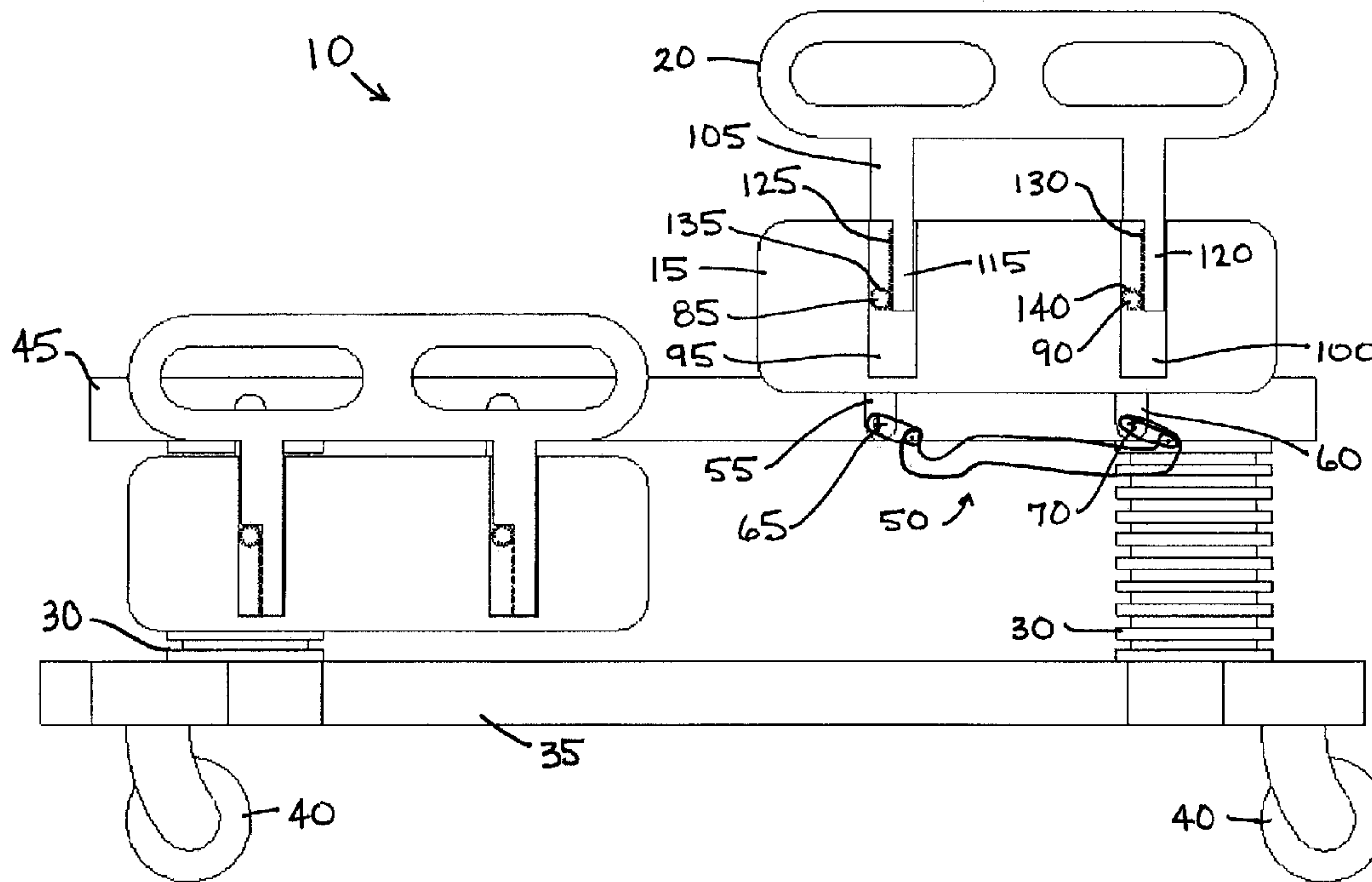




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(57) Abrégé/Abstract:

A bed siderail has a vertical siderail extension, a horizontal siderail extension, or both. A bed siderail has dual vertical siderail extensions. A bed has gap fillers pivotally mounted to the headboard and/or footboard, either in the manner of a hinge, or by means of a dual axis pivot, to fill gaps between the headboard/footboard and a siderail. A bed siderail has pivotally mounted gap fillers directed toward the headboard, footboard, or an adjacent siderail. A bed has slidably mounted gap fillers. A bed siderail has pivotally mounted gap fillers, to fill a gap between the siderail and a mattress, the gap fillers being either gravity- or cam-activated, or being integrally formed in the siderail support arms. A bed siderail is rotatable from a deployed to a stowed position, and is simultaneously stowed close-into or underneath the bed frame.

## ABSTRACT OF THE DISCLOSURE

A bed siderail has a vertical siderail extension, a horizontal siderail extension, or both. A bed siderail has dual vertical siderail extensions. A bed has gap fillers pivotally mounted to the headboard and/or footboard, either in the manner of a hinge, or by means of a dual axis pivot, to fill gaps between the headboard/footboard and a siderail. A bed siderail has pivotally mounted gap fillers directed toward the headboard, footboard, or an adjacent siderail. A bed has slidably mounted gap fillers. A bed siderail has pivotally mounted gap fillers, to fill a gap between the siderail and a mattress, the gap fillers being either gravity- or cam-activated, or being integrally formed in the siderail support arms. A bed siderail is rotatable from a deployed to a stowed position, and is simultaneously stowed close-into or underneath the bed frame.

BED SIDERAIL

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH

[0002] Not applicable.

BACKGROUND OF THE INVENTION

Field of the Invention

[0003] The invention relates to a bed siderail. In one of its aspects, the invention relates to a bed siderail with vertical and/or horizontal extensions or gap fillers. In another aspect, the invention relates to a siderail retractable underneath a bed support frame. In another of its aspects, the invention relates to a siderail deployed to a position closely abutting a bed mattress.

Description of Related Art

[0004] Hospital beds are provided siderails to prevent a patient from falling out. Additional safeguards are sometimes desirable, providing siderails with greater coverage of the bedside, thereby reducing gaps between the siderails or the siderails and the headboard or footboard.

[0005] It would be advantageous to provide a siderail or bed and siderail assembly that reduces gaps, and increases safety.

BRIEF SUMMARY OF THE INVENTION

[0006] A bed siderail has a vertical siderail extension, a horizontal siderail extension, or both. A bed siderail has dual vertical siderail extensions. A bed has gap fillers pivotally mounted to the headboard

and/or footboard, either in the manner of a hinge, or by means of a dual axis pivot, to fill gaps between the headboard/footboard and a siderail. A bed siderail has pivotally mounted gap fillers directed toward the headboard, footboard, or an adjacent siderail. A bed has slidably mounted gap fillers. A bed siderail has pivotally mounted gap fillers, to fill a gap between the siderail and a mattress, the gap fillers being either gravity- or cam-activated, or being integrally formed in the siderail support arms. A bed siderail is rotatable from a deployed to a stowed position, and is simultaneously stowed close-into or underneath the bed frame.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0007] The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

[0008] Figure 1 is a side view of a bed with a vertically expanding siderail according to the invention.

[0009] Figure 2 is a partial cut-away side view of the vertically expanding siderail of Figure 1 in the deployed, use position.

[0010] Figure 3 is a partial cut-away side view of the vertically expanding siderail of Figures 1-2 in a partially stowed position.

[0011] Figure 4 is a partial cut-away side view of the vertically expanding siderail of Figures 1-3 in a stowed position.

[0012] Figure 5 is a side view of a bed with a horizontally expanding siderail according to a further embodiment of the invention.

[0013] Figure 6 is a partial cut-away side view of the horizontally expanding siderail of Figure 5 in an upright, use position.

**[0014]** Figure 7 is a partial cut-away side view of the horizontally expanding siderail of Figures 5-6 in a partially stowed position.

**[0015]** Figure 8 is a partial cut-away side view of the horizontally expanding siderail of Figures 5-7 in a stowed position.

**[0016]** Figure 9 is a side view of a bed with a vertical and horizontal expanding siderail according to a further embodiment of the invention.

**[0017]** Figure 10 is a partial cut-away side view of the vertically and horizontally expanding siderail of Figure 9 in a deployed, use position.

**[0018]** Figure 11 is a partial cut-away side view of the vertically and horizontally expanding siderail of Figures 9-10 in a partially stowed position.

**[0019]** Figure 12 is a partial cut-away side view of the vertically and horizontally expanding siderail of Figures 9-11 in a stowed position.

**[0020]** Figure 13 is a side view of a bed with a compound vertically expanding siderail according to a further embodiment of the invention.

**[0021]** Figure 14 is a partial cut-away side view of the compound vertically expanding siderail of Figure 13 in a deployed, use position.

**[0022]** Figure 15 is a partial cut-away side view of the compound vertically expanding siderail of Figures 13-14 in a partially stowed position.

**[0023]** Figure 16 is a partial cut-away side view of the compound vertically expanding siderail of Figures 13-15 in a stowed position.

**[0024]** Figure 17 is a perspective view of a bed with headboard- and footboard-mounted gap fillers according to a further embodiment of the invention.

**[0025]** Figure 18 is a perspective view according to Figure 17 with the gap fillers in a stowed position.

**[0026]** Figure 19 is a perspective view of a bed with gap filler pivotally attached to a footboard according to a further embodiment of the invention.

**[0027]** Figure 20 is a plan view of the bed with gap filler pivotally attached to the footboard of Figure 19.

**[0028]** Figure 21 is an enlarged perspective view of a pivot mechanism according to Figures 19-20.

**[0029]** Figure 22 is a perspective view of a bed according to Figures 19-21 with the gap fillers in a partially stowed position.

**[0030]** Figure 23 is a plan view according to Figure 22.

**[0031]** Figure 24 is a perspective view of the bed with gap fillers pivotally attached to the footboard according to Figures 19-23 with the gap fillers in the stowed position.

**[0032]** Figure 25 is a plan view according to Figure 24.

**[0033]** Figure 26 is a perspective view of a bed with gap filler pivotally mounted to the footboard according to a further embodiment of the invention.

**[0034]** Figure 27 is a plan view according to Figure 26.

**[0035]** Figure 28 is an enlarged detail view of the pivot mechanism according to Figures 26-27.

**[0036]** Figure 29 is a perspective view of a bed with gap fillers pivotally attached to the footboard according to Figures 26-28 with the gap fillers in a partially stowed position.

**[0037]** Figure 30 is a plan view according to Figure 29.

**[0038]** Figure 31 is a perspective view of a bed with gap fillers pivotally attached to the footboard according to Figures 26-30 with the footboards in the stowed position.

**[0039]** Figure 32 is a plan view according to Figure 31.

**[0040]** Figure 33 is a perspective view of a bed with siderail-mounted gap fillers according to a further embodiment of the invention.

**[0041]** Figure 34 is a perspective view according to Figure 33 with the gap fillers open.

**[0042]** Figure 35 is a perspective view of a bed with centrally positioned gap fillers pivotally mounted to the bed siderails according to a further embodiment of the invention.

**[0043]** Figure 36 is a perspective view of a bed according to Figure 35 with the gap fillers rotated to an open position.

**[0044]** Figure 37 is a perspective view of a bed according to Figures 33-36 with end and center gap fillers pivotally attached to the bed siderails.

**[0045]** Figure 38 is a perspective view of a bed according to Figure 37 with the gap fillers rotated to an open position.

**[0046]** Figure 39 is a perspective view of a bed with a continuous, window-shade style siderail according to a further embodiment of the invention.

**[0047]** Figure 40 is a perspective view of a bed according to Figure 39 with the siderail in the retracted position.

**[0048]** Figure 41 is a perspective view of a bed with horizontally-extending window-shade style siderails according to a further embodiment of the invention.

**[0049]** Figure 42 is a perspective view of a bed according to Figure 41 with the siderails in the retracted position.

**[0050]** Figure 43 is a perspective view of a bed and bed extension with frame-mounted gap filler according to a further embodiment of the invention.

**[0051]** Figure 44 is a perspective view according to Figure 43 with the gap filler in a horizontally extended position.

**[0052]** Figure 45 is a perspective view of the bed according to Figures 43-44 with the gap fillers in the vertically extended position.

**[0053]** Figure 46 is an enlarged perspective view of a gap filler according to Figures 43-45 in the stowed position.

**[0054]** Figure 47 is an enlarged perspective view of the gap filler according to Figures 43-46 in the horizontally extended position.

**[0055]** Figure 48 is an enlarged perspective view of the gap filler according to Figures 43-47 with the gap filler in the vertically extended position.

**[0056]** Figure 49 is an enlarged detail view of a vertical locking mechanism of the gap filler according to Figures 43-48.

**[0057]** Figure 50 is a side view of a bed with siderail and vertically acting gap filler according to a further embodiment of the invention.

**[0058]** Figure 51 is a side view of a bed with siderail according to Figure 50 with the siderail in the stowed position.

**[0059]** Figure 52 is a side view of a bed with pivoting siderail and cam-activated gap filler according to a further embodiment of the invention.

**[0060]** Figure 53 is a side view of a siderail according to Figure 52 in the deployed, use position.

**[0061]** Figure 54 is a side view of the siderail of Figures 52-53 in a partially stowed position.

**[0062]** Figure 55 is a side view of the siderail of Figures 52-54 in the stowed position.



**[0063]** Figure 56 is a side view of a bed with siderail having integrally formed gap filler according to a further embodiment of the invention.

**[0064]** Figure 57 is a side view of a siderail according to Figure 56 in a deployed, use position.

**[0065]** Figure 58 is a side view of a siderail according to Figures 56-57 in a partially stowed position.

**[0066]** Figure 59 is a side view of a siderail according to Figures 56-58 in the stowed position.

**[0067]** Figure 60 is a perspective view of a bed having a pivotally extending, stowable siderail according to a further embodiment of the invention.

**[0068]** Figure 61 is a side view of the bed with siderail in the deployed, use position according to Figure 60.

**[0069]** Figure 62 is an end view of the bed with siderail according to Figures 60-61.

**[0070]** Figure 63 is a side view of the bed with siderail according to Figures 60-62 with the siderail in a partially folded position.

**[0071]** Figure 64 is an end view of the bed with siderail according to Figure 63.

**[0072]** Figure 65 is a side view of the bed with siderail according to Figures 60-64 with the siderail in a folded position.

**[0073]** Figure 66 is an end view of the bed with siderail according to Figure 65.

**[0074]** Figure 67 is a side view of the bed with siderail according to Figures 60-66 with the siderail in an under-bed stowed position.

**[0075]** Figure 68 is an end view of the bed with siderail according to Figure 67.

**[0076]** Figure 69 is a perspective view of the siderail according to Figures 60-68.

[0077] Figure 70 is an enlarged perspective view of a mounting mechanism of the siderail according to Figures 60-69.

[0078] Figure 71 is a perspective view of the siderail according to Figures 60-70 in the partially folded position.

[0079] Figure 72 is an enlarged detail view of the mounting mechanism of the siderail according to Figures 60-71 in the partially folded position.

[0080] Figure 73 is a perspective view of the siderail according to Figures 60-72 in the folded position.

[0081] Figure 74 is an enlarged perspective detail of the mounting mechanism of the siderail according to Figures 60-73 in the folded position.

[0082] Figure 75 is a perspective view of the siderail according to Figures 70-74 in the under-bed stowed position.

[0083] Figure 76 is an enlarged view of the mounting mechanism for the siderail according to Figures 60-75 in the under-bed stowed position.

[0084] Figure 77 is a perspective view of a bed with a gear-drive-mounted siderail according to a further embodiment of the invention.

[0085] Figure 78 is a side view of the bed with gear-drive-mounted siderail in the deployed, use position according to Figure 77.

[0086] Figure 79 is an end view of the bed with gear-drive-mounted siderail according to Figures 77-78.

[0087] Figure 80 is a side view of the bed with gear-drive-mounted siderail according to Figures 77-79 with the siderail in the partially folded position.

[0088] Figure 81 is an end view of the bed with gear-drive-mounted siderail according to Figures 77-80 with the siderail in the partially folded position.

[0089] Figure 82 is a side view of the bed with gear-drive-mounted siderail according to Figures 77-81 with the siderail in the fully folded and stowed position.

[0090] Figure 83 is an end view of the bed with gear-drive-mounted siderail according to Figures 77-82 with the siderail in the fully folded and stowed position.

[0091] Figure 84 is a perspective view of the gear-drive-mounted siderail according to Figures 77-83.

[0092] Figure 85 is an enlarged perspective view of the gear drive of the gear-drive-mounted siderail according to Figures 77-84.

[0093] Figure 86 is an exploded perspective view of the gear drive mechanism of the gear-drive-mounted siderail according to Figures 77-85.

[0094] Figure 87 is a perspective view of the gear-drive-mounted siderail of Figures 77-86 in the fully folded and stowed position.

[0095] Figure 88 is an enlarged perspective view of the gear drive mechanism of the gear-drive-mounted siderail of Figures 77-87 in the fully folded and stowed position.

[0096] Figure 89 is a perspective view of a siderail assembly according to a further embodiment of the invention.

[0097] Figure 90 is an enlarged perspective view according to Figure 89.

[0098] Figure 91 is a side view of the siderail assembly according to Figures 89-90 in a deployed, use position.

[0099] Figure 92 is an end view according to Figure 91.

[00100] Figure 93 is a side view of the siderail assembly according to Figures 89-92 in a partially stowed position.

[00101] Figure 94 is an end view according to Figure 93.

[00102] Figure 95 is a side view of the siderail assembly according to Figures 89-94 in a stowed position.

[00103] Figure 96 is an end view according to Figure 95.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[00104] Certain terminology will be used in the following description for convenience in reference only and will not be limiting. The words "up", "down", "right", "left", "clockwise" or "counterclockwise" will designate directions in the drawings to which reference is made. The words "in" and "out" will refer to directions toward and away from, respectively, the geometric center of the device and designated parts thereof. The words "proximal", "distal", "transverse" or "longitudinal" will refer to the orientation of an element with respect to the patient support apparatus. Such terminology will include derivatives and words of similar import.

[00105] Referring to Figure 1, a bed 10 having a siderail 15 with a siderail vertical extension 20 is illustrated. The bed 10 includes a bed frame 25 supported by a pair of telescoping stanchions 30 mounted to a base frame 35. The base frame 35 is supported on a floor surface by a plurality of wheels or casters 40.

[00106] The bed frame 25 includes a bed frame side rail 45. A siderail support mechanism 50 mounts the siderail 15 to the bed frame side rail 45. The siderail support mechanism 50 is substantially as disclosed in pending U.S. Patent Application No. \_\_\_\_\_, filed \_\_\_\_\_ (Attorney Docket S\*M C-284), incorporated herein by reference.

**[00107]** The siderail support mechanism 50 includes a pair of upstanding support arms 55, 60. The support arms 55, 60 are pivotally connected at the bed frame side rail 45 by lower pivot shafts 65, 70 and pivotally connected at upper pivot shafts 75, 80 to the siderail 15. The support arms 55, 60 further each include a pinion gear 85, 90 mounted on the upper pivot shafts 75, 80 to rotate therewith.

**[00108]** The pinion gear 85, 90 is positioned within a vertical recess 95, 100 within the siderail 15. Each recess 95, 100 is configured to receive one of a pair of support stanchions 105, 110 for the siderail vertical extension 20. Each of the support stanchions 105, 110 for the siderail vertical extension 20 include a rack section 115, 120 having a plurality of teeth 125, 130 configured to mesh with teeth 135, 140 of the respective pinion gear 85, 90 within the recess 95, 100 of the siderail 15.

**[00109]** Referring to Figures 2-4, as the siderail 15 is moved from a deployed, use position as shown in Figure 2 to a stowed position, as shown in Figure 4, the support arms 55, 60 rotate clockwise relative to the siderail 15, causing the pinion gears 85, 90 to also rotate clockwise. As each pinion gear 85, 90 rotates relative to the siderail 15, the siderail vertical extension 20 is drawn into the siderail 15 by the meshing of the rack section 115, 120 and the pinion gear 85, 90 within each recess 95, 100 of the siderail 15. When the siderail 15 is raised from the stowed position of Figure 4 to the deployed, use position of Figure 2, the converse occurs, raising the siderail vertical extension 20.

**[00110]** Figures 5-8 illustrate a further embodiment of an expanding siderail mechanism 150 according to the invention. In this embodiment, a pair of recesses 155, 160 are oriented laterally in a siderail 165. A U-shaped

siderail lateral extension 170 is provided, having a bight portion 175 and a pair of legs 180, 185 extending laterally to be received within the recesses 155, 160. The lateral extension 170 further includes a rack section 190 having a plurality of teeth 195 configured to mesh with a plurality of teeth 200 of a pinion gear 205 secured to an upper pivot shaft 210 of a support arm 215 of the siderail 165. The siderail 165 is pivotally supported on the bed frame side rail 45 by the support arm 215 and a second support arm 217.

**[00111]** As shown in Figures 6-8, as the siderail 165 is lowered from the deployed, use position of Figure 6 to the stowed position of Figure 8, the pinion gear 205 rotates clockwise, engaging the rack 190 of the lateral extension 170 to draw the lateral extension 170 into the recesses 155, 160 within the siderail 165.

**[00112]** Figures 9-12 illustrate a siderail mechanism 220 having a siderail 222 with a combination of a vertical siderail extension 225 and lateral siderail extensions 230, 232 according to a further embodiment of the invention. As shown in Figure 9, a pair of support stanchions 235, 240 of the vertical siderail extension 225 are received in recesses 237, 242 of the siderail 222 and are driven by a first pair of pinion gears 245, 250 after the manner of the first embodiment. Each stanchion 235, 240 includes a second vertical portion 255, 260, each carrying a second pinion gear 265, 270. The second pinion gears 265, 270 are configured to ride on one of a pair of fixed tracks 275, 280 mounted on the siderail 222. Each second pinion gear 265, 270 drives a connection rod 285, 290 through a respective recess 295, 300 in the vertical siderail extension 225. The connection rods 285, 290 include a first rack section 305, 310 for engaging the second pinion gears 265, 270 and a second rack section 315, 320 for engaging a third

pinion gear 325, 330 rotatably mounted within the vertical siderail extension 225.

**[00113]** The third pinion gears 325, 330 in the vertical siderail extension 225 further engage a rack section 335, 340 on the lateral extensions 230, 232. The lateral extensions 230, 232 are received within lateral recesses 345, 350 of the vertical siderail extension 225.

**[00114]** Referring sequentially to Figures 10-12, it can be seen that as a pair of support arms 355, 360 supporting the siderail 222 move from a deployed, use position (Figure 10) to a stowed position (Figure 12), the various rack and pinion systems work in concert to retract the siderail vertical extension 225 and the siderail lateral extensions 230, 232 simultaneously. By way of example, as the siderail 222 is rotated from the deployed, use position, the support arm 360 rotates in a clockwise direction, as does the pinion gear 250. As the pinion gear 250 rotates in a clockwise direction, the support stanchion 240 is drawn downwardly into the recess 242. As the support stanchion 240 travels downwardly, the second pinion gear 270 rides on the fixed track 280, rotating in a clockwise direction. The clockwise rotation of the second pinion gear 270 draws the connection rod 290 downwardly, imparting a counterclockwise rotation in the third pinion gear 330. The counterclockwise rotation of the third pinion gear 330 engaging the rack section 340 draws the lateral extension 232 leftward and into the recesses 345, 350.

**[00115]** Referring to Figures 13-16, a siderail mechanism 370 includes a siderail 375. A first vertical extension 380 and a second vertical extension 385 are provided slidably received on the siderail 375. A dual rack and pinion system 390 similar to the embodiment of Figures 9-12 is employed. Support stanchions 395, 400 support the first vertical extension 380 and are slidably

received in recesses 405, 410 in the siderail 375. Interconnecting rods 415, 420 are fixed to the second vertical extension 385 and are slidably received in a pair of recesses 425, 430 in the first vertical extension 380. As the support arms 435, 440 of the siderail 375 pivot, moving the siderail 375 from the deployed, use position of Figure 14 to the stowed position of Figure 16, the first and second vertical extensions 380, 385 are simultaneously retracted.

**[00116]** Referring now to Figures 17-18, a bed 10 having a pair of gap fillers 450, 455 is illustrated. The gap fillers 450, 455 are planar sections pivotally mounted to a footboard 460 and headboard 465 of the bed 10 by hinges 470, 475. In a deployed position, shown in Figure 17, the gap fillers 450, 455 are operable to block gaps that would normally exist between a conventional siderail (not shown) and each of the footboard 460 and the headboard 465. In a stowed position, shown in Figure 18, the gap fillers 450, 455 are rotated about the hinges 470, 475 to lie parallel to the footboard 460 or the headboard 465 of the bed 10.

**[00117]** Referring to Figures 19-32, a further embodiment of a gap filler 480 according to the invention is illustrated. As shown in Figures 19-21, the gap filler 480 is pivotally connected to the footboard 460 of the bed 10 by an eccentric two-axis pivot arm or hinge 485 mounted to an upper extent 490 of the gap filler 480. The gap filler 480 is further adaptable for mounting to the headboard 465 of the bed 10.

**[00118]** In the deployed position of Figures 19-21, the gap filler 480 is operable to block a gap between the footboard 460 and a conventional siderail 492. When not in use, the gap filler 480 is shifted to a stowed position parallel to the footboard 460 (Figure 24). As shown in Figures 22-23, the gap filler 480 is shifted



from the deployed position, through an arcuate path defined by the two-axis pivot hinge 485, to the stowed position of Figures 24-25.

**[00119]** A variation of the embodiment of Figures 19-25 is illustrated in Figures 26-32. Referring to Figure 26, a gap filler 495 is pivotally connected to the footboard 460. Unlike the previous embodiment, however, the pivot hinge 485 is attached to the gap filler 495 at a center portion 497. The gap filler 495 functions in the same fashion as the embodiment of Figures 19-25, configured to block a gap created between the footboard 460 and the conventional siderail 492. In this embodiment, however, when the gap filler 495 is in the stowed position parallel to the footboard 460, the gap filler 495 substantially overlaps the footboard 460 (Figure 31).

**[00120]** Referring to Figures 33-38, a bed 10 having a siderail 500 with a hinge-mounted end gap filler 505 or center gap filler 510 is illustrated. As shown in Figure 33-34, the end gap filler 505 is pivotally mounted to the siderail 500 by a hinge 515, and is configured to fill the gap between the footboard 460 or the headboard 465 and the siderail 500. The end gap filler 505 can be rotated away from the bed 10, as shown in Figure 34, and can be stowed flat against the outside face 520 of the siderail 500.

**[00121]** Referring to Figures 35-36, the siderail 500 with hinge-mounted center gap filler 510 is illustrated. The center gap filler 510 is pivotally mounted to the siderail 500 by a hinge 525 and is configured to cover at least a portion of the gap between adjacent siderails 500. As shown in Figure 36, the center gap filler 510 is rotatable about the hinge 525 away from the bed 10 and can be stowed flat against the outer face 520 of the siderail 500. The center gap filler 510 is D-shaped and

includes a gripping surface 530 to provide a patient handhold.

**[00122]** The siderail 500 can be configured with both the end gap filler 505 and the center gap filler 510, as shown in Figures 37-38. The end gap filler 505 is configured to fill the gap between each siderail 500 and the footboard 460 or the headboard 465. The center gap filler 510 is configured to fill the gap between the siderails 500.

**[00123]** Referring to Figures 39-40, a further embodiment of a siderail 650 is illustrated, configured for continuous coverage of the side of the bed 10. The siderail 650 comprises a window-shade type fabric 655 retractable onto a spool 660 secured to the bed frame side rail 45, and a horizontal rod 665 having a handle 670 for raising or lowering the siderail 650. A catch 675, 680 is mounted to each of the footboard 460 and the headboard 465 of the bed 10. As shown in Figure 39, the siderail 650 is secured in a deployed position. In the deployed position, the horizontal rod 665 is supported on the catches 675, 680. Figure 40 illustrates the stowed position, where in the fabric 655 is retracted into the spool 660.

**[00124]** Referring to Figures 41-42, a further embodiment of a gap filler 685 is illustrated. The gap filler 685 comprises a window-shade-type fabric 687 coiled on a spool 689 and including a terminal rod 691 having a handle 693. The spool 689 is mounted vertically adjacent either the footboard 460 or headboard 465 (or both) of the bed 10, in alignment with the bed frame side rail 45. A perforated rail 695 having a plurality of apertures 697 is mounted adjacent the bed frame side rail 45, the apertures configured to receive an end of the terminal rod 691. As shown in Figure 41, the gap filler 687 can be extended from the footboard 460 or headboard

465, the fabric 687 filling the gap adjacent the footboard 460 or headboard 465, with the terminal rod 691 anchoring the gap filler 687 by receipt in one of the apertures 697. The gap filler 687 extends from the footboard or headboard to provide continuous coverage along the bed frame side rail 45 in conjunction with the conventional siderail 500. When not in use, the gap filler 687 is stored vertically on the spool 689 at the headboard 460 or footboard 465, as shown in Figure 42.

**[00125]** Referring now to Figures 43-49, the bed 10 is provided with a further embodiment of a gap filling system 700 comprising a plurality of rigid planar gap fillers 705. The gap fillers 705 are stowed horizontally underneath the bed surface or an auxiliary, removable, or stowable optional bed extender 707, and are configured for deployment through openings 710 in the bed frame side rail 45.

**[00126]** Referring to Figures 46-49, a base cavity 715 configured for receiving the gap filler 705 is formed on the bed frame side rail 45 and positioned below each opening 710. The base cavity 715 includes a pair of upstanding sidewalls 720, 725. Each sidewall 720, 725 includes an inwardly directed guide pin 730. The span between the guide pins 730 provides sufficient clearance for the gap filler 705 to be drawn through the opening 710. As the gap filler 705 is drawn through the opening 710, guide slots 735 formed in the edges of the gap filler 705 are exposed and engage the guide pins 730. The guide slots 735 terminate at the end of the gap filler 705. When the gap filler 705 is withdrawn from the opening 710 so that the guide pins 730 bottom out in the guide slots 735, the gap filler is configured to be rotatable to a vertical orientation. Once vertical, the gap filler 705 is configured to drop into the base cavity

715 and form a wall parallel to the bed frame side rail 45.

**[00127]** Figures 50-51 illustrate a siderail 800 with free-hanging gap fillers 805, 810. The siderail 800 is pivotally connected to the bed frame side rail 45 by a pair of support arms 815, 820. In the deployed, use position of Figure 50, the gap fillers 805, 810 are pivotally mounted to the siderail 800 and hang freely to a horizontal orientation between the siderail 800 and the bed 10. Referring to Figure 51, when the siderail 800 is in a lowered or stowed position proximate the floor surface supporting the bed 10, the gap fillers 805, 810 are likewise positioned horizontally, proximate the floor surface. The gap fillers 805, 810 being free-hanging, should the bed be moved and encounter a low-lying obstacle, or should an attendant approach the lowered siderail 800, the gap filler 805, 810 is free to lift rather than wedge the obstacle or the foot of the attendant against the floor. The gap fillers 805, 810 are therefore configured to fill a gap between the siderail and the bed surface, and further configured for ready displacement upon contacting an object while in the stowed position.

**[00128]** Figures 52-55 illustrate a siderail 830 having a cam-activated gap filler 835. The siderail 830 is pivotally mounted to the bed frame side rail 45 by a pair of support arms 840, 845. The support arm 845 has an upper pivot shaft 850, to which a football-shaped cam 855 is eccentrically mounted. Referring to Figure 53, the cam 855 includes a minor lobe 857 and a major lobe 858. The cam-activated gap filler 835 is pivotally mounted to the siderail 830 by a pivot pin 859 and includes a gap filling portion 860 and a lever arm portion 865. The gap filler 835 and cam 855 are arranged on the siderail 830 so that the cam 855 can act upon the lever arm portion

865 of the gap filler 835. With the siderail 830 in the deployed, use position of Figure 53, the cam 855 is oriented so that the minor lobe 857 is directed downwardly toward the lever arm portion 865 of the gap filler 835. The gap filling portion 860 of the gap filler 830 is thereby free to hang under gravity to its lowermost position to fill a gap between the siderail 830 and the bed 10. Referring to Figures 53-55, as the siderail 830 rotates from the deployed, use position to a stowed position (Figure 55), an increasing radius of the cam 835 is directed toward the lever arm portion 865 of the gap filler 835. As the siderail 830 reaches the stowed position, the major lobe 858 of the cam 855 is directed to the lever arm portion 865 of the gap filler 835, raising the gap filling portion 860 to its uppermost, stowed position.

**[00129]** Figures 56-59 disclose a siderail 870 pivotally mounted to a bed frame side rail 45 by a pair of support arms 875, 880. The support arms 875, 880 are generally L-shaped, thereby integrally including a gap filling portion 885, 890 respectively. Each gap filling portion 885, 890 is a lateral extension of the respective support arm 875, 880 of the siderail 870, and is configured to occupy a gap between the siderail 870 and the bed 10 when the siderail 870 is in the deployed, use position, as shown in Figures 56-57. Referring to Figures 58-59, as the siderail 870 is lowered from the deployed, use position to a stowed position, the support arms 875, 880 rotate so that the gap filling portions 885, 890 are concealed behind the siderail 870.

**[00130]** A further embodiment of a siderail 900 is illustrated in Figures 60-76. The siderail 900 includes an upper horizontal rail 905 and a lower horizontal rail 910, with the upper and lower horizontal rails 905, 910 connected by a plurality of spindles 915. The spindles

915 are pivotally connected to both the upper and lower horizontal rails 905, 910.

**[00131]** The siderail 900 further includes a plurality of support arms 920, 922, 924 pivotally connected to the upper and lower horizontal rails 905, 910. The support arms 920, 922, 924 are parallel to each other and to the spindles 915 so that the siderail 900 is collapsible in the sense of an extended four-bar linkage.

**[00132]** The support arms 920, 922, 924 are further pivotally connected to a mounting assembly 930 secured to an underside of the bed frame side rail 45 (see Figure 70). The mounting assembly 930 includes a hinge block 935, a pivot block 940 and a wedge block 945. The hinge block 935 is configured for mounting to the bed frame side rail 45 and includes a pivot cutout 950 and a pivot pin 955. The pivot block 940 includes a pivot portion 960 and a mount portion 965 having a through aperture 970. Each support arm 920, 922, 924 includes an inwardly turned base extension 975. The wedge block 945 is L-shaped, having a base portion 980 and a leg portion 985 (see Figure 76).

**[00133]** The pivot cutout 950 of the hinge block 935 is configured to receive the pivot portion 960 of the pivot block 940, with the pivot pin 955 pivotally connecting the pivot block 940 to the hinge block 935. With the siderail 900 in the upright position, the pivot block 940 depends directly below the hinge block 935. The through aperture 970 of the pivot block 940 is configured to receive the base extension 975 of one of the support arms 920, 922, 924 therethrough. The respective support arm 920, 922, 924 is thereby pivotally connected to the pivot block 940 by the base extension 975. The base extension 975 is configured to connect to the wedge block 945, with the base portion 980 of the wedge block 945 fixedly

mounted to the base extension 975, against an inside face 990 of the pivot block 940.

**[00134]** Referring Figures 62 and 69-70, the siderail 900 is in the deployed, use position. The support arms 920, 922, 924 are vertically oriented, and the wedge block 945 is inverted so that the leg portion 985 of the L-shaped wedge block 945 is positioned against an inside face 995 of the hinge block 935. The wedge block 945 thus prevents the pivot block 940 from rotating clockwise about the pivot pin 955.

**[00135]** The siderail 900 is configured for movement to a lowered position shown in Figures 65-66 and 73-74 by rotating the support arms 920, 922, 924 about the base extension 975. The support arms 920, 922, 924 and the spindles 915 thus also pivot between the upper and lower horizontal rails 905, 910 to draw them together in the manner of a four-bar link.

**[00136]** As the support arms 920, 922, 924 rotate counterclockwise, the base extension 975 rotates the wedge block 945 in the same fashion. As the wedge block 945 is rotated counterclockwise, the leg portion 985 of the L-shaped wedge block 945 is rotated clear of the hinge block 935, as best shown in Figures 73-74. The base portion 980 of the wedge block 945, to which the base extension 975 is connected, aligns behind the mount portion 965 of the pivot block 935. The pivot block 935 is thereby released to rotate 90 degrees about the pivot pin 955 until the base portion 980 of the wedge block 945 contacts the inside face 995 of the hinge block 935.

**[00137]** The support arms 920, 922, 924 thus rotate downwardly to a collapsed position of the siderail 900, and then the collapsed siderail 900 is configured to rotate about pivot pin 955 of each hinge block 935 to a fully stowed position underneath the bed frame 25 and parallel to the bed frame side rail 45.

**[00138]** A further embodiment of a siderail 1000 is illustrated in Figures 77-88. The siderail 1000 includes an upper horizontal rail 1005 and a lower horizontal rail 1010, with the upper and lower horizontal rails 1005, 1010 connected by a plurality of spindles 1015. The spindles 1015 are pivotally connected to both the upper and lower horizontal rails 1005, 1010.

**[00139]** The siderail 1000 further includes a pair of support arms 1020, 1025 pivotally connected to the upper and lower horizontal rails 1005, 1010. The support arms 1020, 1025 are parallel to each other and to the spindles 1015 so that the siderail 1000 is collapsible in the sense of an extended four-bar linkage.

**[00140]** The support arms 1020, 1025 are further pivotally connected to a mounting assembly 1030 secured to an underside of the bed frame side rail 45 (see Figure 86). The mounting assembly 1030 includes a support stanchion 1035 and a pivot shaft 1040. The support stanchion 1035 includes a pivot shaft aperture 1045 surrounded by a beveled helical gear 1050 having gear teeth 1055. The pivot shaft 1040 includes a threaded portion 1060 and a head portion 1065 having a through aperture 1070. Each support arm 1020, 1025 includes a mounting stud 1075 surrounded by a beveled helical gear 1080 having gear teeth 1085. The through aperture 1070 of the pivot shaft 1040 is configured to receive the mounting stud 1075 of the support arm 1020, 1025. The pivot shaft aperture 1045 is configured to receive the threaded portion of the pivot shaft 1040. With the mounting stud 1075 received in the through aperture 1070 and the pivot shaft 1040 received in the pivot shaft aperture 1045, the beveled helical gears 1050, 1080 are configured to operably engage. While the gears 1050, 1080 are described as being helical, it is also



anticipated that other configurations of beveled gear can be configured for this use.

**[00141]** Referring now to Figures 78-83, as the siderail 1000 is lowered, the spindles 1015 and the support arms 1020, 1025 rotate in a counterclockwise direction and the upper and lower horizontal rails 1005, 1010 collapse onto one another. As the support arms 1020, 1025 rotate about the mounting stud 1075, rotation of the gear 1080 relative to the gear 1050 rotates the mounting stud 1075 about the pivot shaft 1040 from a horizontal orientation to a vertical orientation. The support arms 1020, 1025 thus rotate downwardly and inwardly so that as the siderail 1000 is lowered to the collapsed position of Figures 82-83 and 87-88, it is simultaneously rotated inwardly to a stowed condition underneath the bed frame 25 and parallel to the bed frame side rails 45.

**[00142]** A further embodiment of a siderail assembly 1100 is illustrated in Figures 89-96. The siderail assembly 1100 includes a siderail 1105 pivotally supported from the bed frame side rail 45 by at least two support arms 1110, 1115. The support arms 1110, 1115 are pivotally connected to the siderail 1105 by upper pivot brackets 1120, 1125. The support arms 1110, 1115 are pivotally connected to the bed frame side rail 45 by lower pivot brackets 1130, 1135. The lower pivot brackets are mounted to stanchions 1140, 1145 and depend directly below the bed frame side rail 45. In a further embodiment, the support arms 1110, 1115 can be configured with an in-turned lower end directly pivotally mounted in the lower pivot bracket after the manner disclosed in commonly owned U.S. Patent 6 253 397, issued July 3, 2001, incorporated herein by reference.

**[00143]** Each of the upper and lower pivot brackets 1120, 1125, 1130, 1135 includes a pivot pin defining a pivot axis for the respective pivot bracket. The pivot

pins of the pivot brackets 1120-1135 are parallel to each other, in order to define a four-bar linkage between the siderail 1105, bed frame side rail 45, and support arms 1110, 1115, but are skew with respect to the longitudinal or transverse directions of the bed 10 and with respect to a vertical direction.

**[00144]** The siderail assembly 1100 is configured so that the siderail 1105 is closely secured adjacent the surface of the bed 10 when in the upright, deployed position shown in Figures 89-92. In order to attain this condition, the support arms 1110, 1115 must form identical compound curves to reach the siderail 1105 from the lower pivot brackets 1130, 1135, which are underneath the bed frame side rail 45, and which are in a non-orthogonal orientation as described above. As shown in Figures 91-92, the support arms 1110, 1115 extend outwardly and upwardly to the right from the lower pivot brackets 1130, 1135, then turn leftwardly and subsequently inwardly to the upper pivot brackets 1120, 1125. This circuitous routing of the support arms 1110, 1115 is necessary to clear the bed frame side rail 45 and bring the siderail 1105 snugly against the bed 10. The support arms 1110, 1115 are releasably secured in the upright, deployed position as described in the aforementioned U.S. Patent 6 253 397.

**[00145]** Referring now to Figure 93, the siderail 1105 has been displaced to the right. Due to the orientation of the pivot axes of the pivot brackets 1120-1135, as the siderail 1105 is displaced to the right, it is displaced outwardly from the bed frame side rail 45 through a pre-defined portion of the rotation of the support arms 1110, 1115. As the siderail 1105 continues to the right, the support arms 1110, 1115 pass a crossover point after which, as the siderail 1105 continues to move to the right, the support arms 1110, 1115 draw the siderail 1105

inwardly toward the bed frame side rail 45. As the siderail 1105 reaches its lowermost, stowed position, it abuts the bed frame side rail 45, as illustrated in Figures 95-96. In the illustrated embodiment, the siderail 1105 abuts the bed frame side rail 45 and rests on the upper end of the support arms 1110, 1115.

**[00146]** While the invention has been described in the specification and illustrated in the drawings with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention as defined in the claims. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiment illustrated by the drawings and described in the specification as the best mode presently contemplated for carrying out this invention, but that the invention will include any embodiments falling within the scope of the appended claims.

What is claimed is:

1. A bed siderail having a siderail vertical extension, the siderail being mountable to a bed frame by a siderail support mechanism, the siderail support mechanism having a pair of arms pivotally attached to the bed frame at a lower pivot shaft and pivotally attached to the siderail at an upper pivot shaft, at least one of the arms further comprising a pinion gear mounted thereon with an axis common with the upper pivot shaft, the pinion gear having pinion gear teeth;

the siderail vertical extension having at least one support stanchion for slidably supporting the siderail vertical extension on the siderail, the at least one support stanchion having a plurality of rack teeth thereon, the support stanchion of the siderail vertical extension being arranged on the siderail so that the pinion gear teeth mesh with the rack teeth; and

the arms adapted to pivot about the lower pivot shafts to shift the siderail from a lower position to an upper position, wherein, as the arms are pivoted about the lower pivot shafts to shift the siderail from the lower position to the upper position, the pinion gear rotates to drive the rack teeth of the support stanchion, moving the vertical extension relative to the siderail.

2. The bed siderail according to claim 1, further comprising a fixed rack, the support stanchion further including a second pinion gear, the second pinion gear arranged to ride on the fixed rack, the siderail vertical extension further comprising an actuator rod having a first actuator rod rack and a second actuator rod rack, a

third pinion gear, and a horizontal extension having a horizontal extension rack;

wherein the second pinion gear meshes with the fixed rack and the first actuator rod rack and the third pinion gear meshes with the second actuator rod rack and the horizontal extension rack.

3. The bed siderail according to claim 1, further comprising a fixed rack, the support stanchion further including a second pinion gear, the second pinion gear arranged to ride on the fixed rack, wherein the vertical extension is a first vertical extension, and further comprising a second vertical extension supported by a second support stanchion, the second support stanchion having a rack thereon,

wherein the rack of the second support stanchion meshes with the second pinion gear to drive the second vertical extension upward simultaneously with the first vertical extension.

4. A bed siderail having a siderail horizontal extension, the siderail being mountable to a bed frame by a siderail support mechanism, the siderail support mechanism having a pair of arms pivotally attached to the bed frame at a lower pivot shaft and pivotally attached to the siderail at an upper pivot shaft, at least one of the arms further comprising a pinion gear mounted thereon with an axis common with the upper pivot shaft, the pinion gear having pinion gear teeth;

the siderail horizontal extension having at least one support stanchion for slidably supporting the siderail horizontal extension on the siderail, the at

least one support stanchion having a plurality of rack teeth thereon, the support stanchion of the siderail horizontal extension being arranged on the siderail so that the pinion gear teeth mesh with the rack teeth; and the arms adapted to pivot about the lower pivot shafts to shift the siderail from a lower position to an upper position, wherein, as the arms are pivoted about the lower pivot shafts to shift the siderail from the lower position to the upper position, the pinion gear rotates to drive the rack teeth of the support stanchion, moving the horizontal extension relative to the siderail.

5. A bed having a headboard and a footboard, a bed frame including a bed frame side rail, a mattress having an upper surface and supported on the bed frame, and a siderail connected to the bed frame side rail for deployment from a stowed position to a deployed position wherein the siderail extends alongside the bed frame side rail and mattress to a height greater than the upper surface of the mattress, and wherein the siderail and one of the headboard and footboard define a gap therebetween, the bed further comprising:

a gap filler pivotally mounted to the one of the headboard and footboard.

6. The bed of claim 5, wherein the gap filler is mounted to the one of the headboard and footboard by a hinge.

7. The bed of claim 5, wherein the gap filler is mounted to the one of the headboard and footboard by a dual axis pivot.

8. A bed having a headboard and a footboard, a bed frame including a bed frame side rail, a mattress having an upper surface and supported on the bed frame, and a siderail connected to the bed frame side rail for deployment from a stowed position to a deployed position wherein the siderail extends alongside the bed frame side rail and mattress to a height greater than the upper surface of the mattress, and wherein the siderail and one of the headboard and footboard define a gap therebetween, the bed further comprising:

a gap filler pivotally mounted to the siderail.

9. The bed of claim 8, wherein the siderail comprises a first siderail, and further comprising a second siderail, wherein the first and second siderails define a second gap therebetween, and a second gap filler pivotally mounted to one of the first siderail and the second siderail.

10. A bed having a headboard and a footboard, a bed frame including a bed frame side rail, a mattress having an upper surface and supported on the bed frame, and a siderail connected to the bed frame side rail for deployment from a stowed position to a deployed position wherein the siderail extends alongside the bed frame side rail and mattress to a height greater than the upper surface of the mattress, and wherein the siderail and one of the headboard and footboard define a gap therebetween, the bed further comprising:

a gap filler of the window shade style, extending from at least one of the headboard and the footboard to the siderail.

11. A bed having a headboard and a footboard, a bed frame including a bed frame side rail, a mattress having an upper surface and supported on the bed frame, and a siderail connected to the bed frame side rail for deployment from a stowed position to a deployed position wherein the siderail extends alongside the bed frame side rail and mattress to a height greater than the upper surface of the mattress, and wherein the siderail is of the window shade style, vertically extending from the bed frame side rail.

12. A bed having a headboard and a footboard, a bed frame including a bed frame side rail, a mattress having an upper surface and supported on the bed frame, and a siderail connected to the bed frame side rail for deployment from a stowed position to a deployed position wherein the siderail extends alongside the bed frame side rail and mattress to a height greater than the upper surface of the mattress, and wherein the siderail and one of the headboard and footboard define a gap therebetween, the bed further comprising:

a gap filler slidably mounted to the bed frame side rail.

13. The bed of claim 12, wherein the gap filler is slidably housed horizontally in the bed frame and is deployable by rotation adjacent the bed frame side rail.



14. A bed having a headboard and a footboard, a bed frame including a bed frame side rail, a mattress having an upper surface and supported on the bed frame, and a siderail connected to the bed frame side rail for deployment from a stowed position to a deployed position wherein the siderail extends alongside the bed frame side rail and mattress to a height greater than the upper surface of the mattress, and wherein the siderail and the mattress define a gap therebetween, the bed further comprising:

a gap filler pivotally mounted to the siderail.

15. The bed of claim 14, wherein the gap filler deploys into a use position by gravity.

16. The bed of claim 14, wherein the gap filler is cam-activated by deployment of the siderail.

17. The bed of claim 14, wherein the gap filler is integrally formed with a support arm of the siderail and rotates into the gap during deployment of the siderail.

18. A bed having a headboard and a footboard, a bed frame including a bed frame side rail, a mattress having an upper surface and supported on the bed frame, and a siderail connected to the bed frame side rail for deployment from a stowed position to a deployed position wherein the siderail extends alongside the bed frame side rail and mattress to a height greater than the upper surface of the mattress, and wherein the siderail comprises:

an upper horizontal rail;

a lower horizontal rail; and  
a pair of support arms pivotally connecting the upper and lower horizontal rails and the bed frame side rail and arranged to collapse the siderail in the manner of a four-bar linkage, and wherein the siderail is configured to rotate under the bed frame side rail in the stowed position.

19. The bed of claim 18, wherein the siderail is connected to the bed frame side rail by a wedge block mechanism, whereby the collapsing of the siderail frees the wedge block mechanism to rotate the siderail under the bed frame side rail.

20. The bed of claim 18, wherein the siderail is connected to the bed frame side rail by a gear drive mechanism, whereby the collapsing of the siderail simultaneously rotates the siderail under the bed frame side rail.

21. A siderail for a bed, the siderail configured to be pivotally supported from the bed on a plurality of support arms, the support arms being configured to pivotally connect the siderail and a bed frame side rail about parallel pivot axes skew to the siderail and bed frame side rail, the siderail being thereby configured to pivot from a deployed position abutting the bed, through an arcuate path separated from the bed, to a stowed position abutting the bed.

22. The siderail of claim 21, wherein the arcuate path defines a non-vertical plane skew to a longitudinal direction and a transverse direction of the bed.

VERTICALLY EXPANDING SIDERAIL

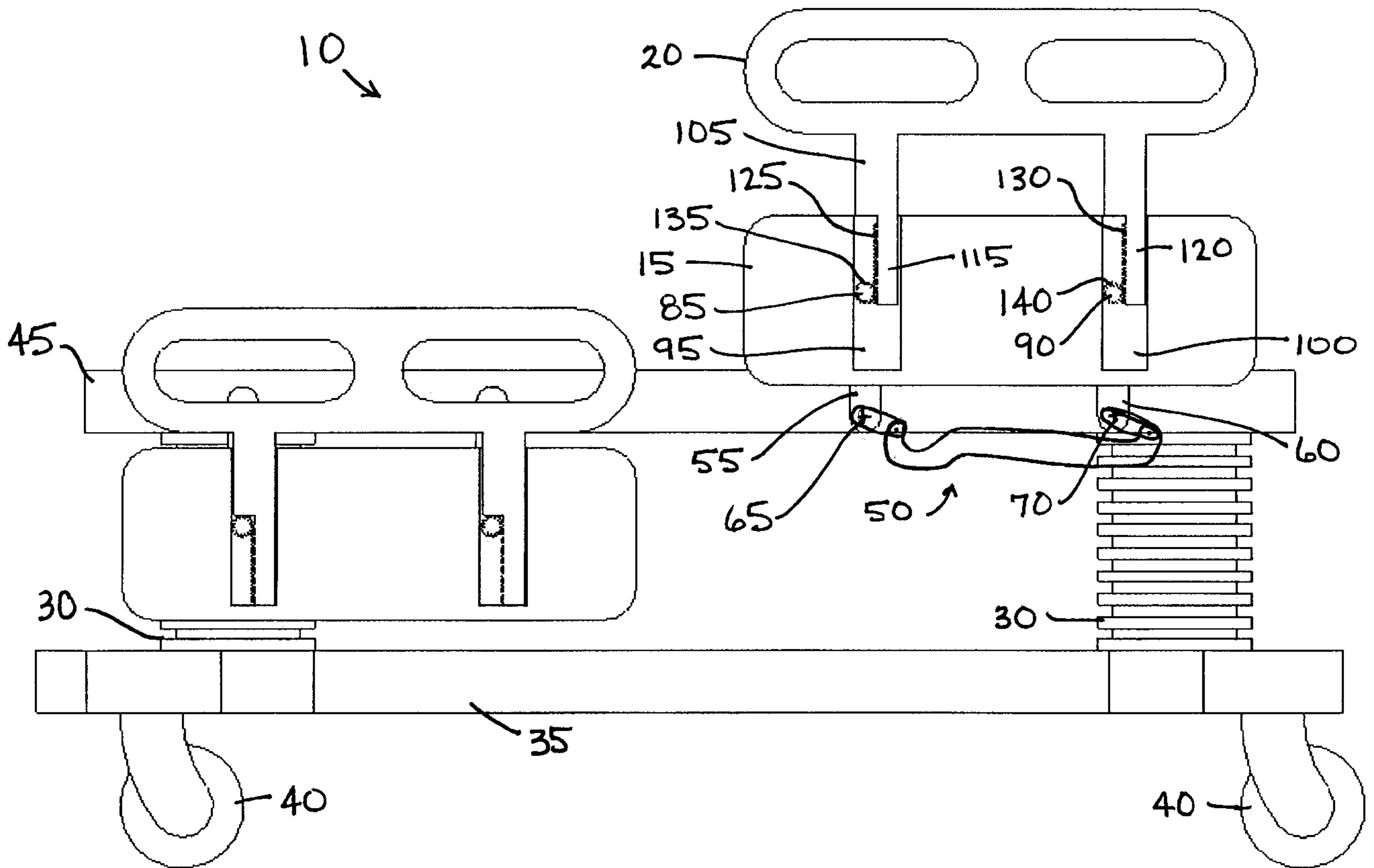


FIG. 1

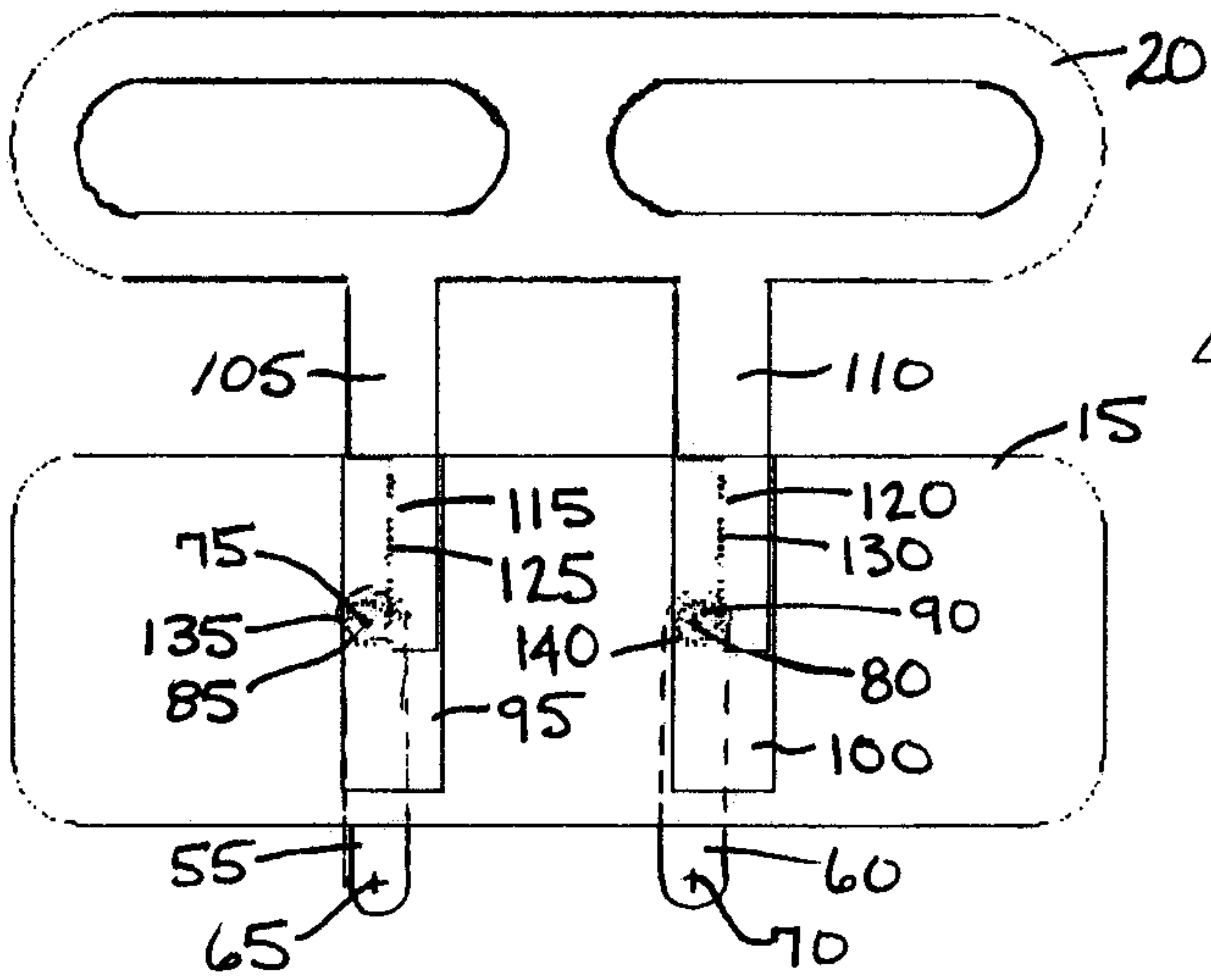


Fig. 2

RAIL UP

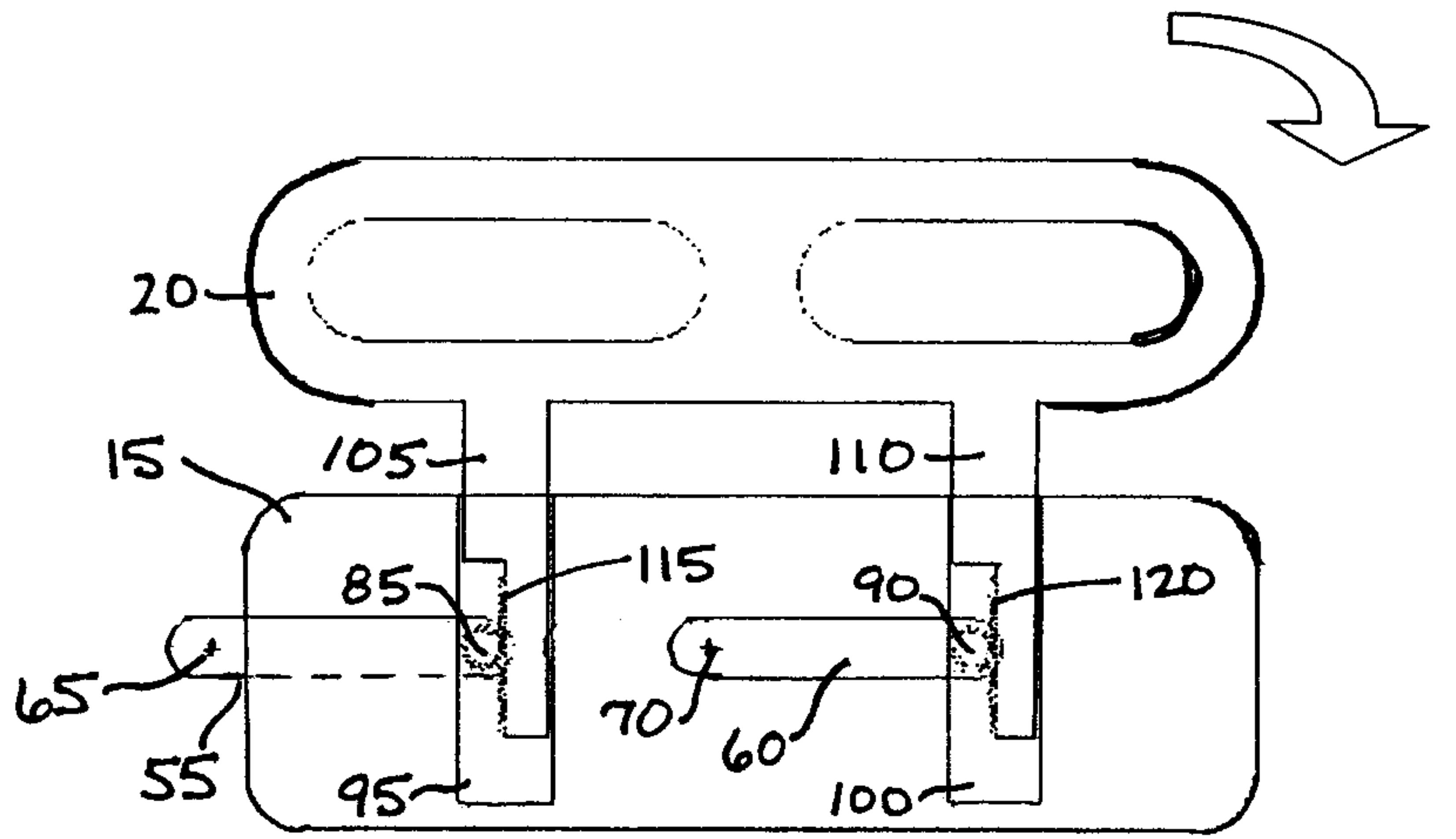
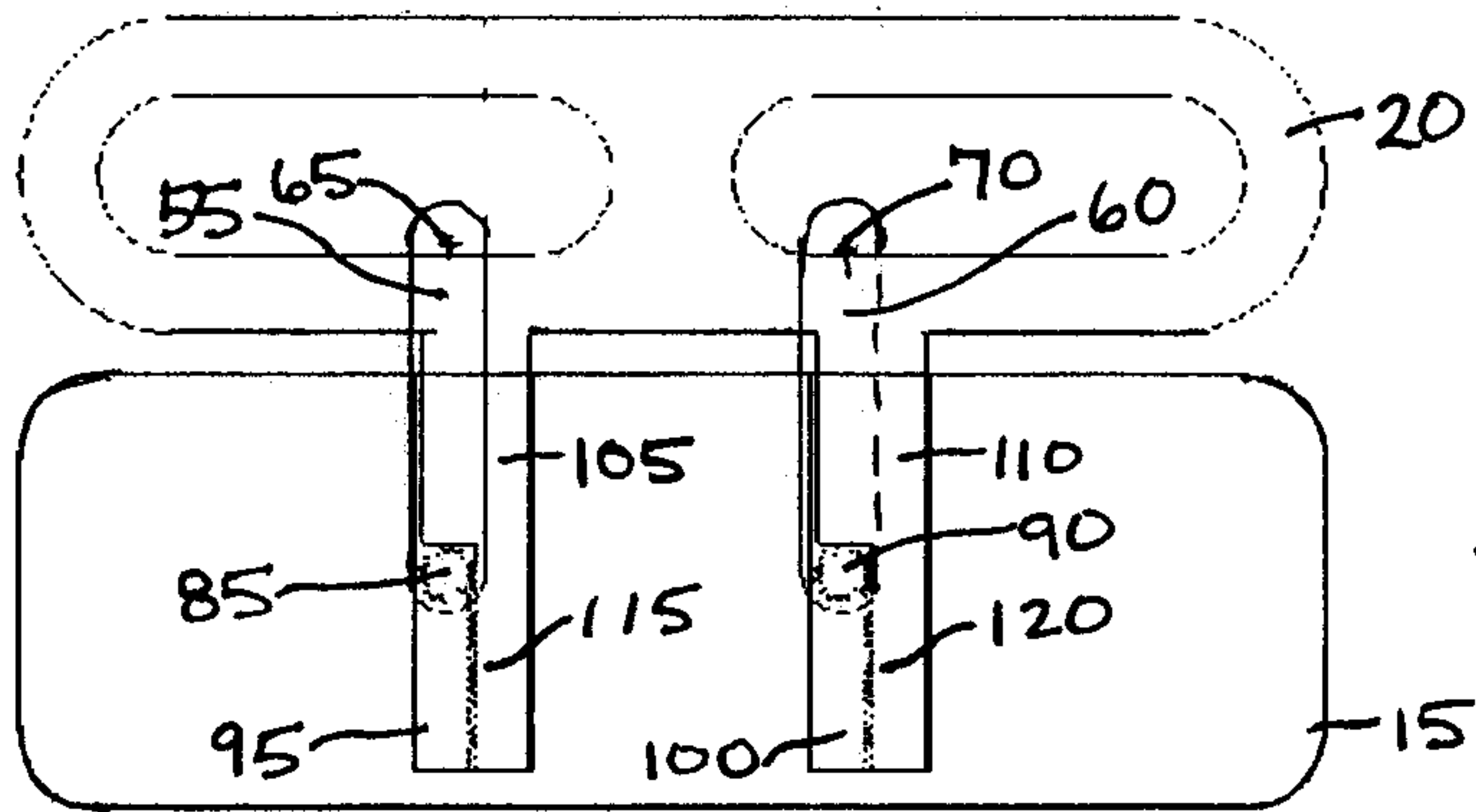


Fig. 3

RAIL IN MIDDLE



RAIL DOWN

Fig. 4

# HORIZONTALLY EXPANDING SIDERAIL (TELESCOPING)

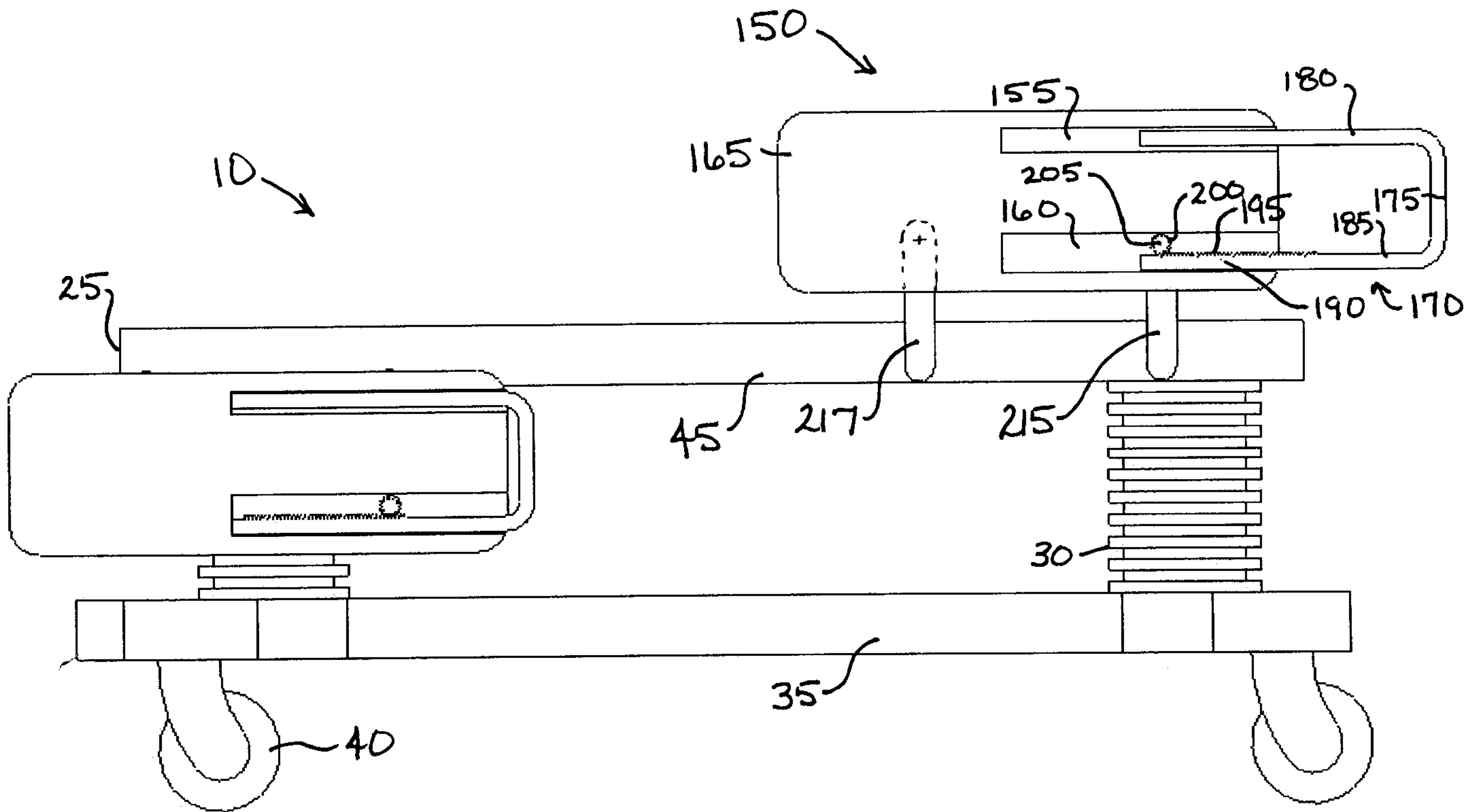


Fig. 5

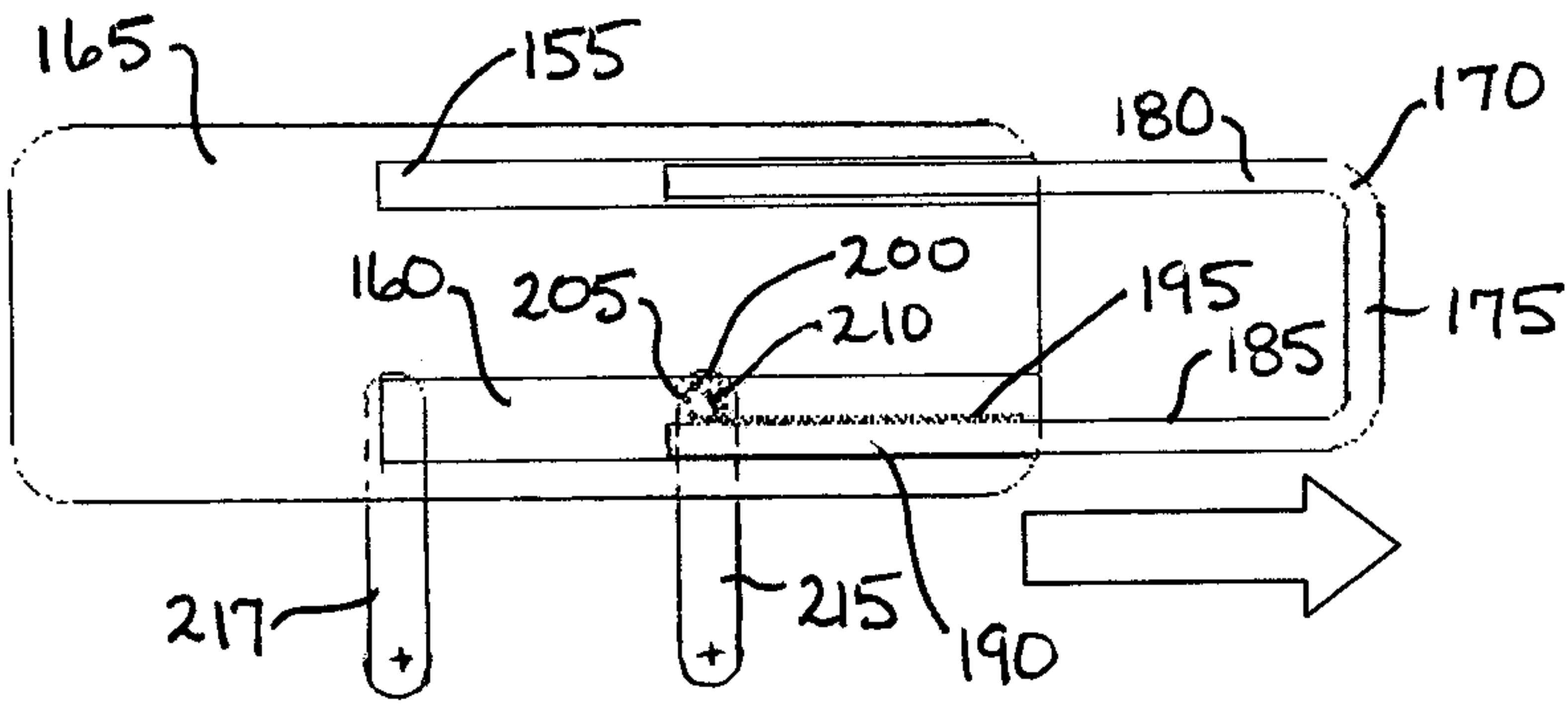
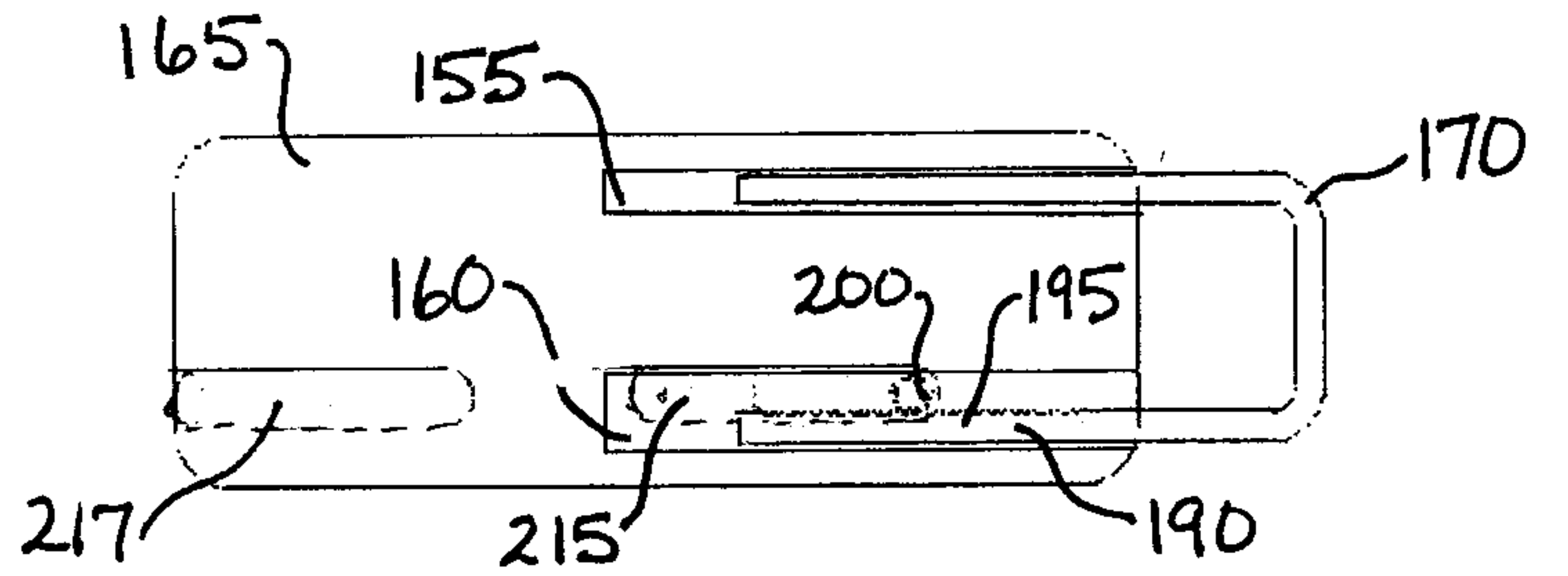
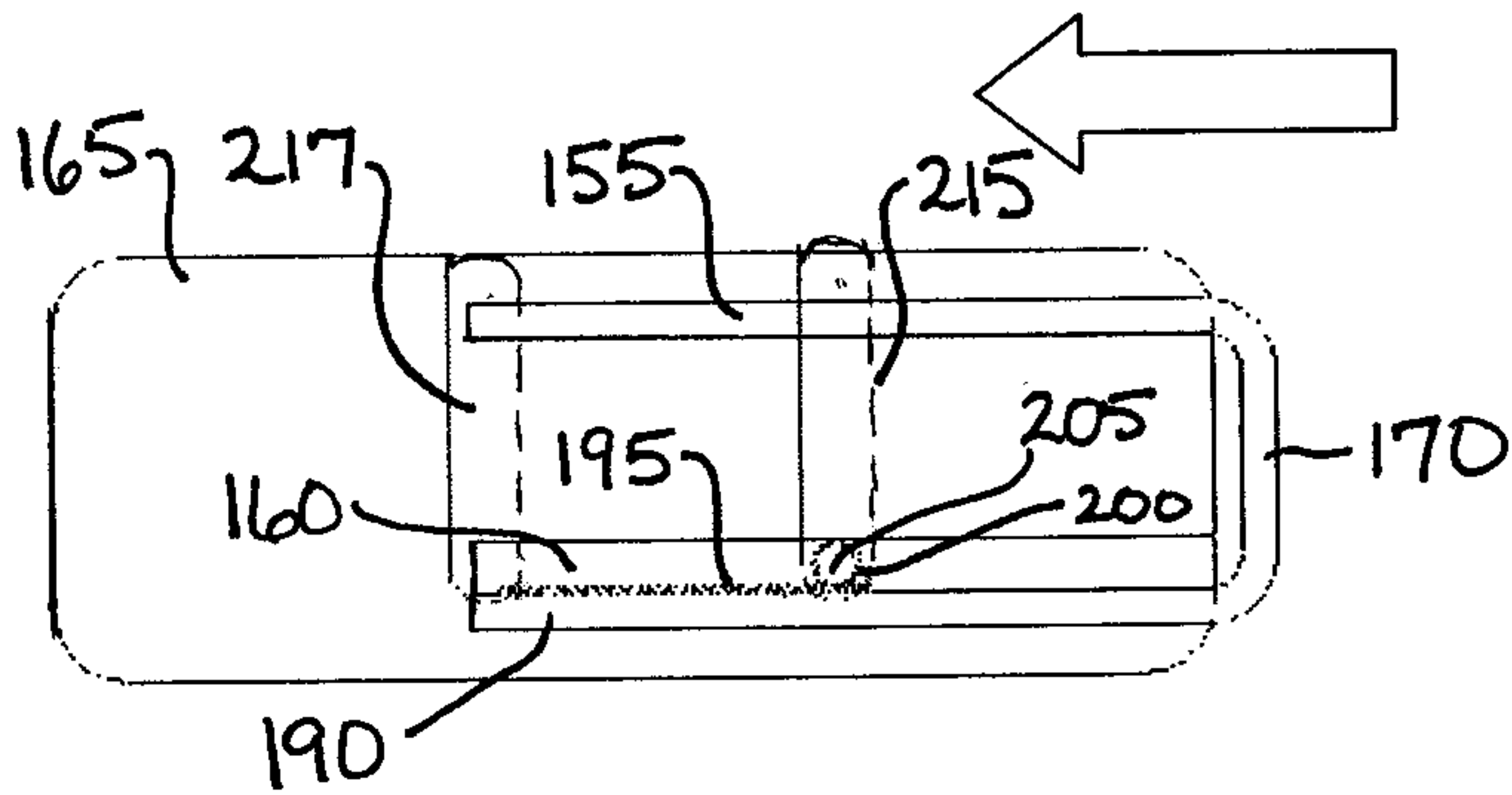


Fig. 6  
RAIL UP



RAIL IN MIDDLE  
Fig. 7



RAIL DOWN  
Fig. 8

# VERTICAL & HORIZONTAL EXPANDING SIDERAIL

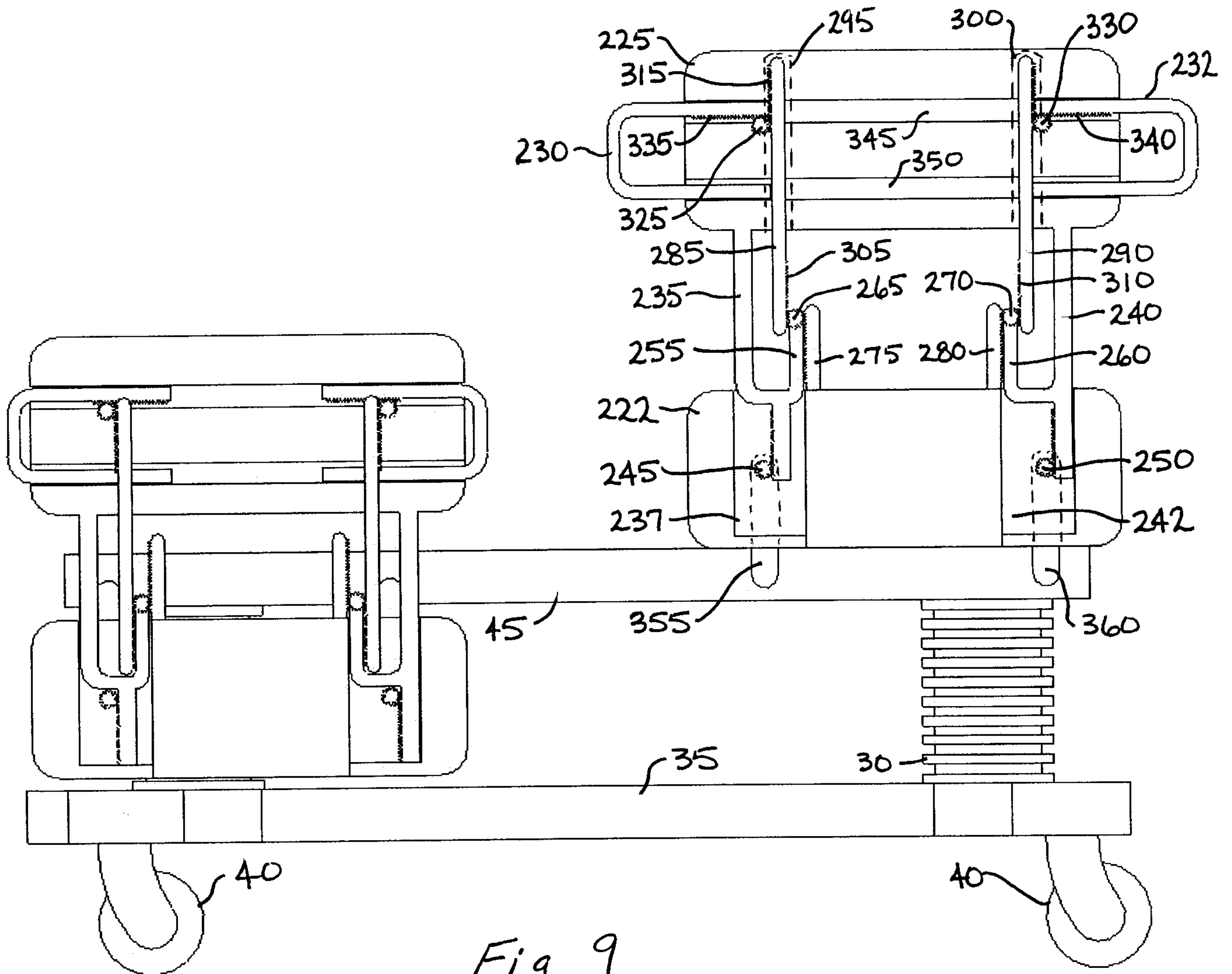




Fig. 10

RAIL UP



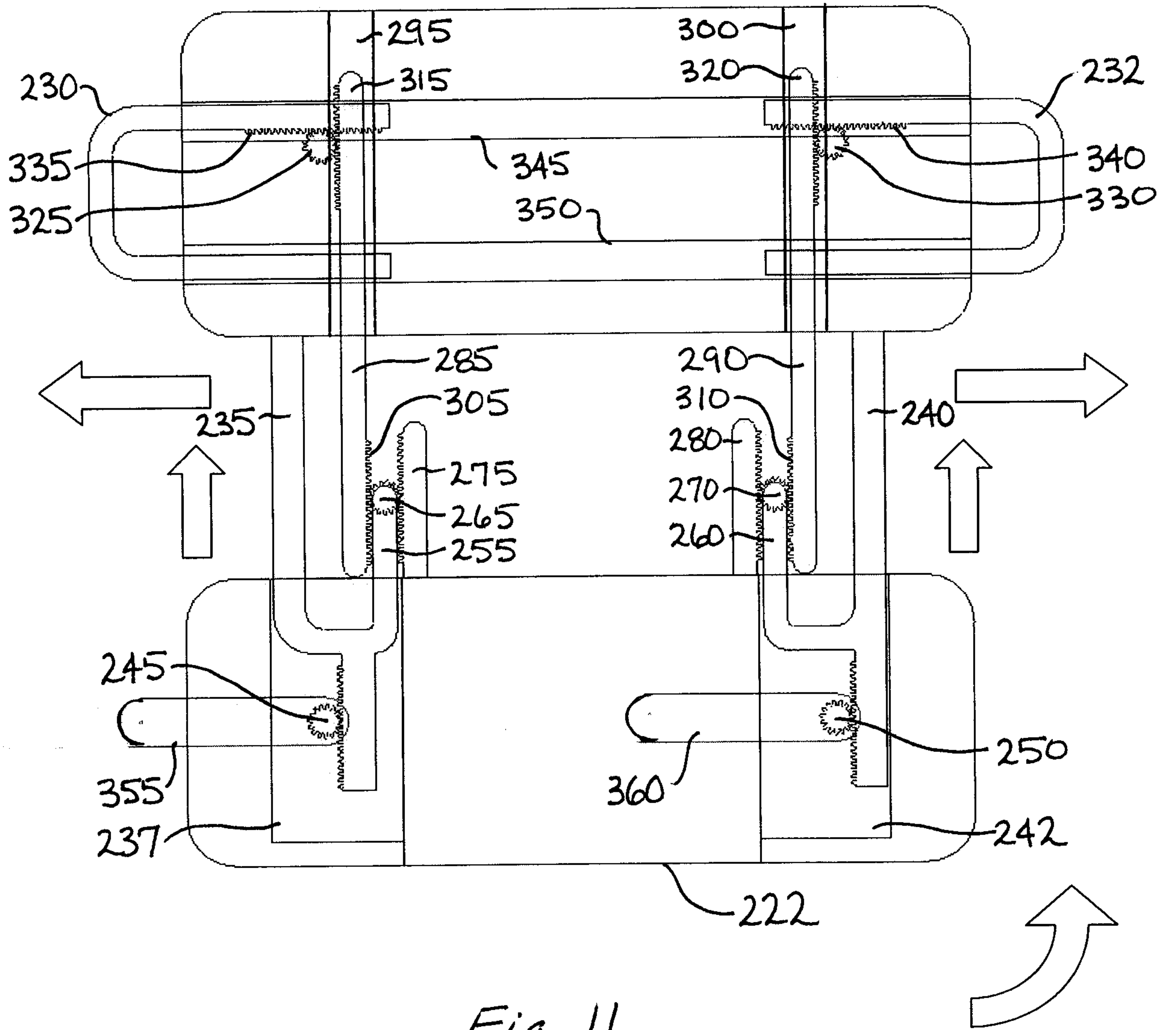


Fig. 11

RAIL IN MIDDLE

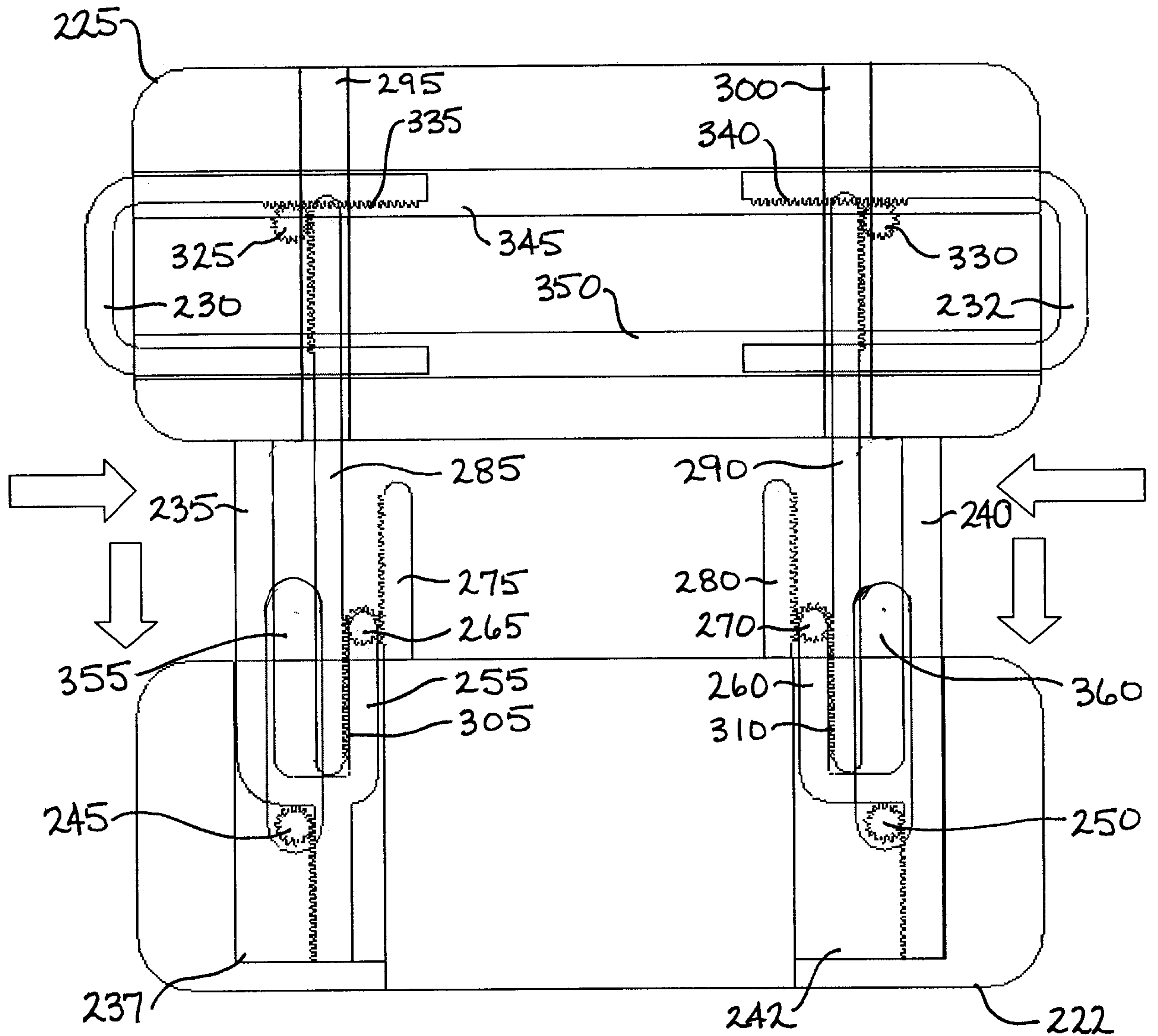


Fig. 12

RAIL DOWN

# 3 POSITION TELESCOPING SIDERAIL

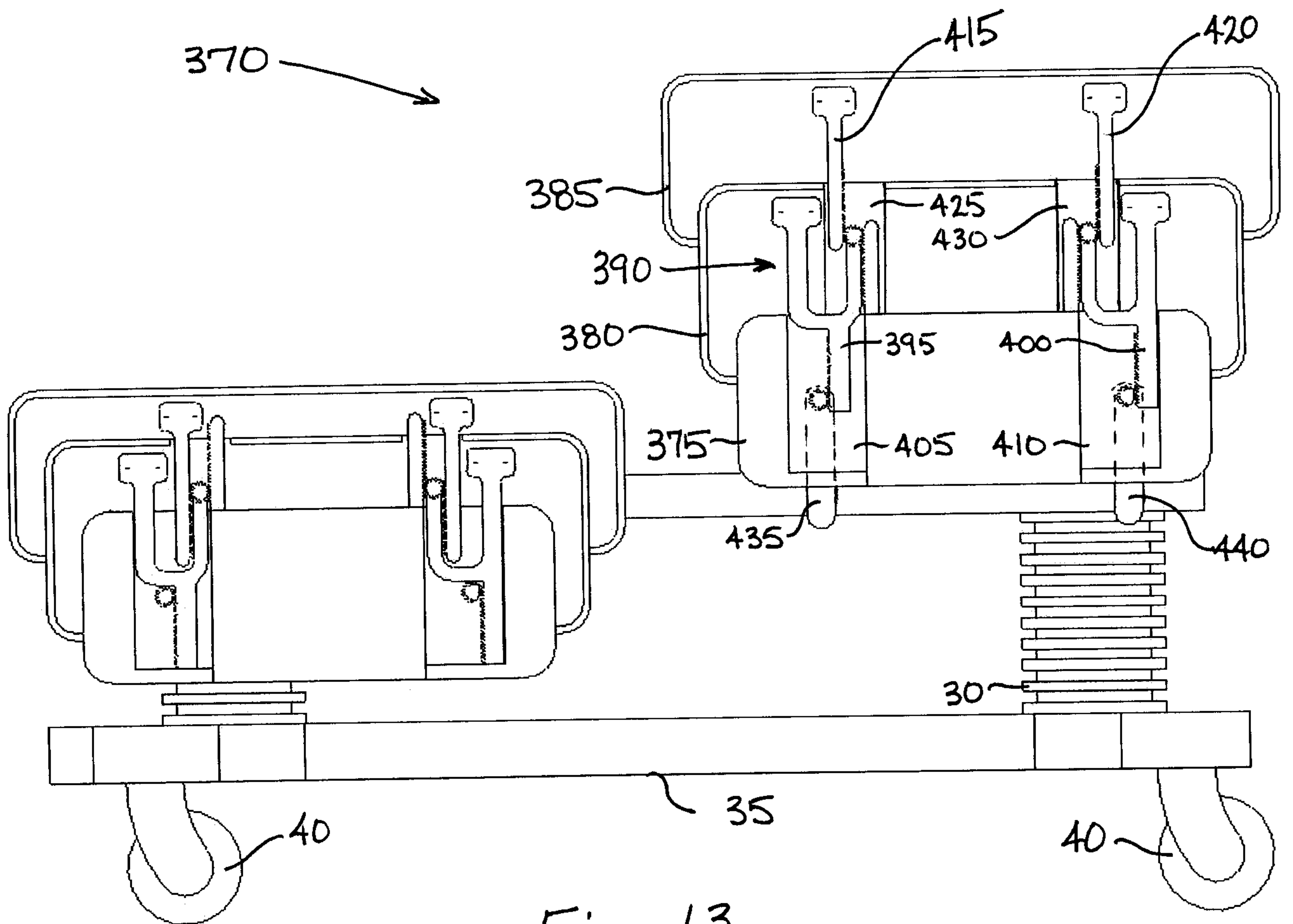


Fig. 13

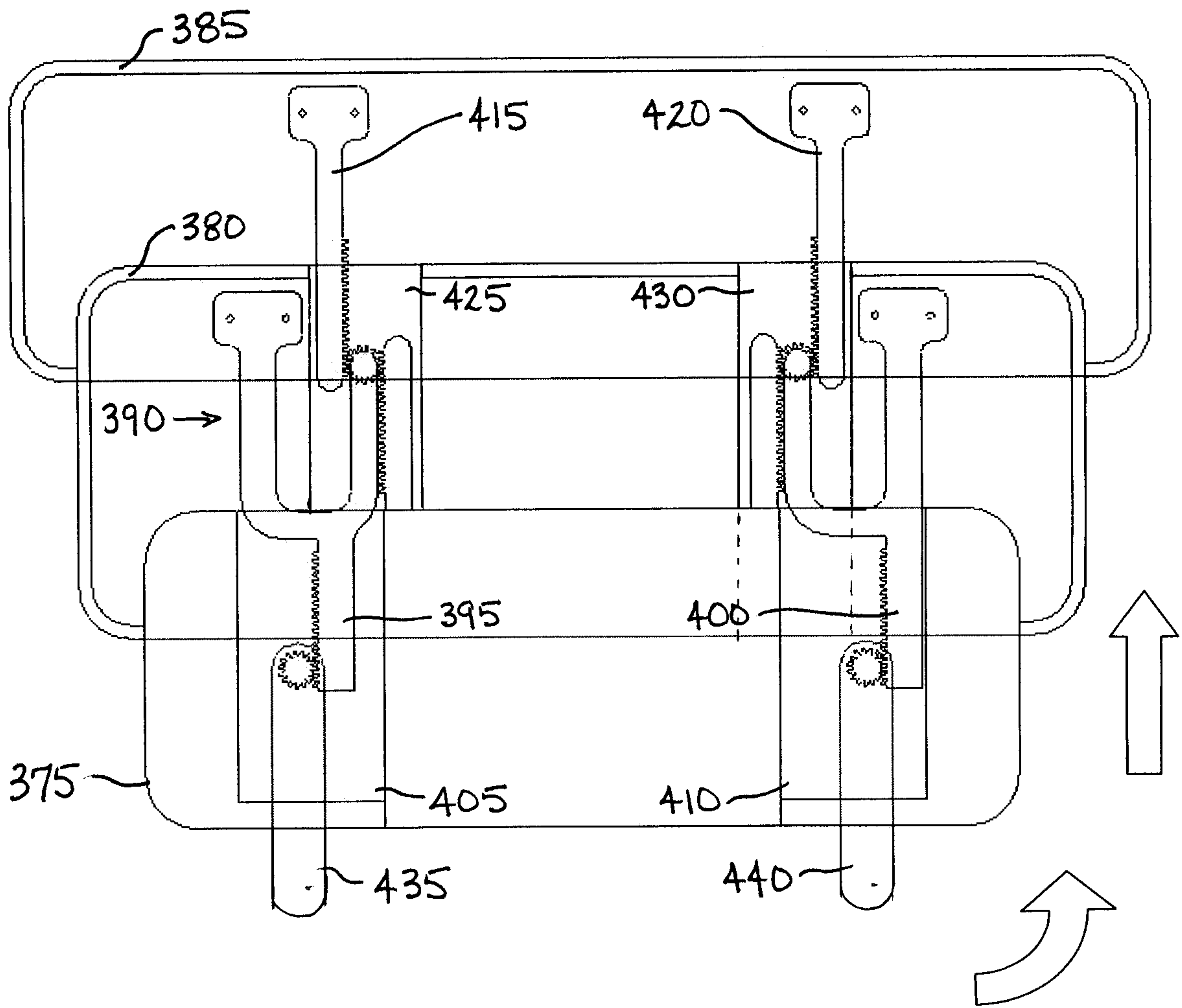


Fig. 14

SIDERAIL UP

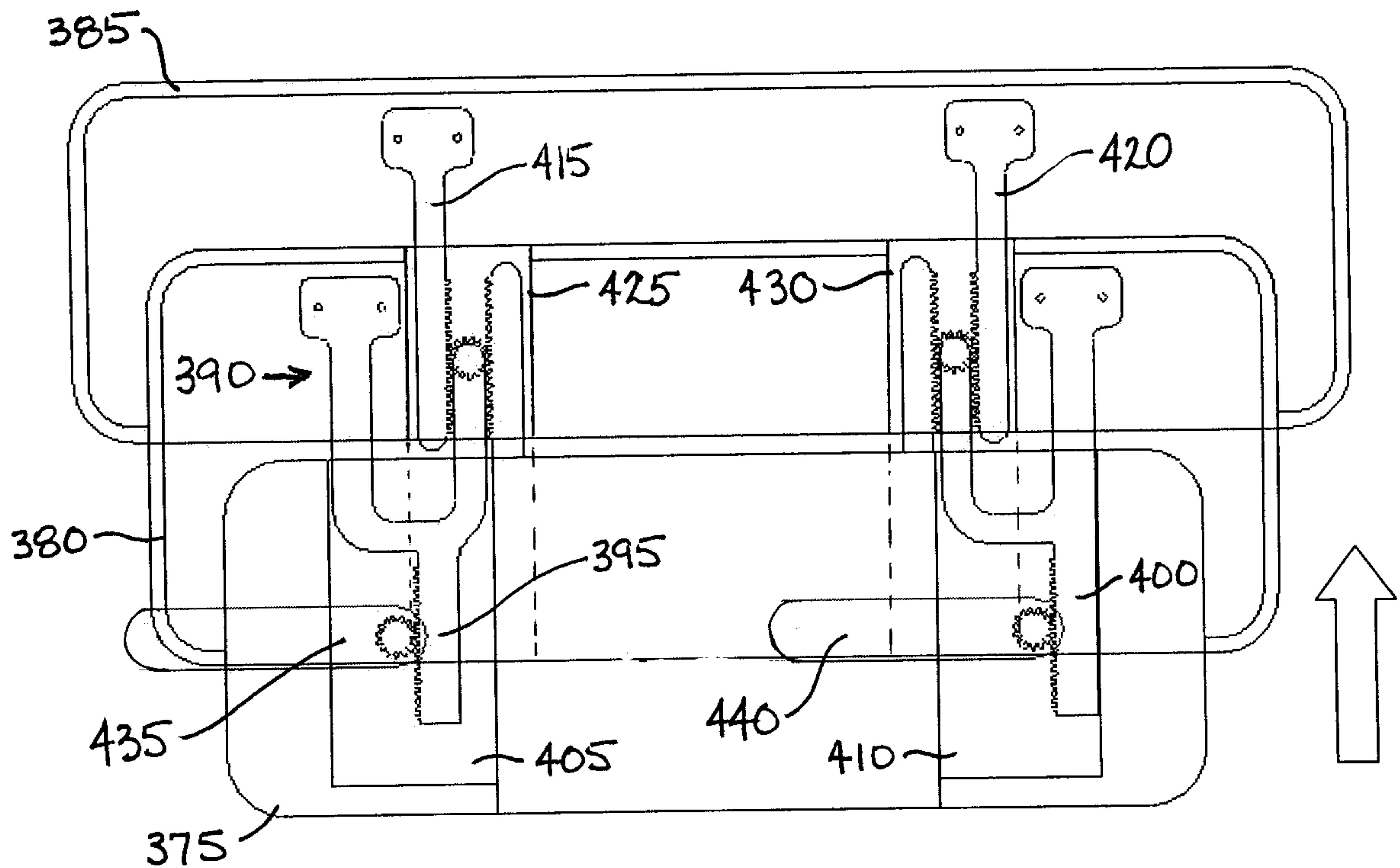


Fig. 15

SIDERAIL IN MIDDLE

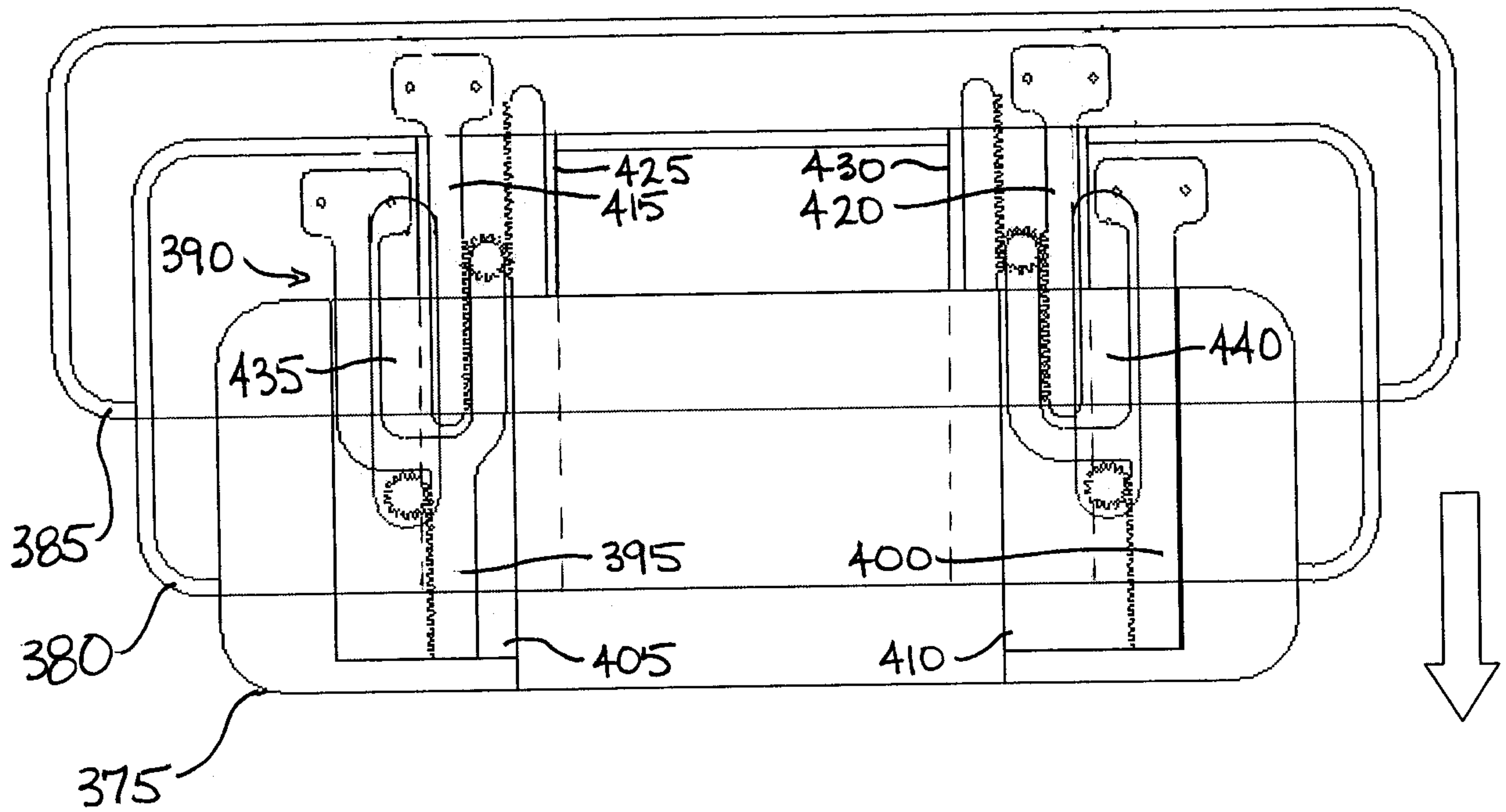
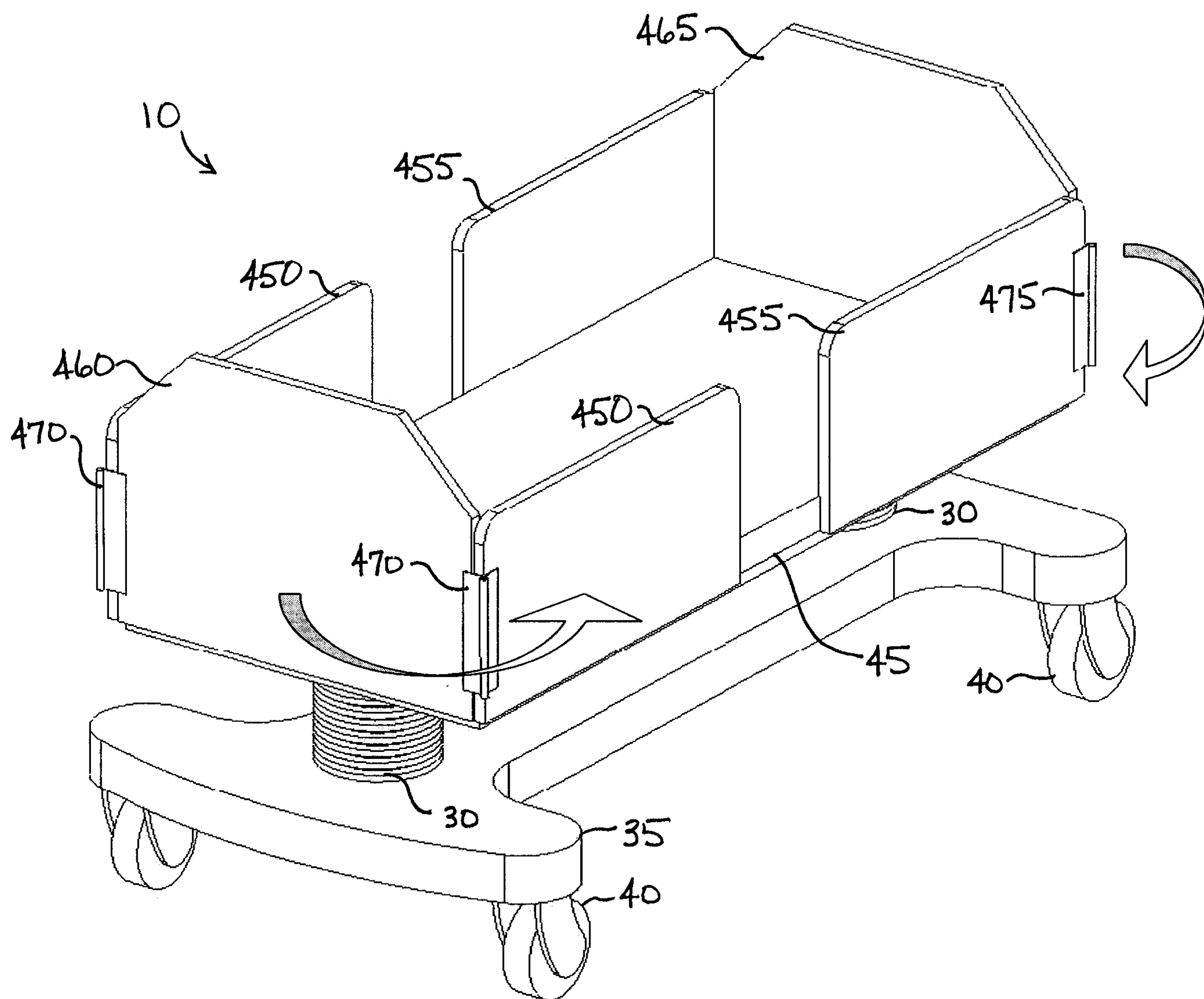


Fig. 16

SIDERAIL DOWN

# HINGED GAP FILLERS



*Fig. 17*

DOORS CLOSED

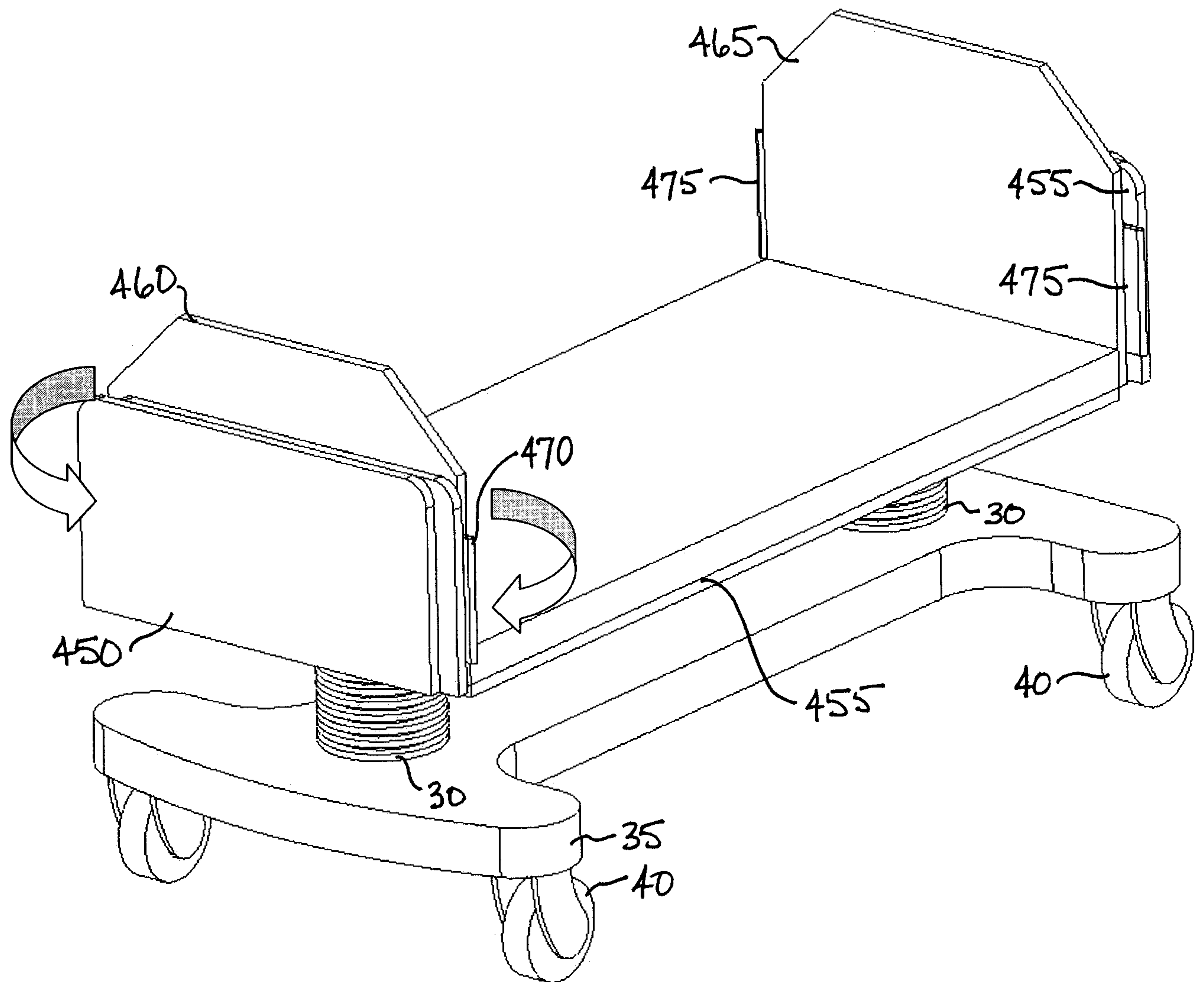


Fig. 18

DOORS OPEN



# ROTATING GAP FILLER PIVOT AT TOP OF FILLER

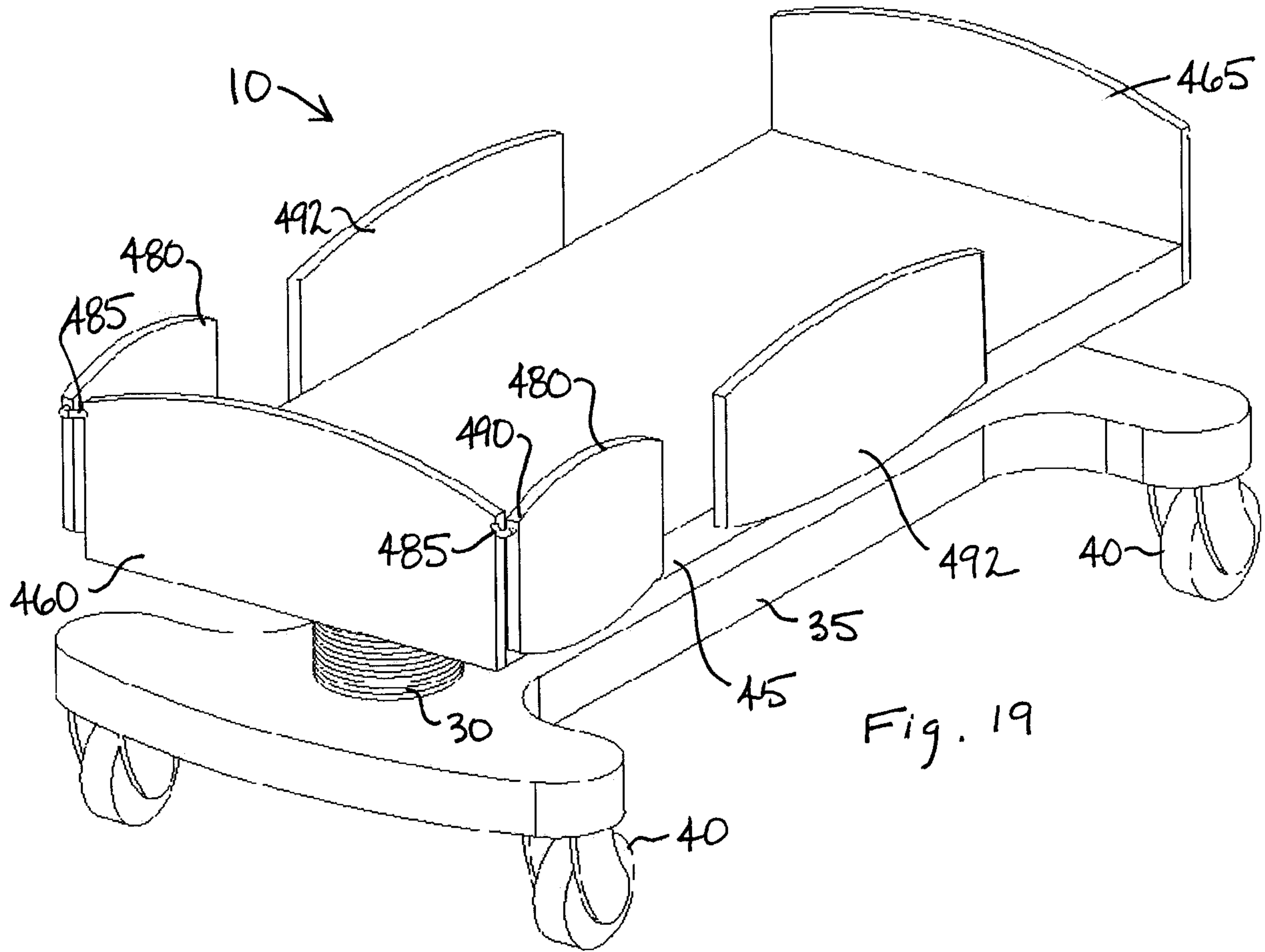


Fig. 19

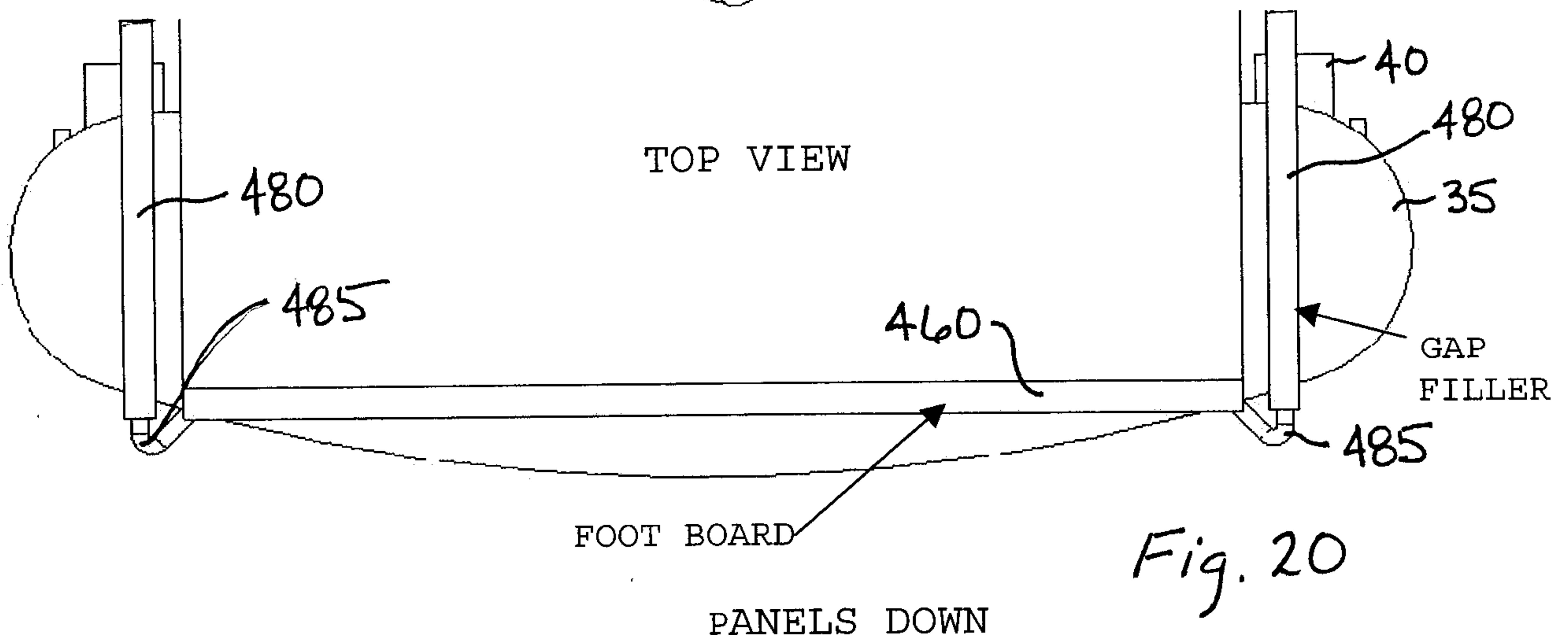


Fig. 20

CORNER VIEW

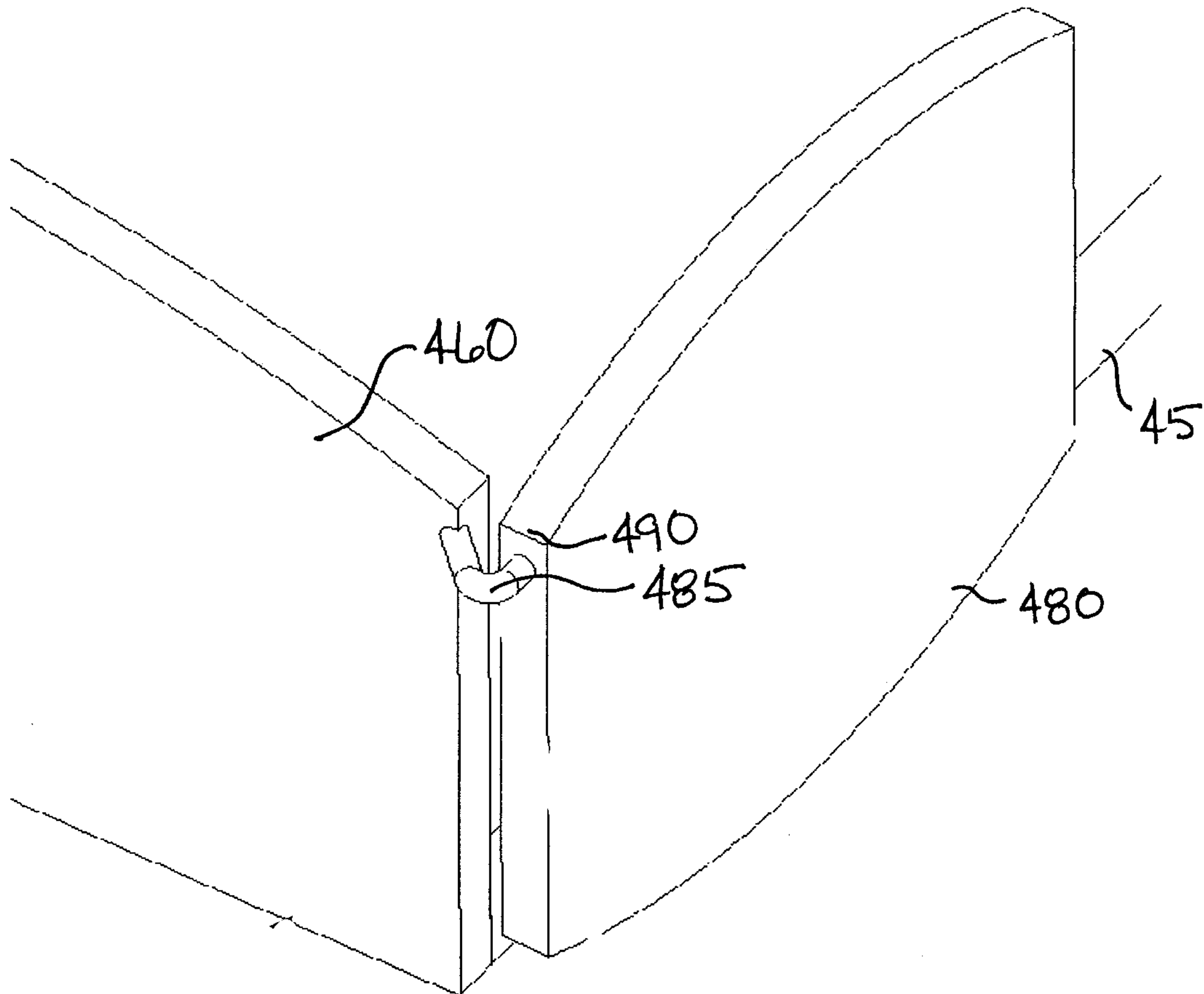
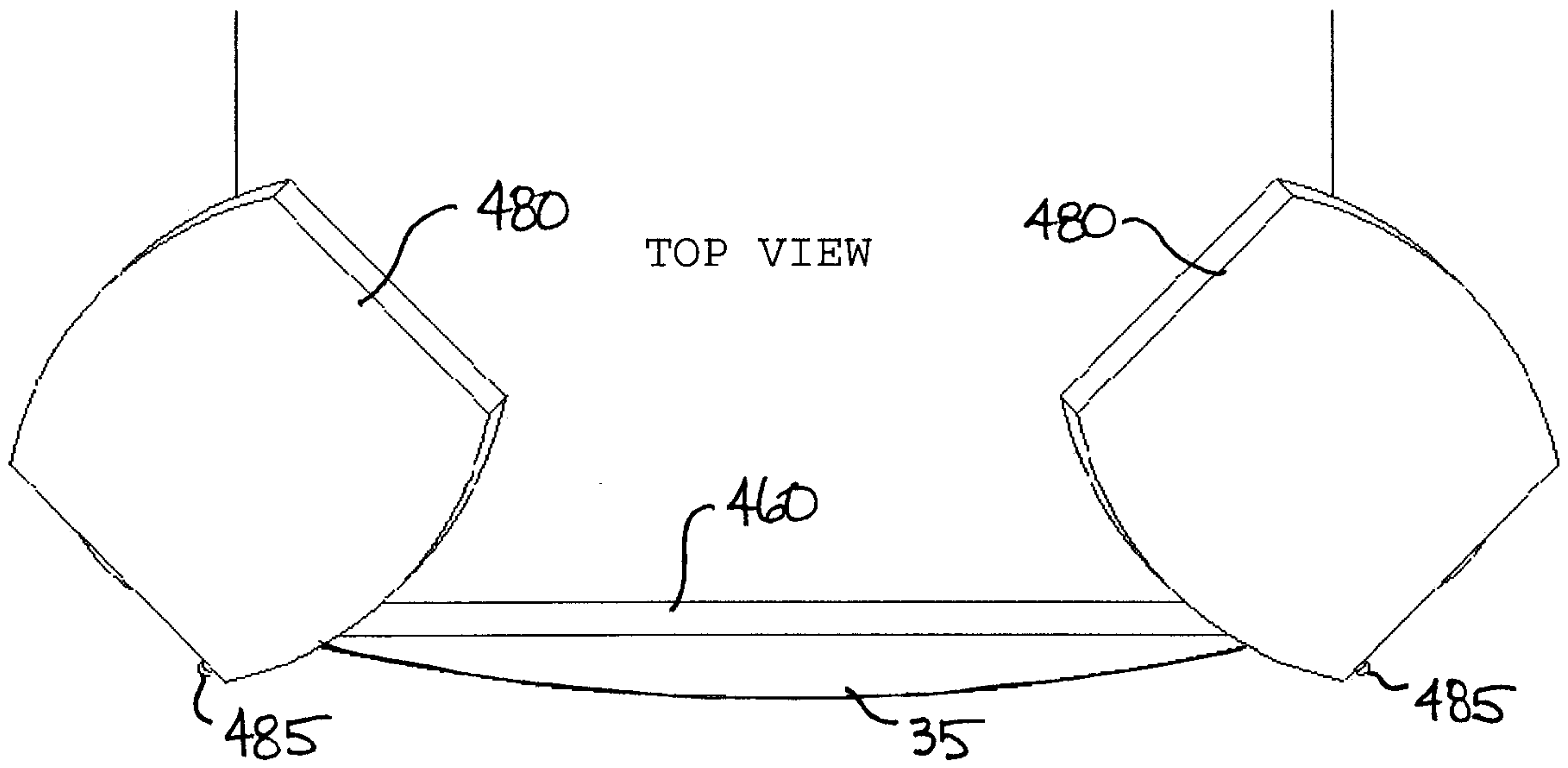
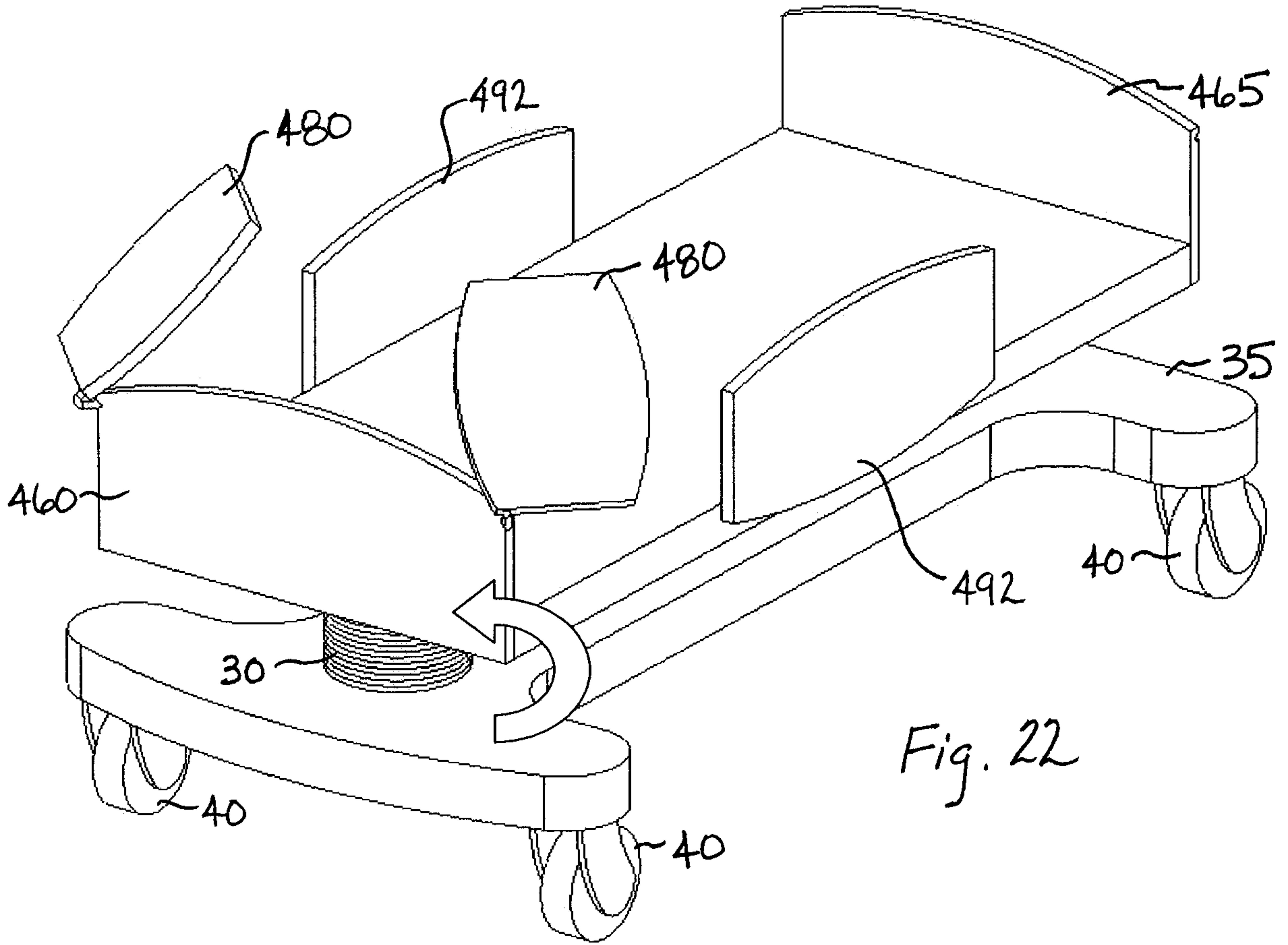


Fig. 21



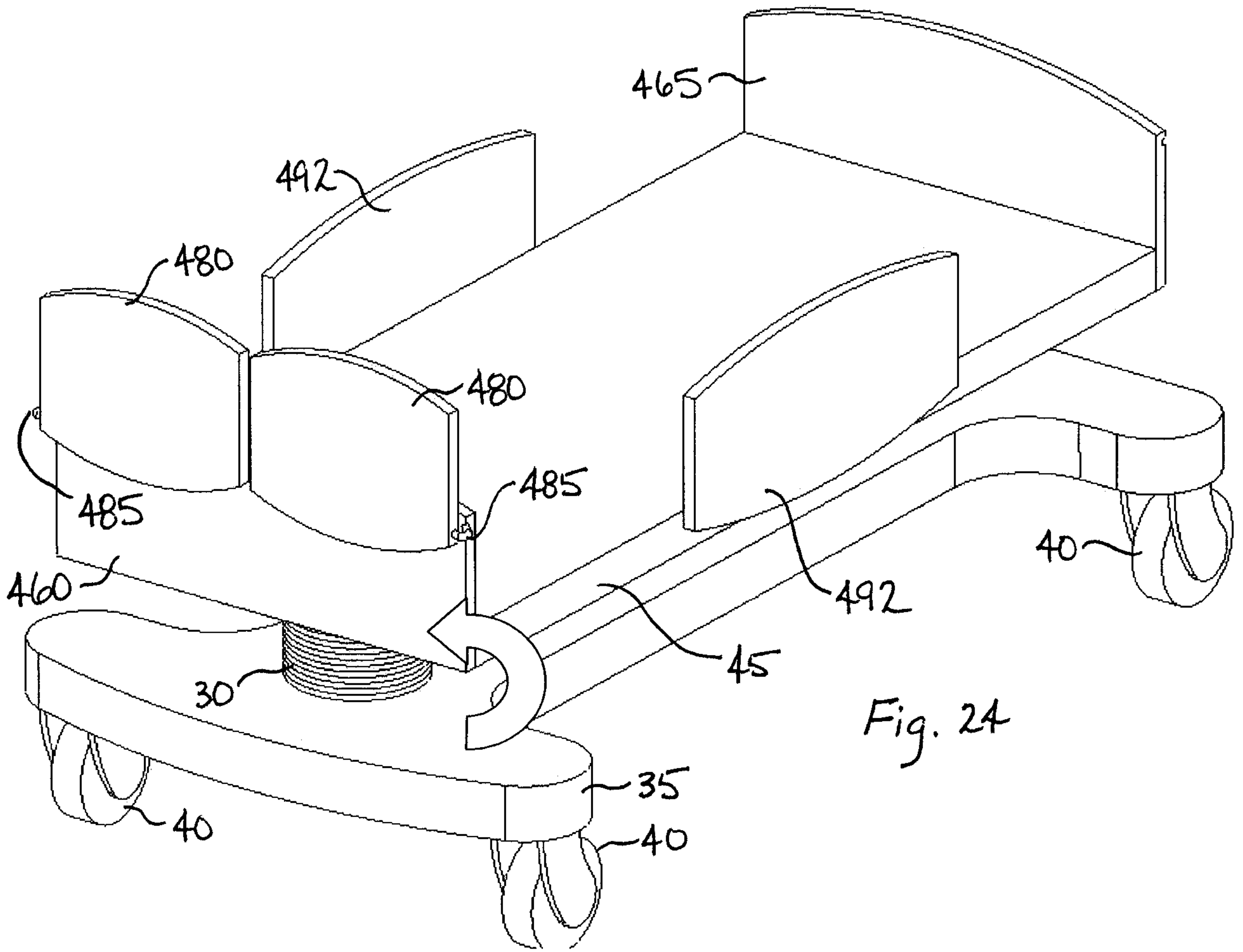
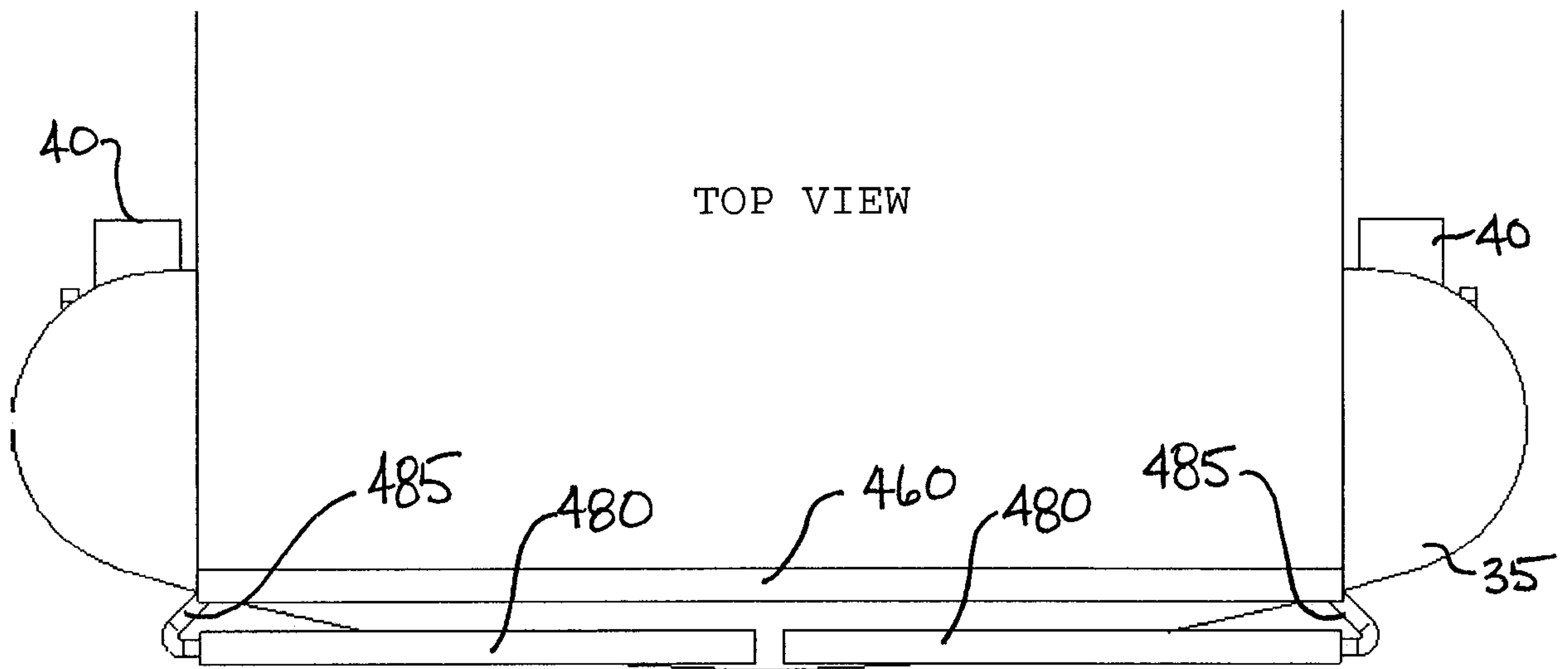


Fig. 24



TOP VIEW

Fig. 25

# ROTATING GAP FILLER

## PIVOT IN MIDDLE OF FILLER

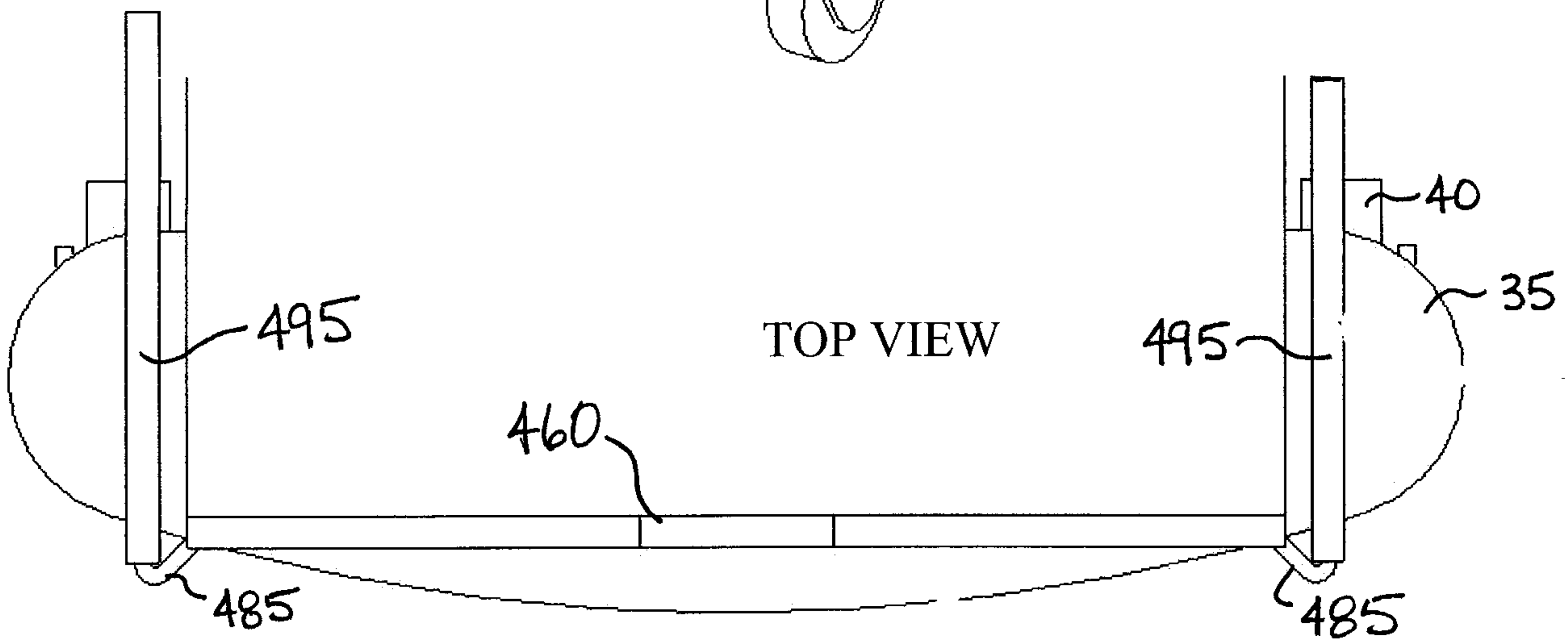
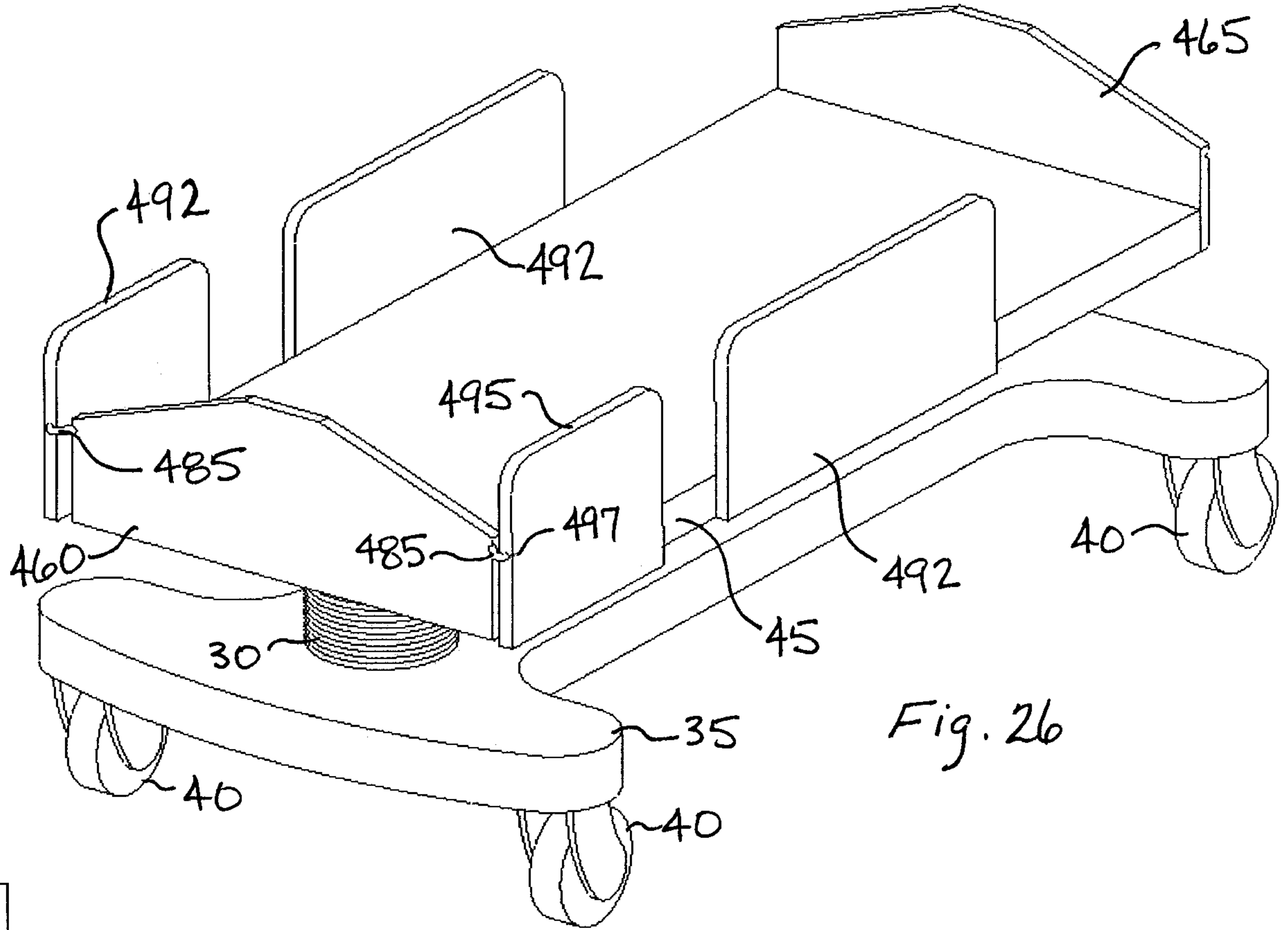


Fig. 27

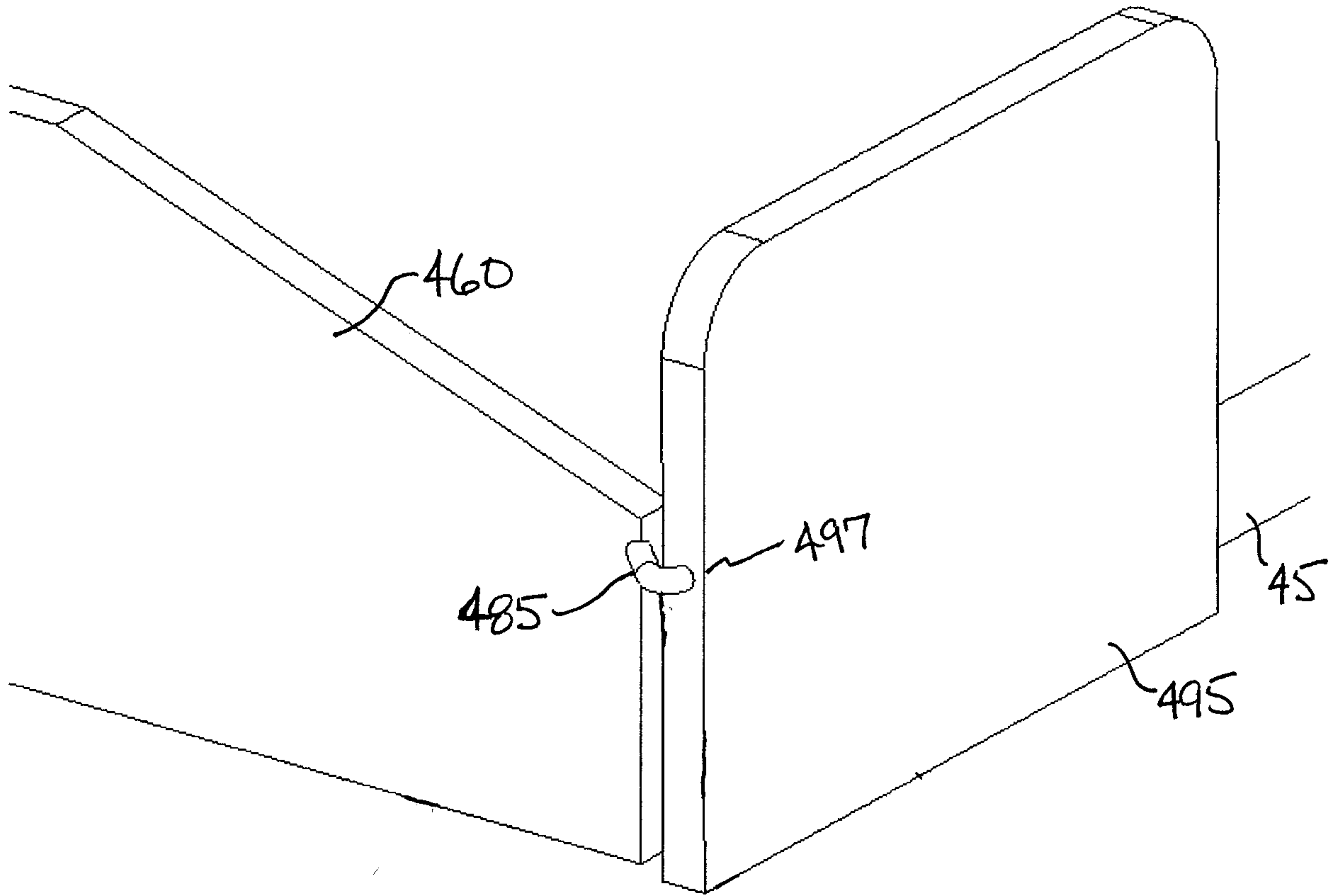
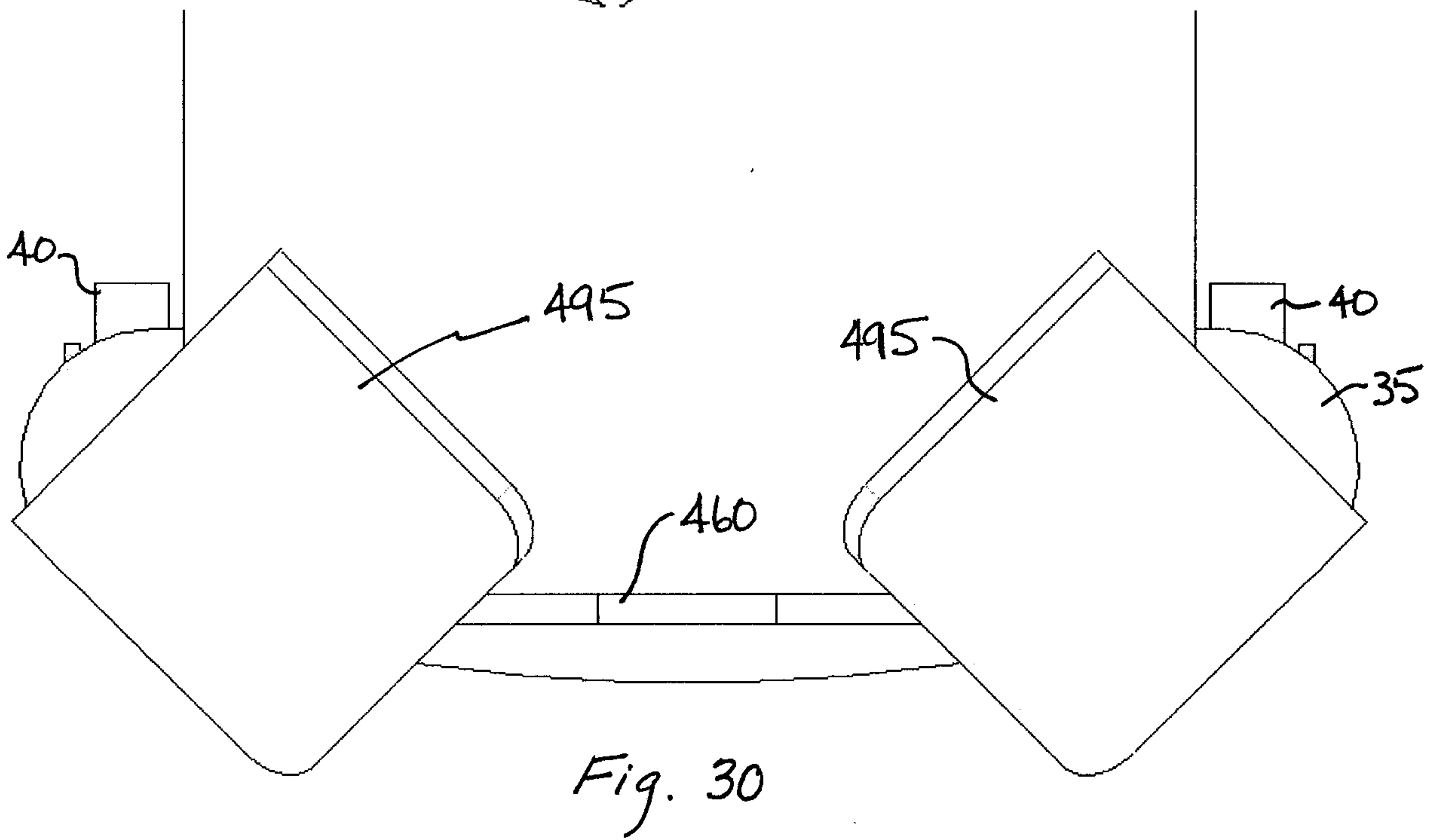
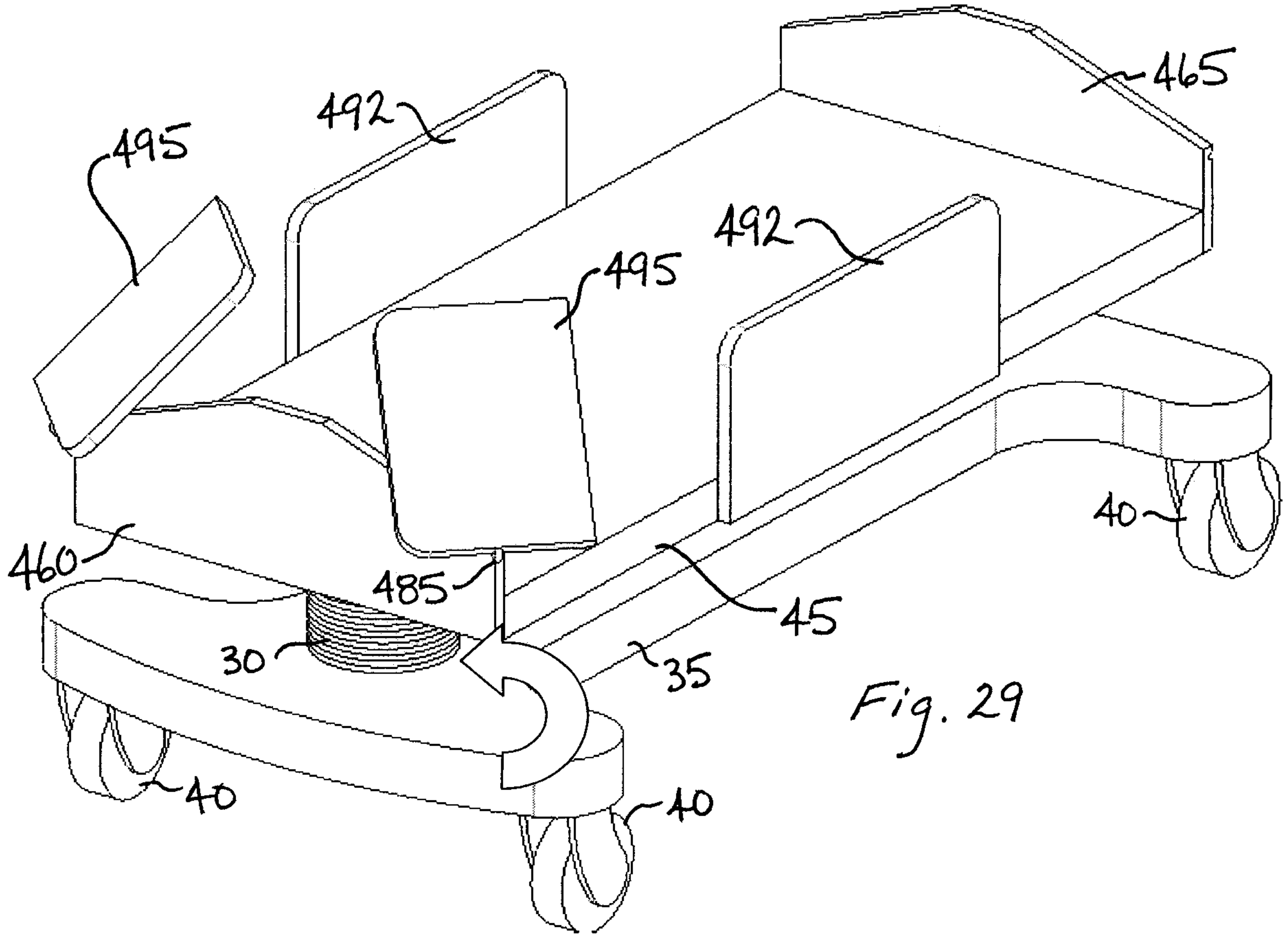


Fig. 28



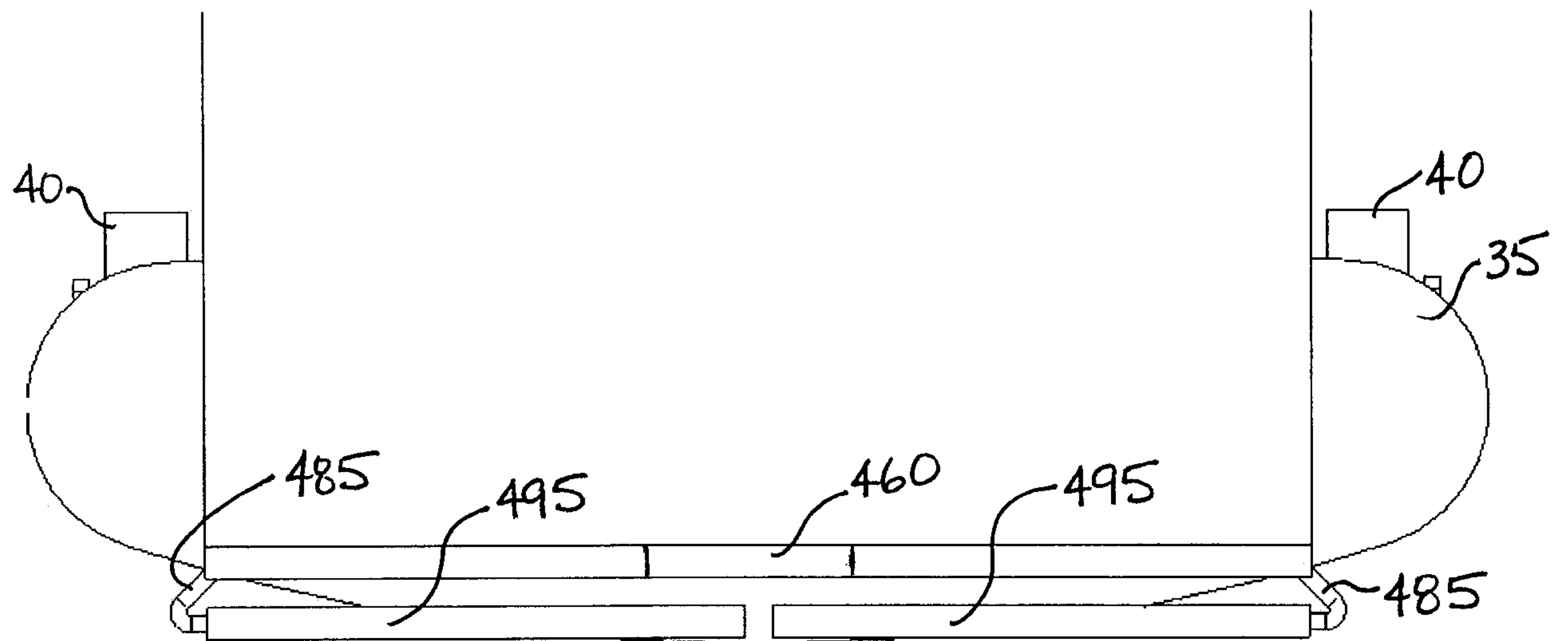
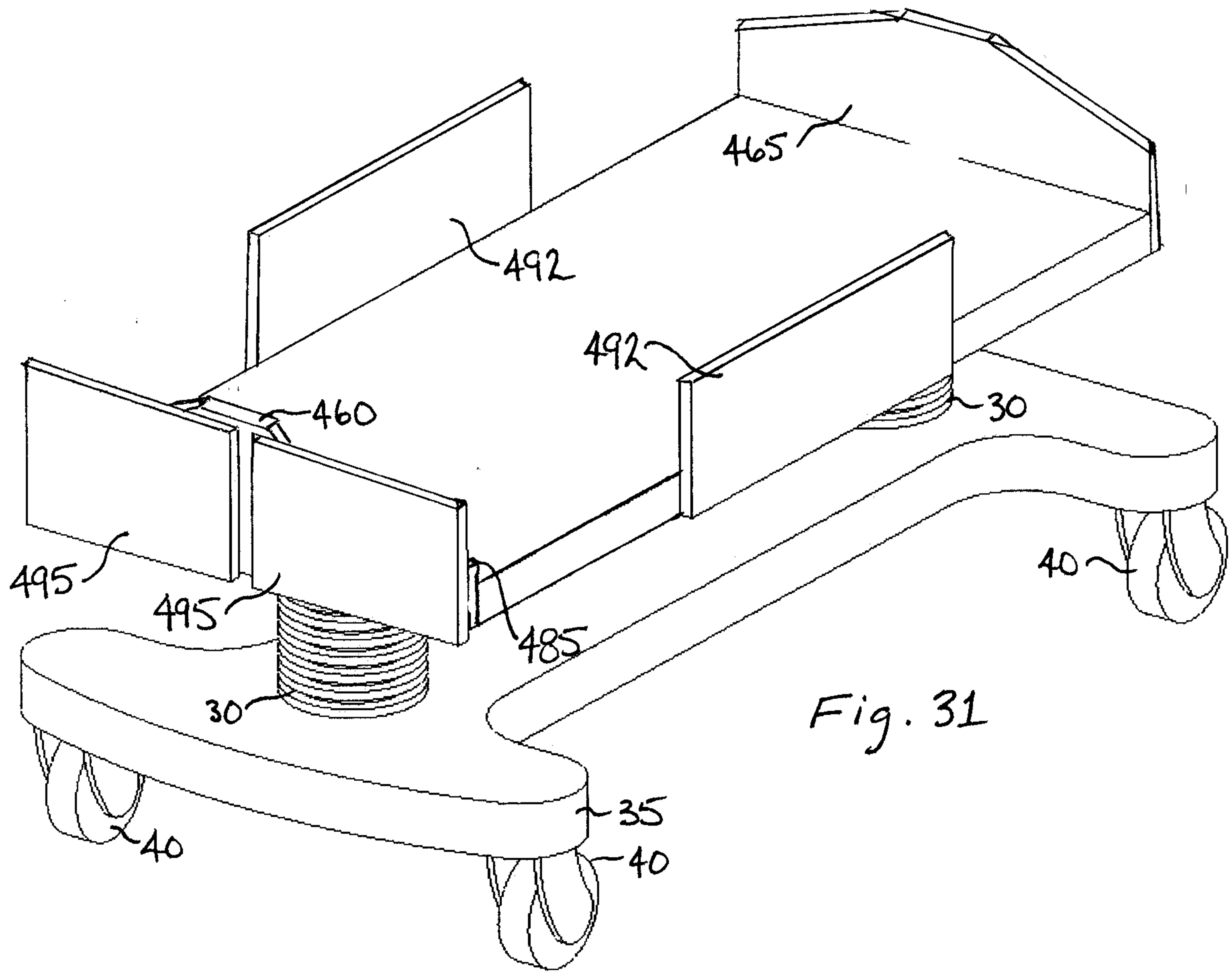


Fig. 32



# SIDERAIL MOUNTED "HINGED DOOR"

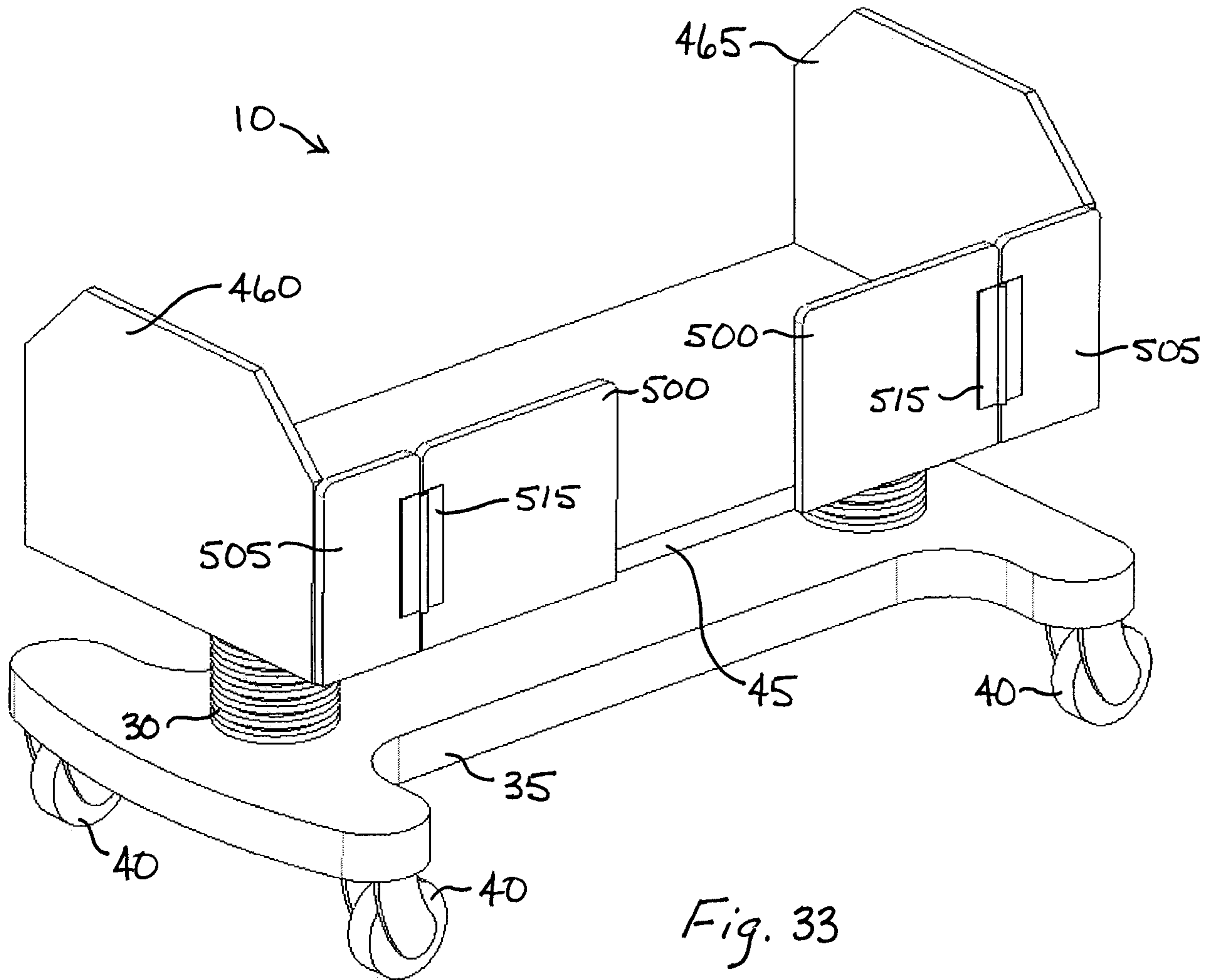
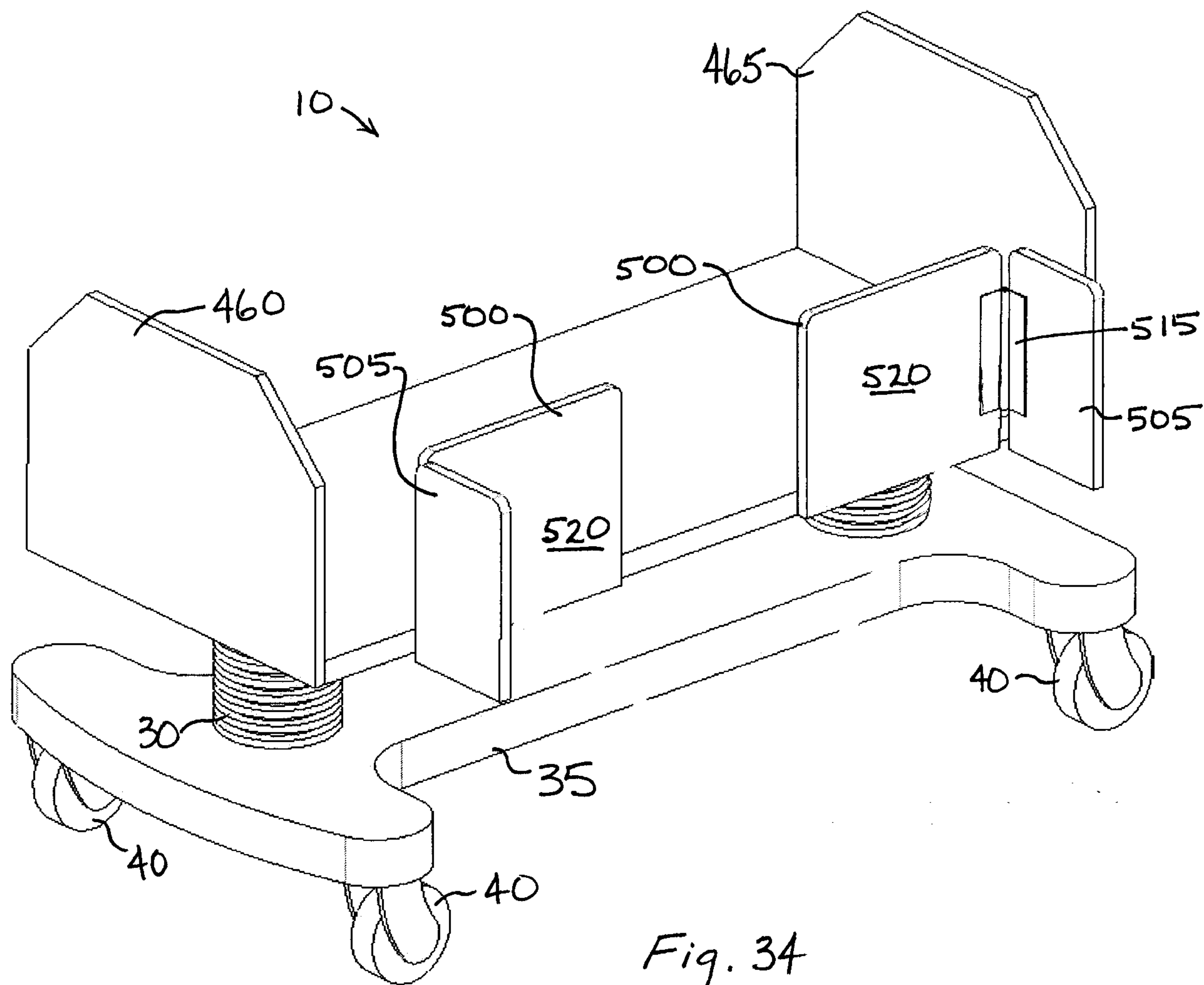


Fig. 33



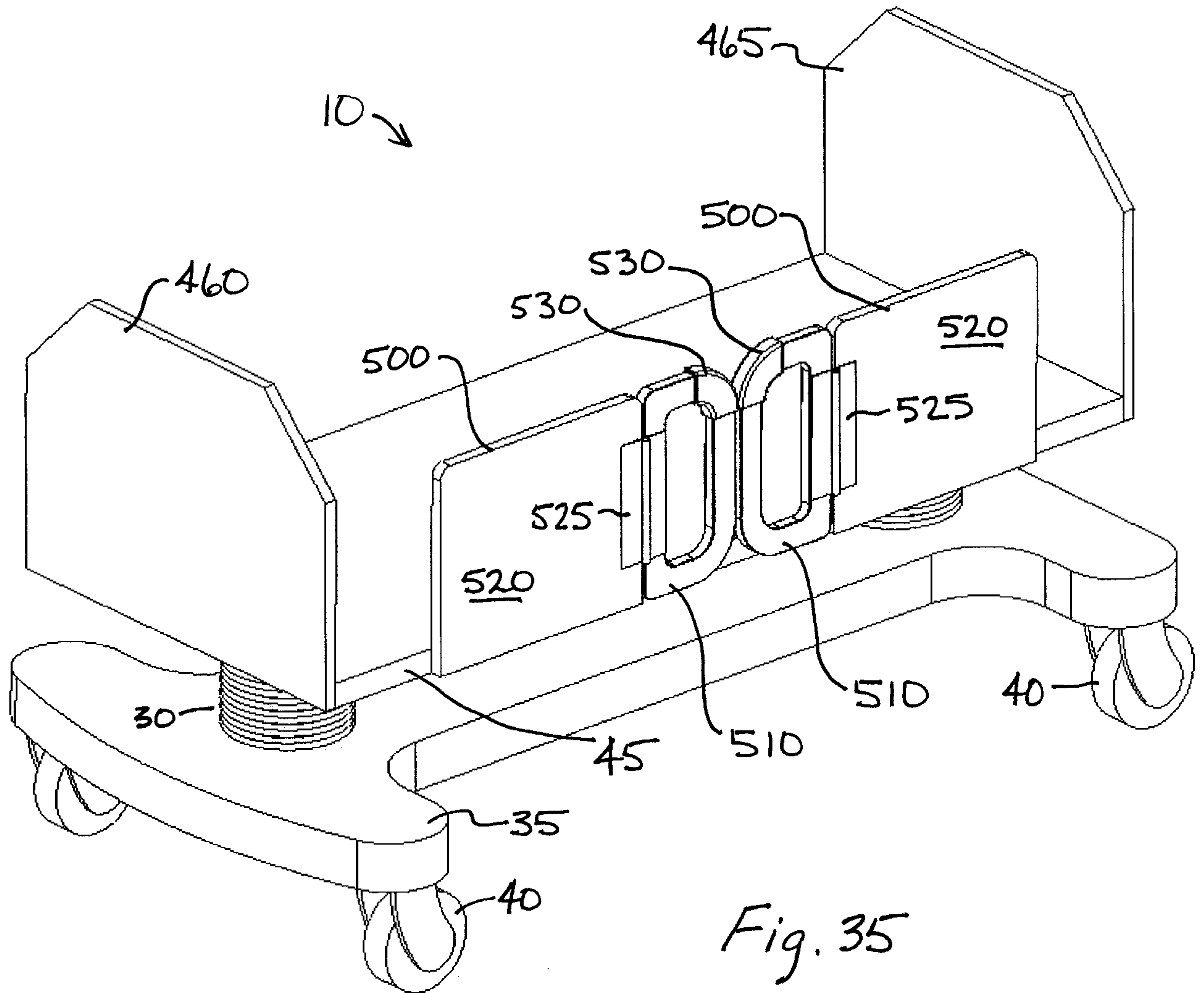


Fig. 35

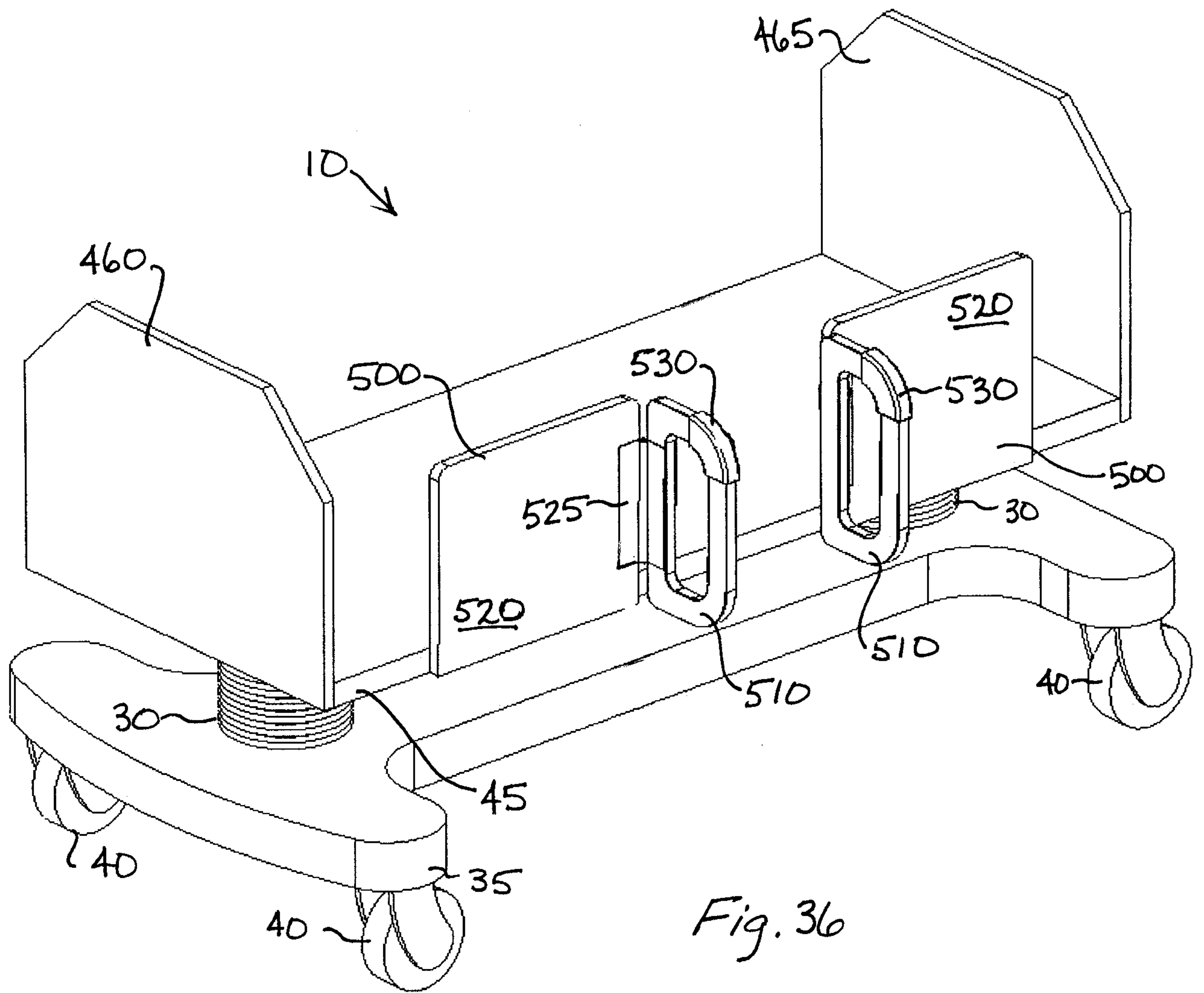


Fig. 36

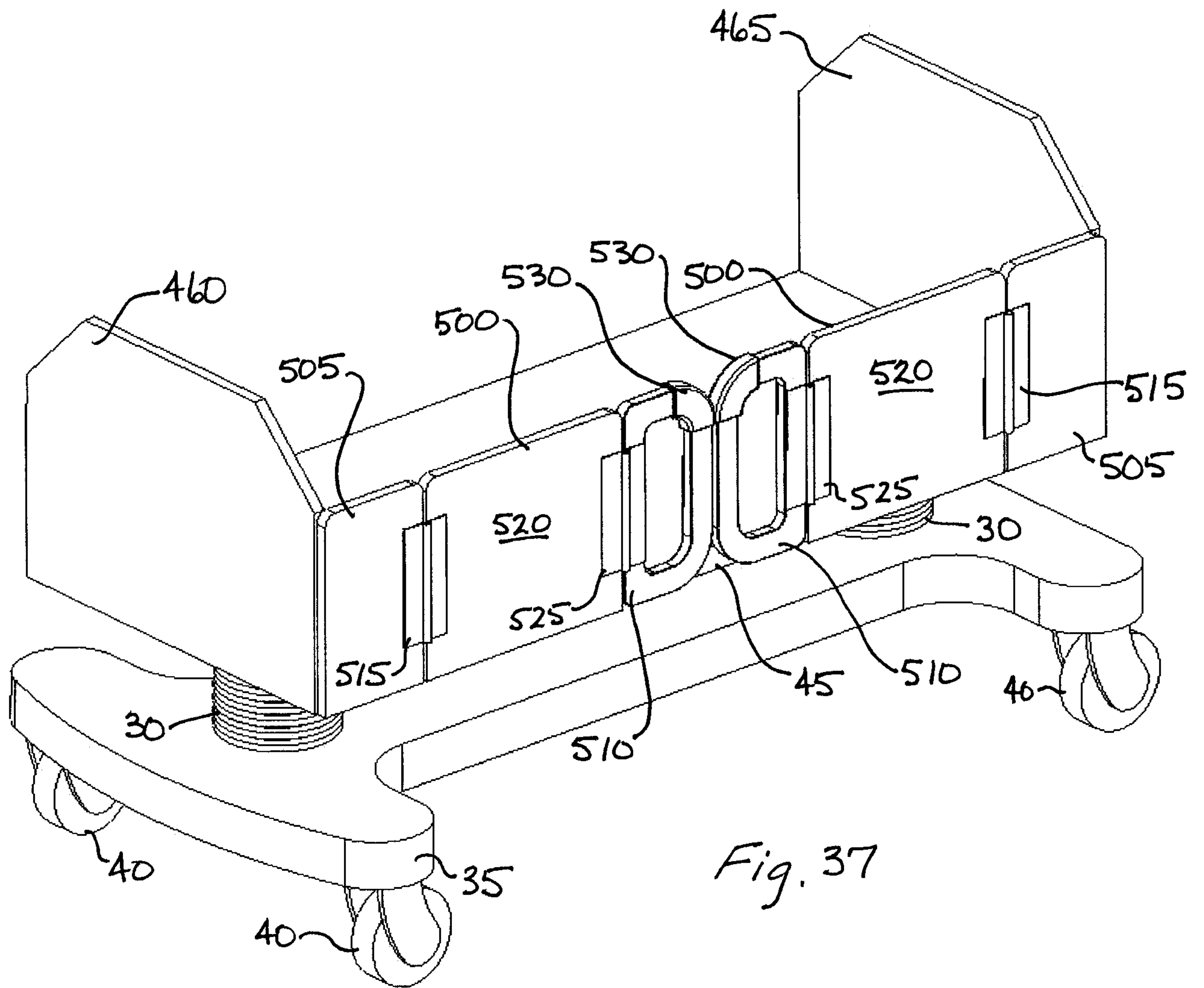


Fig. 37

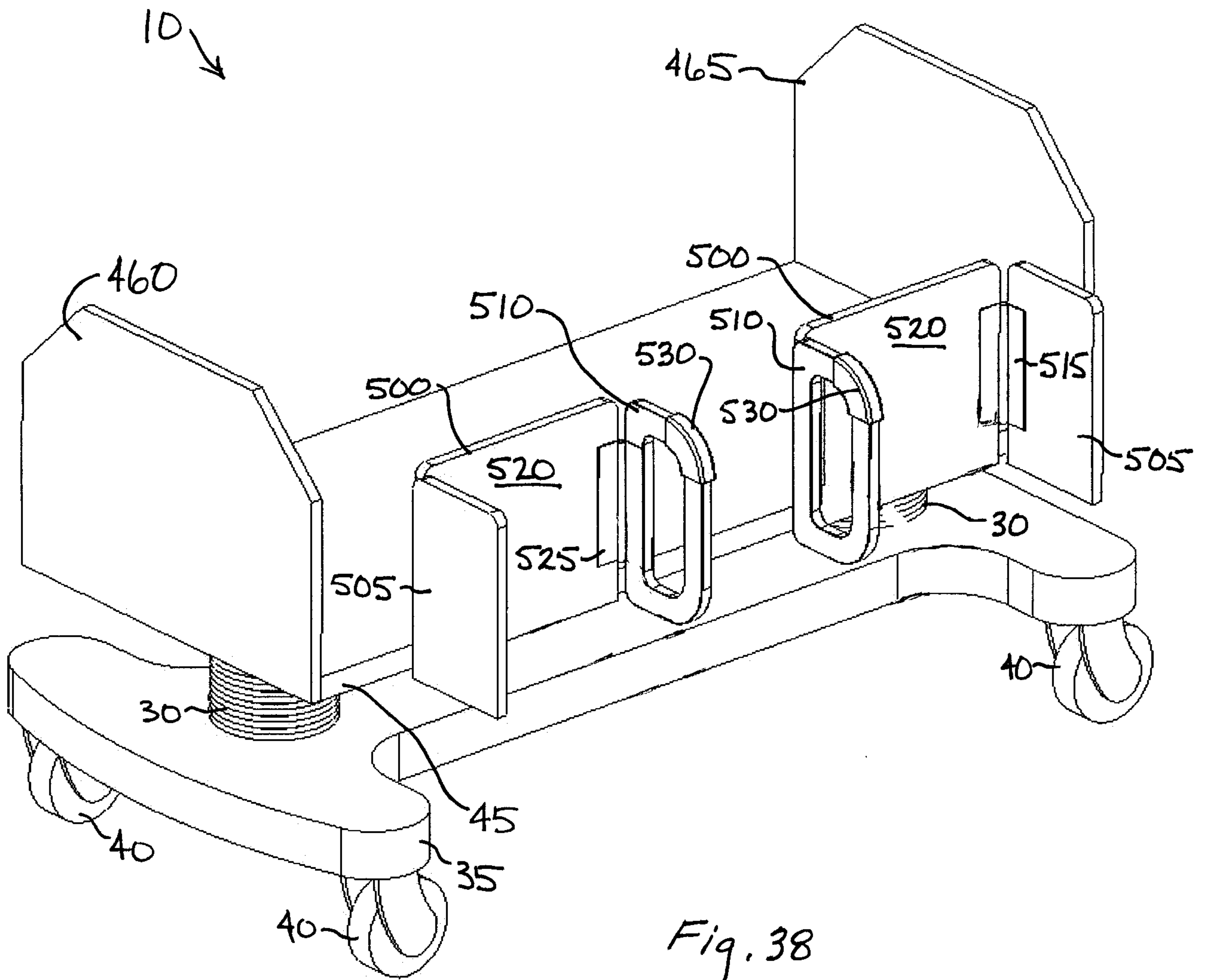


Fig. 38

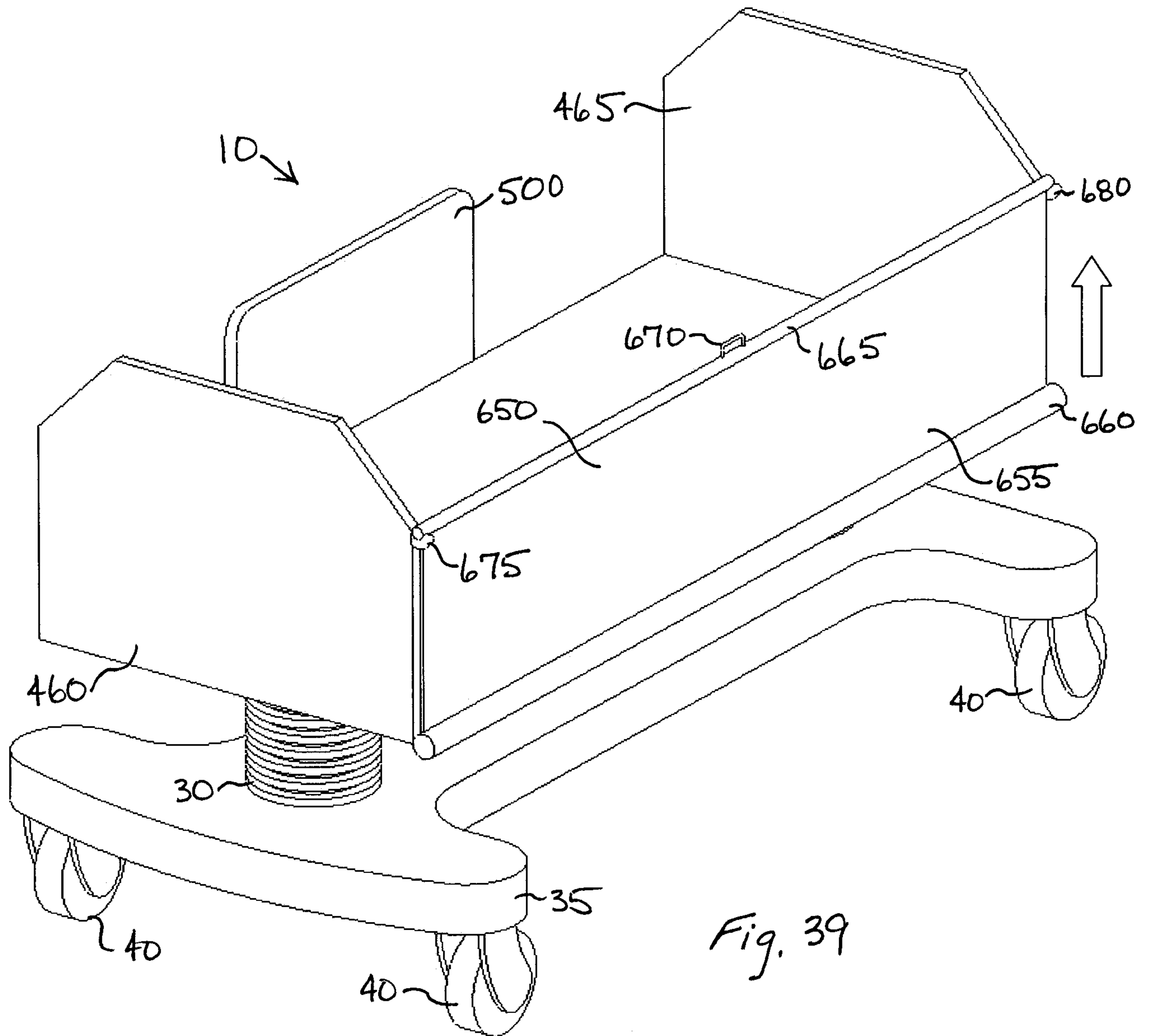


Fig. 39

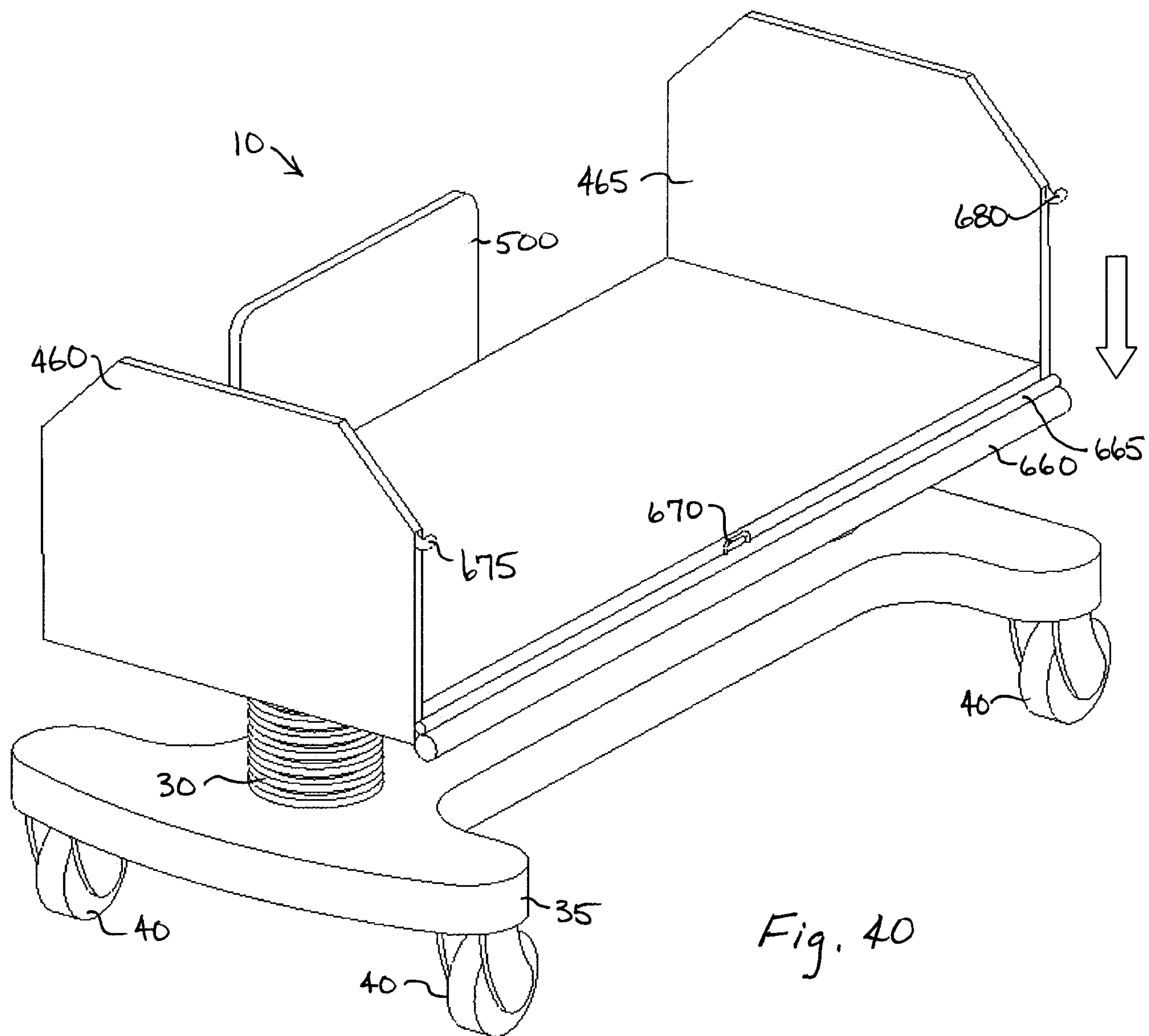
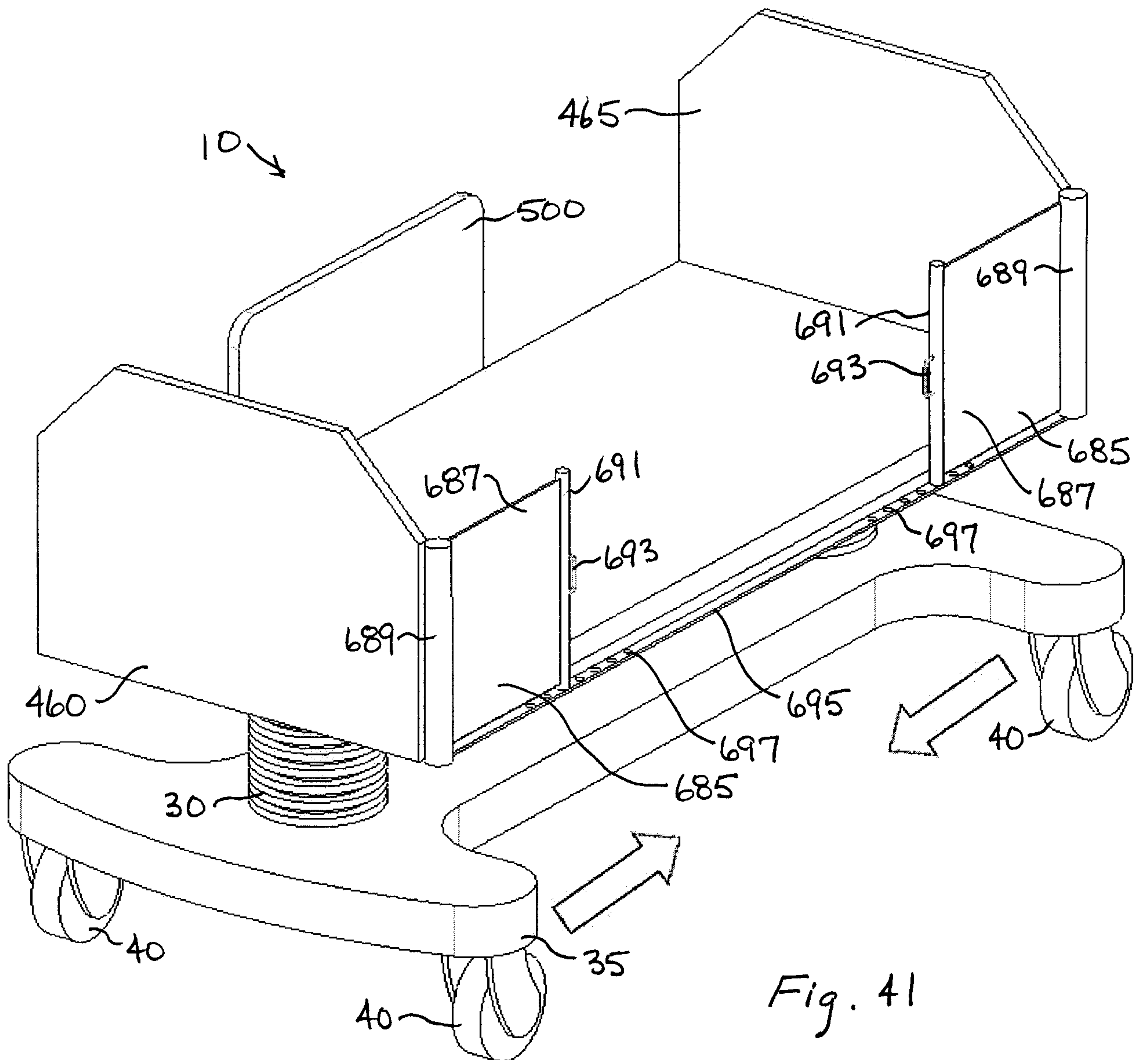
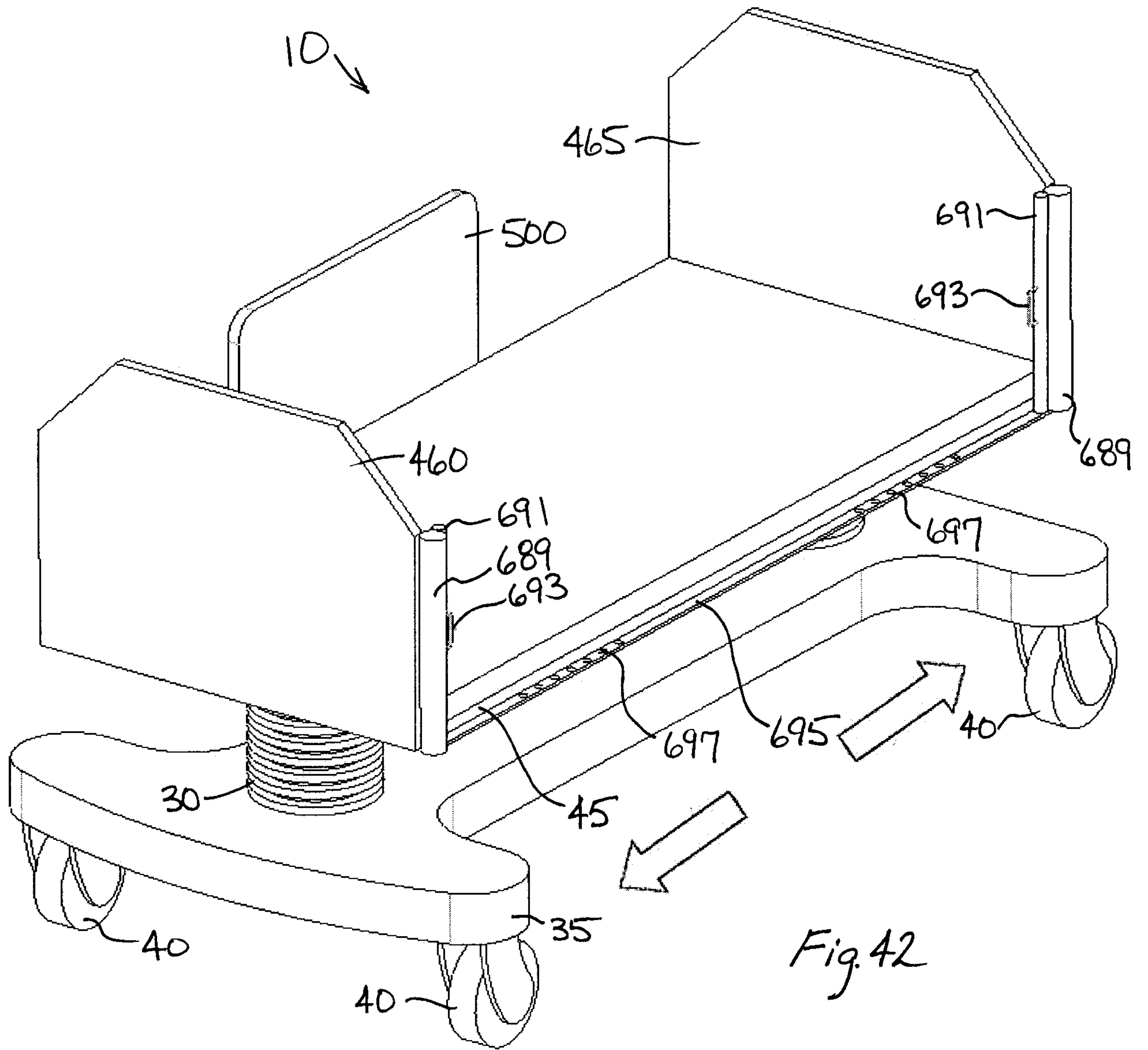
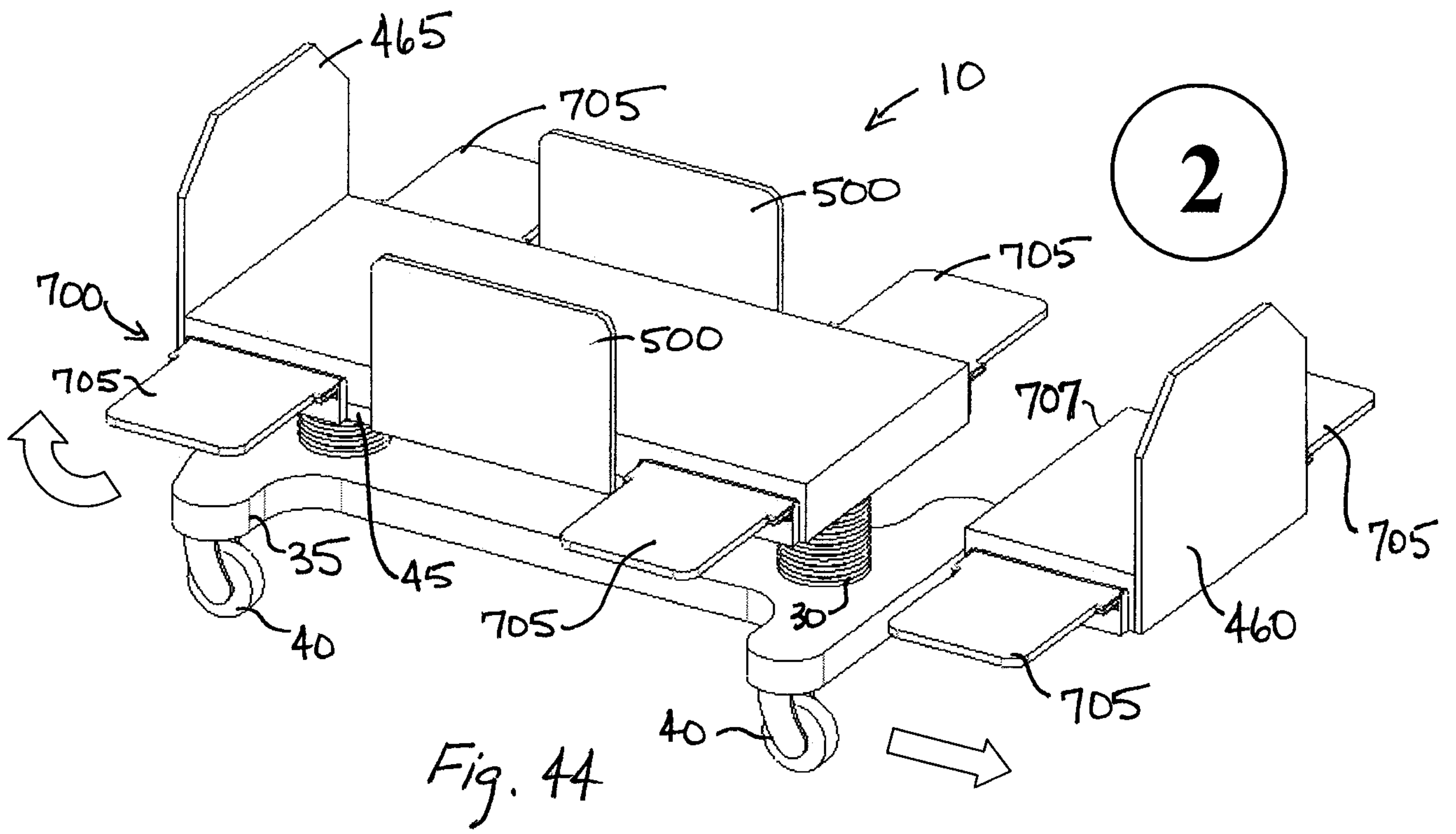
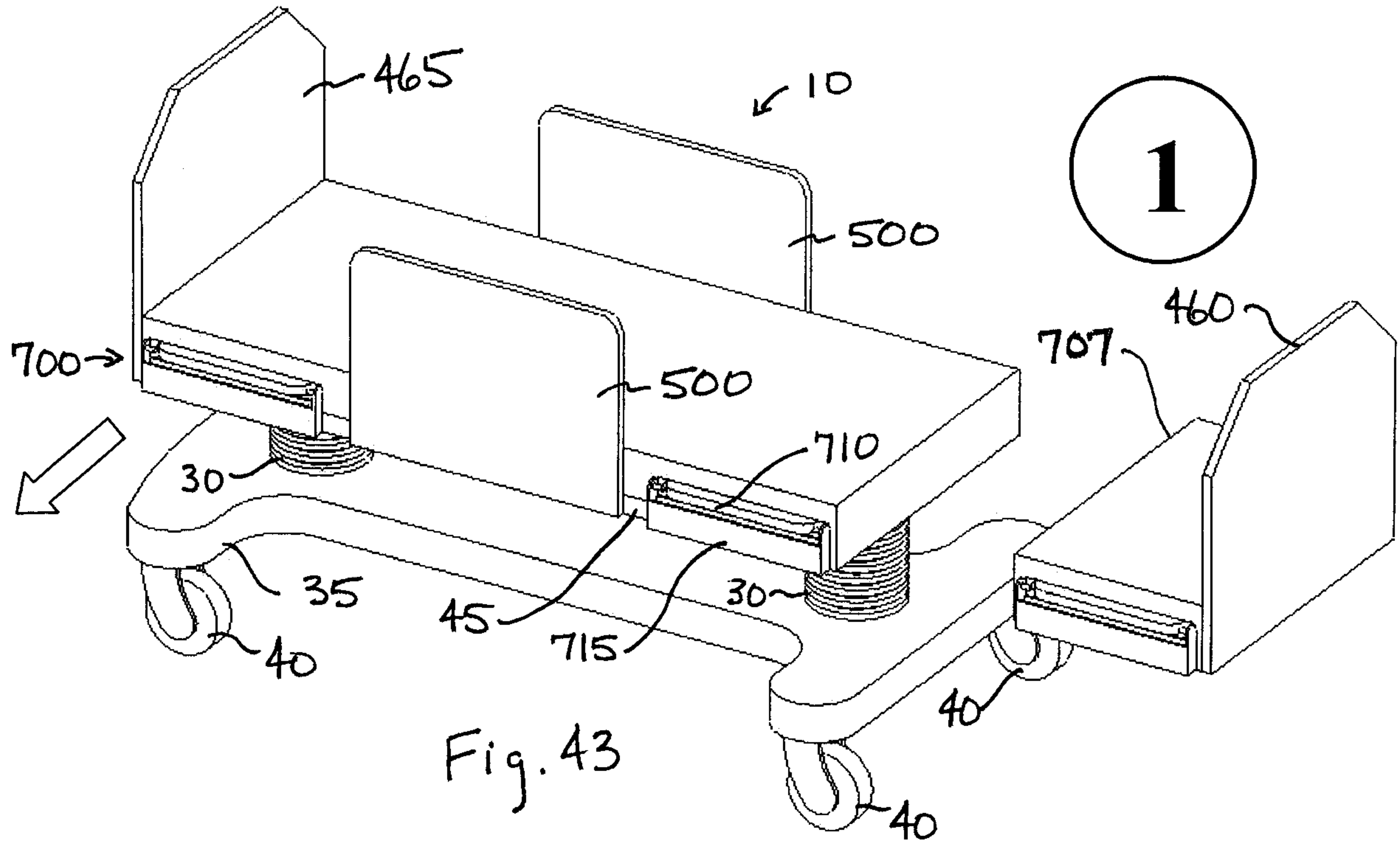


Fig. 40









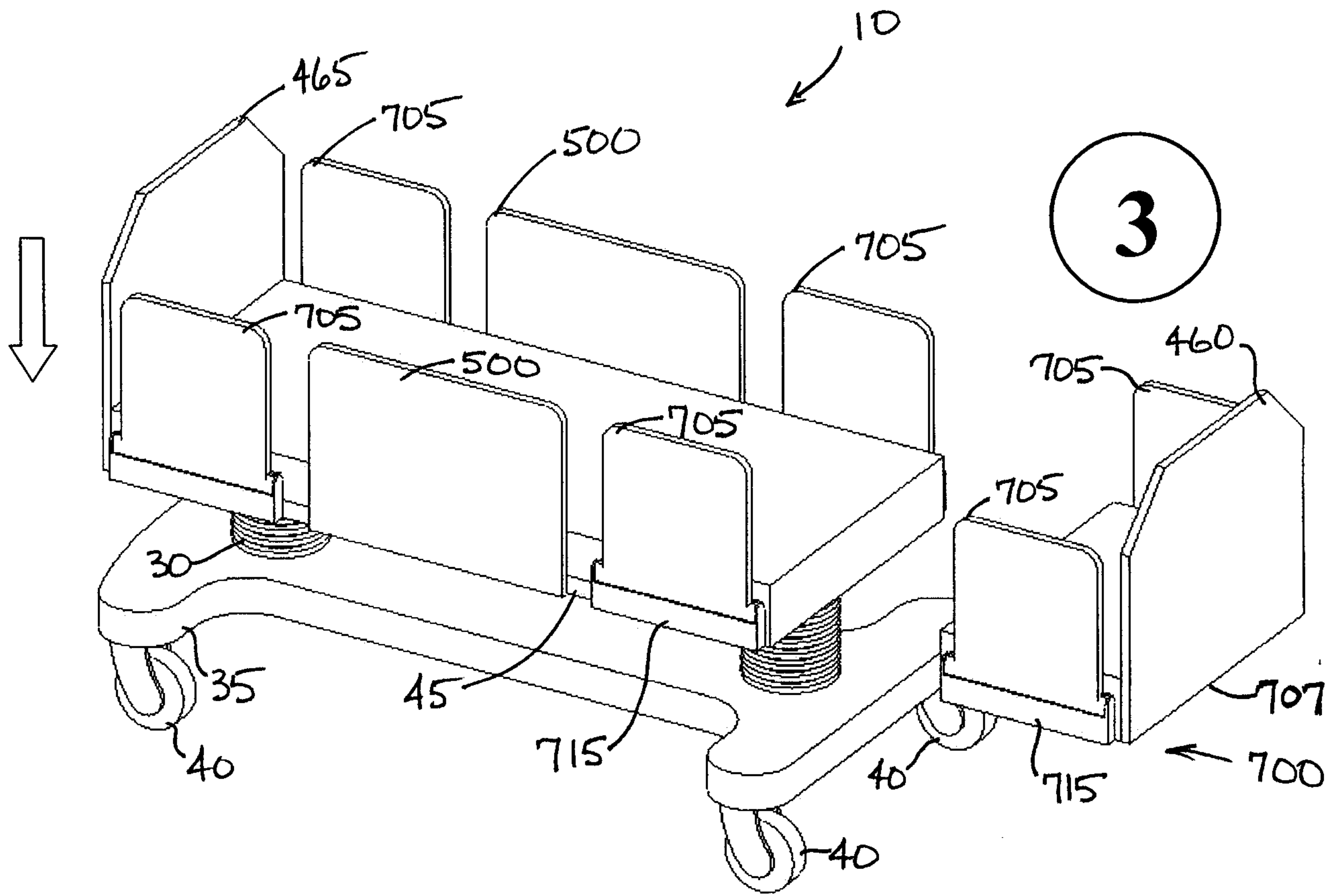


Fig. 45

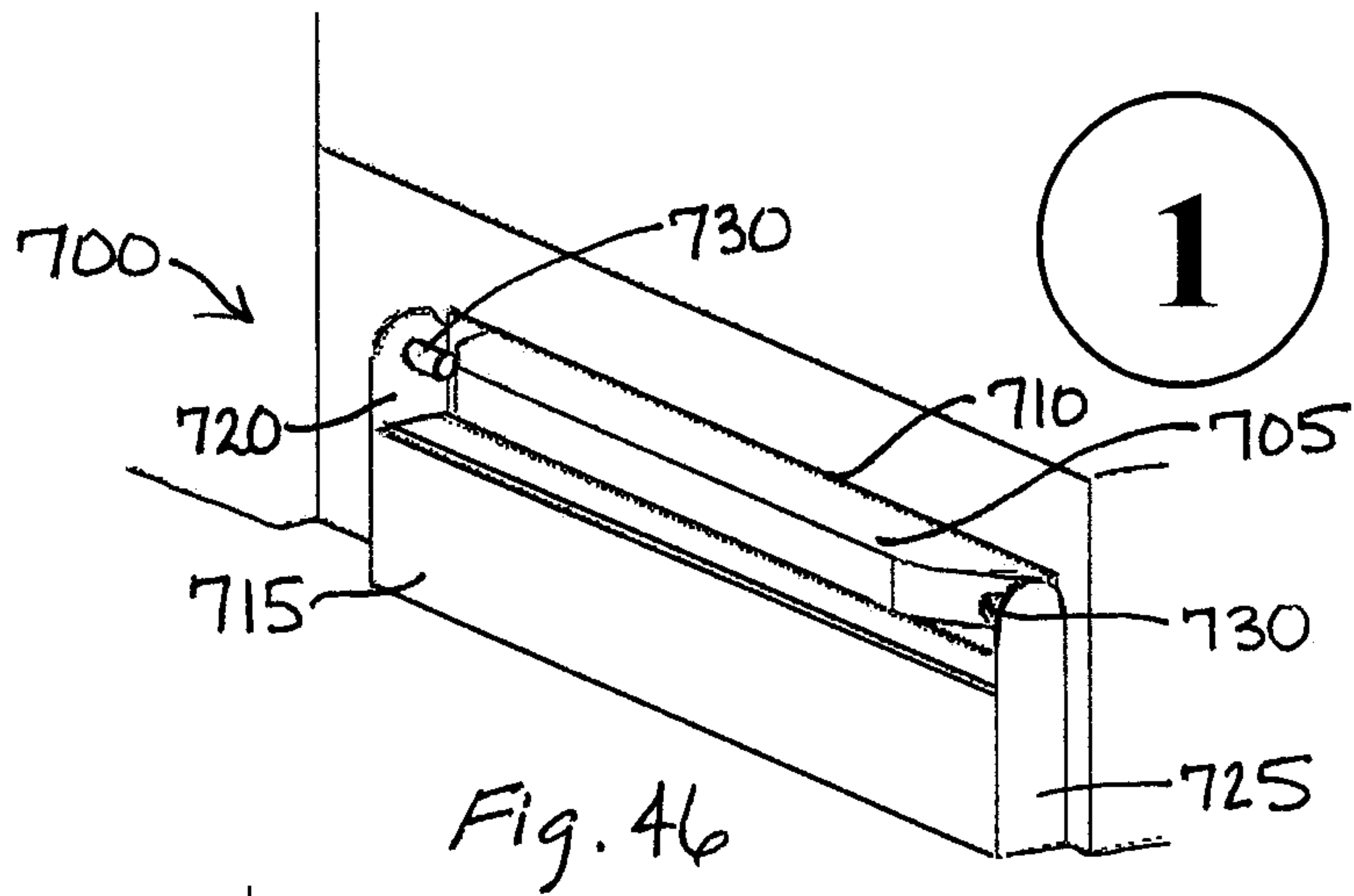


Fig. 46

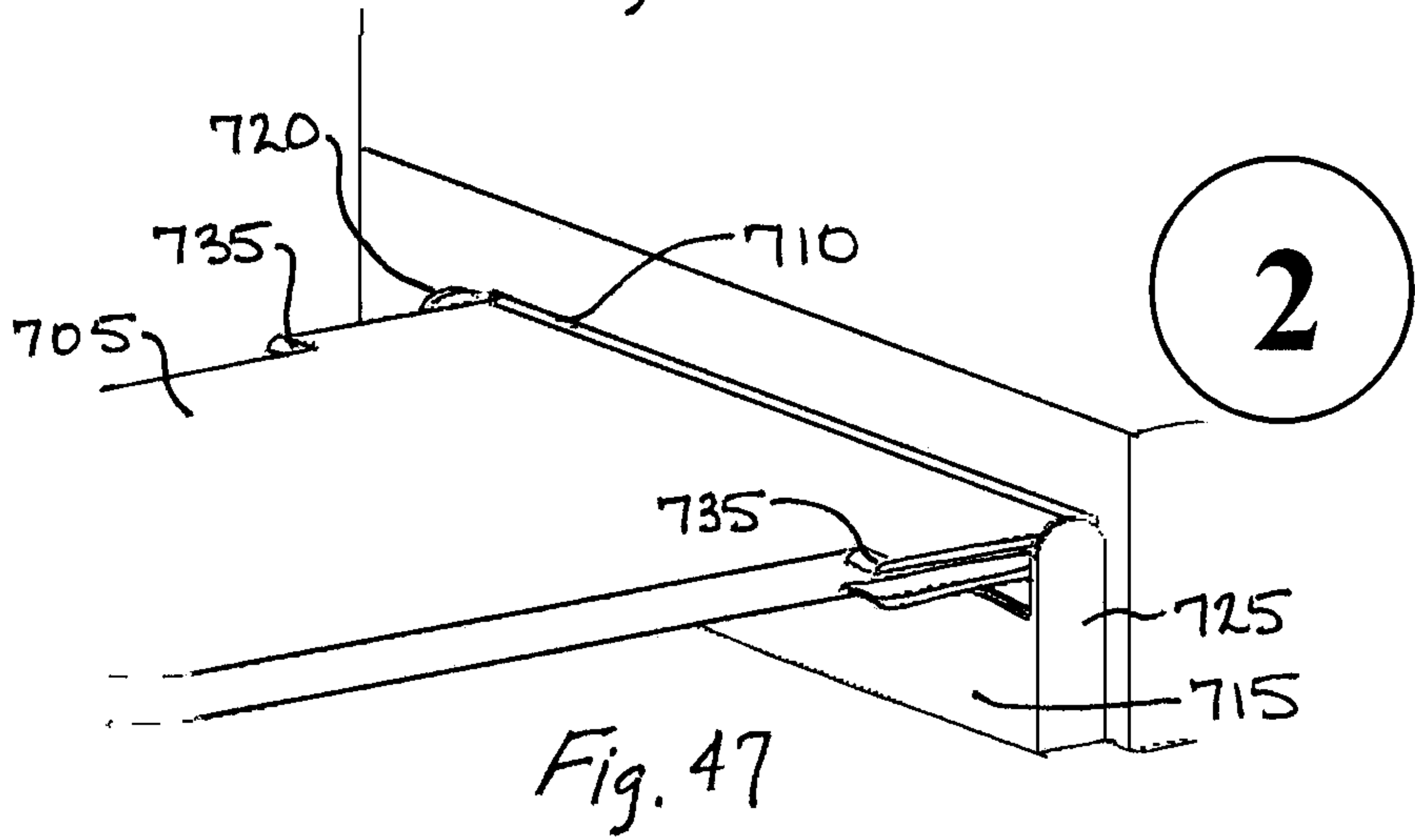
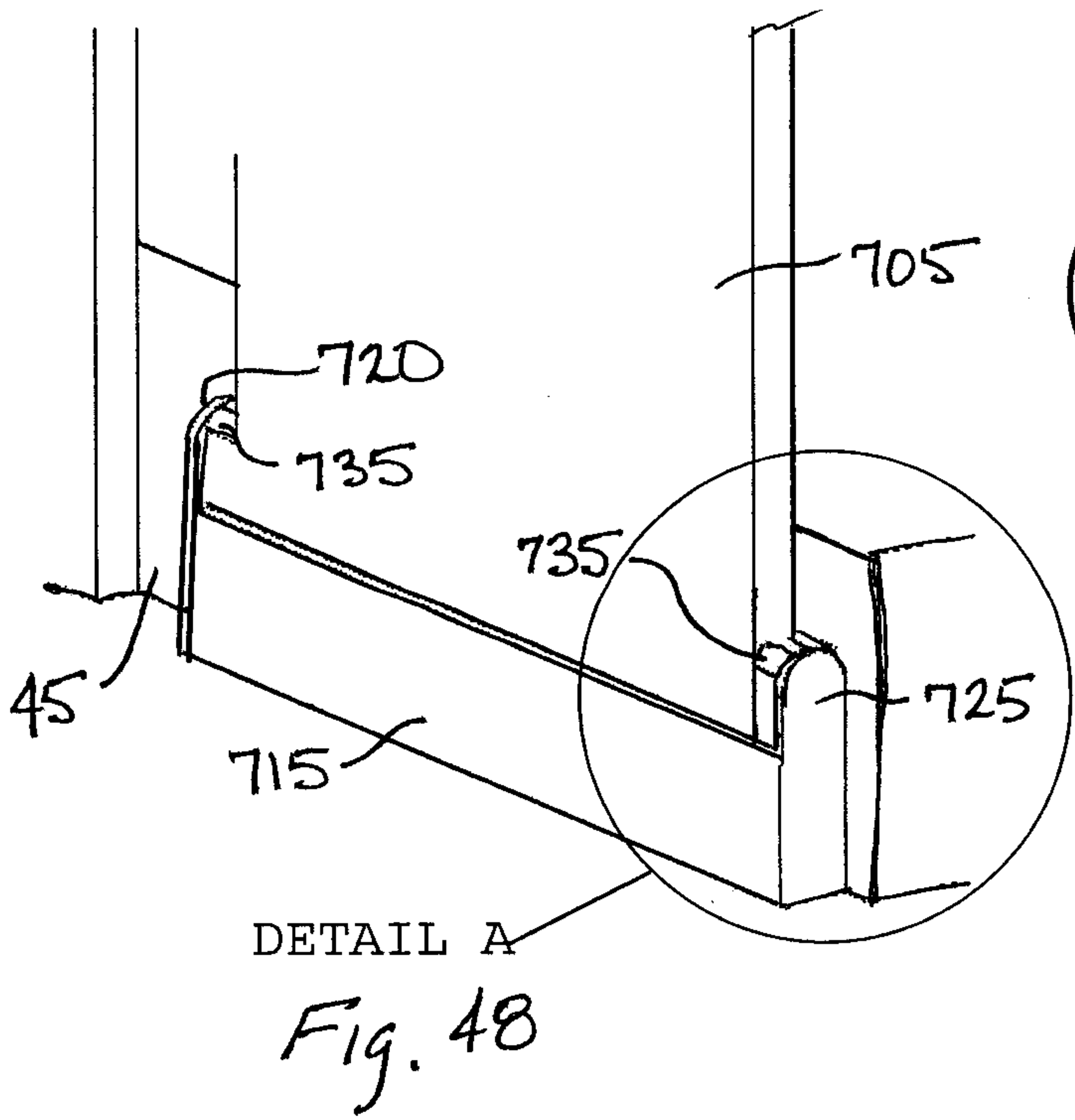
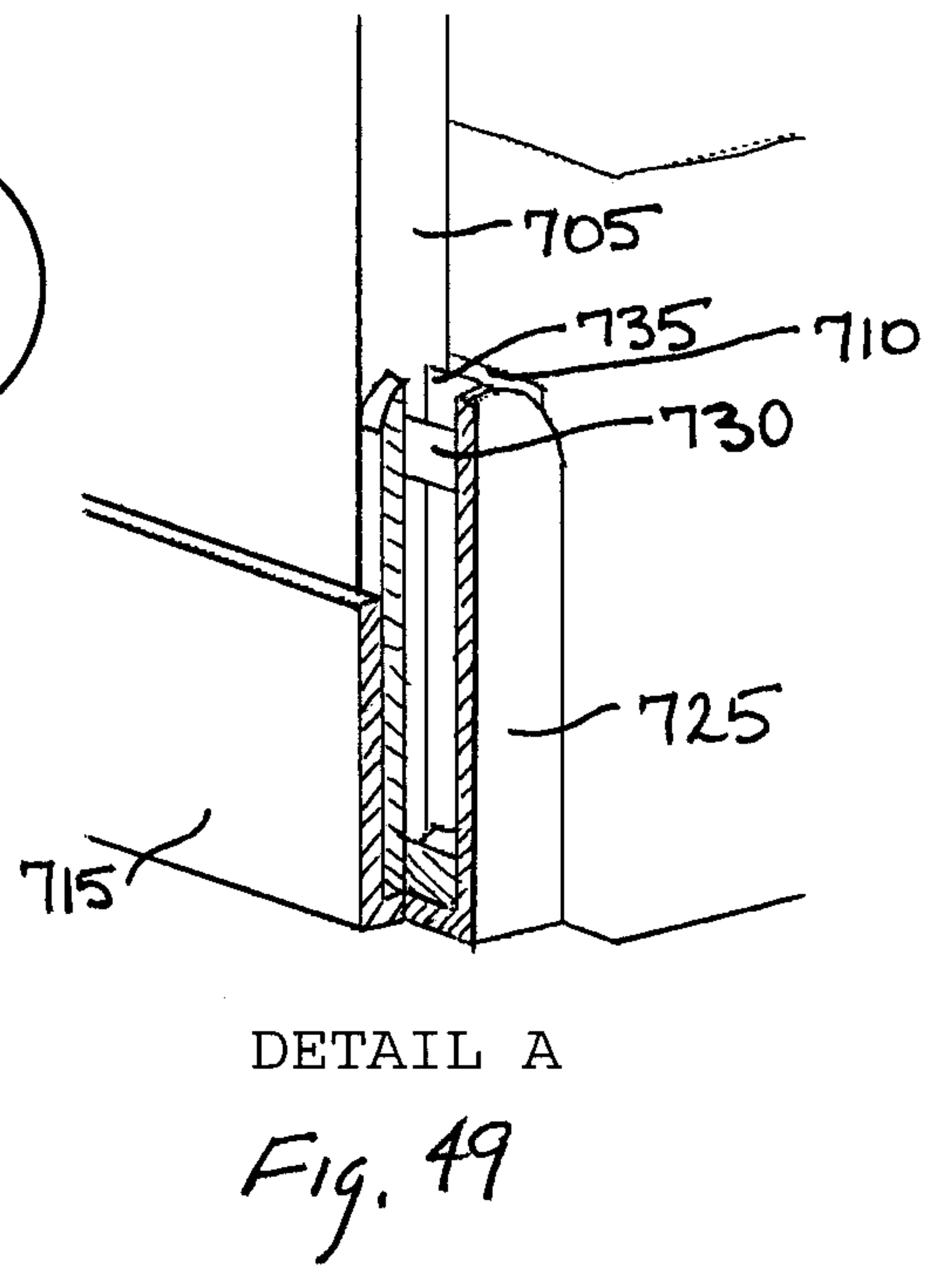


Fig. 47



DETAIL A

Fig. 48



DETAIL A

Fig. 49

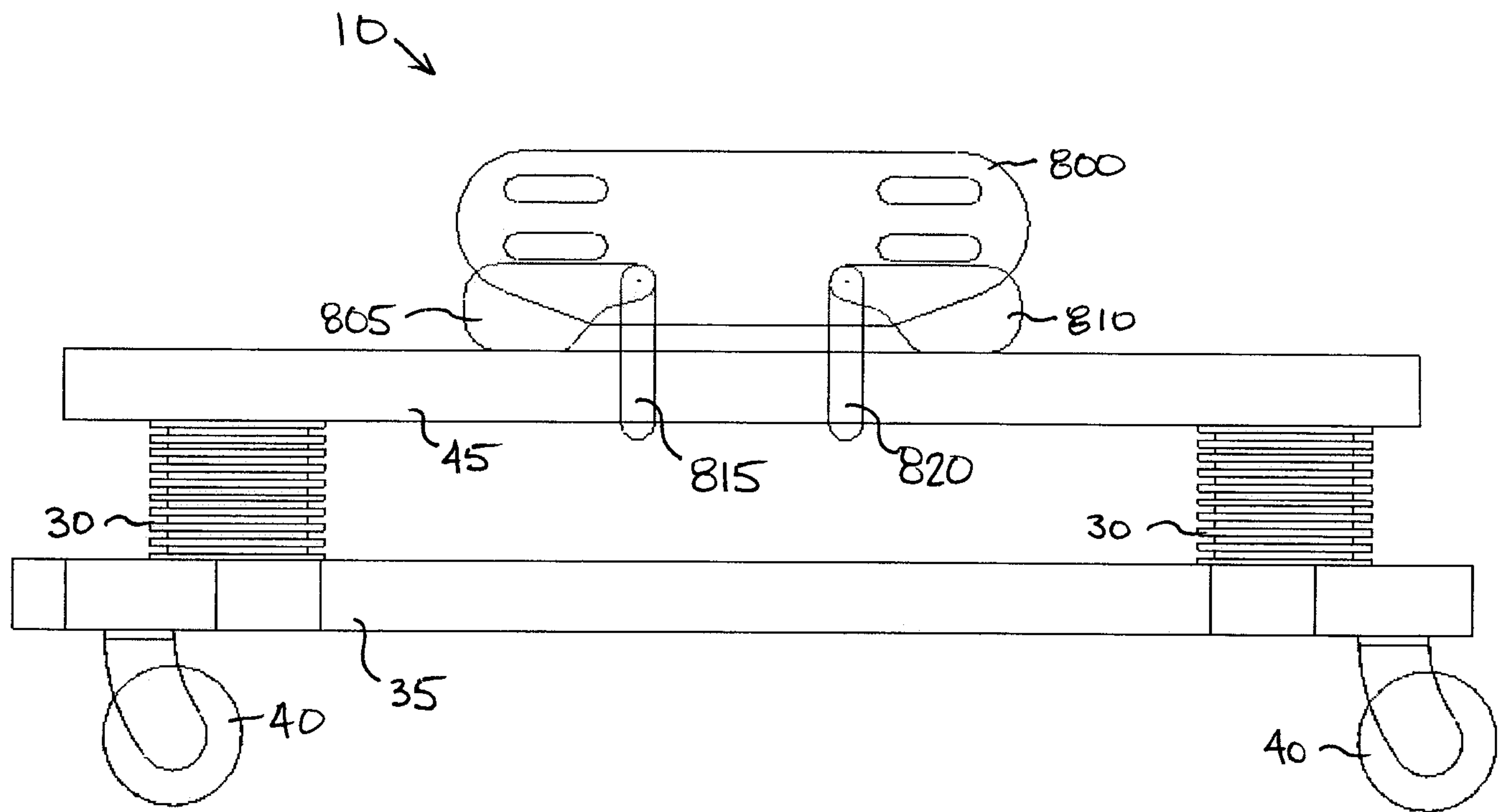


Fig. 50

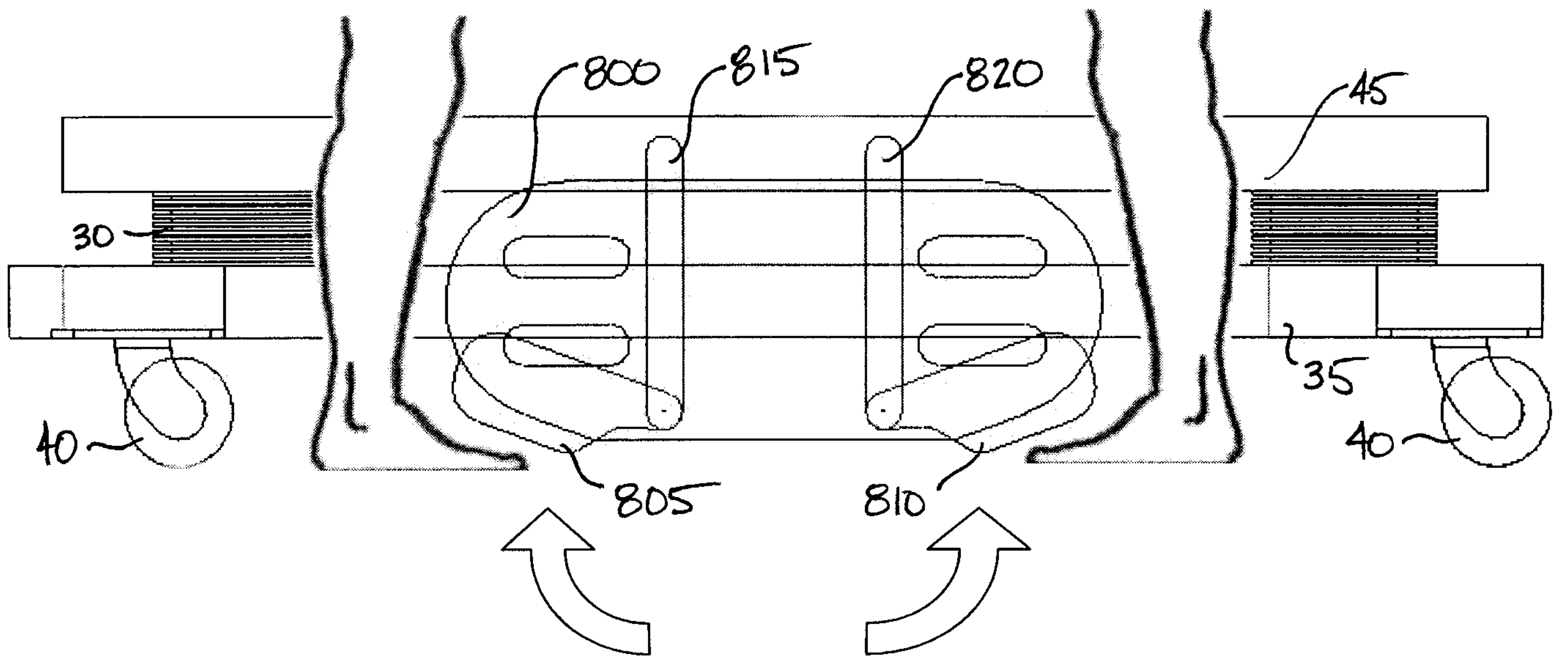


Fig. 51

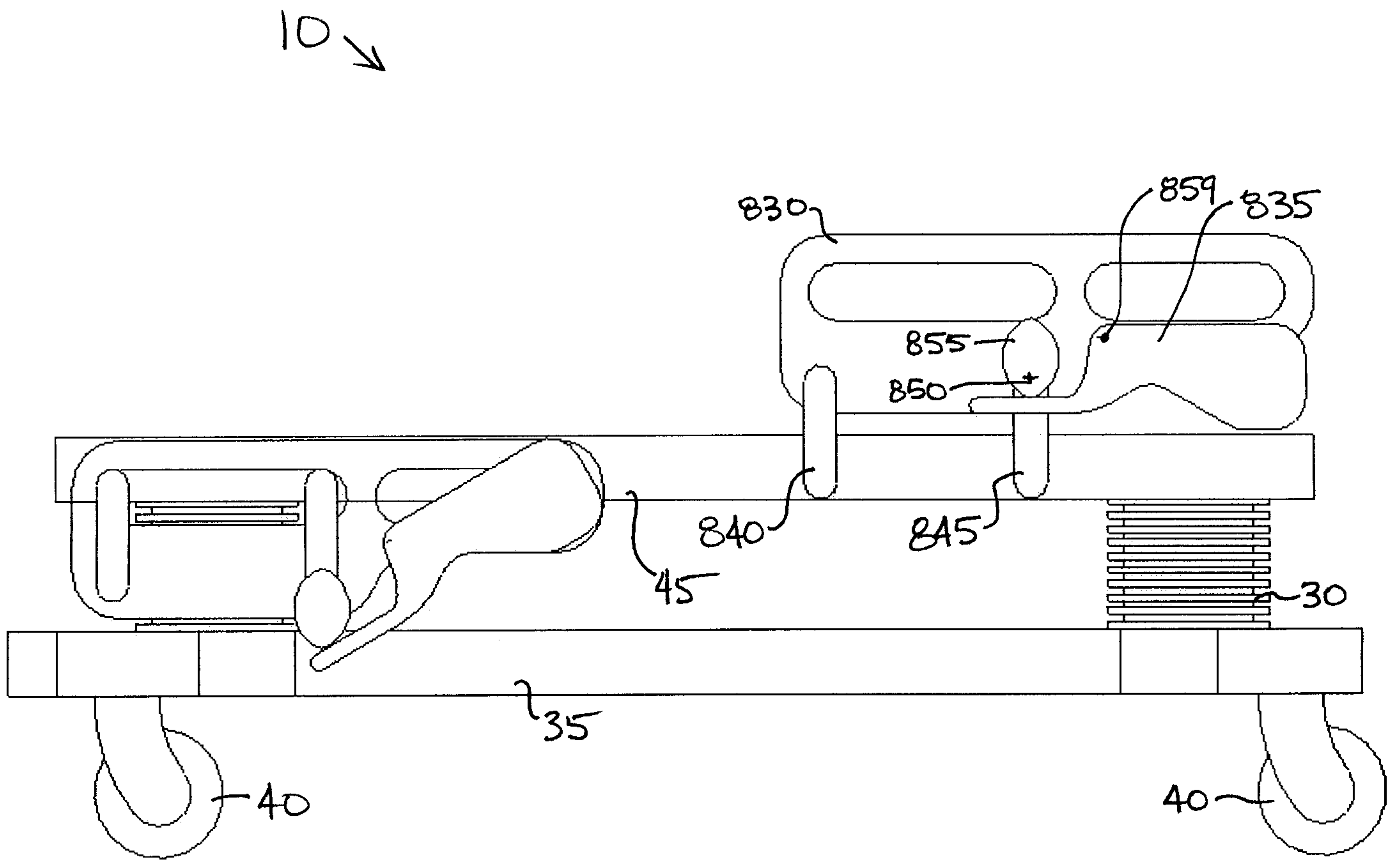


Fig. 52



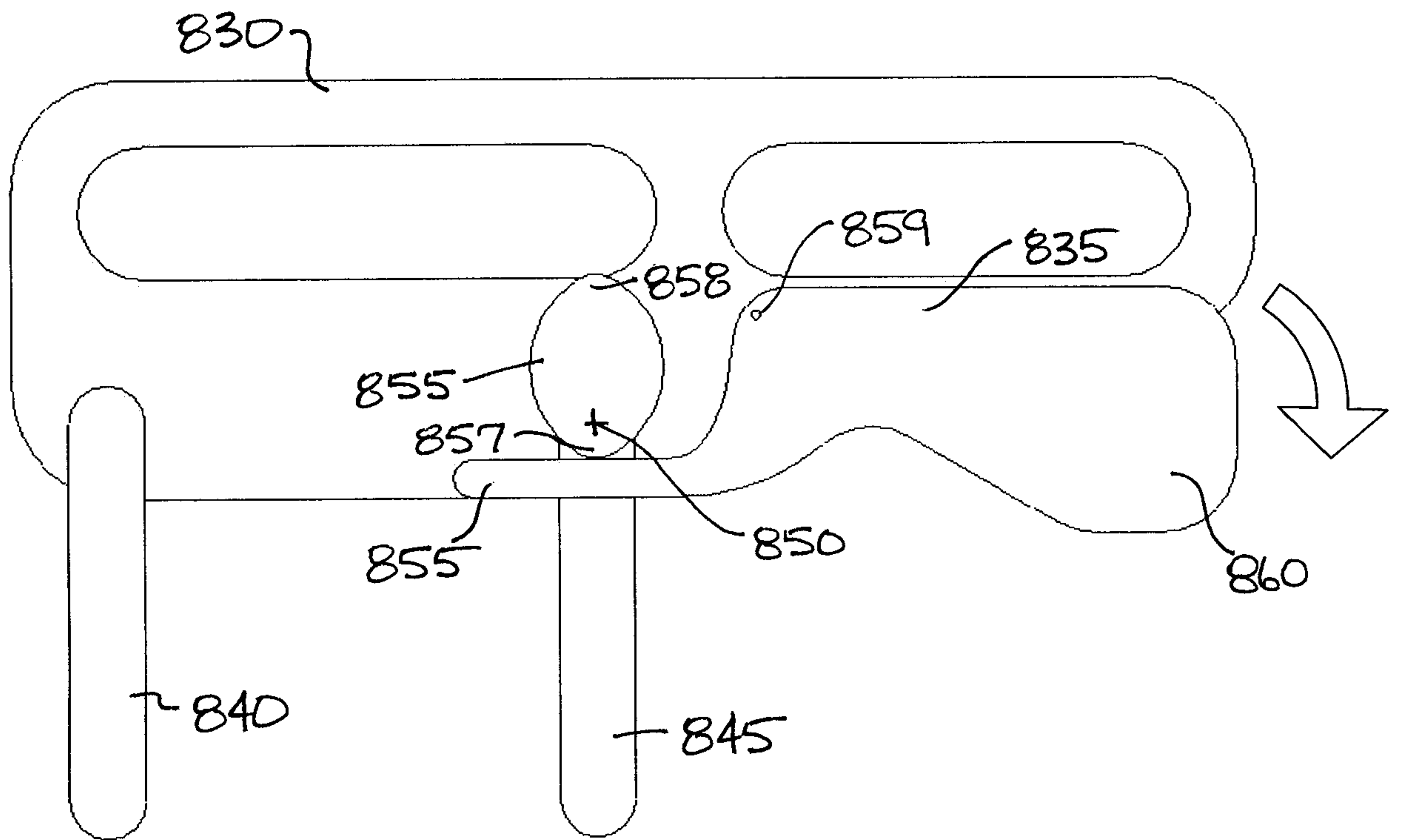


Fig. 53

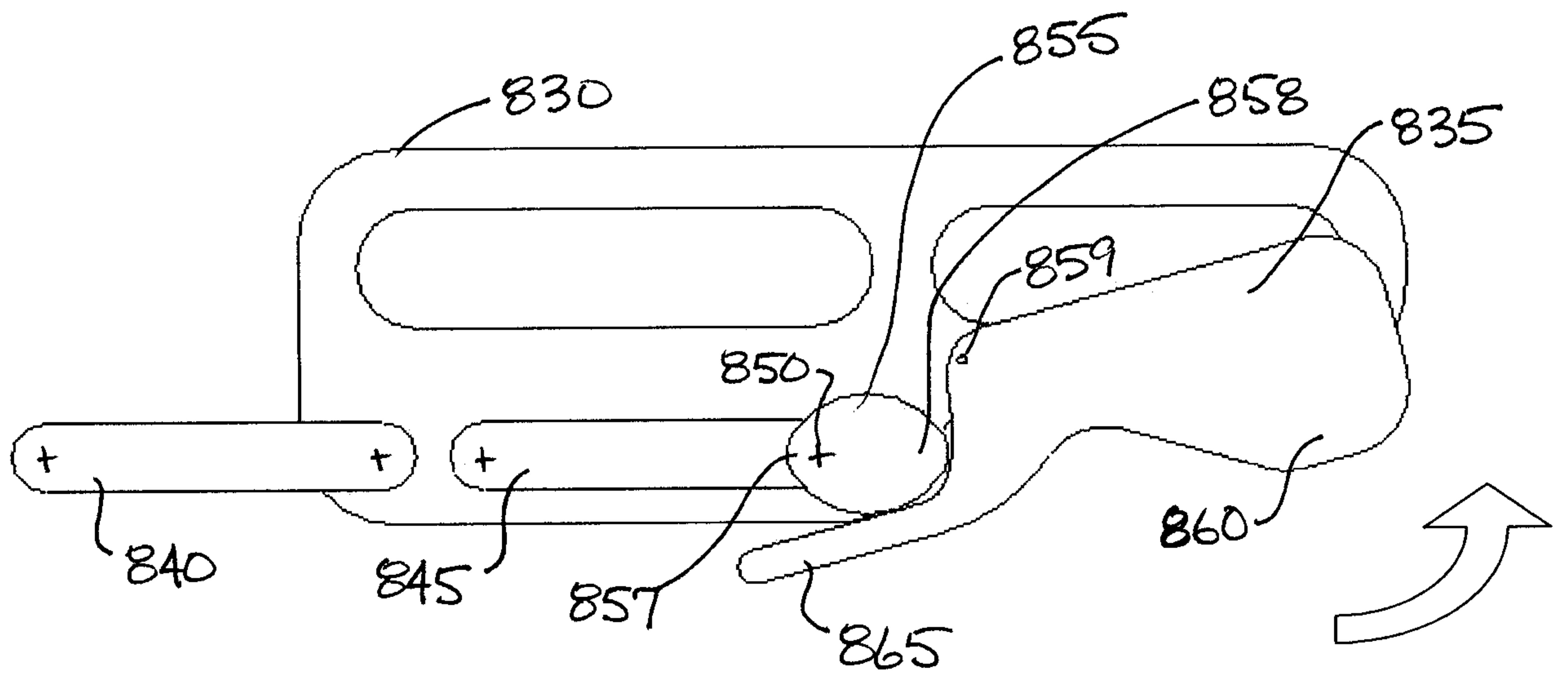


Fig. 54

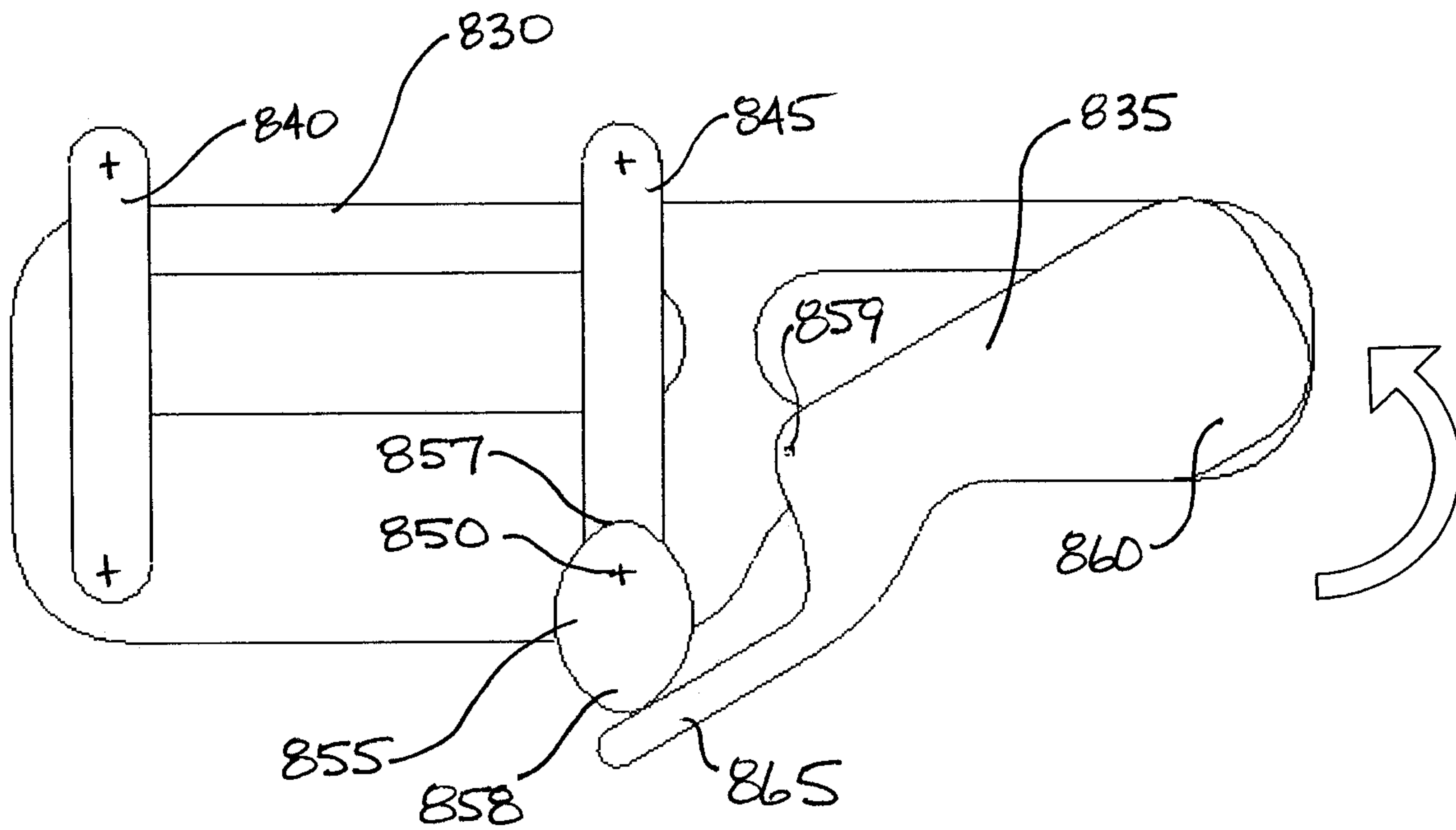


Fig. 55

# ROTATABLY MOUNTED GAP FILLER

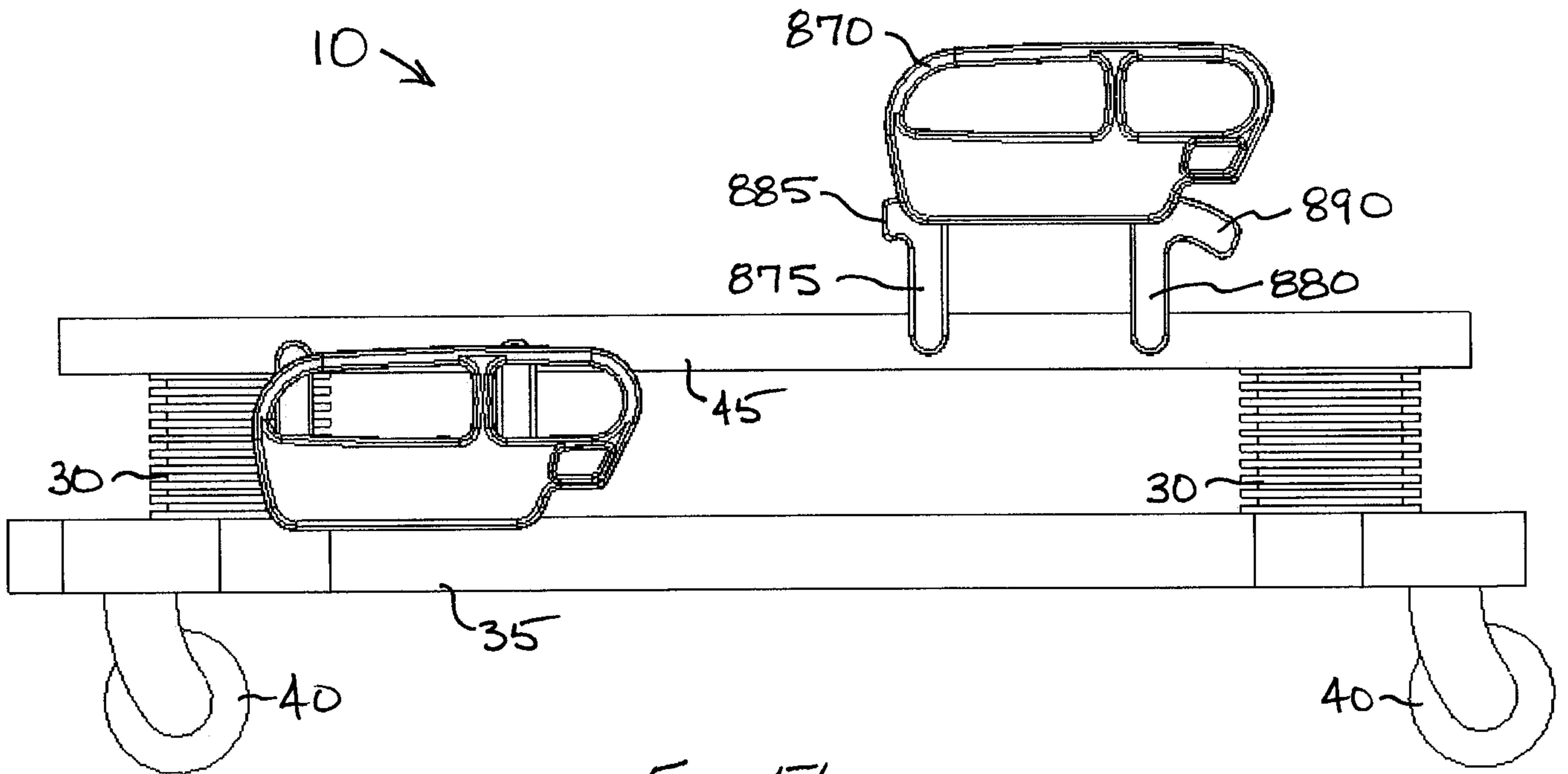


Fig. 56

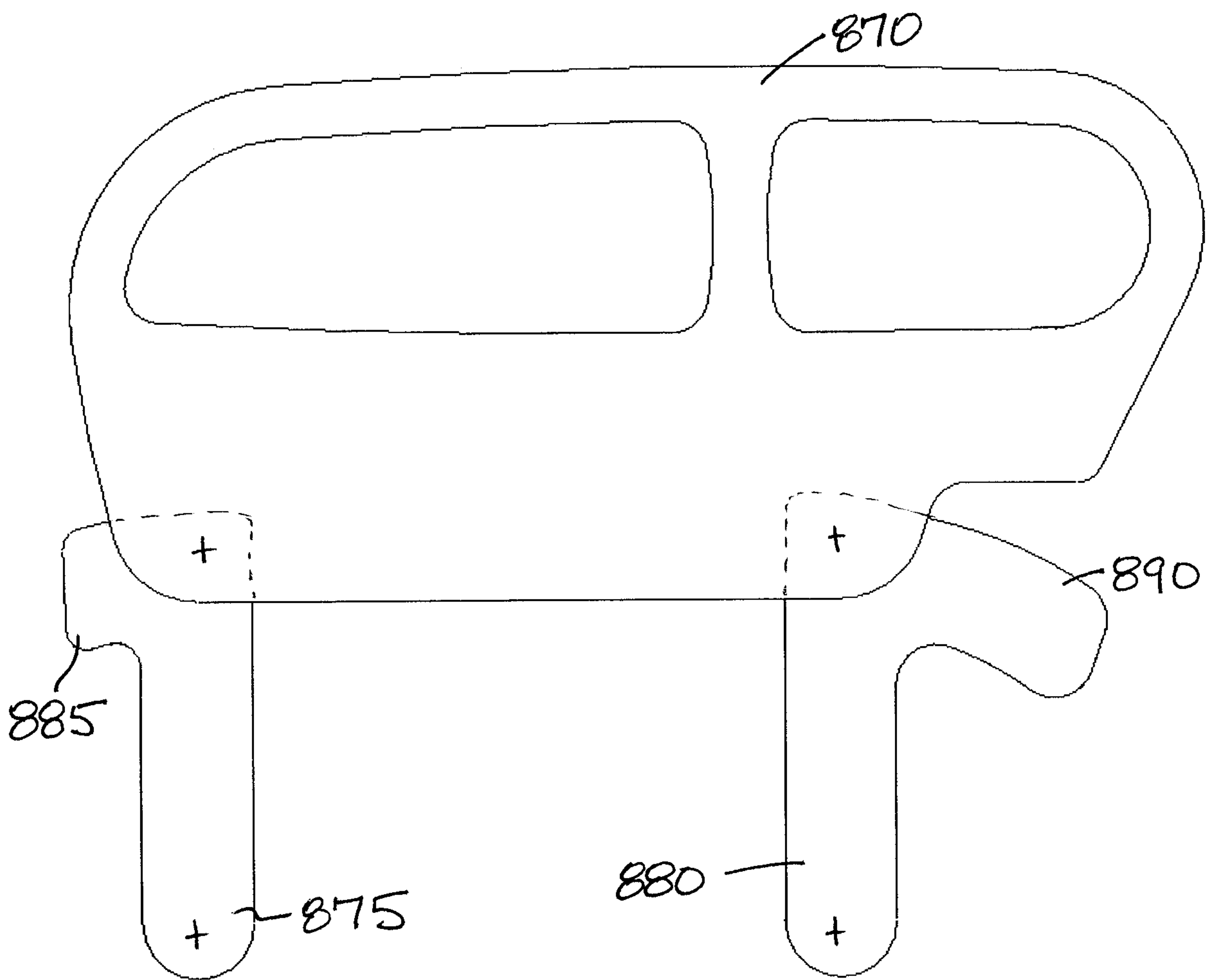


Fig. 57

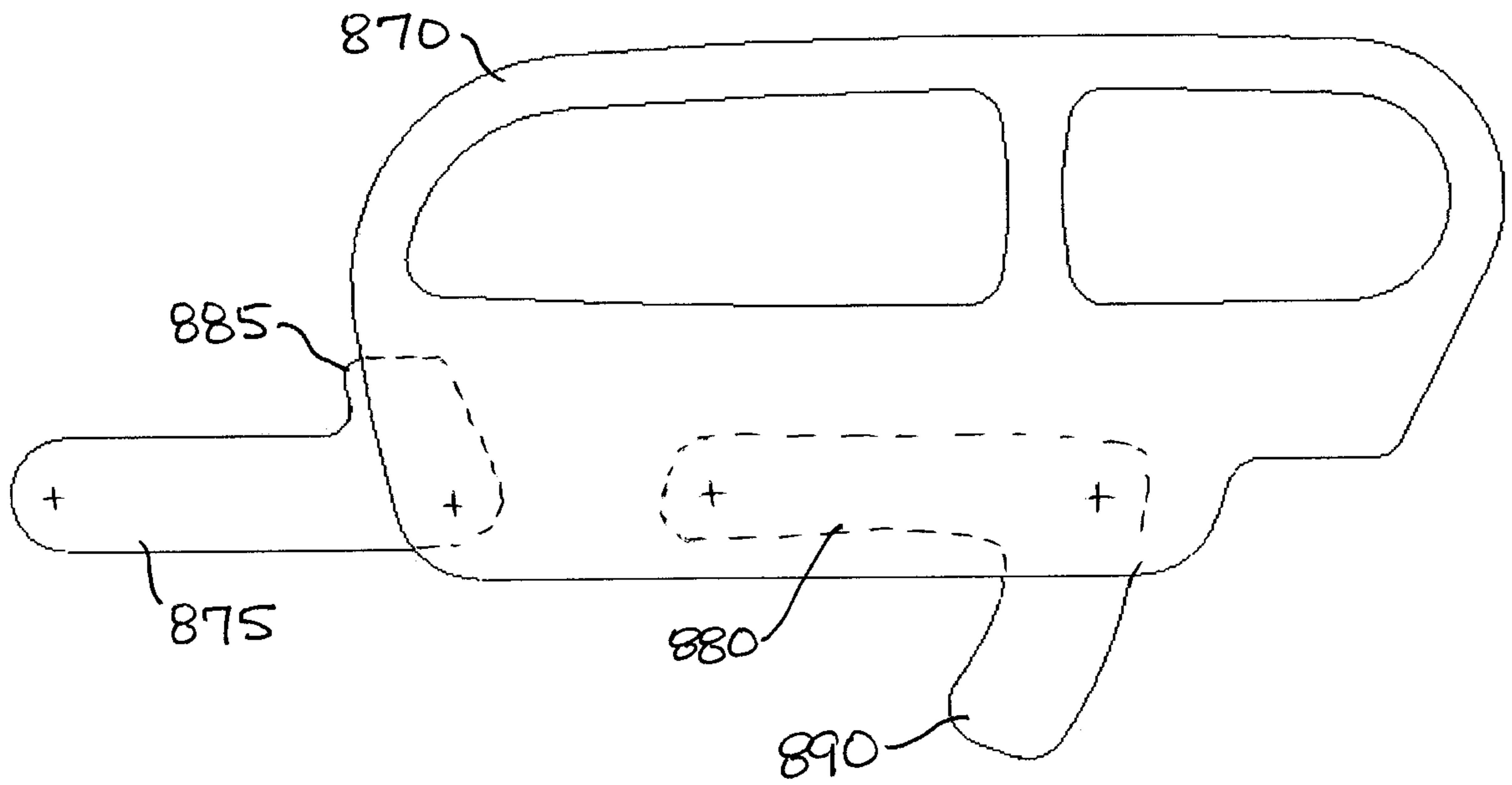


Fig. 58

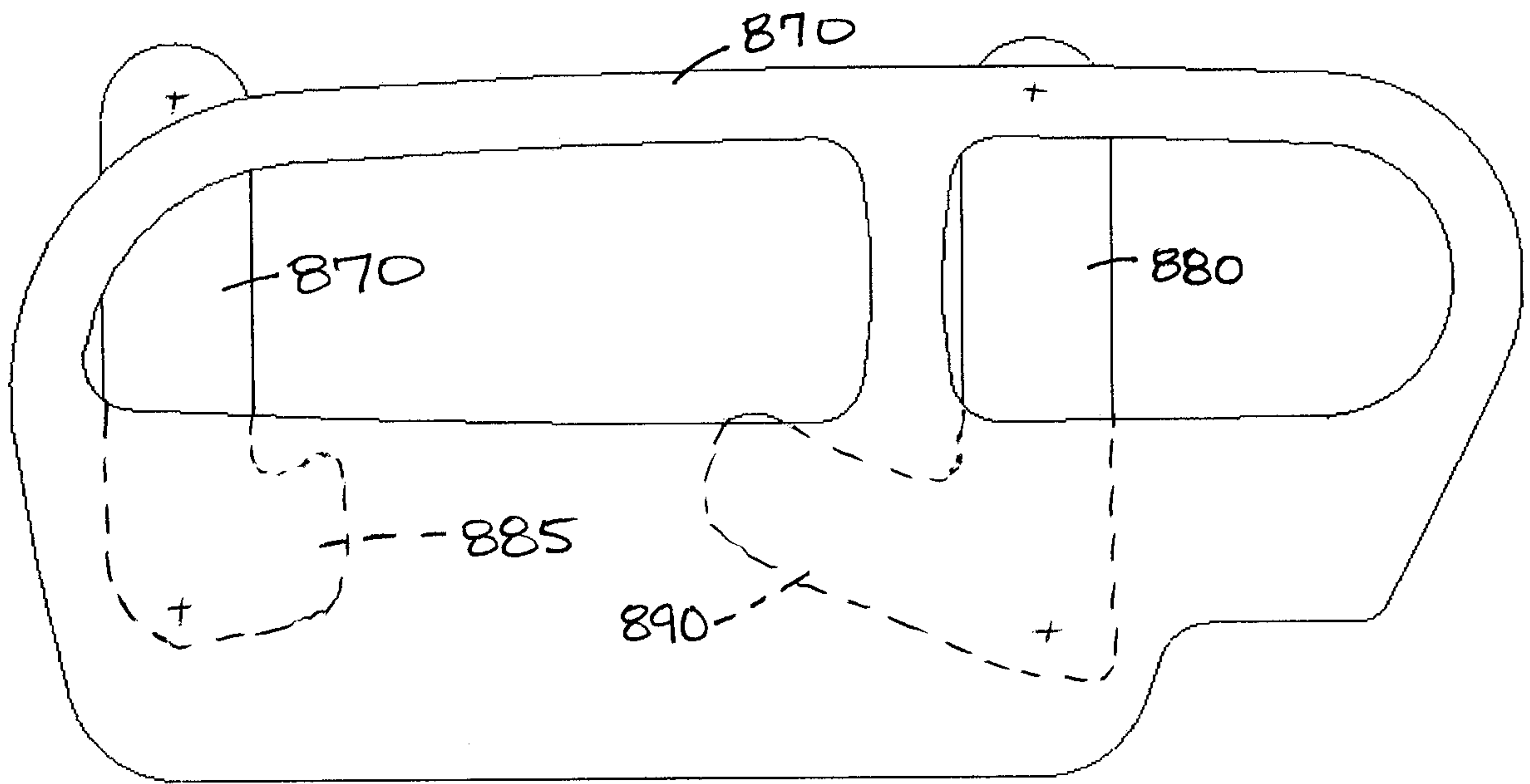


Fig. 59





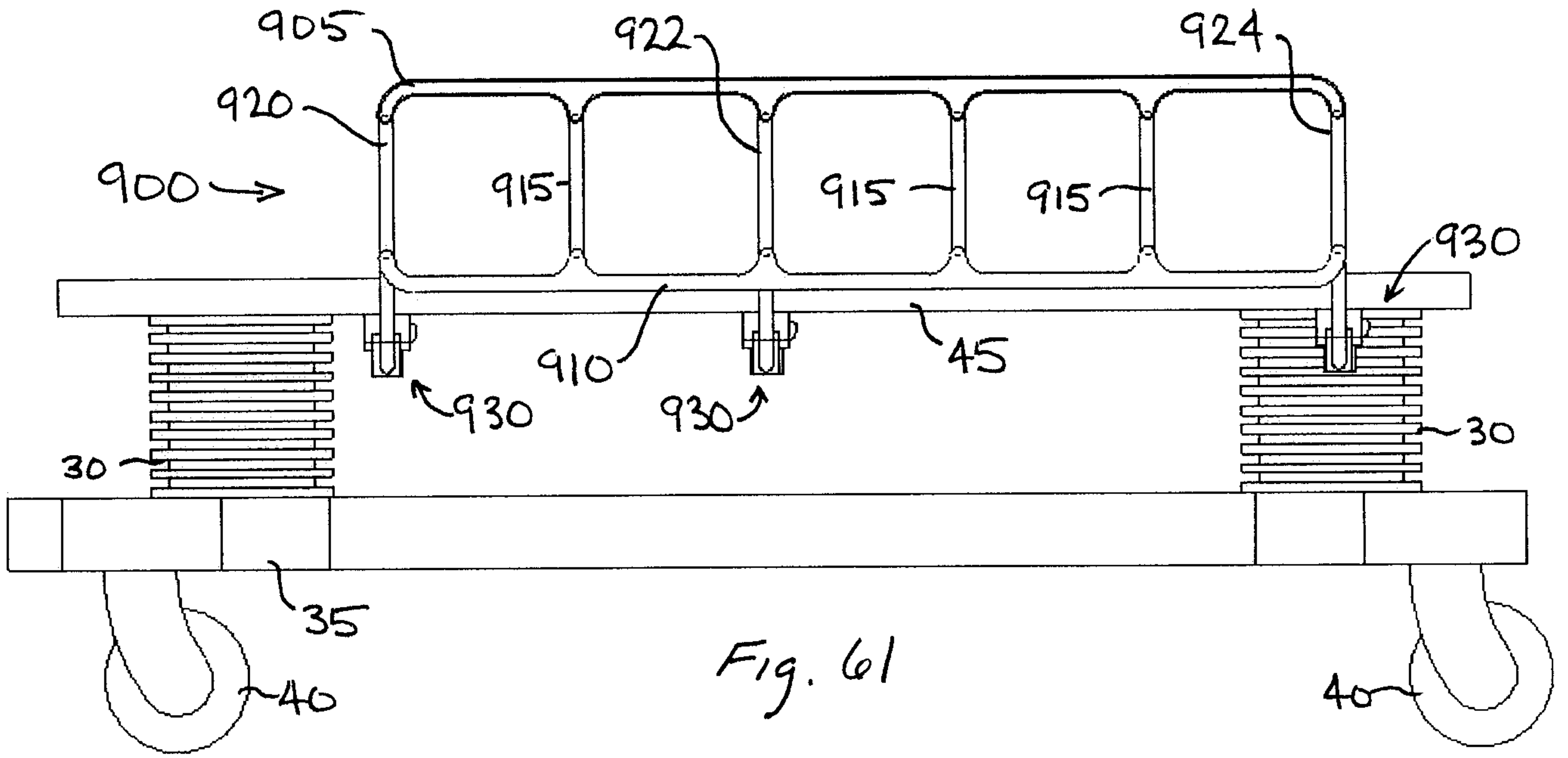


Fig. 61

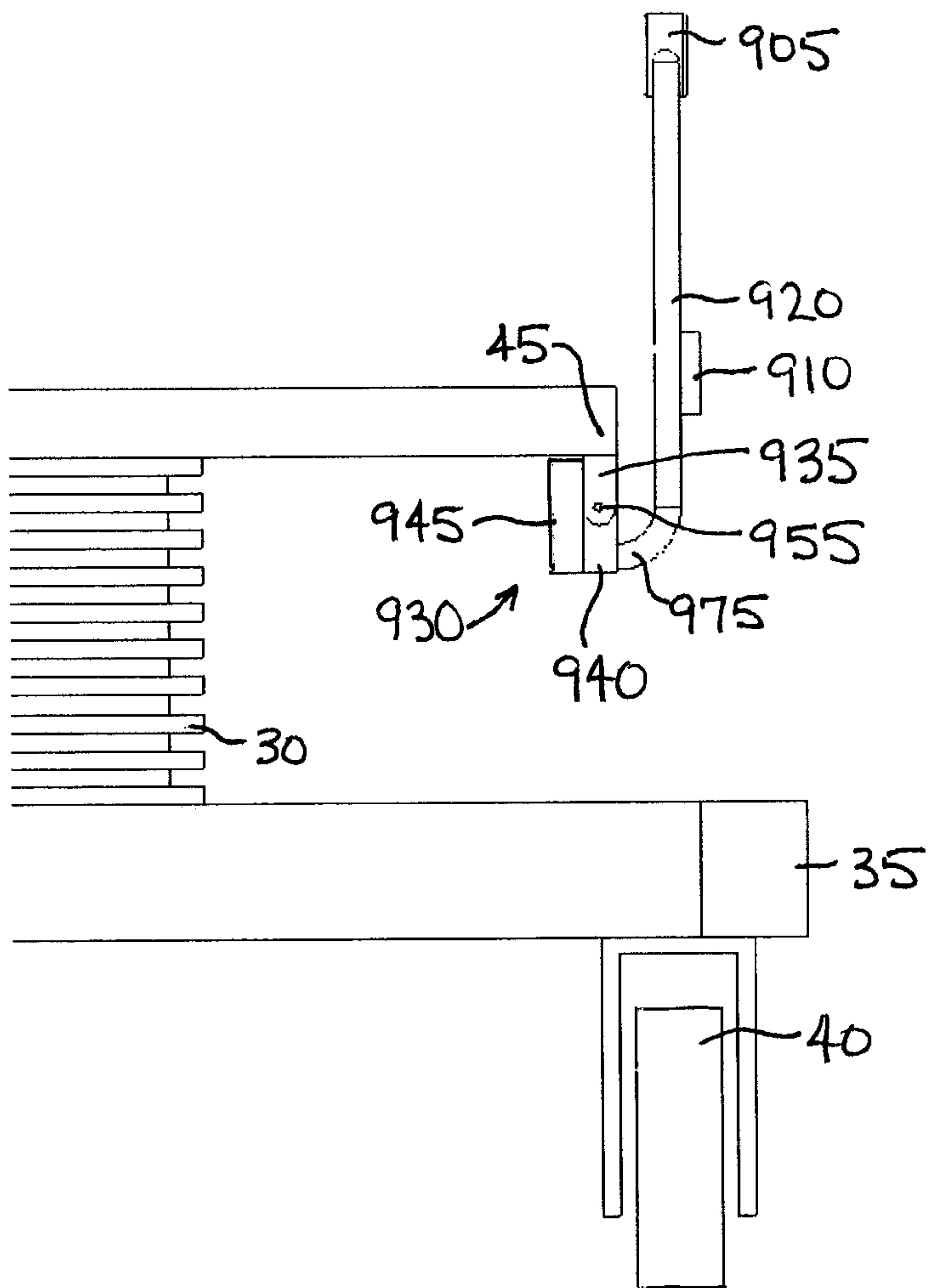


Fig. 62

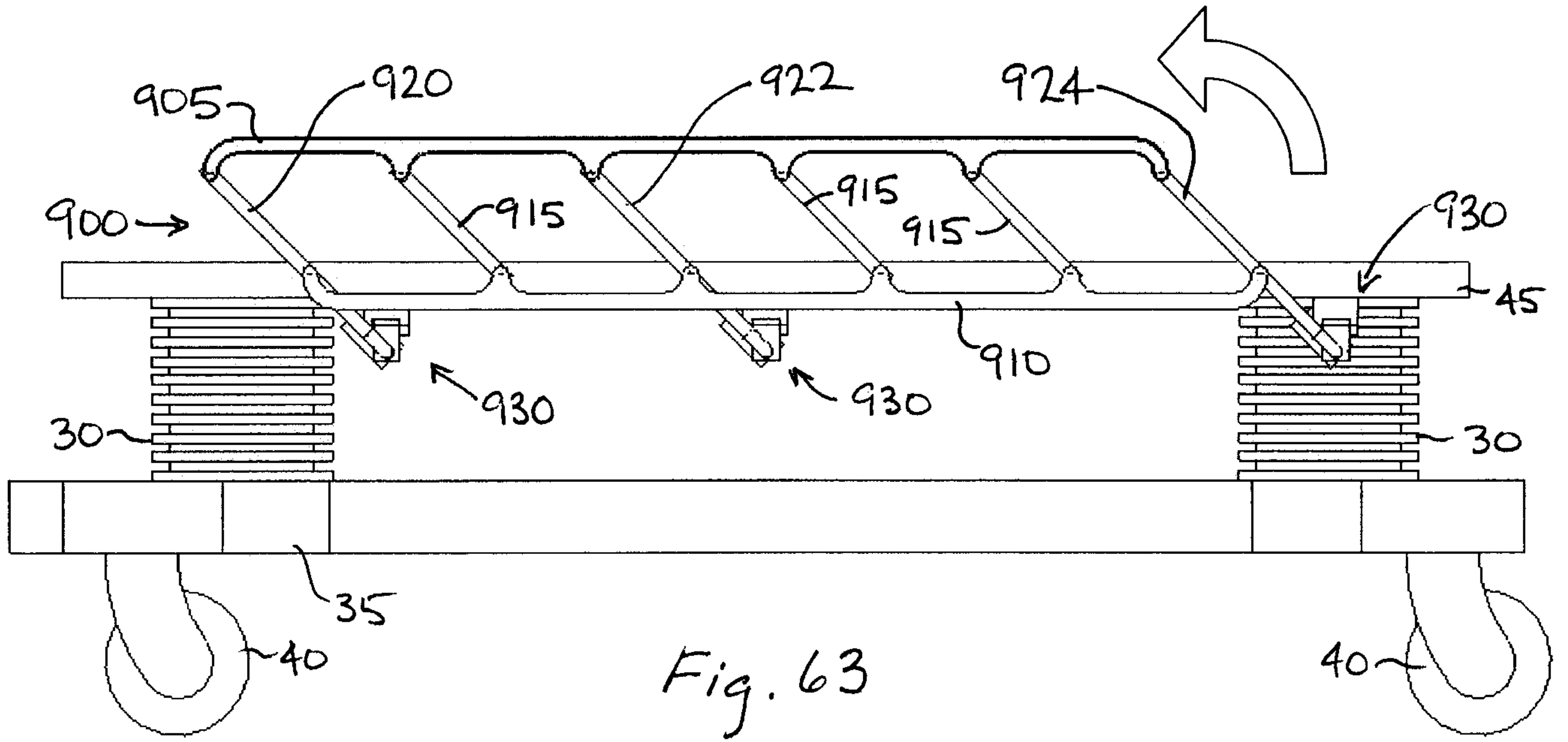


Fig. 63

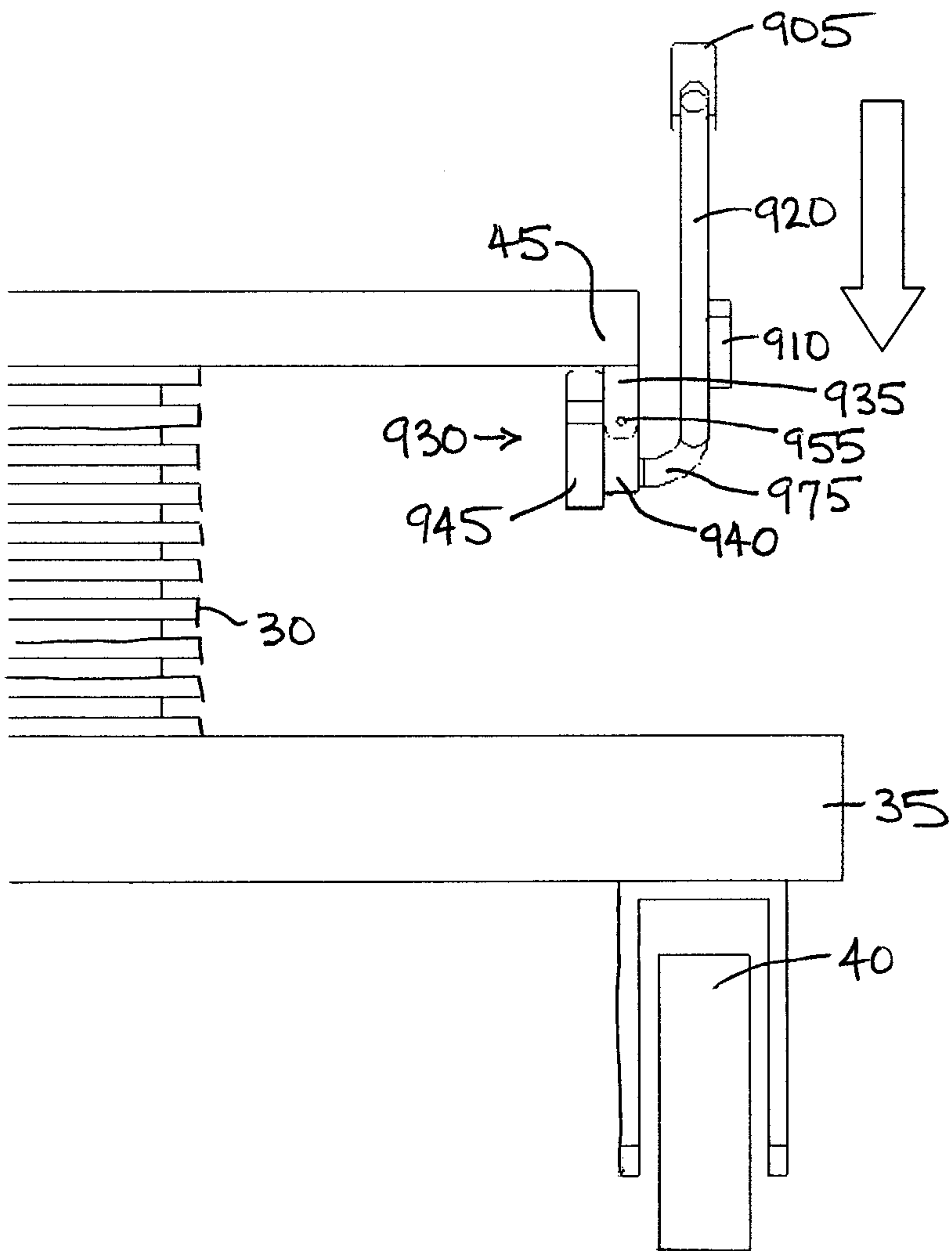
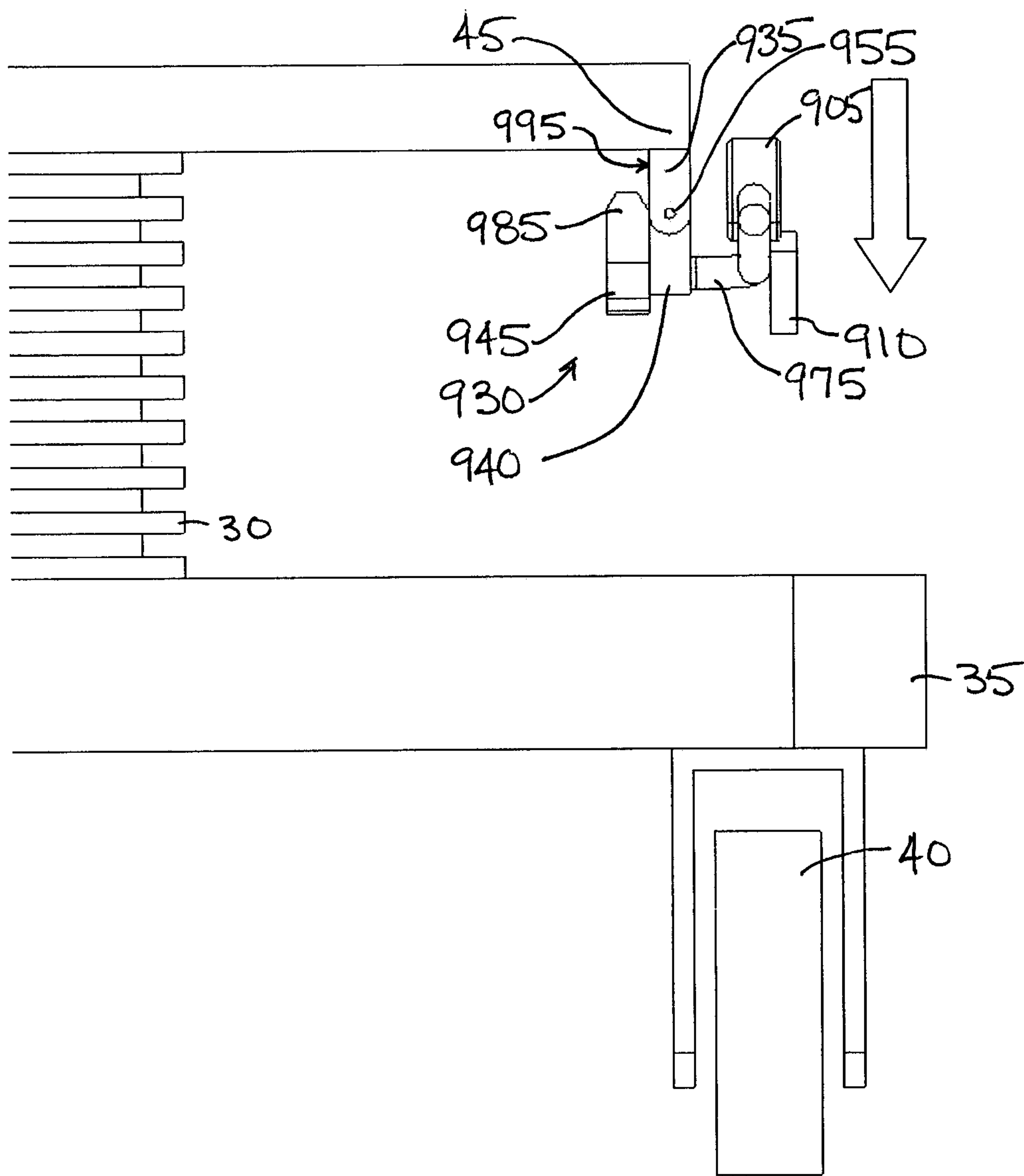
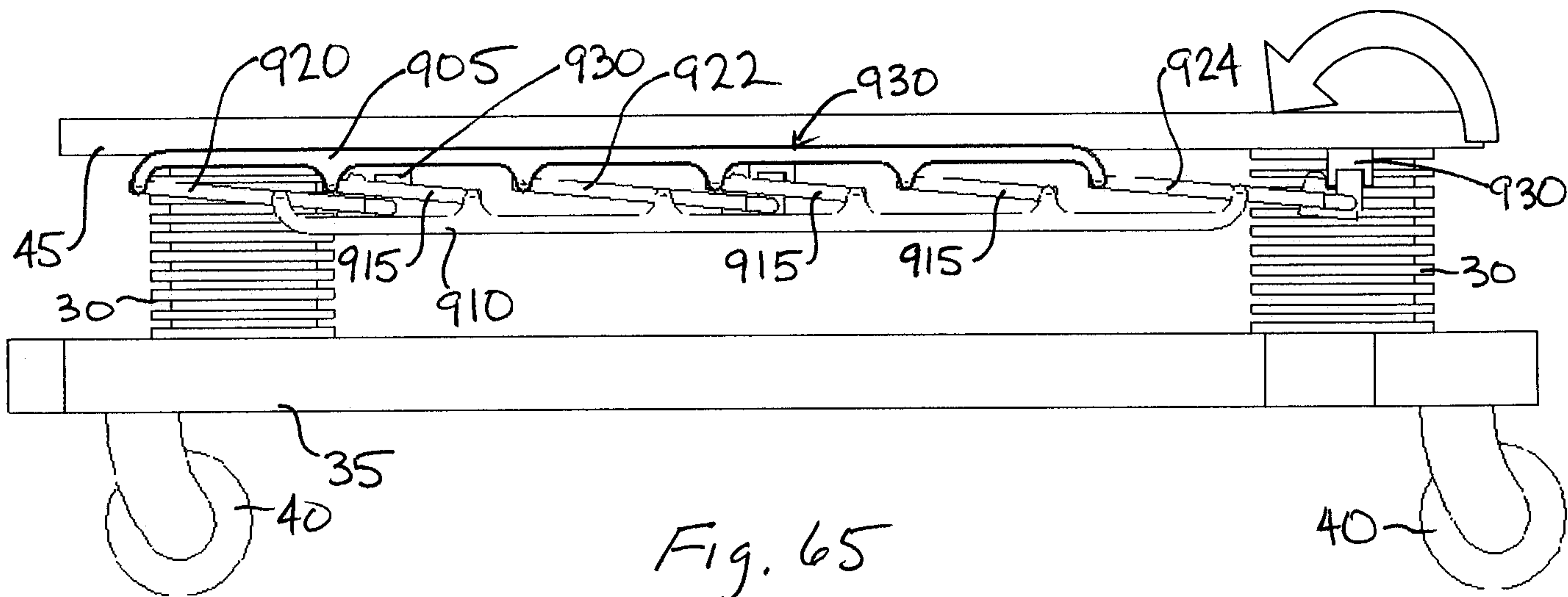
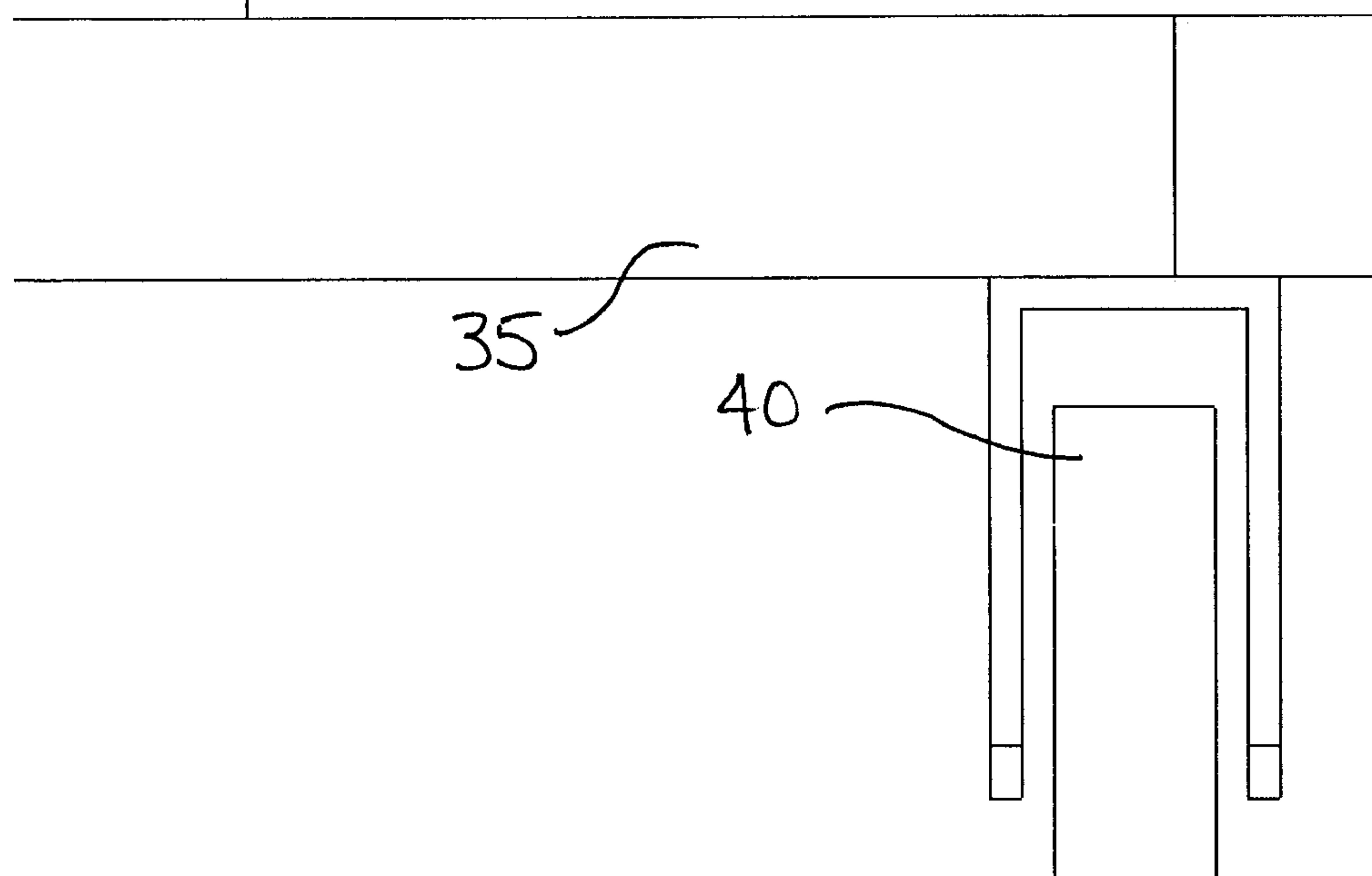
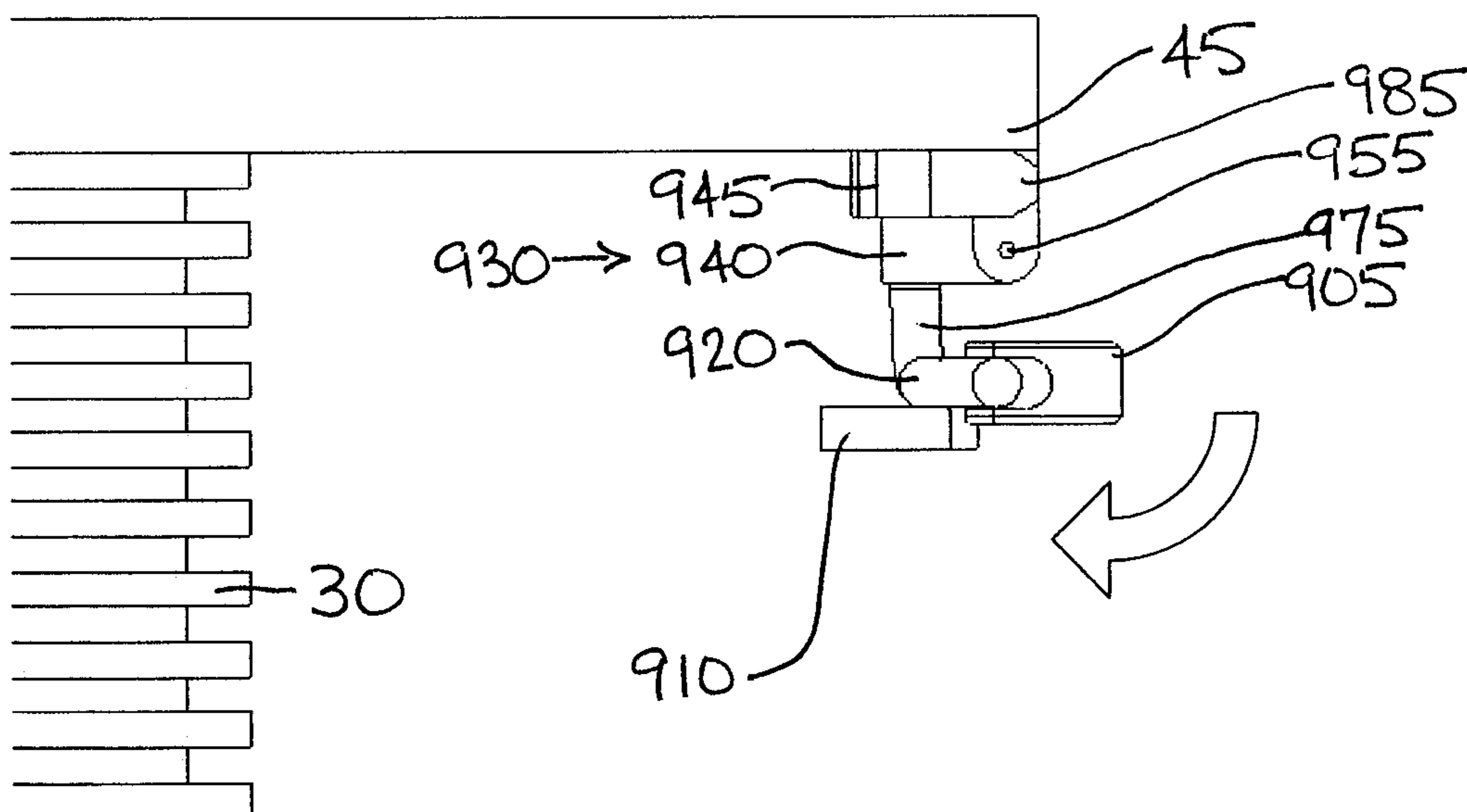
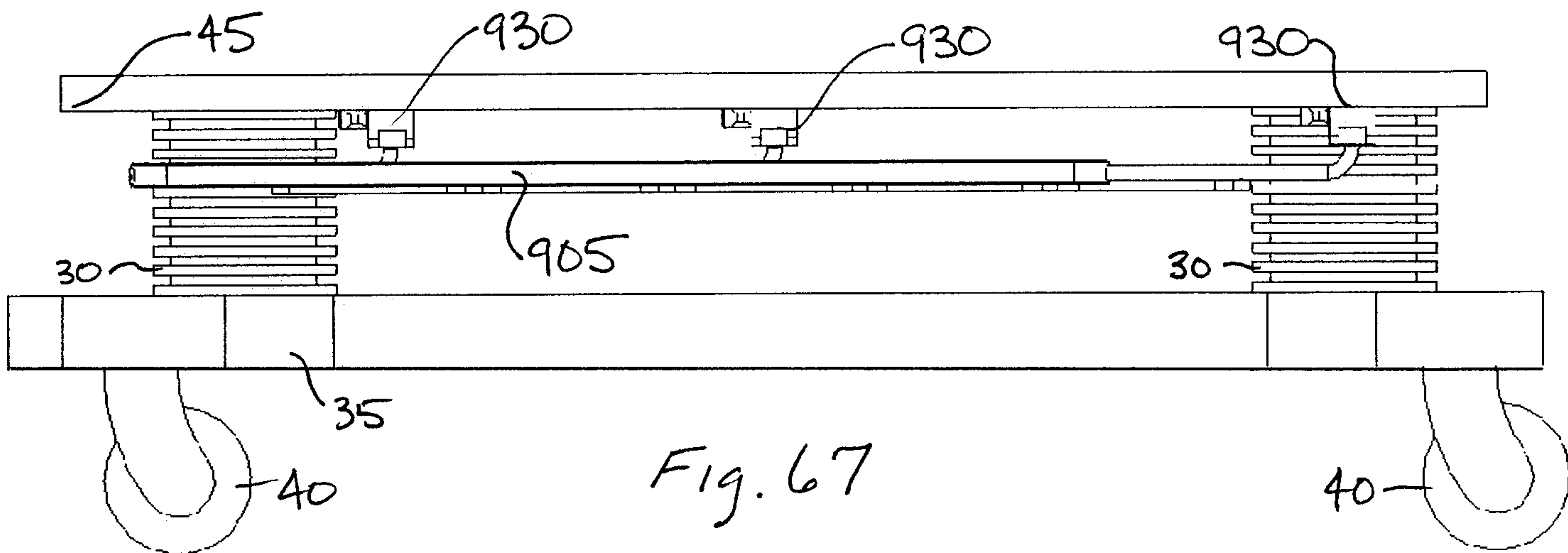


Fig. 64





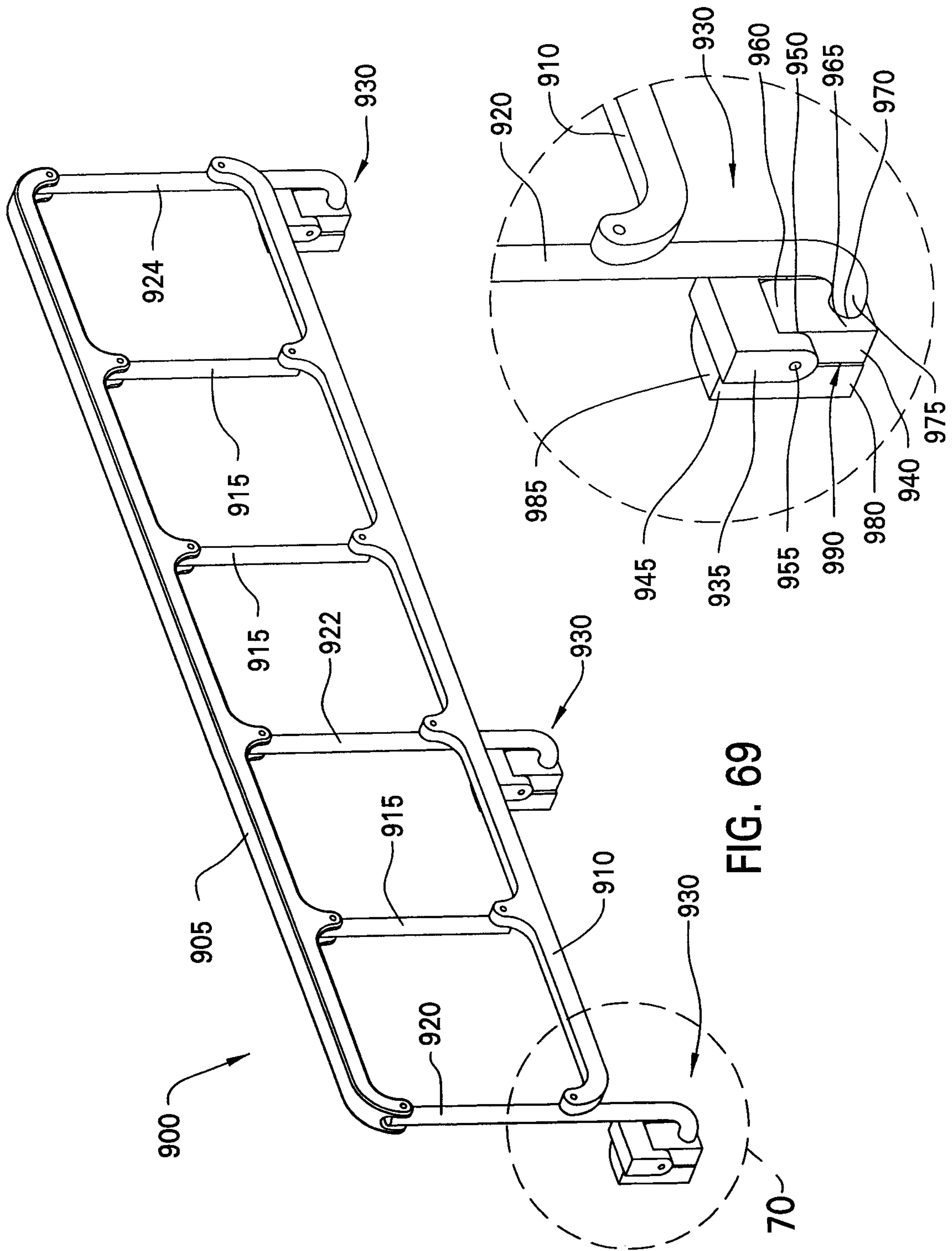
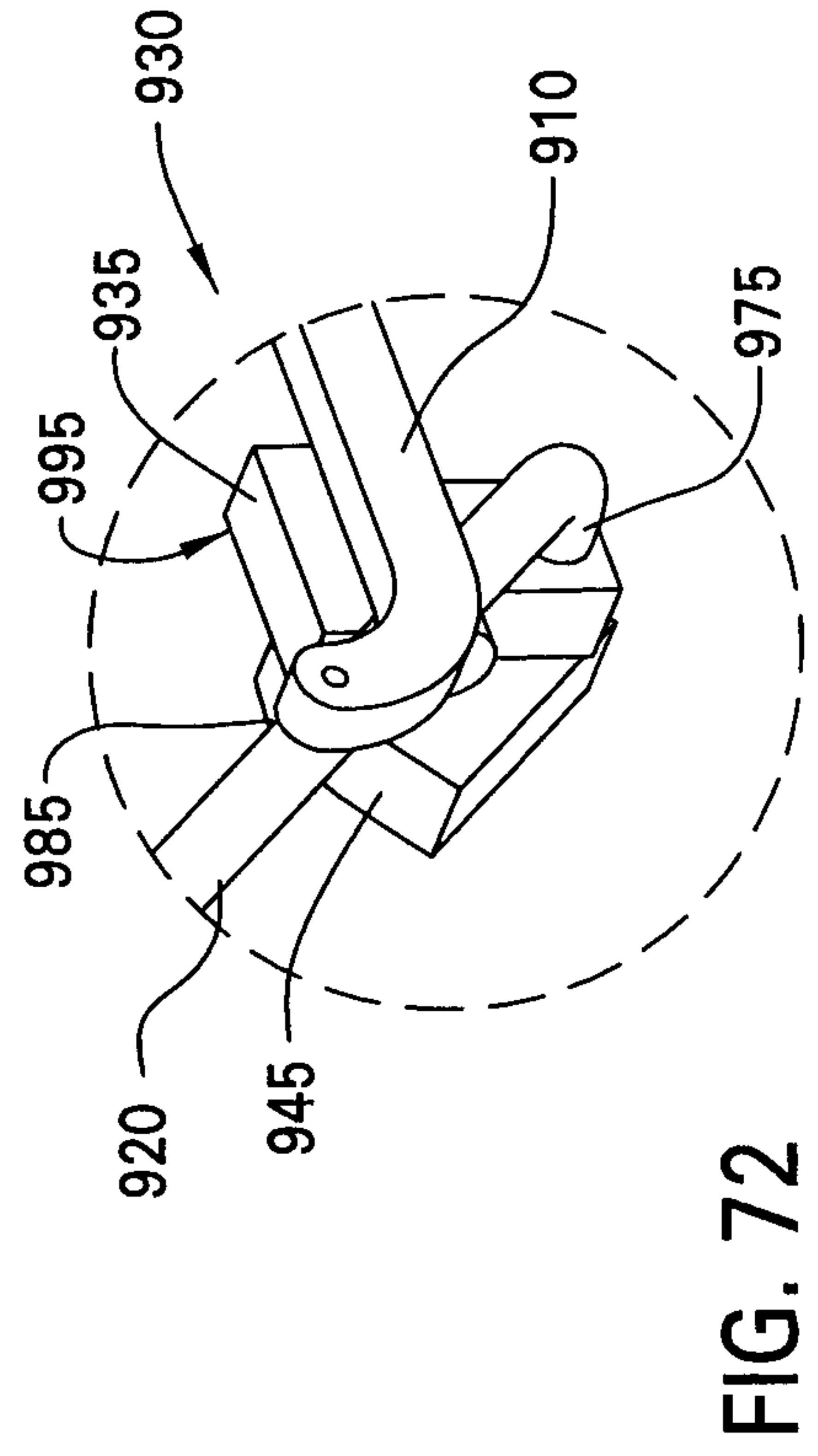
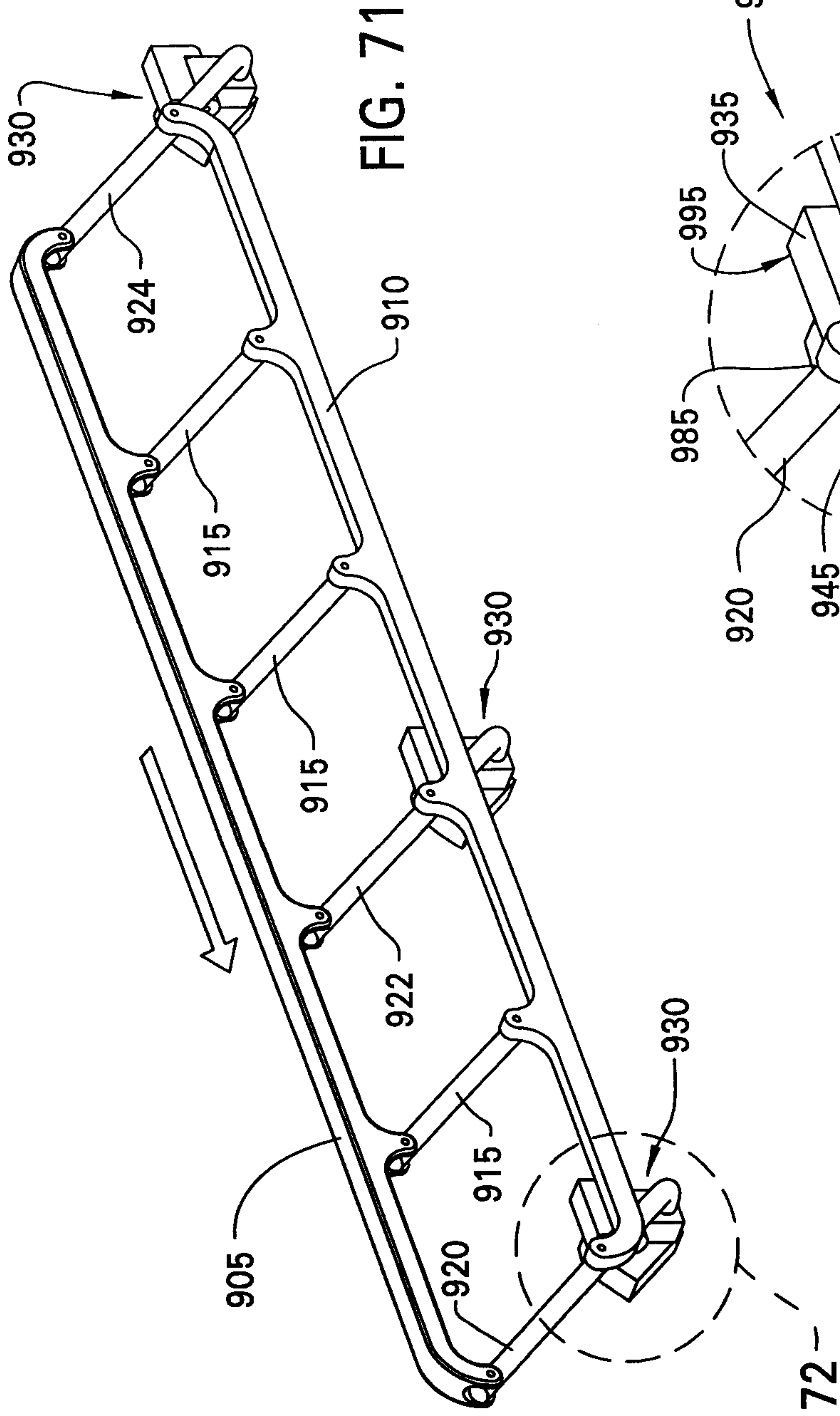


FIG. 69

FIG. 70



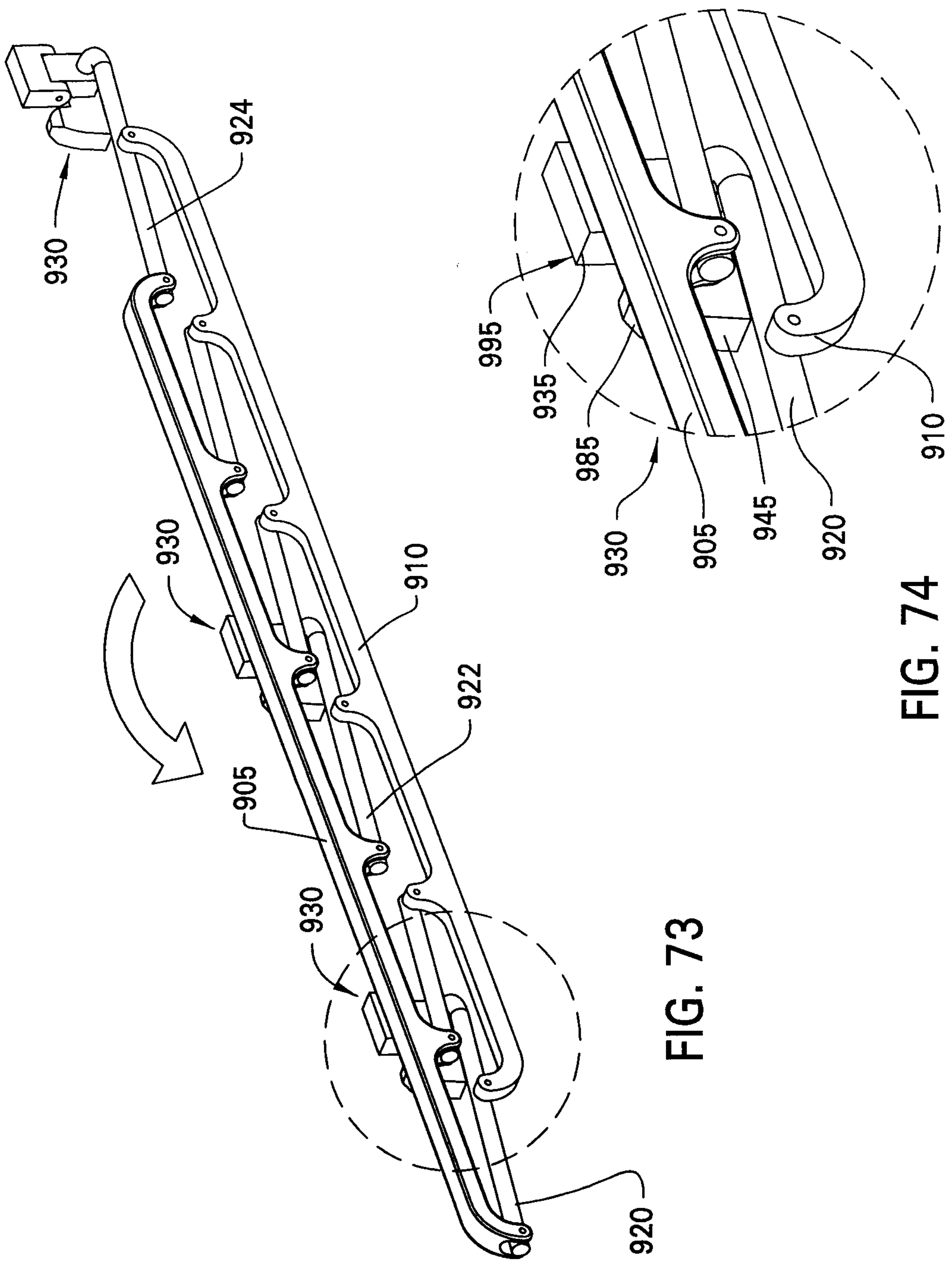


FIG. 73

FIG. 74

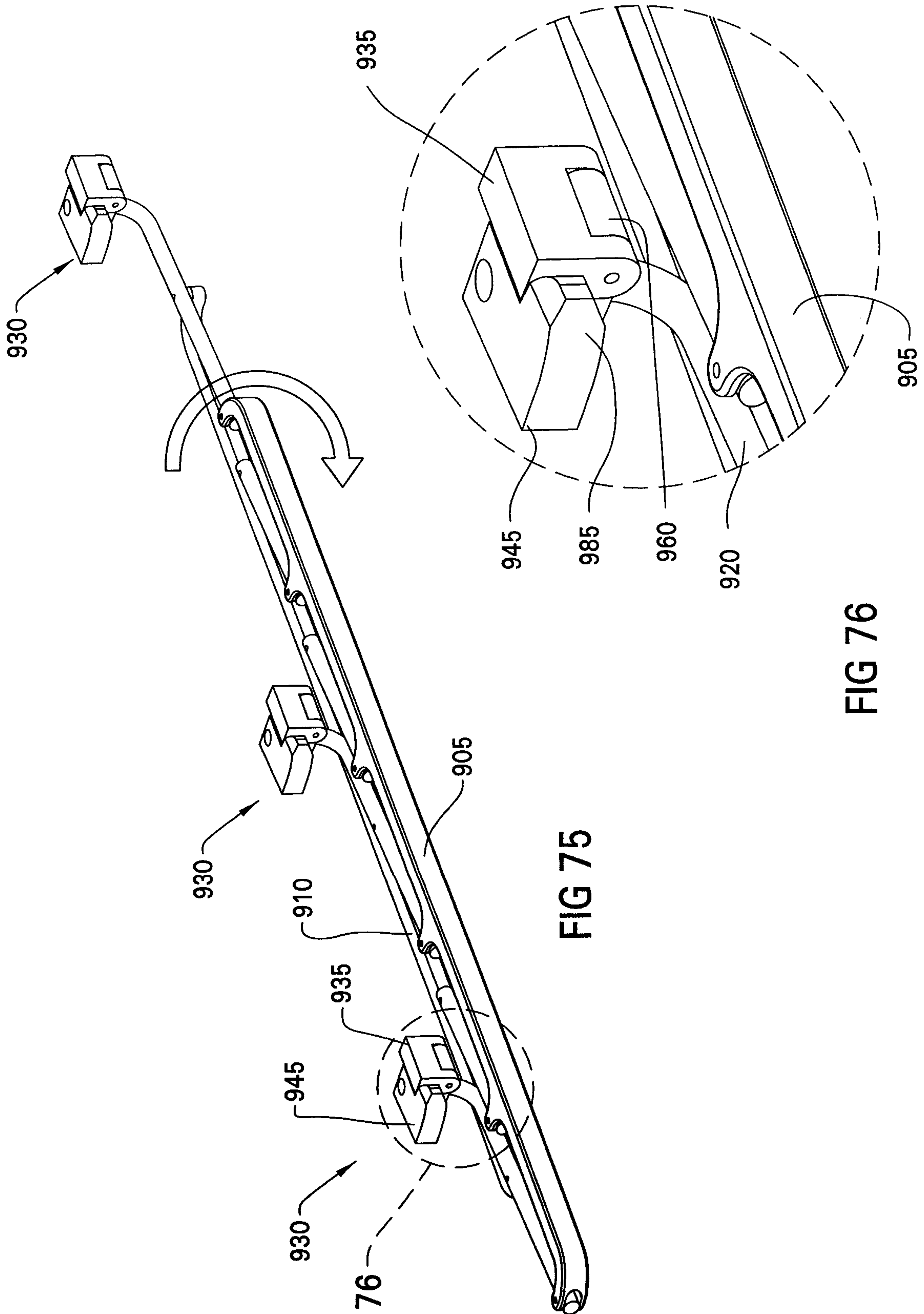


FIG 75

FIG 76



# Gear Drive Side Rail

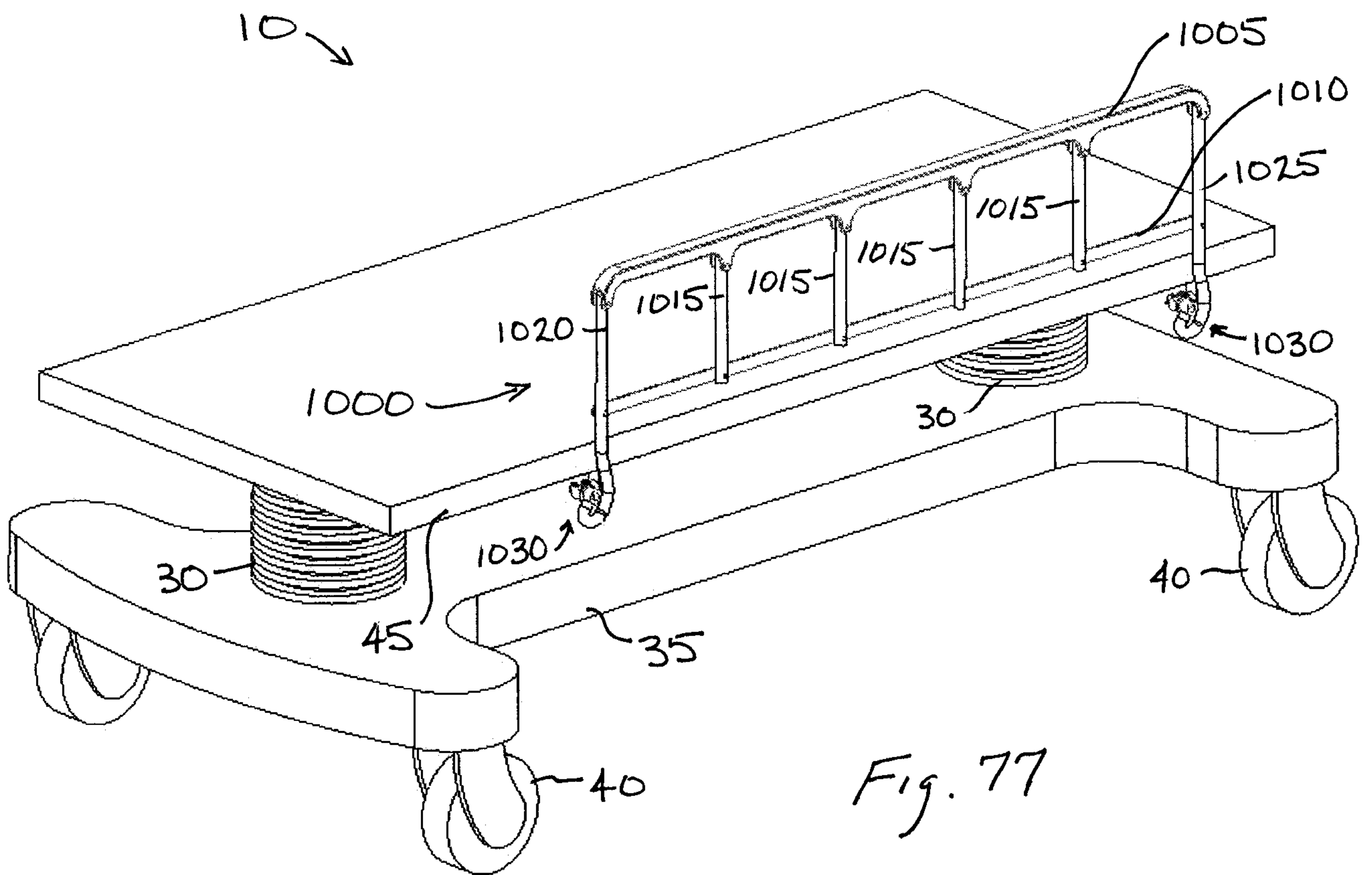


Fig. 77

# RAIL UP

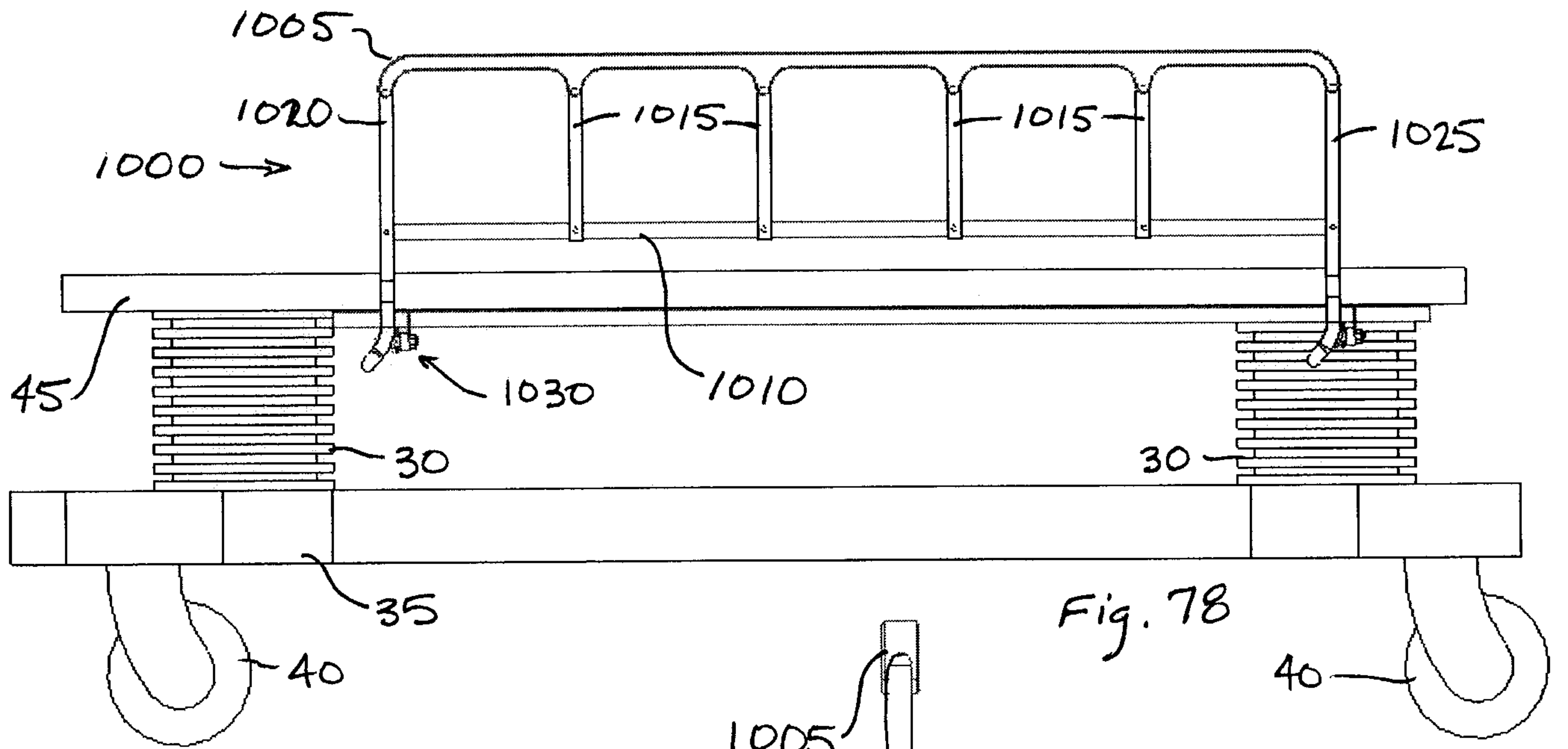


Fig. 78

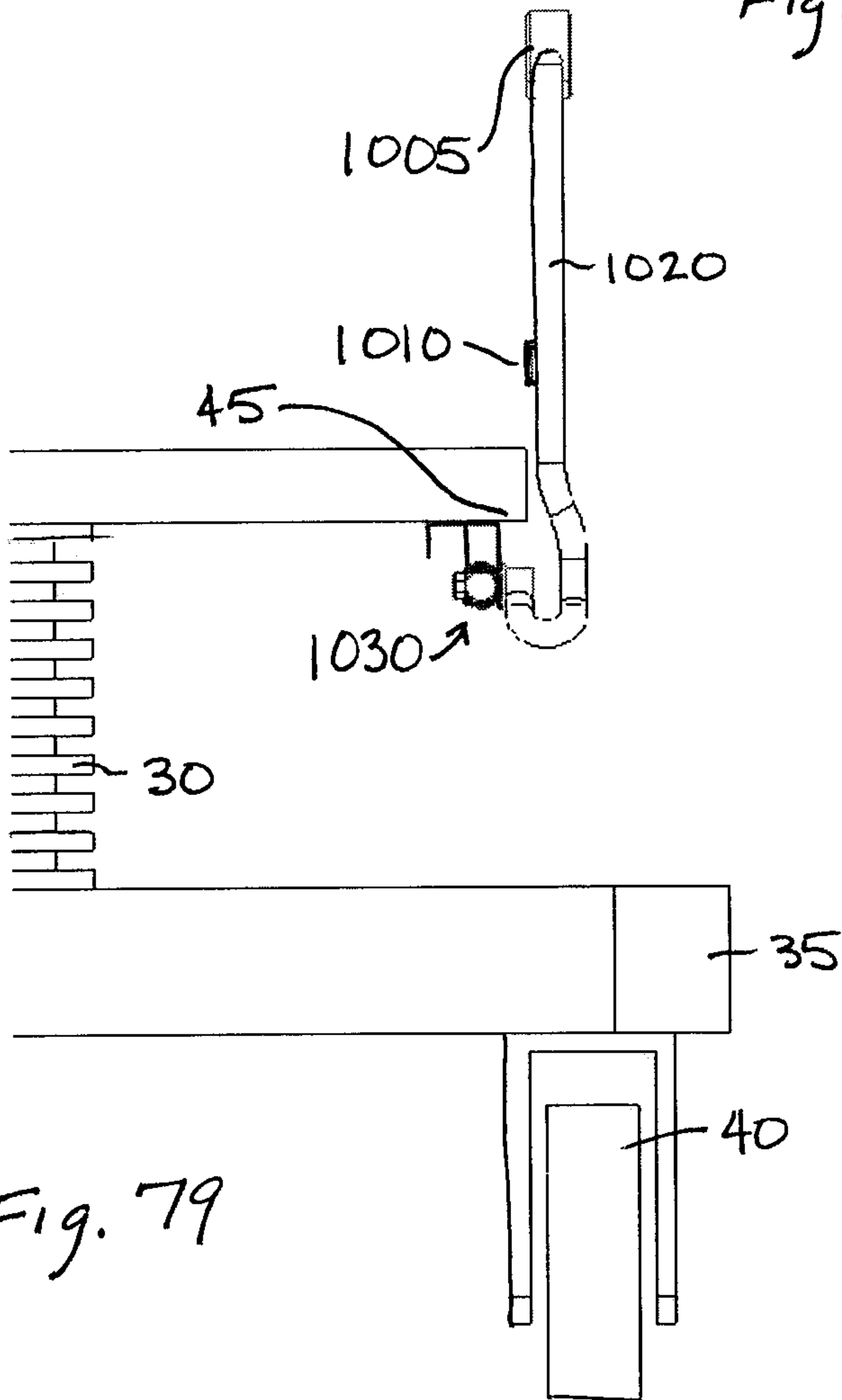


Fig. 79

RAIL IN MIDDLE

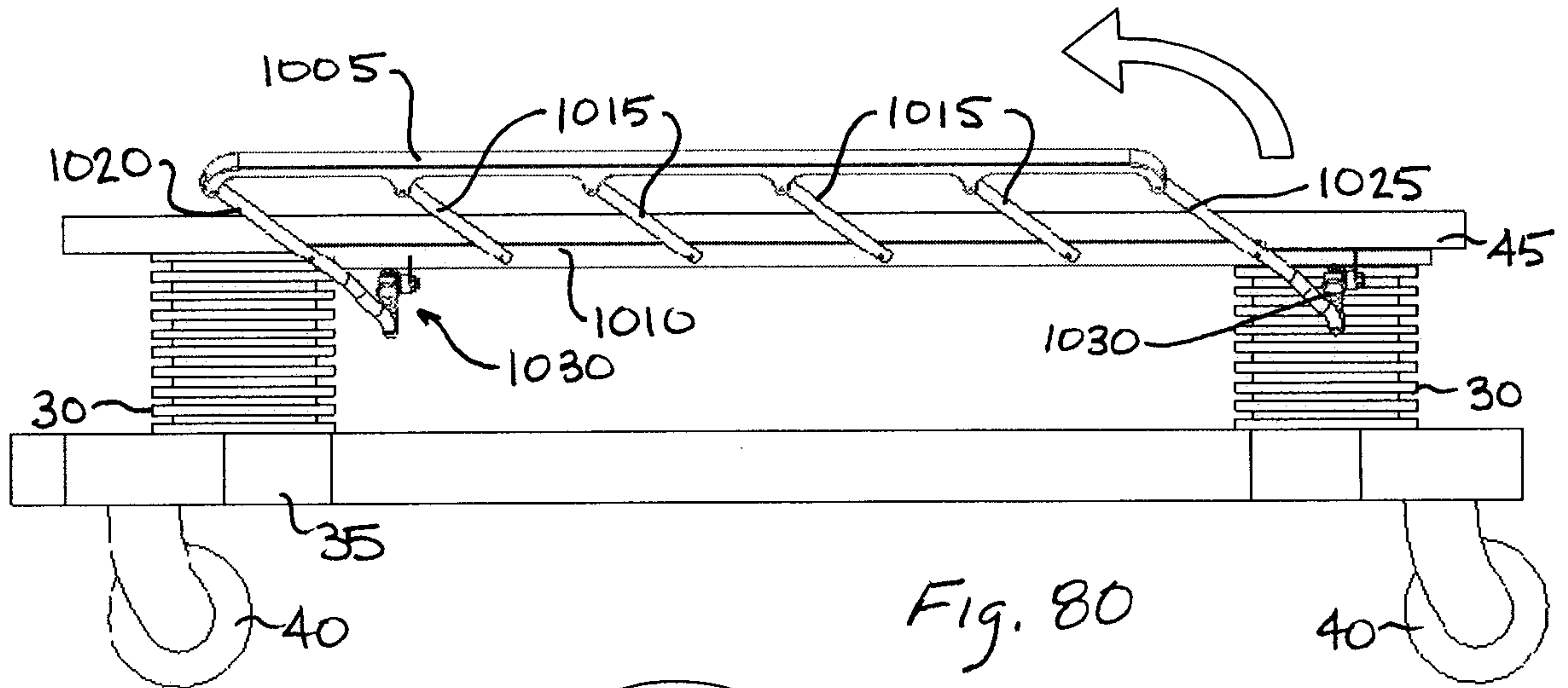


Fig. 80

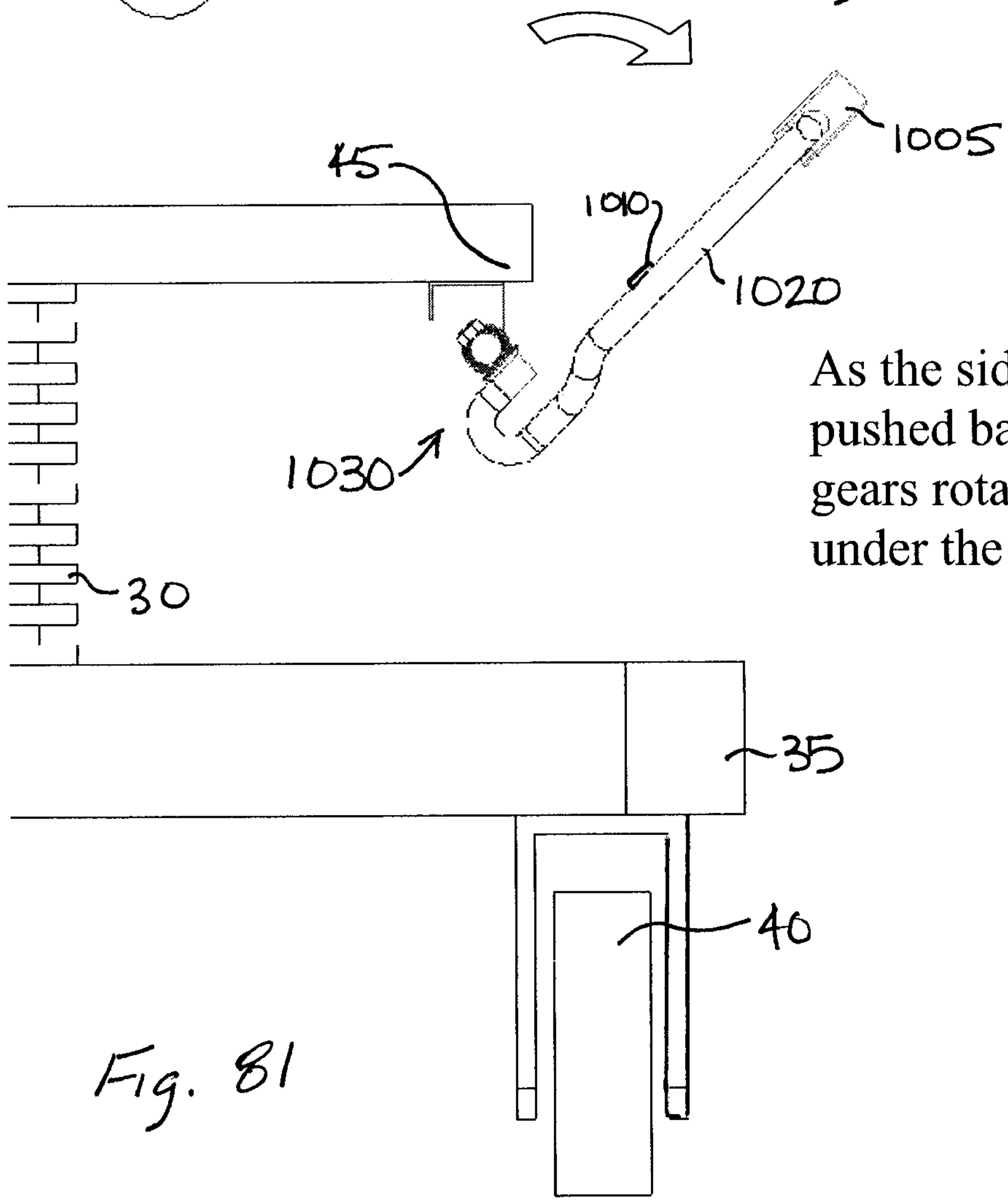


Fig. 81

As the side rail is pushed backwards the gears rotate the side rail under the bed.

RAIL DOWN

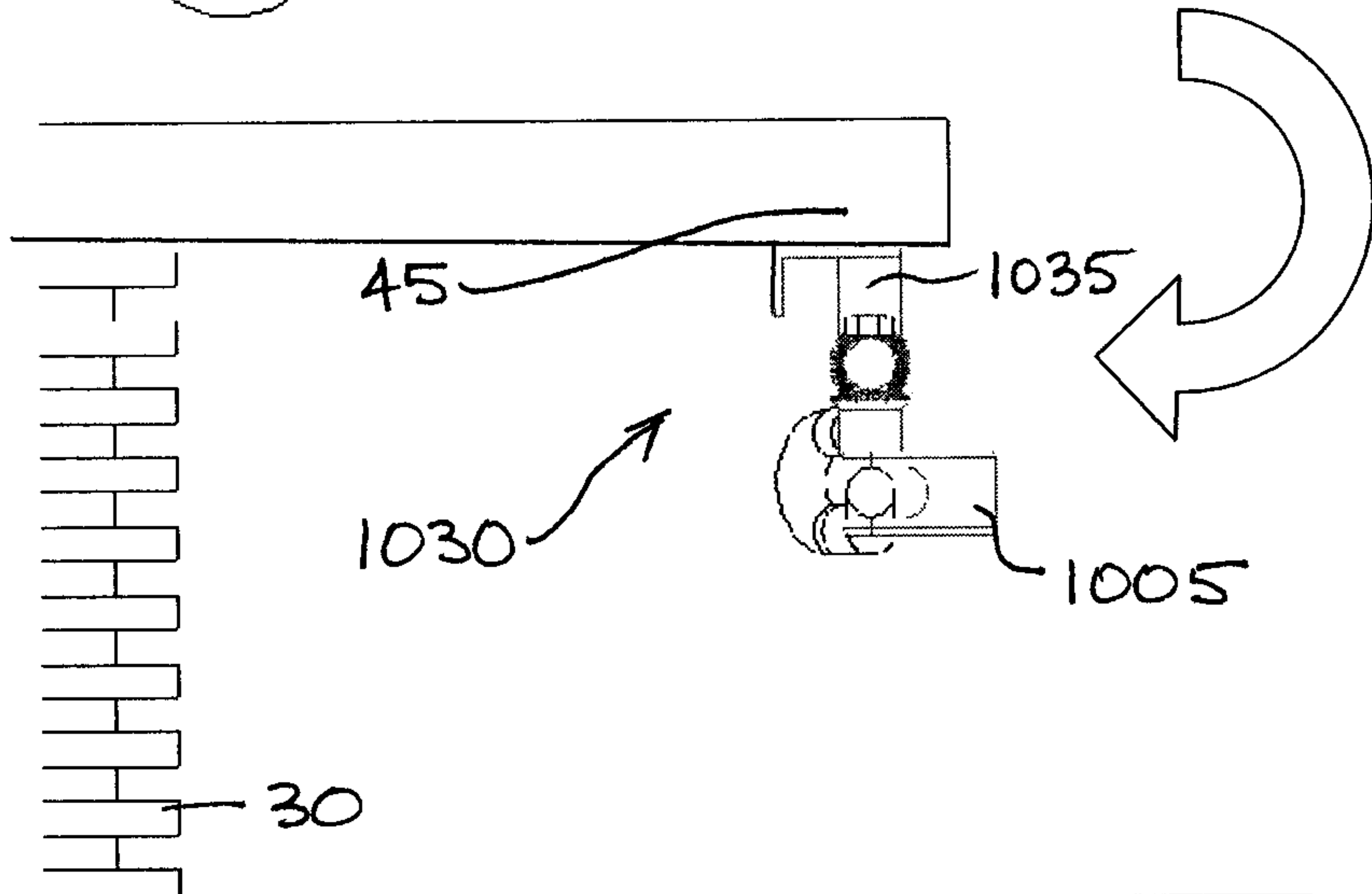
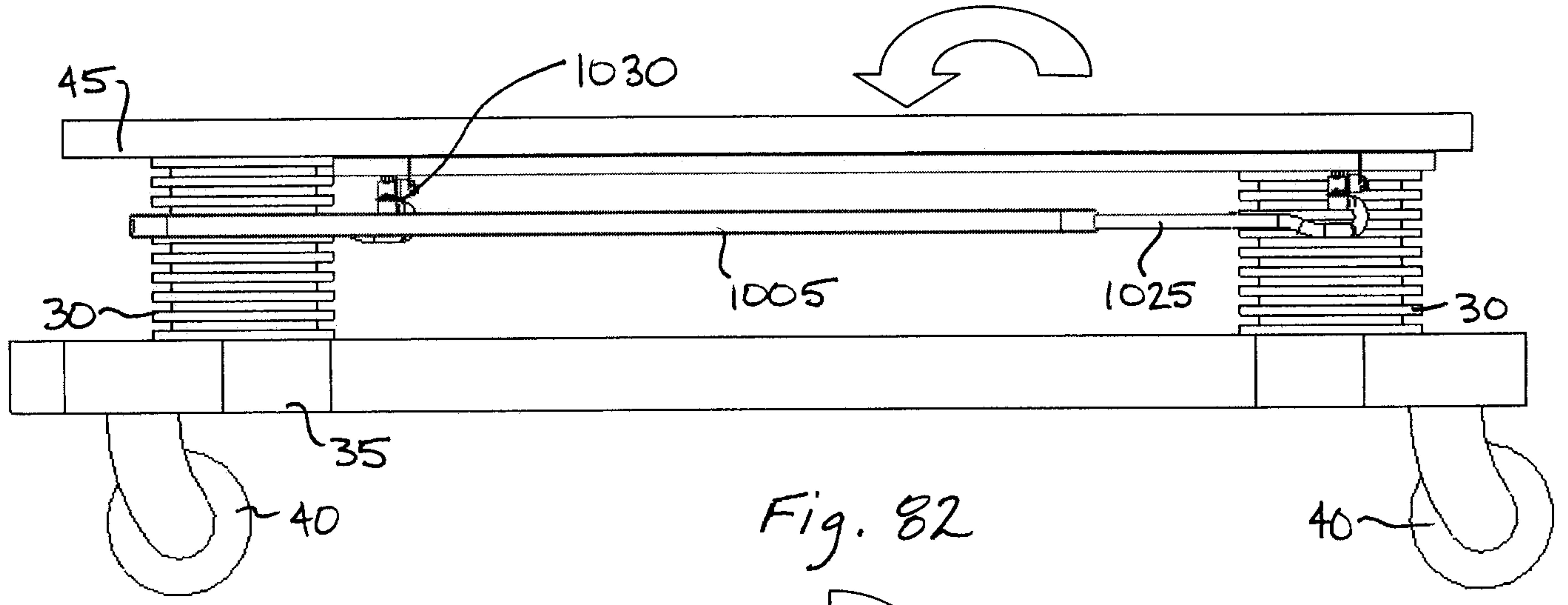


Fig. 83

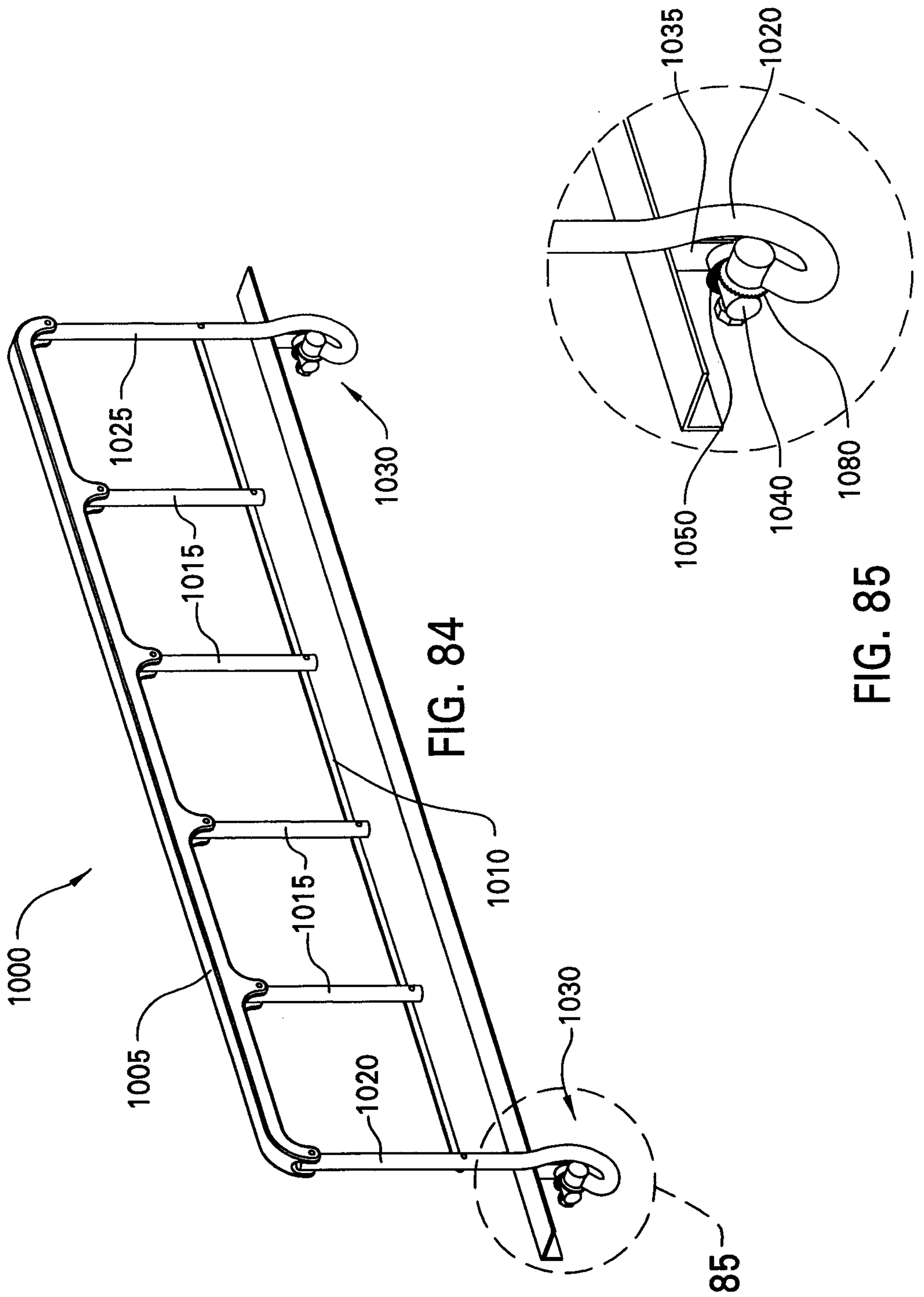


FIG. 84

FIG. 85

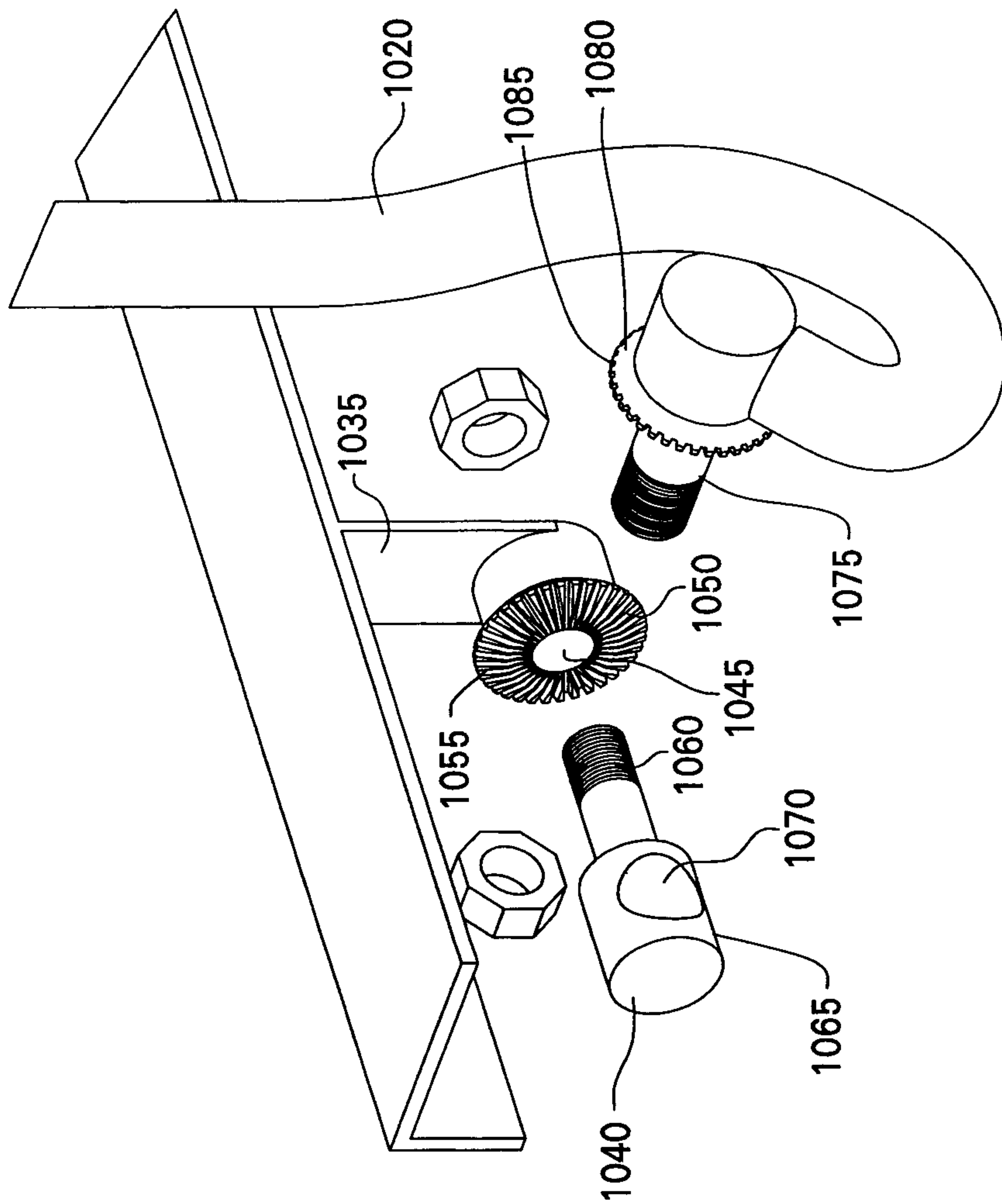
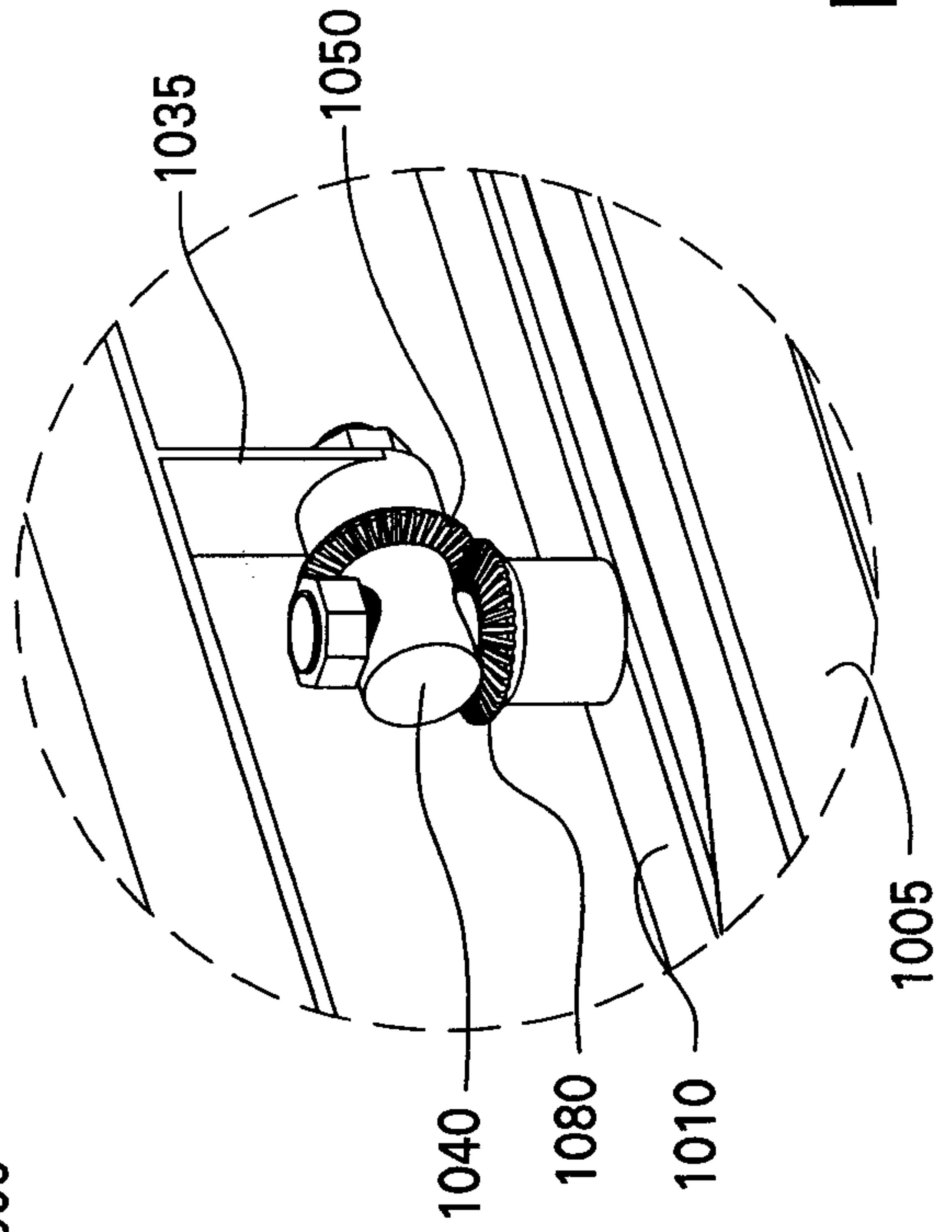
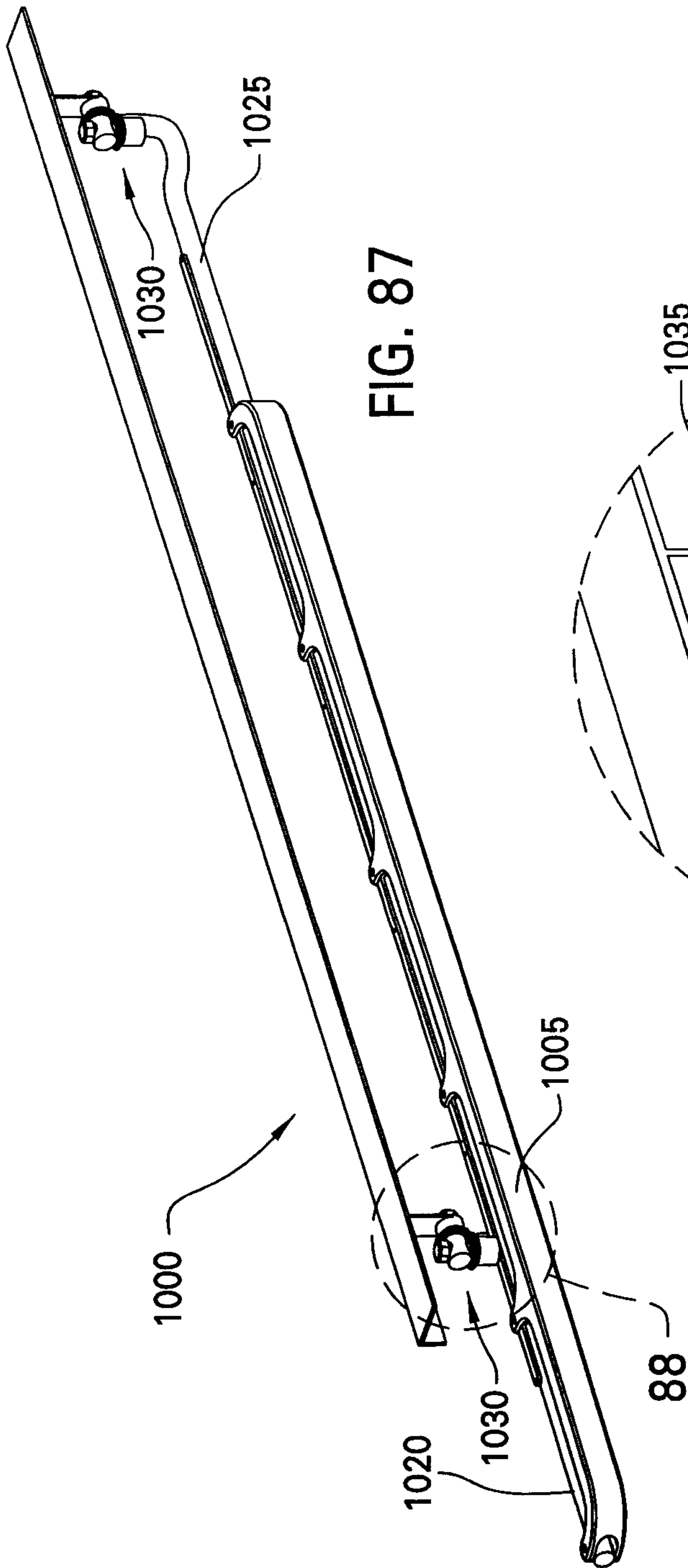
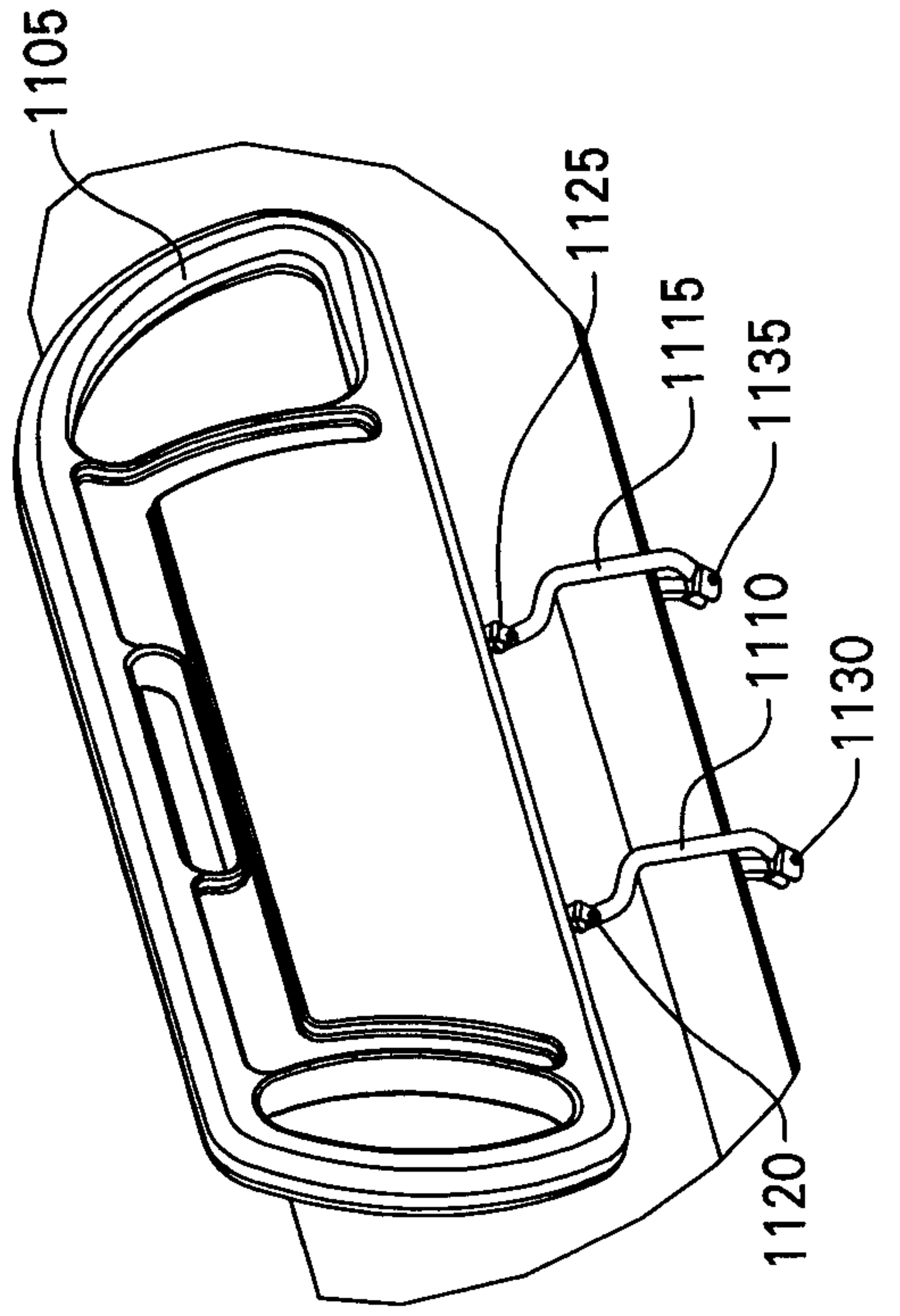
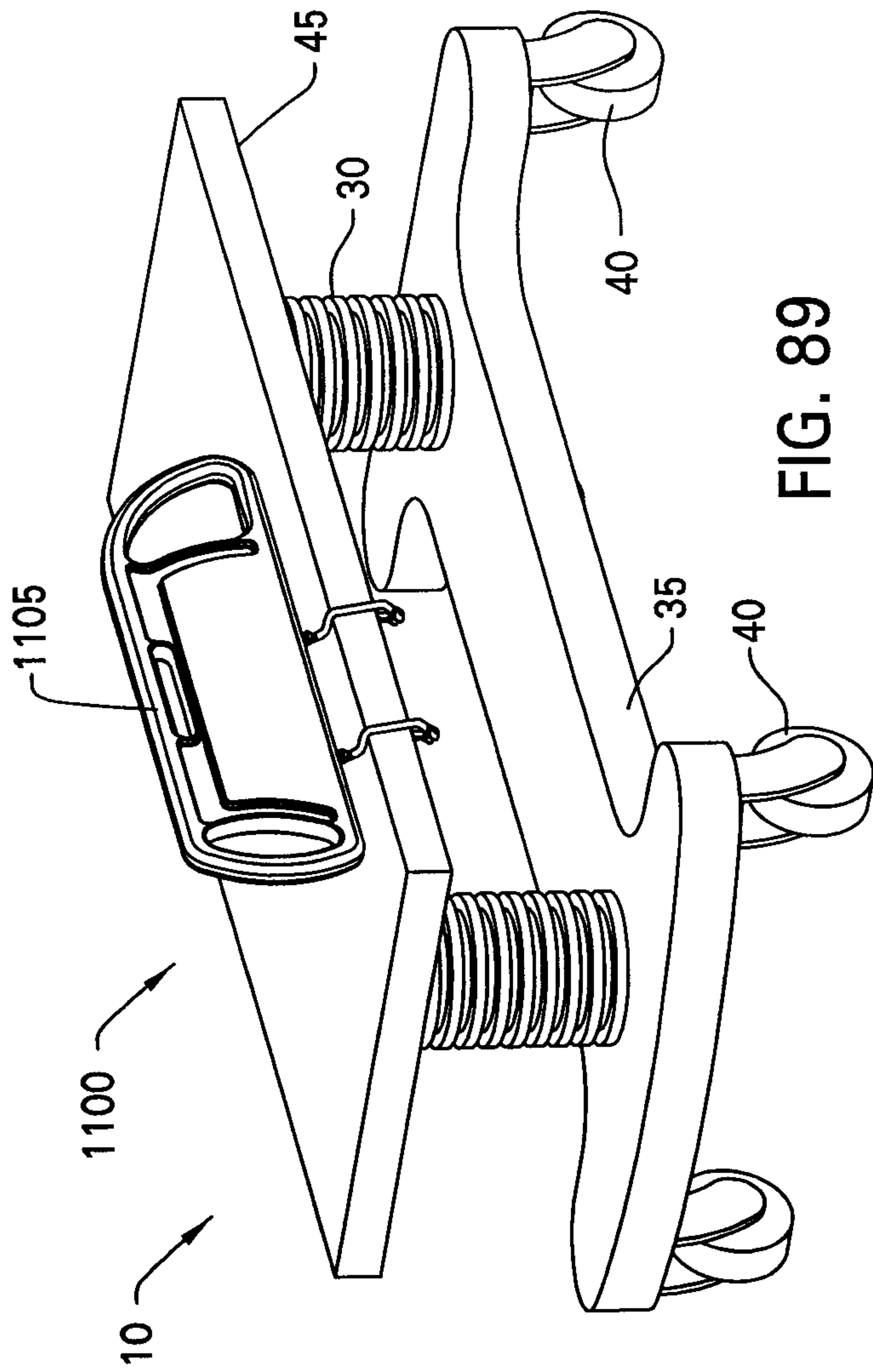


FIG. 86







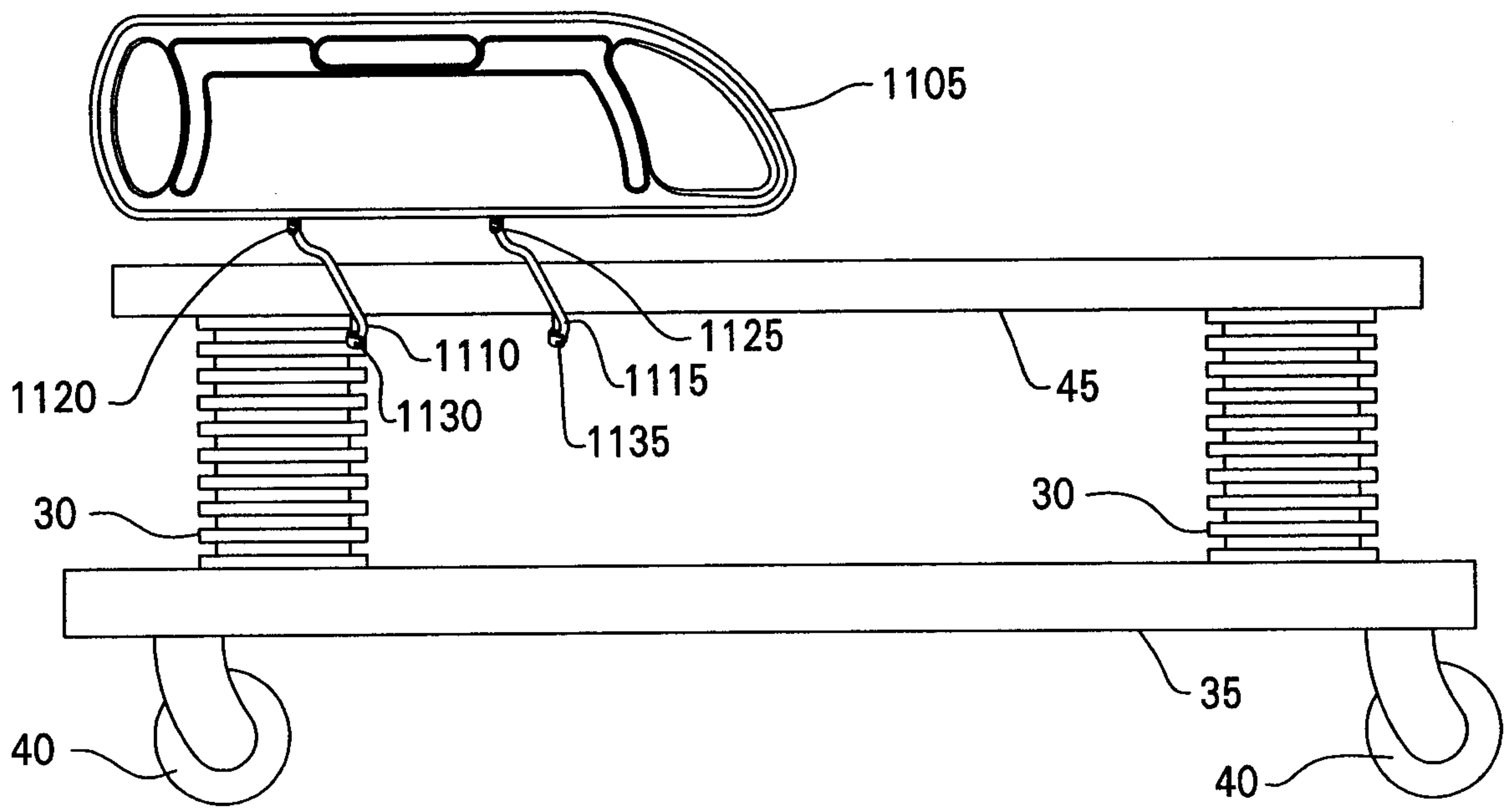


FIG. 91

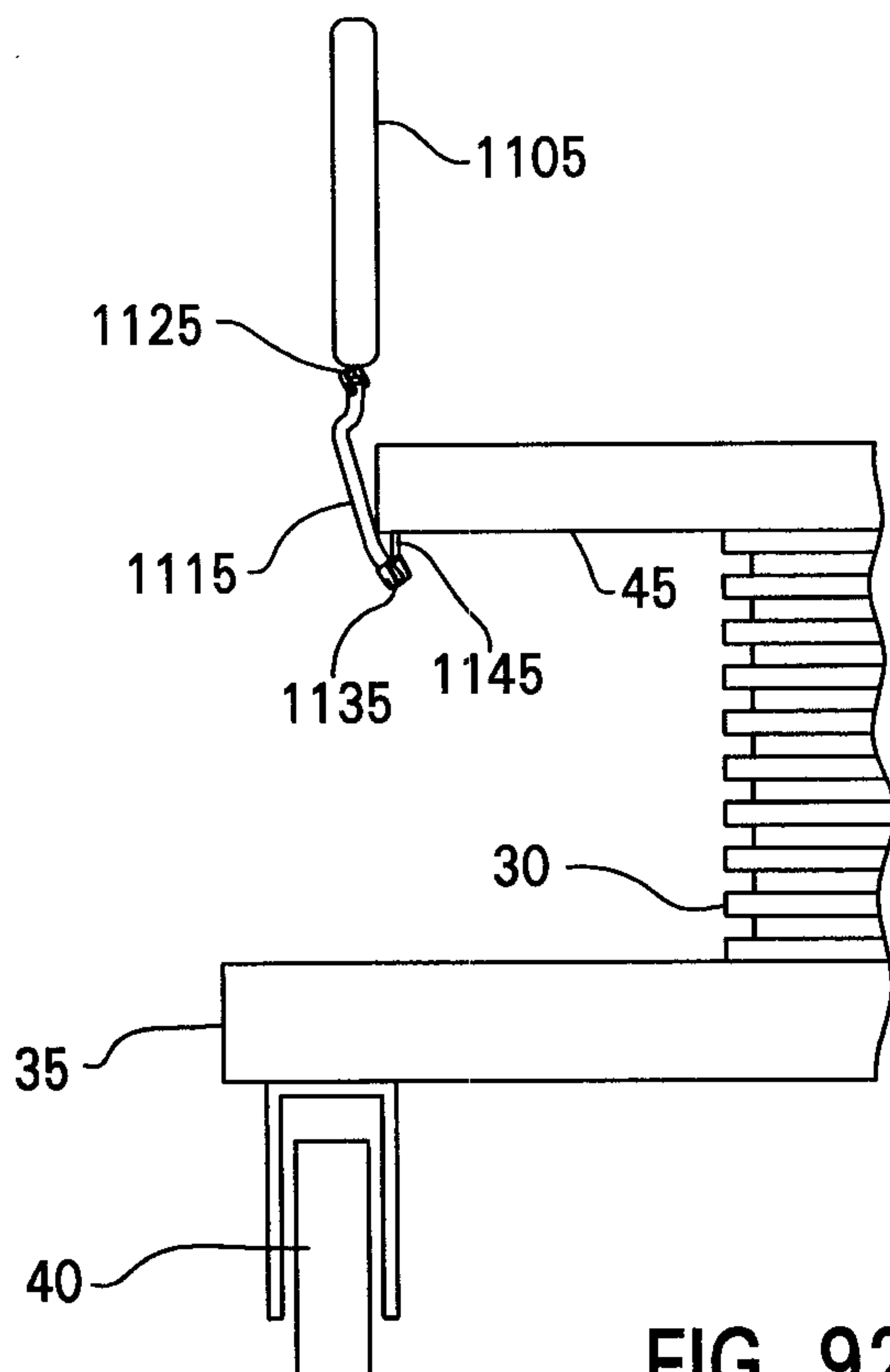


FIG. 92

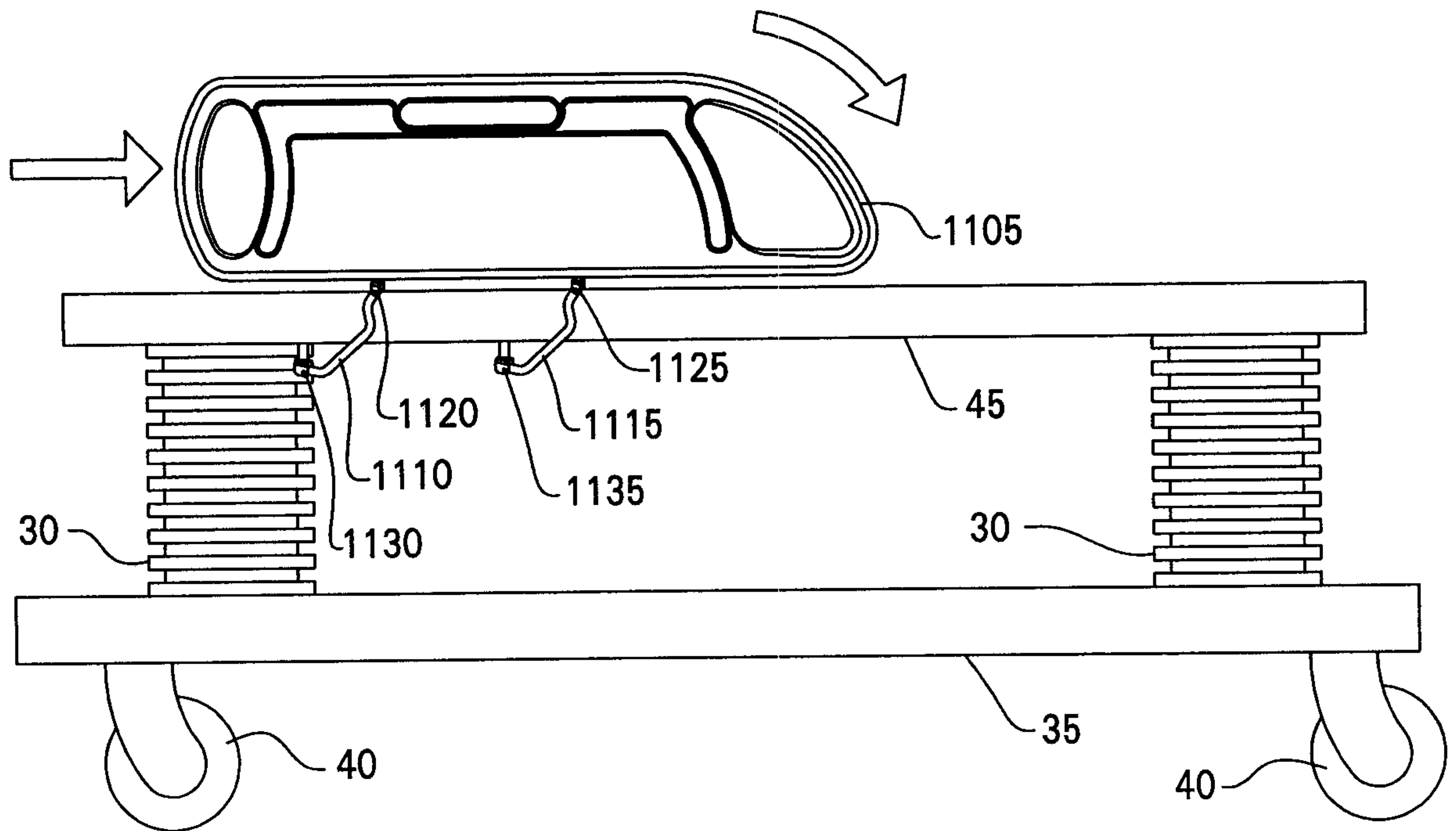


FIG. 93

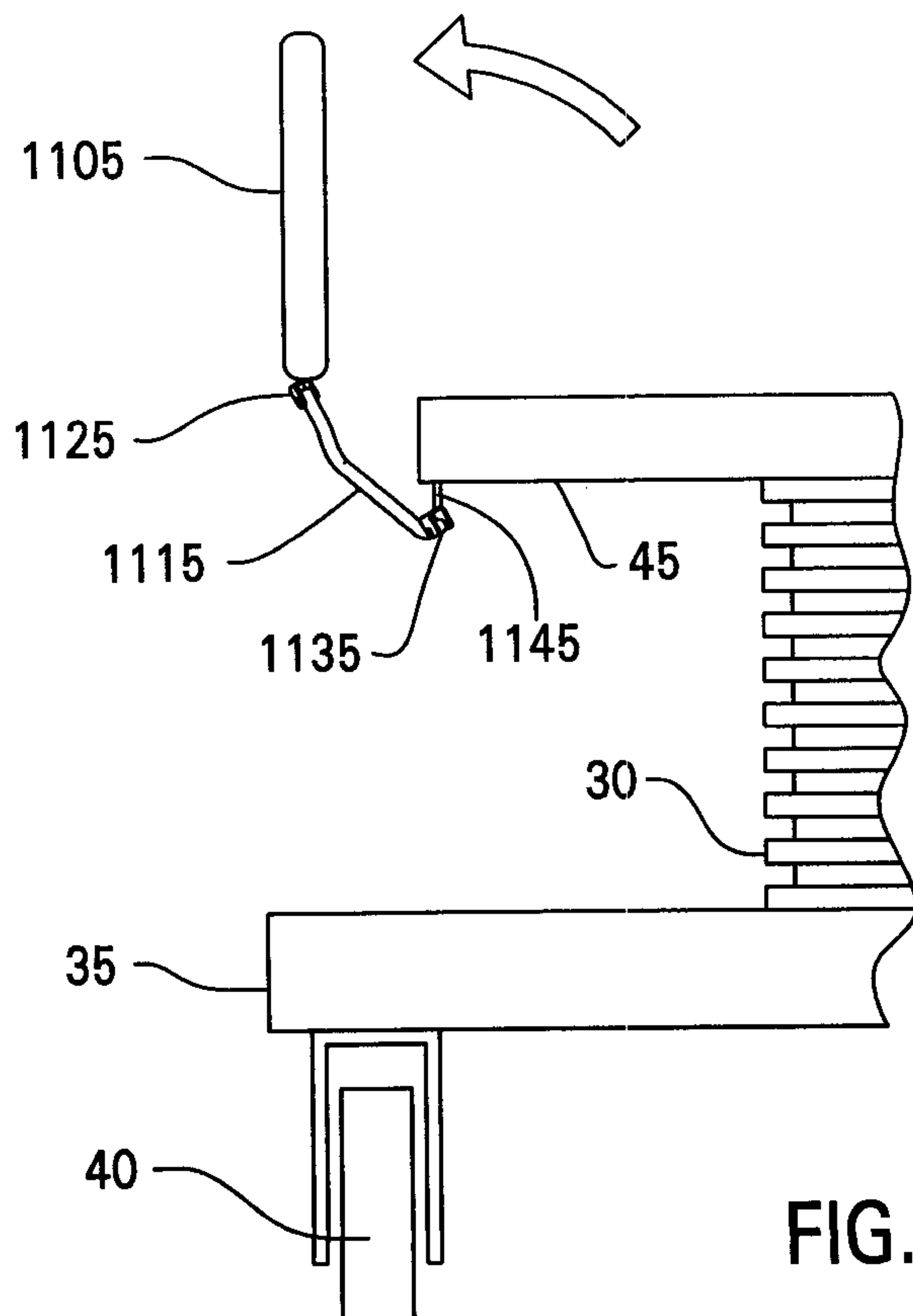


FIG. 94

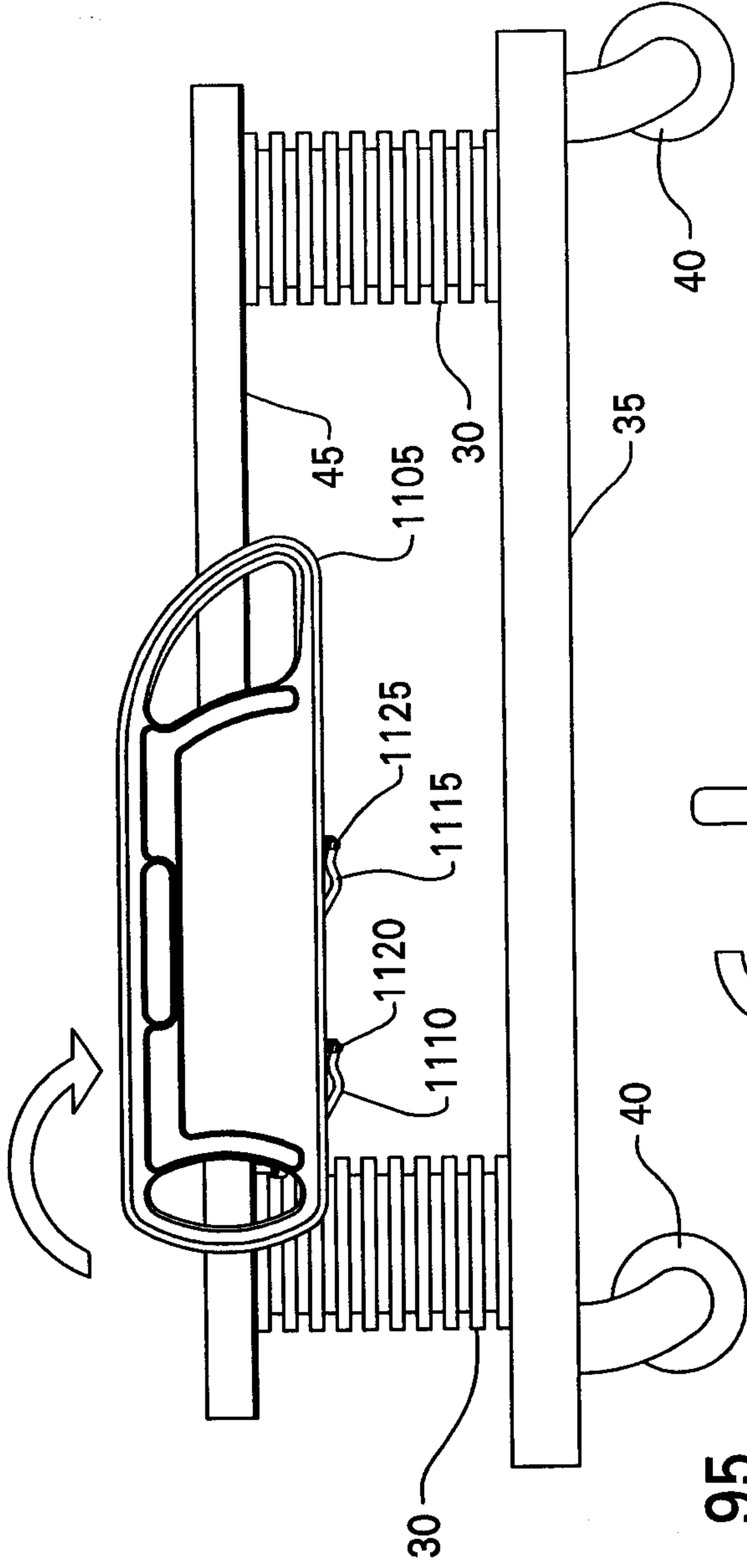


FIG. 95

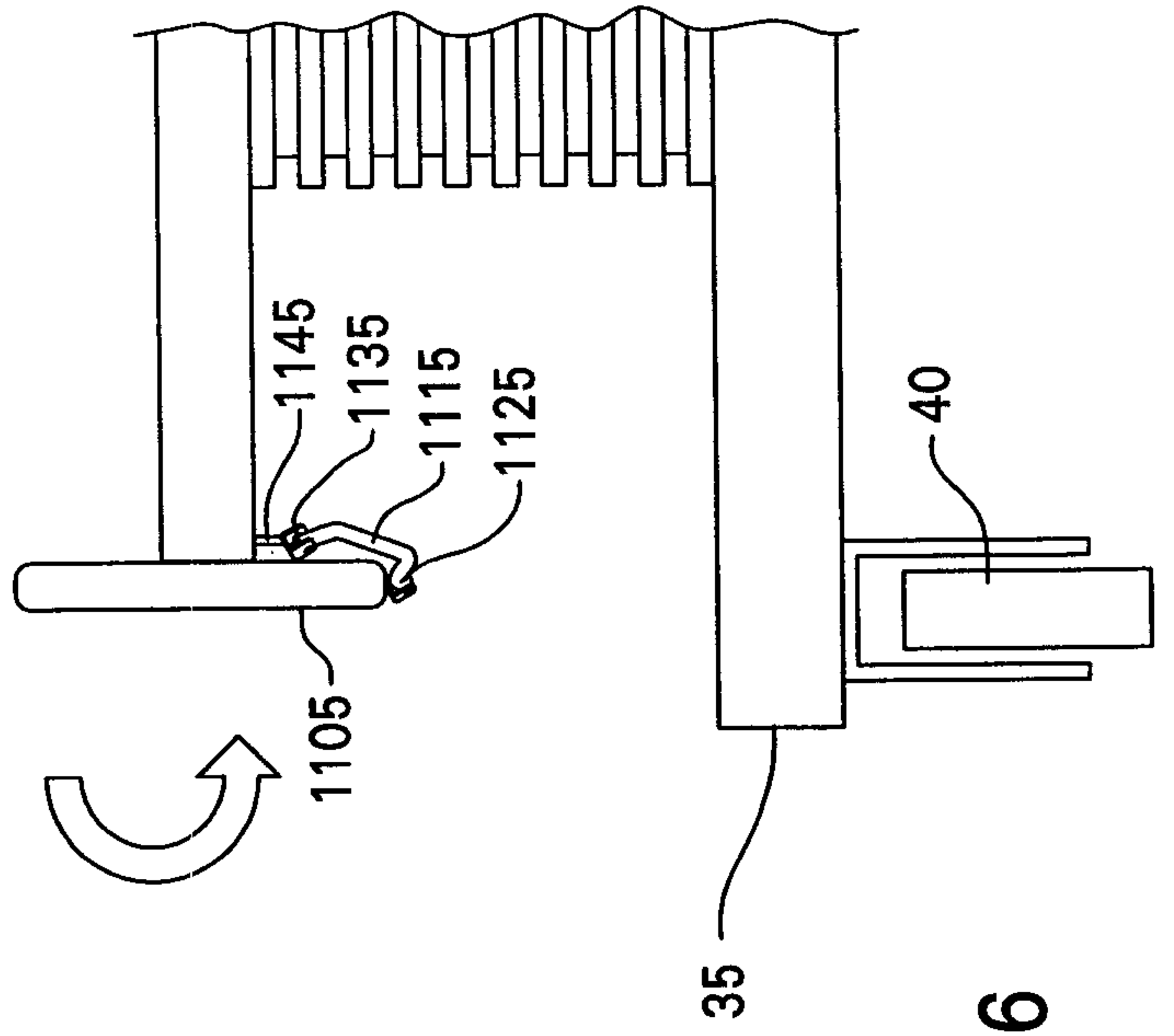


FIG. 96

