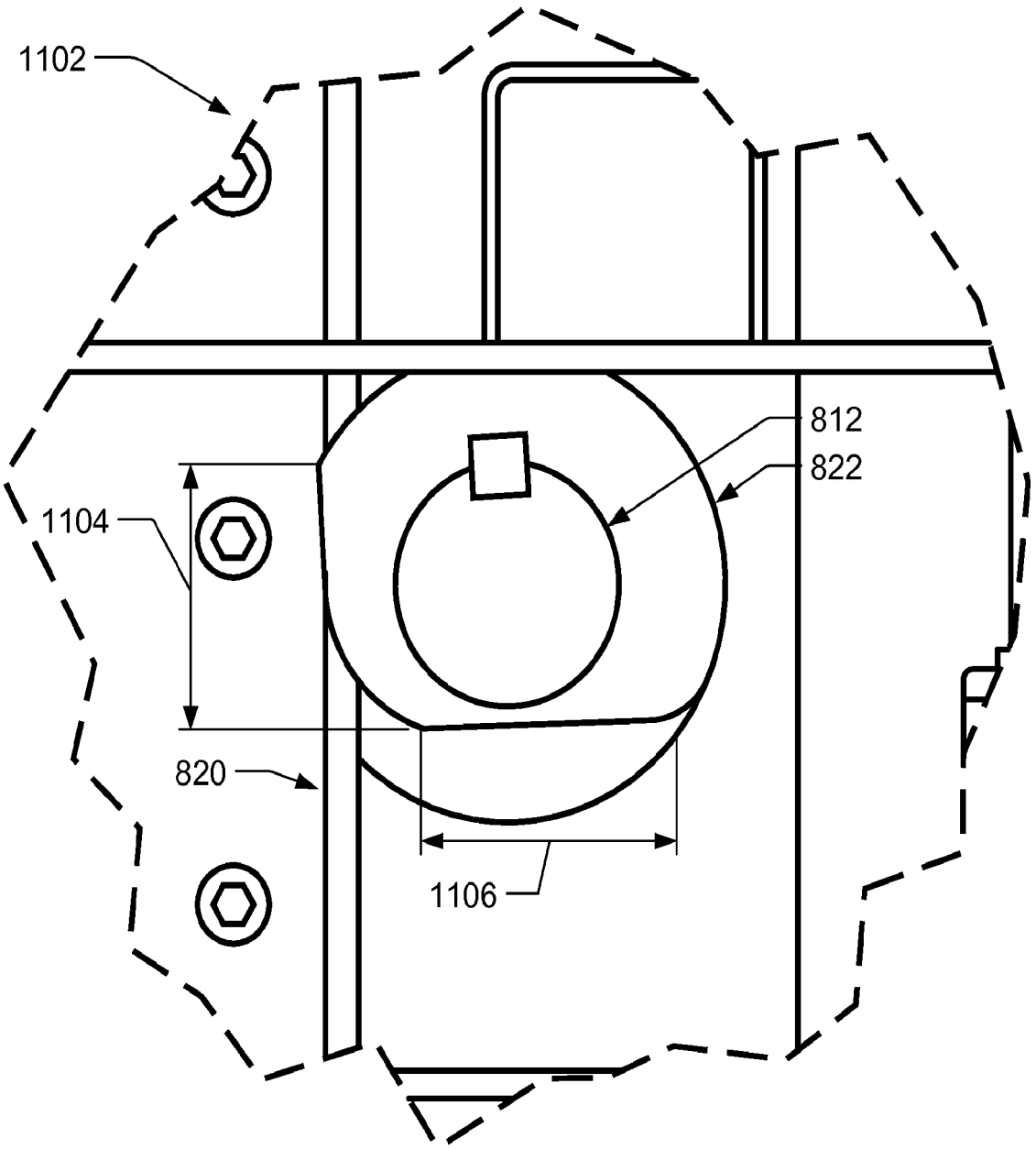

FIG. 11

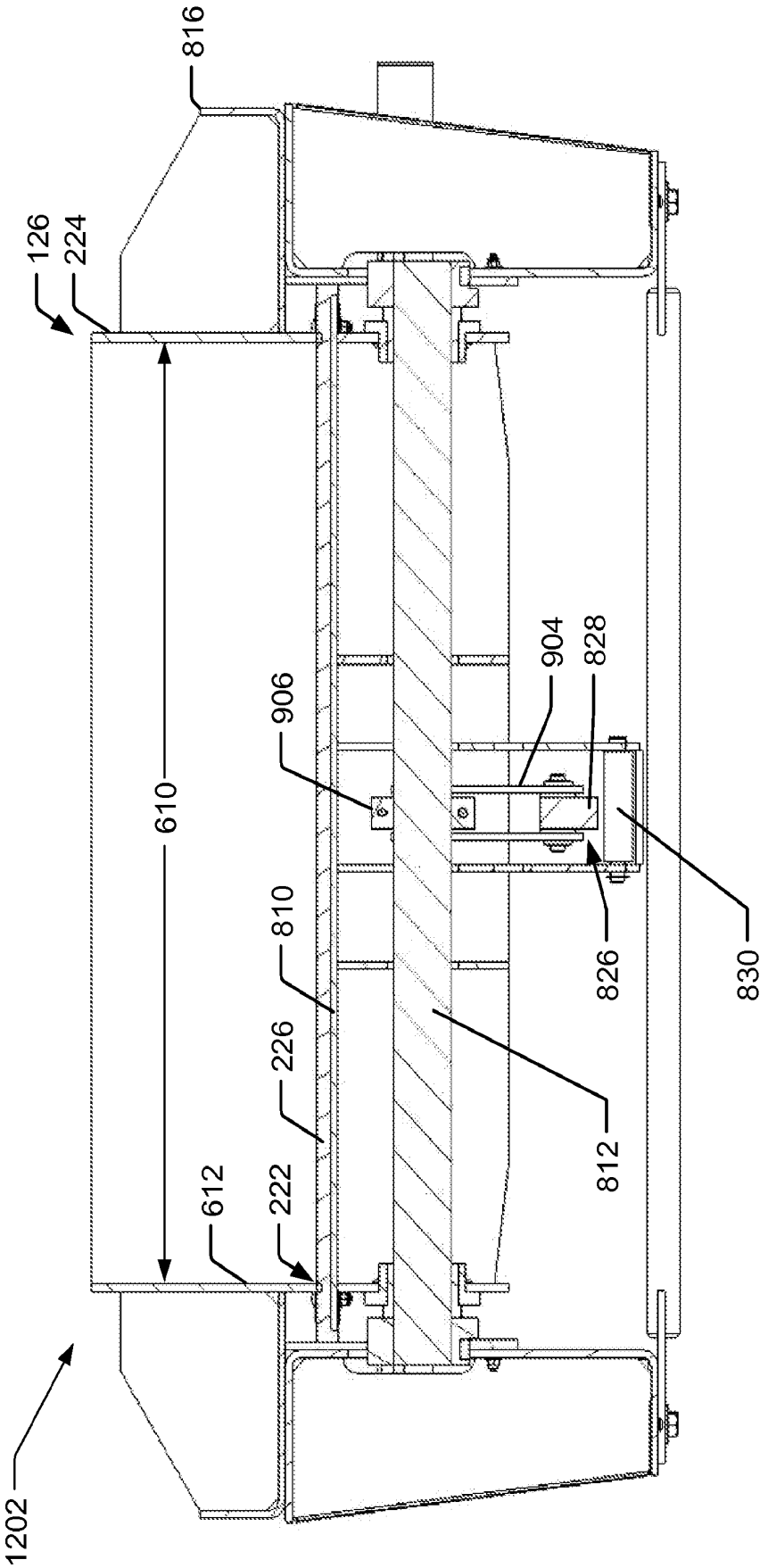

FIG. 12

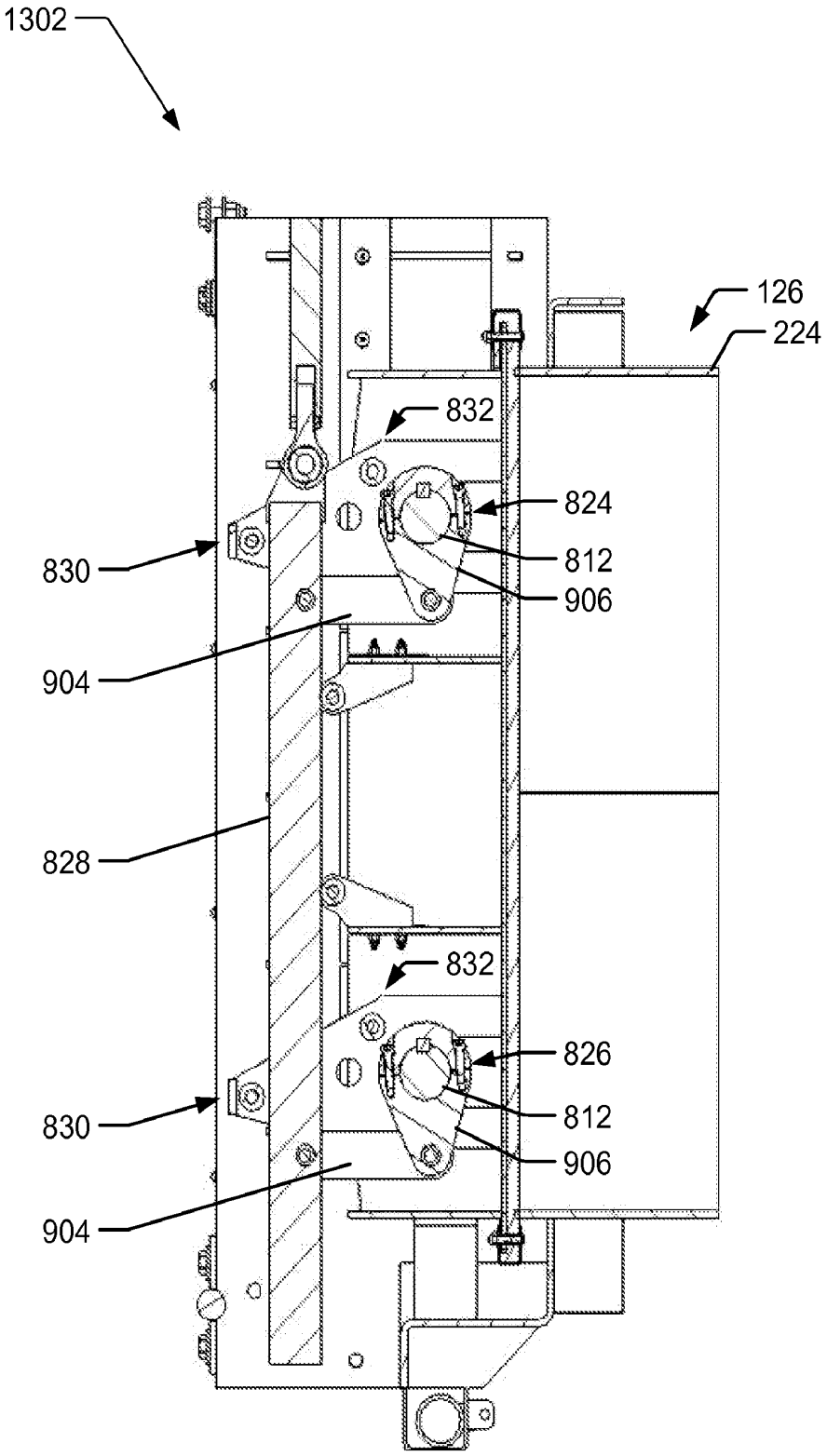

FIG. 13

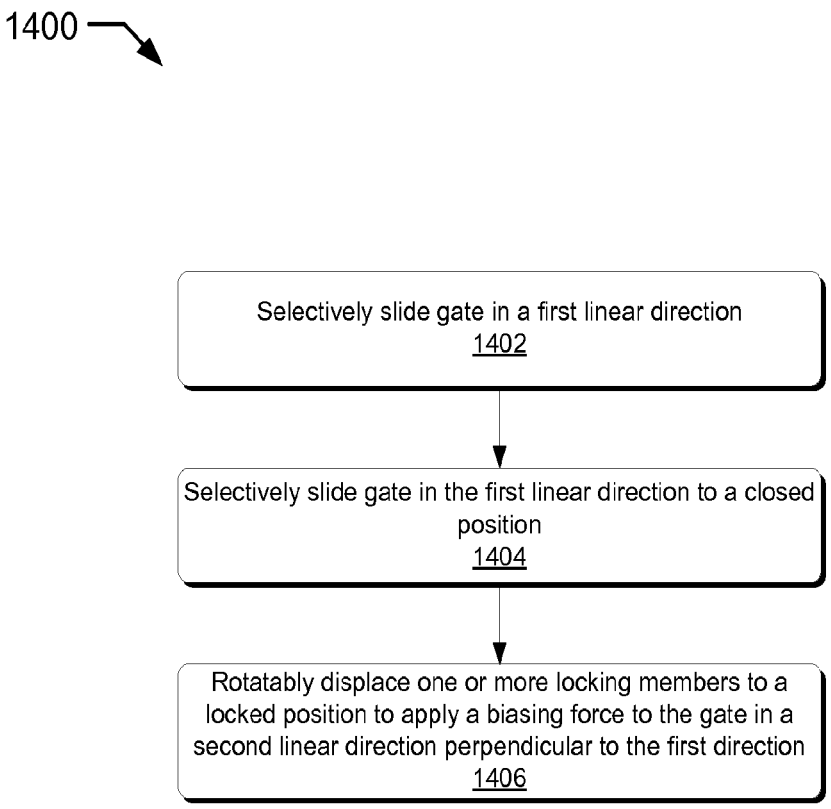
1400
Selectively slide gate in a first linear direction
1402
Selectively slide gate in the first linear direction to a closed position
1404
Rotatably displace one or more locking members to a locked position to apply a biasing force to the gate in a second linear direction perpendicular to the first direction
1406

FIG. 14

REFERENCES CITED IN THE DESCRIPTION

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- US 2652946 A **[0004]**
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