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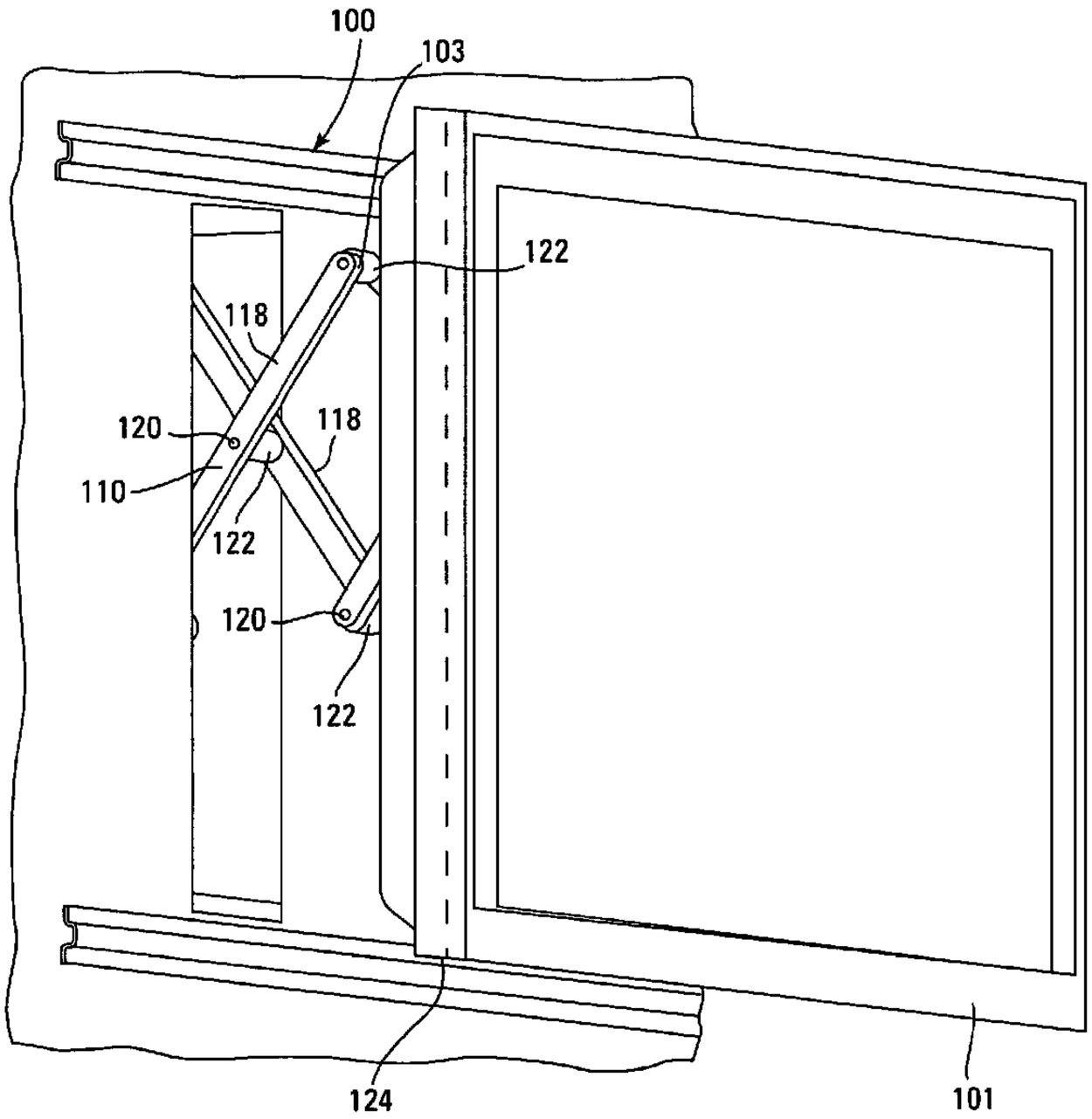

(57) Abrégé/Abstract:
A device for mounting an electronic display to a wall includes a support structure operably connected to a tilt head assembly and a display interface structure. The support structure includes an arm assembly that can be extended and rotated so that the electronic display avoids contacting the wall. The tilt head assembly includes an attachment member, guide structures for tilting the electronic display so that the electronic display remains self-balancing, and a plate for positioning the guide structures. The display interface structure facilitates attachment of the attachment member to the electronic display.

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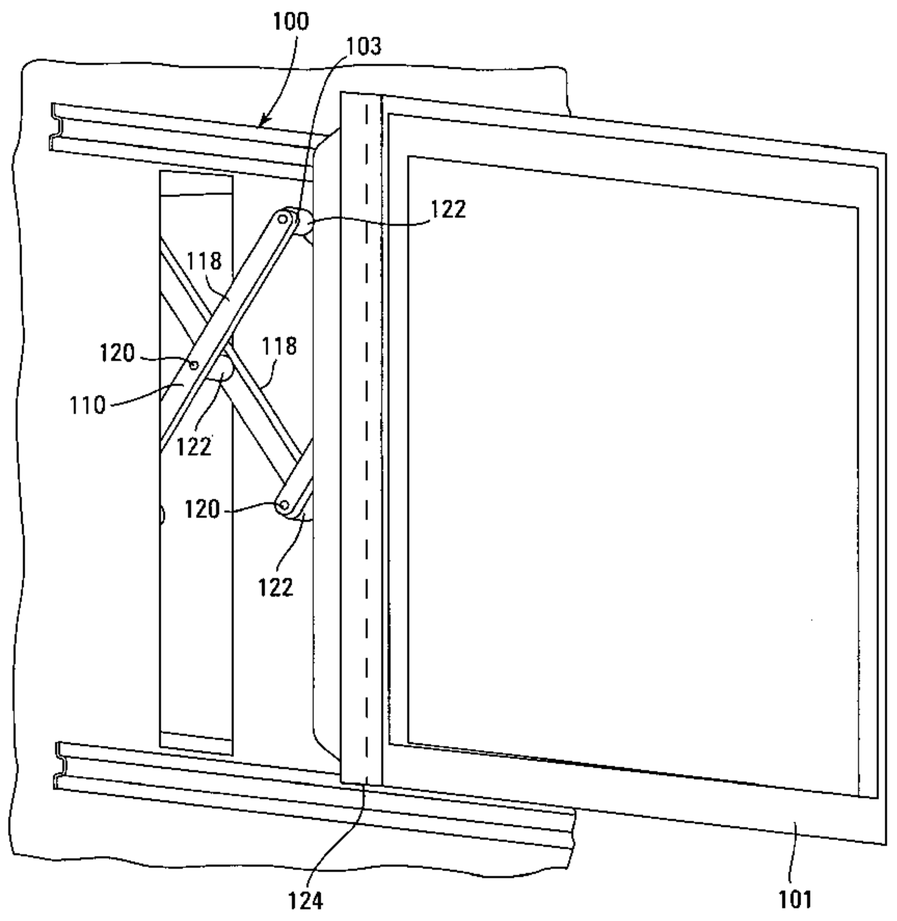

(57) Abstract: A device for mounting an electronic display to a wall includes a support structure operably connected to a tilt head assembly and a display interface structure. The support structure includes an arm assembly that can be extended and rotated so that the electronic display avoids contacting the wall. The tilt head assembly includes an attachment member, guide structures for tilting the electronic display so that the electronic display remains self-balancing, and a plate for positioning the guide structures. The display interface structure facilitates attachment of the attachment member to the electronic display.

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WALL-AVOIDING SELF-BALANCING MOUNT FOR TILT POSITIONING OF A FLAT PANEL ELECTRONIC DISPLAY

FIELD OF THE INVENTION

The present invention relates to flat panel display devices, and more specifically to mounting devices for flat panel electronic display devices.

BACKGROUND OF THE INVENTION

An attribute of modern flat-panel electronic displays that makes them highly desirable to consumers is the aesthetic appeal of a very flat device that has the appearance of a framed photo or painting when hung from a wall. This same attribute is also desirable in that floor and interior space taken up by the display is minimal.

With current flat panel display technology, however, best viewing quality is typically achieved when the screen is viewed at as near as possible to a ninety degree angle from the plane of the screen. Liquid crystal displays will often appear perceptibly darker at the more oblique angles. In other cases, particularly with plasma displays, glare from the screen surface may impair viewing. Consequently, it is desirable to have the ability to selectively position the display to enable best viewing quality.

Numerous wall mounting devices for flat panel displays have been developed so as to enable tilt and/or swing positioning of the display.

A drawback of these previous mount designs is that the edges of the display may sometimes collide with the wall surface during positioning. These collisions may leave unsightly marks or gouges in the wall surface, or may cause damage to the display itself. Hence,

there is still a need for a flat panel display mount that enables selective positioning of the display while alleviating the undesirable effects of wall collisions.

SUMMARY OF THE INVENTION

The present invention addresses the need in the industry for an electronic display mount that enables selectively positioning of the electronic display, while alleviating the undesirable effects of wall collisions. Device and methods according to the present invention generally include a support structure operably connected to a display interface structure and a tilt head assembly. The display interface structure is attached to the electronic display. The support structure includes an extendable arm assembly, a pivot column, and a swingstop post. The support structure can be used to rotatably position the electronic device about a substantially vertical axis. The tilt head assembly includes an attachment member, a positionable plate, and guide structures. The tilt head assembly can be used to rotatably position the electronic display about a substantially horizontal axis.

According to an embodiment of the present invention, the extendable arm is selectively positionable to a plurality of positions. The pivot column defines the substantially vertical axis about which the support structure can be rotated. The swingstop post defines a plurality of ranges of rotation of the extendable arm assembly about the substantially vertical axis. Each position of the extendable arm assembly corresponds to a range of rotation.

According to another embodiment of the present invention, the first and second guide structures define a path of rotation of the electronic display about the substantially horizontal axis. The electronic display is substantially self-balancing at any point along the path of rotation.

According to another embodiment of the present invention, the plate is positionable in a plurality of positions. Each position defines a different location of the substantially horizontal axis.

According to another embodiment of the present invention, a system comprises an electronic display device and a support structure operably connected to a display interface structure and a tilt head assembly. The display interface structure is attached to the electronic display. The support structure includes an extendable arm assembly, a pivot column, and a swingstop post and can be used to rotatably position the electronic device about a substantially vertical axis. The tilt head assembly includes an attachment member, a positionable plate, and guide structures. The tilt head assembly can be used to rotatably position the electronic display about a substantially horizontal axis.

According to another embodiment of the present invention, a method provides for positioning an electronic display mounted to a substantially vertically oriented surface with a mounting device. The mounting device includes a support structure operably connected to a display interface structure and a tilt head assembly. The method comprises extending the support structure to a first extended position, rotating the electronic display about a substantially vertical axis within a range of rotation defined by the first extended position, positioning the tilt head assembly, and rotating the electronic display about a substantially horizontal axis to a first tilted position. The electronic display is self-balancing in the first tilted position.

BRIEF DESCRIPTION OF THE DRAWINGS

The embodiments of the present invention may be more completely understood in consideration of the following detailed description of various embodiments in connection with the accompanying drawings, in which:

Figure 1 is a front perspective view of a flat panel electronic display and mount according to an embodiment of the invention;

Figure 2 is a perspective view of a mount according to an embodiment of the invention coupled with a wall assembly and with a flat panel electronic display mounted thereon and shifted away from the wall assembly;

Figure 3 is a rear perspective view of the display and mount of Figure 1;

Figure 4 is a rear perspective view of a mount according to an embodiment of the invention coupled with an electronic display;

Figure 5 is another rear perspective view of a mount according to an embodiment of the invention coupled with an electronic display;

Figure 6 is a fragmentary rear perspective view of a portion of the mount of Figure 3 depicted without the extendable arm assembly and display for clarity;

Figure 7 is a fragmentary rear perspective view of the display and mount of Figure 3;

Figure 8 is an exploded view of the tilt head and support column assemblies of a mount according to an embodiment of the invention;

Figure 9 is a fragmentary side elevation view of the tilt head portion of a mount according to an embodiment of the invention;

Figure 10 is a fragmentary side elevation view of the tilt head of Figure 9 with the pitch member removed for clarity;

Figure 11 is a fragmentary side elevation view of the inner yoke of the tilt head of Figure 9;

Figure 12 is a side elevation view of the mount and display of Figure 3, depicting the tilting motion of the display;

Figure 13 is a rear perspective view of a display coupled with the tilt head and display interface structure portions of a mount according to an embodiment of the invention;

Figure 14 is a top plan view of a display and mount according to an embodiment of the invention depicting the swing motion of the display in a first position relatively spaced apart from a wall surface;

Figure 15 is a top plan view of a display and mount according to an embodiment of the invention depicting the swing motion of the display in a second position relatively more proximate a wall surface;

Figure 16 is a top perspective view of a lower pivot bushing of a mount according to an embodiment of the invention;

Figure 17 is a top plan view of the bushing of Figure 16;

Figure 18 is a side elevation view of the bushing of Figure 16;

Figure 19 is a top perspective view of an upper pivot bushing of a mount according to an embodiment of the invention;

Figure 20 is a top plan view of the bushing of Figure 19;

Figure 21 is a side elevation view of the bushing of Figure 19;

Figure 22 is a front perspective view of the swing limit cam of a mount according to an embodiment of the invention;

Figure 23 is a top plan view of the cam of Figure 22;

Figure 24 is a bottom plan view of the cam of Figure 22;

Figure 25 is a fragmentary bottom perspective view of a portion of a mount according to an embodiment of the invention, depicting the bottom pivot bushing interfacing with the swing limit cam;

Figure 26 is a fragmentary perspective view of the lift adjuster mechanism of a mount according to an embodiment of the invention;

Figure 27 is a side elevation view of a mount and display according to an embodiment of the invention with the display in an upright position;

Figure 28 is a side elevation view of the mount and display depicted in Figure 4 with the display in a fully tilted position;

Figure 29 is a top plan view of a mount according to an embodiment of the invention;

Figure 30 is a rear elevation view of a mount according to an embodiment of the invention;

Figure 31 is a side elevation view of the mount depicted in Figure 7;

Figure 32 is a fragmentary perspective view of a mount according to an embodiment of the invention, depicted in a tilt position;

Figure 33 is a perspective view of the yoke component of a mount according to an embodiment of the invention;

Figure 34 is a perspective view of the threaded coupler component of a mount according to an embodiment of the invention;

Figure 35 is a perspective view of the interface plate component of a mount according to an embodiment of the invention;

Figure 36 is a perspective view of the outer pitch arm component of a mount according to an embodiment of the invention;

Figure 37 is a perspective view of the inner pitch arm component of a mount according to an embodiment of the invention;

Figure 38 is a side elevation view of the outer pitch arm component of a mount according to an embodiment of the invention;

Figure 39 is a side elevation view of the inner pitch arm component of a mount according to an embodiment of the invention;

Figure 40 is a fragmentary perspective view of the slide block and guide track of a mount according to an embodiment of the invention;

Figure 41 is a perspective view of a slide block component of a mount according to an embodiment of the invention;

Figure 42 is a perspective view of the second mounting plate component of a mount according to an embodiment of the invention;

Figure 43 is a perspective view of the first mounting plate component of a mount according to an embodiment of the invention; and

Figure 44 is a perspective view of a mount according to an embodiment of the invention with an in-wall mounting interface.

While the present invention is amendable to various modifications and alternative forms, specifics thereof have been shown by way of example in the drawings and will be described in detail. It should be understood, however, that the intention is not to limit the present invention to the particular embodiments described. On the contrary, the intention is to cover all

modifications, equivalents, and alternatives falling within the scope of the present invention as defined by the claims.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figures 1-5, a wall-avoiding mount is generally depicted with reference numeral 100. Mount 100 can be used to mount flat panel display 101 to wall 102. Generally, mount 100 includes support structure 103, tilt head 104, and display interface structure 106. Mount may also include in-wall box 108.

Support structure 103 generally includes extendable arm assembly 1 10, support column assembly 112, and swing limit cam 1 14. Extendable arm assembly 110 generally includes wall interface 1 16 and arms 118, pivotally coupled together at pivots 120. Lateral spacers 122 may be provided at pivots 120 to provide lateral spacing between adjacent arms 1 18 in order to avoid pinch points and shearing action as extendable arm assembly 110 is extended and retracted. As depicted in Figures 14-15, extendable arm assembly 110 enables display 101 to be selectively positioned at any desired distance outward from wall surface 124.

It will be readily appreciated that extendable arm assembly 110 may include virtually any desired number of arms 118 so as to enable a desired range of movement outward from wall surface 124. Further, consistent with other aspects of embodiments of the invention disclosed herein, support structure 103 may include or consist of any other structure providing support for tilt head 104, such as swing arm arrangements or fixed mounting brackets. Moreover, support structure 103 may be attached directly to wall surface 124, or may be advantageously used with in-wall attachment arrangements.

Support column assembly 112 generally includes tubular vertical column 126, upper pivot bushing 128, lower pivot bushing 130 and lift adjuster assembly 132. Upper pivot bushing 128, as depicted in Figs. 19-21, generally includes body portion 134 defining central bore 136. Tab 138 extends from body portion 134 and defines pivot aperture 140. Body portion 134 is generally cylindrical with front edge 142 having a smaller radius than rear edge 144, defining a pair of shoulders 146, 148.

Similarly, lower pivot bushing 130, as depicted in Figs. 16-18, generally includes body portion 150 defining central bore 152. Tab 154 extends from body portion 150 and defines pivot

aperture 156. Body portion 150 is generally cylindrical with front edge 158 having a smaller radius than rear edge 160, defining a pair of shoulders 162, 164.

Upper and lower pivot bushings 128, 130, are vertically and rotationally slidably disposed on column 126, with column 126 extending through central bores 136, 152, respectively. Separate arms 118 of extendable arm assembly 110 are pivotally attached to tabs 138, 154, of each of upper and lower pivot bushings 128, 130, with pivots 166 extending into pivot apertures 140, 156.

Lift adjuster assembly 132 as depicted in Figure 26 generally includes body 168, attaching fastener 170, and lift screw 172. Body 168 is attached proximate upper end 174 of column 126 with attaching fastener 170. Lift screw 172 is threadedly received in body 168 and includes bearing plate 176 at lower end 178. Thumb knob 180 may be provided on upper end 182 to enable lift screw 172 to be easily threaded in and out of body 168 with the fingers.

In use, bearing plate 176 slidably bears on upper surface 184 of upper pivot bushing 128, thereby vertically locating upper pivot bushing 128 on column 126. The relative vertical position of upper pivot bushing 128 is selectively adjustable by threading lift screw 172 in or out of body 168, thereby lowering or raising upper pivot bushing 128 relative to column 126. As extendable arm assembly 110 is extended and retracted, upper pivot bushing 128 remains in position while lower pivot bushing 130 slides vertically on column 126.

Swing limit cam 114, as depicted in Figures 22-25, generally includes elongate body 186 presenting lower end 188 and upper end 190. Lower end 188 has width dimension W that is generally wider than width dimension W_1 of upper end 190. Intermediate portion 192 is tapered, presenting upwardly sloping opposing flanks 194. Front side 196 is concave, conforming to the radius of front edge 158 of lower pivot bushing 130.

Swing limit cam 114 is affixed to the inner side 198 of tilt head 104 as depicted in Figure 13, with front edge 158 of lower pivot bushing 130 in registry with front side 196 as depicted in Figure 25. Column 126 is positioned along concave front side 196 of swing limit cam 114 and is fixed in rotational and vertical position relative thereto. In use, with display 101 positioned proximate wall surface 124 as depicted in Figure 15, lower pivot bushing 130 is relatively closer to bottom end 200 of column 126. In this position, shoulders 162, 164, of lower pivot bushing 130 engage sides 202 of lower end 188 of swing limit cam 114, limiting side-to-side swinging motion of display 101 to a relatively greater degree as depicted in Figure 15, so as to prevent contact of display 101 with wall surface 124.

As extendable arm assembly 110 is extended outward and display 101 is positioned further away from wall surface 124, lower pivot bushing 130 slides upward on column 126 and

upward relative to swing limit cam 114, which is vertically fixed in position on tilt head 104. Once lower pivot bushing 130 reaches intermediate portion 192, the greater distance between each of shoulders 162, 164, and sloping flanks 194 enables a steadily increasing range of side-to-side swinging motion for display 101. When lower pivot bushing 130 reaches upper end 190 of swing limit cam 114, a full range of side-to-side swinging motion for display 101 is enabled, as depicted in Figure 14.

It will be appreciated that the vertical position of swing limit cam 114 may be adjusted on tilt head 104 to alter the relative distance from wall surface 124 at which lower pivot bushing 130 begins to encounter intermediate portion 192 and upper end 190. Moreover, it will be appreciated that the geometry of swing limit cam 114 may be altered as desired to produce desired swing limiting characteristics. For example, swing limit cam 114 may be made relatively longer with more gently sloping flanks 194 to enable a more gradual limiting of swing motion relative to distance. In another example, opposing flanks 194 may a provided with differing slopes so as to enable a greater range of swing motion in one direction relative to the opposing direction.

Tilt head 104 is generally attached intermediate support structure 103 and display interface structure 106. In a first example embodiment, tilt head 104 generally includes inner yoke 204, pitch cams 206, and pitch member 208, as depicted in Figures 8-11. In a second example embodiment, tilt head 104 generally includes body portion 210, a pair of inner pitch arms 212, a pair of outer pitch arms 214, and a display interface assembly 216, as depicted in Figures 27-32.

Referring to the first example embodiment of tilt head 104 depicted in Figures 8-11, inner yoke 204 generally includes back plane 218 defining laterally oriented opening 220, and having parallel projecting flanges 222, 224. Each of flanges 222, 224, define upright guide structure 226, first oblong aperture 228, and second oblong aperture 230, in lateral registry across tilt head 104.

Each pitch cam 206 defines a guide structure 232, which may be in the form of an elongate slot, and a pair of apertures 234, 236. Pitch cams 206 are secured on the outer surface 238 of each of flanges 222, 224, with aperture 234 in registry with oblong aperture 228 and aperture 236 in registry with oblong aperture 230. Travelers (not depicted) extend through each of the registered aperture pairs228, 234 and 230, 236. The travelers are slidable in oblong apertures 228, 230 such that pitch cams 206 are selectively positionable relative to inner yoke 204 as depicted in Figure 10.

Pitch member 208 generally includes back plane 239 having parallel projecting flanges 240, 242. Each of flanges 240, 242, define apertures 244, 246, in lateral registry across tilt head 104. Inner yoke 204 and pitch cams 206 are disposed between flanges 240, 242, with apertures 244 in registry with guide structures 232, and apertures 246 in registry with guide structures 226. Followers 248 extend through apertures 244 and slidably engage in each guide structure 232, and followers 250 extend through apertures 246 and slidably engage in each guide structure 226.

Display interface structure 106 as depicted in Figure 13, generally includes vertical uprights 252, 254, horizontal braces 256, 258, central reinforcing plate 260, and gusset plates 262, 264. Vertical uprights 252, 254, are secured to back side 266 of display 101 with fasteners 268. Horizontal braces 256, 258, are secured to vertical uprights 252, 254, and are coupled with gusset plates 262, 264. Central reinforcing plate 260 extends between and is secured to horizontal braces 256, 258. Pitch member 208 engages and is secured to horizontal braces 256, 258.

In use, as depicted in Figure 12, display 101 is tiltable about a generally horizontal tilt axis by grasping the top edge 270 of the display 101 and pulling outward. As display 101 tilts, followers 248 slide in guide structures 232, and followers 250 slide in guide structures 226 to guide and define the tilting path of travel for display 101. Notably, as display 101 tilts forward, bottom edge 272 maintains substantially the same distance from wall surface 124. Hence, even when extendable arm assembly 110 is retracted so that display 101 is positioned immediately proximate wall surface 124, display 101 will not contact wall surface 124 at any point in the tilting motion.

Another desirable feature of tilt head 104 as also depicted in Figure 12 is that guide structures 226 and guide structures 232 may be oriented so as to define a path of travel about a tilt axis located generally below and forward of display 101, such that center of gravity 274 translates along a substantially horizontal axis 198, and the display 101 is substantially "self-balancing." That is, display 101 will maintain a desired tilt position without being held by a secondary friction source.

It will be appreciated that the position of pitch cams 206 may be adjusted so as to alter the position of the tilt axis for display 101 and also the path along which the center of gravity will translate upon tilting. Further, it will be appreciated that the shape of guide structures 226, 232, may be altered so as to give a desired effect to the tilt motion of display 101. For example, guide structures 226, 232, may be substantially straight as depicted, or either or both may be curved, angular, or any other desired shape. Guide structures 226, 232 themselves, although

depicted as slots, may be any other suitable structure capable of guiding a follower, such as channels, grooves, cam surfaces, and the like.

Referring to the second example embodiment of tilt head 104 depicted in Figures 27-32, body portion 210 generally includes yoke portion 276 with a pair of projecting uprights 278, 280. Yoke portion 276 defines central bore 282, of which a portion proximate bottom end 284 may be threaded to receive threaded coupler 286. Each of uprights 278, 280, defines guide track 288 facing laterally outward. A slide block 290 is slidably disposed in each guide track 288 as depicted in Figure 40. Slide block 290 defines aperture 292. Each upright 278, 280, defines aperture 294 therethrough proximate top end 296.

Inner pitch arm 212 is elongate, presents opposing ends 298, 300, and defines apertures 302, 304 proximate ends 298, 300, respectively. Inner pitch arm 212 further defines aperture 306 intermediate ends 298, 300.

Outer pitch arm 214 is also elongate, presents opposing ends 308, 310, and defines apertures 312, 314 proximate ends 308, 310, respectively. Clearance notch 316 is defined in lateral margin 318 proximate aperture 320.

Display interface assembly 216 generally includes interface plate 322, first mounting plate 324, and second mounting plate 326. Interface plate 322 includes display attachment portion 328 and projecting parallel flanges 330, 332. Display attachment portion 328 defines apertures 334 and elongate apertures 336 for attaching first and second mounting plates 324, 326 and display 101 with fasteners (not depicted). Each flange 330, 332 defines elongate guide slot 338 and pivot apertures 340.

Each inner pitch arm 212 is pivotally coupled to one of uprights 278, 280, with a pivot pin 342 extending through aperture 294. The other end of each inner pitch arm 212 is coupled with interface plate 322 with pivot 344 slidable in elongate guide slot 338. Each outer pitch arm 214 is pivotally coupled to slide block 290 with pivot 346 extending through aperture 292. The other end of each outer pitch arm 214 is pivotally coupled to interface plate 322 with pivot pin 348 extending through apertures 312, 314, 340. Notch 316 enables outer pitch arm 214 to clear pivot 344 when mount 100 is positioned in an upright position, as depicted in Figure 27.

In use, display 101 may be first disposed in a generally vertical upright position, as depicted in Figure 27. Lower corner 350 is disposed a distance D from upright column 352 of extendable arm assembly 110, upon which yoke portion 276 is received. Center of gravity C.G. of display 101 is disposed along generally horizontal axis A-A, which is a distance X above bottom end 284 of yoke portion 276.

A user may selectively tilt display 101 forward as depicted in Figure 28 by grasping and pulling top edge 270 of display 101. As the user pulls, each inner pitch arm 212 pivots about pivots 344, 346, and pivot 344 slides in elongate guide slot 338. Simultaneously, each outer pitch arm 214 pivots about pivots 346, with each slide block 290 sliding upward in guide tracks 288. Advantageously, center of gravity C.G. of display 101 translates substantially along axis A-A, which is maintained at distance X above the bottom end 284 of yoke portion 276, while lower corner 350 remains substantially at the same distance D from upright column 352. The effect is for display 101 to be essentially self-balancing, able to maintain any desired tilt position between the upright position depicted in Figure 27 and the fully tilted position depicted in Figure 28 without the addition of significant additional friction between any of the components of mount 100. Further, the lower corner 350 of display 101 maintains an essentially constant distance from wall assembly 354 as display 101 is tilted, thereby eliminating the problem of display 101 striking wall assembly 354, even when mount 100 is fully retracted as depicted in Figure 44.

In the embodiment depicted in Figures 30-31, mount 100 additionally includes friction element 356, which may include a bolt 358 extending through an aperture defined in inner pitch arm 212 and guide slot 360 defined in outer pitch arm 214. Friction washer 362 abuts outer surface 364 of outer pitch arm 214 and is held in place with nut 366. Notch 368 is defined in each of parallel flanges 330, 332 to clear friction element 356.

In use, friction can be selectively added if needed to maintain a desired tilt position by tightening nut 366. Conversely, friction can be removed to enable freer positioning of mount 100 by loosening nut 366.

The embodiments above are intended to be illustrative and not limiting. Additional embodiments are encompassed within the scope of the claims. Although the present invention has been described with reference to particular embodiments, those skilled in the art will recognize that changes may be made in form and detail without departing from the scope of the invention as defined by the claims.

CLAIMS:

1. An electronic display system adapted to attach to a substantially vertical fixed structure, the system comprising:

an electronic display device;

a support structure adapted to attach to the fixed structure; and

a tilt head assembly operably coupled with the support structure such that the electronic display device is selectively pivotable about a substantially vertical pivot axis, the tilt head assembly presenting a display mounting surface receiving the electronic display device thereon, the tilt head assembly enabling selective tilting of the electronic display device between a first position in which a top edge of the electronic display device and a bottom edge of the electronic display device are each spaced apart a first distance from the fixed structure, and a second position in which the bottom edge of the electronic display device is spaced at substantially the same first distance from the fixed structure while the top edge of the electronic display device is spaced apart a second distance from the fixed structure, the second distance being greater than the first distance, wherein a center of gravity of the electronic display device translates along a substantially horizontal axis as the electronic display device is tilted between the first position and the second position.

2. The system of claim 1, further comprising a vertically oriented pivot column operably coupling the tilt head assembly with the support structure, the pivot column defining the substantially vertical pivot axis.

3. The system of any one of claims 1 and 2, wherein the support structure comprises an extensable arm assembly, the extensible arm assembly enabling selective shifting of the electronic display in a substantially horizontal direction between a first position in which the electronic display device is proximate the fixed structure and a second position in which the electronic display is spaced apart from the fixed structure.

4. The system of claim 3, further comprising a swing limit cam on one of the tilt head assembly or the pivot column and a swing stop member on the other of the tilt head assembly or the pivot column, the swing limit cam and the swing stop member cooperatively arranged so as to limit pivoting of the electronic display device about the substantially vertical pivot axis to a predetermined angular range.

5. The system of claim 4, wherein the swing limit cam and the swing stop member are configured and arranged such that the predetermined angular range increases as the electronic display is shifted away from the fixed structure with the extensible arm assembly.

6. A device for mounting an electronic display to a substantially vertically oriented surface, the device comprising:

a display interface structure;

a support structure; and

a tilt head assembly for tilting the electronic display , the tilt head assembly including an attachment member and first and second guide structures, the attachment member being operably connected to the support structure such that the electronic display device is selectively pivotable about a substantially vertical pivot axis, the first and second guide structures defining a path of travel of the electronic display about a tilt axis such that a bottom edge of the electronic display remains at substantially a same first distance from the substantially vertically oriented surface while a top edge of the electronic display tilts away from the substantially vertically oriented surface as the electronic display travels about the tilt axis, and such that a centre of gravity of the electronic display translates along a substantially horizontal axis as the electronic display travels about the tilt axis, wherein the electronic display is substantially self-balancing at any point along the path of rotation and the support structure is operably connected to the display interface structure and the attachment member.

7. The device of claim 6, wherein the top edge is rotatable through at least approximately thirty degrees.

8. The device of any one of claims 6 and 7, wherein the first and second guide structures comprise elongated slots.

9. The device of any one of claims 6 to 8, wherein the tilt head assembly further comprises a friction element for stabilizing the electronic display.

10. A device for mounting an electronic display to a substantially vertically oriented surface, the device comprising:

a display interface structure;

a support structure for rotatably positioning the electronic display about a substantially vertical axis; and

means for rotatably positioning the electronic display about a substantially horizontal axis and wherein the substantially horizontal axis is disposed forward of and below a center of gravity of the electronic display;

wherein the electronic display is substantially self-balancing and the support structure is operably coupled to the display interface structure and the means for rotatably positioning the electronic display about a substantially horizontal axis.

11. The device of claim 10, wherein the support structure comprises an extensable arm assembly, the extensible arm assembly enabling selective shifting of the electronic display in a substantially horizontal direction between a first position in which the electronic display device is proximate the substantially vertically oriented surface and a second position in which the electronic display is spaced apart from the substantially vertically oriented surface.

12. A mount for attaching an electronic display to a wall, the electronic display presenting a rear side, the mount comprising:

a support structure adapted to attach to the wall; and

at least one tilt assembly, the tilt assembly including a display interface member presenting a display mounting surface for abuttingly receiving the rear side of the electronic display, and a support structure interface coupled with the support structure, the display interface member and the support structure interface operably coupled such that when the support structure is coupled to the wall and the electronic display is attached to the display interface member with the display mounting surface abutting the rear side of the electronic display, the display interface member is selectively tiltable about a substantially horizontal tilt axis spaced apart forwardly from the display mounting surface and disposed proximate a bottom end of the display interface member.

13. The mount of claim 12, wherein one of the display interface member and the support structure interface defines a pair of elongate guide slots in a plane perpendicular to the display mounting surface and the other one of the display interface member and the support structure interface carries a pair of guide pins, each of the guide pins engaged in a separate one of the guide slots to couple the display interface member with the support structure interface, the guide pins shiftable in the guide slots to enable tilting of the display interface about the substantially horizontal tilt axis.

14. The mount of claim 13, wherein at least one of the guide slots is substantially straight and oriented at an angle relative to the display mounting surface.

15. The mount of claim 12, further comprising a height adjustment mechanism operable to selectively vertically shift the display interface member relative to the support structure.

16. The mount of claim 12, wherein the support structure comprises an arm assembly.

17. The mount of claim 16, wherein the arm assembly is extendable to enable selective shifting of the at least one tilt assembly away from the wall.

18. An electronic display system comprising:

an electronic display device presenting a rear side; and

a mount for attaching the electronic display device to a wall, the mount comprising:

a support structure adapted to attach to the wall; and

at least one tilt assembly, the tilt assembly including a display interface member presenting a display mounting surface, the electronic display device received on the display mounting surface with the display mounting surface abutting the rear side of the electronic display, and a support structure interface coupled with the support structure, the display interface member and the support structure interface operably coupled such that the electronic display device is selectively tiltable about a substantially horizontal tilt axis spaced apart forwardly from the display mounting surface and disposed proximate a bottom end of the display interface member, wherein a center of gravity of the electronic display device is shifted in a substantially horizontal plane as the electronic display device is tilted.

19. The system of claim 18, wherein one of the display interface member and the support structure interface defines a pair of elongate guide slots in a plane perpendicular to the display mounting surface and the other one of the display interface member and the support structure interface carries a pair of guide pins, each of the guide pins engaged in a separate one of the

guide slots to couple the display interface member with the support structure interface, the guide pins shiftable in the guide slots to enable tilting of the electronic display device about the substantially horizontal tilt axis.

20. The system of claim 19, wherein at least one of the guide slots is substantially straight and oriented at an angle relative to the display mounting surface.

21. The system of claim 18, further comprising a height adjustment mechanism operable to selectively vertically shift the electronic display device relative to the support structure.

22. The system of claim 18, wherein the support structure comprises an arm assembly.

23. The system of claim 22, wherein the arm assembly is extendable to enable selective shifting of the at least one tilt assembly away from the wall.

24. A mount for attaching an electronic display to a wall, the electronic display presenting a rear side, the mount comprising:

a support structure adapted to attach to the wall; and

at least one tilt assembly, the tilt assembly including a display interface member presenting a display mounting surface for abuttingly receiving the rear side of the electronic display, and a support structure interface, the display interface member and the support structure interface operably coupled with first and second guide structures defining a substantially horizontal tilt axis spaced apart forwardly from the display mounting surface and disposed proximate a bottom end of the display interface member, the first and second guide structures defining a tilt path of the display interface member about the substantially

horizontal axis such that when the support structure is attached to the wall and the electronic display is attached to the display interface member with the display mounting surface abutting the rear side of the electronic display, the display interface member is selectively tiltable about the substantially horizontal axis between a first substantially vertical orientation in which a top edge of the display interface member and a bottom edge of the display interface member are substantially equidistant from the wall, and a second fully tilted orientation in which the top edge of the display interface member is a greater distance from the wall than the bottom edge of the display interface member.

25. The mount of claim 24, wherein each of the first guide structure and the second guide structure comprises an elongate guide slot defined in one of the display interface member and the support structure and oriented in a plane perpendicular to the display mounting surface, and a guide pin carried in the other one of the display interface member and the support structure interface and engaged in the guide slot, the guide pins shiftable in the guide slots to enable tilting of the display interface member about the substantially horizontal tilt axis.

26. The mount of claim 25, wherein at least one of the guide slots is substantially straight and oriented at an angle relative to the display mounting surface.

27. The mount of claim 24, further comprising a height adjustment mechanism operable to selectively vertically shift the display interface member relative to the support structure.

28. The mount of claim 24, wherein the support structure comprises an arm assembly.

29. The mount of claim 28, wherein the arm assembly is extendable to enable selective shifting of the at least one tilt assembly away from the wall.

30. The mount of claim 24, in combination with an electronic display device, wherein when the electronic display device is received on the display mounting surface, the electronic display device is substantially self-balancing at any point along the tilt path between the first position and the second position, and wherein a center of gravity of the electronic display translates in a substantially horizontal plane as the display interface member is tilted between the first position and the second position.

31. An electronic display system adapted to attach to a substantially vertical fixed structure, the system comprising:

an electronic display device presenting a rear side;

a support structure adapted to attach to the fixed structure; and

a tilt head assembly operably coupled with the support structure, the tilt head assembly presenting a display mounting surface abuttingly receiving the rear side of the electronic display device thereon, the tilt head assembly enabling selective tilting of the electronic display device between a first position in which a top edge of the electronic display device and a bottom edge of the electronic display device are each spaced apart a first distance from the fixed structure, and a second position in which the bottom edge of the electronic display device is spaced at substantially the same first distance from the fixed structure while the top edge of the electronic display device is spaced apart a second distance from the fixed structure, the second distance being greater than the first distance, wherein a center of gravity

of the electronic display device translates along a substantially horizontal axis as the electronic display device is tilted between the first position and the second position.

32. A device for mounting an electronic display to a substantially vertically oriented surface, the electronic display presenting a rear side, the device comprising:

a display interface structure presenting a display mounting surface;

a support structure; and

a tilt head assembly for tilting the electronic display, the tilt head assembly including an attachment member and first and second guide structures, the attachment member being operably connected to the support structure, the first and second guide structures defining a path of travel of the electronic display about a tilt axis such that when the electronic display device is attached to the display interface structure with the display mounting surface abutting the rear side of the electronic display device, a bottom edge of the electronic display remains at substantially a same first distance from the substantially vertically oriented surface while a top edge of the electronic display tilts away from the substantially vertically oriented surface as the electronic display travels about the tilt axis, and such that a center of gravity of the electronic display translates along a substantially horizontal axis as the electronic display travels about the tilt axis, wherein the electronic display is substantially self-balancing at any point along the path of rotation and the support structure is operably connected to the display interface structure and the attachment member.

33. A device for mounting an electronic display to a substantially vertically oriented surface, the device comprising:

a display interface structure mountable to the electronic display;

a support structure for rotatably positioning the electronic display about a substantially vertical axis, the support structure including an extendable arm assembly selectively positionable to a plurality of positions, a pivot column defining the substantially vertical axis, and a swingstop post defining a plurality of ranges of rotation of the extendable arm assembly about the substantially vertical axis, each position of the extendable arm assembly corresponding to a range of rotation;

a tilt head assembly for rotatably positioning the electronic display about a substantially horizontal axis, the tilt head assembly including an attachment member;

wherein the support structure is operably connected to the display interface structure and the attachment member;

wherein the support structure comprises an upper bushing and a lower bushing, the upper and lower bushings being operably attached to the extendable arm assembly and pivotally connected to the pivot column; and

wherein the upper and lower bushings are adapted to engage the swingstop post and thereby inhibit rotation of the extendable arm assembly around the pivot column.

34. The device of claim 33, wherein extending the extendable arm assembly causes the lower bushing or the upper bushing to slide along the pivot column.

35. The device of claim 33, wherein the swingstop post comprises an elongate body having an upper end, a lower end, and a plurality of widths intermediate the upper and lower ends, the plurality of widths defining the plurality of ranges of rotation of the extendable arm assembly.

36. The device of claim 35, wherein the elongate body of the swingstop post is adapted to substantially prevent the electronic display from contacting the substantially vertically oriented surface when the extendable arm assembly is rotated about the substantially vertical axis.

37. The device of claim 35, wherein each width of the elongate body generally decreases from the top end to the bottom end.

38. A device for mounting an electronic display to a substantially vertically oriented surface, the device comprising:

a display interface structure mountable to the electronic display;

a support structure for rotatably positioning the electronic display about a substantially vertical axis, the support structure including an extendable arm assembly selectively positionable to a plurality of positions, a pivot column defining the substantially vertical axis, and a swingstop post defining a plurality of ranges of rotation of the extendable arm assembly about the substantially vertical axis, each position of the extendable arm assembly corresponding to a range of rotation; and

a tilt head assembly for rotatably positioning the electronic display about a substantially horizontal axis, the tilt head assembly including an attachment member;

wherein the support structure is operably connected to the display interface structure and the attachment member;

wherein the swingstop post comprises an elongate body having an upper end, a lower end, and a plurality of widths intermediate the upper and lower ends, the plurality of widths defining the plurality of ranges of rotation of the extendable arm assembly; and

each width of the elongate body generally increases from the top end to the bottom end.

39. A device for mounting an electronic display to a substantially vertically oriented surface, the device comprising:

a display interface structure;

a support structure for rotatably positioning the electronic display about a substantially vertical axis; and

a tilt head assembly for rotatably positioning the electronic display about a substantially horizontal axis, the tilt head assembly including an attachment member and first and second guide structures, the attachment member being operably connected to the support structure and the first and second guide structures defining a path of rotation of the electronic display about the substantially horizontal axis;

wherein the electronic display is substantially self-balancing at any point along the path of rotation and wherein the substantially horizontal axis is disposed forward of and below a center of gravity of the electronic display and the support structure is operably connected to the display interface structure and the attachment member.

40. The device of claim 39, wherein the electronic display has a top edge and a bottom edge, the path of rotation of the electronic display about the substantially horizontal axis defining a plurality of distances between the bottom edge of the flat panel display and the

substantially vertically oriented surface, and the first and second guide structures being adapted so the plurality of distances are substantially similar.

41. The device of claim 40, wherein the top edge is rotatable through at least approximately thirty degrees.

42. The device of claim 39, wherein the first and second guide structures substantially prevent the electronic display from contacting the substantially vertically oriented surface when the electronic display is rotated about the substantially horizontal axis.

43. The device of claim 39, wherein the first and second guide structures are adapted so that the center of gravity travels along a substantially horizontal linear path as the electronic display is rotated through the path of rotation.

44. The device of claim 39, wherein the first and second guide structures comprise elongated slots.

45. The device of claim 39, wherein the tilt head assembly further comprises a friction element for stabilizing the electronic display.

46. A method for positioning an electronic display mounted to a substantially vertically oriented surface with a mounting device, the mounting device including a support structure operably connected to a display interface structure and a tilt head assembly, the method comprising:

extending the support structure to a first extended position;

rotating the electronic display about a substantially vertical axis within a range of rotation defined by the first extended position;

positioning the tilt head assembly; and

rotating the electronic display about a substantially horizontal axis that is disposed forward of and below a center of gravity of the electronic display to a first tilted position;

wherein the electronic display is self-balancing in the first tilted position.

47. The method of claim 46, wherein the support structure includes a bushing rotatably attached to a pivot column, the step of extending the support structure further including the step of sliding the bushing along the pivot column.

48. The method of claim 46, wherein the step of rotating the electronic display about a substantially horizontal axis includes the step of moving a center of gravity of the electronic display along a substantially horizontal linear path.

49. The method of claim 46, wherein the electronic display is substantially inhibited from contacting the substantially vertically oriented surface.

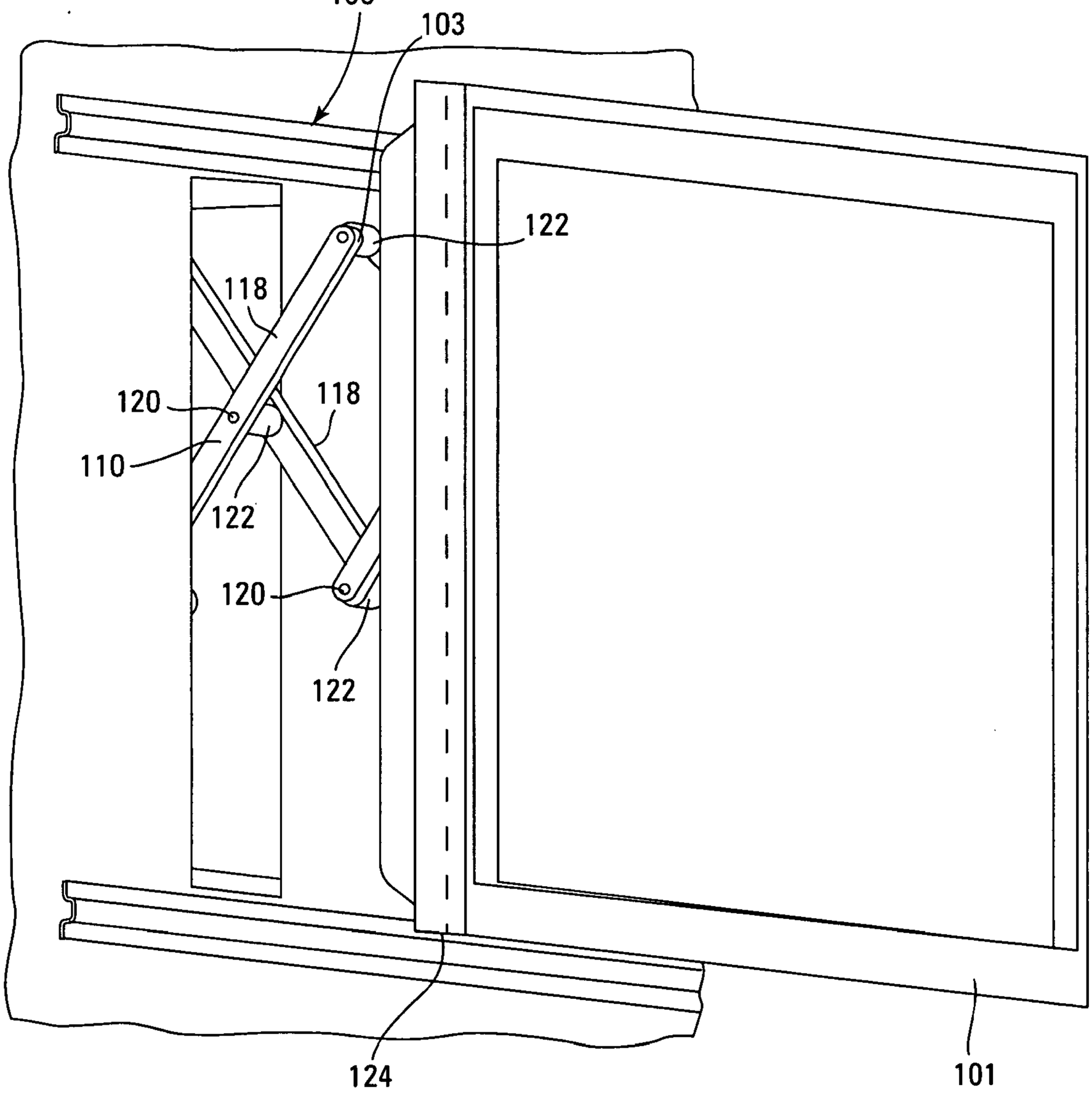

Fig. 1

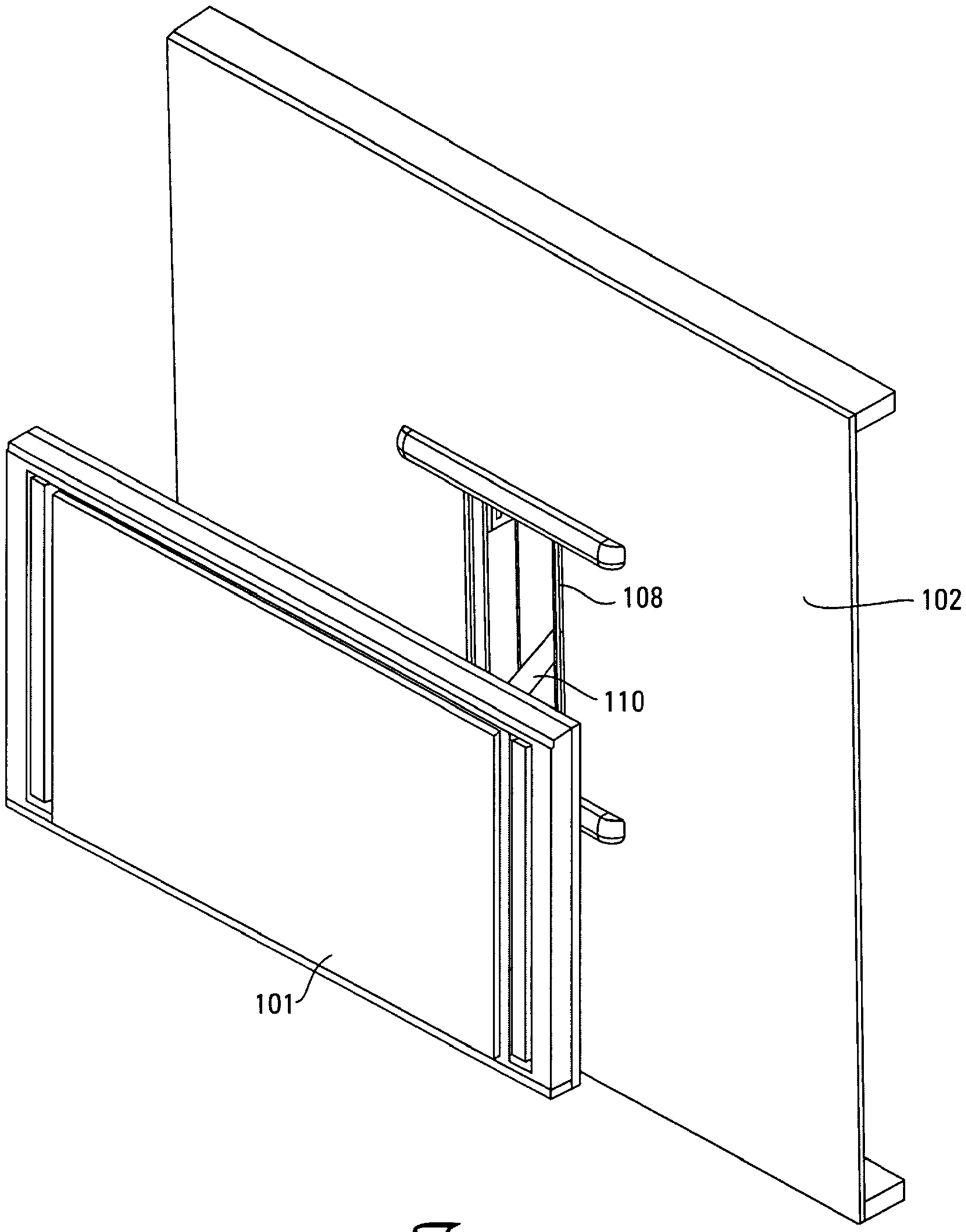

Fig. 2

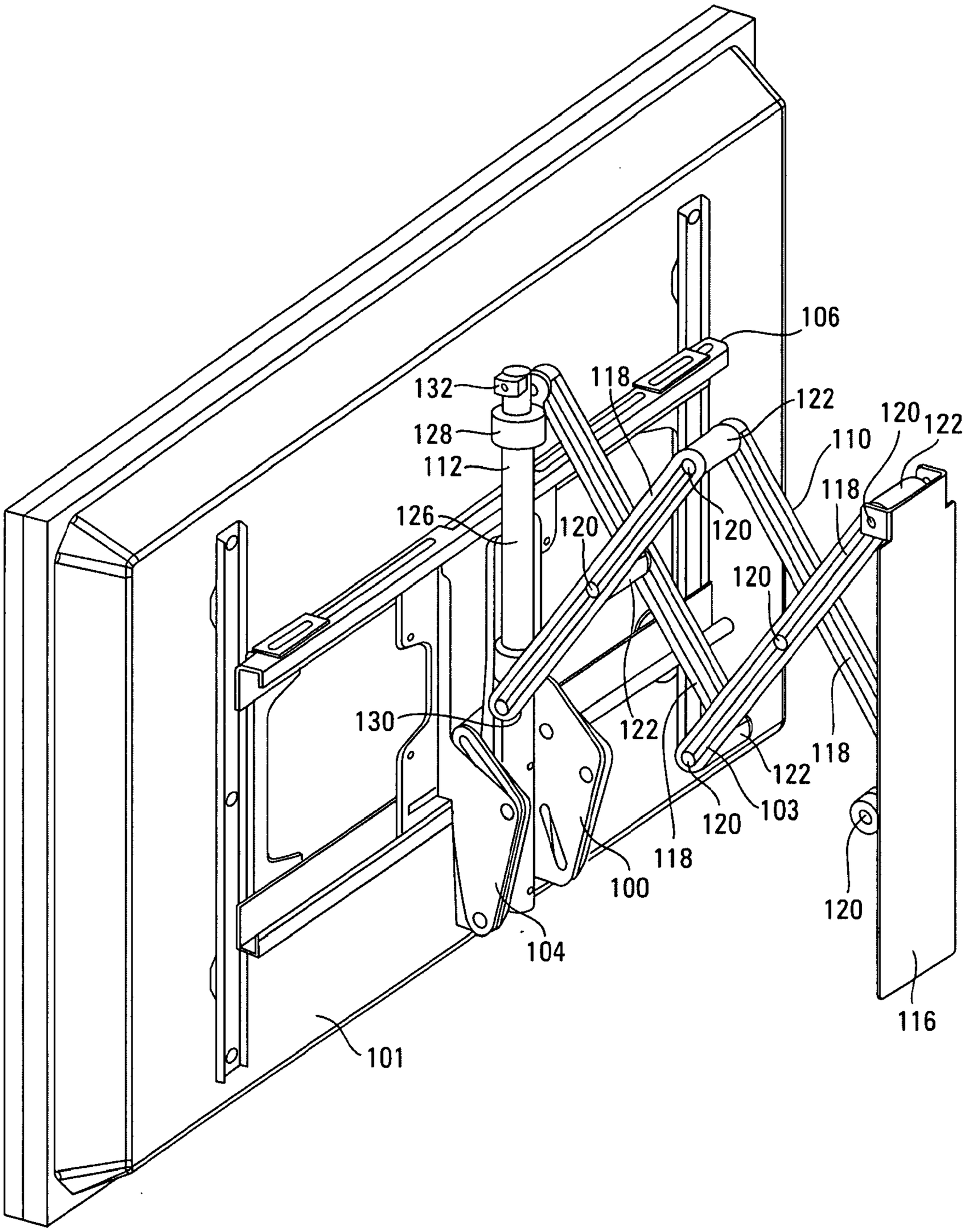
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Fig. 3

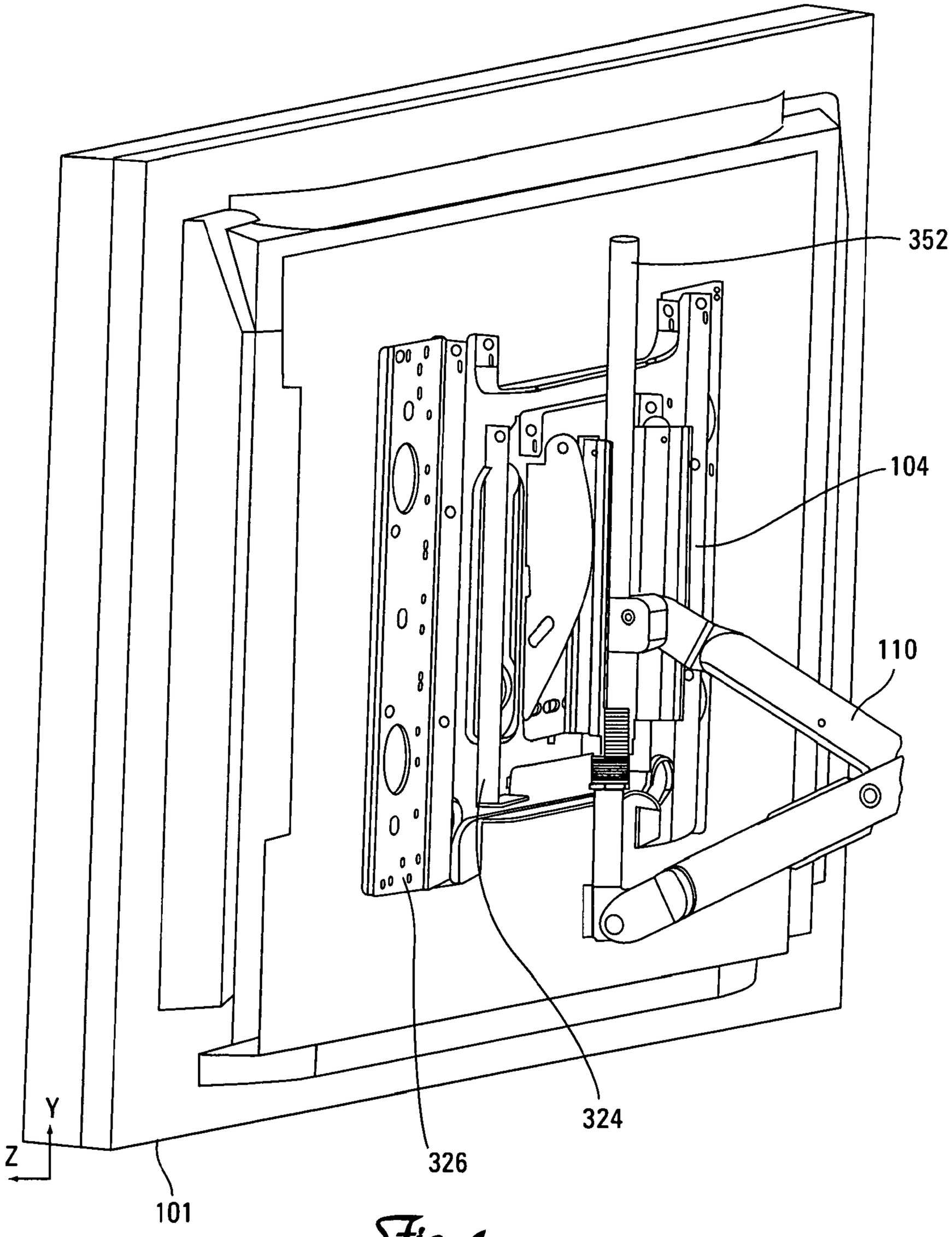

Fig. 4

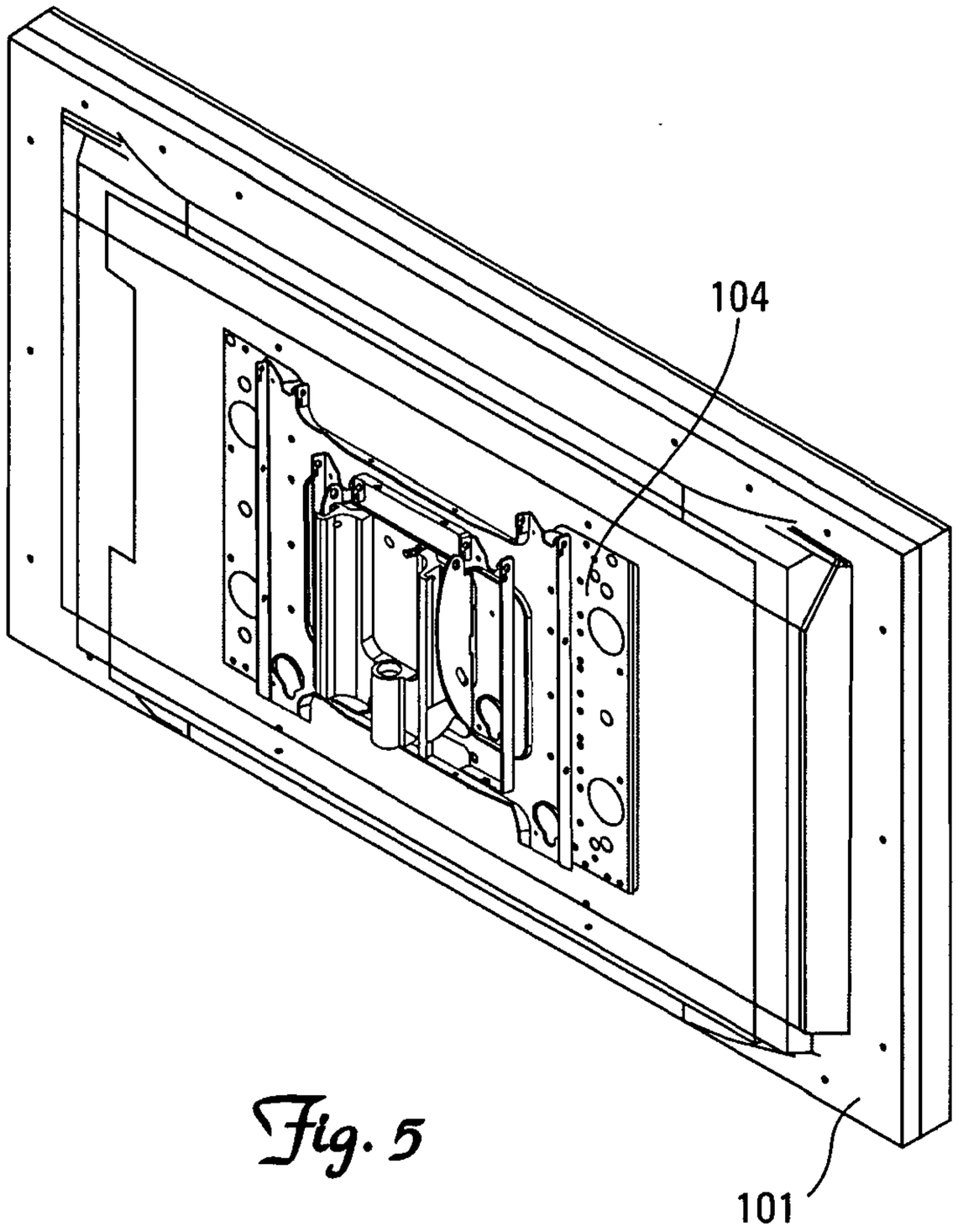

Fig. 5

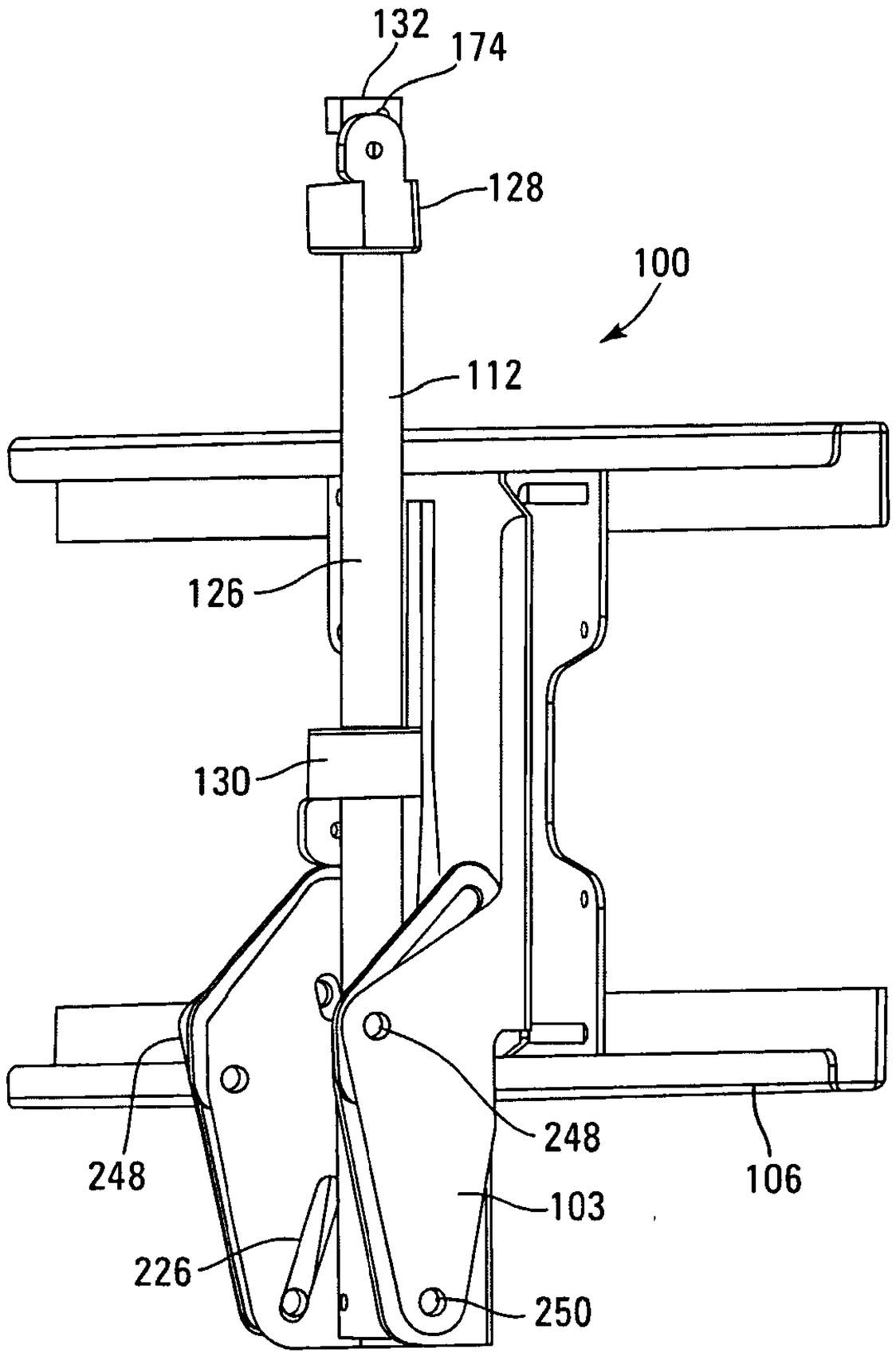

Fig. 6

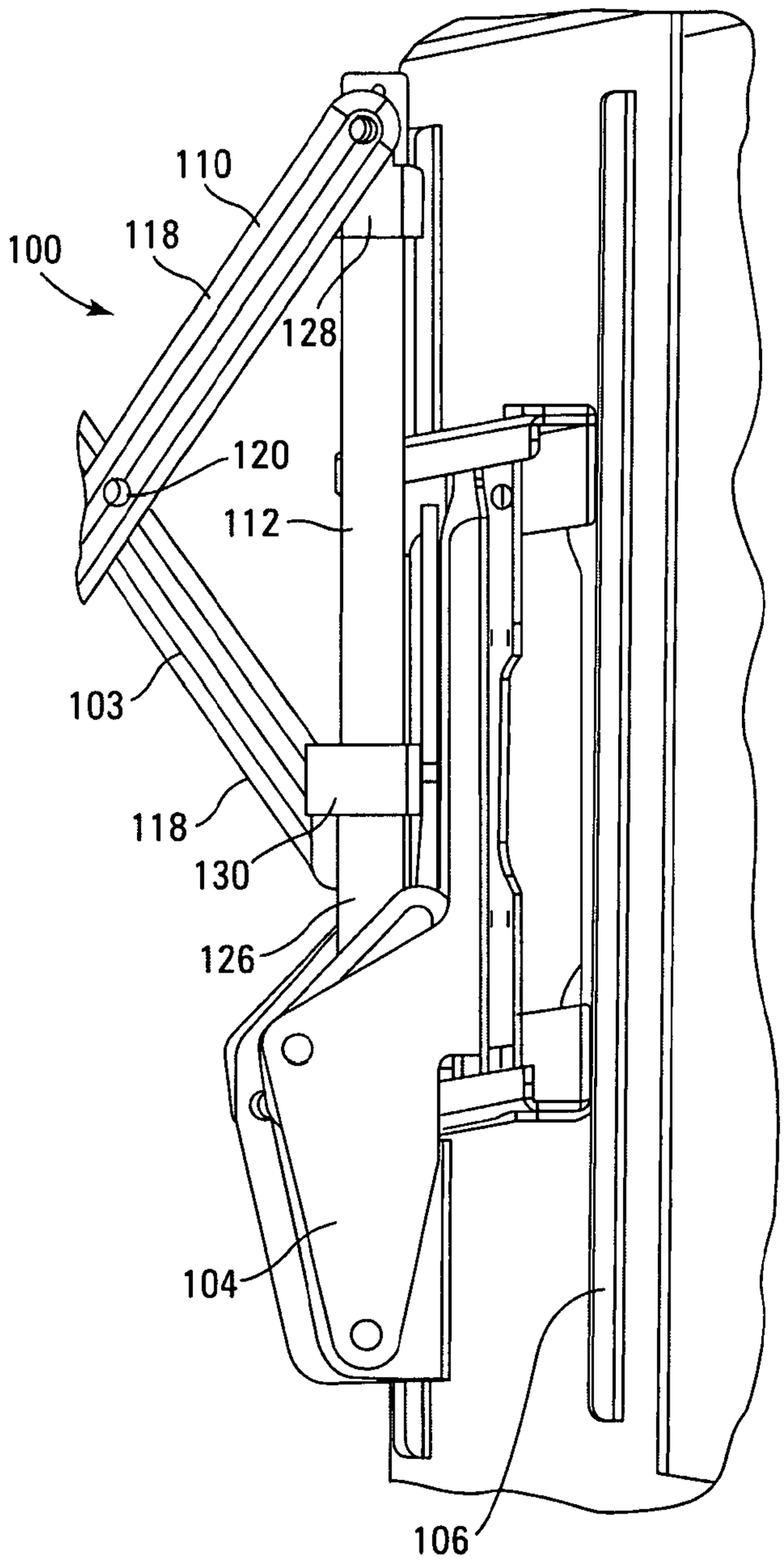

Fig. 7

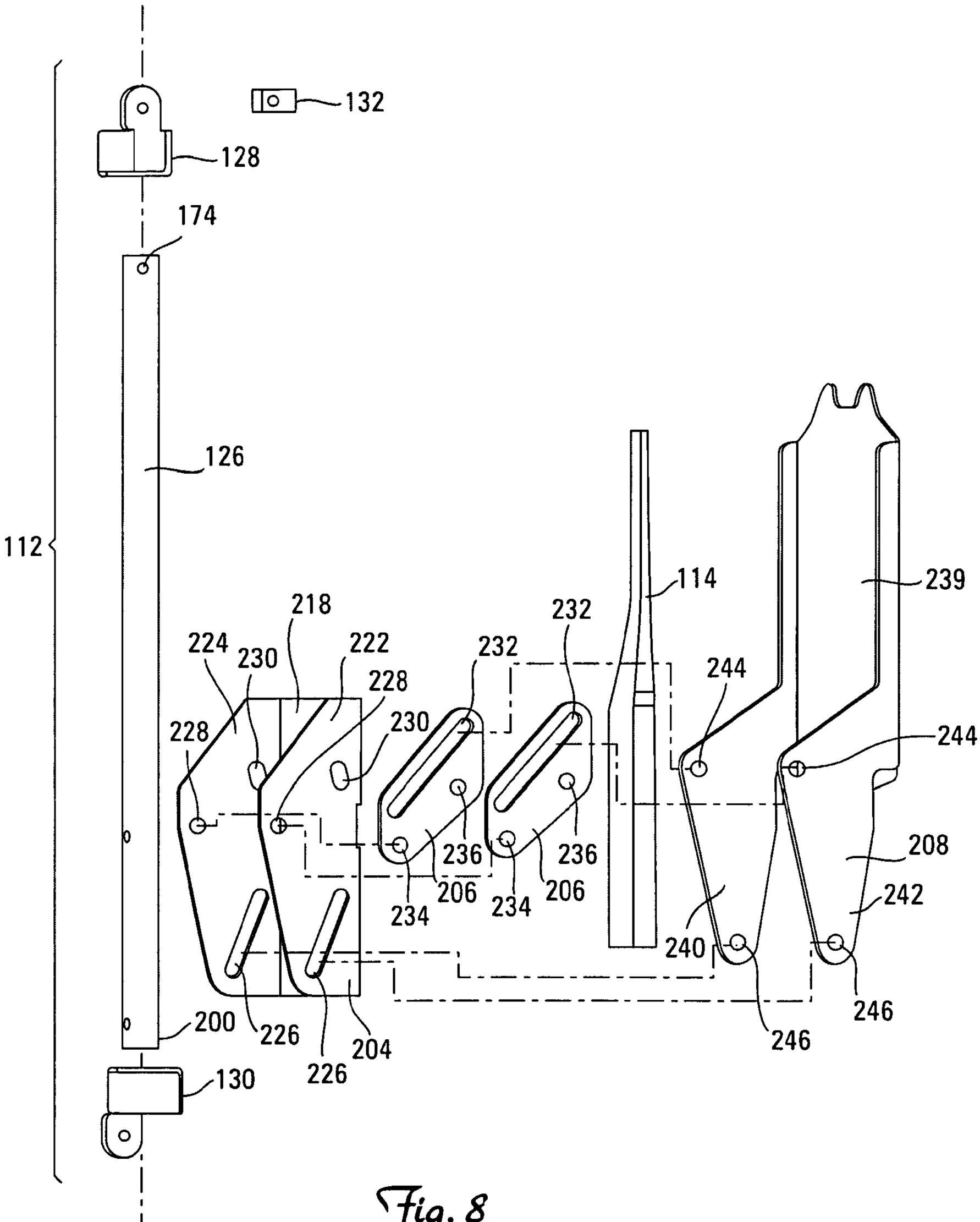
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Fig. 8

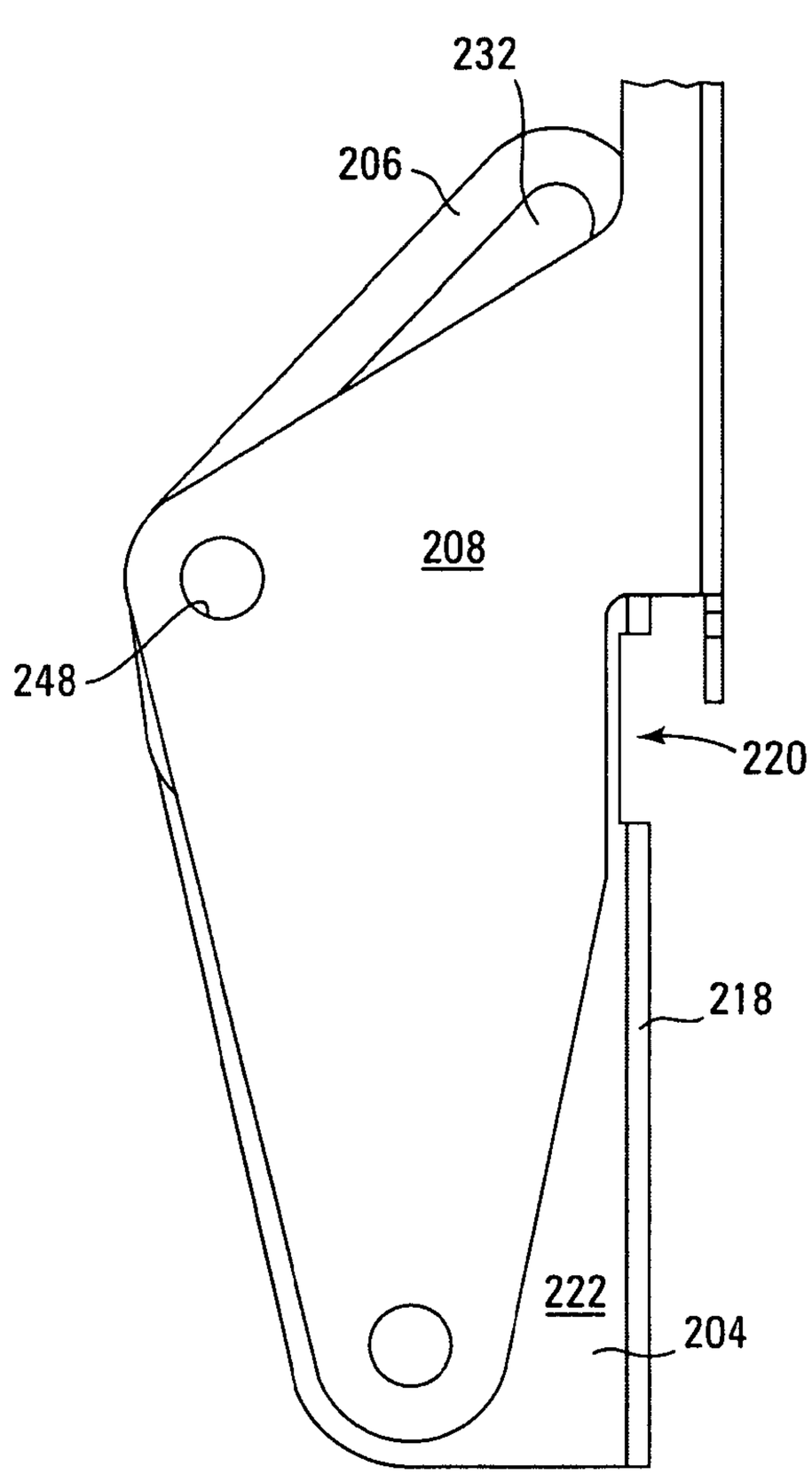

Fig. 9

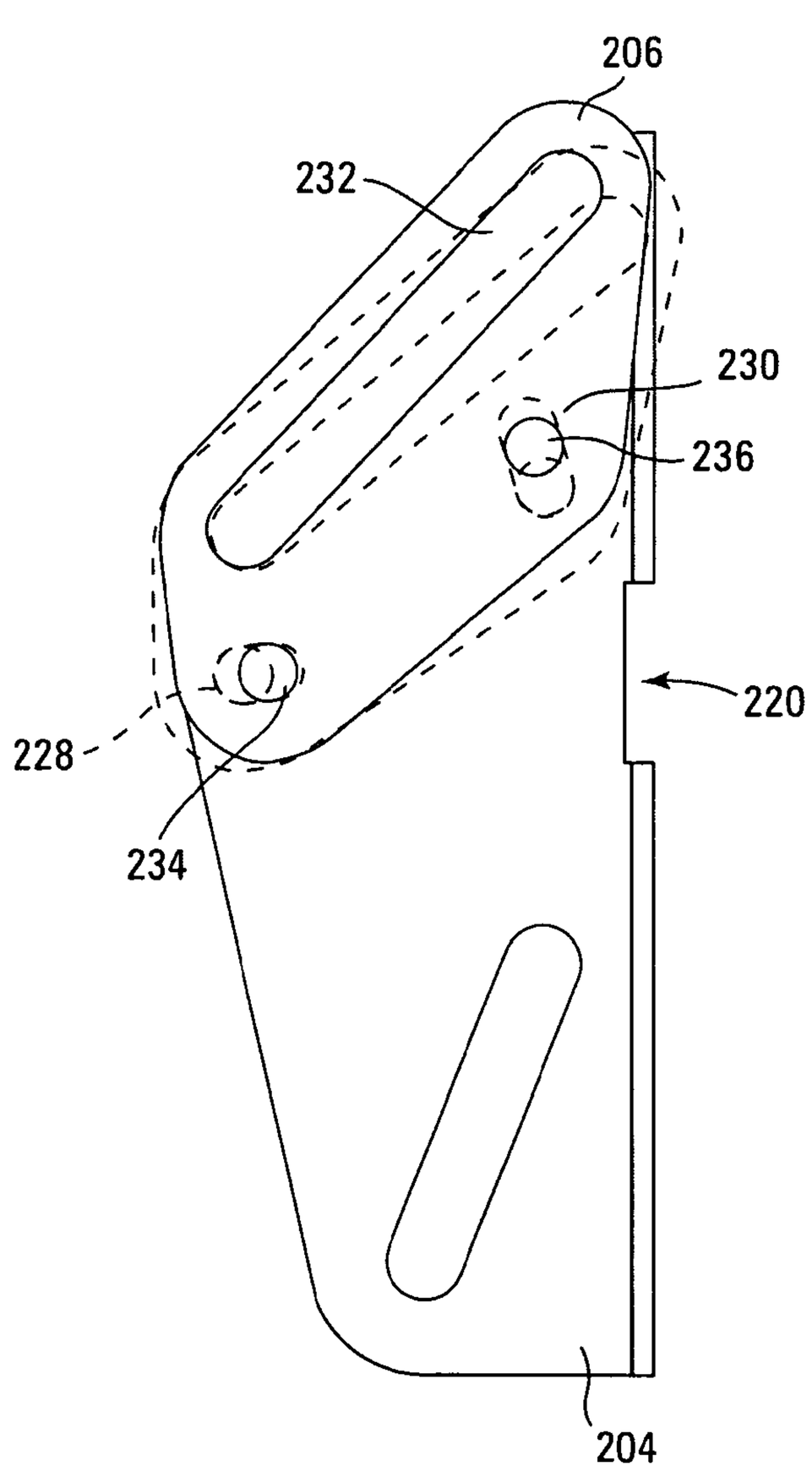

Fig. 10

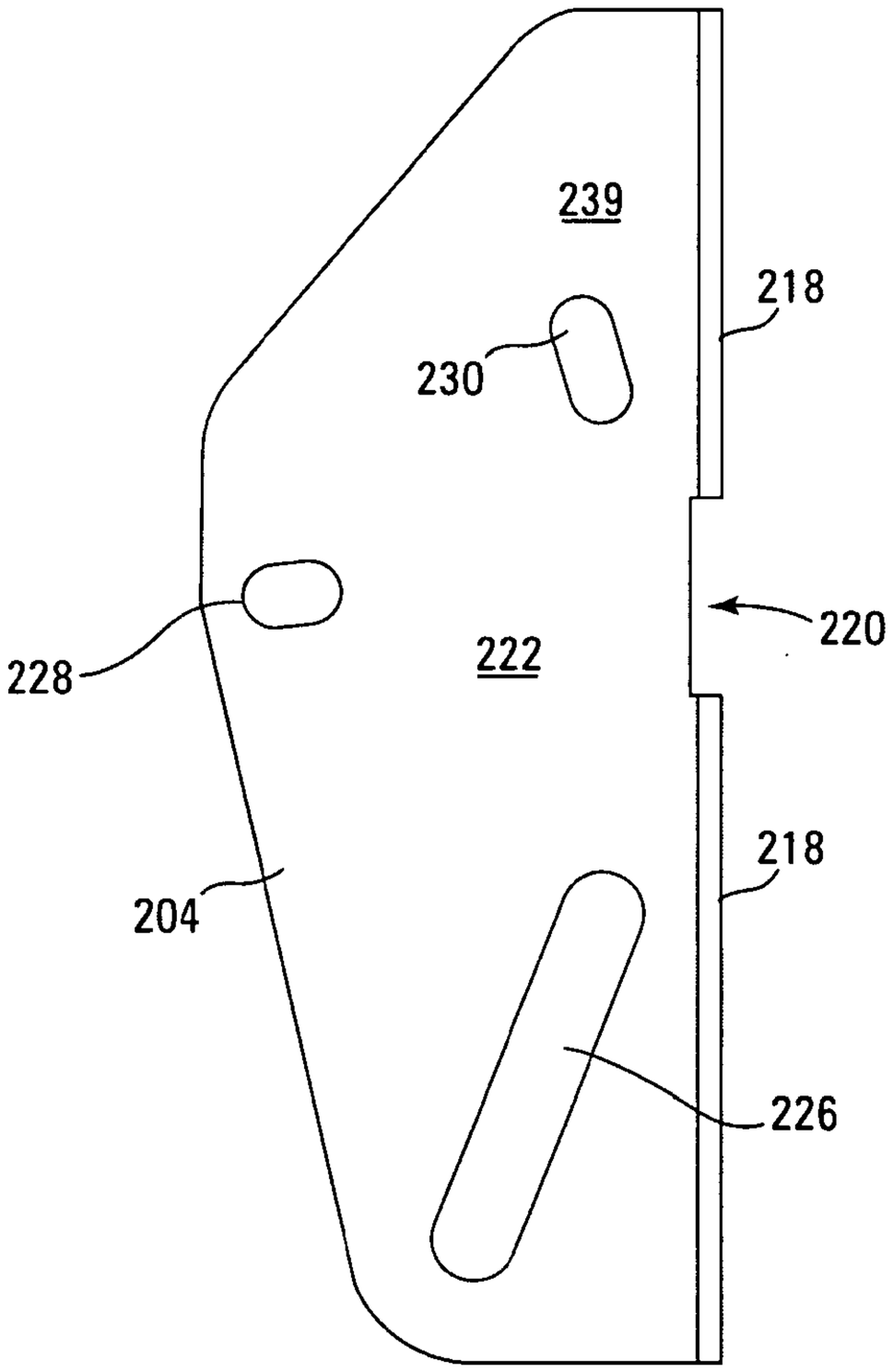

Fig. 11

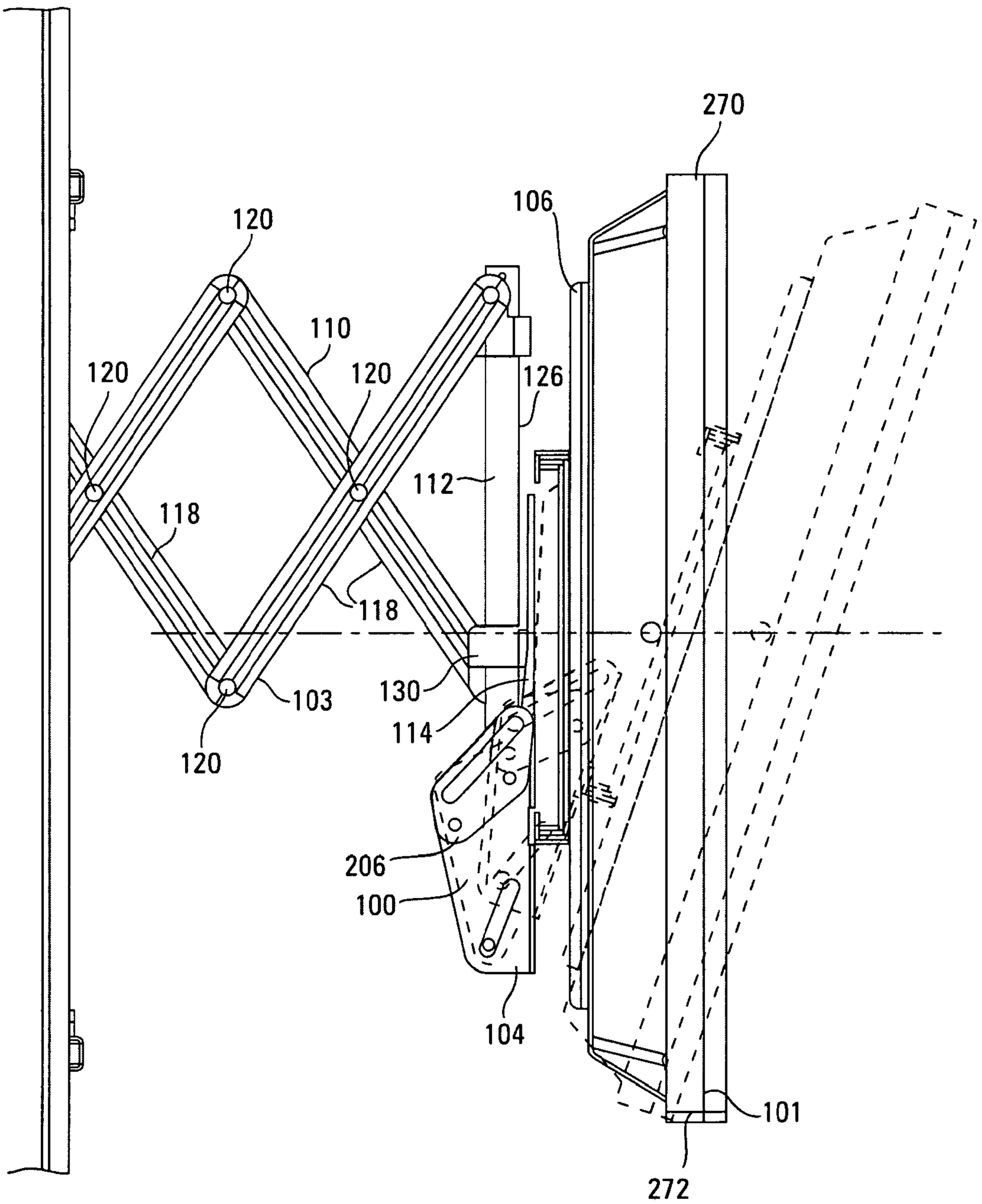
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Fig. 12

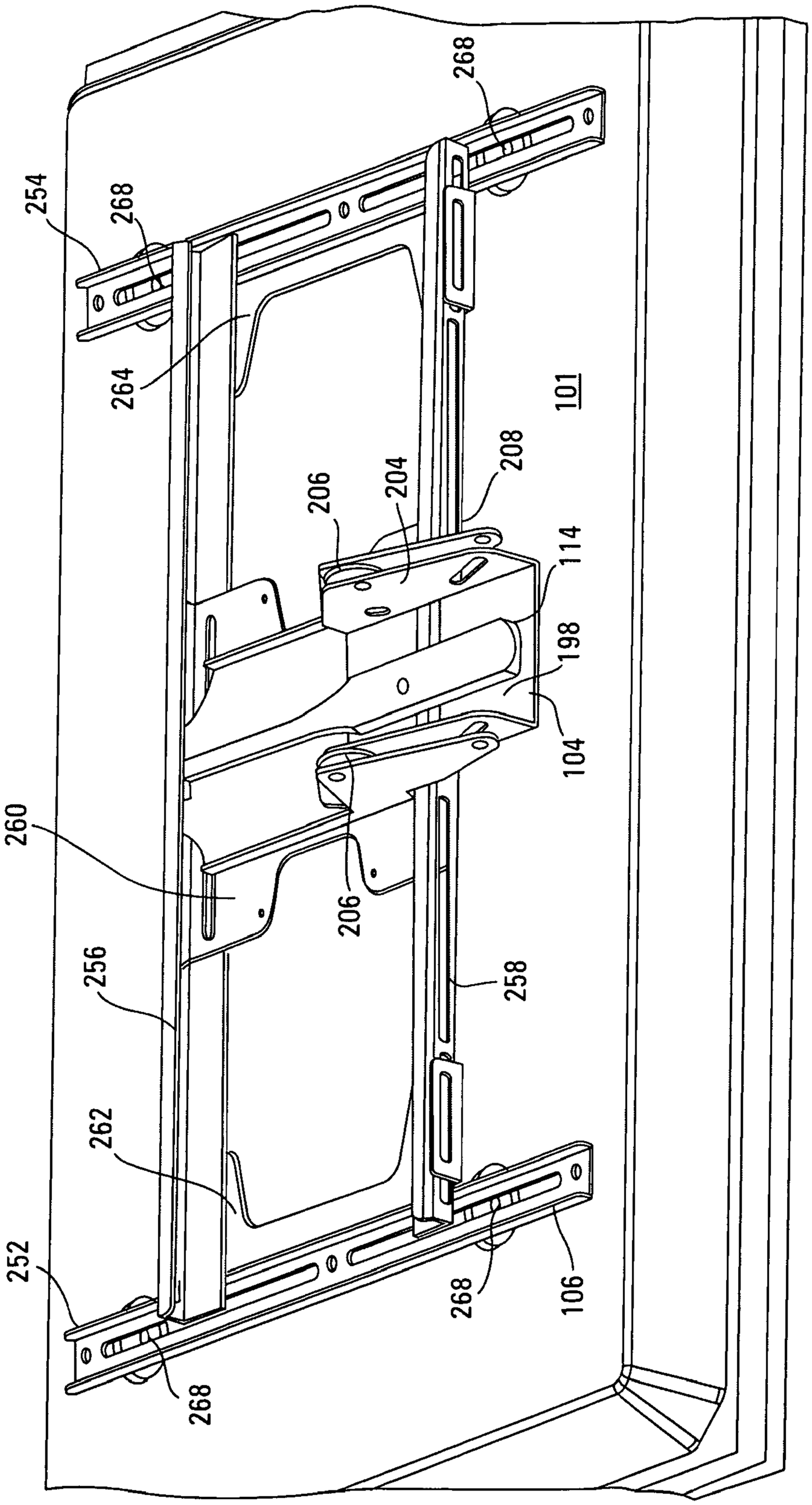
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Fig. 13

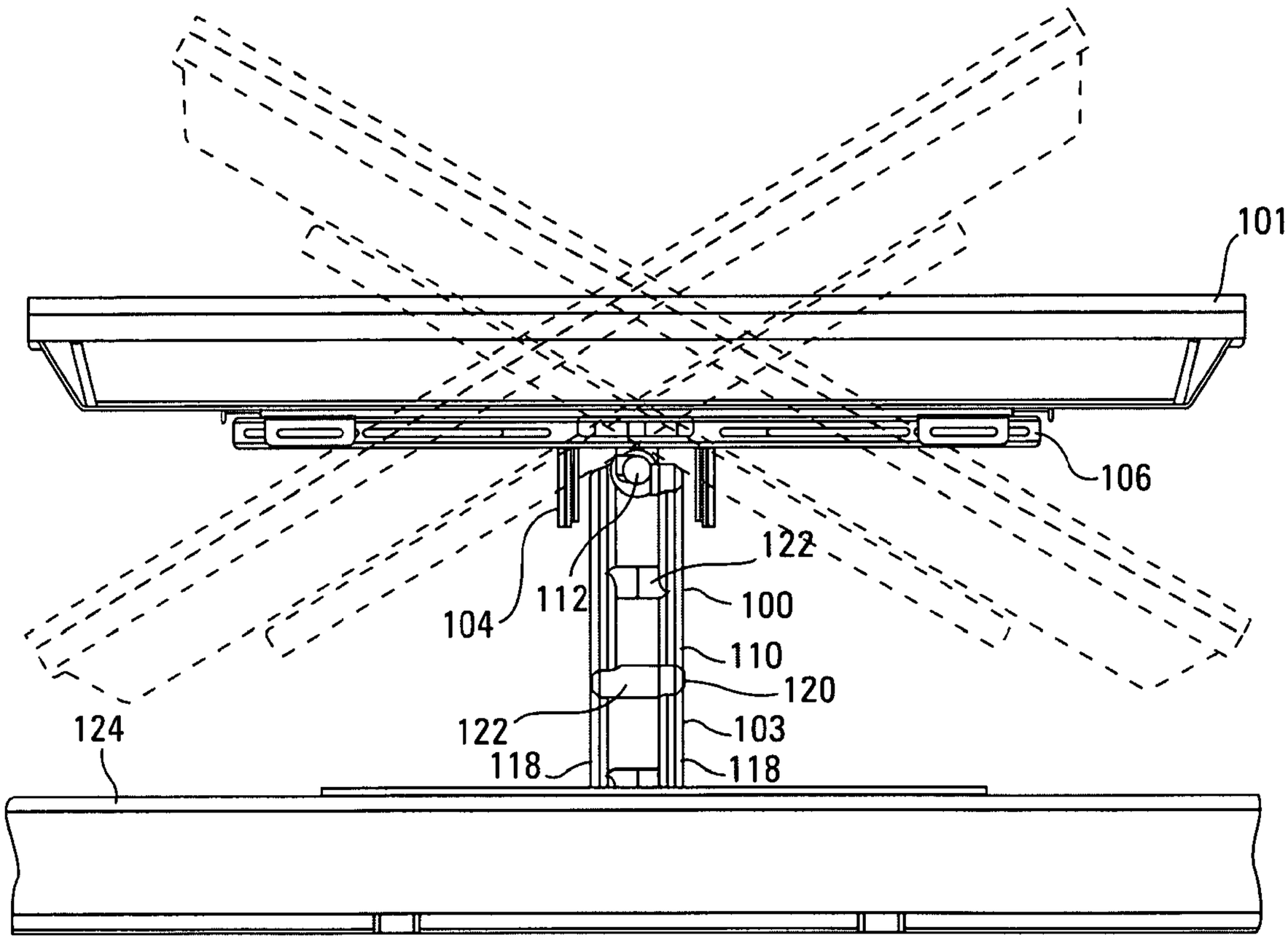

Fig. 14

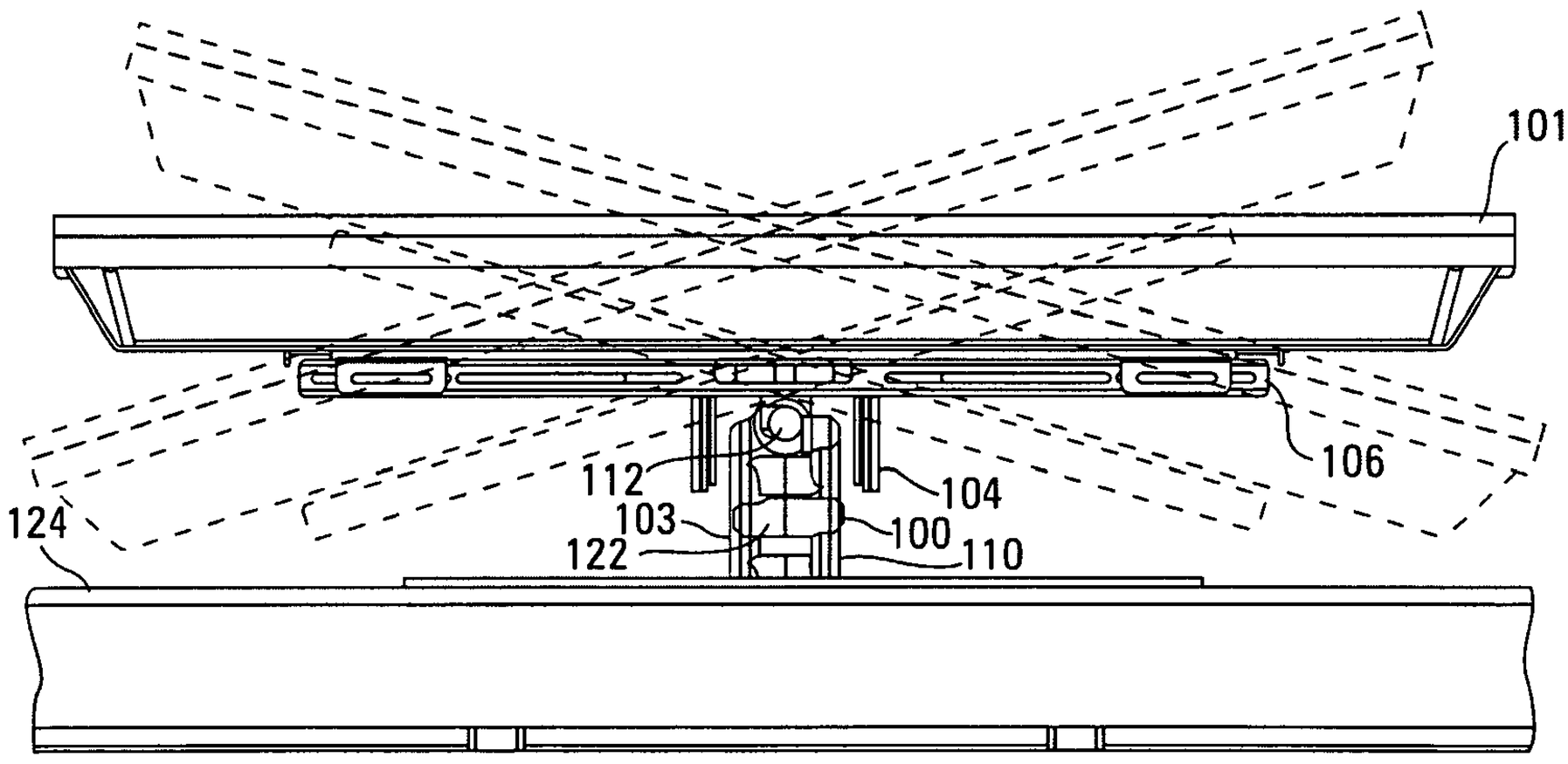

Fig. 15

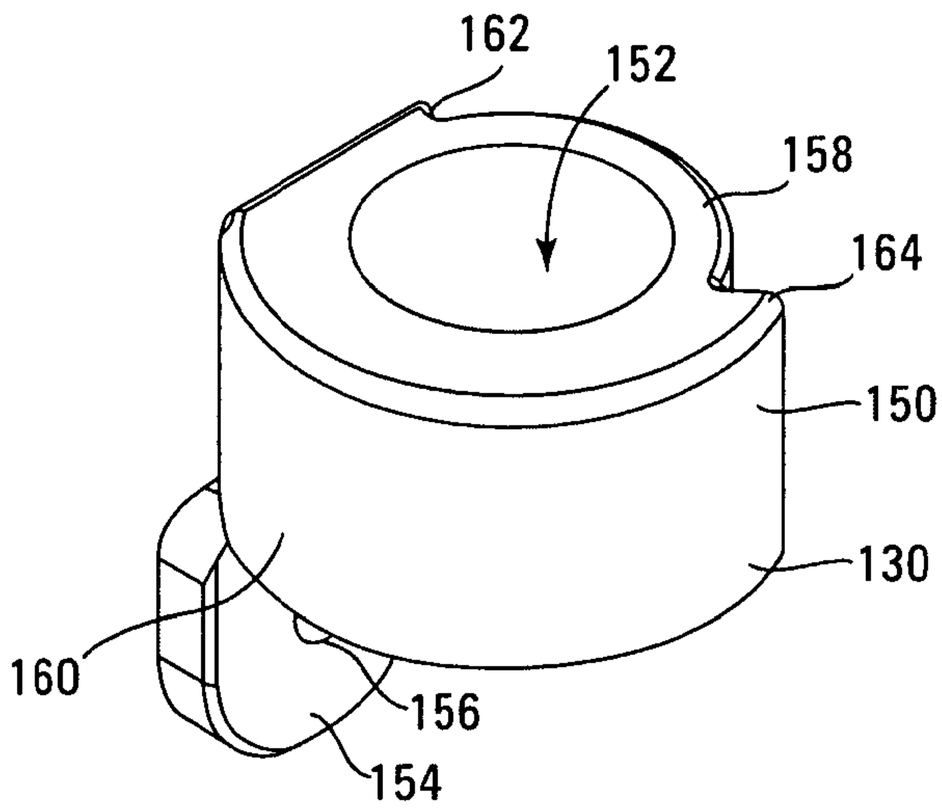

Fig. 16

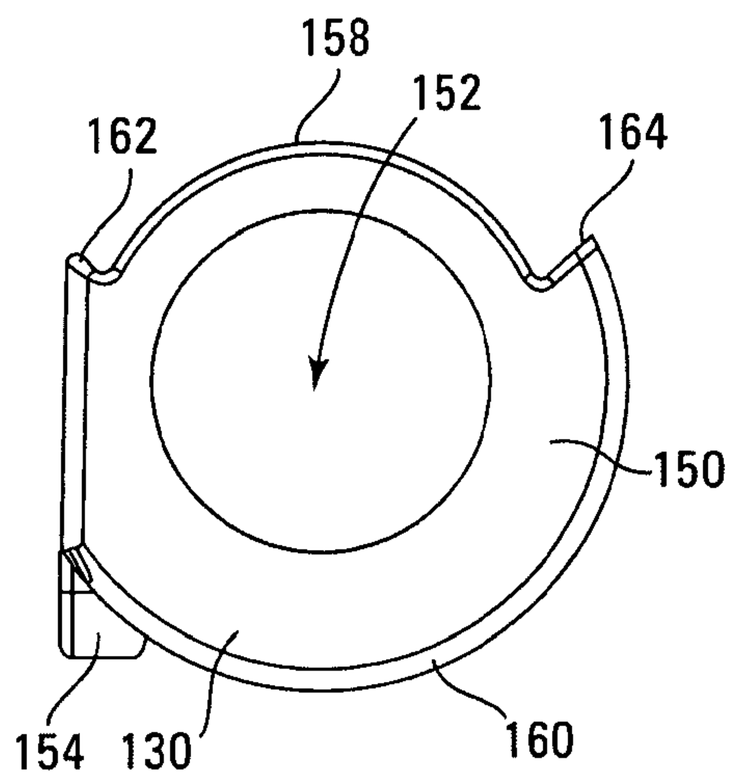

Fig. 17

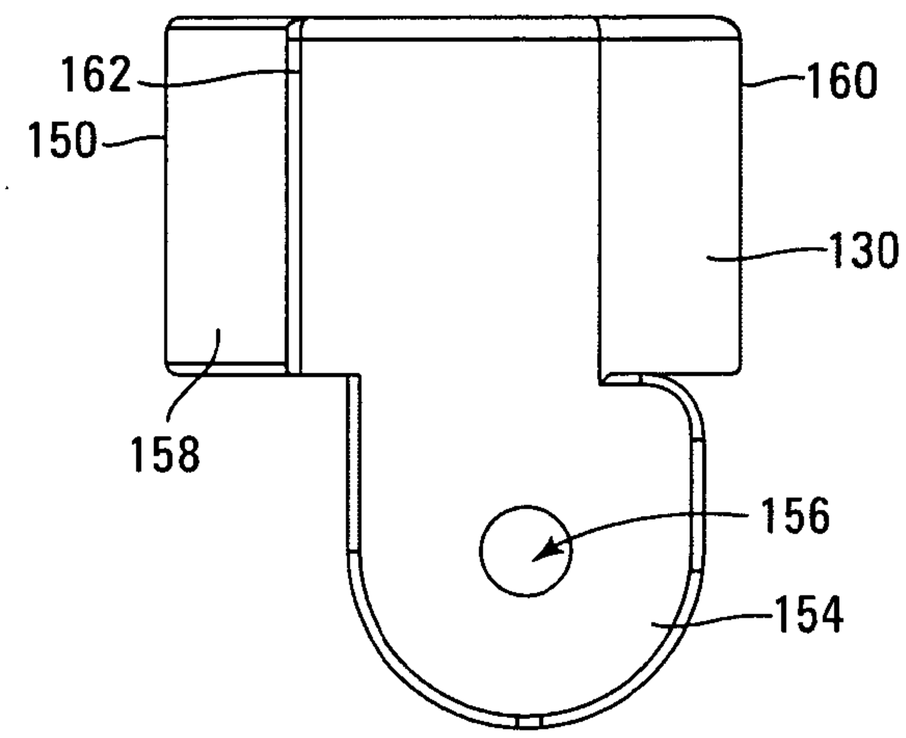

Fig. 18

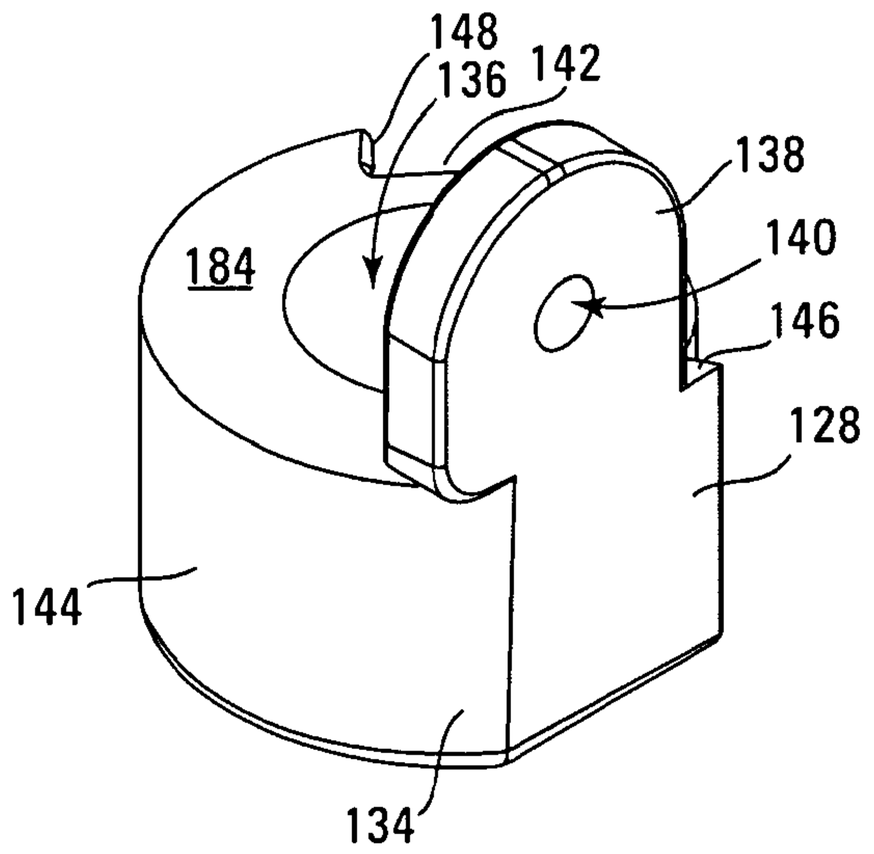

Fig. 19

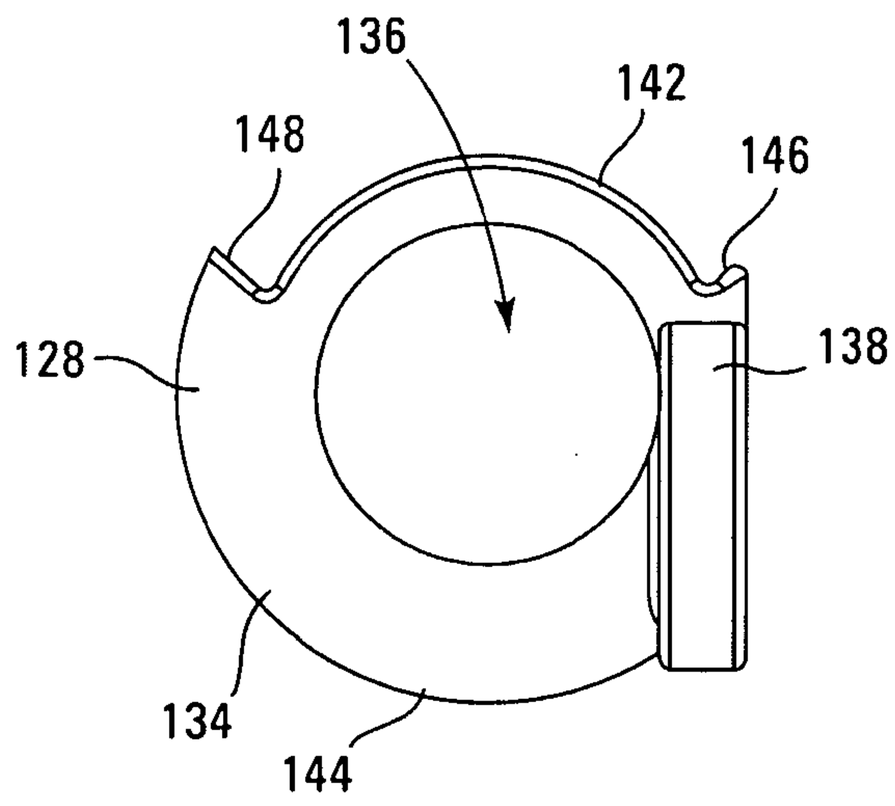

Fig. 20

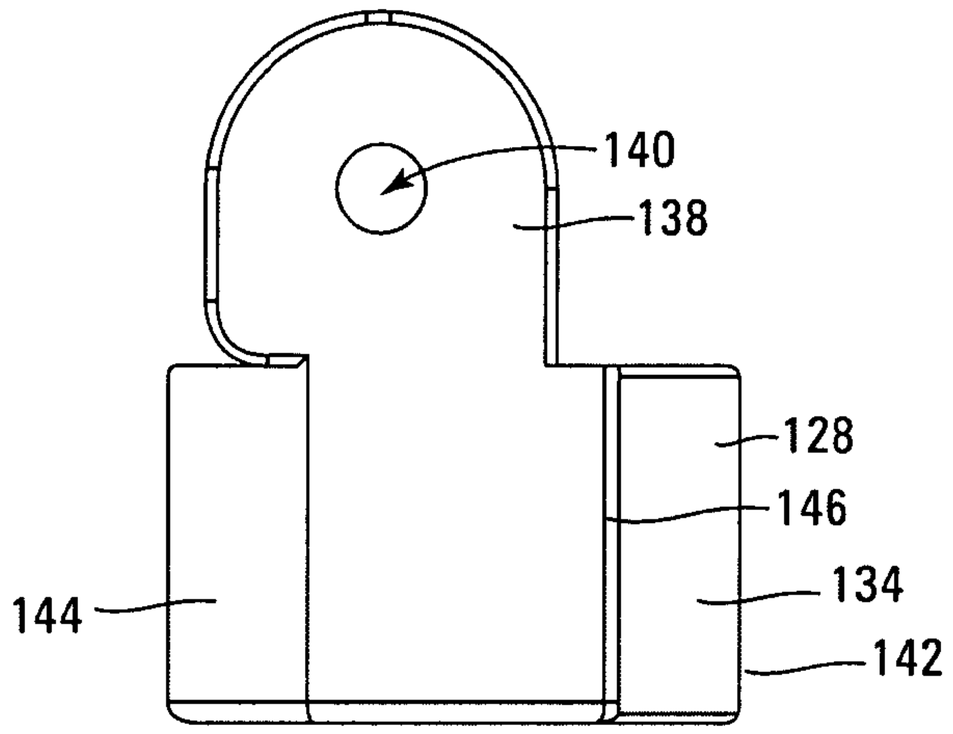

Fig. 21

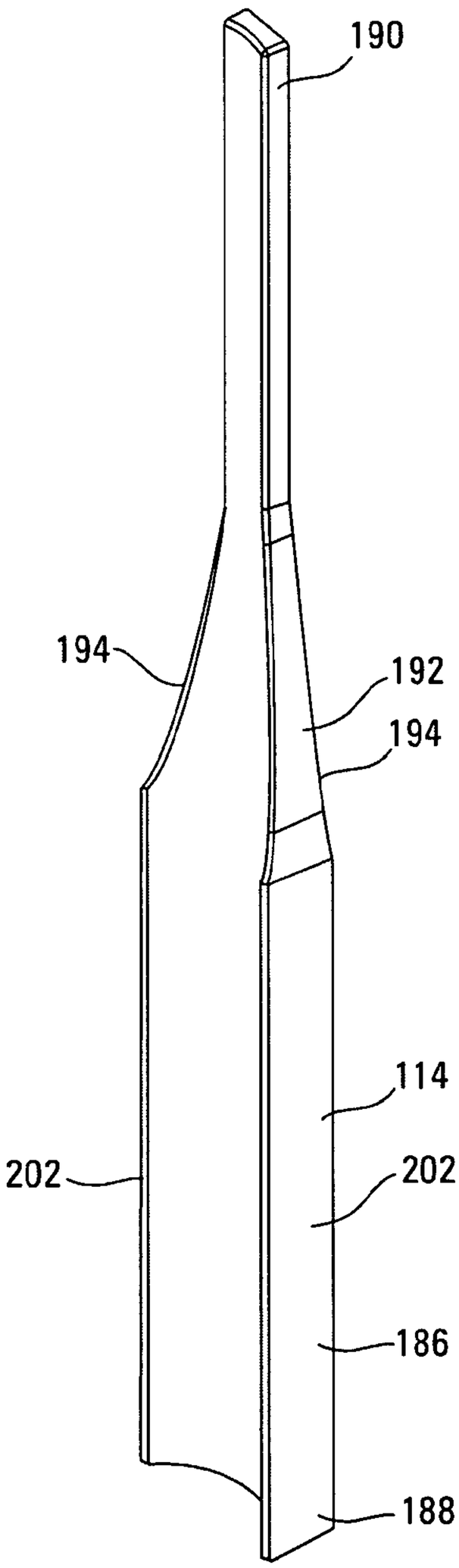

Fig. 22

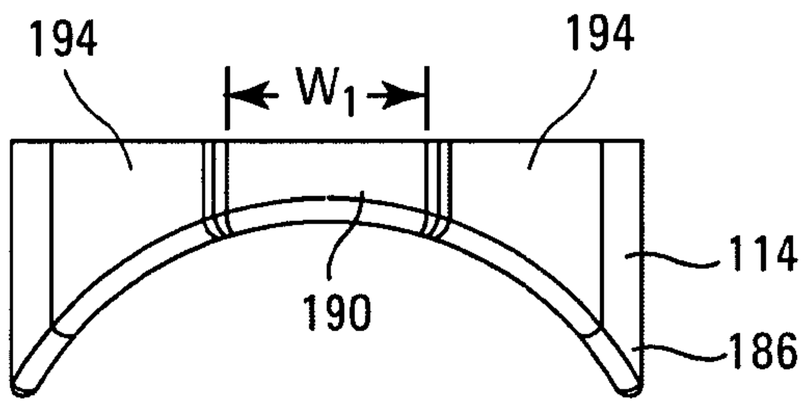

Fig. 23

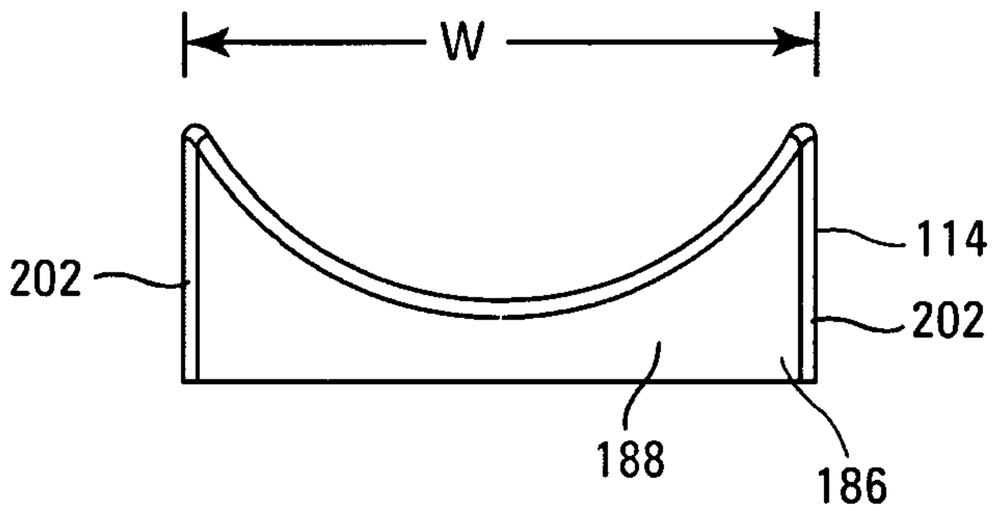

Fig. 24

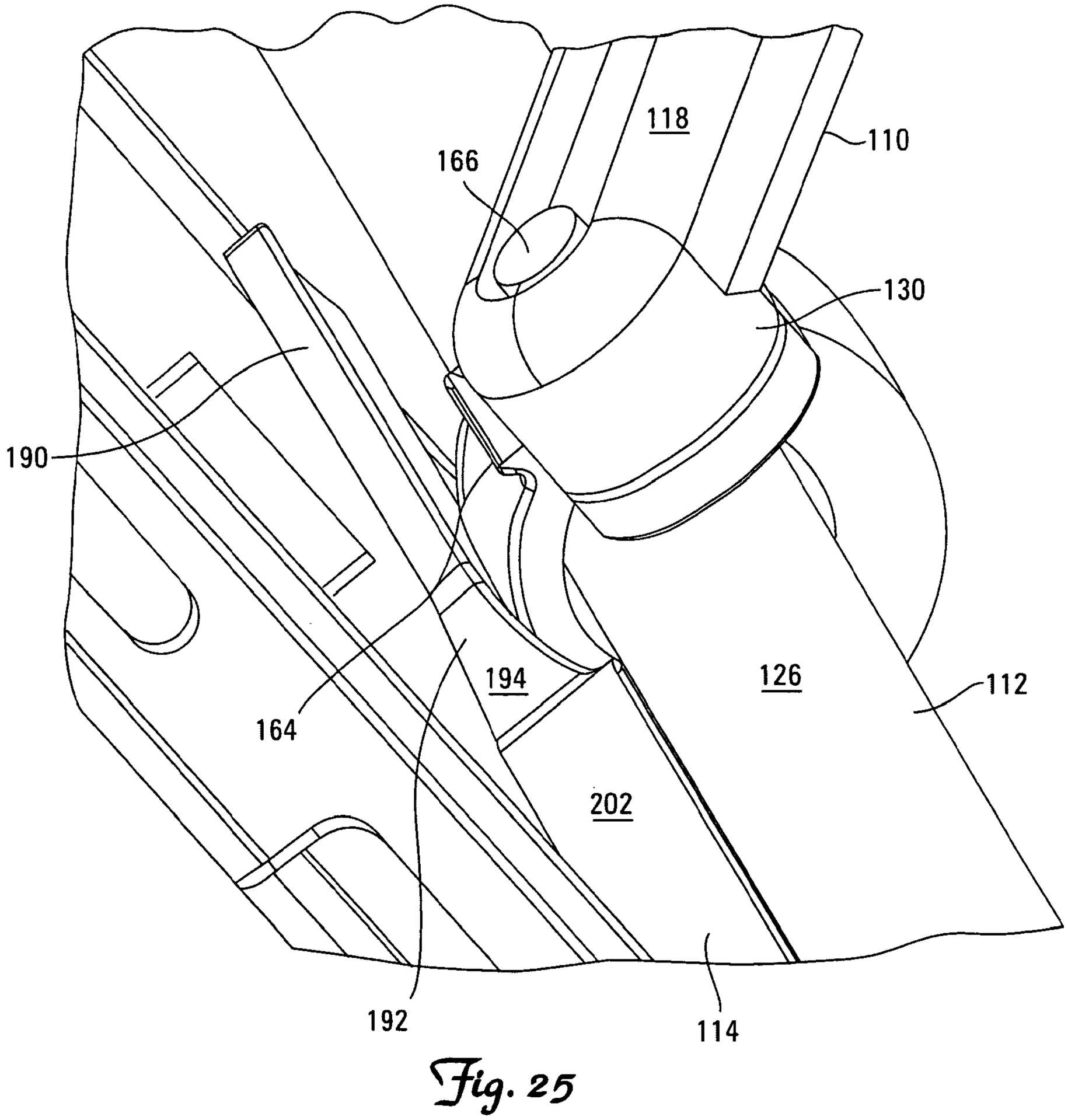

Fig. 25

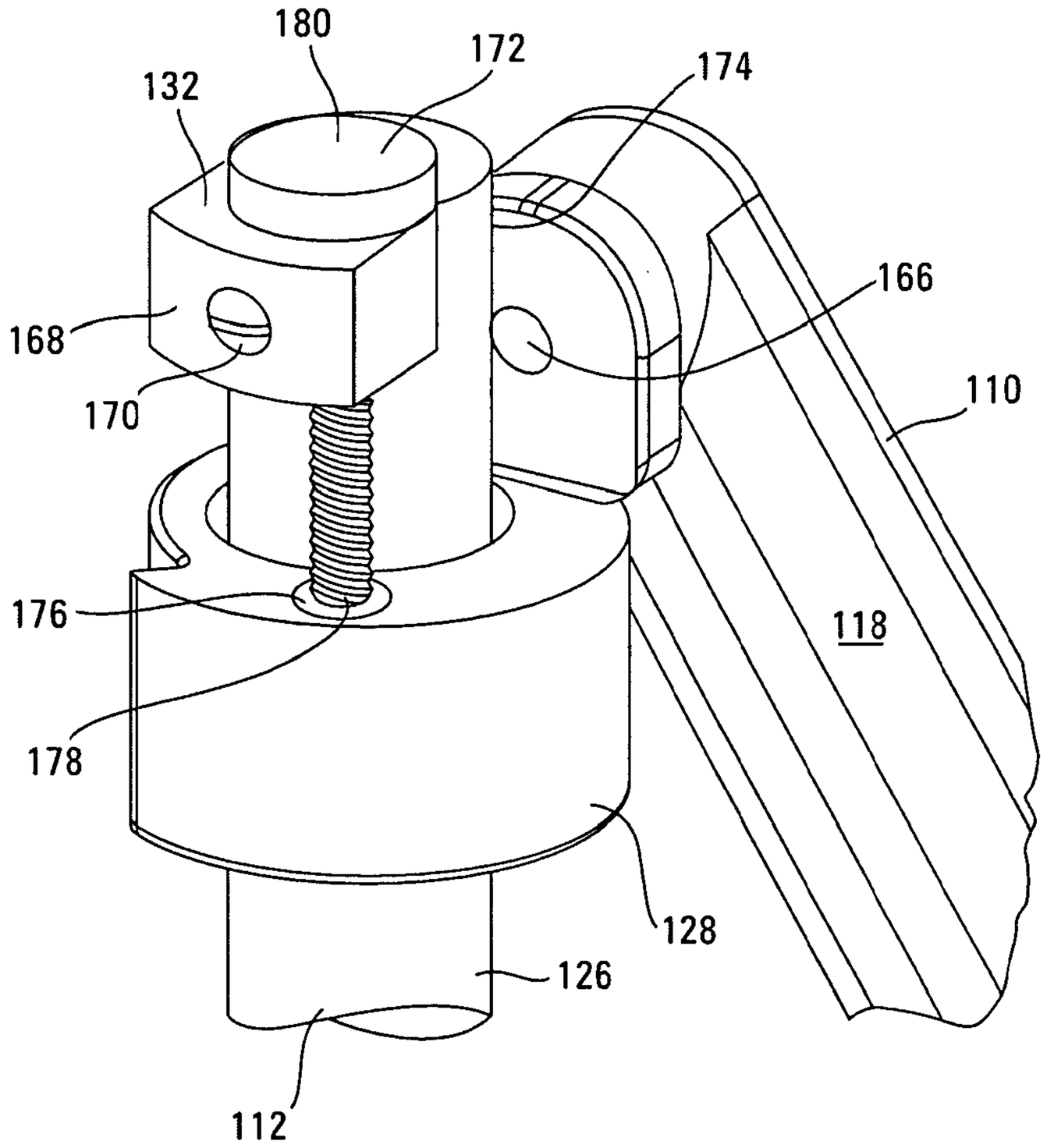

Fig. 26

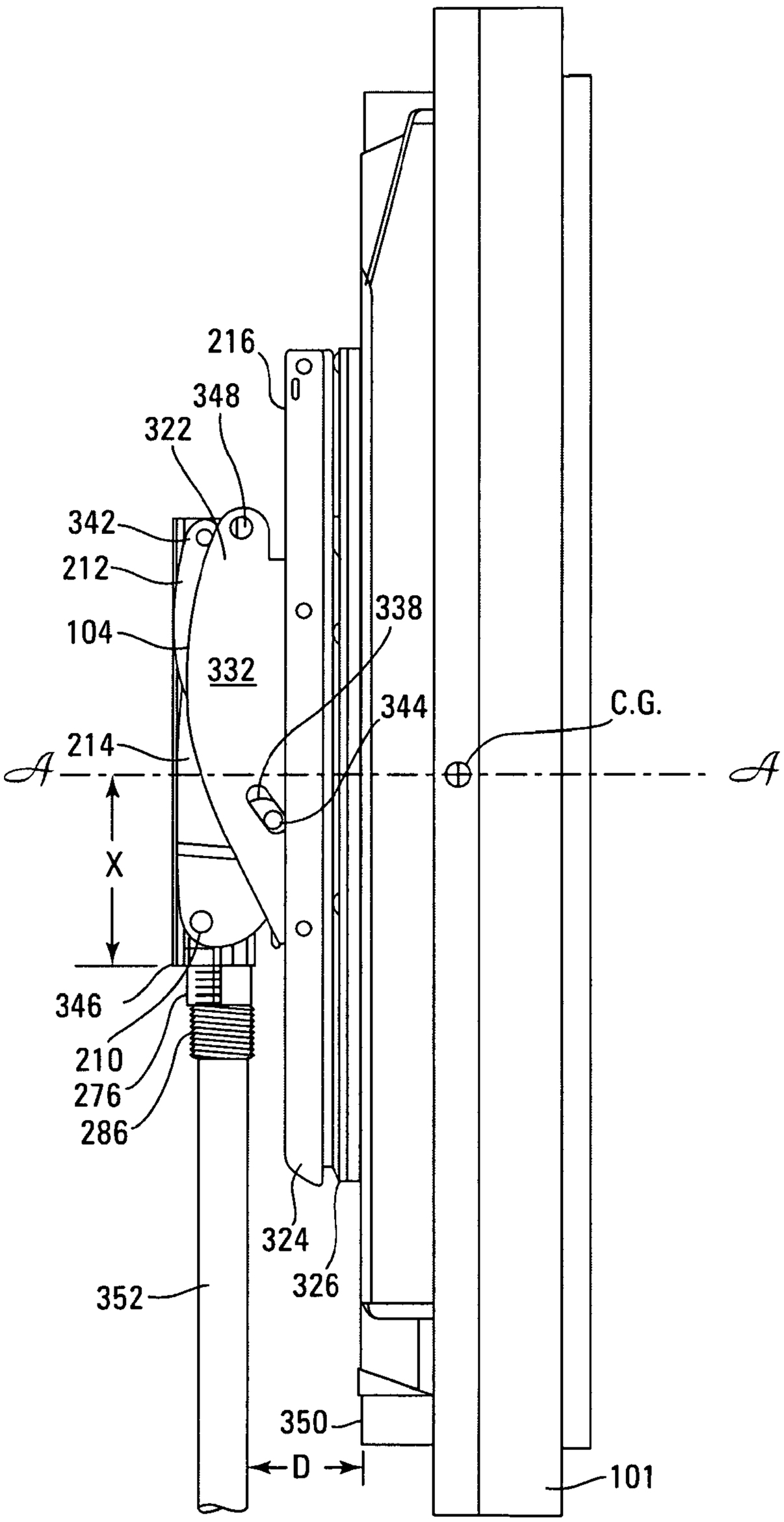
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Fig. 27

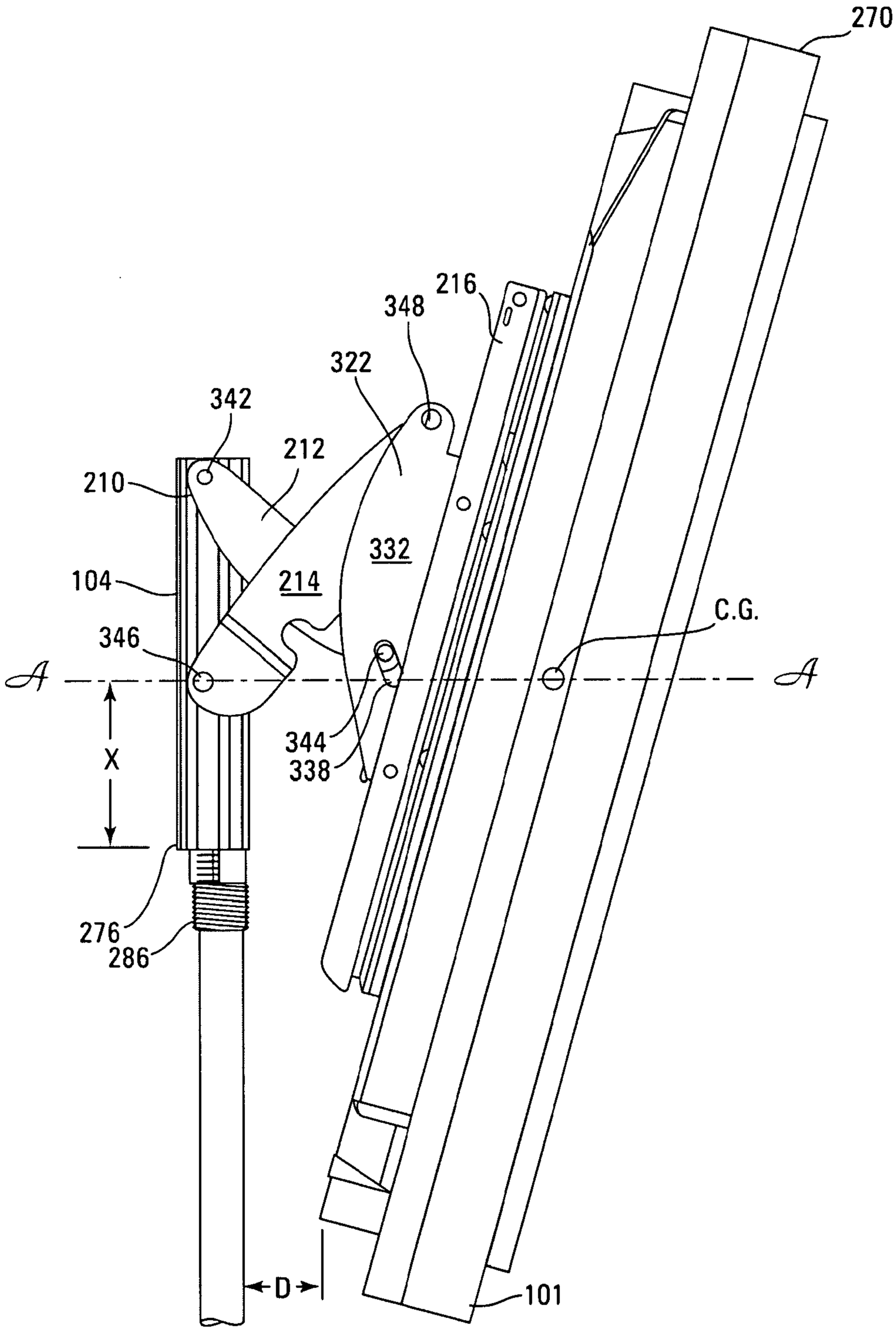
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Fig. 28

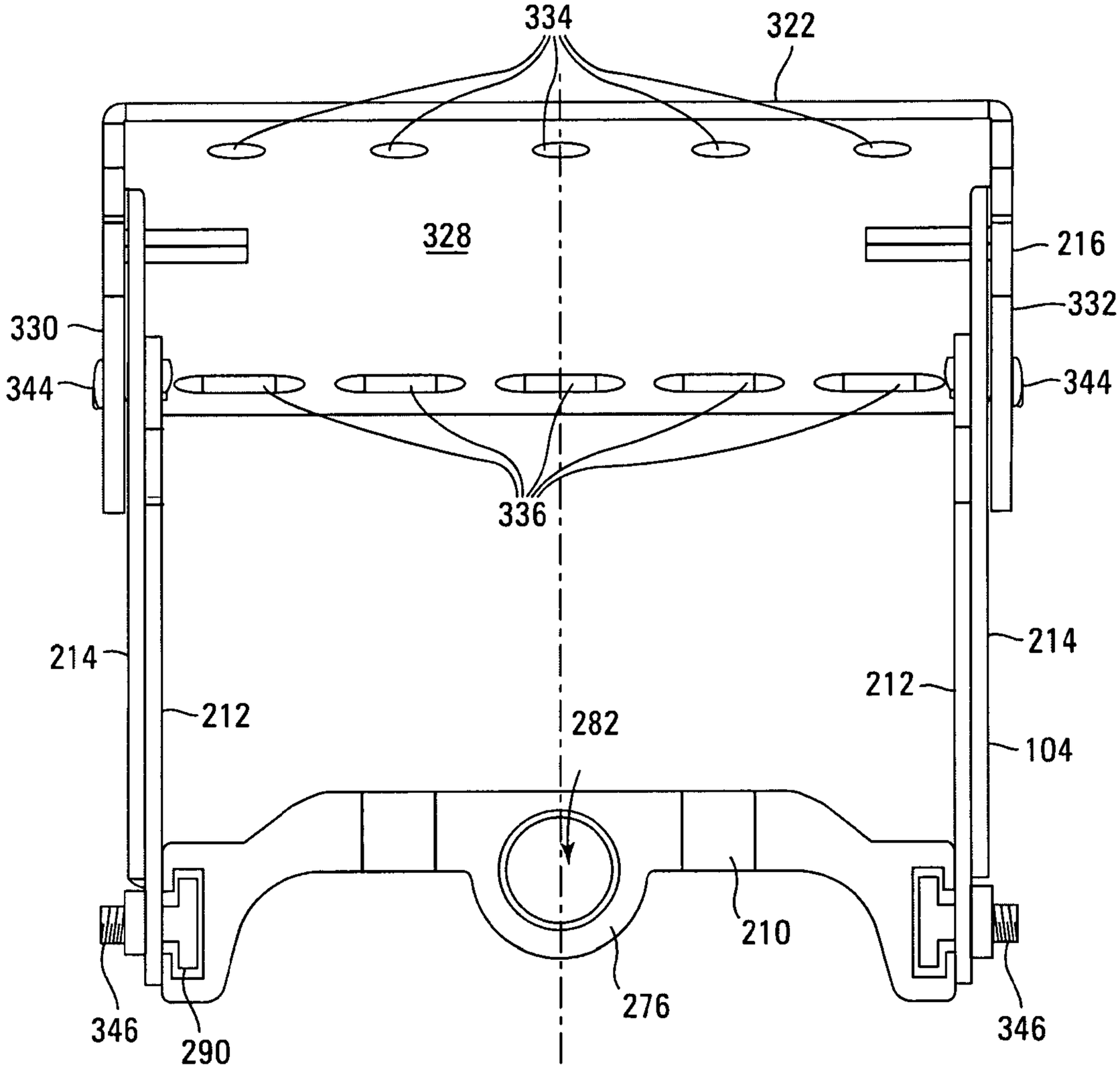
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Fig. 29

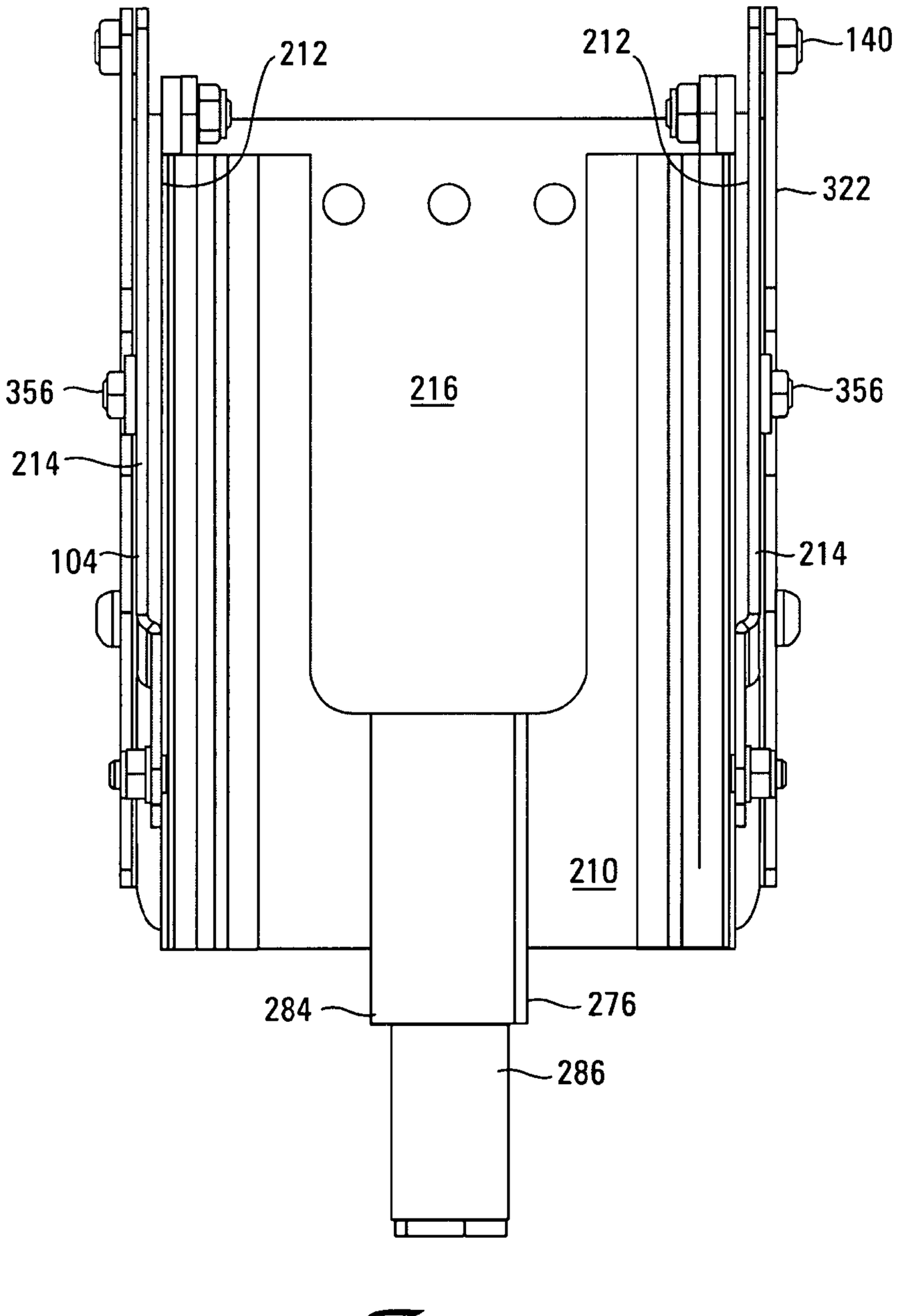

Fig. 30

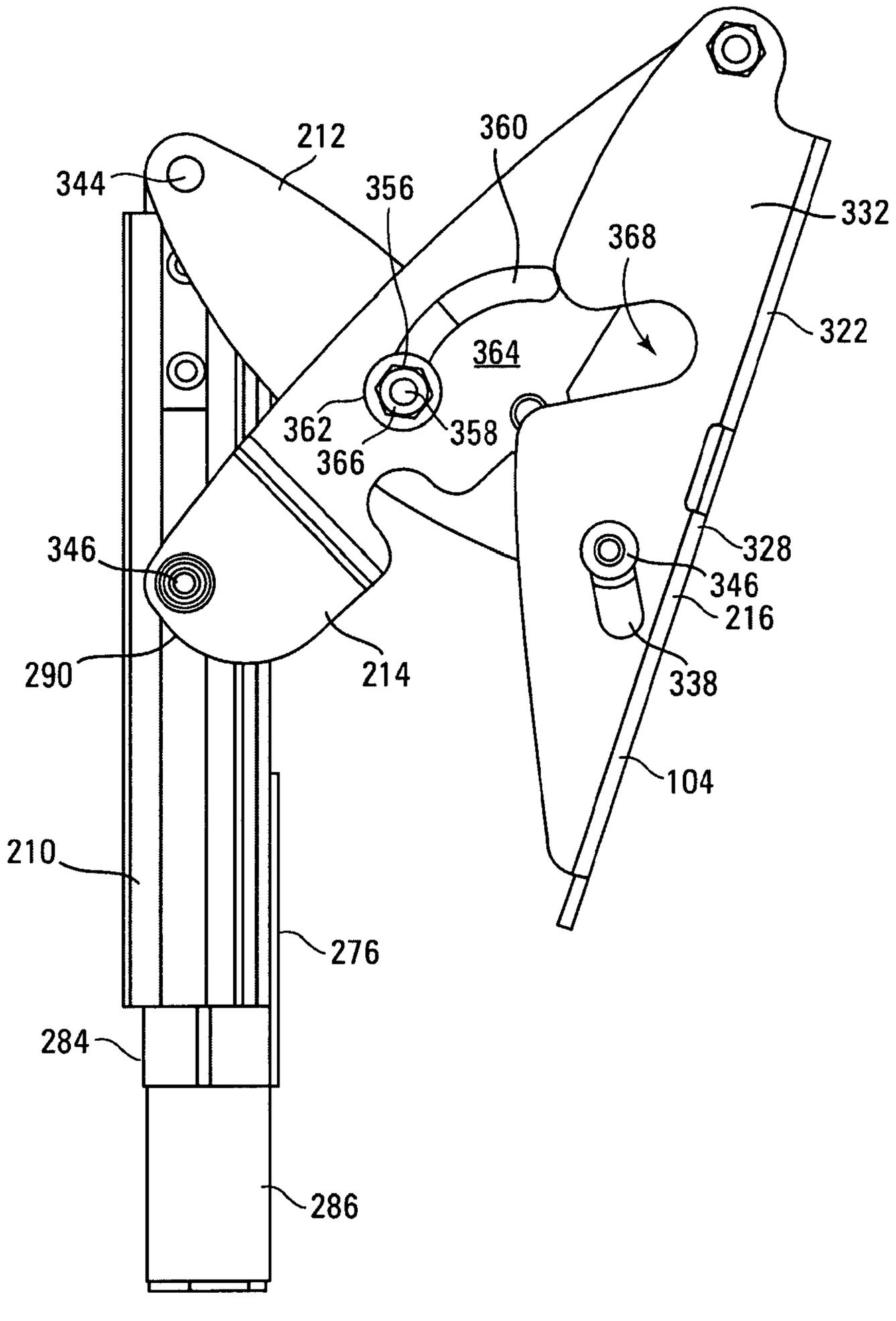
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Fig. 31

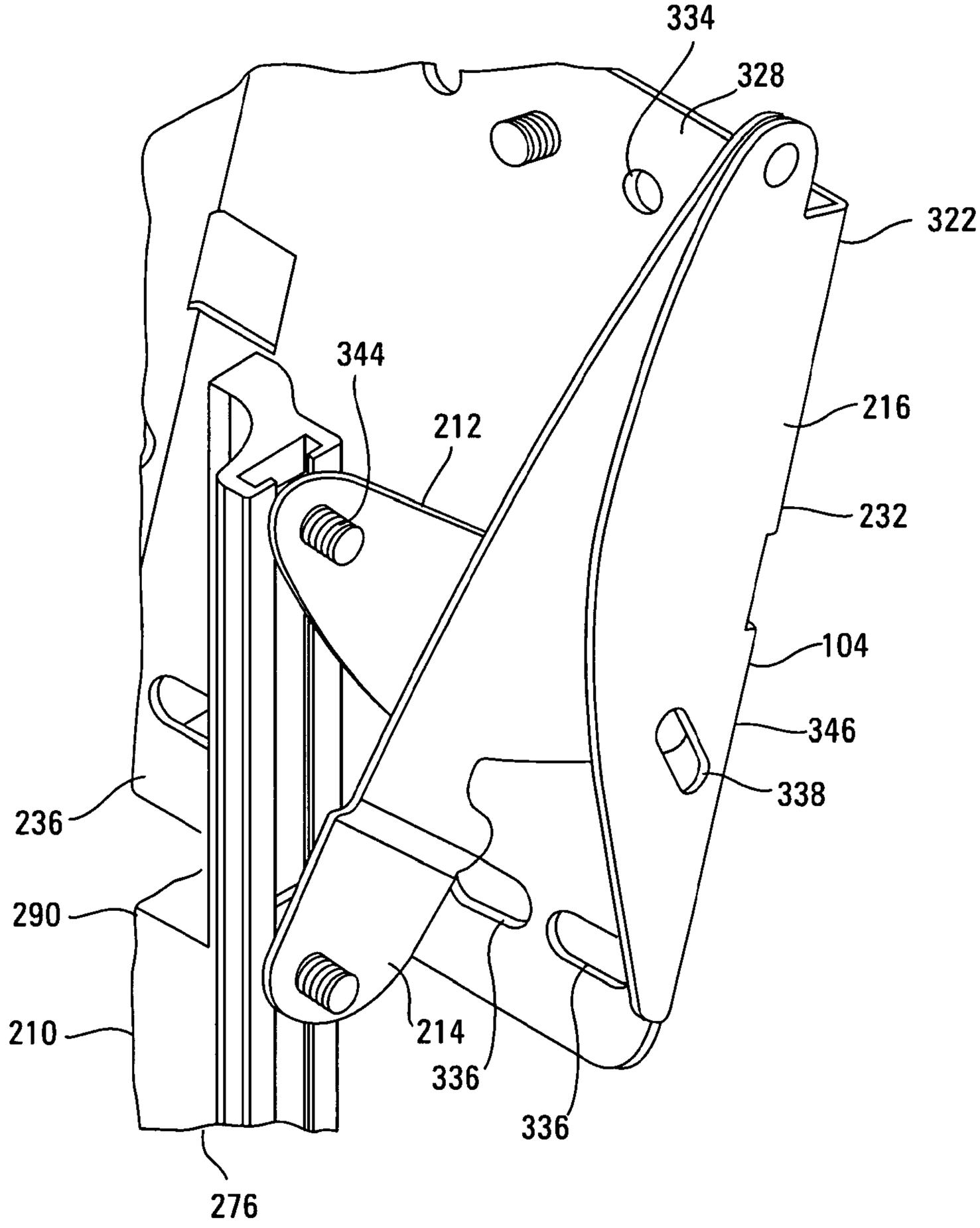
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Fig. 32

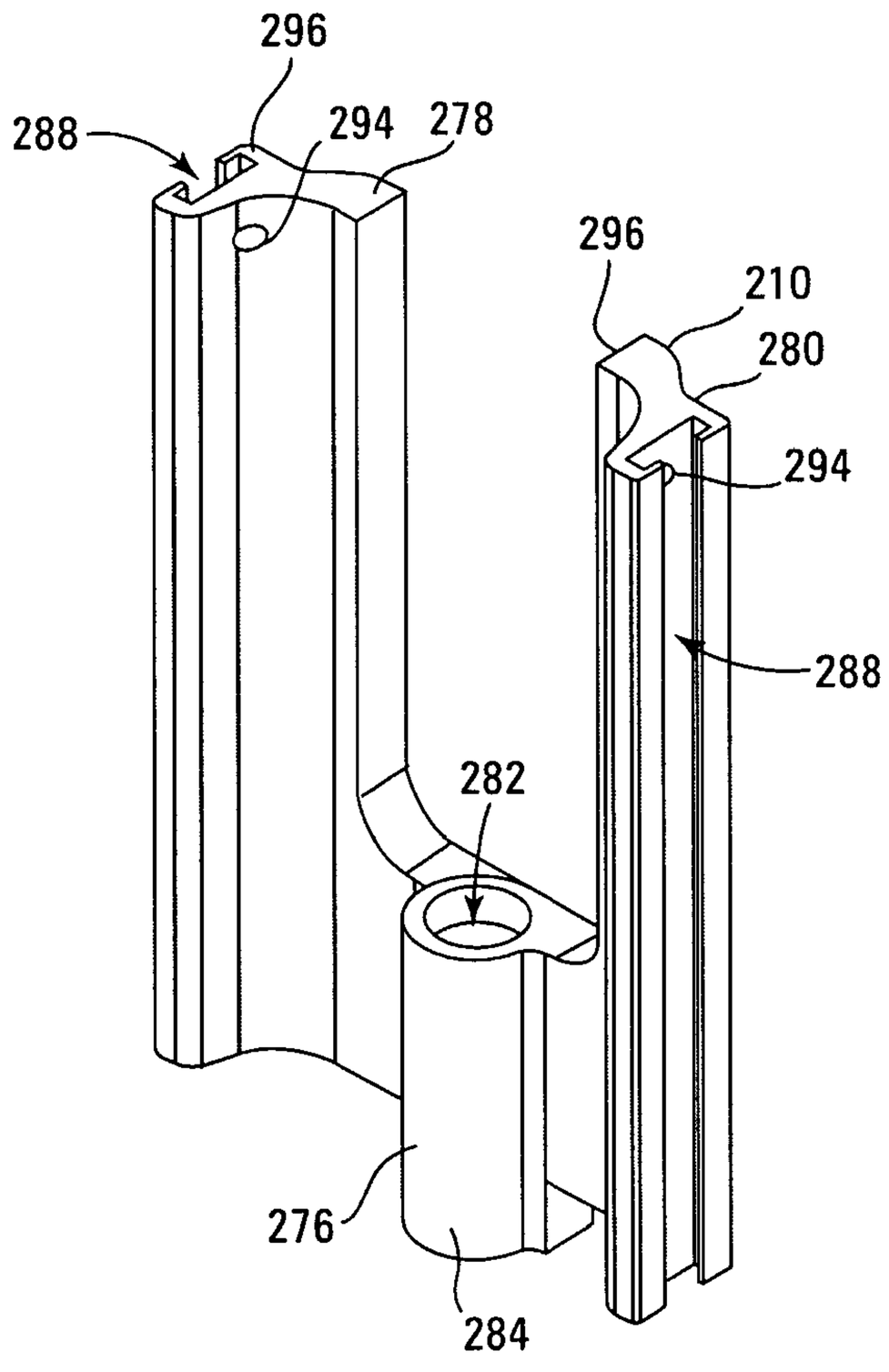

Fig. 33

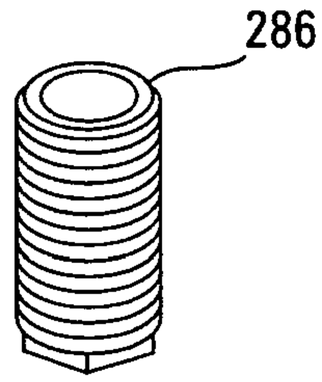

Fig. 34

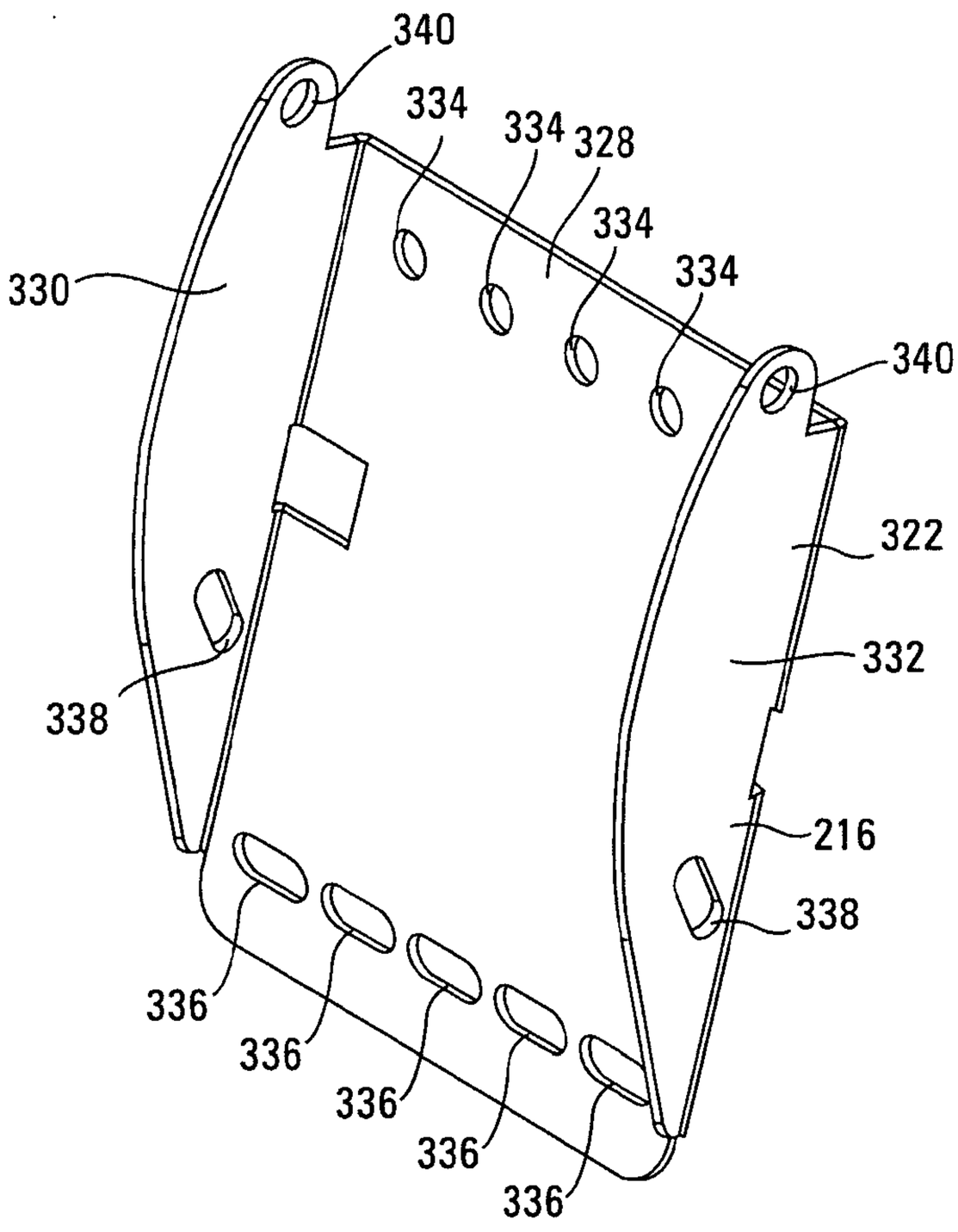
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Fig. 35

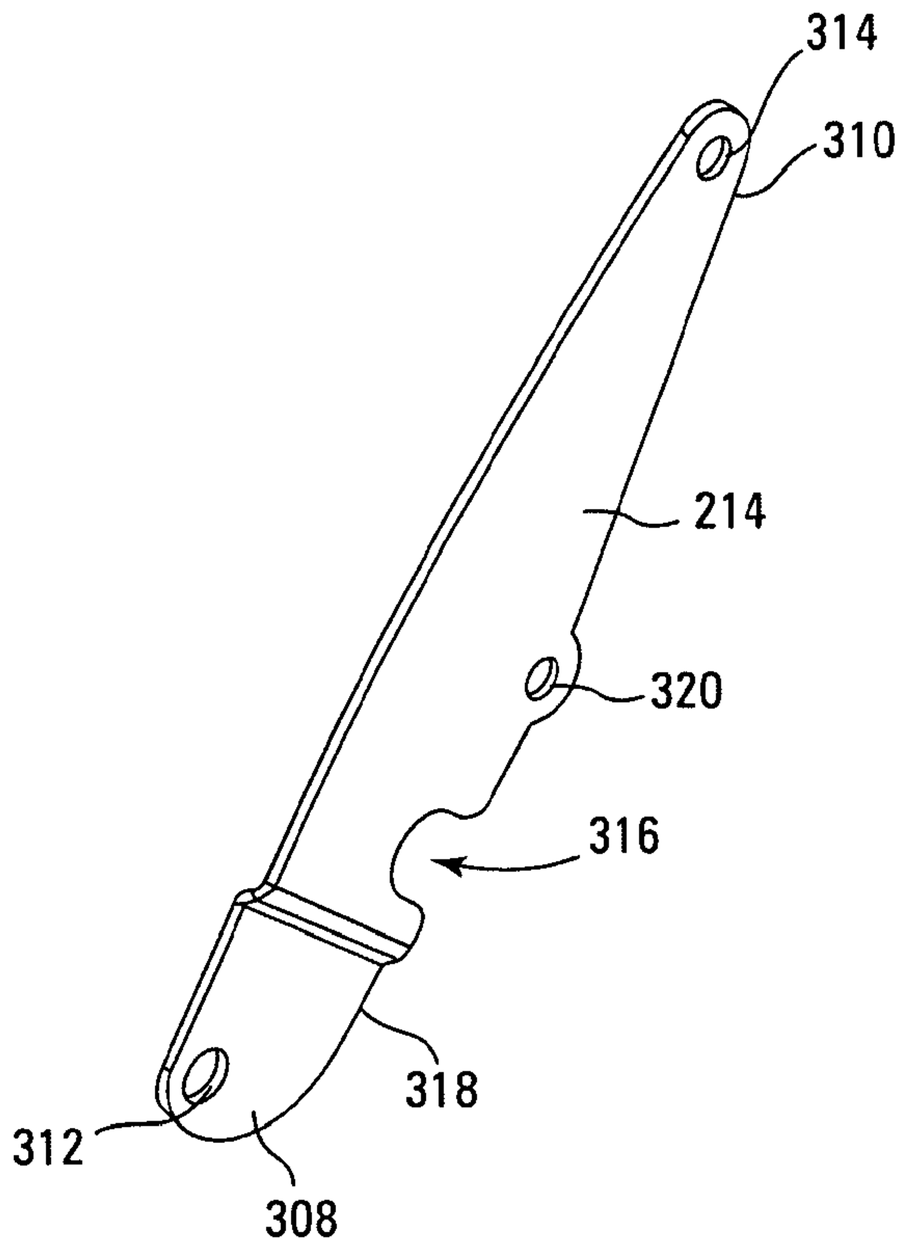


Fig. 36

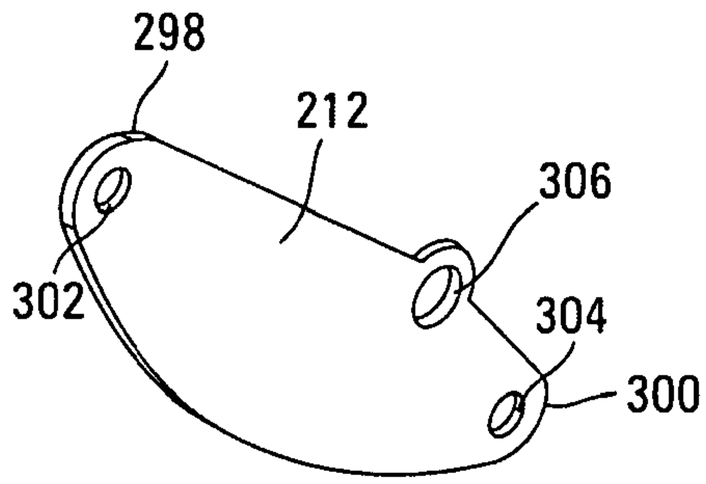


Fig. 37

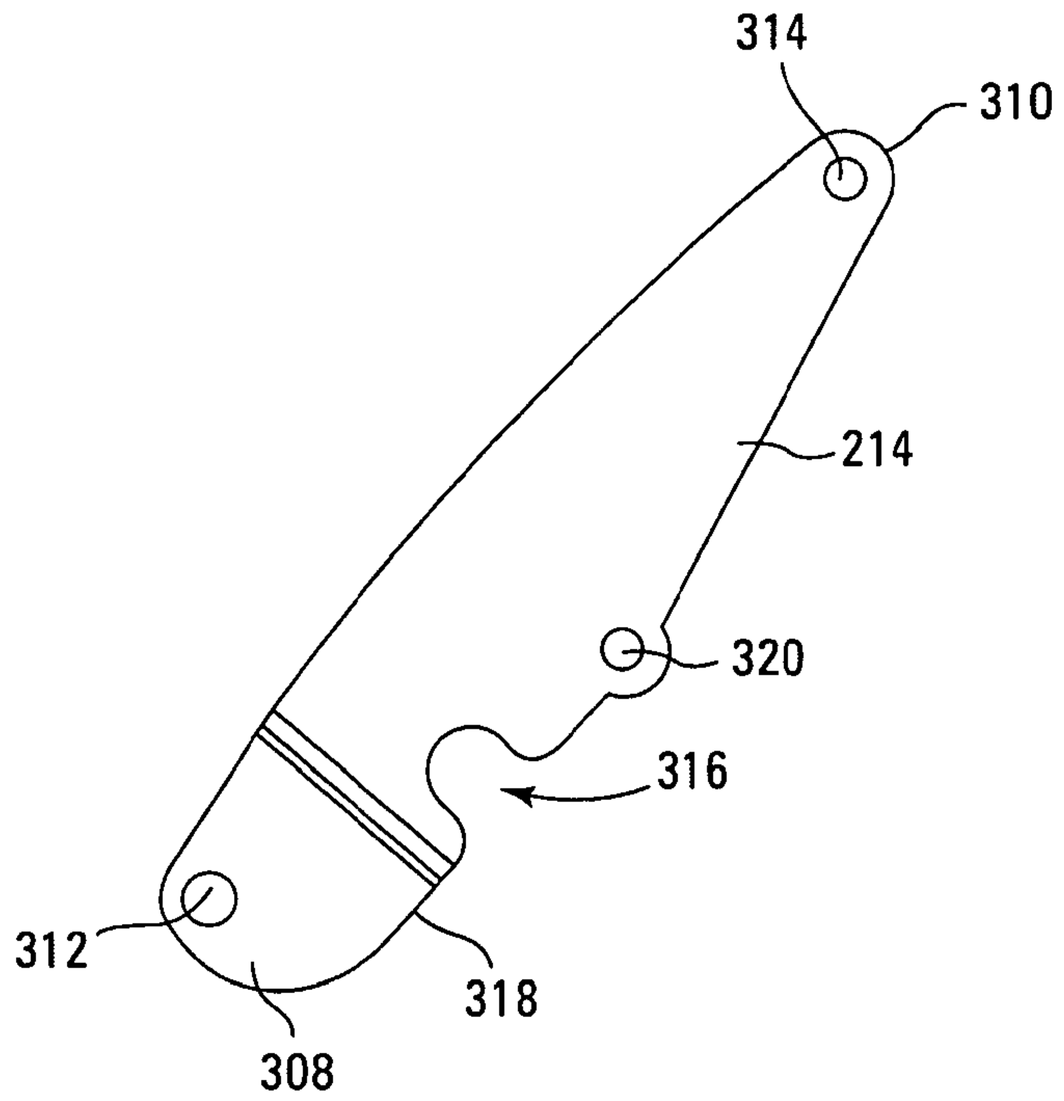


Fig. 38

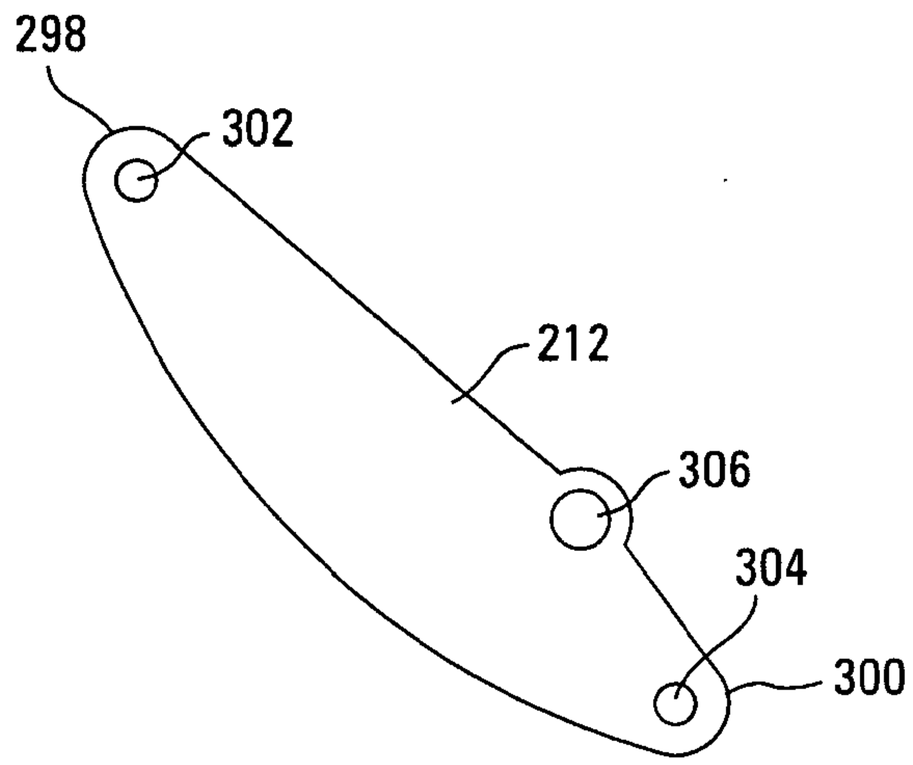


Fig. 39

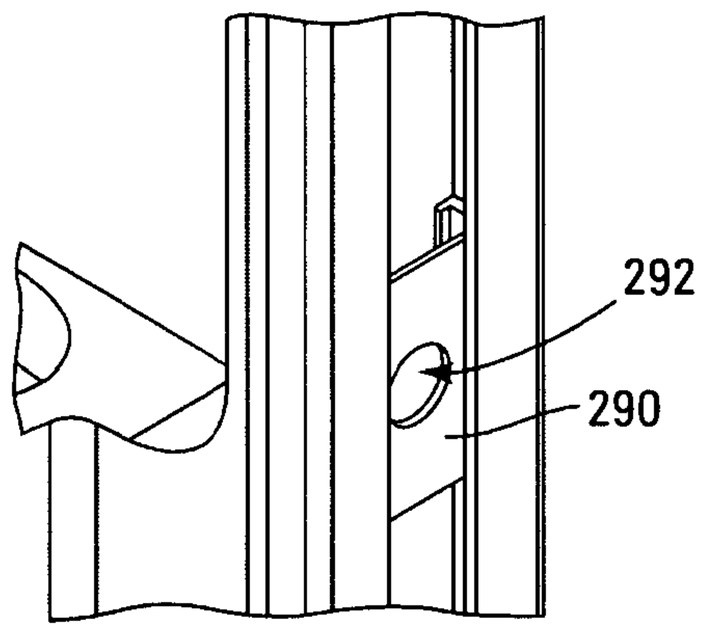


Fig. 40

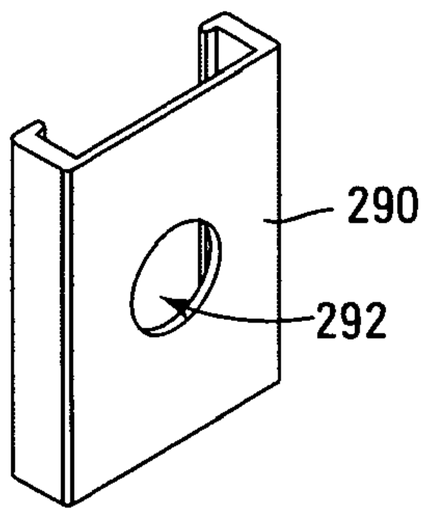


Fig. 41

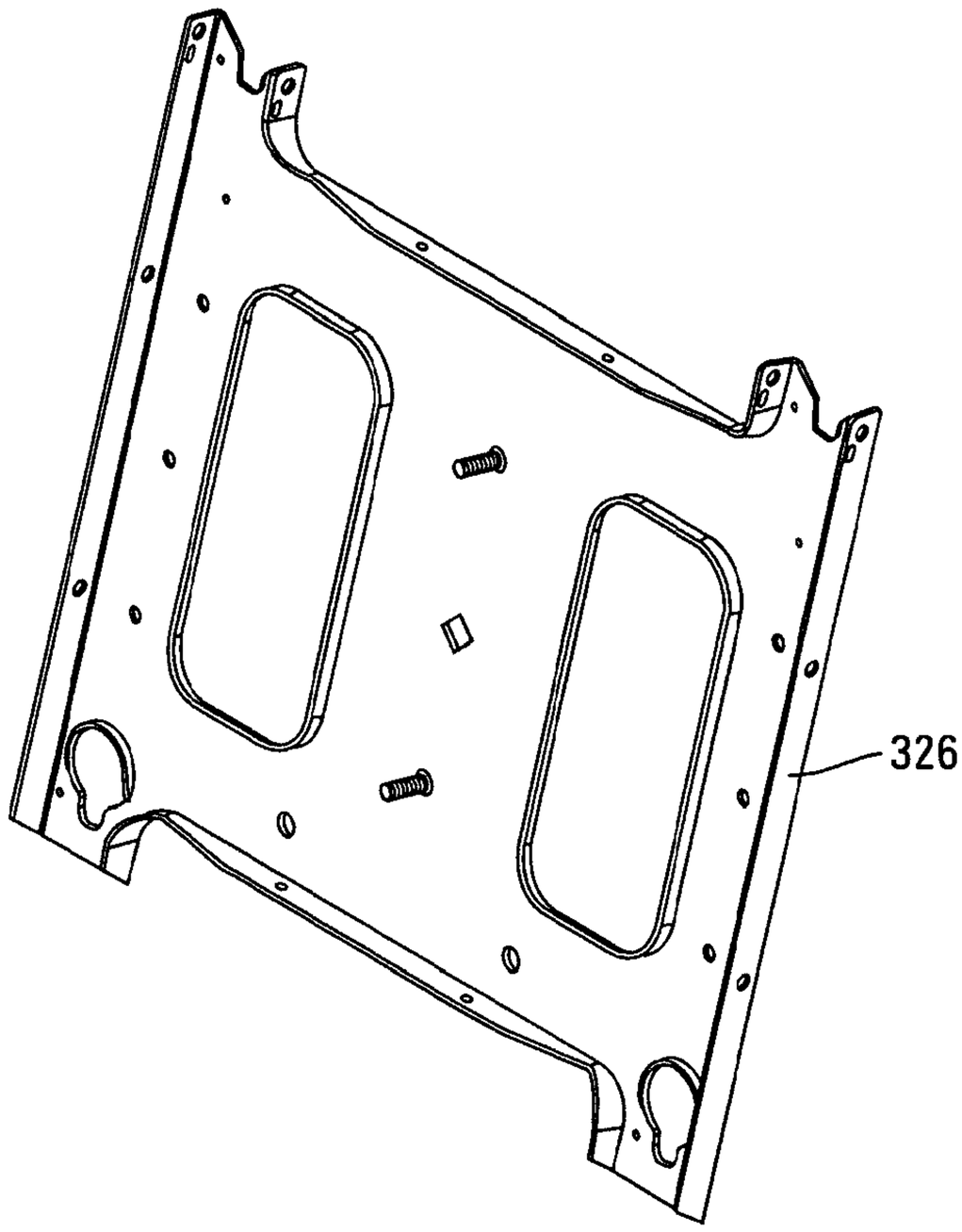


Fig. 42

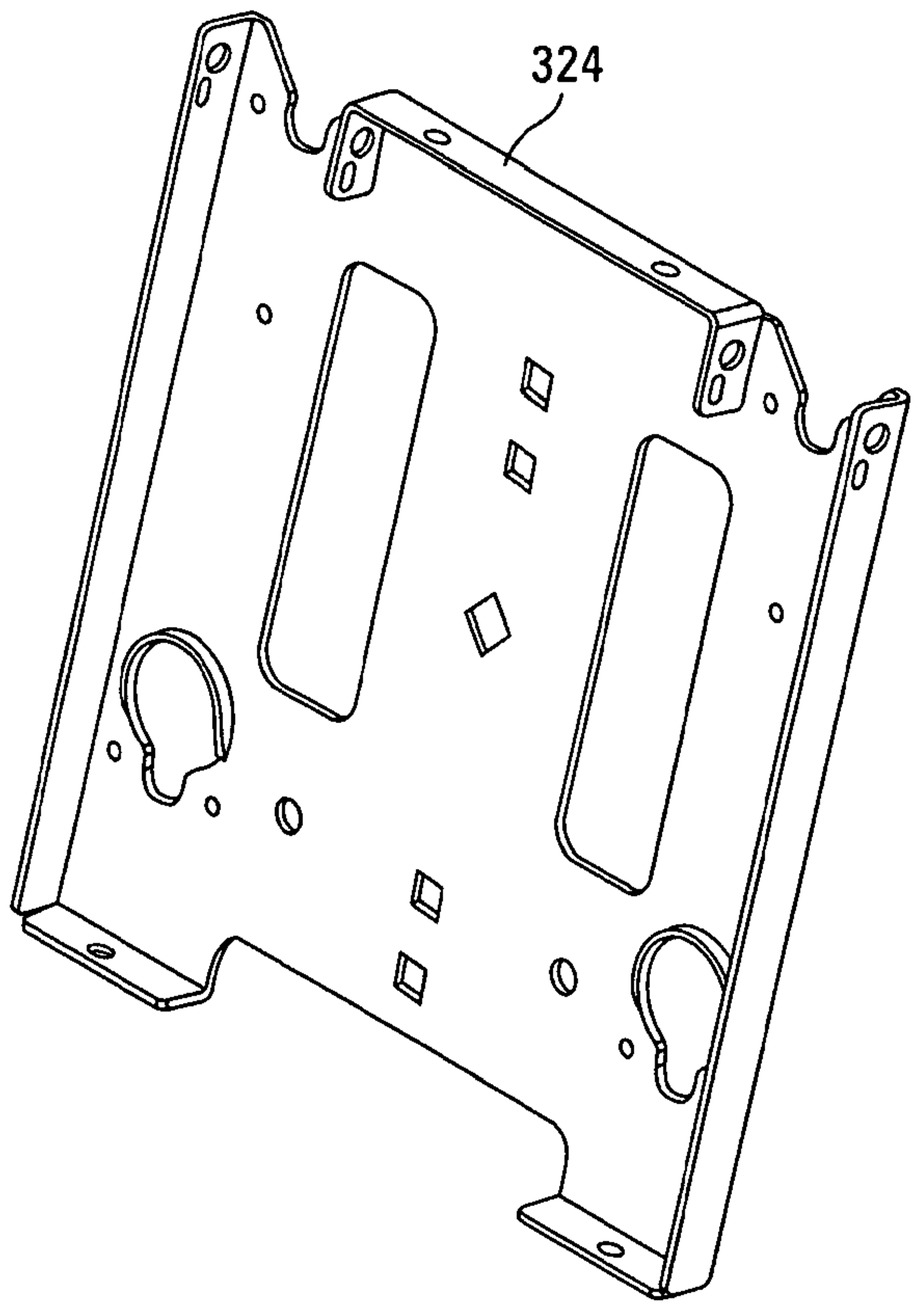


Fig. 43

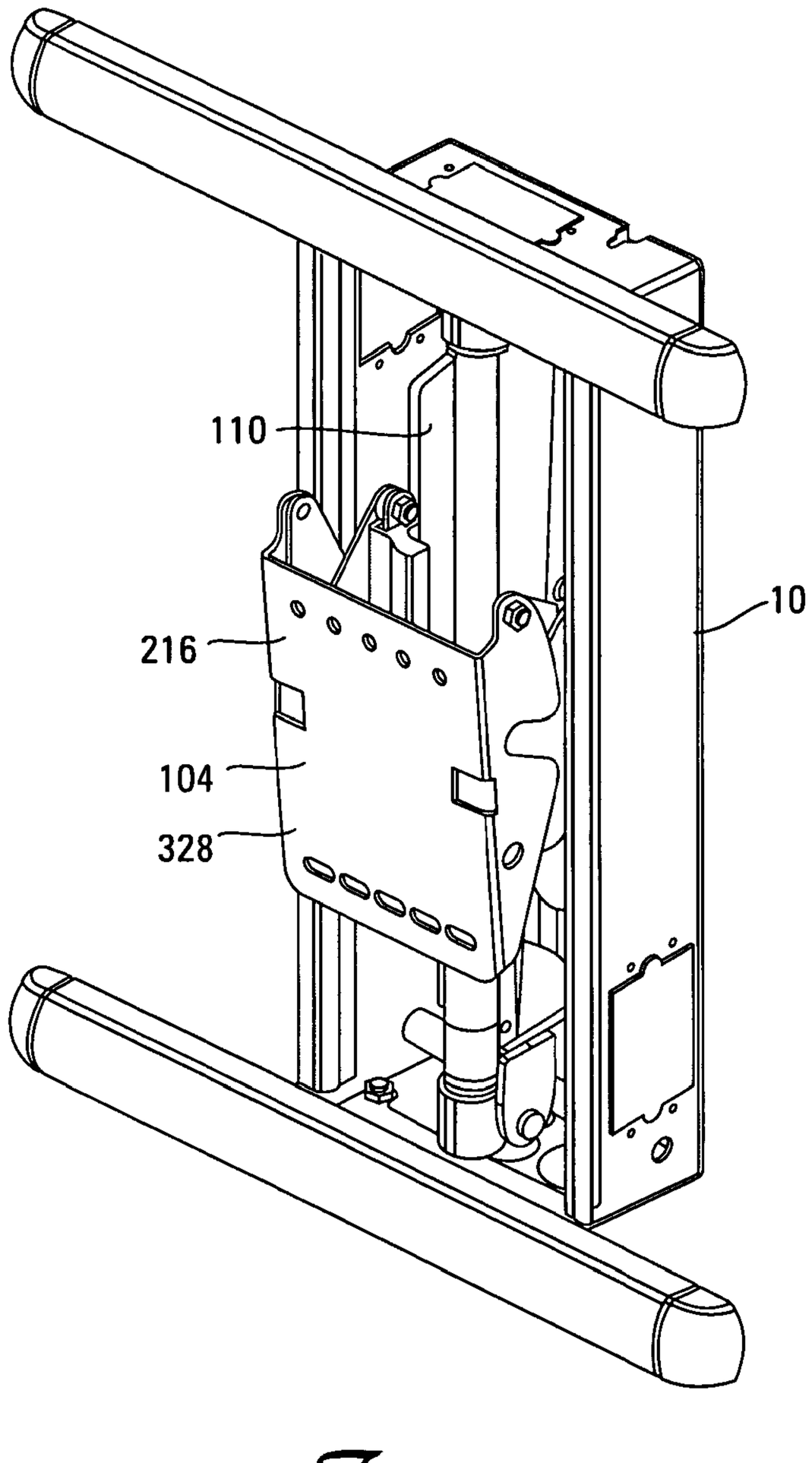
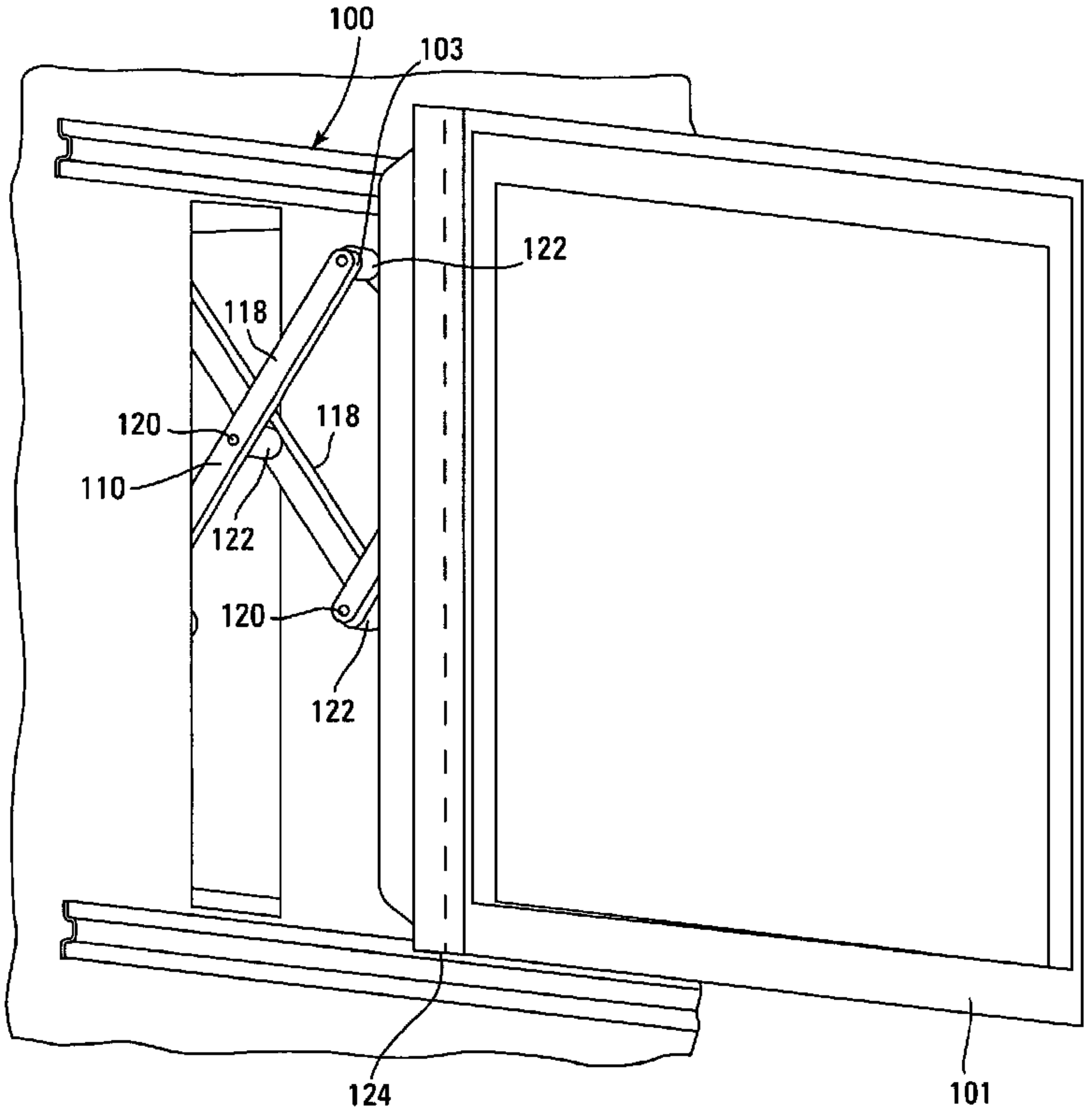


Fig. 44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