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(71) Applicant: **POLARIS INDUSTRIES INC.** [US/US]; 2100 Highway 55, Medina, MN 55340 (US).

(72) Inventors: **NOVOTNY, Shane, A.**; 10935 Sailor Way, Woodbury, MN 55129 (US). **MORISCH, Bradley, R.**; 13999 274th Court, Lindstrom, MN 55045 (US). **GROSS, Brian, J.**; 56282 350 Street, Warroad, MN 56763 (US). **LEONARD, Jed, P.**; 445 Kenmar Circle, Minnetonka, MN 55340 (US).

(74) Agent: **VAN DALEN, Jessica, L.**; Faegre Baker Daniels LLP, 300 North Meridian Street, Suite 2700, Indianapolis, IN 46204 (US).

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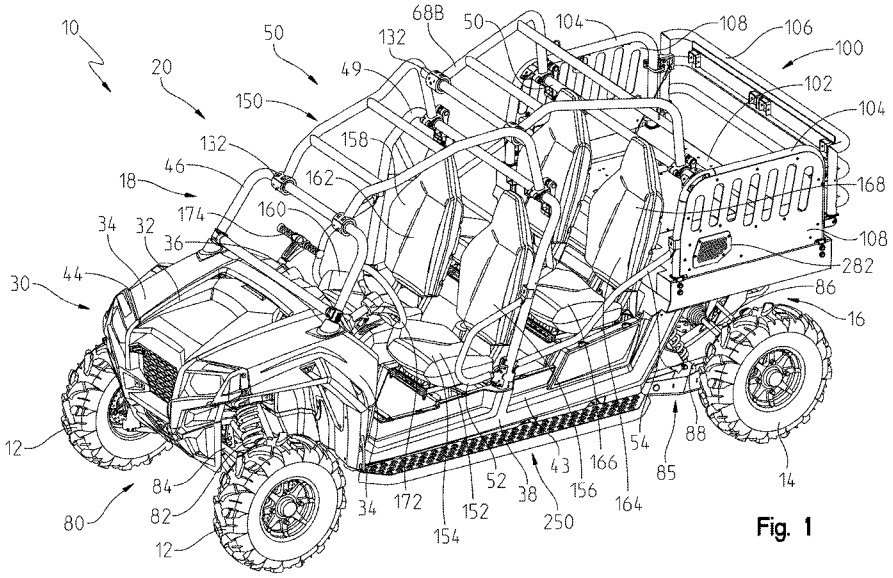

Fig. 1

(57) Abstract: An illustrative embodiment of the present disclosure includes a vehicle (10) comprising a plurality of ground engaging members (12, 14), a chassis (30) supported by the plurality of ground engaging members, and an engine (274) supported by the chassis. The engine is configured to provide power to at least one of the plurality of ground engaging members. The vehicle further comprises a seating area (150) supported by the chassis. The seating area includes at least an operator seat (152) and a passenger seat (158) in a side-by-side arrangement. The vehicle further comprises a plurality of longitudinal members (62) positionable above the seating area and a coupling device (130) coupled to at least one of the longitudinal members. The coupling device has an adjustment member (144) to vary a force of the coupling device.

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FOLDING CAB FRAME

BACKGROUND OF THE DISCLOSURE

[0001] The present disclosure relates to vehicles, and more particularly to side-by-side utility and all-terrain vehicles.

[0002] Generally, all-terrain vehicles ("ATVs") and utility vehicles ("UVs") are used to carry one or more passengers over a variety of terrain. More particularly, some ATVs and UVs may include side-by-side seating, in which a passenger may be seated next to the driver at the front of the vehicle. Side-by-side vehicles also may include a rear seating area to accommodate additional passengers in the vehicle. A roll cage may be provided over the seating of the vehicle. Additionally, ATVs and UVs may provide a cargo area in the front and/or the rear of the vehicle in order to carry cargo.

SUMMARY OF THE DISCLOSURE

[0003] An illustrative embodiment of the present disclosure includes a vehicle comprising a plurality of ground engaging members; a chassis supported by the plurality of ground engaging members; and an engine supported by the chassis. The engine is configured to provide power to at least one of the plurality of ground engaging members. The vehicle further comprises a seating area supported by the chassis. The seating area includes at least an operator seat and a passenger seat in a side-by-side arrangement. The vehicle further comprises a plurality of longitudinal members positionable above the seating area; and a coupling device coupled to at least one of the longitudinal members. The coupling device has an adjustment member to vary a force of the coupling device.

[0004] Another illustrative embodiment of the present disclosure includes a vehicle comprising a plurality of ground engaging members; a frame supported by the plurality of ground engaging members; a hood supported by the frame; and an engine supported by the frame. The engine is configured to provide power to at least one of the plurality of ground engaging members. The vehicle further includes a seating area supported by the ground engaging members, and a cargo area rearward of the seating area. Additionally, the vehicle comprises a roll cage positionable above the seating area. The roll cage is configured to rotate between a first position and a second position. The first position includes the roll cage positioned above the seating area. The second position includes the roll cage pivoted in a

forward direction and supported on the hood. The roll cage is spaced apart from the cargo area when in the second position.

[0005] A further illustrative embodiment of the present disclosure includes a vehicle comprising a plurality of ground engaging members; a frame supported by the plurality of ground engaging members; and an engine supported by the frame. The engine is configured to provide power to at least one of the plurality of ground engaging members. The vehicle of the present disclosure further comprises a seating area supported by the ground engaging members. The seating area includes at least an operator seat, a front passenger seat, and at least one rear passenger seat positioned rearward of the operator seat and the front passenger seat. The frame includes a first movable portion positioned above the operator seat and the front passenger seat, and a second movable portion positioned above the at least one rear passenger seat. The second movable portion is coupled to the first movable portion such that the first and second movable portions are configured to move together.

[0006] Yet another illustrative embodiment of the present disclosure includes a vehicle comprising a plurality of front ground engaging members; a plurality of rear ground engaging members positioned rearward of the front ground engaging members; and a frame supported by the plurality of ground engaging members. The frame extends in a longitudinal direction of the vehicle and includes a front portion supported by the front ground engaging members, a rear portion supported by the rear ground engaging members, and an intermediate portion rearward of the front portion and forward of the rear portion. The vehicle further comprises an engine supported by the frame and configured to provide power to at least one of the plurality of ground engaging members. Additionally, the vehicle comprises a seating area supported by the ground engaging members and a plurality of longitudinal members positionable above the seating area. The plurality of longitudinal members are configured to move between a raised positioned and a lowered position. The raised position includes the longitudinal members positioned above the seating area, and the lowered position includes the longitudinal members positioned forward of the seating area. Each of the longitudinal members include a pivot device spaced apart from adjacent pivot devices.

[0007] Another illustrative embodiment of the present disclosure includes a vehicle comprising a plurality of ground engaging members; a frame supported by the plurality of ground engaging members; and an engine supported by the frame and configured to provide power to at least one of the plurality of ground engaging members. Additionally, the vehicle comprises a seating area supported by the ground engaging members which includes an

operator seat and a passenger seat laterally adjacent the operator seat. The vehicle further comprises a grab bar coupled to the frame and forward of the passenger seat. The grab bar is configured to move in a first range of motion and a second range of motion. The first range of motion is movement in a generally forward and rearward direction and the second range of motion is movement in a generally upward and downward direction.

[0008] Additional features and advantages of the present invention will become apparent to those skilled in the art upon consideration of the following detailed description of the illustrative embodiment exemplifying the best mode of carrying out the invention as presently perceived.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The foregoing aspects and many of the intended advantages of this invention will become more readily appreciated as the same becomes better understood by reference to the following detailed description when taken in conjunction with the accompanying drawings.

[0010] Fig. 1 is a front perspective view of an illustrative vehicle of the present disclosure;

[0011] Fig. 2 is a rear perspective view of the vehicle of Fig. 1;

[0012] Fig. 3 is a side elevational view of the vehicle of Fig. 1;

[0013] Fig. 4 is a front perspective view of an illustrative roll cage and frame of the vehicle of the present disclosure;

[0014] Fig. 5 is an exploded view of an illustrative coupling device;

[0015] Fig. 6A is a rear perspective view of the coupling device of Fig. 5 in a closed position;

[0016] Fig. 6B is a further rear perspective view of the coupling device including a handle rotated upwardly;

[0017] Fig. 6C is a rear perspective view of the coupling device with the handle extending rearwardly;

[0018] Fig. 6D is a further rear perspective view of the coupling device in an open position;

[0019] Fig. 7 is a cross-sectional view of the coupling device of Fig. 5;

[0020] Fig. 8A is a front perspective view of a pivot device of the present disclosure;

[0021] Fig. 8B is an exploded view of the pivot device of Fig. 8A;

[0022] Fig. 9 is a cross-sectional view of the pivot device, taken along line 9-9 of Fig. 8A;

[0023] Fig. 10 is a side perspective view of a grab handle of the present disclosure;

[0024] Fig. 11 is an exploded view of the grab handle of Fig. 10;

[0025] Fig. 12 is a cross-sectional view of the grab handle of Fig. 10, taken along line 12-12 of Fig. 10;

[0026] Fig. 13 is a side perspective view of a running board assembly of the present disclosure;

[0027] Fig. 14 is a bottom perspective view of the running board assembly of Fig. 13;

[0028] Fig. 15 is an exploded view of the running board assembly;

[0029] Fig. 16 is front perspective view of a cargo area of the present disclosure;

[0030] Fig. 17 is an exploded view of the cargo area of Fig. 16;

[0031] Fig. 18 is a top elevational view of the cargo area;

[0032] Fig. 19 is an exploded view of a support plate of the cargo area of Fig. 16;

[0033] Fig. 20 is a rear perspective view of the cargo area;

[0034] Fig. 21 is a bottom elevational view of the cargo area, including an engine assembly, a continuously variable transmission assembly, and an air intake system of the present disclosure;

[0035] Fig. 22A is a front perspective view of an alternative embodiment of the cargo area of Fig. 16;

[0036] Fig. 22B is a top elevational view of the cargo area of Fig. 22A;

[0037] Fig. 23 is a rear perspective view of the roll cage of the present disclosure, when the roll cage is uncoupled from the frame;

[0038] Fig. 24 is a side view of the vehicle of the present disclosure, disclosing illustrative steps of folding the roll cage;

[0039] Fig. 25 is a front perspective view of an alternative embodiment vehicle of the present disclosure;

[0040] Fig. 26 is a rear perspective view of the vehicle of Fig. 25;

[0041] Fig. 27 is a side elevational view of the vehicle of Fig. 25;

[0042] Fig. 28 is a front perspective view of a roll cage and frame of the vehicle of Fig. 25;

[0043] Fig. 29 is an exploded view of a running board assembly of the vehicle of Fig. 25;

[0044] Fig. 30 is a rear perspective view of the roll cage of Fig. 25;

[0045] Fig. 31 is a side view of the vehicle of Fig. 25, disclosing illustrative steps of folding the roll cage;

[0046] Fig. 32 is a front perspective view of an alternative embodiment vehicle of the present disclosure;

[0047] Fig. 33 is a rear perspective view of the vehicle of Fig. 32;

[0048] Fig. 34 is an exploded view of a front portion of a frame assembly and a front bumper of the vehicle of Fig. 32;

[0049] Fig. 35 is an exploded view of a rear portion of the frame assembly and a rear bumper of the vehicle of Fig. 33;

[0050] Fig. 36 is a front perspective view of a cargo area of the vehicle of Fig. 32;

[0051] Fig. 37 is a top view of the cargo area of Fig. 36; and

[0052] Fig. 38 is a front perspective view of a bolster bar of the vehicle of Fig. 32.

[0053] Corresponding reference characters indicate corresponding parts throughout the several views. Although the drawings represent embodiments of various features and components according to the present disclosure, the drawings are not necessarily to scale and certain features may be exaggerated in order to better illustrate and explain the present disclosure. The exemplifications set out herein illustrate embodiments of the invention, and such exemplifications are not to be construed as limiting the scope of the invention in any manner.

DETAILED DESCRIPTION OF THE DRAWINGS

[0054] The embodiments disclosed below are not intended to be exhaustive or to limit the invention to the precise forms disclosed in the following detailed description. Rather, the embodiments are chosen and described so that others skilled in the art may utilize their teachings. While the present disclosure is primarily directed to a utility vehicle, it should be understood that the features disclosed herein may have application to other types of vehicles such as all-terrain vehicles, motorcycles, watercraft, snowmobiles, and golf carts.

[0055] Referring to Figs. 1-3, an illustrative embodiment of a vehicle 10 is shown, and includes ground engaging members, a drivetrain assembly 16, a frame 20, a body or chassis 30, a front suspension assembly 80, a rear suspension assembly 85, and a cargo area 100. Vehicle 10 may be referred to as a utility vehicle ("UV"), an all-terrain vehicle

("ATV"), or a side-by-side vehicle ("SxS") and is configured for travel over various terrains or surfaces. More particularly, vehicle 10 may be configured for military applications.

[0056] Vehicle 10 includes a plurality of ground engaging members, illustratively a set of front wheels 12 and a set of rear wheels 14. In one embodiment, one or more wheels 12, 14 may be replaced with tracks, such as the PROSPECTOR II tracks available from Polaris Industries, Inc. located at 2100 Highway 55 in Medina, Minn. 55340.

[0057] Drivetrain assembly 16 is operably supported on frame 20 and is drivingly connected to one or more of wheels 12, 14. As shown in Fig. 21, drivetrain assembly 16 may include an engine 274, a transmission, for example a continuously variable transmission ("CVT") 272, front and rear differentials (not shown), and a drive shaft (not shown). Engine 274 may be a fuel-burning internal combustion engine, however, any engine assembly may be contemplated, such as hybrid, fuel cell, or electric.

[0058] Front suspension assembly 80 may be coupled to chassis 30 and front wheels 12. As shown in Figs. 1 and 3, front suspension assembly 80 includes a shock 82 coupled to each front wheel 12 and a front axle arrangement which may include a front control arm assembly 84. Similarly, rear suspension assembly 85 may be coupled to chassis 30 and rear wheels 14. Illustratively, rear suspension assembly 85 includes a shock 86 coupled to each rear wheel 14 and a rear axle arrangement 88. Additional details of drivetrain assembly 16 and front suspension assembly 80 may be described in U.S. Patent No. 7,819,220, filed July 28, 2006, titled "SIDE-BY-SIDE ATV", Docket No. PLR-06-1688.01P, and U.S. Patent Application Publication No. 2008/0023240, filed July 28, 2006, titled "SIDE-BY-SIDE ATV," Docket No. PLR-06-1688.02P; and additional details of rear suspension assembly 85 are described in U.S. Patent Application Publication No. 2012/0031693, filed August 3, 2010, titled "SIDE-BY-SIDE ATV," Docket No. PLR-06-24357.02P, the disclosures of which are expressly incorporated by reference herein.

[0059] Chassis 30 may include a hood 32, front fenders 34, a dashboard assembly 36, side boards 38, a front floorboard 40, a rear floorboard 42, foot plates 43, and cargo area 100. Additional accessories, such as a bumper or front brush guard 44, may be included on chassis 30. Chassis 30 may conceal certain components of vehicle 10, for example hood 32 and front fenders 34 may conceal a front differential and other portions of front suspension assembly 80. Additionally, portions of chassis 30, such as hood 32 and cargo area 100, may include attachment members (e.g., hooks and latches) for securing accessories to vehicle 10, as is

further detailed herein. Chassis 30 illustratively extends in a longitudinal direction of vehicle 10.

[0060] Referring to Figs. 1-3, vehicle 10 includes a seating area 150 supported by chassis 30 and frame 20, and which includes seating for at least an operator and a passenger. Illustratively, one embodiment of vehicle 10 includes four seats, including an operator seat 152, a front passenger seat 158, and two rear passenger seats 164. More particularly, operator seat 152 and front passenger seat 158 are in a side-by-side arrangement, and rear passengers seats 164 also are in a side-by-side arrangement. Rear passenger seats 164 are positioned behind operator seat 152 and front passenger seat 158 and may be elevated relative to seats 152, 158. Operator seat 152 includes a seat bottom 154, illustratively a bucket seat, and a seat back 156. Similarly, front passenger seat 158 includes a seat bottom 160, illustratively a bucket seat, and a seat back 162. Likewise, each rear passenger seat 164 includes a seat bottom 166, illustratively a bucket seat, and a seat back 168.

[0061] Vehicle 10 further includes frame 20 supported by wheels 12, 14. In particular, frame 20 includes a front frame portion 22, a rear frame portion 24, and an intermediate frame portion 26. Vehicle 10 also comprises an overhead frame portion, illustratively, a roll cage 50. Roll cage 50 is coupled to frame 20 and cooperates with seating area 150 to define a cab 18 of vehicle 10, as is further detailed herein.

[0062] Referring to Fig. 3, front frame portion 22 illustratively includes a front frame member 46 positioned forward of seating area 150. Front frame member 46 may be coupled to chassis 30 and/or to other components of frame 20, for example frame rails 28 (Figs. 13-15). As shown in Fig. 4, illustrative front frame member 46 is a four-bar member having a substantially rectangular shape; however, other configurations of front frame member 46 are possible, for example front frame member 46 may be generally U-shaped. Front frame member 46 may support a windshield (not shown). Illustrative front frame member 46 is comprised of multiple frame components coupled together through conventional fastening means (e.g., welds, bolts, screws, rivets, or adhesive), as further detailed herein.

[0063] As shown in Figs. 1-4, rear frame portion 24 illustratively includes a rear frame member 48. Rear frame member 48 may be removably coupled to cargo area 100, as is detailed herein. Rear frame member 48 is rearward of seating area 150 and, more particularly, is rearward of rear passenger seats 164. Exemplary rear frame member 48 extends generally horizontally and may be substantially perpendicular to the longitudinal

direction of vehicle 10. Alternative embodiments of rear frame portion 24 may include additional frame members.

[0064] Referring to Figs. 1-4, intermediate frame portion 26 illustratively includes an intermediate frame member 49 spaced apart from front frame member 46 and rear frame member 48. Intermediate frame member 49 illustratively extends above and is laterally outward from operator seat 152 and front passenger seat 158. Intermediate frame member 49 may be coupled to frame 20 and/or chassis 30, and in particular side boards 38, with conventional fasteners, such as bolts, welds, rivets, or adhesive. As is further detailed herein, intermediate frame member 49 may be comprised of multiple frame components coupled together.

[0065] Additionally, intermediate frame portion 26 may support bolster members 52, 54, 56. As shown in Figs. 1-3, illustrative bolster members 52 are forward of bolster members 53, 54. More particularly, bolster members 52 assist in retaining the operator and a front passenger in seats 152, 158, respectively. Additionally, bolster members 54 assist in retaining rear passengers in seats 164. Rear passengers also may use bolster member 53 for additional support. Bolster member 53 is rearward of seats 152, 158, and forward of seats 164, and is coupled to opposing sides of intermediate frame member 49. Illustratively, bolster member 53 is a grab bar for rear passengers.

[0066] Referring to Figs. 3 and 4, roll cage 50 includes a forward section 58 and a rearward section 60. Roll cage 50 is positioned above seating area 150 and, therefore, above the operator and passengers. Forward section 58 illustratively includes a plurality of longitudinal frame members 62 and cross members 64. More particularly, cross members 64 may be substantially perpendicular to longitudinal frame members 62 and conventionally coupled thereto, for example, through welding, bolts, rivets, and/or adhesive. Illustratively, forward section 58 of roll cage 50 includes two longitudinal frame members 62A, 62B and three cross members 64A, 64B, 64C, however, forward section 58 may not be limited to this arrangement. One end of longitudinal frame members 62A, 62B may be coupled to front frame member 46 at pivot points 66A, 66B, respectively. Additionally, an opposing end of longitudinal frame members 62A, 62B may be removably coupled to intermediate frame member 49 with coupling devices 130, as is further detailed herein.

[0067] Referring to Fig. 4, rearward section 60 includes a plurality of longitudinal frame members 68 and cross members 70. Exemplary cross members 70 are substantially perpendicular to longitudinal frame members 68 and may be conventionally coupled thereto

with fasteners, such as welds, rivets, bolts, and/or adhesive. Illustratively, rearward section 60 of roll cage 50 includes two longitudinal frame members 68A, 68B and three cross members 70A, 70B, 70C, however, rearward section 60 may not be limited to this arrangement. One end of longitudinal frame members 68A, 68B may be coupled to cross member 64C of forward section 58 at pivot points 72A, 72B, respectively. Additionally, an opposing end of longitudinal frame members 68A, 68B may be removably coupled to rear frame member 48 with coupling devices 130, as is further detailed herein.

[0068] Roll cage 50 further includes a plurality of coupling devices 130 and a plurality of pivot devices 132. In particular, one end of each longitudinal frame member 62A, 62B, 68A, 68B includes one coupling device 130 and the opposing end includes one pivot device 132. Referring to Figs. 5-7, illustrative coupling devices 130 are tooless, quick-release clamps that may be operated by hand. Coupling devices 130 include an upper clamp portion 134, a lower clamp portion 136, a fastener 138, a cam surface 140, a handle 142, an adjustment mechanism 144, a locking pin 146, and a fastener 148. Upper clamp portion 134 and lower clamp portion 136 each include a semi-circular recess 135 and 137, respectively. When coupling device 130 is in a closed position (i.e., upper and lower clamp portions 134, 136 are brought together), recesses 135, 137 define an aperture 149 (Fig. 6A) to receive intermediate frame member 49 and/or rear frame member 48, as shown in Fig. 4.

[0069] Referring to Figs. 5-7, upper and lower clamp portions 134, 136 are pivotably coupled together with fastener 138, illustratively a shoulder bolt. Upper clamp portion 134 is fixedly coupled to roll cage 50, in particular to one end of each longitudinal frame member 62A, 62B, 68A, 68B with welds, bolts, adhesive, rivets, or other fasteners (Fig. 4). Conversely, lower clamp portion 136 is configured to pivot or rotate in clockwise and counterclockwise directions relative to upper clamp portion 134. As such, lower clamp portion 136 is freely pivotable about fastener 138 between an open position and a closed position.

[0070] Cam surface 140 extends from upper clamp portion 134. Handle 142 may rotate relative to cam surface 140 in order to close and open coupling device 130. In particular, handle 142 rotates in an over-cam manner (i.e., above cam surface 140) in order to adjust the clamp force, as is further detailed herein. Handle 142 illustratively includes a first side 142A and a second side 142B coupled together with a fastener 148. Fastener 148 is received within apertures 143A, 143B of first and second sides 142A, 142B, respectively. More particularly, as shown in Fig. 7, fastener 148 may be a socket end cap screw that is

threaded at one end 148b and unthreaded (e.g., smooth) at the other end 148a. As such, aperture 143A may be unthreaded such that fastener 148 slides through without any obstruction or engagement. However, aperture 143B may be threaded in order to engage threaded end 148b of fastener 148, thereby coupling together first and second sides 142A, 142B of handle 142. An end cap 148c of fastener 148 engages a shoulder or step 145 of first side 142A in order to prevent overtightening fastener 148 in handle 142.

[0071] As shown in Fig. 5, adjustment mechanism 144 includes an adjustment pin 190, a support pin 192, and a threaded pin 194. In particular, adjustment pin 190 is coupled to handle 142 and lower clamp portion 136. Adjustment pin 190 includes external threads 196 and a groove 198. Adjustment pin 190 is received within an internally threaded aperture 200 of threaded pin 194. A retaining member 202, for example an E-clip, a C-clip, or a spiral external retaining ring, is received within groove 198 of adjustment pin 190 to retain adjustment pin 190 within threaded pin 194. Threaded pin 194 is received within apertures 204A, 204B of first and second sides 142A, 142B, respectively, of handle 142. Illustratively, threaded pin 194 is frictionally held in apertures 204A, 204B of first and second sides 142A, 142B, respectively.

[0072] Adjustment pin 190 also is coupled to support pin 192. More particularly, adjustment pin 190 may be received within aperture 208 of support pin 192. Adjustment pin 190 is positioned within support pin 192 so as to align an aperture 210 of adjustment pin 190 and an aperture 212 of support pin 192. As shown in Fig. 5, apertures 210, 212 receive a roll or spring pin 214 to secure adjustment pin 190 within support pin 192.

[0073] Referring to Fig. 5, support pin 192 is received within apertures 206A, 206B of lower clamp portion 136. As with threaded pin 194, support pin 192 is frictionally held within apertures 206A, 206B of lower clamp portion 136.

[0074] Handle 142 further includes apertures 216A, 216B in first and second sides 142A, 142B, respectively, to receive locking pin 146. Similarly, lower clamp portion 136 includes apertures 218A, 218B, which also receive locking pin 146. In particular, aperture 216A aligns with aperture 218A, and aperture 216B aligns with aperture 218B to receive pin portion 147 of locking pin 146. A retaining portion 141 of locking pin 146 extends between opposing sides of pin portion 147 in order to secure pin portion 147 to lower clamp portion 136 and handles 142.

[0075] The clamp force of adjustment mechanism 144 may be increased or decreased without using tools in order to accommodate varying sizes of rear and intermediate frame

members 48, 49. In particular, handle 142 may be rotated about adjustment pin 190 in order to adjust the position of handle 142 relative to cam surfaces 140. For example, rotating handles 142 in a counterclockwise direction (as viewed in one of Figs. 6A-6D) about adjustment pin 190 may increase the distance between handles 142 and cam surfaces 140, thereby allowing frame members with a larger diameter to be received within aperture 149. Furthermore, the clamping force is adjusted accordingly. Additionally, clockwise rotation of handles 142 about adjustment pin 190 may decrease the distance between cam surfaces 140 and handles 142 such that aperture 149 may accommodate frame members with smaller diameters and the appropriate amount of clamping force may be applied thereto. Furthermore, the adjustability of coupling devices 130 is able to reduce vibrations and noise from rattling because the clamping force may be increased such that coupling devices 130 fits securely, rather than loosely, around intermediate frame member 49 and rear frame member 48.

[0076] As detailed above, roll cage 50 further includes pivot device 132. Referring to Fig. 4, each longitudinal frame member 62A, 62B, 68A, 68B includes a pivot device 132. As shown in Figs. 8A, 8B, and 9, pivot devices 132 include a frame connector 220, at least one bushing 222, an upper pivot member 224, and a lower pivot member 226. Pivot devices 132 are coupled to front frame member 46 and cross member 64C of forward section 58 to allow forward and rearward sections 58, 60 of roll cage 50 to pivot forward in order to collapse or fold, as is further detailed herein.

[0077] Frame connector 220 is positioned between two components of front frame member 46 and cross member 64C. Frame connectors 220 include a body 228, flanges 230, and ends 232. Body 228 and ends 232 may have the same diameter, however, the diameter of body 228 and ends 232 is illustratively less than the diameter of the components of front frame member 46 and cross member 64C. As such, ends 232 may be received within the components of front frame member 46 and cross member 64C until flanges 230 are engaged by the frame components. Frame connectors 220 may be comprised of the same material as the components of front frame member 46 and cross member 64C (e.g., steel) and may be conventionally coupled thereto (e.g., with welds, adhesive, rivets, bolts). In this way, frame connectors 220 form part of front frame member 46 and cross member 64C.

[0078] Bushings 222 may be received on body 228 of frame connectors 220, as shown in Figs. 8A, 8B, and 9. Illustratively, there are four bushings 222, however, various embodiments may include other arrangements of bushings 222. Bushings 222 may be

comprised of a polymeric material, rather than a metallic material, in order to prevent corrosion of front frame member 46, cross member 64C, and upper and lower pivot members 224, 226. Bushings 222 include a body 234 and a flange 236. Flanges 236 are positioned adjacent to flanges 230 of frame connectors 220 and body 234 engages body 228 of frame connectors 220. Bushings 222 may be spaced apart from each other, as shown in Figs. 8A, 8B, and 9.

[0079] Referring to Figs. 8A, 8B, and 9, upper and lower pivot members 224, 226 generally surround bushings 222 and frame connectors 220. Upper and lower pivot members 224, 226 include ends 238, a center portion 240, channels 242, and fasteners 248. Additionally, lower pivot member 226 also may include an aperture 244 and a lubrication dispenser 246, illustratively a grease zerk fitting. Illustrative upper pivot member 224 is fixed to one end of each longitudinal frame member 62A, 62B, 68A, 68B, however, lower pivot member 224 is provided separately and is coupled to upper pivot member 224 with fasteners 248. Illustratively, four fasteners 248 (e.g., socket end cap screws) may be received in apertures 249 in order to couple together upper and lower pivot members 224, 226.

[0080] As shown in Figs. 8A and 9, lubrication dispenser 246 may be provided to flow grease or other lubricant through channels 242 to facilitate the pivotal movement of upper and lower pivot members 224, 226 relative to bushings 222. As such, upper and lower pivot members 224, 226 rotate with each longitudinal frame member 62A, 62B, 68A, 68B when forward and rearward sections 58, 60 of roll cage 50 fold forward, as further detailed herein.

[0081] By providing each longitudinal frame member 62A, 62B, 68A, 68B of roll cage 50 with pivot devices 132, longitudinal frame members 62A, 62B, 68A, 68B may remain spaced apart from each other. As such, it is not necessary to join longitudinal frame members 62A, 62B or 68A, 68B at a single pivot device 132. In this way, roll cage 50 may have greater strength and stability than if longitudinal frame members 62A, 62B and/or longitudinal frame members 68A, 68B were coupled together at a single pivot device 132. In particular, a single pivot device 132 may weaken roll cage 50. Additional details of roll cage 50 may be provided in U.S. Patent No. 7,871,106, filed March 17, 2008, titled "METHOD AND APPARATUS RELATED TO TRANSPORTABILITY OF A VEHICLE", Docket No. PLR-06-2019.05P-01, the complete disclosure of which is expressly incorporated by reference herein.

[0082] Referring now to Figs. 1-3, cab 18 further includes a plurality of operator controls 170 supported by dashboard assembly 36 and by which the operator may provide inputs to control vehicle 10. In one embodiment, controls 170 include a steering wheel 172 and foot pedals (not shown). The position of steering wheel 172 may be adjustable. For example, steering wheel 172 may include an adjustment device (not shown), such as a spring or shock, to tilt or rotate steering wheel 172 in a generally upward or downward direction in order to facilitate rapid entry into and exit from vehicle 10.

[0083] The foot pedals of operator controls 170 are actuatable by the operator to control the acceleration and speed of vehicle 10 through the control of engine 274 (Fig. 21) and a braking system (not shown). Additional details regarding operator controls 170, are provided in U.S. Patent No. 7,819,220, filed July 28, 2006, titled "SIDE-BY-SIDE ATV", Docket No. PLR-06-1688.01P, the complete disclosure of which is expressly incorporated by reference herein.

[0084] Seating area 150 may include a grab bar or handle 174 supported on dashboard assembly 36. As shown in Figs. 1-3, a front passenger may hold grab bar 174 for additional stability during operation of vehicle 10. Illustratively, as shown in Figs. 10-12, grab bar 174 is a T-handle having a shaft 176 and a handle 178, however, grab bar 174 may be configured in other arrangements. Handle 178 is illustratively perpendicular to shaft 176 and may be covered with a gripping material, for example, a polymeric material. Grab bar 174 is illustratively adjustable in a plurality of directions.

[0085] Shaft 176 of grab bar 174 may include a plurality of apertures 179 to adjust the position of grab bar 174. More particularly, shaft 176 may be configured to telescope and includes apertures 179 which are spaced apart along the length of shaft 176 (Fig. 11). Apertures 179 may receive a pin 180 to secure the position of grab bar 174. In this way, a first range of motion of grab bar 174 includes adjusting grab bar 174 in forward and rearward directions, thereby accommodating the ergonomic preference of many different front passengers.

[0086] Additionally, grab bar 174 may be configured to rotate or tilt in the same manner as steering wheel 172. As shown in Figs. 10 and 11, grab bar 174 further includes an adjustment device 182, illustratively a gas spring or shock, which allows grab bar 174 to tilt upwardly or downwardly. As such, a front passenger may tilt grab bar 174 upwardly to facilitate rapid entry into and exit from vehicle 10. Similarly, the front passenger may tilt grab bar 174 downwardly when in vehicle 10 in order to easily hold on to grab bar 174 during

operation of vehicle 10. In this way, adjustment device 182 allows grab bar 174 to have a second range of motion in an upward or downward direction.

[0087] Referring to Figs. 10 and 11, adjustment device 182 includes a cylinder 184, a movable piston rod 186, a sleeve 187, and fasteners 189. A lever (not shown) is operably coupled to piston rod 186 and is configured to selectively block fluid flow within cylinder 184. In operation, the lever is in a rest position when it blocks fluid flow and locks rod 186, and hence grab bar 174, in a specific position. Activation of the lever permits fluid flow within cylinder 184 and, thus permits adjustment of rod 186, and grab bar 174. Adjustment device 182 may comprise a Bloc-O-Lift RTM gas spring available from Stabilus.

[0088] Adjustment device 182 is supported on chassis 30 and grab bar 174. In particular, adjustment device 182 is coupled to a frame member 74, which is positioned below dashboard assembly 36 (Figs. 1-3), with fasteners 189. A tilting arm 75 and sleeve 187 may be coupled to shaft 176 and frame member 74. In particular, tilting arm 75 supports the movement of grab bar 174 when adjustment device 182 is activated. A bushing 76, a washer 77, and fasteners 78, 79 may be used to couple tilting arm 75 with frame member 74. As shown, fastener 78 may be a bolt or other similar coupler and fastener 79 may be a nut or other coupler that is complementary to fastener 78.

[0089] Referring to Figs. 13-15, vehicle 10 further includes a running board assembly 250 spaced laterally outward from chassis 30 and below foot plates 43 (Figs. 1-3). However, running board assembly 250 does not extend outwardly more than front fenders 34 (Figs. 1-3). As such, running board assembly 250 does not increase the width of vehicle 10. Running board assembly 250 may be coupled to chassis 30 and/or frame rails 28 to increase the overall stability and strength of vehicle 10. Additionally, running board assembly 250 facilitates entry into and exit from vehicle 10 because an operator or passenger may step onto running board assembly 250 when entering and exiting vehicle 10.

[0090] Running board assembly 250 includes running board plates 252, running board frame members 254, and support members 256, 258. Running board plates 252 extend in the longitudinal direction of vehicle 10 and, in particular, along the length of cab 18 which allows the operator, front passenger, and rear passengers to access running board assembly 250. Running board plates 252 may be extruded from a metallic material, for example steel. Running board plates 252 illustratively include a plurality of raised apertures 260 to provide traction when an operator or passenger steps on running board plates 252. Apertures 260 also allow dirt or other matter to fall through, which further facilitates traction.

[0091] Running board plates 252 may include a lip 262 along an inner edge of running board plates 252. Lip 262 may engage chassis 30 and may be coupled thereto with conventional fasteners (not shown). Additionally, running board plates 252 may be further coupled to chassis 30 with running board frame members 254. In particular, an outer edge of running board plates 252 may be coupled to running board frame members 254, which are coupled to chassis 30 with conventional fasteners (not shown).

[0092] Additionally, running board plates 252 may be coupled to frame 20 with support members 256, 258. Illustratively, each running board plate 252 includes two support members 256 and one support member 258, although alternative embodiments may be contemplated. Two or more couplers (not shown) are received through slots 264 of support members 256 in order to couple running board plates 252 to frame 20. Similarly, four or more fasteners (not shown) are received through slots 266 of support members 258 in order to couple running board plates 252 to frame 20.

[0093] Referring to Figs. 16-21, cargo area 100 of vehicle 10 includes a support plate 102, side frames 104, and a rear frame or wall 106 to store and transport cargo items. Optionally, cargo area 100 may further include side walls 108 coupled to side frames 104. Cargo area 100 is supported on vehicle 10 rearward of rear passenger seats 164. Rear frame member 48 may be removably coupled to side frames 104 with conventional fasteners 110. Side frames 104 are illustratively U-shaped and may include multiple frame members coupled together to define side frames 104. Side walls 108 are coupled to side frames 104 with conventional fasteners 112.

[0094] Support plate 102 extends between side frames 104 and between rear frame member 48 and rear frame 106. Cargo items may be supported on support plate 102 and retained within cargo area 100 by side walls 108 and rear frame 106. Additionally, support plate 102 includes a plurality of attachment members for securing cargo. More particularly, the attachment members may include rails 114 and tie-down rods 116. Rails 114 may be received within recessed channels 115 of support plate 102. A fastener, for example a bolt, hook, or latch, may be slidably received within rails 114 to provide a coupling surface for a bungee, strap, chord, cable, or other similar device that is used to secure cargo within cargo area 100. Similarly, chords, cables, straps, or bungees can be secured onto tie-down rods 116 to also retain cargo within cargo area 100. Additionally, rails 114 and tie-down rods 116 may be used for other applications, such as transport of vehicle 10.

[0095] As shown in Figs. 16 and 17, rear frame 106 illustratively is a pivotable tailgate configured to couple with a chord, cable, bungee, or strap to secure cargo. Rear frame 106 includes vertical attachment members 118 positioned between horizontally extending frame members 119. Vertical attachment members 118 have a plurality of apertures 120 that may receive a chord, cable, bungee, or strap. The other end of the chord, cable, bungee, or strap can then be used to retain cargo in cargo area 100 or can be used for other applications. As shown, rear frame 106 is in a latched position, wherein a coupling mechanism 122 secures rear frame 106 to side frames 104. A steel cable 124 may be used to lower rear frame 106 in an unlatched position. By disengaging coupling mechanism 122, rear frame 106 may be pivoted to the unlatched position and held in the unlatched position with cable 124.

[0096] Cargo area 100 also may be configured to support a portion of an air intake system 270 of vehicle 10. In particular, air intake system 270 is operably coupled to drivetrain assembly 16, and, in particular to CVT 272 and engine 274. As shown in Figs. 16 and 21, an air intake 276 is positioned on the operator's side of vehicle 10 and is operably coupled to engine 274. Air intake 276 is surrounded by a housing 280, which may be coupled to side wall 108 and support plate 102 of cargo area 100. A cover 282 may be secured to side wall 108 to conceal the opening of air intake 276. Similarly, an air intake 278 is positioned on the opposing side of vehicle 10 and is operably coupled to CVT 272. Air intake 278 is surrounded by a housing 284, which may be coupled to side wall 108 and support plate 102. Air intake 278 also may include a cover 286 to conceal the opening of air intake 278. Cover 286 may be coupled to side wall 108. Additional details of air intake system 270 may be provided in U.S. Patent Application Publication No. 2012/0031693, filed August 3, 2010, titled "SIDE-BY-SIDE VEHICLE," Docket No. PLR-06-24357.01P, the complete disclosure of which is expressly incorporated by reference herein.

[0097] Alternatively, as shown in Figs. 22A and 22B, vehicle 10 may include cargo area 500. Cargo area 500 of Figs. 22A and 22B is similar to cargo area 100 of Figs. 1-3 and 16-21, with like reference numbers indicating like parts having like structure and like functionality, except as detailed hereinafter. In particular, cargo area 500 includes a support plate 502, side walls 504, and rear frame 106 (Fig. 21). Cargo area 500 includes a plurality of coupling locations, illustratively tie-down rods 508 and apertures 510, on support plate 502. In particular, tie-down rods 508 may be generally positioned at the front of cargo area 500 and below rear frame member 48. Additionally, tie-down rods 508 may be generally

positioned at the rear of cargo area 500 near rear frame 106, and along a middle portion of support plate 502.

[0098] Apertures 510 are illustratively positioned inward from side walls 504, however, apertures 510 may be located at any position on support plate 502. Apertures 510 may be configured to receive conventional fasteners, such as bolts, hooks, and latches, in order to retain cargo within cargo area 500. Furthermore, apertures 510 may be used to secure rails 114 (Fig. 21) to support plate 502. In particular, fasteners, such as bolts, may be received through apertures (not shown) in rails 114 and through apertures 510 in support plate 502 in order to couple rails 114 to support plate 502. As such, rails 114 may be coupled to the top surface of support plate 502 and the position of rails 114 may be moved or adjusted to accommodate specific cargo. In this way, an operator may position rails 114 in any desired location on support plate 502.

[0099] Referring to Fig. 22A, air intake system 270 may be coupled to side walls 504. Air intake 276 is surrounded by housing 280, which may be coupled to side wall 504 and support plate 502 of cargo area 500. Illustratively, side wall 504 includes a recessed portion 512 which receives air intake 276. Cover 282 may be secured to recessed portion 512 of side wall 504 to conceal the opening of air intake 276 in order to prevent sand and other particulate matter or debris from entering air intake 276. Similarly, air intake 278 is surrounded by housing 284, which may be coupled to side wall 504 and support plate 502. Illustratively, side wall 504 includes a recessed portion (not shown) similar to recessed portion 512 which receives air intake 278. Cover 286 (Fig. 17) of air intake 278 may be secured to the recessed portion of side wall 504 to conceal the opening of air intake 278 in order to prevent sand and other particulate matter or debris from entering air intake 278.

[00100] During operation or transport of vehicle 10, the height of roll cage 50 may be adjusted to allow vehicle 10 to enter confined spaces, for example an aircraft, or for transportation by parachute or helicopter. In particular, as detailed herein, roll cage 50 may collapse or fold in order to reduce the height of vehicle 10.

[00101] Referring to Figs. 23 and 24, roll cage 50 may pivot or rotate from a raised position to a lowered position. When in the raised position, roll cage 50 is positioned above seating area 150 and is coupled to rear and intermediate frame members 48, 49. Conversely, when in the lowered position, roll cage 50 is folded forward and is secured to hood 32 of vehicle 10. More particularly, coupling devices 130 and pivot devices 132 cooperate to

release forward and rearward sections 58, 60 of roll cage 50 from intermediate frame member 49 and rear frame member 48.

[00102] As shown in Figs. 6B-6D, an operator may remove locking pins 146 from handles 142 without using tools. Handles 142 may then rotate upwardly and disengage from cam surfaces 140, thereby releasing the clamping force. Lower clamp portion 136 may rotate away from upper clamp portion 134 when handle 142 is released from cam surfaces 140, which also uncouples rear and intermediate frame members 48, 49 from coupling devices 130, as shown in Figs. 23 and 24. In this way, forward and rearward sections 58 and 60 of roll cage 50 are freely pivotable about pivot points 66A, 66B and 72A, 72B, respectively. As is explained herein, clamps are operable by hand and do not require the use of tools.

[00103] When coupling devices 130 are released from intermediate frame member 49 and rear frame member 48, forward section 58 of roll cage 50 is lifted upwardly by hand, thereby also lifting rearward section 60. As such, rearward section 60 is able to pivot in a clockwise direction about pivot devices 132 at pivot points 72A, 72B. More particularly, upper and lower pivot members 224, 226 pivot about bushings 222 (Fig. 9) such that rearward section 60 may fold or collapse under forward section 58. However, rearward section 60 is still coupled to forward section 58 by pivot devices 132 and cross member 64C. When rearward section 60 is positioned beneath forward section 58, a strap, tie, bungee, cable, chord, or other flexible component (not shown) may be used to secure rearward section 60 to forward section 58. Additionally, longitudinal frame members 68A, 68B may include a plurality of polymeric bumpers 300 (Fig. 23) to prevent damage to longitudinal frame members 62A, 62B, 68A, 68B.

[00104] With rearward section 60 coupled to forward section 58, forward section 58 may rotate or pivot in a counterclockwise direction about pivot devices 132 coupled to front frame member 46 at pivot points 66A, 66B. In particular, upper and lower pivot members 224, 226 may rotate relative to bushings 222 (Fig. 9) in order to pivot forward and rearward sections 58, 60 toward hood 32. When forward and rearward sections 58, 60 are both supported on hood 32 in the lowered position, a strap, cable, bungee, or similar flexible component (not shown) may be used to secure roll cage 50 to front brush guard 44, hood 32, or front fenders 34. As such, the height of vehicle 10 is reduced when roll cage 50 is in the lowered position. The process of collapsing or folding roll cage 50 does not require tools (e.g., is tooless) and may be done by hand.

[00105] As has been detailed herein, roll cage 50, including both forward and rearward sections 58, 60, is pivoted in a forward direction by a compound movement toward hood 32, rather than in a rearward direction toward cargo area 100. Both forward and rearward sections 58, 60 remain coupled together and, therefore, both fold in a forward direction. As such, cargo area 100 remains open and available for storing and supporting cargo items. Additionally, it may be preferred to remove rear frame member 48 after rearward section 60 of roll cage 50 is folded forward and stored in the lowered position. Fasteners 110 are removed from rear frame member 48 and side frames 104 of cargo area 100 in order to remove rear frame member 48 therefrom.

[00106] Referring to Figs. 25-31, vehicle 10' may alternatively include only operator seat 152 and front passenger seat 158, thereby accommodating up to two people rather than up to four people, as was previously described. Vehicle 10' of Figs. 25-31 includes features similar to those of vehicle 10 of Fig. 1-24, with like reference numerals indicating like elements having like functionality and structure, except as described below.

[00107] Referring to Figs. 25-27, vehicle 10' includes seating area 150' supported by chassis 30' and frame 20', and which includes operator seat 152 and passenger seat 158 in a side-by-side arrangement. Bolster members 52' may be coupled to chassis 30' and side frames 104 of cargo area 100, or alternatively to side walls 504 of cargo area 500 (Figs. 22A and 22B), and positioned adjacent operator seat 152 and passenger seat 158 to retain the operator and/or passenger in vehicle 10'. Vehicle 10' also comprises roll cage 50' coupled to frame 20' and cooperating with seating area 150' to define cab 18' of vehicle 10'.

[00108] Referring to Fig. 27, frame 20' includes front frame portion 22 and rear frame portion 24. Front frame portion 22 illustratively includes front frame member 46 positioned forward of seating area 150'. Front frame member 46 may be coupled to chassis 30' and/or to other components of frame 20', for example frame rails (not shown). Front frame member 46 may support a windshield (not shown). As shown in Figs. 24 and 25, rear frame portion 24 illustratively includes rear frame member 48, which may be removably coupled to cargo area 100. Rear frame member 48 is rearward of seating area 150'.

[00109] Referring to Figs. 27 and 29, roll cage 50' is positioned above seating area 150' and, therefore, above the operator and passenger. Roll cage 50' illustratively includes longitudinal frame members 62 and cross members 64. More particularly, cross members 64 may be substantially perpendicular to longitudinal frame members 62 and conventionally coupled thereto, for example, through welding, bolts, rivets, and/or adhesive. Illustratively,

roll cage 50' includes two longitudinal frame members 62A, 62B and three cross members 64A, 64B, 64C, however, roll cage 50' may not be limited to this arrangement. One end of longitudinal frame members 62A, 62B may be coupled to front frame member 46 at pivot points 66A, 66B, respectively. Additionally, an opposing end of longitudinal frame members 62A, 62B may be removably coupled to rear frame member 48 with coupling devices 130, as is further detailed herein.

[00110] Roll cage 50' further includes coupling devices 130 and pivot devices 132. In particular, one end of each longitudinal frame member 62A, 62B includes coupling devices 130 and the opposing end includes pivot devices 132. As detailed above, coupling devices 130 receive rear frame member 48, as shown in Figs. 25, 26, and 29.

[00111] Roll cage 50' further includes pivot device 132. Referring to Figs. 8A and 9, each longitudinal frame member 62A, 62B includes one pivot device 132 having frame connector 220, at least one bushing 222, upper pivot member 224, and lower pivot member 226. Pivot devices 132 are coupled to front frame member 46 to allow roll cage 50' to pivot forward.

[00112] Frame connector 220 is positioned between two components of front frame member 46 and includes body 228, flanges 230, and ends 232. Ends 232 may be received within the components of front frame member 46 until flanges 230 are engaged by the frame components. Frame connectors 220 may be comprised of the same material as the components of front frame member 46 (e.g., steel) and may be conventionally coupled thereto with welds, adhesive, rivets, and/or bolts. In this way, frame connectors 220 form part of front frame member 46.

[00113] As shown in Fig. 9, and referring to pivot devices 132, a layer of lubricant may flow through channels 242 between upper and lower pivot members 224, 226 and bushings 222. As such, upper and lower pivot members 224, 226 allow roll cage 50' to pivot forward. More particularly, upper and lower pivot members 224, 226 rotate relative to bushings 222 in order to fold/collapse roll cage 50'.

[00114] Referring to Figs. 25-29, by providing each longitudinal frame member 62A, 62B of roll cage 50' with one pivot device 132, longitudinal frame members 62A, 62B may remain spaced apart from each other. As such, it is not necessary to join longitudinal frame members 62A, 62B at a single pivot point. In this way, roll cage 50' may have greater strength and stability than if longitudinal frame members 62A, 62B were coupled together at a single pivot device 132. In particular, a single pivot device 132 may weaken roll cage 50'.

[00115] Referring now to Fig. 29, vehicle 10' further includes running board assembly 250' spaced laterally outward from chassis 30' and below foot plates 43'. Running board assembly 250' may be coupled to chassis 30' and/or frame rails 28' to increase the overall stability and strength of vehicle 10'. Additionally, running board assembly 250' facilitates entry and exit from vehicle 10' because an operator or passenger may step onto running board assembly 250' when entering and exiting vehicle 10'.

[00116] Running board assembly 250' includes running board plates 252', running board frame members 254', and support members 258'. Running board plates 252' extend in the longitudinal direction of vehicle 10' and, in particular, along the length of cab 18' which allows the operator and passenger to access running board assembly 250'. Running board plates 252' illustratively include a plurality of raised apertures 260 to provide traction when an operator or passenger steps on running board plates 252'. Apertures 260 also allow dirt or other matter to fall through, which also facilitates traction.

[00117] Running board plates 252' may be coupled to frame 20' with support members 258. Illustratively, each running board plate 252' includes one support member 258, although alternative embodiments may be contemplated. Four or more fasteners (not shown) are received through slots 266 of support members 258 in order to couple running board plates 252' to frame 20'.

[00118] During operation or transport of vehicle 10', the height of roll cage 50' may be adjusted to allow vehicle 10' to enter confined spaces, for example an aircraft, or for transportation by parachute or helicopter. In particular, as detailed herein, roll cage 50' may collapse or fold in order to reduce the height of vehicle 10'.

[00119] Referring to Figs. 30 and 31, roll cage 50' may pivot or rotate from a raised position to a lowered position wherein roll cage 50' is secured to hood 32 of vehicle 10'. More particularly, coupling devices 130 and pivot devices 132 cooperate to release roll cage 50' from rear frame member 48.

[00120] As shown in Fig. 6D, locking pins 146 may be removed from handles 142 by hand to allow handles 142 to rotate upwardly. As such, handles 142 disengage from cam surfaces 140 and the clamping force is released. Lower clamp portion 136 may rotate away from upper clamp portion 134 when handle 142 is released from cam surfaces 140, which also releases rear frame member 48 from coupling devices 130. In this way, roll cage 50' is freely pivotable about pivot points 66A, 66B, as shown in Figs. 30 and 31.

[00121] When coupling devices 130 are released from rear frame member 48, roll cage 50' is pivoted in a counterclockwise direction about pivot devices 132 coupled to front frame member 46 at pivot points 66A, 66B. In particular, upper and lower pivot members 224, 226 may rotate relative to bushings 222 in order to pivot roll cage 50' toward hood 32. When roll cage 50' is supported in the lowered position, a strap, cable, bungee, or similar flexible component (not shown) may be used to secure roll cage 50' to front brush guard 44, hood 32, or front fenders 34. As such, the height of vehicle 10' is reduced when roll cage 50' is in the lowered position.

[00122] As was previously detailed herein, roll cage 50' is pivoted in a forward direction toward hood 32, rather than in a rearward direction toward cargo area 100 or cargo area 500. As such, the cargo area remains open and available for storing and supporting cargo items. Additionally, it may be preferred to remove rear frame member 48 after roll cage 50' is folded forward and stored in the lowered position. Fasteners 110 may be removed from rear frame member 48 and side frames 104 of cargo area 100 in order to remove rear frame member 48 therefrom.

[00123] Referring to Figs. 32-38, an alternative embodiment of vehicle 10 is shown as vehicle 10'' and includes features similar to those of vehicle 10 of Fig. 1-24, with like reference numerals indicating like elements having like functionality and structure, except as described below. Vehicle 10'' includes a frame assembly 20'', a chassis 30'', roll cage 50, and a cargo area 100'' supported on front wheels 12 and rear wheels 14. Frame 20'' supports a front bumper assembly 400, a rear bumper assembly 440, and side carrying members 430, 436.

[00124] As shown in Fig. 34, front bumper assembly 400 is coupled to a front frame portion 22' of frame assembly 20'' and includes an upper frame member 402, an inner frame member 420, and an outer frame member 422. Frame members 402, 420, and 422 may be integrally formed with each other or may be coupled to each other with conventional fasteners (e.g., bolts, welds, rivets, adhesive). Additionally, by coupling front bumper assembly 400 to front frame portion 22'', as detailed herein, front bumper assembly 400 may increase the strength and stability of frame assembly 20''. Outer frame members 422 are coupled to each other through a brace member 404. A plurality of brackets 406 may be supported on outer frame members 422 and/or brace member 404 and are coupled to flanges 414 of front frame portion 22''. More particularly, fasteners 408 may be received through apertures 416 of flanges 414 in order to couple brackets 406 thereto.

[00125] Brace member 404 also may be coupled to a front plate 410 of front frame portion 22''. Conventional fasteners may be received through apertures 412 of front plate 410 in order to secure front bumper assembly 400 thereto. Additionally, brace member 404 may be coupled to inner frame members 420. Illustratively, inner frame members 420 support guard members 424. Guard members 424 may be coupled to inner frame members 420 with fasteners 426. Inner frame members 420 also are attached to a bracket 423, which couples with front frame portion 22'' through fasteners 425.

[00126] As shown in Fig. 34, front bumper assembly 400 also may include accessories. For example, front bumper assembly 400 may include a towing member, illustratively a receiver hitch 428, and latches 418 supported below brace member 404. In one embodiment, latches 418 are fixed to vehicle 10'' and are used as tie-down members for coupling vehicle 10'' during transport. For example, latches 418 may secure vehicle 10'' to an aircraft during transport. Receiver hitch 428 may be configured for towing and/or for use with a multi-mount winch assembly.

[00127] Front frame portion 22'' also supports side carrying members 430. Illustratively, vehicle 10'' includes two opposing side carrying members 430 positioned rearward of front bumper assembly 400. Side carrying members 430 are coupled to a bracket 434 of front frame portion 22'' and extend laterally outward therefrom and through an opening 431 in a front fender 34'' of chassis 30''. Side carrying member 430 includes an aperture 432 for coupling to various cargo and/or transportation means. In one embodiment, exemplary apertures 432 are configured to receive cables, hooks, latches, ropes, wire, or other similar objects in order to couple vehicle 10'' to a parachute, helicopter, aircraft carrier, or other transportation means for transporting vehicle 10''. Other configurations of side carrying members 430 may be used.

[00128] Similarly, as shown in Figs. 33 and 35, a rear frame portion 24'' of frame assembly 20'' supports additional side carrying members 436. Illustratively, vehicle 10'' includes two opposing side carrying members 436 positioned forwardly of rear bumper assembly 440. Side carrying members 436 are coupled to a bracket 468 of rear frame portion 24'' and extend laterally outward therefrom and through an opening 437 in a rear portion of a side board 38'' of chassis 30''. Side carrying member 436 includes an aperture 438 for coupling to various cargo and/or transportation means. In one embodiment, exemplary apertures 438 are configured to receive cables, hooks, latches, ropes, wire, or other similar objects in order to couple vehicle 10'' to a parachute, helicopter, aircraft carrier, or other

transportation means for transporting vehicle 10''. Other configurations of side carrying members 436 may be used.

[00129] Rear frame portion 24'' also supports rear bumper assembly 440, as shown in Fig. 35. Rear bumper assembly 440 includes an upper frame member 442, a laterally-extending frame member 448, lower inner frame members 444, and lower outer frame members 446. Frame members 442, 444, 446, and 448 of rear bumper assembly 440 may be integrally formed together or may be coupled together with conventional fasteners (e.g., welds, bolts, rivets, and/or adhesive). Additionally, by coupling rear bumper assembly 440 to rear frame portion 24'', as detailed herein, rear bumper assembly 440 may increase the strength and stability of frame assembly 20''. Lower inner and outer frame members 444, 446 extend between laterally-extending frame member 448 and a brace 451. Additionally, a brace 450 may extend between lower inner frame members 444. A bracket having a rear plate 454 and a lower plate 456 may be used to couple rear bumper assembly 440 to rear frame portion 24''. More particularly, fasteners 458 may be used to couple rear bumper assembly 440 to a rear support member 462 of rear frame portion 24''. As such, rear bumper assembly 440 is generally supported below a rear center panel 464 and rear outer panels 466 of chassis 30''.

[00130] As shown in Fig. 36, rear bumper assembly 440 also may include accessories. For example, rear bumper assembly 440 may include a towing member, illustratively a receiver hitch 452, and latches 460 supported on brace 451. In one embodiment, latches 460 are fixed to vehicle 10'' and used as tie-down members for coupling vehicle 10'' during transport. Receiver hitch 452 may be configured for towing and/or for use with a multi-mount winch assembly.

[00131] Referring now to Figs. 35-37, rear frame portion 24'' also supports cargo area 100''. Cargo area 100'' is generally identical to cargo area 100 of Figs. 1-3 and cargo area 500 of Figs. 22A and 22B, wherein like reference numbers indicate like components, except as described below. Cargo area 100'' includes support plate 502, side frames 104'', side walls 108'', and a rear frame 106''. Cargo area 100'' also includes a plurality of coupling locations, illustratively tie-down rods 508 and apertures 510, on support plate 502. Apertures 510 may be configured to receive conventional fasteners, such as bolts, hooks, and latches, in order to retain cargo within cargo area 500. Furthermore, apertures 510 may be used to secure rails 114 (Fig. 21) to support plate 502, as detailed herein, to allow an operator to position rails 114 in any desired location on support plate 502. In one embodiment, support

plate 502 includes a removable cover 470 that also includes apertures 510. Removable cover 470 conceals drivetrain assembly 16 and may be removed in order to allow access thereto.

[00132] In one embodiment, rear frame 106'' of cargo area 100'' is a movable tailgate configured to pivot between a closed, or latched, position and an open, or unlatched, position. As shown in Fig. 36, rear frame 106'' includes cross members 472, which are generally parallel to each other. Cross members 472 include a plurality of apertures 474, thereby allowing additional components, accessories, cargo, and/or transportation means to be coupled to vehicle 10''. Additionally, apertures 474 reduce the weight of rear frame 106'' and, therefore, vehicle 10''.

[00133] Side walls 108'' are positioned generally forward of rear frame 106'' and are coupled to side frames 104'' and a brace 476. Brace 476 is spaced apart from side walls 108'' and side frames 104'' and includes apertures 478. Brace 476 may be welded to side frames 104''. Apertures 478 allow additional components, accessories, cargo, and/or transportation means to be coupled to vehicle 10''. More particularly, an accessory, cargo, and/or a transportation tie-down member may be coupled to side frames 104'' and further secured to brace 476 with a latch, hook, wire, rope, cable, or other fastener. Additionally, apertures 478 reduce the weight of cargo area 100'' and, therefore, vehicle 10''.

[00134] Side frames 104'' also may be coupled to a bolster bar 480, as shown in Fig. 38. Bolster bar 480 extends from cargo area 100'' to front frame portion 22'' in order to further support passengers and the operator within vehicle 10''. Illustrative bolster bar 480 is a single component that is coupled to side frames 104'' through a bracket 490 on side frames 104'' and a tab 488 on bolster bar 480. Bolster bar 480 also is coupled to intermediate frame member 49 with a fastener 486 and may be further secured thereto through a bracket 484 on intermediate frame member 49 and a tab 482 on bolster bar 480.

[00135] While this invention has been described as having an exemplary design, the present invention may be further modified within the spirit and scope of this disclosure. This application is therefore intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains.

WHAT IS CLAIMED IS:

1. A vehicle (10) comprising:

a plurality of ground engaging members (12, 14);

a chassis (30) supported by the plurality of ground engaging members;

an engine (274) supported by the chassis and configured to provide power to at least one of the plurality of ground engaging members;

a seating area (150) supported by the chassis, the seating area including at least an operator seat (152) and a passenger seat (158) in a side-by-side arrangement;

a plurality of longitudinal members (62) positionable above the seating area; and

a coupling device (130) coupled to at least one of the longitudinal members, the coupling device having an adjustment member (144) to vary a force of the coupling device.

2. The vehicle of claim 1, wherein the coupling device is tooless.

3. The vehicle of claim 1, wherein the coupling device includes a handle (142) and a cam surface (140), the handle being rotatable about the adjustment member to adjust the position of the handle relative to the cam surface.

4. The vehicle of claim 1, further comprising a pivot device (132) coupled to at least one of the longitudinal members, the pivot device and the coupling device cooperating to rotate the longitudinal members in a forward direction.

5. The vehicle of claim 4, wherein the rotation of the longitudinal members reduces a height of the vehicle.

6. The vehicle of claim 4, further comprising a frame (20), the pivot devices are coupled to a portion of the frame and a bushing (222) is positioned intermediate the pivot devices and the frame.

7. A vehicle (10) comprising:

a plurality of ground engaging members (12, 14);

a frame (20) supported by the plurality of ground engaging members;

a hood (32) supported by the frame;

an engine (274) supported by the frame and configured to provide power to at least one of the plurality of ground engaging members;

a seating area (150) supported by the ground engaging members;

a cargo area (100) rearward of the seating area; and

a roll cage (50) positionable above the seating area, the roll cage being configured to rotate between a first position and a second position, the first position including the roll cage

being positioned above the seating area, and the second position including the roll cage pivoted in a forward direction and supported on the hood, the roll cage being spaced apart from the cargo area when in the second position.

8. The vehicle of claim 7, wherein the roll cage includes a first section (58) and second section (60), the second section being coupled to the first section.

9. The vehicle of claim 8, wherein the second section is configured to move with the first section in the forward direction.

10. The vehicle of claim 7, wherein the cargo area includes a rear member having vertical attachment members (118) positioned between horizontally extending frame members (119).

11. The vehicle of claim 7, further comprising an air intake system (270) operably coupled to the engine, the air intake system being supported by the cargo area.

12. A vehicle (10) comprising:

a plurality of ground engaging members (12, 14);

a frame (20) supported by the plurality of ground engaging members;

an engine (274) supported by the frame and configured to provide power to at least one of the plurality of ground engaging members; and

a seating area (150) supported by the ground engaging members and including at least an operator seat (152), a front passenger seat (158), and at least one rear passenger seat (164) positioned rearward of the operator seat and the front passenger seat, the frame including a first movable portion (58) positioned above the operator seat and the front passenger seat, and a second movable portion (60) positioned above the at least one rear passenger seat, the second movable portion being coupled to the first movable portion such that the first and second movable portions are configured to move together.

13. The vehicle of claim 12, wherein the second movable portion is configured for compound movement, the second movable portion being configured to move toward the first movable portion, and being configured to move with the first movable portion in a forward direction.

14. The vehicle of claim 12, wherein the second movable portion is coupled to the first movable portion in a plurality of pivot locations (72A, 72B).

15. The vehicle of claim 12, wherein the first movable portion is coupled to the frame at a plurality of pivot locations (66A, 66B).

16. The vehicle of claim 12, further comprising a running board assembly (250) coupled to the frame.

17. A vehicle (10) comprising:

a plurality of front ground engaging members (12);

a plurality of rear ground engaging members (14) positioned rearward of the front ground engaging members;

a frame (20) supported by the plurality of ground engaging members and extending in a longitudinal direction of the vehicle, the frame including a front portion (22) supported by the front ground engaging members, a rear portion (24) supported by the rear ground engaging members, and an intermediate portion (26) rearward of the front portion and forward of the rear portion;

an engine (274) supported by the frame and configured to provide power to at least one of the plurality of ground engaging members;

a seating area (150) supported by the ground engaging members; and

a plurality of longitudinal members (62) positionable above the seating area, the plurality of longitudinal members being configured to move between a raised positioned and a lowered position, the raised position including the longitudinal members being positioned above the seating area, and the lowered position including the longitudinal members being positioned forward of the seating area, each of the longitudinal members including a pivot device (132) spaced apart from adjacent pivot devices.

18. The vehicle of claim 17, wherein the plurality of longitudinal members includes at least a first longitudinal member (62A) and a second longitudinal member (62B), and the plurality of pivot devices includes at least a first pivot device and a second pivot device, the first pivot device is coupled to the first longitudinal member, and the second pivot device is coupled to the second longitudinal member, the first pivot device being adjacent the second pivot device and spaced apart from the second pivot device.

19. The vehicle of claim 18, wherein the plurality of longitudinal members further includes a third longitudinal member (68A) and a fourth longitudinal member (68B), and the plurality of pivot devices includes a third pivot device and a fourth pivot device, the third longitudinal member is coupled to the third pivot device, and the fourth longitudinal member is coupled to the fourth pivot device, the third and fourth longitudinal members and the third and fourth pivot devices being rearward of the first and second longitudinal members and the first and second pivot devices.

20. The vehicle of claim 17, wherein the plurality of longitudinal members is comprised of a first material, and the plurality of pivot devices includes a bushing comprised of a second material.

21. The vehicle of claim 17, further comprising a plurality of coupling devices coupled to the plurality of longitudinal members.

22. The vehicle of claim 21, wherein the coupling devices are tooless.

23. The vehicle of claim 21, wherein the coupling devices include a handle (142), an adjustment member (144), and a cam surface (140), the handle is rotatable about the adjustment member to control a pressure of the clamping devices.

24. A vehicle (10) comprising:

a plurality of ground engaging members (12, 14);

a frame (20) supported by the plurality of ground engaging members;

an engine (274) supported by the frame and configured to provide power to at least one of the plurality of ground engaging members;

a seating area (150) supported by the ground engaging members and including an operator seat (152) and a passenger seat (158) laterally adjacent the operator seat; and

a grab bar (174) coupled to the frame and forward of the passenger seat, the grab bar being configured to move in a first range of motion and a second range of motion, the first range of motion being movement in a generally forward and rearward direction, and the second range of motion being movement in a generally upward and downward direction.

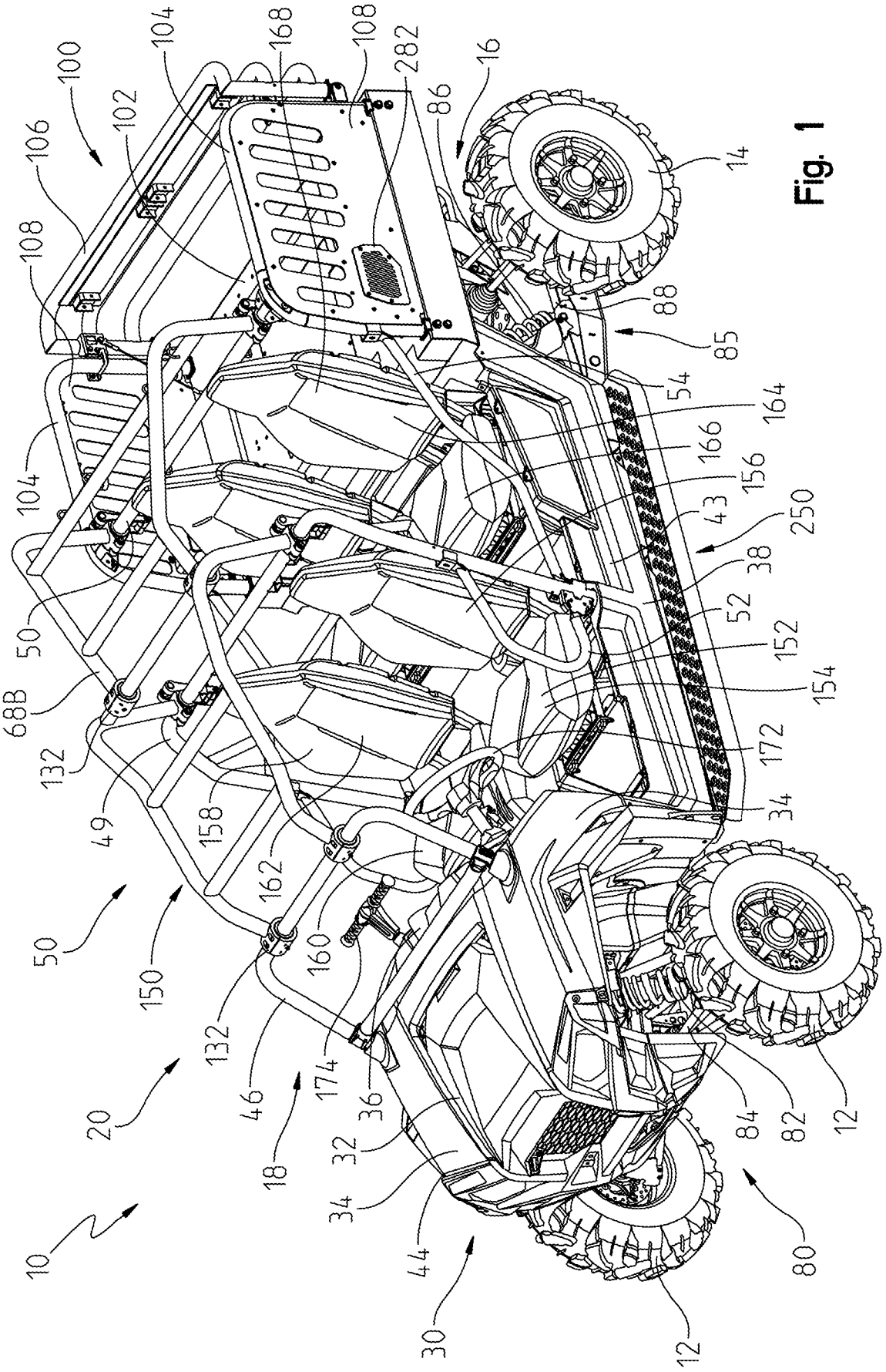
25. The vehicle of claim 24, further comprising an adjustment member (182) coupled to the frame and the grab bar, the adjustment being configured to move the grab bar in the second motion.

26. The vehicle of claim 25, wherein the adjustment member is a gas spring shock having a cylinder (184), a fluid retained within the cylinder, a piston (186), and an activation lever.

27. The vehicle of claim 24, wherein the grab bar includes a shaft (176) configured to move in the first motion, and a fastener (180) coupled to the shaft.

28. The vehicle of claim 27, wherein the fastener is configured to couple with the shaft in a one of a plurality of positions along the shaft.

29. The vehicle of claim 24, further comprising a roll cage (50) positionable above the seating area, the roll cage being configured to rotate in a forward direction.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68B
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108

Fig. 1

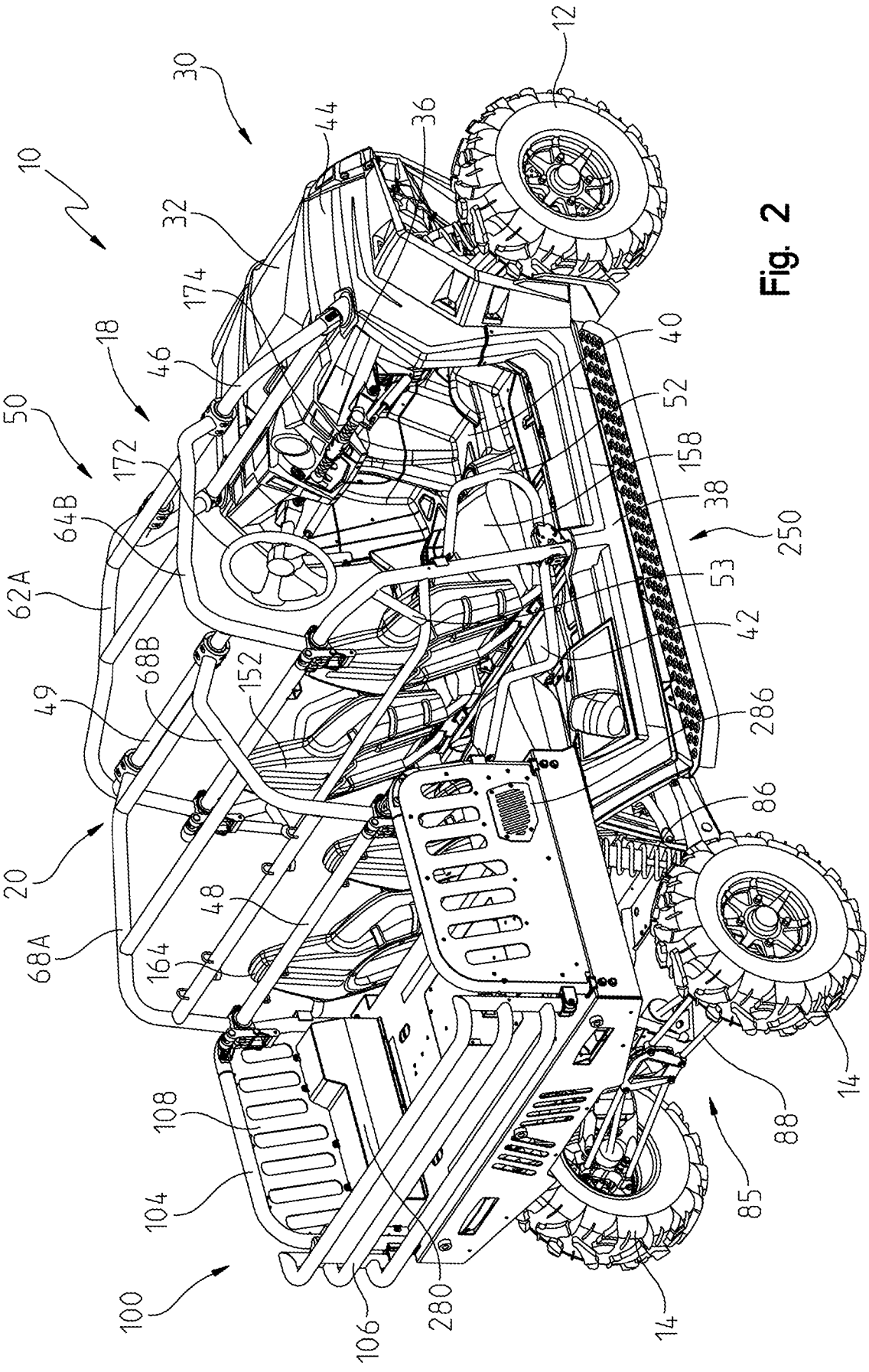
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Fig. 2

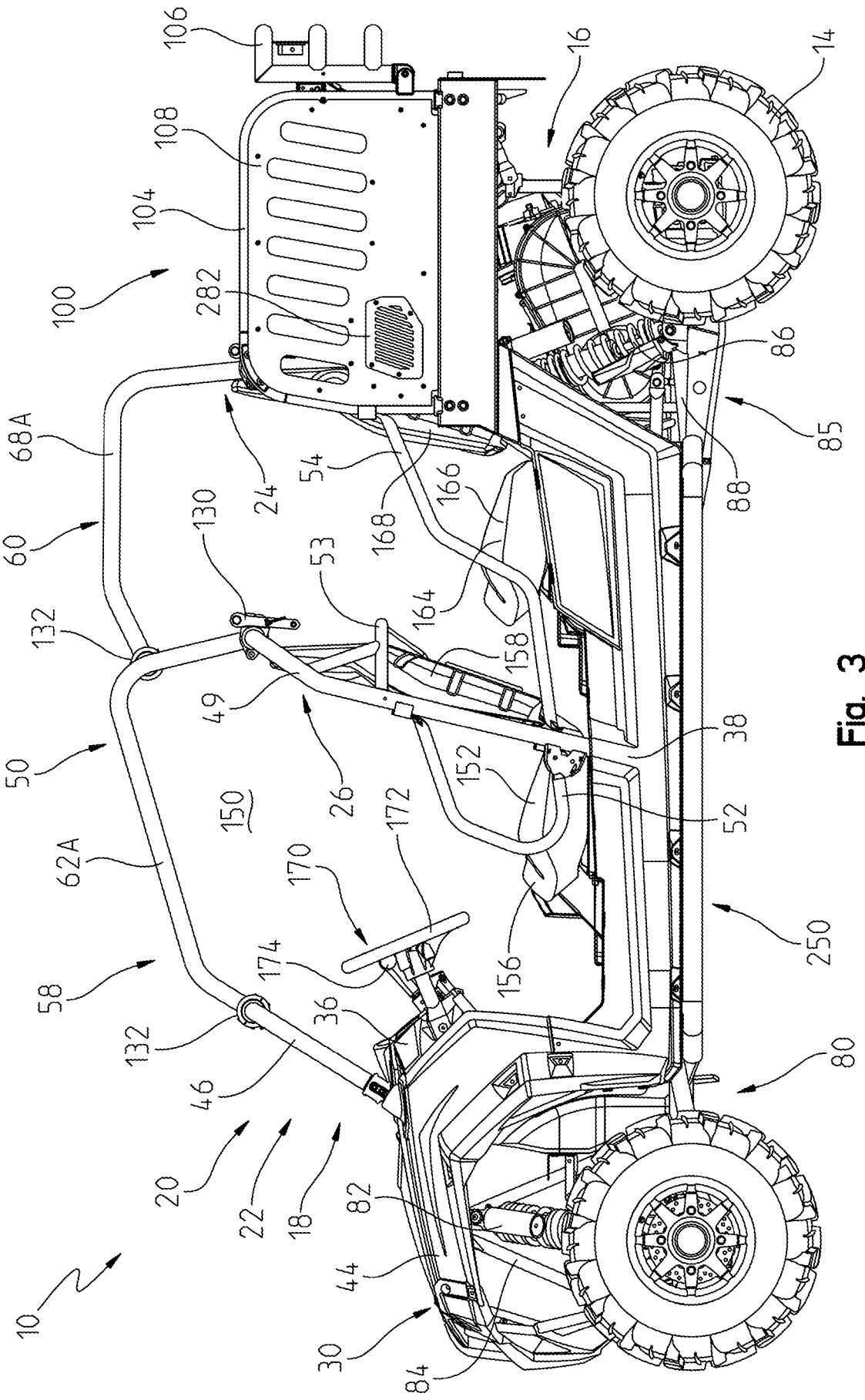
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Fig. 3

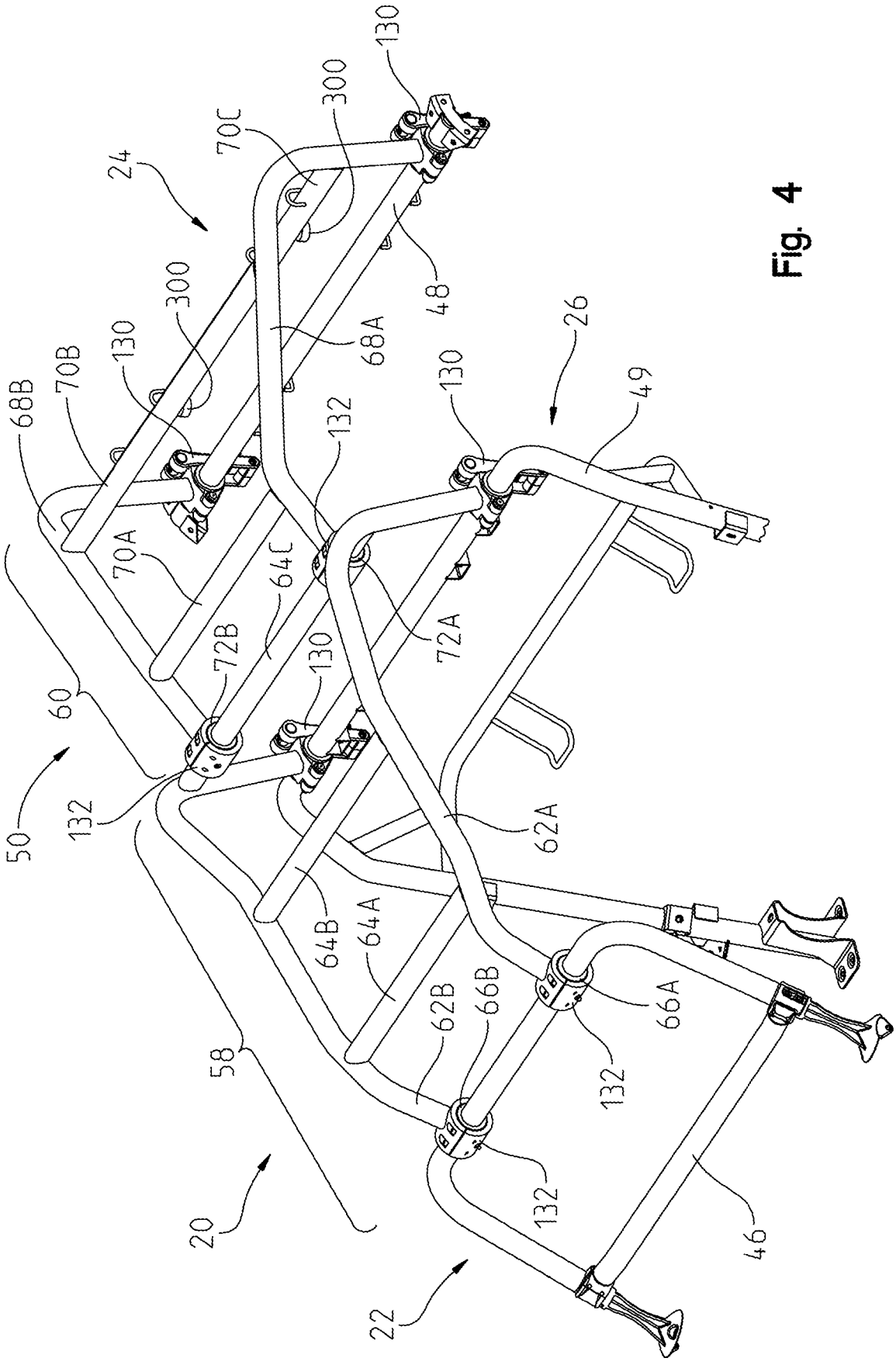
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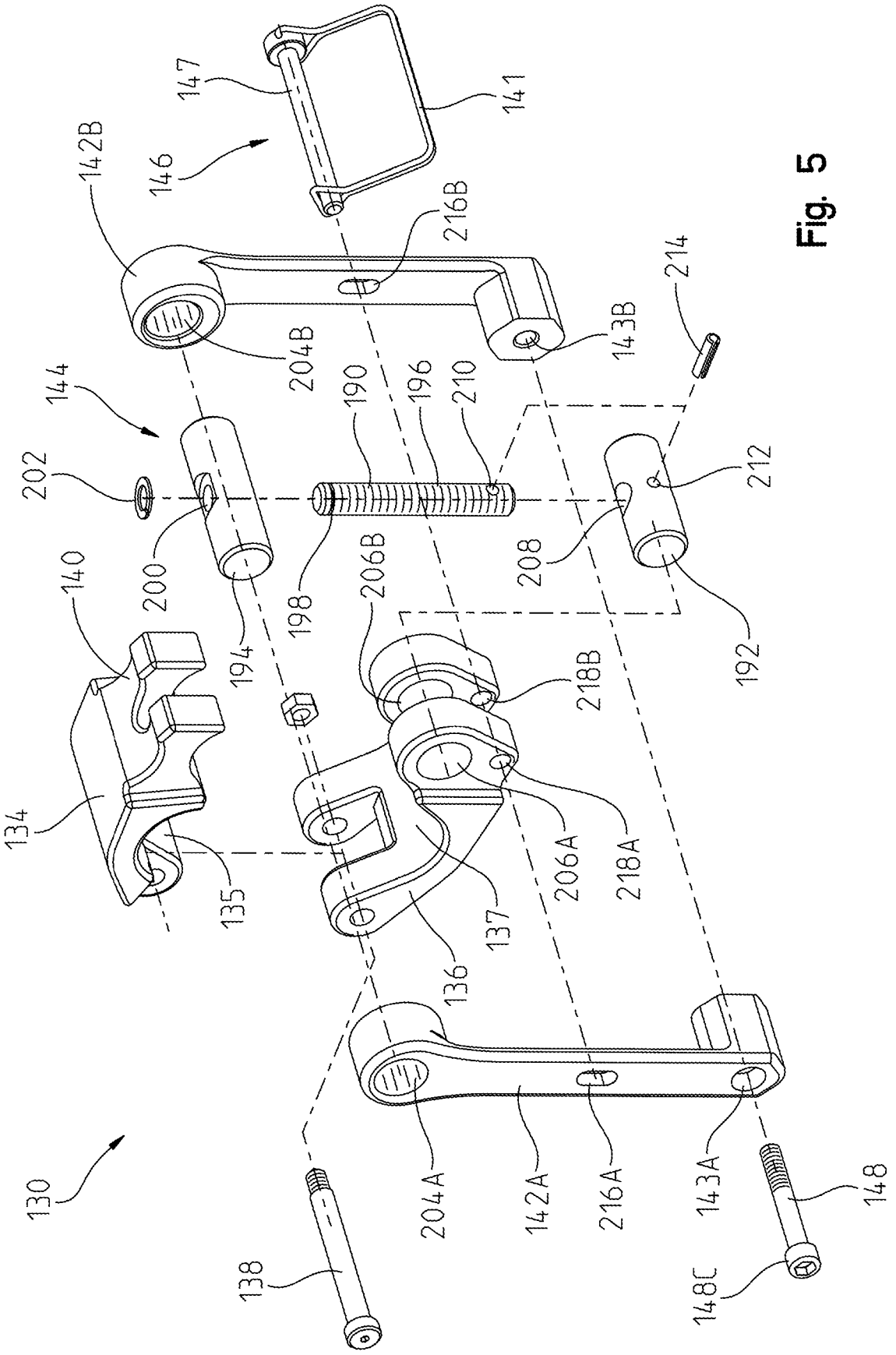
Fig. 4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206A
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204A
142A
216A
143A
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148C

Fig. 5

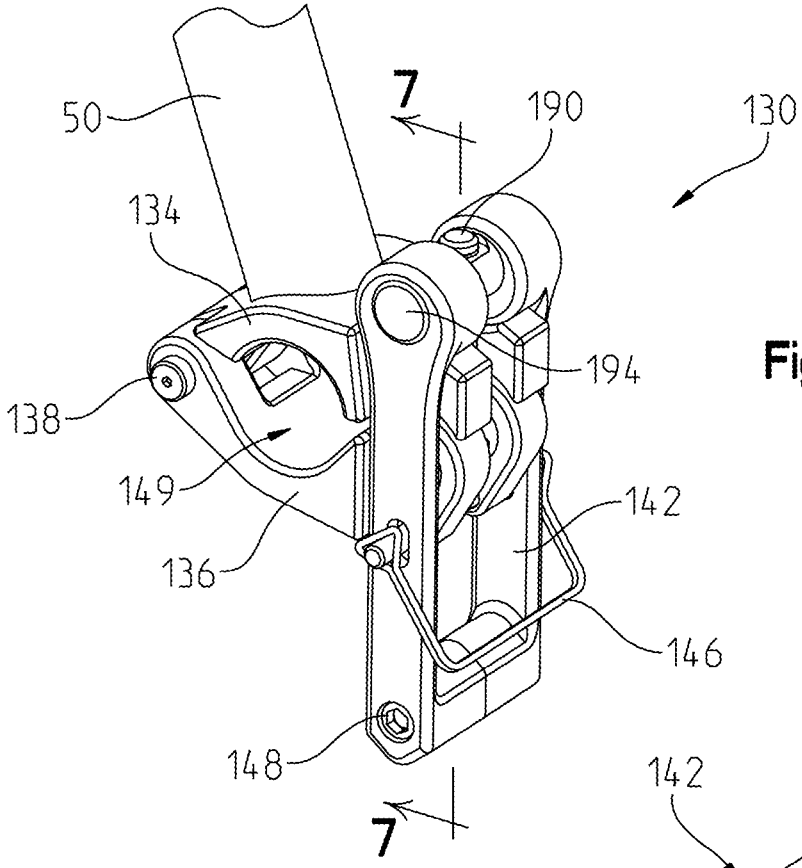
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Fig. 6A

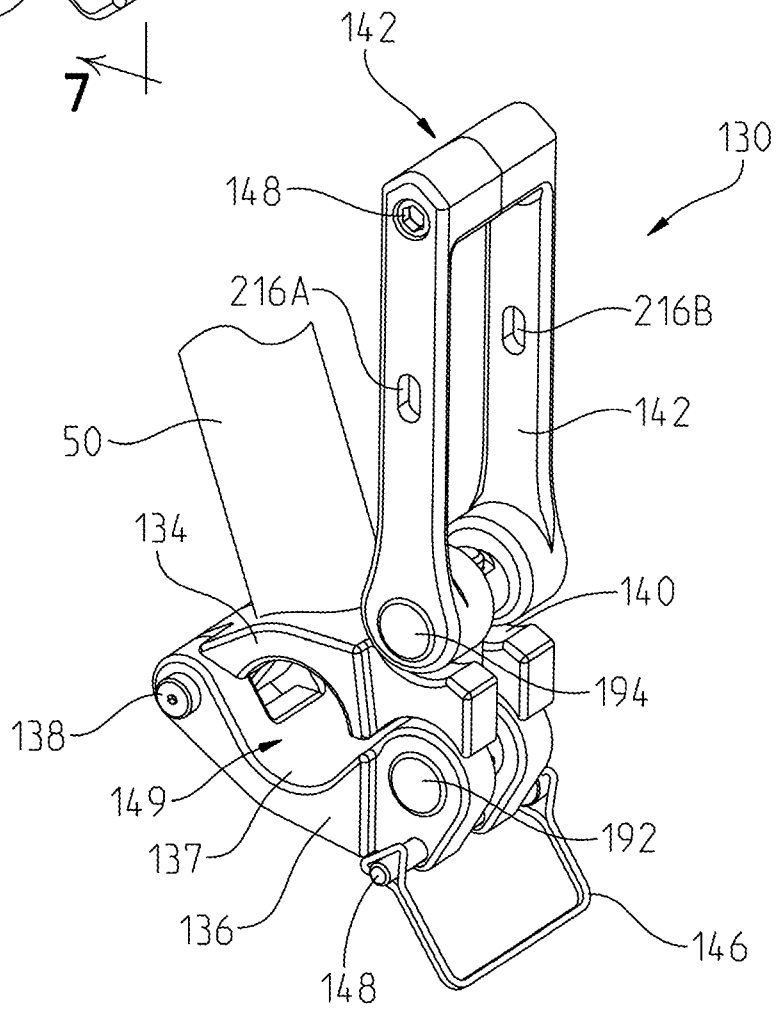
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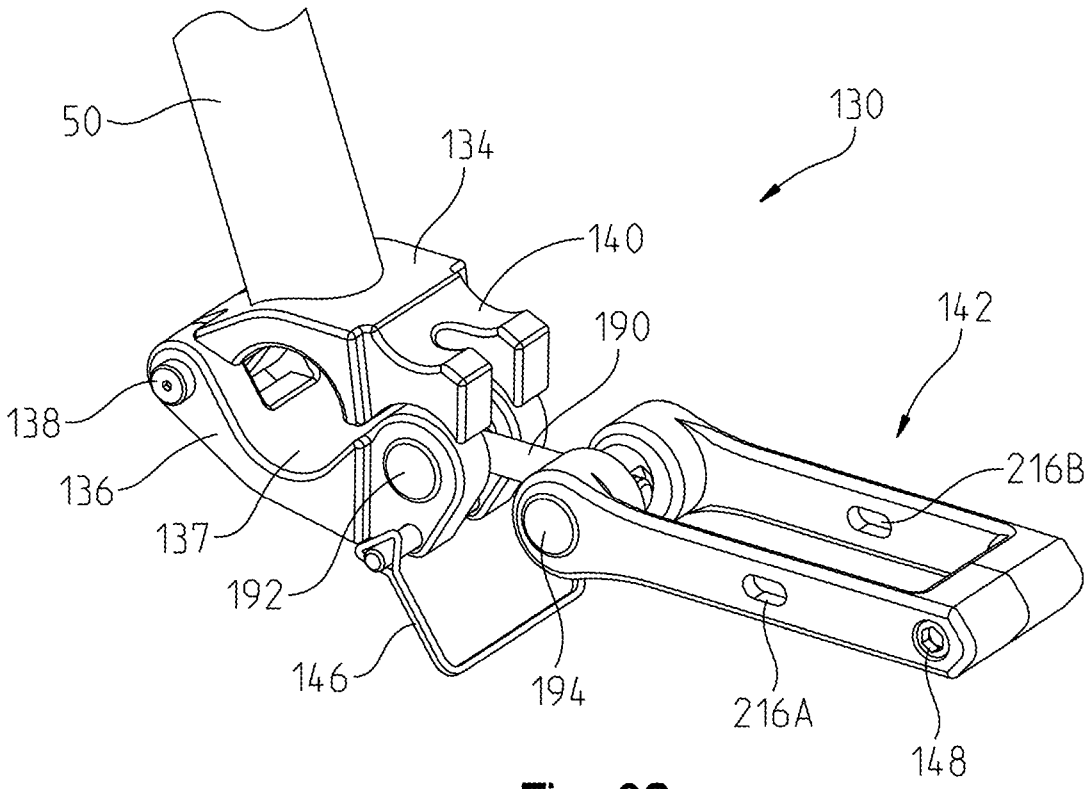
Fig. 6B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216A
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Fig. 6C

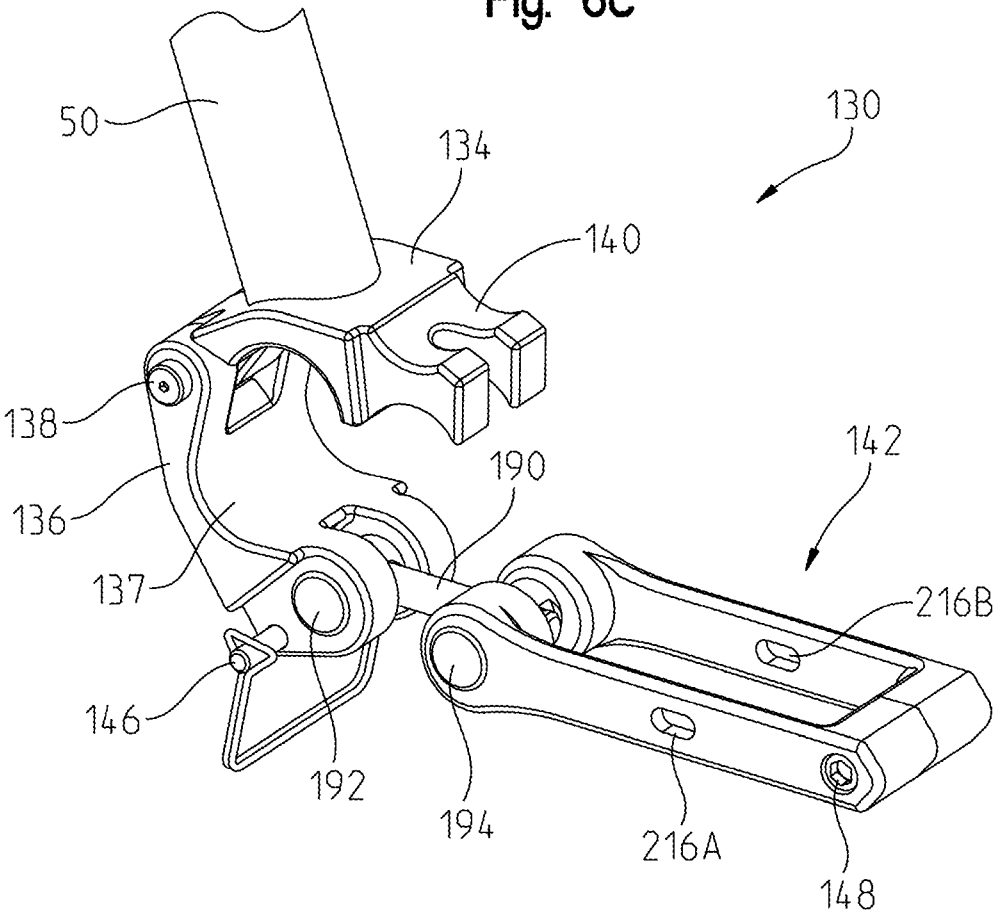
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Fig. 6D

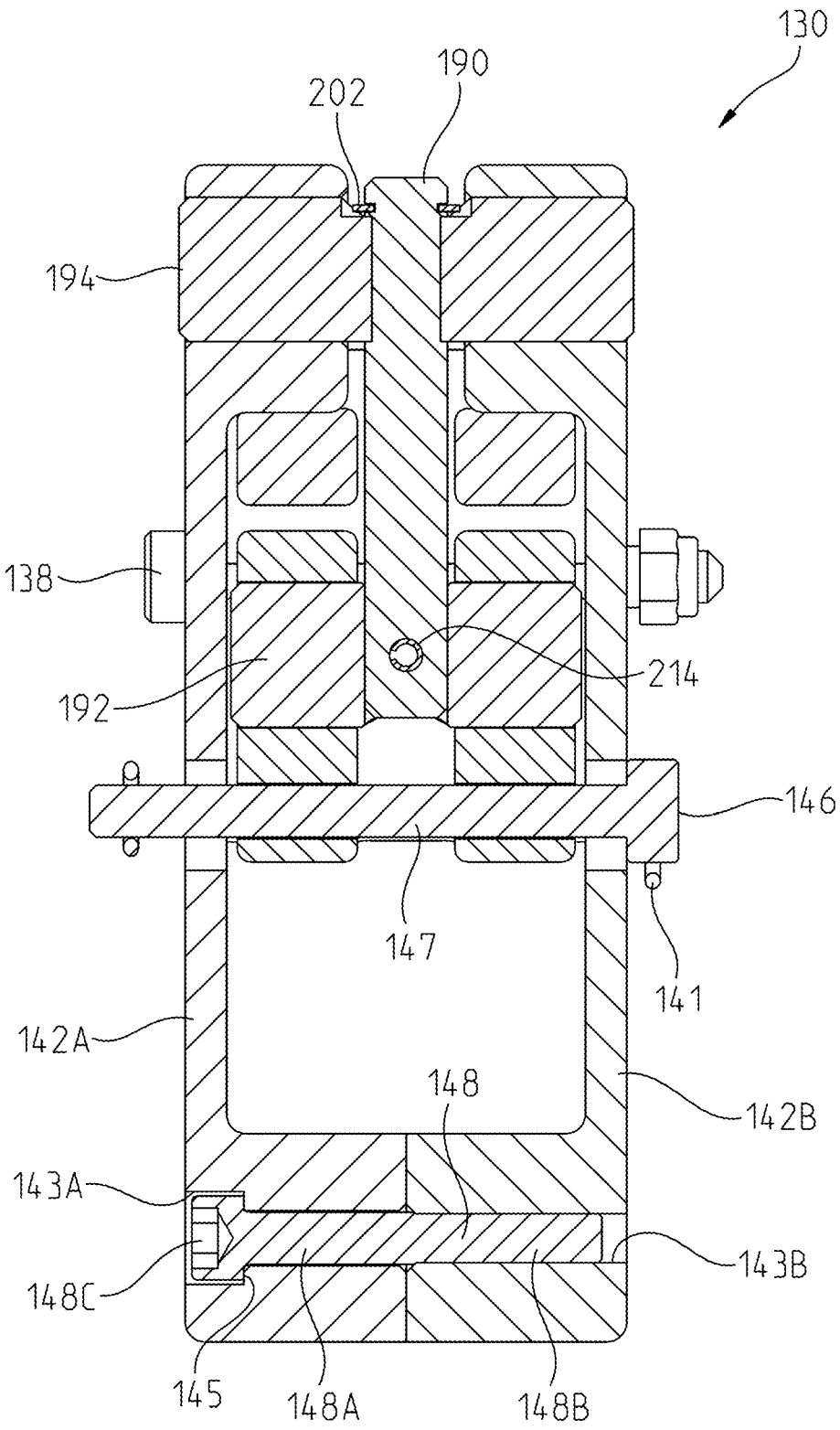
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Fig. 7

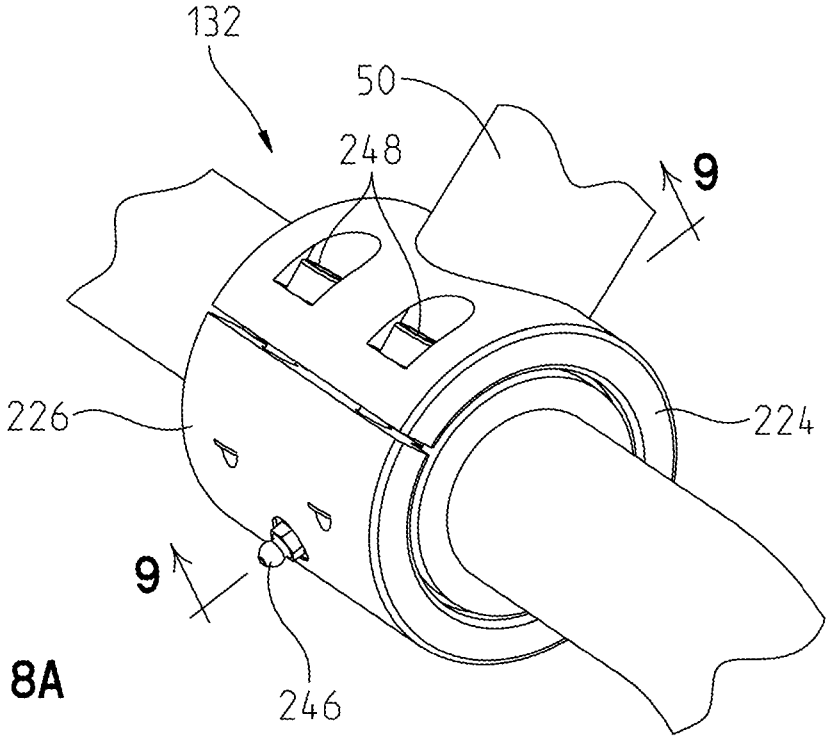
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Fig. 8A

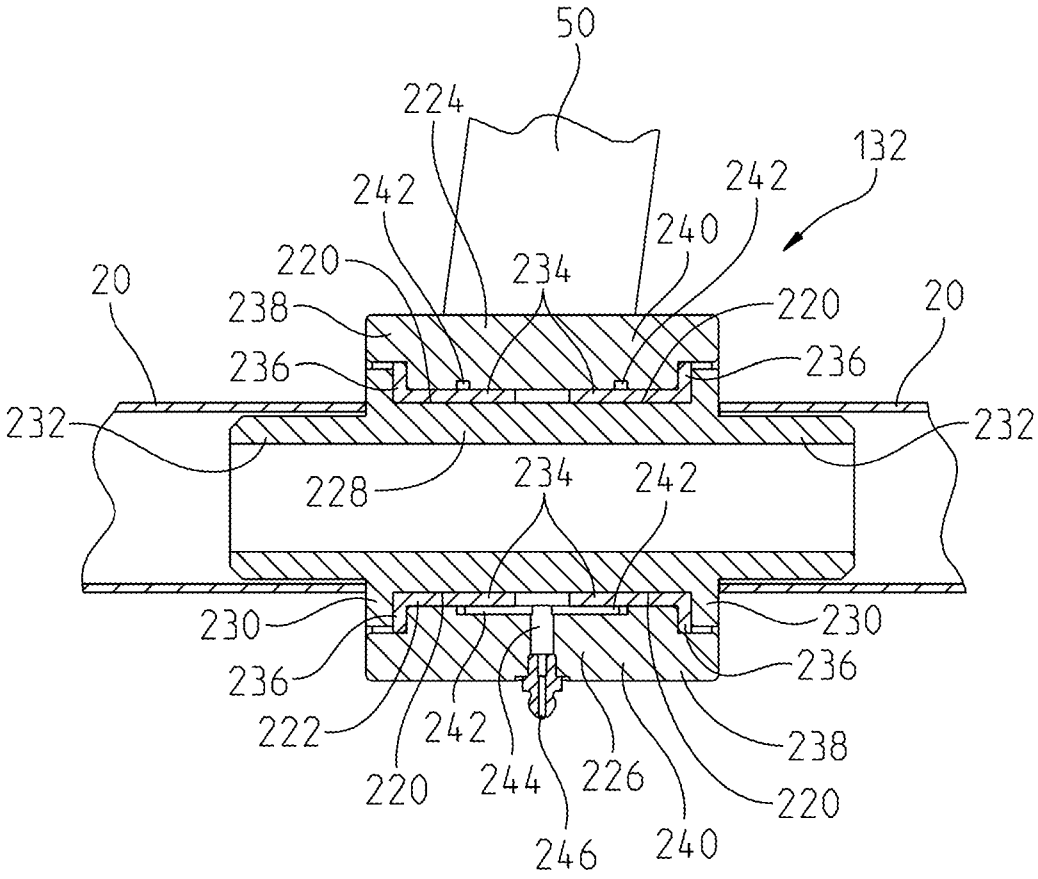
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Fig. 9

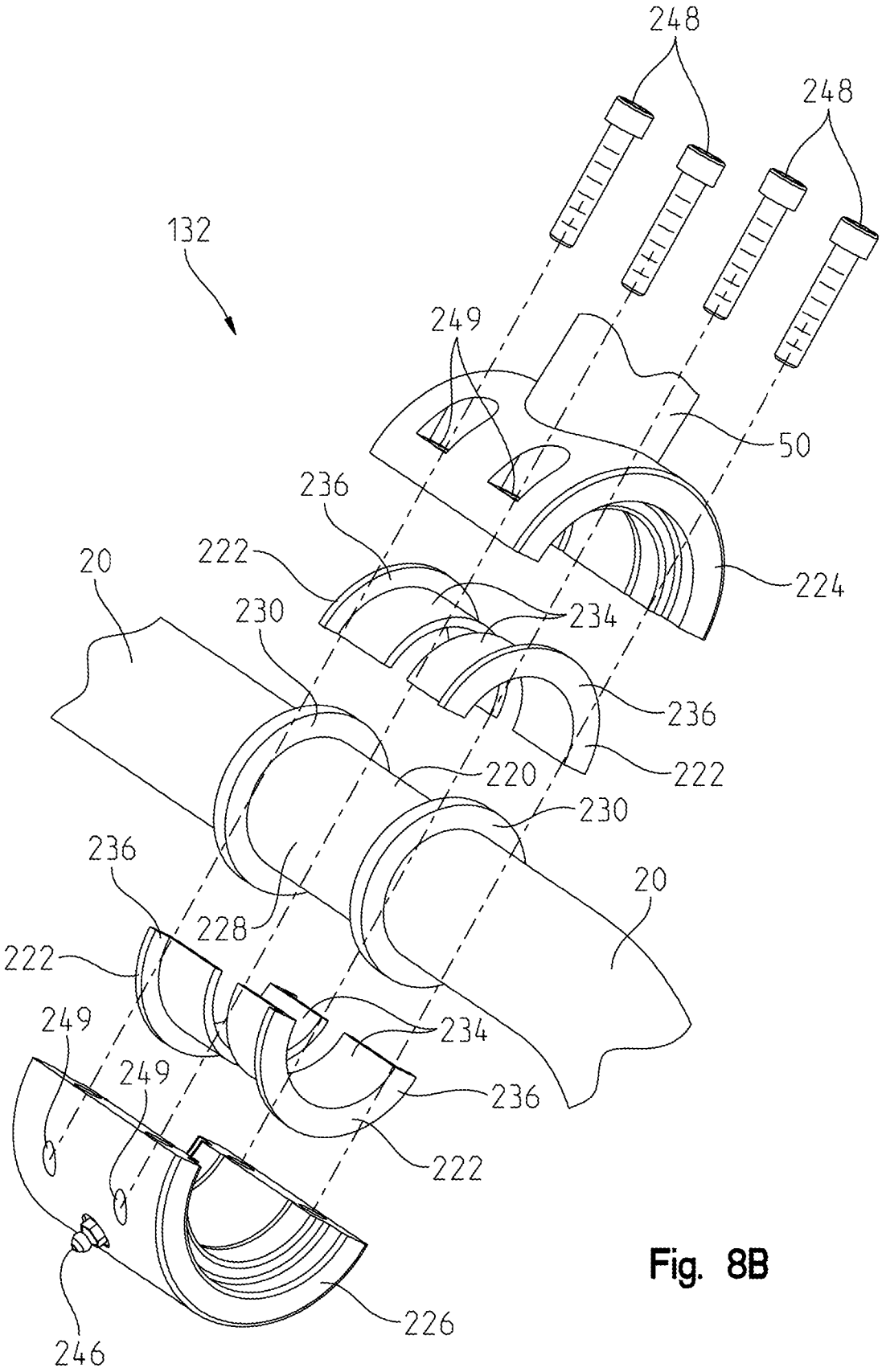
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Fig. 8B

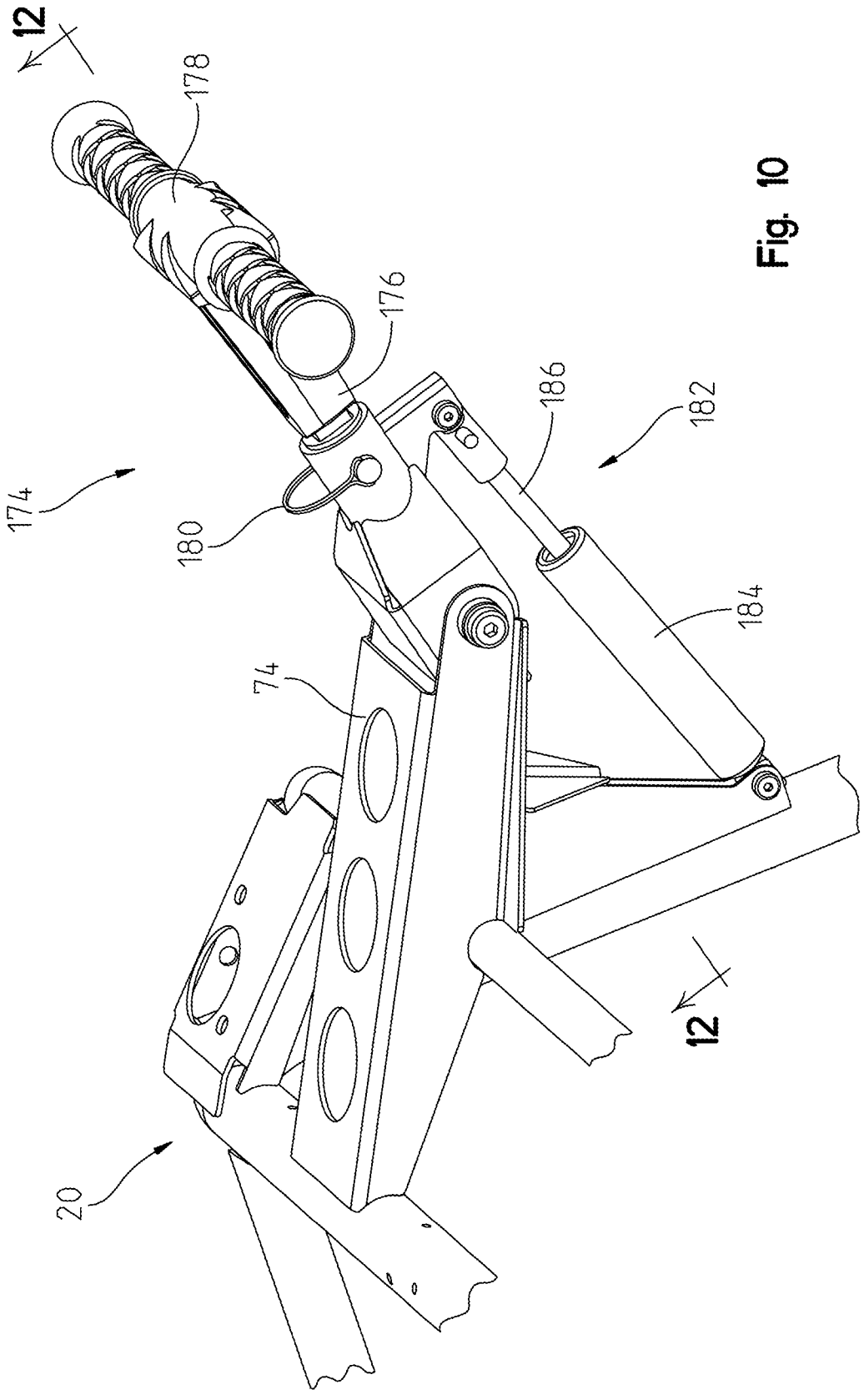

Fig. 10

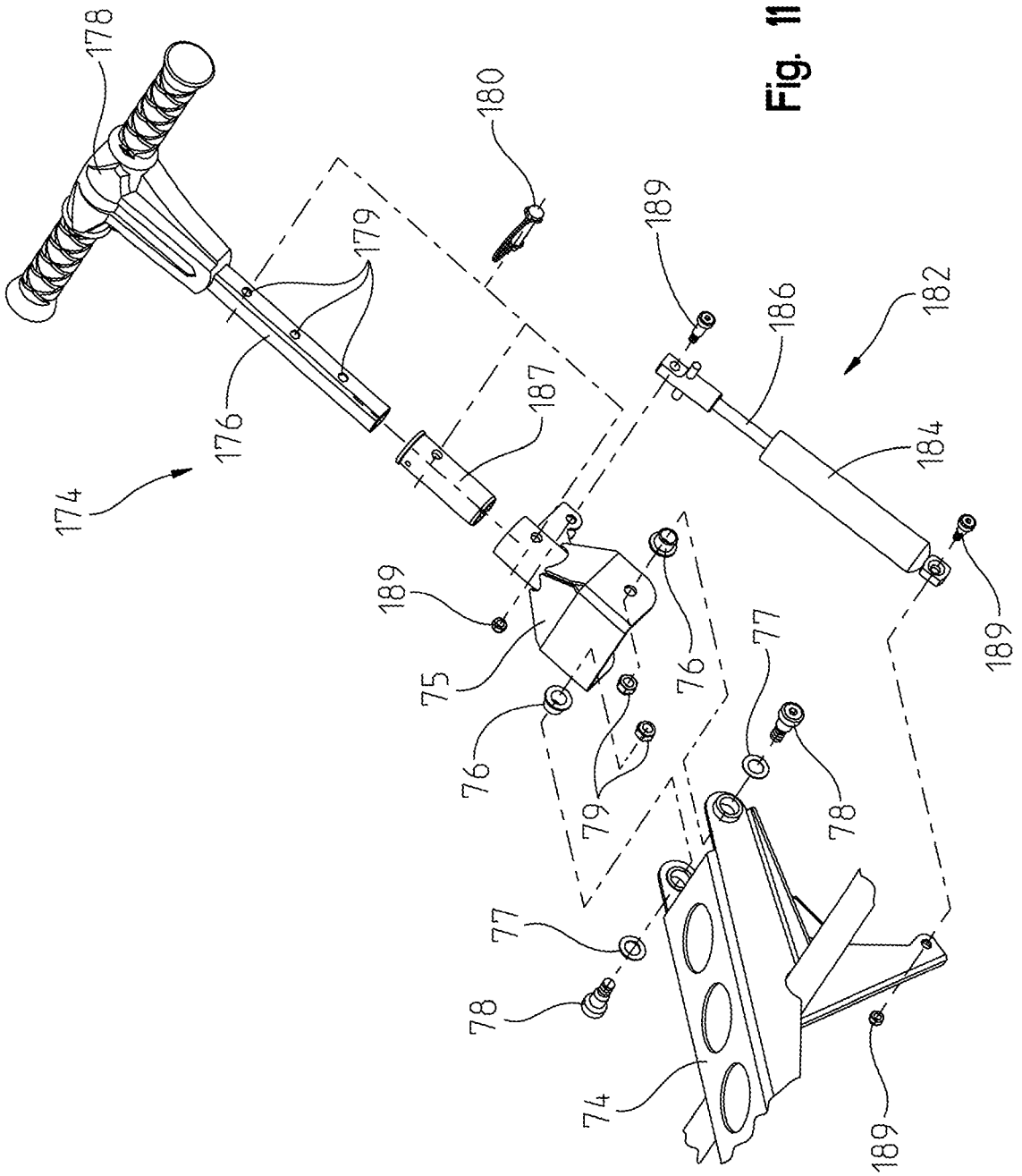
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Fig. 11

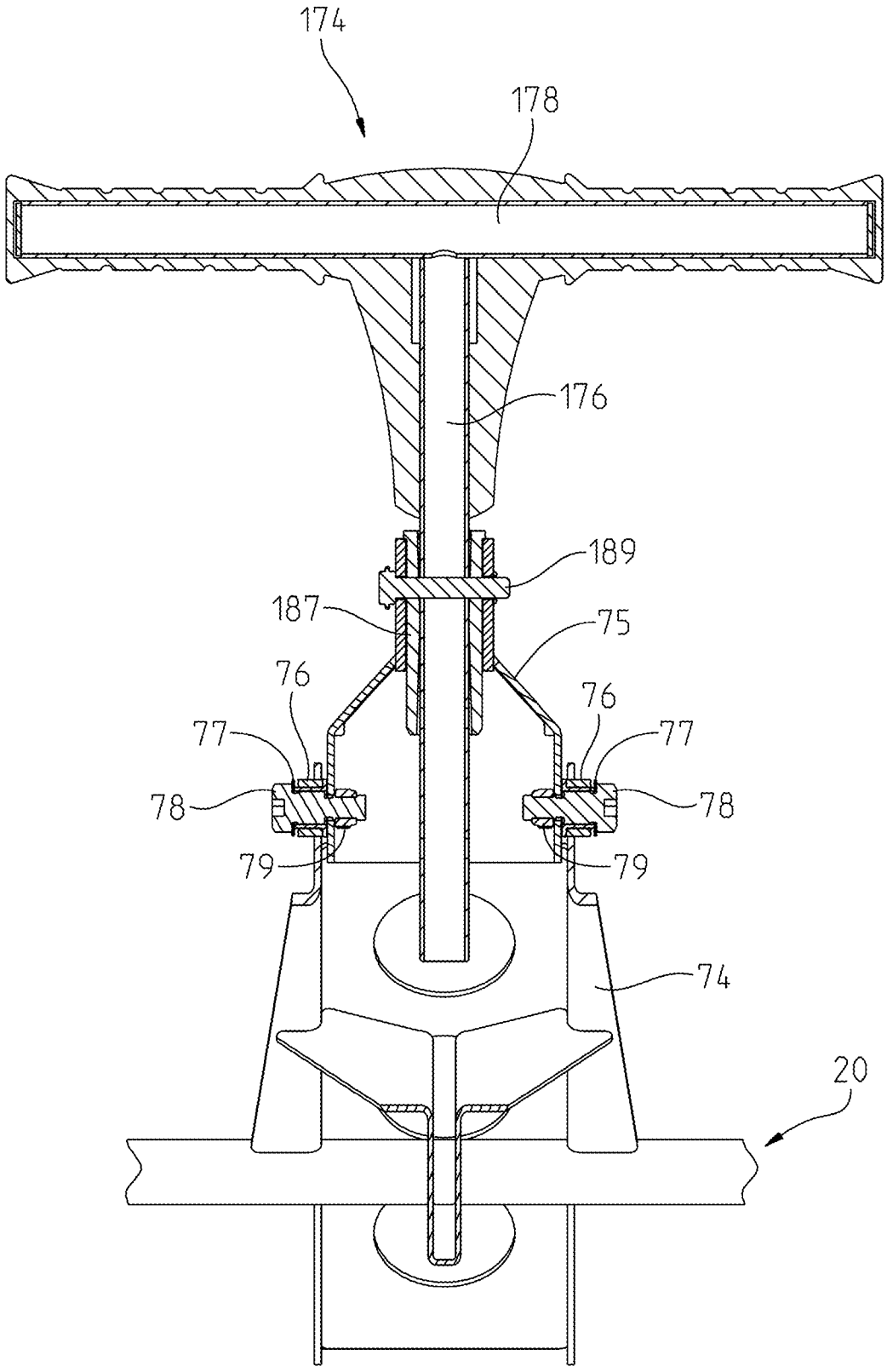

Fig. 12

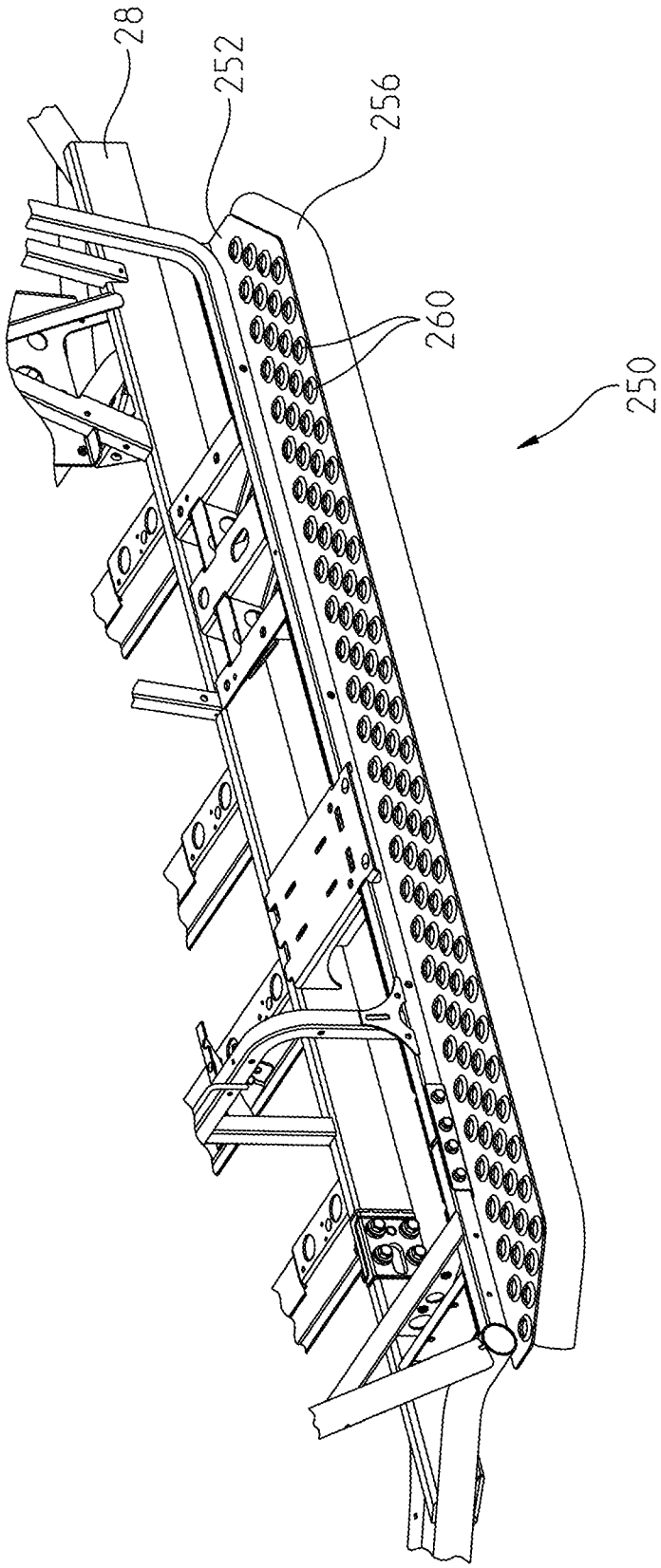

Fig. 13

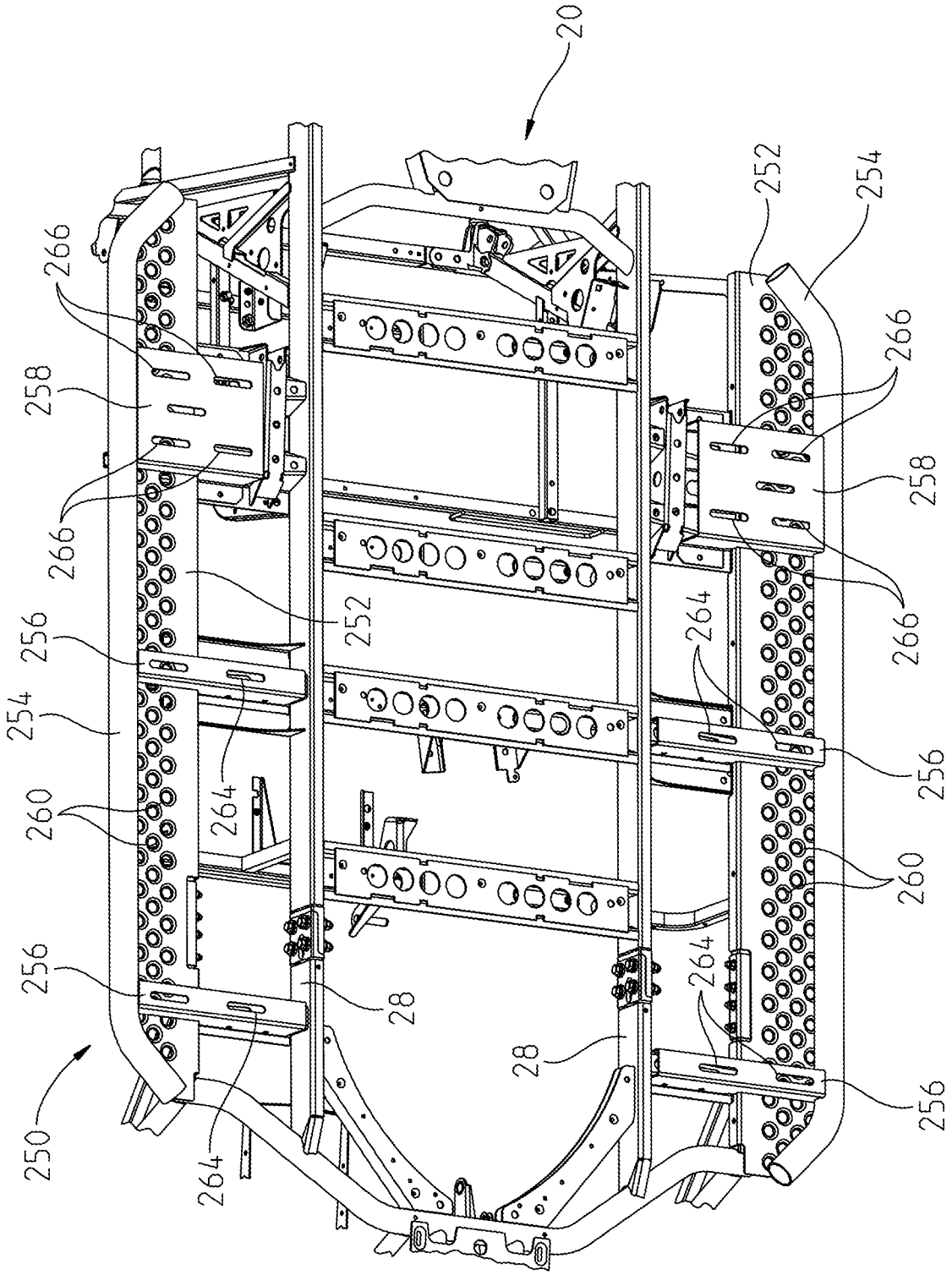
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Fig. 14

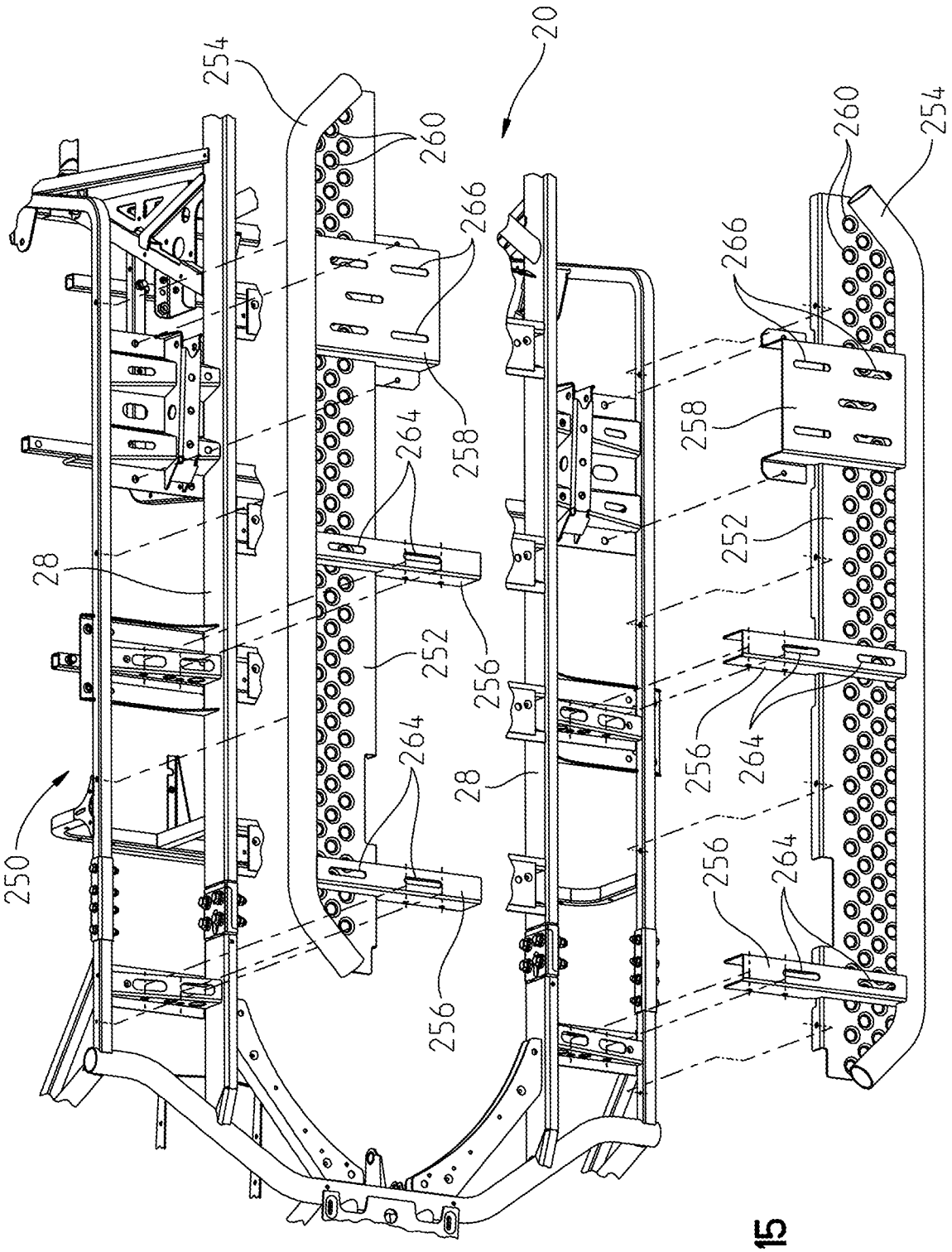

Fig. 15

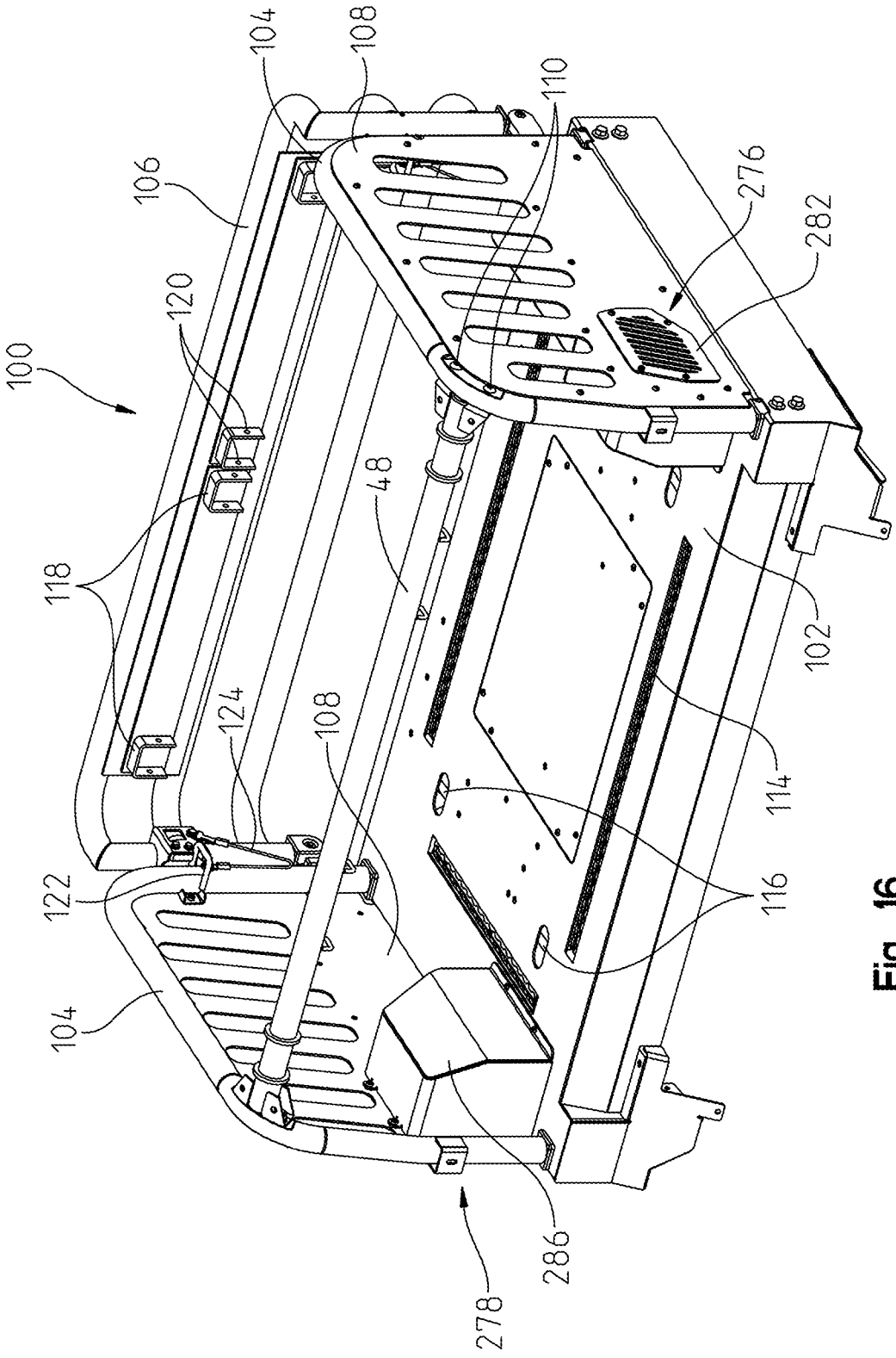
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Fig. 16

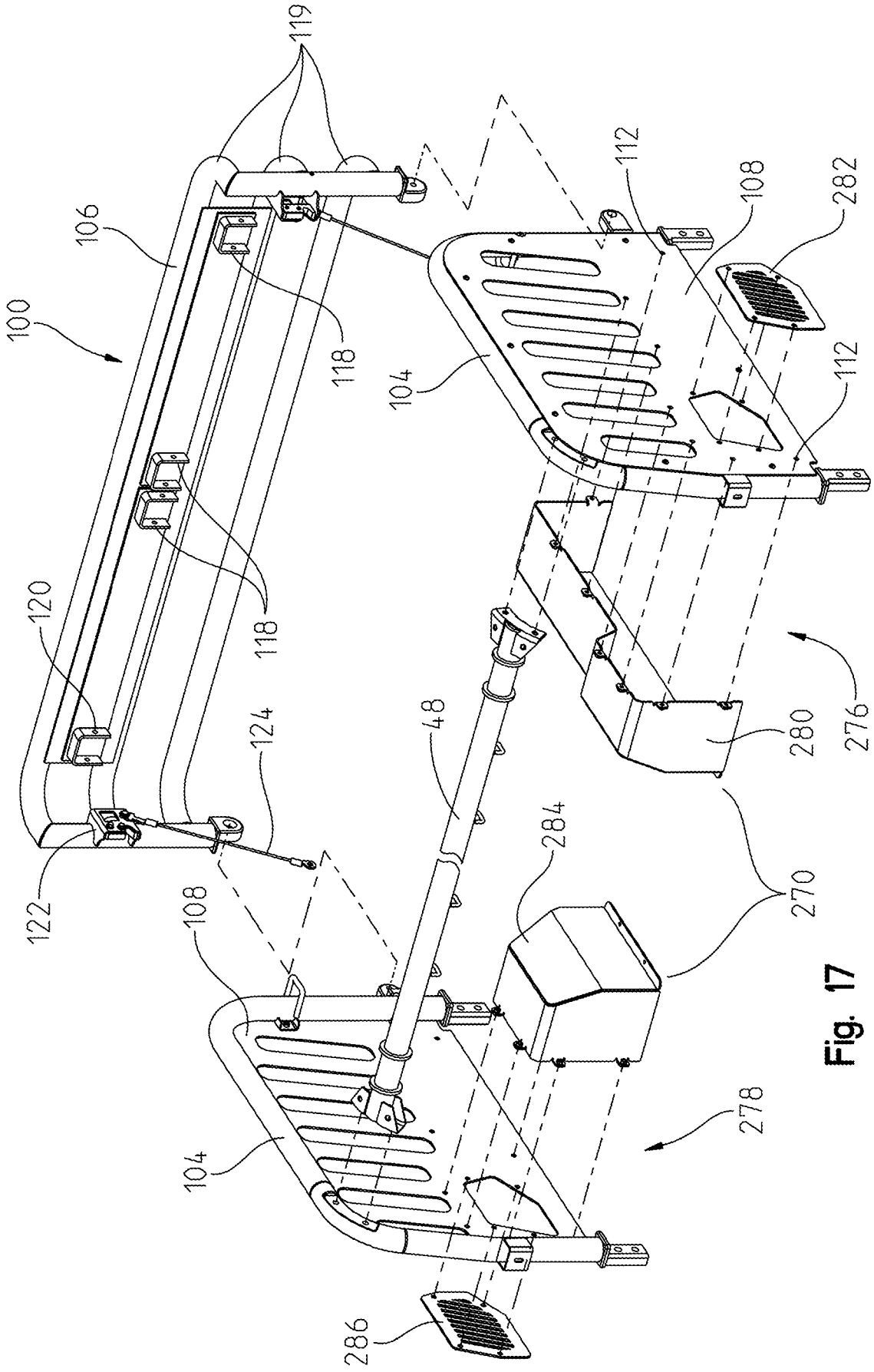
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Fig. 17

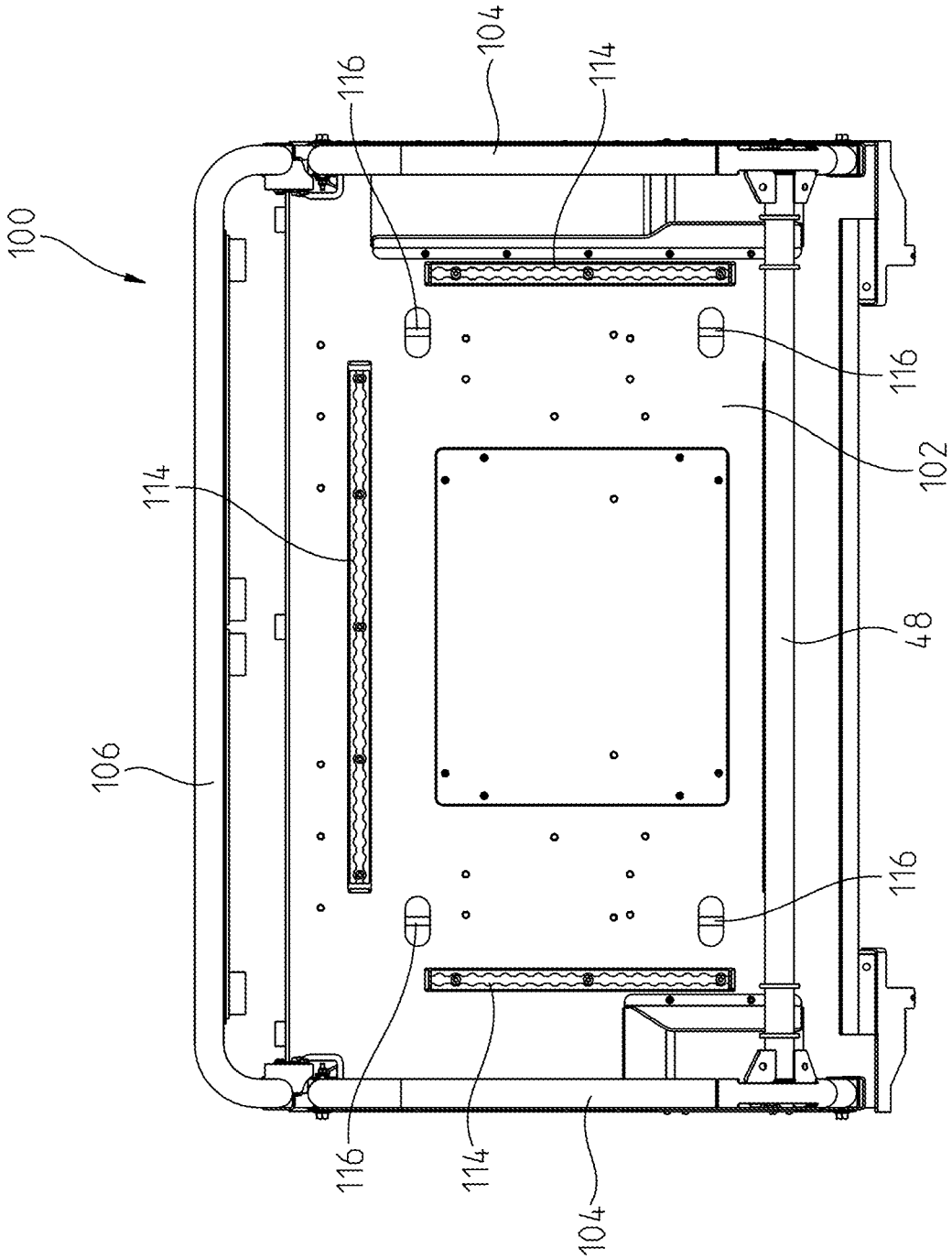

Fig. 18

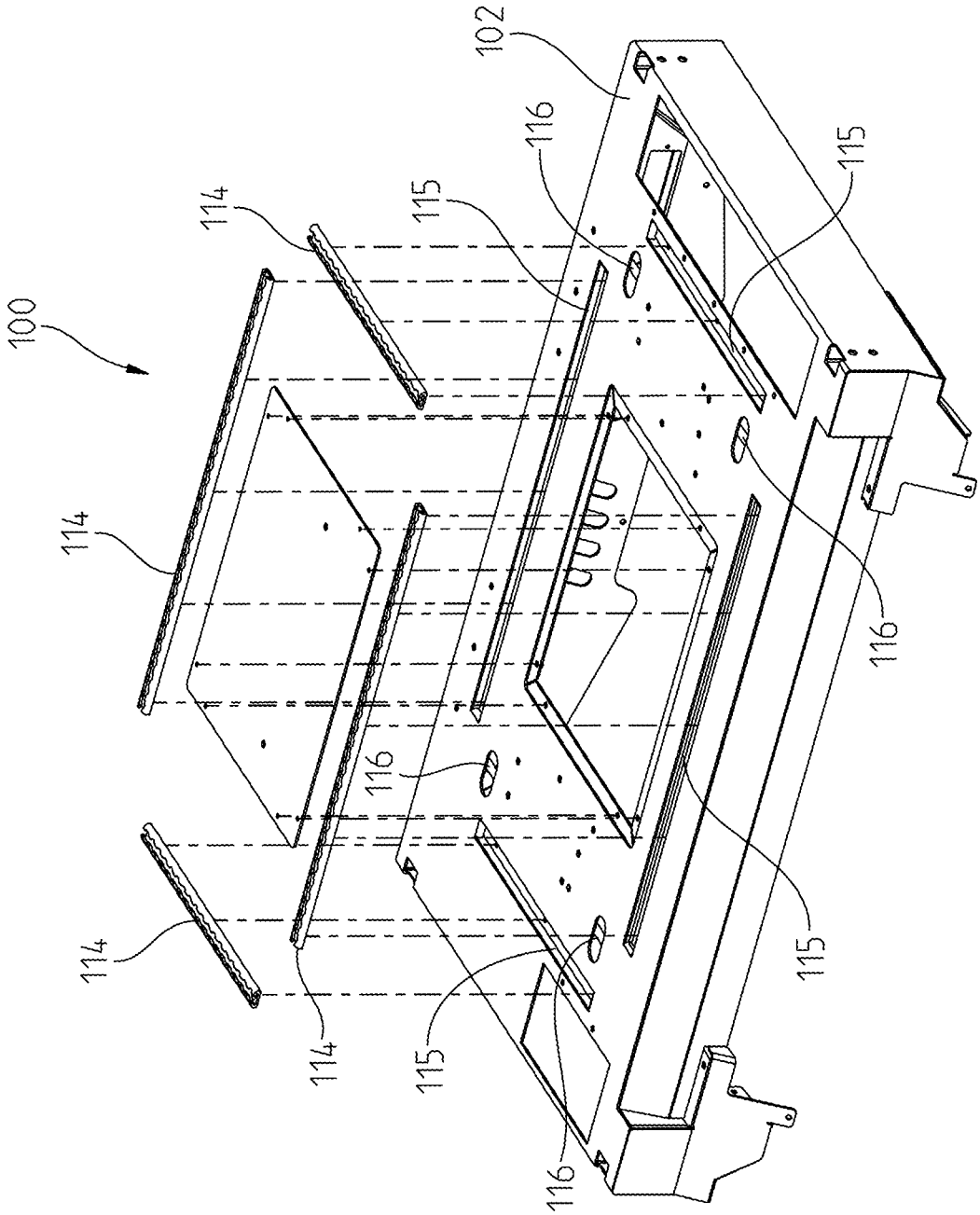

Fig. 19

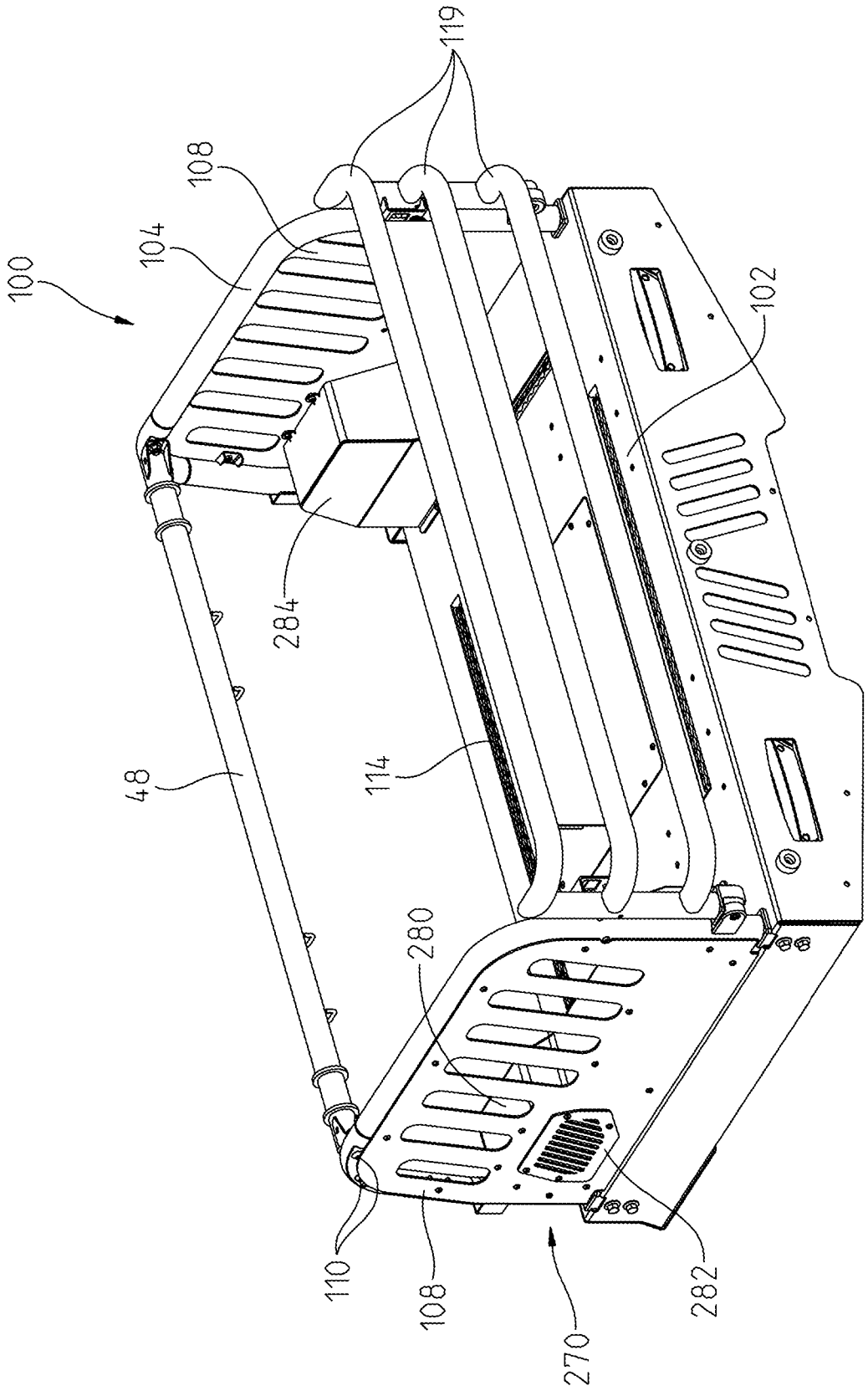

Fig. 20

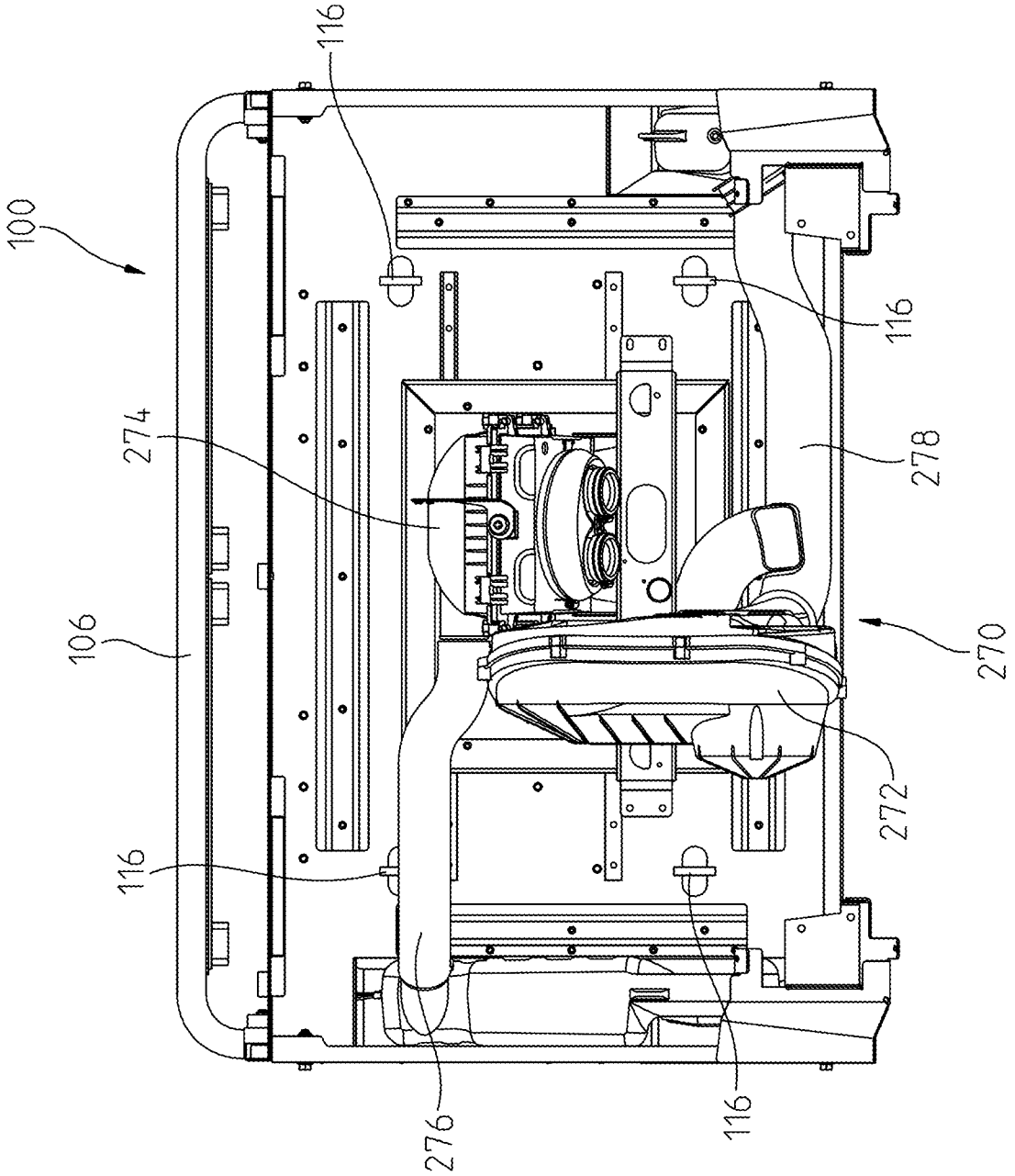

Fig. 21

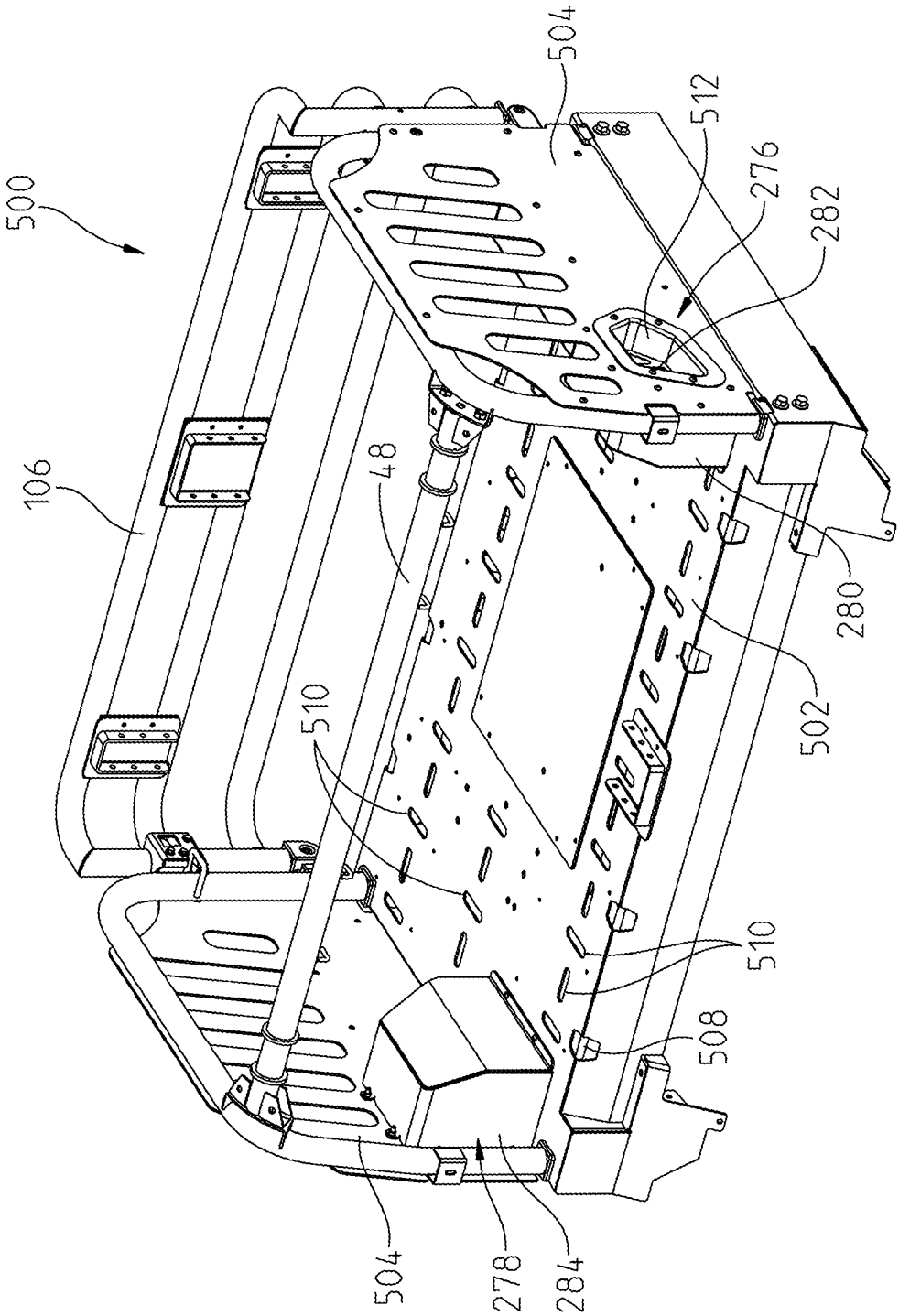

Fig. 22A

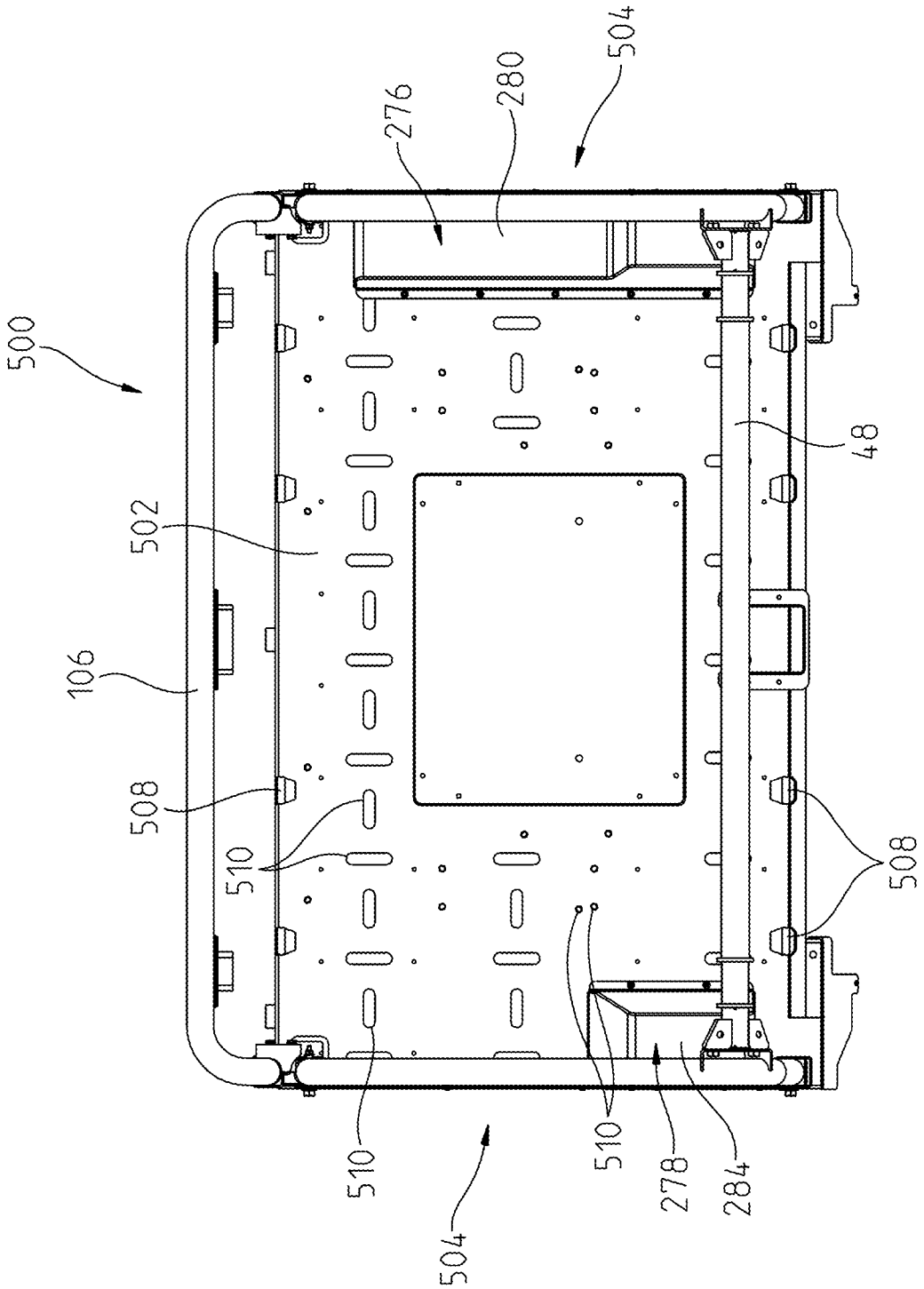

Fig. 22B

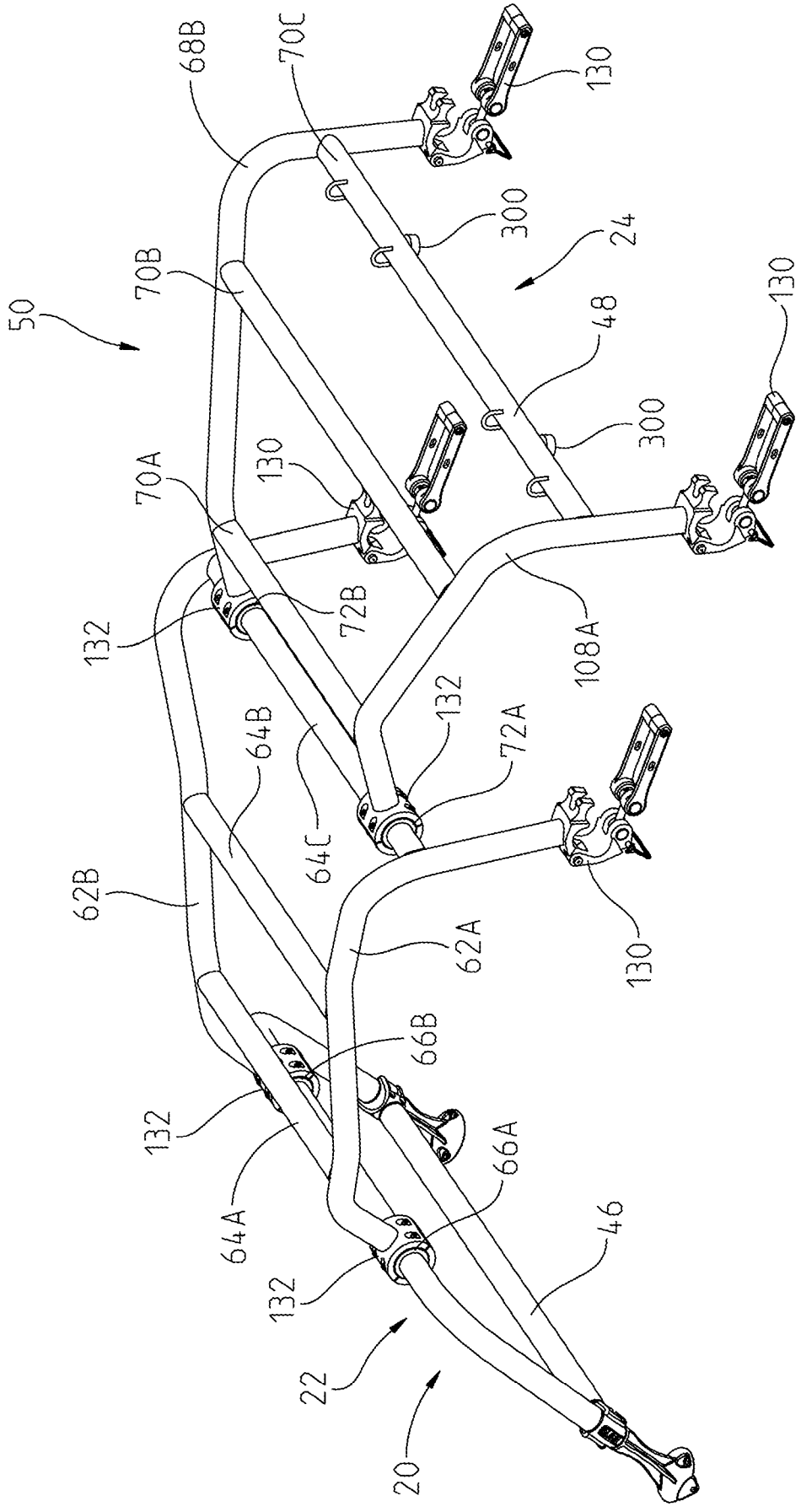
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Fig. 23

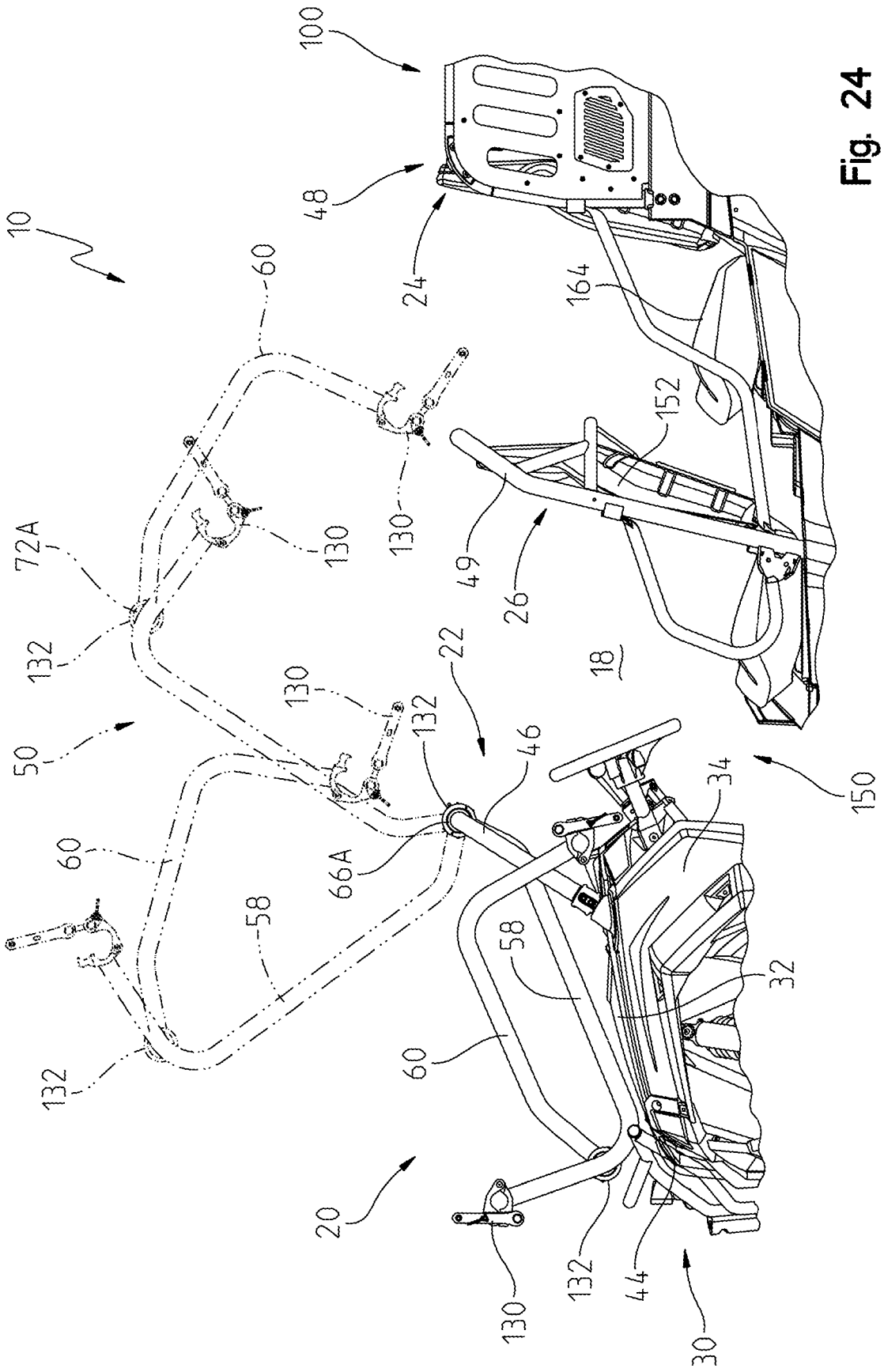
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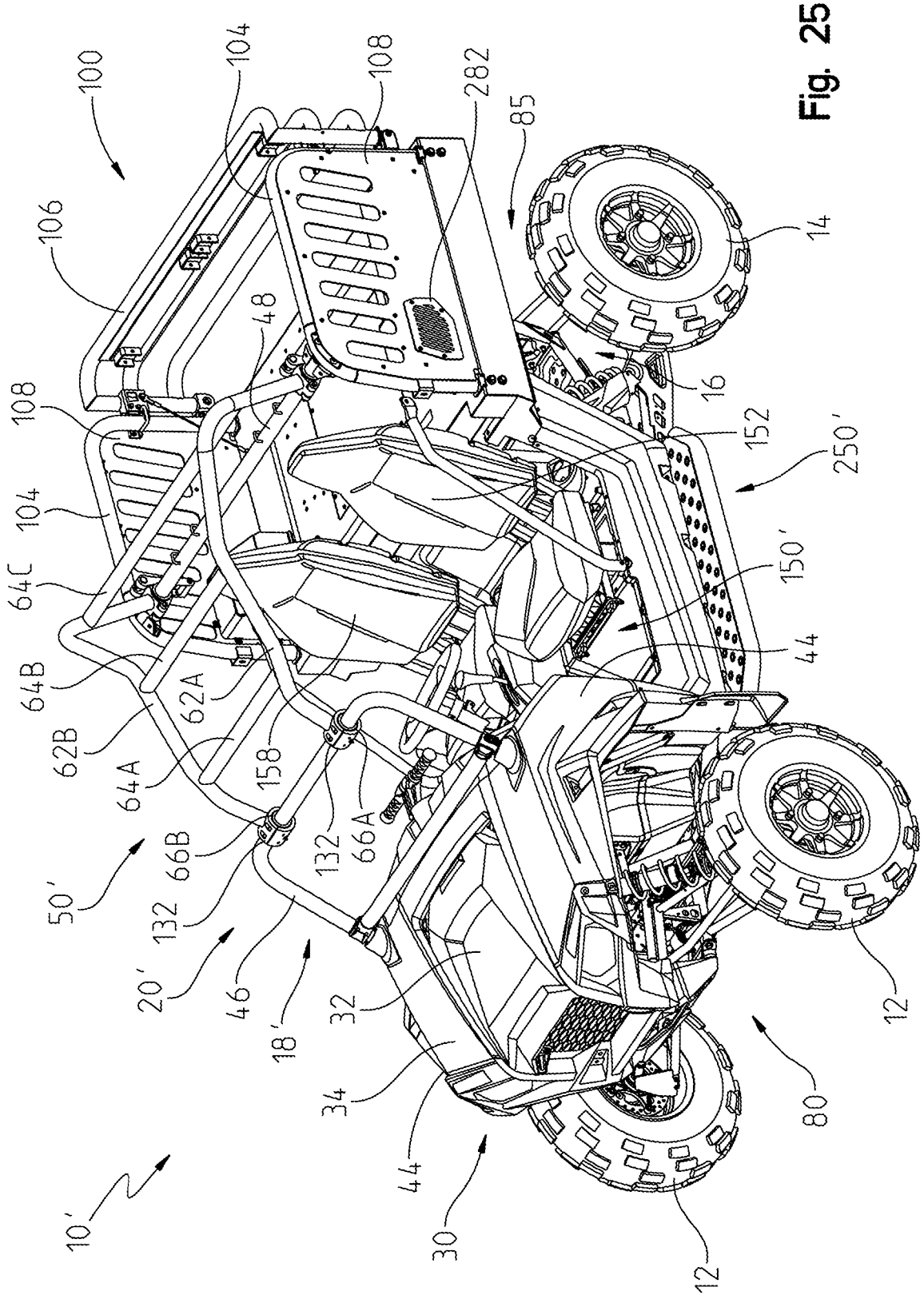
Fig. 24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158
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132
20'
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18'
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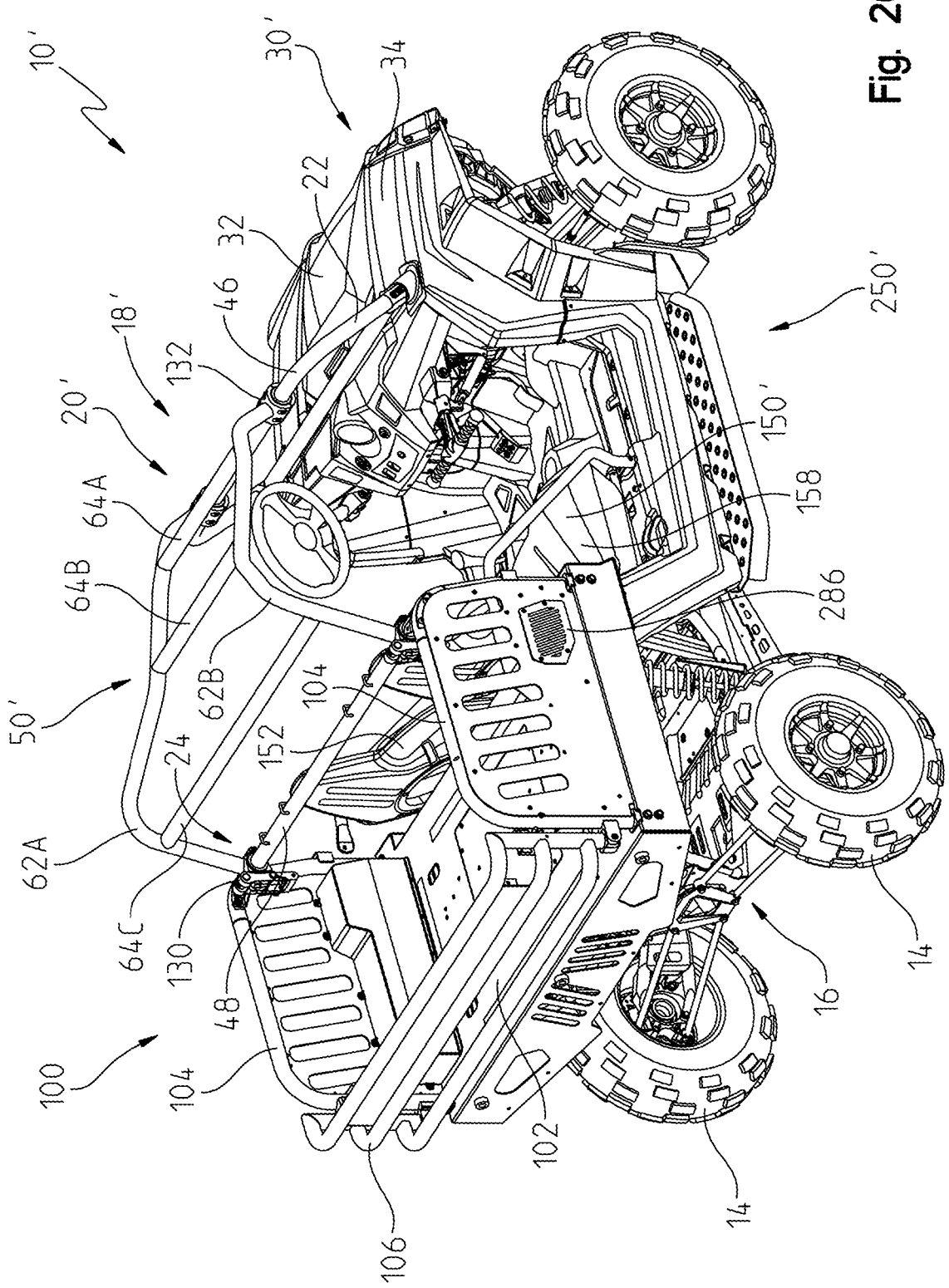
80
12
10'

Fig. 25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150'
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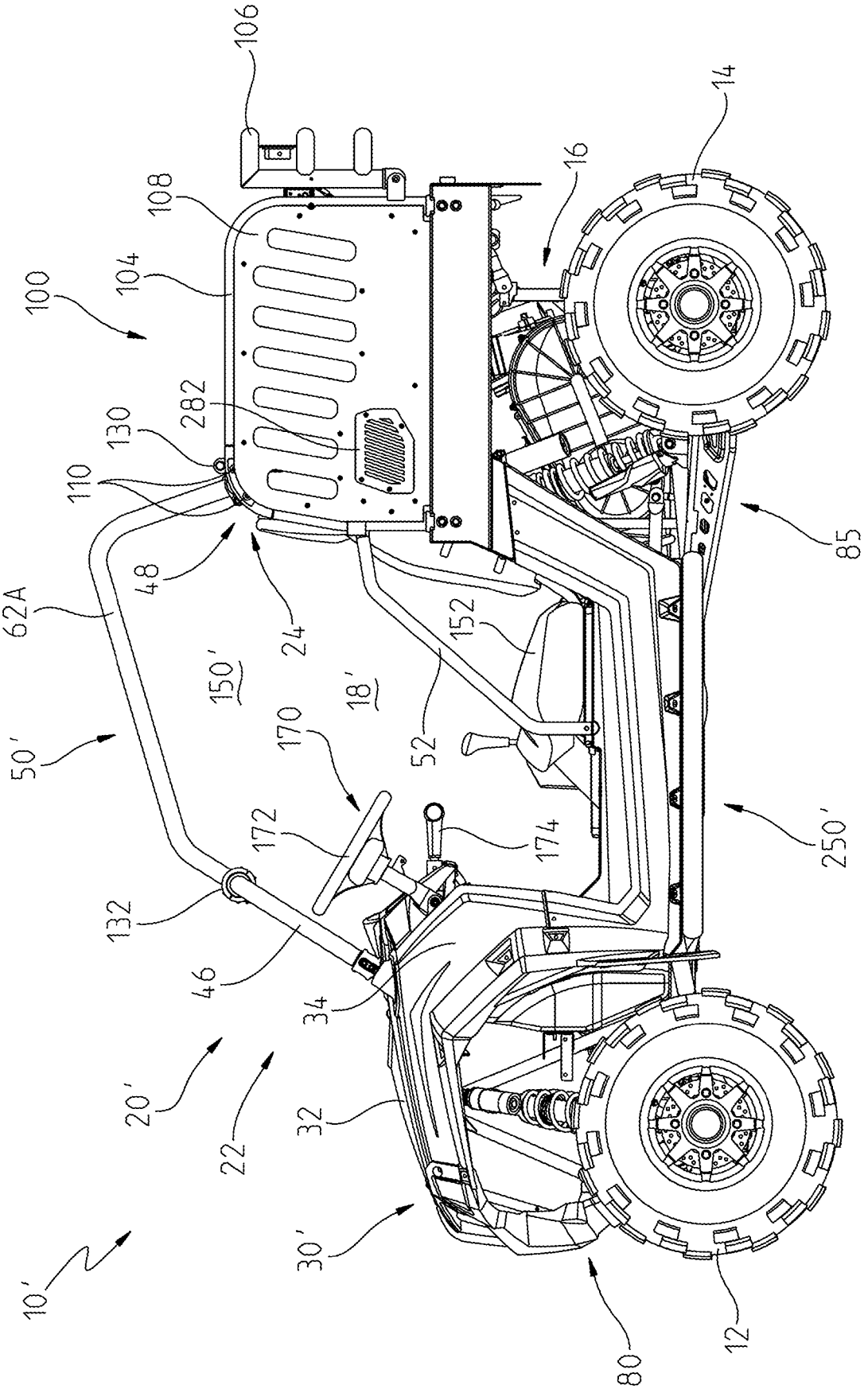
Fig. 26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172
174
250'
132
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20'
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30'
10'
80
12

Fig. 27

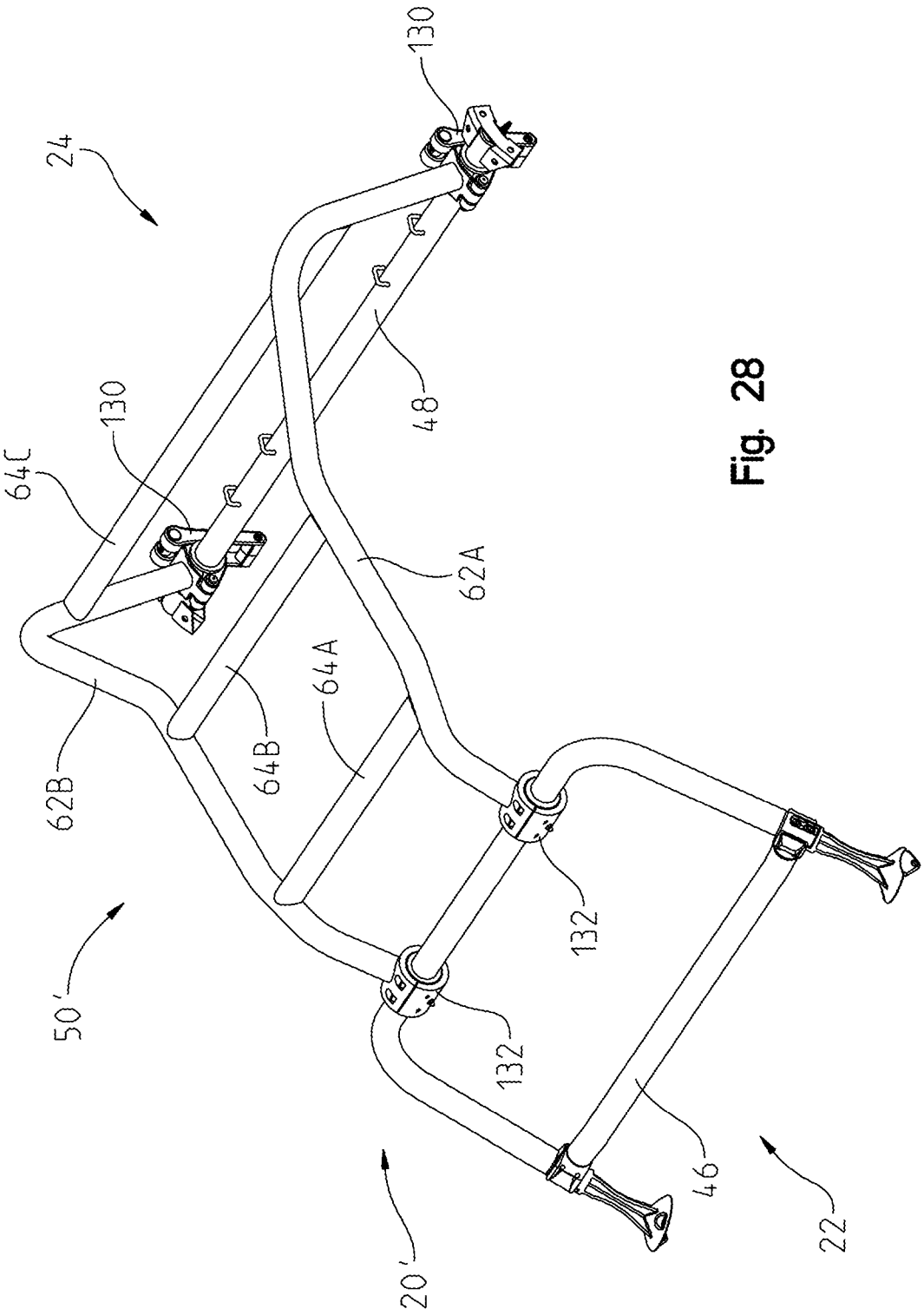


Fig. 28

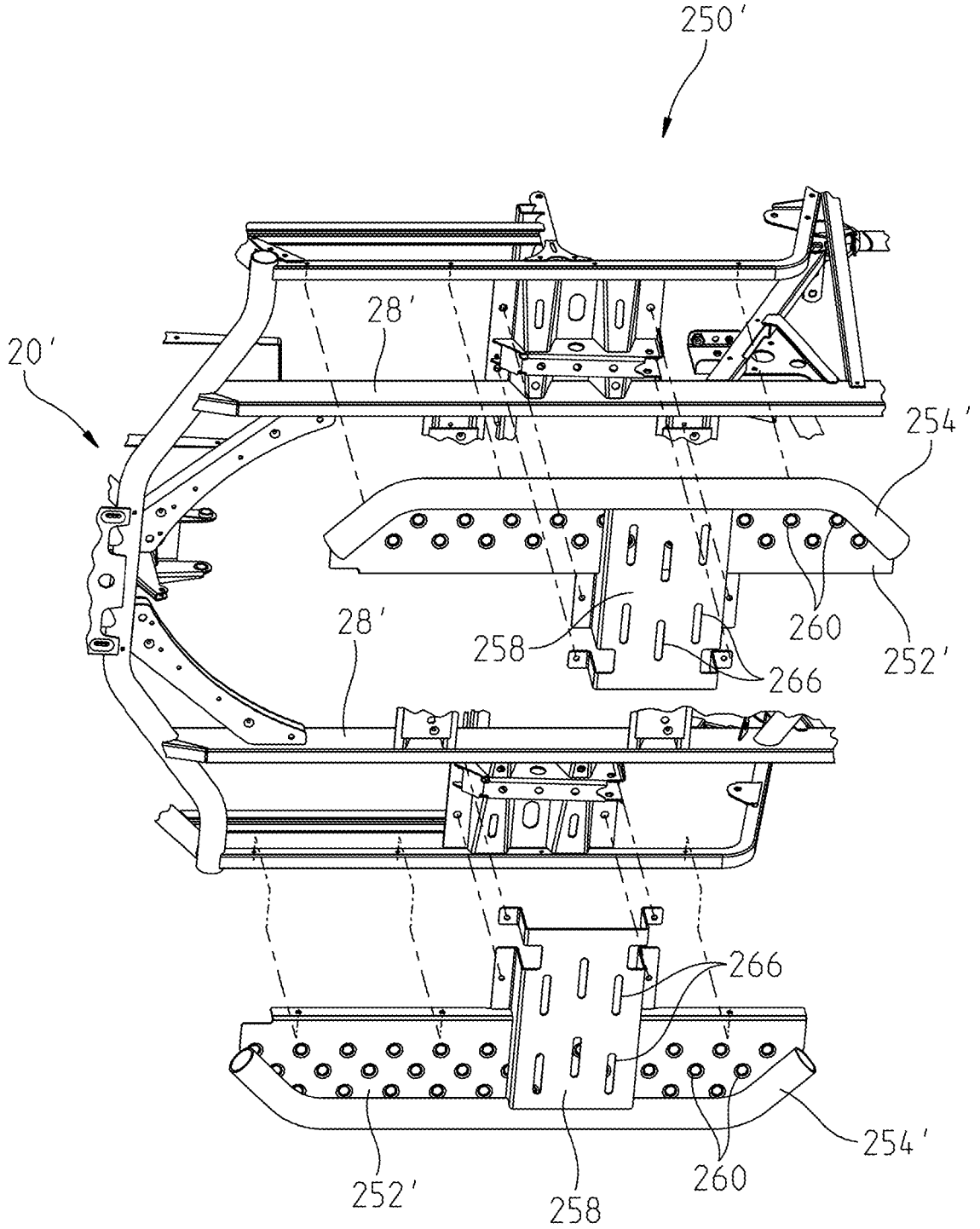


Fig. 29

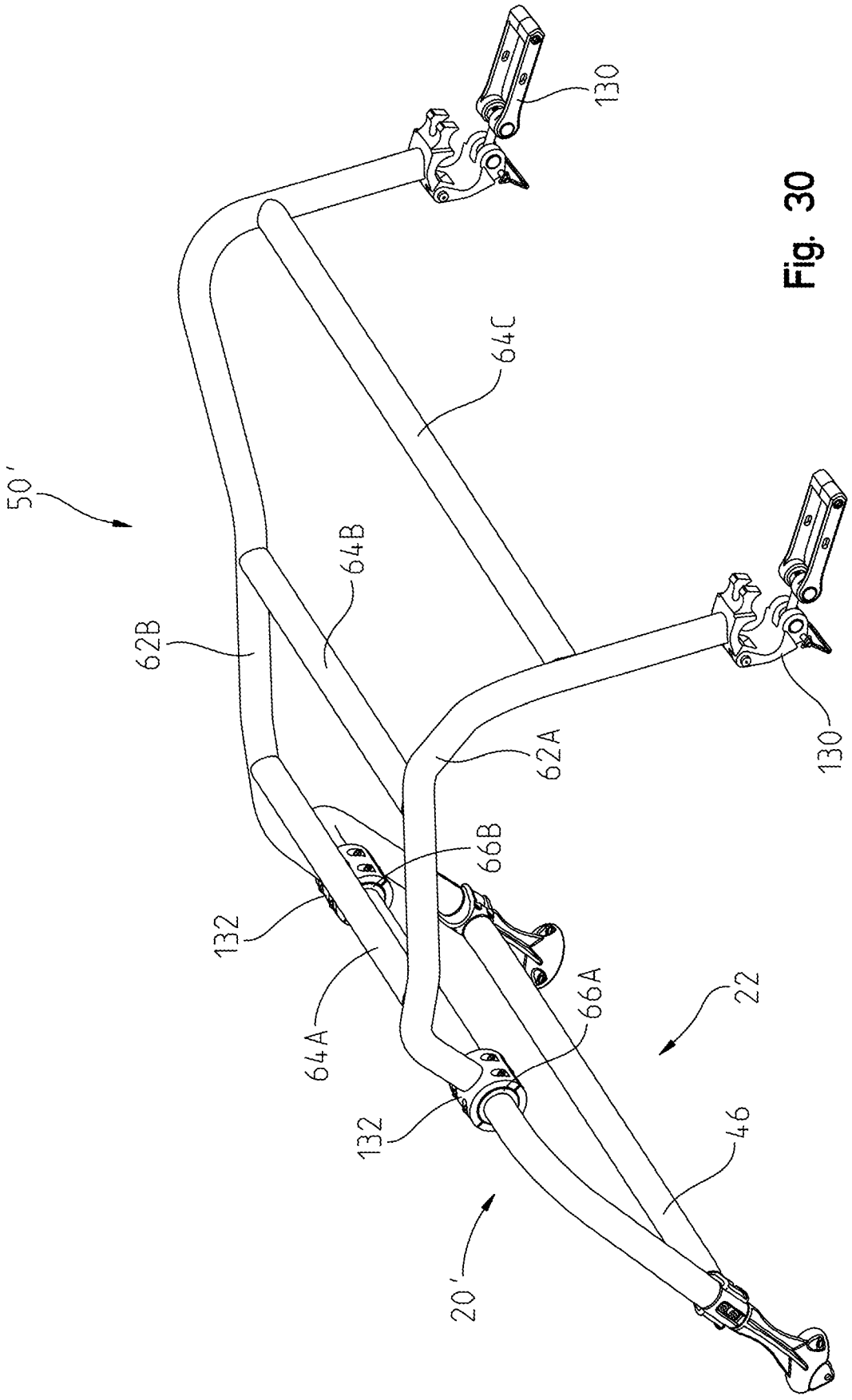
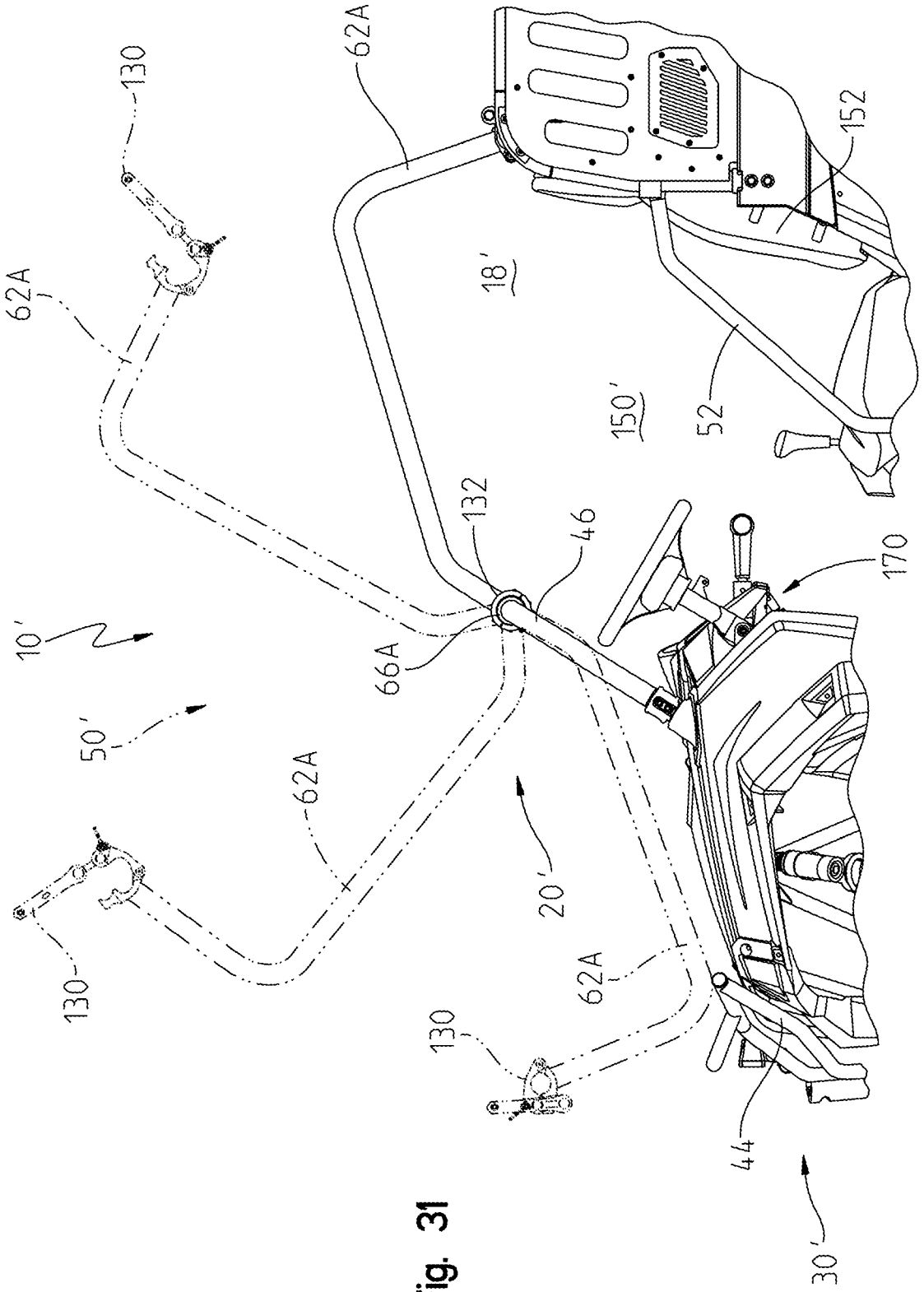


Fig. 30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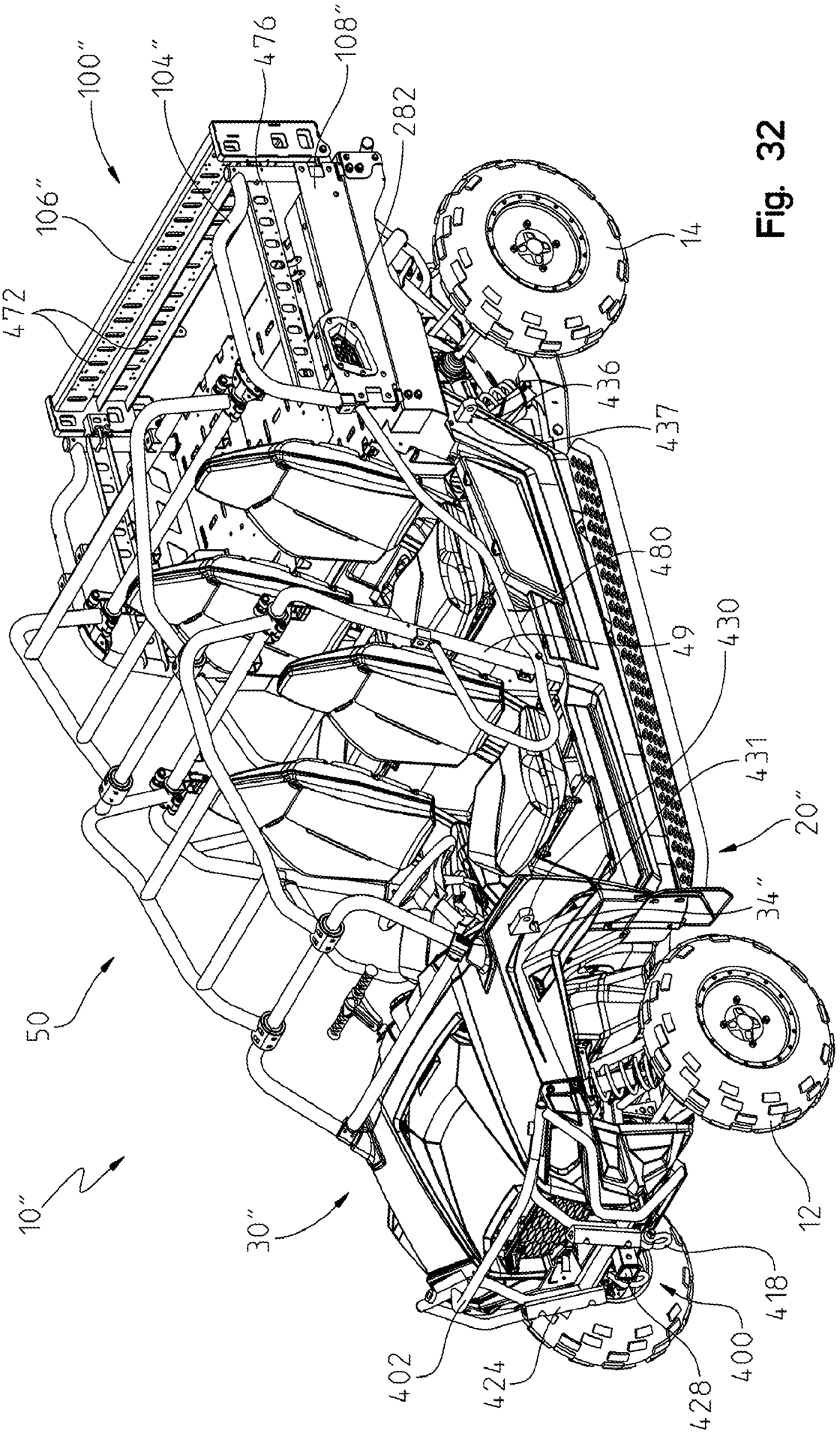
62A
18'
152
150'
52
132
46
170
66A
10'
50'
62A
20'
130
62A
130
44
30'

Fig. 31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104''
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108''
282
106''
472
14
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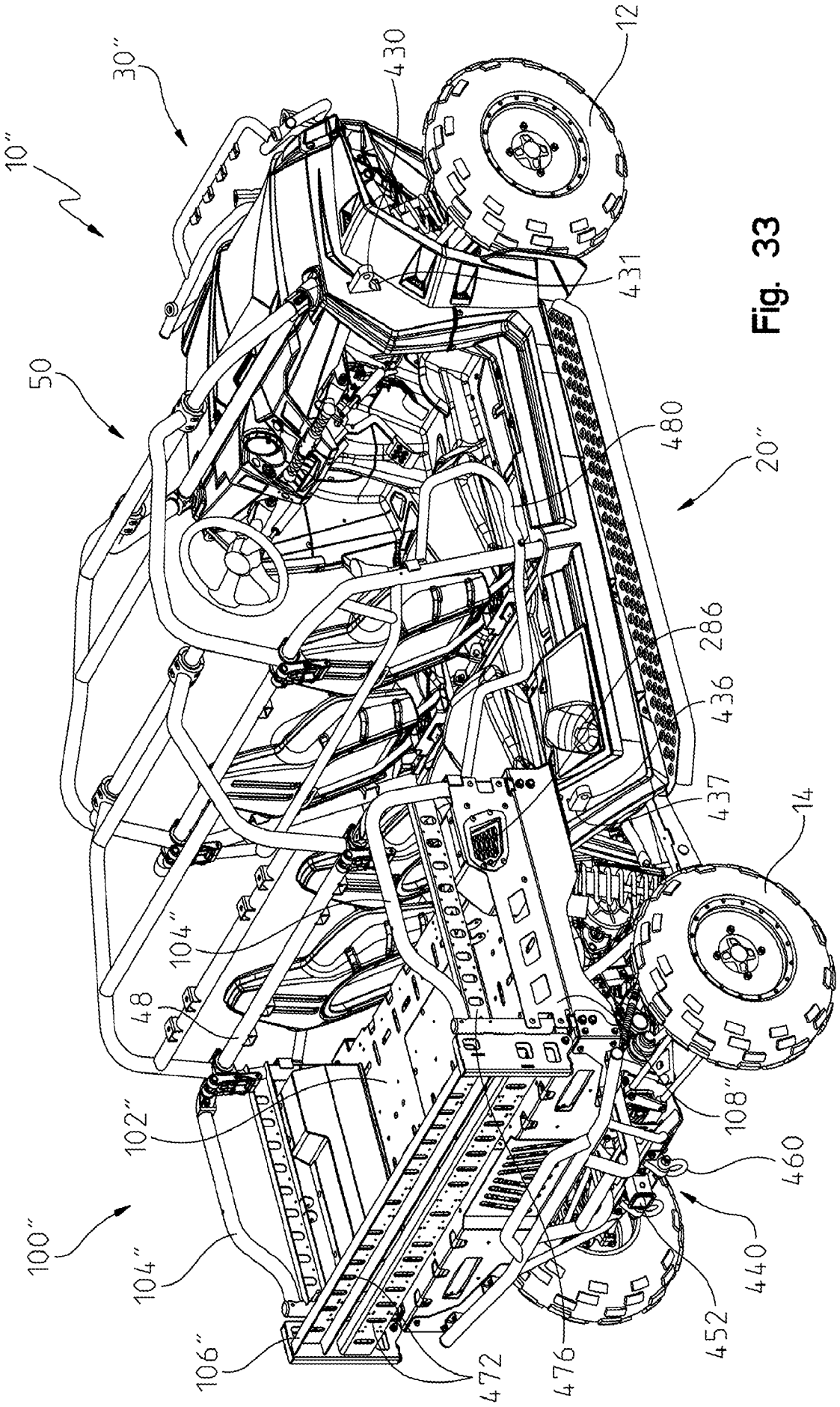
437
480
49
430
431
20''
34''
50
10''
30''
12
418
400
402
424
428

Fig. 32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104''
440
452
106''
472
476

Fig. 33

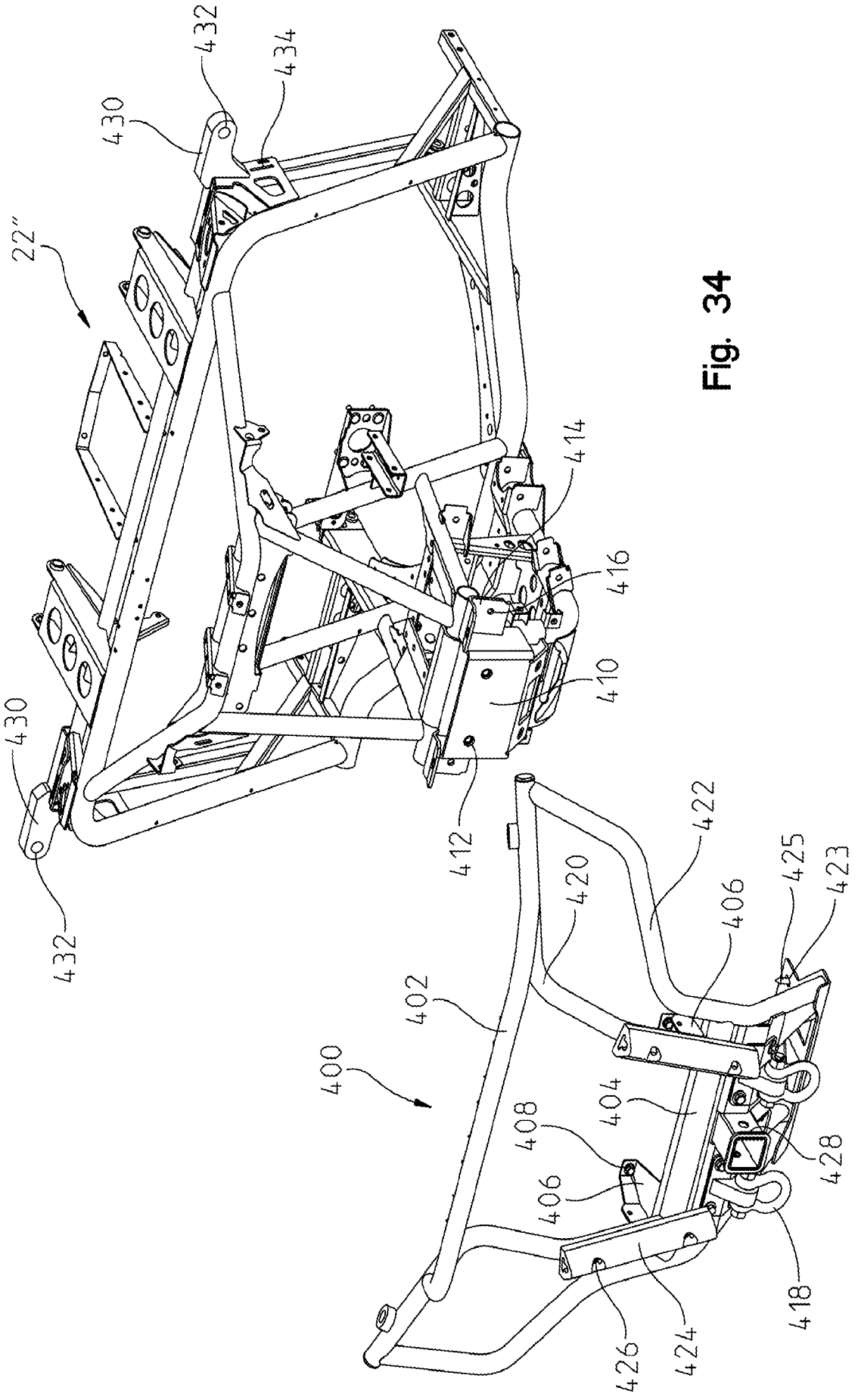
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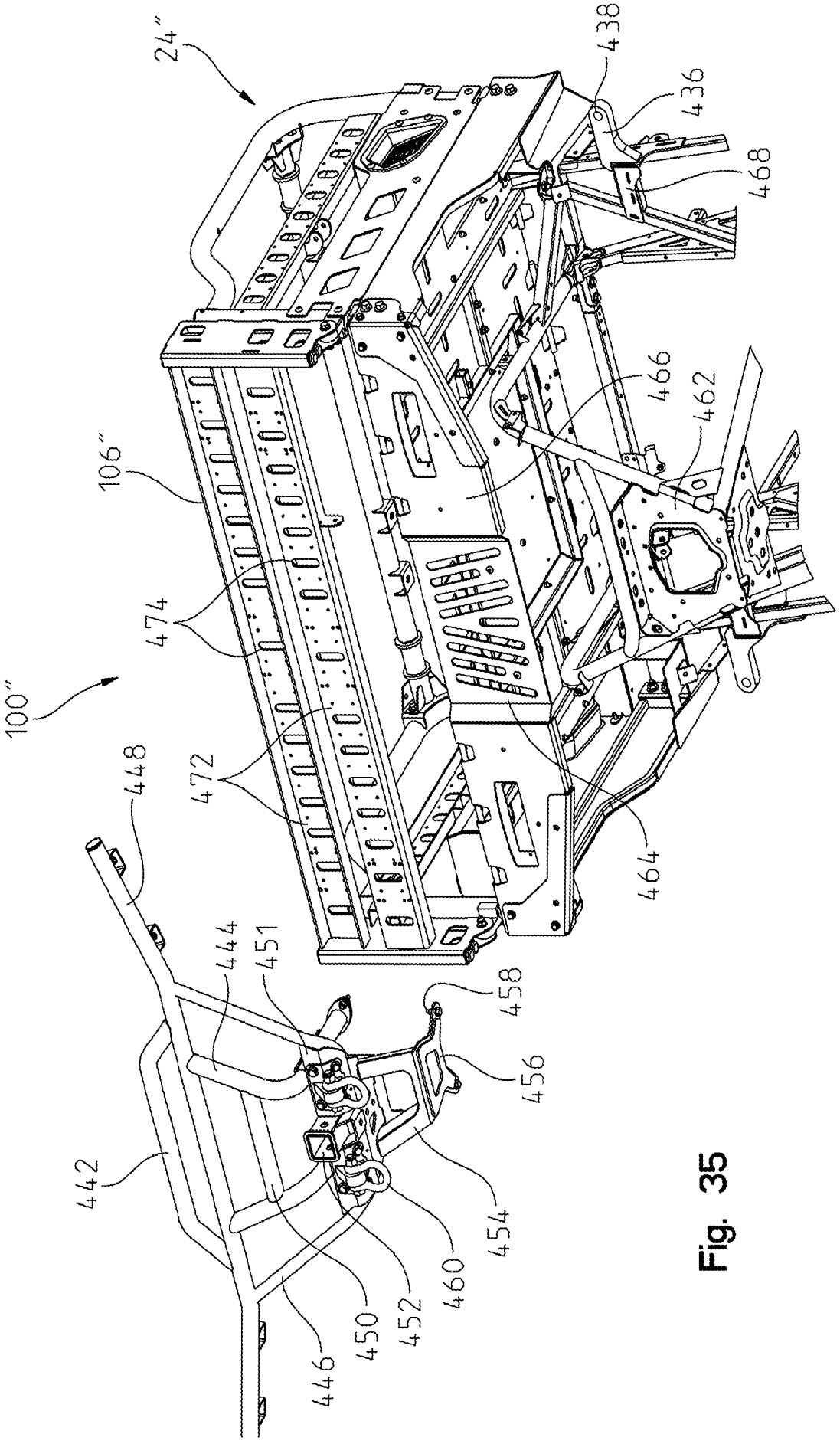
Fig. 34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436
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106"
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100"
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442
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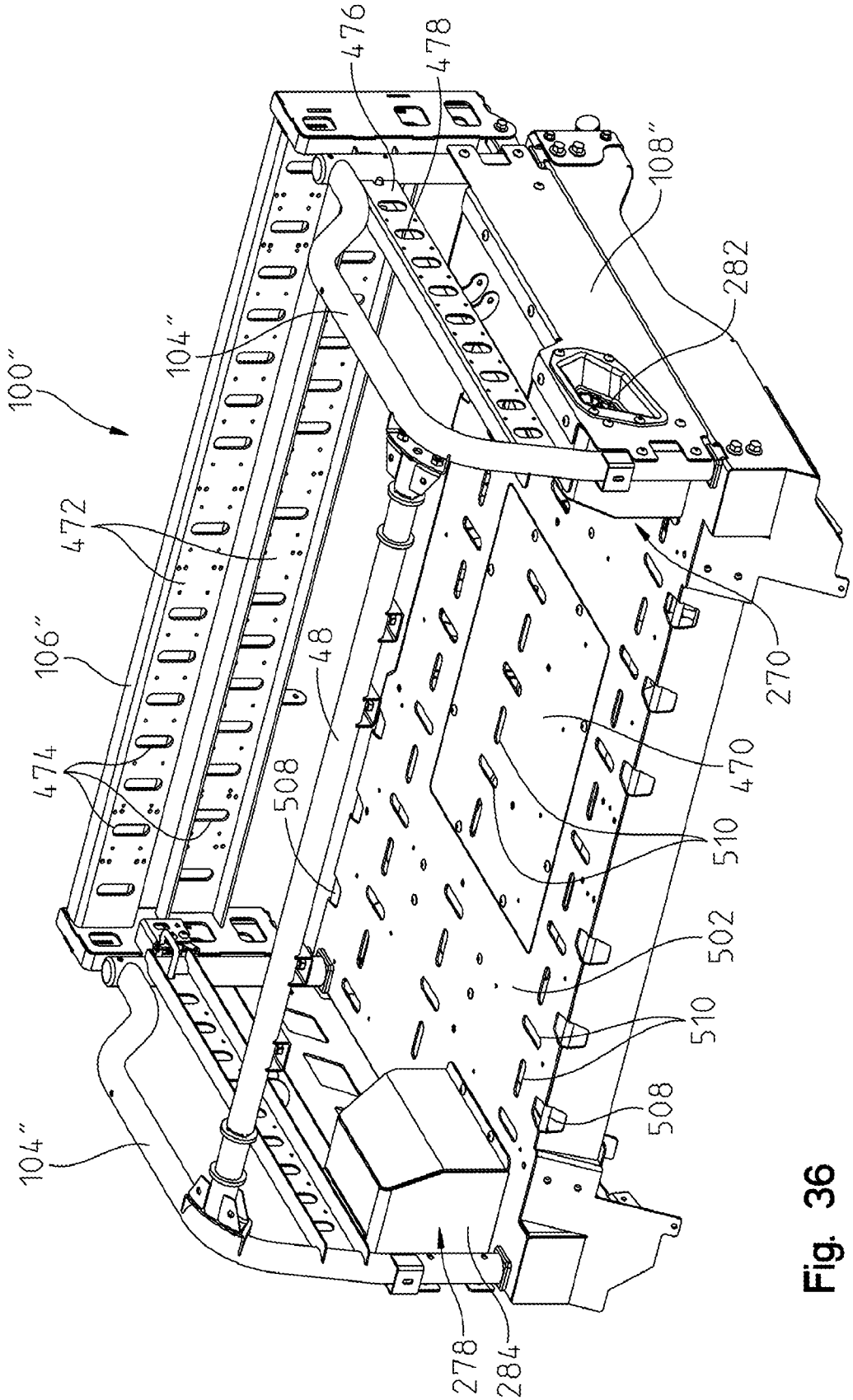
450
446

Fig. 35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104"
100"
472
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270
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508
470
510
502
510
508
104"
278
284

Fig. 36

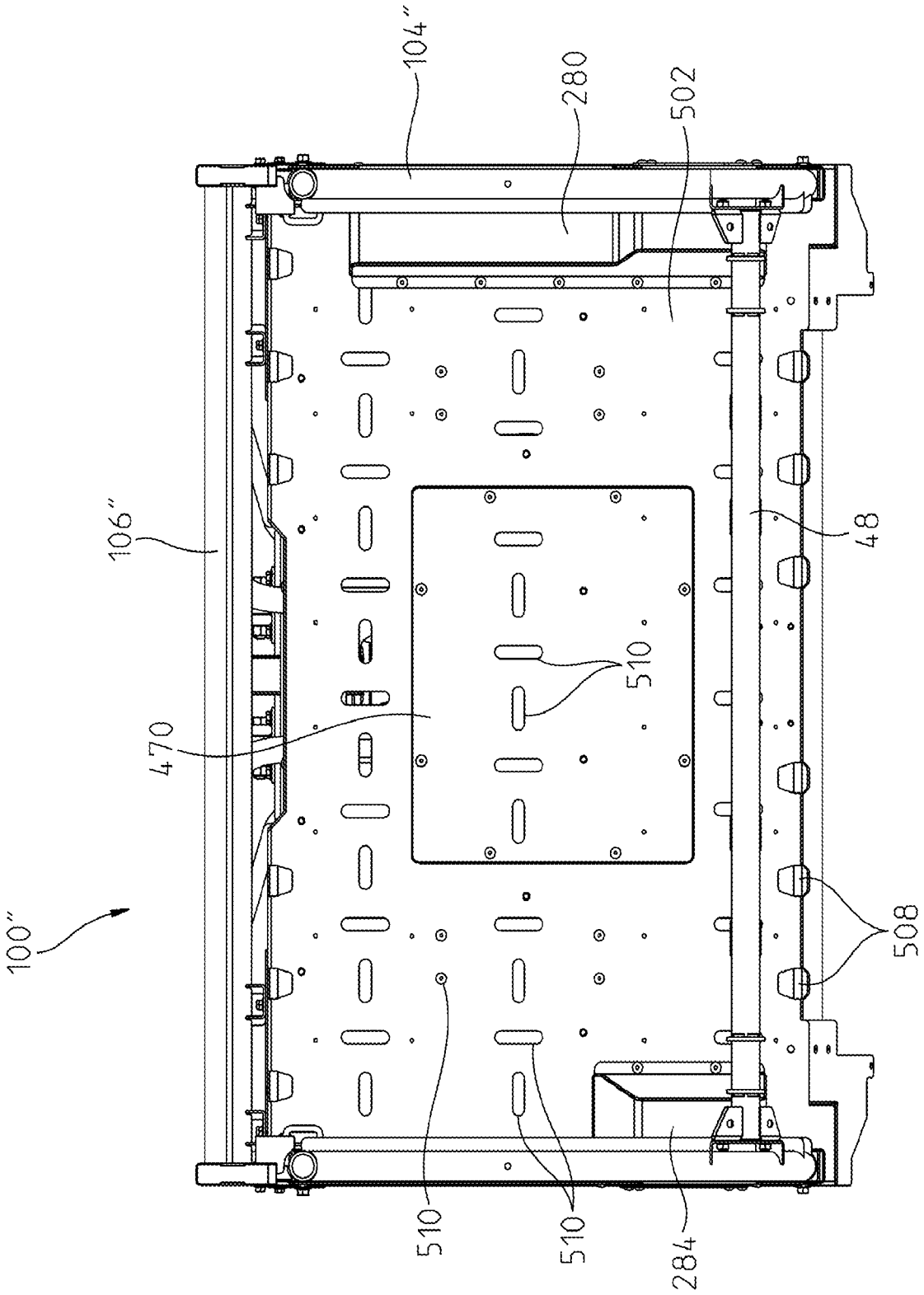

Fig. 37

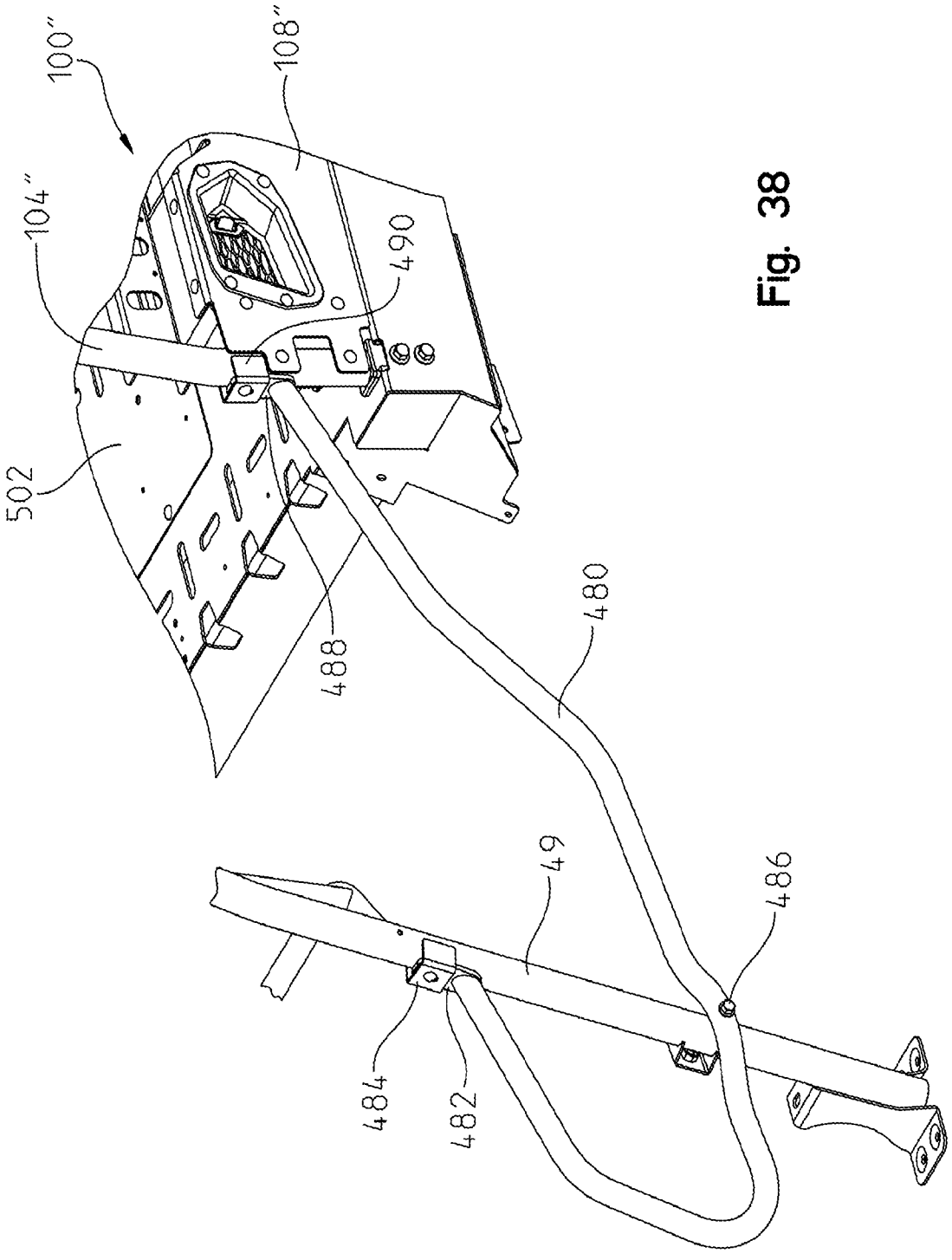

Fig. 38

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(72) Inventors: **NOVOTNY, Shane, A.**; 10935 Sailor Way, Woodbury, MN 55129 (US). **MORISCH, Bradley, R.**; 13999 274th Court, Lindstrom, MN 55045 (US). **GROSS, Brian, J.**; 56282 350 Street, Warroad, MN 56763 (US). **LEONARD, Jed, P.**; 445 Kenmar Circle, Minnetonka, MN 55305 (US).

(74) Agent: **VAN DALEN, Jessica, L.**; Faegre Baker Daniels LLP, 300 North Meridian Street, Suite 2700, Indianapolis, IN 46204 (US).

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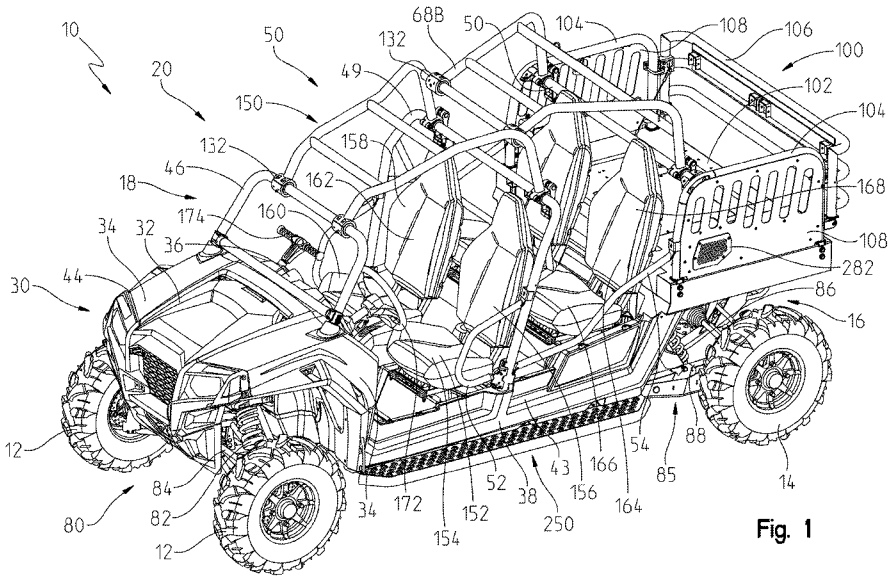

Fig. 1

(57) Abstract: An illustrative embodiment of the present disclosure includes a vehicle (10) comprising a plurality of ground engaging members (12, 14), a chassis (30) supported by the plurality of ground engaging members, and an engine (274) supported by the chassis. The engine is configured to provide power to at least one of the plurality of ground engaging members. The vehicle further comprises a seating area (150) supported by the chassis. The seating area includes at least an operator seat (152) and a passenger seat (158) in a side-by-side arrangement. The vehicle further comprises a plurality of longitudinal members (62) positionable above the seating area and a coupling device (130) coupled to at least one of the longitudinal members. The coupling device has an adjustment member (144) to vary a force of the coupling device.

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International application No
PCT/US2013/034530

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B62D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/000849 A1 (LEONARD JOSHUA J [US] ET AL) 1 January 2009 (2009-01-01)	1,2, 4-10, 17-19
Y	paragraphs [0069], [0074], [0075], [0080], [0081]; claim 1; figures 1,4,5,6,8a,9,15b,17a,18a	11
X	WO 2008/013564 A1 (POLARIS INC [US]; SUNSDAHL LARRY RICHARD [US]; DECKARD AARON DAVID [US) 31 January 2008 (2008-01-31) page 17, last paragraph - page 18, paragraph 1; figures 1,23	24,27,29
Y	US 2009/302590 A1 (VAN BRONKHORST KEVIN [US] ET AL) 10 December 2009 (2009-12-10) paragraphs [0067], [0103]; figures 20,21	11

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Petersson, Magnus

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/034530

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2010/019539 A1 (NAKAMURA NORIMI [JP] ET AL) 28 January 2010 (2010-01-28) paragraphs [0011] - [0113]; figures 1,3-5	12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2013/034530

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009000849 A1	01-01-2009	NONE	
WO 2008013564 A1	31-01-2008	AT 518727 T	15-08-2011
		AU 2006346500 A1	31-01-2008
		CN 101511664 A	19-08-2009
		EP 2046625 A1	15-04-2009
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		US 2012056411 A1	08-03-2012
		US 2013241228 A1	19-09-2013

(19)中华人民共和国国家知识产权局

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(71)申请人 北极星工业有限公司
地址 美国明尼苏达州
(72)发明人 沙恩·A·诺沃特尼
布雷德利·R·莫里施
布赖恩·J·格罗斯
杰德·P·莱昂纳德
(74)专利代理机构 北京集佳知识产权代理有限公司 11227
代理人 王雪 潘炜
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B60K 5/00(2006.01)
B60R 21/13(2006.01)

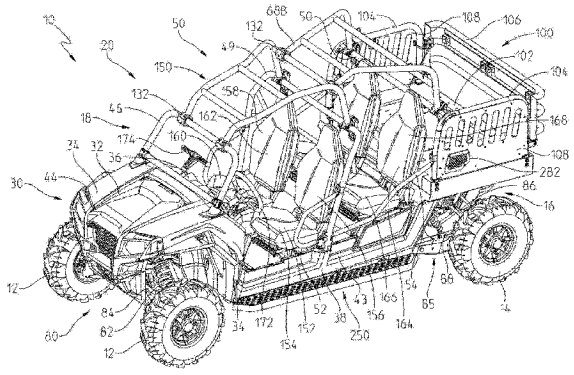
权利要求书3页 说明书16页 附图41页

(54)发明名称

折叠式驾驶室框架

(57)摘要

本公开的说明性实施方式包括车辆(10),该车辆(10)包括:多个地面接合构件(12、14);由多个地面接合构件支承的车架(30);以及由车架支承的发动机(274)。发动机构造成向多个地面接合构件中的至少一个地面接合构件提供动力。车辆还包括由车架支承的座椅区域(150)。座椅区域包括呈并排式布置的至少操作者座椅(152)和乘客座椅(158)。车辆还包括能够定位在座椅区域上方的多个纵向构件(62)以及联接至纵向构件中的至少一个纵向构件的联接设备(130)。联接设备具有用以改变联接设备的力的调节构件(144)。



CN 104703865 A

1. 一种车辆 (10)，包括：

多个地面接合构件 (12、14)；

车架 (30)，所述车架 (30) 由所述多个地面接合构件支承；

发动机 (274)，所述发动机 (274) 由所述车架支承并且构造成向所述多个地面接合构件中的至少一个地面接合构件提供动力；

座椅区域 (150)，所述座椅区域 (150) 由所述车架支承，所述座椅区域包括呈并排式布置的至少操作者座椅 (152) 和乘客座椅 (158)；

多个纵向构件 (62)，所述多个纵向构件 (62) 能够定位在所述座椅区域的上方；以及

联接设备 (130)，所述联接设备 (130) 联接至所述纵向构件中的至少一个纵向构件，所述联接设备具有用以改变所述联接设备的力的调节构件 (144)。

2. 根据权利要求 1 所述的车辆，其中，所述联接设备为免工具拆装式。

3. 根据权利要求 1 所述的车辆，其中，所述联接设备包括手柄 (142) 和凸轮面 (140)，所述手柄能够绕所述调节构件旋转以调节所述手柄相对于所述凸轮面的位置。

4. 根据权利要求 1 所述的车辆，还包括枢转设备 (132)，所述枢转设备 (132) 联接至所述纵向构件中的至少一个纵向构件，所述枢转设备和所述联接设备相配合以使所述纵向构件沿向前方向旋转。

5. 根据权利要求 4 所述的车辆，其中，所述纵向构件的旋转使所述车辆的高度减小。

6. 根据权利要求 4 所述的车辆，还包括框架 (20)，所述枢转设备联接至所述框架的一部分，并且在所述枢转设备与所述框架之间定位有衬套 (222)。

7. 一种车辆 (10)，包括：

多个地面接合构件 (12、14)；

框架 (20)，所述框架 (20) 由所述多个地面接合构件支承；

发动机盖 (32)，所述发动机盖 (32) 由所述框架支承；

发动机 (274)，所述发动机 (274) 由所述框架支承并且构造成向所述多个地面接合构件中的至少一个地面接合构件提供动力；

座椅区域 (150)，所述座椅区域 (150) 由所述地面接合构件支承；

货物区域 (100)，所述货物区域 (100) 位于所述座椅区域的后方；以及

防滚架 (50)，所述防滚架 (50) 能够定位在所述座椅区域的上方，所述防滚架构造成在第一位置与第二位置之间旋转，所述第一位置包括所述防滚架被定位在所述座椅区域上方，并且所述第二位置包括所述防滚架沿向前方向枢转并且支承在所述发动机盖上，当所述防滚架处于所述第二位置时，所述防滚架与所述货物区域间隔开。

8. 根据权利要求 7 所述的车辆，其中，所述防滚架包括第一部段 (58) 和第二部段 (60)，所述第二部段联接至所述第一部段。

9. 根据权利要求 8 所述的车辆，其中，所述第二部段构造成与所述第一部段一起沿向前方向移动。

10. 根据权利要求 7 所述的车辆，其中，所述货物区域包括后部构件，所述后部构件具有竖直附接构件 (118)，所述竖直附接构件 (118) 定位在水平延伸的框架构件 (119) 之间。

11. 根据权利要求 7 所述的车辆，还包括进气系统 (270)，所述进气系统 (270) 以可操作的方式联接至所述发动机，所述进气系统由所述货物区域支承。

12. 一种车辆 (10)，包括：

多个地面接合构件 (12、14)；

框架 (20)，所述框架 (20) 由所述多个地面接合构件支承；

发动机 (274)，所述发动机 (274) 由所述框架支承并且构造成向所述多个地面接合构件中的至少一个地面接合构件提供动力；以及

座椅区域 (150)，所述座椅区域 (150) 由所述地面接合构件支承并且包括至少操作者座椅 (152)、前部乘客座椅 (158) 以及定位在所述操作者座椅和所述前部乘客座椅后方的至少一个后部乘客座椅 (164)，所述框架包括第一可移动部 (58) 和第二可移动部 (60)，所述第一可移动部 (58) 定位在所述操作者座椅和所述前部乘客座椅的上方，所述第二可移动部 (60) 定位在所述至少一个后部乘客座椅的上方，所述第二可移动部联接至所述第一可移动部，使得所述第一可移动部和所述第二可移动部构造成一起移动。

13. 根据权利要求 12 所述的车辆，其中，所述第二可移动部构造成用于进行复合运动，所述第二可移动部构造成朝向所述第一可移动部移动，并且构造成与所述第一可移动部一起沿向前方向移动。

14. 根据权利要求 12 所述的车辆，其中，所述第二可移动部在多个枢转位置 (72A、72B) 联接至所述第一可移动部。

15. 根据权利要求 12 所述的车辆，其中，所述第一可移动部在多个枢转位置 (66A、66B) 处联接至所述框架。

16. 根据权利要求 12 所述的车辆，还包括联接至所述框架的踩踏板组件 (250)。

17. 一种车辆 (10)，包括：

多个前部地面接合构件 (12)；

多个后部地面接合构件 (14)，所述多个后部地面接合构件 (14) 定位在所述前部地面接合构件的后方；

框架 (20)，所述框架 (20) 由所述多个地面接合构件支承并且沿所述车辆的纵向方向延伸，所述框架包括前部部分 (22)、后部部分 (24) 以及中间部分 (26)，所述前部部分 (22) 由所述前部地面接合构件支承，所述后部部分 (24) 由所述后部地面接合构件支承，所述中间部分 (26) 位于所述前部部分的后方和所述后部部分的前方；

发动机 (274)，所述发动机 (274) 由所述框架支承并且构造成向所述多个地面接合构件中的至少一个地面接合构件提供动力；

座椅区域 (150)，所述座椅区域 (150) 由所述地面接合构件支承；以及

多个纵向构件 (62)，所述多个纵向构件 (62) 能够定位在所述座椅区域的上方，所述多个纵向构件构造成在升高位置与降低位置之间移动，所述升高位置包括所述纵向构件被定位在所述座椅区域上方，所述降低位置包括所述纵向构件被定位在所述座椅区域前方，所述纵向构件中的每个纵向构件包括枢转设备 (132)，所述枢转设备 (132) 与相邻的枢转设备间隔开。

18. 根据权利要求 17 所述的车辆，其中，所述多个纵向构件包括至少第一纵向构件 (62A) 和第二纵向构件 (62B)，并且所述多个枢转设备包括至少第一枢转设备和第二枢转设备，所述第一枢转设备联接至所述第一纵向构件，并且所述第二枢转设备联接至所述第二纵向构件，所述第一枢转设备与所述第二枢转设备相邻并且与所述第二枢转设备间隔

开。

19. 根据权利要求 18 所述的车辆，其中，所述多个纵向构件还包括第三纵向构件 (68A) 和第四纵向构件 (68B)，并且所述多个枢转设备包括第三枢转设备和第四枢转设备，所述第三纵向构件联接至所述第三枢转设备，并且所述第四纵向构件联接至所述第四枢转设备，所述第三纵向构件和所述第四纵向构件以及所述第三枢转设备和所述第四枢转设备位于所述第一纵向构件和所述第二纵向构件以及所述第一枢转设备和所述第二枢转设备的后方。

20. 根据权利要求 17 所述的车辆，其中，所述多个纵向构件由第一材料构成，并且所述多个枢转设备包括由第二材料构成的衬套。

21. 根据权利要求 17 所述的车辆，还包括多个联接设备，所述多个联接设备联接至所述多个纵向构件。

22. 根据权利要求 21 所述的车辆，其中，所述联接设备是免工具拆装式。

23. 根据权利要求 21 所述的车辆，其中，所述联接设备包括手柄 (142)、调节构件 (144) 以及凸轮面 (410)，所述手柄能够绕所述调节构件旋转以控制夹持设备的压力。

24. 一种车辆 (10)，包括：

多个地面接合构件 (12、14)；

框架 (20)，所述框架 (20) 由所述多个地面接合构件支承；

发动机 (274)，所述发动机 (274) 由所述框架支承并且构造成向所述多个地面接合构件中的至少一个地面接合构件提供动力；

座椅区域 (150)，所述座椅区域 (150) 由所述地面接合构件支承并且包括操作者座椅 (152) 以及与所述操作者座椅侧向相邻的乘客座椅 (158)，以及

握杆 (174)，所述握杆 (174) 联接至所述框架并且位于所述乘客座椅的前方，所述握杆构造成在第一运动范围内以及在第二运动范围内运动，所述第一运动范围为沿基本向前和向后方向的运动，并且所述第二运动范围为沿基本向上和向下方向的运动。

25. 根据权利要求 24 所述的车辆，还包括调节构件 (182)，所述调节构件 (182) 联接至所述框架和所述握杆，所述调节构造成使所述握杆在第二运动中移动。

26. 根据权利要求 25 所述的车辆，其中，所述调节构件为气弹簧减震器，所述气弹簧减震器具有缸体 (184)、保持在所述缸体内的流体、活塞 (186) 以及起动控制杆。

27. 根据权利要求 24 所述的车辆，其中，所述握杆包括构造成在第一运动中移动的轴 (176) 以及联接至所述轴的紧固件 (180)。

28. 根据权利要求 27 所述的车辆，其中，所述紧固件构造成在沿着所述轴的多个位置中的一个位置与所述轴相联接。

29. 根据权利要求 24 所述的车辆，还包括防滚架 (50)，所述防滚架能够定位在所述座椅区域的上方，所述防滚架构造成沿向前方向旋转。

折叠式驾驶室框架

背景技术

[0001] 本发明涉及车辆，并且更特别地涉及并排式多用途车辆和并排式全地形车辆。

[0002] 一般地，全地形车辆（“ATVs”）和多用途车辆（“UVs”）用来在多种地形上运载一个或多个乘客。更特别地，某些全地形车辆(ATVs)和多用途车辆(UVs)可以包括并排式座椅，在这种并排式座椅中，乘客可以紧邻驾驶员就坐于车辆的前部。并排式座椅还可以包括后部座椅区域，以在车辆中容纳其他乘客。防滚架可以设置在车辆的座位上方。另外，全地形车辆(ATVs)和多用途车辆(UVs)可以在车辆的前部或后部提供货物区域以便运载货物。

发明内容

[0003] 本公开的说明性实施方式包括一种车辆，该车辆包括：多个地面接合构件；由多个地面接合构件支承的车架；以及由车架支承的发动机。发动机构造成向多个地面接合构件中的至少一个地面接合构件提供动力。车辆还包括由车架支承的座椅区域。座椅区域包括呈并排式布置的至少操作者座椅和乘客座椅。车辆还包括能够定位在座椅区域上方的多个纵向构件；以及联接至纵向构件中的至少一个纵向构件的联接设备。联接设备具有用以改变联接设备的力的调节构件。

[0004] 本公开的另一说明性实施方式包括一种车辆，该车辆包括：多个地面接合构件；由多个地面接合构件支承的框架；由框架支承的发动机盖；以及由框架支承的发动机。发动机构造成向多个地面接合构件中的至少一个地面接合构件提供动力。车辆还包括由地面接合构件支承的座椅区域以及位于座椅区域后方的货物区域。另外，车辆包括能够定位在座椅区域上方的防滚架。防滚架构造成在第一位置与第二位置之间旋转。第一位置包括防滚架被定位在座椅区域上方。第二位置包括防滚架沿向前方向枢转并且支承在发动机盖上。当防滚架处于第二位置时，防滚架与货物区域间隔开。

[0005] 本公开的另一说明性实施方式包括一种车辆，该车辆包括：多个地面接合构件；由多个地面接合构件支承的框架；以及由框架支承的发动机。发动机构造成向多个地面接合构件中的至少一个地面接合构件提供动力。本公开的车辆还包括由地面接合构件支承的座椅区域。座椅区域包括至少操作者座椅、前部乘客座椅以及定位在操作者座椅和前部乘客座椅后方的至少一个后部乘客座椅。框架包括定位在操作者座椅和前部乘客座椅上方的第一可移动部以及定位在至少一个后部乘客座椅上方的第二可移动部。第二可移动部联接至第一可移动部，使得第一可移动部和第二可移动部构造成一起移动。

[0006] 本公开的又一说明性实施方式包括一种车辆，该车辆包括：多个前部地面接合构件；定位在前部地面接合构件后方的多个后部地面接合构件；以及由多个地面接合构件支承的框架。框架沿车辆的纵向方向延伸并且包括由前部地面接合构件支承的前部部分；由后部地面接合构件支承的后部部分；以及位于前部部分的后方和后部部分的前方的中间部分 26。车辆还包括发动机，该发动机由框架支承并且构造成向多个地面接合构件中的至少一个地面接合构件提供动力。另外，车辆包括由地面接合构件支承的座椅区域以及能够定

位在座椅上方的多个纵向构件。多个纵向构件构造成在升高位置与降低位置之间移动。升高位置包括纵向构件被定位在座椅区域上方，并且降低位置包括纵向构件被定位在座椅区域前方。纵向构件中的各个纵向构件包括与相邻的枢转设备间隔开的枢转设备。

[0007] 本公开的另一说明性实施方式包括一种车辆，该车辆包括：多个地面接合构件；由多个地面接合构件支承的框架；发动机，该发动机由框架支承并且构造成向多个地面接合构件中的至少一个地面接合构件提供动力。另外，车辆包括座椅区域，该座椅区域由地面接合构件支承并且包括至少操作者座椅以及与操作座椅侧向相邻的乘客座椅。车辆还包括握杆，该握杆联接至框架并且位于乘客座椅的前方。握杆构造成在第一运动范围和第二运动范围内移动。第一运动范围为沿基本向前和向后方向的运动，并且第二运动范围为沿基本向上和向下方向的运动。

[0008] 在考虑到以下说明性的实施方式的详细描述时，本发明其他的特征和优点对本领域的普通技术人员而言是显而易见的，这些说明性的实施方式举例说明了如当前所认识到的实施本发明的最佳方案。

附图说明

[0009] 通过参考结合附图的下列详细描述，本发明的上述方面以及多个预期的优点将变得更加易于理解，同样也变得更好理解。

[0010] 图 1 是本公开的说明性车辆的前侧立体图；

[0011] 图 2 是图 1 的车辆的后侧立体图；

[0012] 图 3 是图 1 的车辆的侧视图；

[0013] 图 4 是本公开的车辆的说明性的防滚架和框架的前侧立体图；

[0014] 图 5 是说明性的联接设备的分解图；

[0015] 图 6A 是处于闭合位置的图 5 的联接设备的后侧立体图；

[0016] 图 6B 是包括向上旋转的手柄的联接设备的另一后侧立体图；

[0017] 图 6C 是具有向后延伸的手柄的联接设备的后侧立体图；

[0018] 图 6D 是处于打开位置的联接设备的另一后侧立体图；

[0019] 图 7 是图 5 的联接设备的截面图；

[0020] 图 8A 是本公开的枢转设备的前侧立体图；

[0021] 图 8B 是图 8A 的枢转设备的分解图；

[0022] 图 9 是沿图 8A 中的线 9-9 截取的枢转设备的截面图；

[0023] 图 10 是本公开的握柄的侧视立体图；

[0024] 图 11 是图 10 的握柄的分解图；

[0025] 图 12 是沿图 10 中的线 12-12 截取的图 10 的握柄的截面图；

[0026] 图 13 是本公开的踩踏板组件的侧视立体图；

[0027] 图 14 是图 13 的踩踏板组件的底侧立体图；

[0028] 图 15 是踩踏板组件的分解图；

[0029] 图 16 是本公开的货物区域的前侧立体图；

[0030] 图 17 是图 16 的货物区域的分解图；

[0031] 图 18 是货物区域的俯视图；

[0032] 图 19 是图 16 的货物区域的支承板的分解图；

[0033] 图 20 是货物区域的后侧立体图；

[0034] 图 21 是货物区域的仰视图，其中包括本公开的发动机组件、无级变速器组件以及进气系统；

[0035] 图 22A 是图 16 的货物区域的替代性实施方式的前侧立体图；

[0036] 图 22B 是图 22A 的货物区域的俯视图；

[0037] 图 23 是在防滚架与框架断开联接时的本公开的防滚架的后侧立体图；

[0038] 图 24 是本公开的车辆的侧视图，其公开了折叠该防滚架的说明性步骤；

[0039] 图 25 是本公开的替代性实施方式的车辆的前侧立体图；

[0040] 图 26 是图 25 的车辆的后侧立体图；

[0041] 图 27 是图 25 的车辆的侧视图；

[0042] 图 28 是图 25 的车辆的防滚架和框架的前侧立体图；

[0043] 图 29 是图 25 的车辆的踩踏板组件的分解图；

[0044] 图 30 是图 25 的防滚架的后侧立体图；

[0045] 图 31 是图 25 的车辆的侧视图，其公开了折叠该防滚架的说明性步骤；

[0046] 图 32 是本公开的替代性实施方式的车辆的前侧立体图；

[0047] 图 33 是图 32 的车辆的后侧立体图；

[0048] 图 34 是图 32 的车辆的框架组件的前部部分和前防撞器的分解图；

[0049] 图 35 是图 33 的车辆的框架组件的后部部分和后防撞器的分解图；

[0050] 图 36 是图 32 的车辆的货物区域的前侧立体图；

[0051] 图 37 是图 36 的货物区域的俯视图；以及

[0052] 图 38 是图 32 的车辆的承架杆的前侧立体图。

[0053] 贯穿多幅视图，相应的附图标记表示相应的零部件。尽管附图表示根据本公开的多种特征以及部件的实施方式，但附图不必按比例绘制并且可以放大某些特征，以便更好地说明和解释本公开。本文中所陈述的示例性表示说明了本发明的实施方式，并且这种示例性表示并不构成以任何方式限制本发明的范围。

具体实施方式

[0054] 下面公开的实施方式并非意为穷举的或将本发明限制于在下面的详细描述中公开的精确形式。相反，选取和描述这些实施方式以使本领域的普通技术人员可以利用它们的教示。尽管本公开主要涉及多用途车辆，但是应当理解，本文公开的特征可以应用于诸如全地形车辆、摩托车、水运工具、雪地机动车以及高尔夫球车之类的其他类型的车辆。

[0055] 参照图 1 至图 3，示出了车辆 10 的说明性实施方式并且其包括地面接合构件、动力传动系组件 16、框架 20、车身或车架 30、前悬挂组件 80、后悬挂组件 85 以及货物区域 100。车辆 10 可以称为多用途车辆（“UV”）、全地形车辆（“ATV”）或者并排式车辆（“SxS”）并且构造成用于在多种地形或表面上行进。更特别地，车辆 10 可以构造成用于军事应用。

[0056] 车辆 10 包括多个地面接合构件，其说明性地为一组前车轮 12 和一组后车轮 14。在一个实施方式中，可用履带代替一个或多个车轮 12、14，该履带例如从位于美国明尼苏达州麦地那市 55 号公路 2100 号 (55340)(2100 Highway 55, Medina, MN 55340) 的北极星工

业有限公司可得的 PROSPECTOR II 型履带。

[0057] 动力传动系组件 16 以可操作的方式支承在框架 20 上并且以驱动的方式连接至车轮 12、14 中的一个或多个车轮。如图 21 所示，动力传动系组件 16 可以包括发动机 274、例如无级变速器（“CTV”）272 的变速器、前差速器和后差速器（未示出）以及驱动轴（未示出）。发动机 274 可以为燃烧燃料的内燃发动机，然而，可以设想诸如混合动力发动机、燃料电池发动机或者电动发动机之类的任何发动机组件。

[0058] 前悬挂组件 80 可以联接至车架 30 和前车轮 12。如图 1 和图 3 所示，前悬挂组件 80 包括联接至各个前车轮 12 的减震器 82 以及可以包括前控制臂组件 84 的前轴布置。相似地，后悬挂组件 85 可以联接至车架 30 和后车轮 14。说明性地，后悬挂组件 85 包括联接至各个后车轮 14 的减震器 86 以及后轴布置 88。动力传动系组件 16 和前悬挂组件 80 的其他细节在 2006 年 7 月 28 日提交的名称为“SIDE-BY-SIDE ATV（并排式全地形车辆）”的美国专利 No. 7,819,220（代理案号为 No. PLR-06-1688.01P）以及 2006 年 7 月 28 日提交的名称为“SIDE-BY-SIDE ATV（并排式全地形车辆）”的美国专利申请公开 No. 2008/0023240（代理案号为 No. PLR-06-1688.02P）中进行了描述；并且后悬挂组件 85 的其他细节在 2010 年 8 月 3 日提交的名称为“SIDE-BY-SIDE ATV（并排式全地形车辆）”的美国专利申请公开 No. 2012/0031693（代理案号为 No. PLR-06-24357.02）中进行了描述，这些申请的公开内容通过参引的方式明确地并入本文。

[0059] 车架 30 可以包括发动机盖 32、前挡泥板 34、仪表盘组件 36、侧板 38、前底板 40、后底板 42、脚踏板 43（footplate）以及货物区域 100。车架 30 上可以包括诸如防撞器或前保险杠 44 之类的其他附件。车架 30 可以遮蔽车辆 10 的某些部件，例如，发动机盖 32 和前挡泥板 34 可以遮蔽前差速器以及前悬挂组件 80 的其他部分。另外，诸如发动机盖 32 和货物区域 100 之类的车架 30 的某些部分可以包括用于将附件固接至车辆 10 的附接构件（例如钩和闩锁），如本文进一步详细所述。车架 30 说明性地沿车辆 10 的纵向方向延伸。

[0060] 参照图 1 至图 3，车辆 10 包括由车架 30 和框架 20 支承的座椅区域 150，该座椅区域 150 包括用于至少一个操作者和一个乘客的座位。说明性地，车辆 10 的一个实施方式包括四个座椅，所述四个座椅包括操作者座椅 152、前部乘客座椅 158 以及两个后部乘客座椅 164。更特别地，操作者座椅 152 和前部乘客座椅 158 呈并排式布置，并且后部乘客座椅 164 也呈并排式布置。后部乘客座椅 164 定位在操作者座椅 152 和前部乘客座椅 158 后面并且可以相对于座椅 152、158 上升。操作者座椅 152 包括说明性地为凹背摺椅的座椅底部 154 以及座椅靠背 156。相似地，前部乘客座椅 158 包括说明性地为凹背摺椅的座椅底部 160 以及座椅靠背 162。同样地，各个后部乘客座椅 164 包括说明性地为凹背摺椅的座椅底部 166 以及座椅靠背 168。

[0061] 车辆 10 还包括由车轮 12、14 支承的框架 20。具体地，框架 20 包括前框架部 22、后框架部 24 以及中间框架部 26。车辆 10 还包括说明性地为防滚架 50 的上方框架部。防滚架 50 联接至框架 20 并且与座椅区域 150 相配合以限定车辆 10 的驾驶室 18，如本文进一步详细所述。

[0062] 参照图 3，前框架部 22 说明性地包括定位在座椅区域 150 前方的前框架构件 46。前框架构件 46 可以联接至车架 30 和 / 或框架 20 的其他部件，例如框架纵梁 28（图 13 至图 15）。如图 4 所示，说明性的前框架构件 46 为大体呈矩形形状的四杆构件；然而前框架

构件 46 也可以呈其他构型，例如前框架构件 46 可以基本呈 U 形。前框架构件 46 可以支承挡风玻璃（未示出）。说明性的前框架构件 46 包括通过传统的紧固装置（例如，焊接件、螺钉、螺栓、铆接件或者粘结剂）联接在一起的多个框架部件，如本文将进一步详细所述。

[0063] 如图 1 至图 4 所示，后框架部 24 说明性地包括后框架构件 48。后框架构件 48 可以以能够移除的方式联接至货物区域 100，如本文详细所述。后框架构件 48 在座椅区域 150 的后方并且更加特别地，在后部乘客座椅 164 的后方。示例性的后框架构件 48 基本水平地延伸并且可以大体垂直于车辆 10 的纵向方向。后框架部 24 的替代性实施方式可以包括其他的框架部件。

[0064] 参照图 1 至图 4，中间框架部 26 说明性地包括与前框架构件 46 和后框架构件 48 间隔开的中间框架构件 49。中间框架构件 49 说明性地在操作者座椅 152 和前部乘客座椅 158 上方延伸并且从操作者座椅 152 和前部乘客座椅 158 侧向向外延伸。中间框架构件 49 可以通过诸如螺钉、焊接件、铆接件或者粘结剂之类的传统紧固件联接至框架 20 和 / 或车架 30，并且具体地联接至侧板 38。如本文进一步详细所述，中间框架构件 49 可以包括联接在一起的多个框架部件。

[0065] 另外，中间框架部 26 可以支承承架构件 52、54、56。如图 1 至图 3 所示，说明性的承架构件 52 在承架构件 53、54 的前方。更特别地，承架构件 52 分别有助于将操作者和前面的乘客保持在座椅 152、158 中。另外，承架构件 54 有助于将后面的乘客保持在座椅 164 中。后面的乘客还可以使用承架构件 53 来提供额外支承。承架构件 53 在座椅 152、158 的后方且在座椅 164 的前方，并且联接至中间框架构件 49 的相反两侧。说明性地，承架构件 53 为用于后面的乘客的握杆。

[0066] 参照图 3 和图 4，防滚架 50 包括前部段 58 和后部段 60。防滚架 50 定位在座椅区域 150 的上方并且因此定位在操作者和乘客的上方。前部段 58 说明性地包括多个纵向框架构件 62 和横梁构件 64。更具体地，横梁构件 64 可以大体垂直于纵向框架构件 62 并且例如通过焊接件、螺钉、铆接件和 / 或粘结剂传统地联接至纵向框架构件 62。说明性地，防滚架 50 的前部段 58 包括两个纵向框架构件 62A、62B 以及三个横梁构件 64A、64B、64C，然而，前部段 58 可以不限于这种布置。纵向框架构件 62A、62B 的一端可以分别在枢转点 66A、66B 处联接至前框架构件 46。另外，纵向框架构件 62A、62B 的相反端可以通过联接设备 130 以能够移除的方式联接至中间框架构件 49，如本文进一步详细所述。

[0067] 参照图 4，后部段 60 包括多个纵向框架构件 68 和横梁构件 70。示例性的横梁构件 70 大体垂直于纵向框架构件 68 并且可以例如通过诸如焊接件、铆接件、螺钉和 / 或粘结剂之类的紧固件传统地联接至纵向框架构件 68。说明性地，防滚架 50 的后部段 60 包括两个纵向框架构件 68A、68B 以及三个横梁构件 70A、70B、70C，然而，后部段 60 可以不限于这种布置。纵向框架构件 68A、68B 的一端可以分别在枢转点 72A、72B 处联接至前部段 58 的横梁构件 64C。另外，纵向框架构件 68A、68B 的相反端可以通过联接设备 130 以能够移除的方式联接至后框架构件 48，如本文进一步详细所述。

[0068] 防滚架 50 还包括多个联接设备 130 和多个枢转设备 132。具体地，各个纵向框架构件 62A、62B、68A、68B 的一端包括一个联接设备 130 并且相反端包括一个枢转设备 132。参照图 5 至图 7，说明性的联接设备 130 为可用手操作的免工具拆装的快速释放夹具。联接设备 130 包括上夹具部 134、下夹具部 136、紧固件 138、凸轮面 140、手柄 142、调节机构

144、锁定销 146 以及紧固件 148。上夹具部 134 和下夹具部 136 每者均分别包括半圆形凹部 135 和 137。当联接设备 130 处于闭合位置（即，上夹具部 134 和下夹具部 136 被带向一起）时，凹部 135、137 限定孔口 149（图 6A）以接纳中间框架构件 49 和 / 或后框架构件 48，如图 4 所示。

[0069] 参照图 5 至图 7，上夹具部 134 和下夹具部 136 通过说明性为带肩螺钉的紧固件 138 以能够枢转的方式联接在一起。上夹具部 134 固定地联接至防滚架 50，具体地通过焊接件、螺钉、粘结剂、铆接件或者其他紧固件联接至各个纵向框架构件 62A、62B、68A、68B 的一端（图 4）。相反地，下夹具部 136 构造成相对于上夹具部 134 沿顺时针方向和逆时针方向枢转或旋转。同样地，下夹具部 136 能够在打开位置与闭合位置之间绕紧固件 138 自由地枢转。

[0070] 凸轮面 140 从上夹具部 134 延伸。手柄 142 可以相对于凸轮面 140 旋转以便使联接设备 130 闭合及打开。具体地，手柄 142 以在凸轮上方 (over-cam)（即在凸轮面 140 上方）的方式旋转以便调节夹持力，如本文进一步详细所述。手柄 142 说明性地包括通过紧固件 148 联接在一起的第一侧部 142A 和第二侧部 142B。紧固件 148 分别接纳在第一侧部 142A 和第二侧部 142B 的孔口 143A、143B 内。更特别地，如图 7 所示，紧固件 148 可以为在第一端 148b 具有螺纹且在另一端 148a 没有螺纹（例如，光滑）的内六角螺钉 (socket end cap screw)。同样地，孔口 143A 可以没有螺纹使得紧固件 148 在没有任何阻碍或接合的情况下滑动通过。然而，孔口 143B 可以具有螺纹以便接合紧固件 148 的螺纹端 148b，从而将手柄 142 的第一侧部 142A 和第二侧部 142B 联接在一起。紧固件 148 的端盖 148c 接合第一侧部 142A 的肩部或阶梯部 145，以便防止紧固件 148 在手柄中过紧。

[0071] 如图 5 所示，调节机构 144 包括调节销 190、支承销 192 以及螺纹销 194。具体地，调节销 190 联接至手柄 142 以及下夹具部 136。调节销 190 包括外螺纹 196 和凹槽 198。调节销 190 接纳在螺纹销 194 的内螺纹孔口 200 内。诸如 E 形夹、C 形夹或者螺旋式外部保持环之类的保持构件 202 接纳在调节销 190 的凹槽 198 内以将调节销 190 保持在螺纹销 194 内。螺纹销 194 分别接纳在手柄 142 的第一侧部 142A 和第二侧部 142B 的孔口 204A、204B 内。说明性地，螺纹销 194 分别以摩擦的方式保留在第一侧部 142A 和第二侧部 142B 的孔口 204A、204B 中。

[0072] 调节销 190 还联接至支承销 192。更特别地，调节销 190 可以接纳在支承销 192 的孔口 208 内。调节销 190 定位在支承销 192 内以便使调节销 190 的孔口 210 与支承销 192 的孔口 212 对准。如图 5 所示，孔口 210、212 接纳圆柱销或弹簧销 214，以将调节销 190 固接在支承销 192 内。

[0073] 参照图 5，支承销 192 接纳在下夹具部 136 的孔口 206A、206B 内。与螺旋销 194 一样，支承销 192 以摩擦的方式保留在下夹具部 136 的孔口 206A、206B 内。

[0074] 手柄 142 还分别在第一侧部 142A 和第二侧部 142B 中包括孔口 216A、216B，以接纳锁定销 146。相似地，下夹具部 136 包括同样接纳锁定销 146 的孔口 218A、218B。具体地，孔口 216A 与孔口 218A 对准，并且孔口 216B 与孔口 218B 对准，从而接纳锁定销 146 的销部 147。锁定销 146 的保持部 141 在销部 147 的相对两侧之间延伸，以便将销部 147 固接至下夹具部 136 和手柄 142。

[0075] 可以无需使用工具来增大或减小调节机构 144 的夹持力以便容纳可变尺寸的后

框架构件 48 和中间框架构件 49。具体地，手柄 142 可以绕调节销 190 旋转以便调节手柄 142 相对于凸轮面 140 的位置。例如，使手柄 142 绕调节销 190 沿逆时针方向旋转（如在图 6A 至图 6D 的一者中所观察到的）可以增大手柄 142 与凸轮面 140 之间的距离，从而允许将具有较大直径的框架构件接纳在孔口 149 内。此外，相应地调节了夹持力。另外，手柄 142 绕调节销 190 顺逆时针旋转可以减小凸轮面 140 与手柄 142 之间的距离，使得孔口 149 可以容纳具有较小直径的框架构件并且可以对该具有较小直径的框架构件施加适当量的夹持力。此外，联接设备 130 的可调节性能够减小振动和震颤 (rattling) 产生的噪声，因为可以增大夹持力来使得联接设备 130 牢固地而不是松弛地配合在中间框架构件 49 和后框架构件 48 周围。

[0076] 如上文详细所述，防滚架 50 还包括枢转设备 132。参照图 4，各个纵向框架构件 62A、62B、68A、68B 包括枢转设备 132。如图 8A、图 8B 以及图 9 所示，枢转设备 132 包括框架连接器 220、至少一个衬套 222、上枢转构件 224 以及下枢转构件 226。枢转设备 132 联接至前框架构件 46 和前部段 58 的横梁构件 64C，以允许防滚架 50 的前部段 58 和后部段 60 向前枢转，从而进行对折或折叠，如本文将进一步详细所述。

[0077] 框架连接器 220 定位在前框架构件 46 和横梁构件 64C 的两个部件之间。框架连接器 220 包括本体 228、凸缘 230 以及端部 232。本体 228 和端部 232 可以具有相同的直径，然而本体 228 和端部 232 的直径说明性地小于前框架构件 46 和横梁构件 64C 的部件的直径。同样地，端部 232 可以接纳在前框架构件 46 和横梁构件 64C 的部件内，直到凸缘 230 由框架部件接合为止。框架连接器 220 可以由与前框架构件 46 和横梁构件 64C 的部件相同的材料（例如，钢）构成，并且可以传统地（例如，通过焊接件、粘结剂、铆接件、螺钉）联接至前框架构件 46 和横梁构件 64C 的所述部件。这样，框架连接器 220 形成前框架构件 46 和横梁构件 64C 的一部分。

[0078] 如图 8A、图 8B 以及图 9 所示，衬套 222 可以接纳在框架连接器 220 的本体 228 上。说明性地，存在四个衬套 222，然而，各种实施方式可以包括衬套 222 的其他布置。衬套 222 可以由聚合物材料而不是金属材料构成，以便防止前框架构件 46、横梁构件 64C 以及上枢转构件 224 和下枢转构件 226 被腐蚀。衬套 222 包括本体 234 和凸缘 236。凸缘 236 定位成邻近框架连接器 220 的凸缘 230，并且本体 234 接合框架连接器 220 的本体 228。衬套 222 可以彼此间隔开，如图 8A、图 8B 以及图 9 所示。

[0079] 参照图 8A、图 8B 以及图 9，上枢转构件 224 和下枢转构件 226 基本包围衬套 222 和框架连接器 220。上枢转构件 224 和下枢转构件 226 包括端部 238、中央部 240、通道 242 以及紧固件 248。另外，下枢转构件 226 还可以包括孔口 244 和润滑剂分配器 246，其说明性地为润滑脂加油嘴配件。说明性的上枢转构件 224 固定至各个纵向框架构件 62A、62B、68A、68B 的一端，而下枢转构件 224 分开地设置并且通过紧固件 248 联接至上枢转构件 224。说明性地，四个紧固件 248（例如，六角螺钉）可以接纳在孔口 249 中，以便将上枢转构件 224 和下枢转构件 226 联接在一起。

[0080] 如图 8A 和图 9 所示，润滑剂分配器 246 可以设置成使润滑脂或其他润滑剂流动通过通道 242，以促进上枢转构件 224 和下枢转构件 226 相对于衬套 222 枢转运动。同样地，当防滚架 50 的前部段 58 和后部段 60 向前折叠时，上枢转构件 224 和下枢转构件 226 与各个纵向框架构件 62A、62B、68A、68B 一起旋转，如本文进一步详细所述。

[0081] 通过向防滚架 50 的各个纵向框架构件 62A、62B、68A、68B 提供枢转设备 132，纵向框架构件 62A、62B、68A、68B 可以保持彼此间隔开。同样地，不需要将纵向框架构件 62A、62B 或者 68A、68B 在单个枢转设备 132 处连结。这样，防滚架 50 比在纵向框架构件 62A、62B 和 / 或纵向框架构件 68A、68B 在单个枢转设备 132 处联接在一起时可以具有更大的强度和稳定性。具体地，单个枢转设备 132 会减弱防滚架 50 的强度。防滚架 50 的其他细节可以在 2008 年 3 月 17 日提交的名称为 " METHOD AND APPARATUS RELATED TO TRANSPORTABILITYOF A VEHICLE（关于车辆的运输能力的方法和装备）" 的美国专利 No. 7,871,106（代理案号为 No. PLR-06-2019. 05P-01）中提供，该申请公开的全部内容通过参引的方式明确地并入本文。

[0082] 现在参照图 1 至图 3，驾驶室 18 还包括由仪表盘组件 36 支承的多个操作者控制件 170，并且操作者通过这些控制件 170 可以将输入操作提供给控制车辆 10。在一个实施方式中，控制件 170 包括方向盘 172 和脚踏开关（未示出）。方向盘 172 的位置是可调节的。例如，方向盘 172 可以包括诸如弹簧或者减震器之类的调节设备（未示出），用以使方向盘 172 沿基本向上的方向或基本向下的方向倾斜或旋转，以便有利于快速进入或者离开车辆 10。

[0083] 操作者控制件 170 的脚踏开关能够由操作者致动以通过发动机 274 的控制件（图 21）和制动系统（未示出）来控制车辆 10 的加速度和速度。关于操作者控制件 170 的其他细节在 2006 年 7 月 28 日提交的名称为 “SIDE-BY-SIDE ATV（并排式全地形车辆）”（代理案号为 No. PLR-06-1688. 01P）的美国专利 No. 7,819,220 中提供，该申请公开的全部内容通过参引的方式明确地并入本文。

[0084] 座椅区域 150 可以包括支承在仪表盘组件 36 上的握杆或者手柄 174。如图 1 至图 3 所示，前面的乘客在车辆 10 的运行期间可以抓住握杆 174 来增加稳定性。说明性地，如图 10 至图 12 所示，握杆 174 为具有轴 176 和手柄 178 的 T 形手柄，然而，握杆 174 可以以其他的布置进行构造。手柄 178 说明性地垂直于轴 176 并且可以覆盖有例如聚合物材料的抓握材料。握杆 174 说明性地能够沿多个方向进行调节。

[0085] 握杆 174 的轴 176 可以包括用以调节握杆 174 的位置的多个孔口 179。更具体地，轴 176 可以构造为伸缩式并且包括沿轴 176 的长度间隔开的孔口 179（图 11）。孔口 179 可以接纳销 180，以固接握杆 174 的位置。这样，握杆 174 的第一运动范围包括沿向前方向和向后方向调节握杆 174，从而适应多个不同的前面的乘客的人体工程学需要。

[0086] 另外，握杆 174 可以构造成以与方向盘 172 相同的方式旋转或者倾斜。如图 10 和图 11 所示，握杆 174 还包括调节设备 182，其说明性地为气弹簧或减震器，该调节设备 182 允许握杆 174 向上或向下倾斜。同样地，前面的乘客可以向上倾斜握杆 174 以有利于快速进入或者离开车辆 10。相似地，前面的乘客在处于车辆 10 内时可以向下倾斜握杆 174，以便在车辆 10 的运行期间容易地握住握杆 174。这样，调节设备 182 允许握杆 174 具有沿向上方向和向下方向的第二运动范围。

[0087] 参照图 10 和图 11，调节设备 182 包括缸体 184、可移动活塞杆 186、套筒 187 以及紧固件 189。控制杆（未示出）以可操作的方式联接至活塞杆 186 并且构造成选择性地阻挡流体在缸体 184 内流动。在操作中，当控制杆阻挡流体流动并且锁定杆 186 时，控制杆处于静止位置，并且因此握杆 174 处于特定位置。控制杆的起动允许流体在缸体 184 内流动，

并且因此允许调节杆 186 和握杆 174。调节设备 182 可以包括可从 Stabilus 制造商购买的自锁式气弹簧 (Bloc-O-Lift RTM gas spring)。

[0088] 调节设备 182 支承在车架 30 和握杆 174 上。具体地，调节设备 182 通过紧固件 189 联接至定位在仪表盘组件 36 下方的框架构件 74（图 1 至图 3）。倾斜臂 75 和套筒 187 可以联接至轴 176 和框架构件 74。具体地，在起动调节设备 182 时，倾斜臂 75 支承握杆 174 的运动。衬套 76、垫圈 77 以及紧固件 78、79 可以用于使倾斜臂 75 与框架构件 74 联接。如所示的，紧固件 78 可以为螺钉或其他相似的联接件，并且紧固件 79 可以为与紧固件 78 互补的螺母或者其他的联接件。

[0089] 参照图 13 至图 15，车辆 10 还包括从车架 30 侧向向外间隔开并位于脚踏板 43（图 1 至图 3）下方的踩踏板组件 250。然而，踩踏板组件 250 并未比前挡泥板 34（图 1 至图 3）向外延伸更远。同样地，踩踏板组件 250 为增大车辆 10 的宽度。踩踏板组件 250 可以联接至车架 30 和 / 或框架纵梁 28，以提高车辆 10 的整体稳定性和强度。另外，踩踏板组件 250 有利于进入和离开车辆 10，因为操作者或乘客在进入和离开车辆 10 时可以踩踏在踩踏板组件 250 上。

[0090] 踩踏板组件 250 包括踩踏板板体 252、踩踏板框架构件 254 以及支承构件 256、258。踩踏板板体 252 沿车辆 10 的纵向方向延伸，并且具体地沿着驾驶室 18 的长度延伸，这允许操作者、前面的乘客以及后面的乘客接近踩踏板组件 250。踩踏板组件 250 可以由例如钢之类的金属材料挤压制成。踩踏板板体 252 说明性地包括多个凸起的孔口 260，以在操作者或者乘客踩踏在踩踏板板体 252 上时提供牵引力。孔口 260 还允许灰尘或其他物质下落通过，这进一步有利于牵引力。

[0091] 踩踏板板体 252 可以沿着踩踏板板体 252 的内侧边缘包括唇状部 262。唇状部 262 可以接合车架 30 并且可以通过传统的紧固件（未示出）联接至车架 30。另外，踩踏板板体 252 还可以通过踩踏板框架构件 254 联接至车架 30。具体地，踩踏板板体 252 的外侧边缘可以联接至踩踏板框架构件 254，踩踏板框架构件 254 通过传统的紧固件（未示出）联接至车架 30。

[0092] 另外，踩踏板板体 252 可以通过支承构件 256、258 联接至框架 20。说明性地，各个踩踏板板体 252 包括两个支承构件 256 和一个支承构件 258，但是，可以设想替代性的实施方式。两个或更多个联接件（未示出）接纳通过支承构件 256 的狭槽 264，以便将踩踏板板体 252 联接至框架 20。相似地，四个或更多个紧固件（未示出）接纳通过支承构件 258 的狭槽 266，以便将踩踏板板体 252 联接至框架 20。

[0093] 参照图 16 至图 21，车辆 10 的货物区域 100 包括支承板 102、侧框架 104 以及后框架或后壁 106，用以储存和运输货运物品。选择性地，货物区域 100 还可以包括联接至侧框架 104 的侧壁 108。货物区域 100 支承在车辆 10 上且支承在后部乘客座椅 164 的后方。后框架构件 48 可以通过传统的紧固件 110 以能够移除的方式联接至侧框架 104。侧框架 104 说明性地为 U 形并且可以包括联接在一起用以限定侧框架 104 的多个框架构件。侧壁 108 通过传统的紧固件 112 联接至侧框架 104。

[0094] 支承板 102 在侧框架 104 之间和在后框架构件 48 与后框架 106 之间延伸。货运物品可以支承在支承板 102 上并且通过侧壁 108 和后框架 106 保持在货物区域 100 内。另外，支承板 102 包括用于固接货物的多个附接构件。更特别地，附接构件可以包括纵梁 114

和系缚杆 116。纵梁 114 可以接纳在支承板 102 的内凹通道 115 内。例如螺栓、钩或闩锁之类的紧固件可以以能够滑动的方式接纳在纵梁 114 内，从而向用于将货物固接在货物区域 100 内的弹力绳、带、弦、线缆或者其他类似设备提供联接面。类似地，弦、线缆、带或者弹力绳可固接至系缚杆 116 上，以同样地将货物保持在货物区域 100 内。另外，纵梁 114 和系缚杆 116 可以用于诸如车辆 10 的运输之类的其他应用。

[0095] 如图 16 和图 17 所示，后框架 106 说明性地为可枢转的后挡板，其构造成与弦、线缆、弹力绳或者带联接以固接货物。后框架 106 包括定位在水平延伸的框架构件 119 之间的竖直附接构件 118。竖直附接构件 118 具有可以接纳弦、线缆、弹力绳或者带的多个孔口 120。弦、线缆、弹力绳或者带的另一端随之可用于将货物保持在货物区域 100 中或者可用于其他的应用。如所示，后框架 106 处于闩锁位置，其中，联接机构 122 将后框架 106 固接至侧框架 104。钢缆 124 可以用于使后框架 106 降低至解闩位置。通过分离联接机构 122，后框架 106 可以枢转至解闩位置并且通过线缆 124 保持在解闩位置。

[0096] 货物区域 100 还可以构造成支承车辆 10 的进气系统 270 的一部分。具体地，进气系统 270 以可操作的方式联接至动力传动系组件 16，并且具体地联接至 CVT 272 和发动机 274。如图 16 和图 21 所示，进气部 276 定位在车辆 10 的操作者一侧并且以可操作的方式联接至发动机 274。进气部 276 由可以联接至货物区域 100 的侧壁 108 和支承板 102 的壳体 280 包围。盖 282 可以固接至侧壁 108 以遮蔽进气部 276 的开口。相似地，进气部 278 定位在车辆 10 的相反侧并且以可操作的方式联接至 CVT 272。进气部 278 由可以联接至侧壁 108 和支承板 102 的壳体 284 包围。进气部 278 也可以包括盖 286，其用以遮蔽进气部 278 的开口。盖 286 可以联接至侧壁 108。进气系统 270 的其他细节可以在 2010 年 8 月 3 日提交的名称为“SIDE-BY-SIDE VEHICLE（并排式车辆）”（代理案号为 PLR-06-24357.01P）的美国专利申请公开 No. 2012/0031693 中提供，该申请的全部公开内容通过参引的方式明确地并入本文。

[0097] 替代性地，如图 22A 和 22B 所示，车辆 10 可以包括货物区域 500。图 22A 和 22B 的货物区域 500 与图 1 至图 3 以及图 16 至图 21 的货物区域 100 相似，其中，除了下文详细所述的细节外，相似的附图标记表示具有相似结构和相似功能的相似部件。具体地，货物区域 500 包括支承板 502、侧框架 504 以及后框架 106（图 21）。货物区域 500 在支承板 502 上包括多个联接位置，其说明性地为系缚杆 508 和孔口 510。具体地，系缚杆 508 可以基本定位在货物区域 500 的前方和后框架构件 48 的下方。另外，系缚杆 508 可以基本定位在靠近后框架 106 的货物区域 500 的后方，并且沿着支承板 502 的中间部分定位。

[0098] 孔口 510 说明性地从侧壁 504 向内定位，然而孔口 510 可以位于支承板 502 上的任何位置。孔口 510 可以构造成接纳诸如螺钉、钩以及闩锁之类的传统紧固件，以便将货物保持在货物区域 500 内。此外，孔口 510 可以用于将纵梁 114（图 21）固接至支承板 502。具体地，诸如螺钉之类的紧固件可以接纳通过纵梁 114 中的孔口（未示出）并且接纳通过支承板 502 中的孔口 510，以便将纵梁 114 固接至支承板 502。同样地，纵梁 114 可以联接至支承板 502 的顶部表面并且可以移动或者调节纵梁 114 的位置来容纳特定的货物。这样，操作者可以将纵梁定位在支承板 502 上的期望的位置。

[0099] 参照图 22A，进气系统 270 可以联接至侧壁 504。进气部 276 由壳体 280 包围，壳体 280 可以联接至货物区域 500 的侧壁 504 和支承板 502。说明性地，侧壁 504 包括接纳进

气部 276 的凹入部 512。盖 282 可以固接至侧壁 504 的凹入部 512 以遮蔽进气部 276 的开口，从而防止砂石和其他的颗粒物质或者碎屑进入进气部 276。相似地，进气部 278 由壳体 284 包围，壳体 284 可以联接至侧壁 504 和支承板 502。说明性地，侧壁 504 包括接纳进气部 278 的与凹入部 512 相似的凹入部（未示出）。进气部 278 的盖 286（图 17）可以固接至侧壁 504 的凹入部以遮蔽进气部 278 的孔口，从而防止砂石和其他的颗粒物质或者碎屑进入进气部 278。

[0100] 在车辆 10 的运行或者运输期间，可以调节防滚架 50 的高度以允许车辆 10 进入诸如飞行器之类的受限的空间或者用于通过降落伞或者直升机进行运输。具体地，如本文详细所述，防滚架 50 可以对折或折叠以便减小车辆 10 的高度。

[0101] 参照图 23 和图 24，防滚架 50 可以从升高位置旋转至降低位置。当处于升高位置时，防滚架 50 定位在座椅区域 150 的上方并且联接至后框架构件 48 和中间框架构件 49。相反地，当处于降低位置时，防滚架 50 向前折叠并且固接至车辆 10 的发动机盖 32。更特别地，联接设备 130 和枢转设备 132 相配合以将防滚架 50 的前部段 58 和后部段 60 从中间框架构件 49 和后框架构件 48 释放。

[0102] 如图 6B 至图 6D 所示，操作者可以无需使用工具将锁定销 146 从手柄 142 移除。之后，手柄 142 可以向上旋转并且与凸轮面 140 分离，从而释放夹持力。当手柄 142 从凸轮面 140 释放时，下夹具部 136 可以远离上夹具部 134 旋转，这还使后框架构件 48 和中间框架构件 49 与联接设备 130 断开联接，如图 23 和图 24 所示。这样，防滚架 50 的前部段 58 和后部段 60 能够分别绕枢转点 66A、66B 和 72A、72B 自由地枢转。如本文中所说明的，夹具能够由手操作而无需使用工具。

[0103] 当联接设备 130 从中间框架构件 49 和后框架构件 48 释放时，手向上提升了防滚架 50 的前部段 58，从而也提升了后部段 60。同样地，后部段 60 能够在枢转点 72A、72B 处绕枢转设备 132 沿顺时针方向枢转。更特别地，上枢转构件 224 和下枢转构件 226 绕衬套 222（图 9）枢转，使得后部段 60 可以折叠或者对折到前部段 58 下方。然而，后部段 60 通过枢转设备 132 和横梁构件 64C 仍然联接至前部段 58。当后部段 60 定位在前部段 58 下方时，带、线带、弹力绳、线缆、弦或者其他的柔性部件（未示出）可以用于将后部段 60 固接至前部段 58。另外，纵向框架构件 68A、68B 可以包括多个聚合物防撞器 300（图 23），用以防止纵向框架构件 62A、62B、68A、68B 受到损坏。

[0104] 当后部段 60 联接至前部段 58 时，前部段 58 可以绕枢转设备 132 沿逆时针方向旋转或枢转，其中，枢转设备 132 在枢转点 66A、66B 处联接至前框架构件 46。具体地，上枢转构件 224 和下枢转构件 226 可以相对于衬套 222（图 9）枢转，以便使前部段 58 和后部段 60 朝向发动机盖 32 枢转。当前部段 58 和后部段 60 两者均在降低位置处支承在发动机盖 32 上时，带、线缆、弹力绳或者类似的柔性部件（未示出）可以用于将防滚架 50 固接至前保险杠 44、发动机盖 32 或者前挡泥板 34。同样地，当防滚架 50 处于降低位置时，车辆 10 的高度减小。防滚架 50 的对折或者折叠过程无需工具（例如，是免工具拆装的）并且可以由手完成。

[0105] 如本文中详细所述，包括前部段 58 和后部段 60 的防滚架 50 通过复合运动朝向发动机盖 32 在向前方向上枢转而不是朝向货物区域 100 在向后方向上枢转。前部段 58 和后部段 60 两者保持联接在一起并且因此两者均在向前方向上折叠。同样地，货物区域 100 保

持打开并且可用于储存和支承货运物品。另外，可能优选的是，在防滚架 50 的后部段 60 向前折叠并且储存在降低位置之后将后框架构件 48 移除。将紧固件 110 从后框架构件 48 和货物区域 100 的侧框架 104 移除，以便将后框架构件 48 从货物区域 100 的侧框架 104 移除。

[0106] 参照图 25 至图 31，车辆 10’可以替代性地仅包括操作者座椅 152 和前部乘客座椅 158，从而容纳至多两个人而不是至多四个人，如先前所述。图 25 至图 31 的车辆 10’包括的特征与图 1 至图 24 的车辆 10 的特征相似，其中，除了以下所述的以外，相似的附图标记指示具有相似的功能和结构的相似的元件。

[0107] 参照图 25 至图 27，车辆 10’包括由车架 30’和框架 20’支承的座椅区域 150’，并且该座椅区域 150’包括呈并排式布置的操作者座椅 152 和乘客座椅 158。承架构件 52’可以联接至车架 30’和货物区域 100 的侧框架 104，或者替代性地联接至货物区域 500 的侧壁 504（图 22A 和 22B），并且定位成与操作者座椅 152 和乘客座椅 158 相邻，以将操作者和 / 或乘客保持在车辆 10’内。车辆 10’还包括防滚架 50’，该防滚架 50’联接至框架 20’并且与座椅区域 150’相配合以限定车辆 10’的驾驶室 18’。

[0108] 参照图 27，框架 20’包括前框架部 22 和后框架部 24。前框架部 22 说明性地包括定位在座椅区域 150’前方的前框架构件 46。前框架构件 46 可以联接至车架 30’和 / 或框架 20’的其他部件，例如框架纵梁（未示出）。前框架构件 46 可以支承挡风玻璃（未示出）。如图 24 和图 25 所示，后框架部 24 说明性地包括后框架构件 48，该后框架构件 48 可以以能够移除的方式联接至货物区域 100。后框架构件 48 在座椅区域 150’的后方。

[0109] 参照图 27 至图 29，防滚架 50’定位在座椅区域 150’上方并且因此在操作者和乘客的上方。防滚架 50’说明性地包括纵向框架构件 62 和横梁构件 64。更具体地，横梁构件 64 可以大体垂直于纵向框架构件 62 并且例如通过焊接件、螺钉、铆接件和 / 或粘结剂传统地联接至纵向框架构件 62。说明性地，防滚架 50’包括两个纵向框架构件 62A、62B 以及三个横梁构件 64A、64B、64C，然而，防滚架 50’并不限于该布置。纵向框架构件 62A、62B 的一端可以分别在枢转点 66A、66B 处联接至前框架构件 46。另外，纵向框架构件 62A、62B 的相反端可以通过联接设备 130 以能够移除的方式联接至后框架构件 48，如本文进一步详细所述。

[0110] 防滚架 50’还包括联接设备 130 和枢转设备 132。具体地，各个纵向框架构件 62A、62B 的一端包括联接设备 130 并且相反端包括枢转设备 132。如上文详细所述，联接设备 130 接纳后框架构件 48，如图 25、图 26 以及图 29 所示。

[0111] 防滚架 50’还包括枢转设备 132。参照图 8A 和图 9，各个纵向框架构件 62A、62B 包括一个枢转设备 132，该一个枢转设备 132 具有框架连接器 220、至少一个衬套 222、上枢转构件 224 以及下枢转构件 226。枢转设备 132 联接至前框架构件 46 以允许防滚架 50’向前枢转。

[0112] 框架连接器 220 定位在前框架构件 46 的两个部件之间，并且包括本体 228、凸缘 230 以及端部 232。端部 232 可以接纳在前框架构件 46 的部件内，直到凸缘 230 由框架部件接合。框架连接器 220 可以由与前框架构件 46 的部件相同的材料（例如，钢）构成，并且可以通过焊接件、粘结剂、铆接件和 / 或螺钉传统地联接至前框架构件 46。这样，框架连接器 220 形成前框架构件 46 的一部分。

[0113] 如图 9 所示并且参照枢转设备 132，一层润滑剂可以在上枢转构件 224 和下枢转构

件 226 与衬套 222 之间流动通过通道 242。同样地，上枢转构件 224 和下枢转构件 226 允许防滚架 50’向前枢转。更特别地，上枢转构件 224 和下枢转构件 226 相对于衬套 222 旋转，以便使防滚架 50’折叠 / 对折。

[0114] 参照图 25 至图 29，通过向枢转防滚架 50’的各个纵向框架构件 62A、62B 提供一个枢转设备 132，纵向框架构件 62A、62B 可以保持彼此间隔开。同样地，不需要将纵向框架构件 62A、62B 在单个枢转点处连结。这样，防滚架 50’比在纵向框架构件 62A、62B 在单个枢转设备 132 处联接在一起时可以具有更大的强度和稳定性。具体地，单个枢转设备 132 可以减弱防滚架 50’的强度。

[0115] 现在参照图 29，车辆 10’还包括从车架 30’侧向向外隔开并且在脚踏板 43’下方的踩踏板组件 250’。踩踏板组件 250’可以联接至车架 30’和 / 或框架纵梁 28’，以提高车辆 10’的整体稳定性和强度。另外，踩踏板组件 250’有利于进入和离开车辆 10’，因为操作者和乘客在进入和离开车辆 10’时可以踩踏在踩踏板组件 250’上。

[0116] 踩踏板组件 250’包括踩踏板板体 252’、踩踏板框架构件 254’以及支承构件 258’。踩踏板板体 252’沿车辆 10’的纵向方向延伸，并且具体地沿着驾驶室 18’的长度延伸，这允许操作者以及乘客接近踩踏板组件 250’。踩踏板板体 252’说明性地包括多个凸起的孔口 260，以在操作者或者乘客踩踏在踩踏板板体 252’上时提供牵引力。孔口 260 还允许灰尘或其他物质下落通过，这同样有利于牵引力。

[0117] 踩踏板板体 252’可以通过支承构件 258 联接至框架 20’。说明性地，各个踩踏板板体 252’包括一个支承构件 258，但是可以设想替代性的实施方式。四个或更多个紧固件（未示出）接纳通过支承构件 258 的狭槽 266，以便将踩踏板板体 252’联接至框架 20’。

[0118] 在车辆 10’的运行或者运输期间，可以调节防滚架 50’的高度以允许车辆 10’进入诸如飞行器之类的受限的空间或者用于通过降落伞或者直升机进行运输。具体地，如本文详细所述，防滚架 50’可以对折或折叠以便减小车辆 10’的高度。

[0119] 参照图 30 和图 31，防滚架 50’可以从升高位置旋转至降低位置，其中，防滚架 50’固接至车辆 10’的发动机盖 32。更特别地，联接设备 130 和枢转设备 132 相配合以将防滚架 50’从后框架构件 48’释放。

[0120] 如图 6D 所示，锁定销 146 可以通过手从手柄 142 移除以允许手柄 142 向上旋转。同样地，手柄 142 与凸轮面 140 分离，并且释放了夹持力。当手柄 142 从凸轮面 140 释放时，下夹具部 136 可以远离上夹具部 134 旋转，这还将后框架构件 48 从联接设备 130 释放。这样，防滚架 50’能够绕枢转点 66A、66B 自由地枢转，如图 30 和图 31 所示。

[0121] 当联接设备 130 从后框架构件 48 释放时，防滚架 50’绕枢转设备 132 沿逆时针方向枢转，其中，该枢转设备 132 在枢转点 66A、66B 处联接至前框架构件 46。具体地，上枢转构件 224 和下枢转构件 226 可以相对于衬套 222 旋转，以便使防滚架 50’朝向发动机盖 32 枢转。当防滚架 50’支承在降低位置时，带、线缆、弹力绳或者类似的柔性部件（未示出）可以用于将防滚架 50’固接至前保险杠 44、发动机盖 32 或者前挡泥板 34。同样地，当防滚架 50’处于降低位置时，车辆 10’的高度减小。

[0122] 如本文中先前详细所述，防滚架 50’朝向发动机盖 32 在向前方向上枢转而不是朝向货物区域 100 或货物区域 500 在向后方向上枢转。同样地，货物区域保持打开并且可用于储存或者支承货运物品。另外，可能优选的是，在防滚架 50’向前折叠并且储存在降低位

置之后将后框架构件 48 移除。紧固件 110 可以从后框架构件 48 和货物区域 100 的侧框架 104 移除，以便将后框架构件 48 从货物区域 100 的侧框架 104 移除。

[0123] 参照图 32 至图 38，车辆 10 的替代性实施方式示出为车辆 10”并且包括与图 1 至图 24 的车辆 10’的特征相似的特征，其中，除了以下所述的细节外，相似的附图标记指示具有相似的功能和结构的相似的元件。车辆 10”包括支承在前车轮 12 和后车轮 14 上的框架组件 20”、车架 30”、防滚架 50 以及货物区域 100”。框架 20”支承前防撞器组件 400、后防撞器组件 440 以及侧承载构件 430、436。

[0124] 如图 34 所示，前防撞器组件 400 联接至框架组件 20”的前框架部 22’并且包括上框架构件 402、内框架构件 420 以及外框架构件 422。框架构件 402、420 以及 422 可以彼此一体形成或可以通过传统的紧固件（例如，螺钉、焊接件、铆接件、粘结剂）相互联接。另外，通过将前防撞器组件 400 联接至前框架部 22”，如本文中详细所述，前防撞器组件 400 可以提高框架组件 20”的强度和稳定性。外框架构件 422 通过支架构件 404 相互联接。多个托架 406 可以支承在外框架构件 422 和 / 或支架构件 404 上并且联接至前框架部 22”的凸缘 414。更特别地，紧固件 408 可以接纳通过凸缘 414 的孔口 416，以便将托架 406 联接至凸缘 414。

[0125] 支架构件 404 还联接至前框架部 22”的前板 410。传统的紧固件可以接纳通过前板 410 的孔口 412，以便将前防撞器组件 400 联接至前板 410。另外，支架构件 404 可以联接至内框架构件 420。说明性地，内框架构件 420 支承防护构件 424。防护构件 424 可以通过紧固件 426 联接至内框架构件 420。内框架构件 420 还附接至托架 423，该托架 423 通过紧固件 425 与前框架部 22”相联接。

[0126] 如图 34 所示，前防撞器组件 400 还可以包括附件。例如，前防撞器组件 400 可以包括说明性地为接收器托钩 (receiver hitch)428 的拖挂构件 (towing member) 以及支承在支架构件 404 下方的闩锁 418。在一个实施方式中，闩锁 418 固定至车辆 10”并且在运输期间用作用于联接车辆 10”的系缚构件。例如，闩锁 418 可以在运输期间将车辆 10”固接至飞行器。接收器托钩 428 可以构造成用于钩挂多座架的绞盘组件和 / 或用于与多座架的绞盘组件一起使用。

[0127] 前框架部 22”还支承侧承载构件 430。说明性地，车辆 10”包括定位在前防撞器组件 400 后方的两个相对的侧承载构件 430。侧承载构件 430 联接至前框架部 22”的托架 434 并且从托架 434 侧向向外延伸且延伸通过车架 30”的前挡泥板 34”中的开口 431。侧承载构件 430 包括用于联接至多种货物和 / 或运输装置的孔口 432。在一个示例性实施方式中，示例性的孔口 432 构造成接纳线缆、钩、闩锁、绳、线或者其他类似的物体，以便将车辆 10”联接至降落伞、直升机、飞行器载体或者用于运输车辆 10”的其他运输装置。可以使用侧承载构件 430 的其他构型。

[0128] 相似地，如图 33 和图 35 所示，框架组件 20”的后框架部 24”支承另外的侧承载构件 436。说明性地，车辆 10”包括定位在后防撞器组件 440 的前方的两个相对的侧承载构件 436。侧承载构件 436 联接至后框架部 24”的托架 468 并且从托架 468 侧向向外延伸且延伸通过车架 30”的侧板 38”的后部部分中的开口 437。侧承载构件 436 包括用于联接至多种货物和 / 或运输装置的孔口 438。在一个示例性实施方式中，示例性的孔口 438 构造成接纳线缆、钩、闩锁、绳、线或者其他类似的物体，以便将车辆 10”联接至降落伞、直升机、飞行

器载体或者用于运输车辆 10”的其他运输装置。可以使用侧承载构件 436 的其他构型。

[0129] 后框架部 24”还支承后防撞器组件 440，如图 35 所示。后防撞器组件 440 包括上框架构件 442、侧向延伸的框架构件 448、下部内侧框架构件 444 以及下外部侧框架构件 446。后防撞器组件 440 的框架构件 442、444、446 以及 448 可以彼此一体形成或可以通过传统的紧固件（例如，焊接件、螺钉、铆接件和 / 或粘结剂）相互联接。另外，通过将后防撞器组件 440 联接至后框架部 24”，如本文中详细所述，后防撞器组件 440 可以提高框架组件 20”的强度和稳定性。下部内侧框架构件 444 以及下部外侧框架构件 446 在侧向延伸的框架构件 448 与支架 451 之间延伸。另外，支架 450 可以在下部内侧框架构件 444 之间延伸。具有后板 454 和下板 456 的托架可以用于将后防撞器组件 440 联接至后框架部 24”。更特别地，紧固件 458 可以用于将后防撞器组件 440 联接至后框架部 24”的后支承构件 462。同样地，后防撞器组件 440 基本支承在车架 30”的后部中央面板 464 和后部外侧面板 466 的下方。

[0130] 如图 36 所示，后防撞器组件 440 还可以包括附件。例如，后防撞器组件 440 可以包括说明性地为接收器托钩 452 的拖挂构件以及支承在支架 451 上的闩锁 460。在一个实施方式中，闩锁 460 固定至车辆 10”并且在运输期间用作用于联接车辆 10”的系缚构件。接收器托钩 452 可以构造成用于钩挂多座架的绞盘组件和 / 或与多座架的绞盘组件一起使用。

[0131] 现在参照图 35 至图 37，后框架部 24”还支承货物区域 100”。货物区域 100”基本与图 1 至图 3 的货物区域 100 以及图 22A 和图 22B 的货物区域 500 相同，其中，除了以下所述外，相似的附图标记指示相似的部件。货物区域 100”包括支承板 502、侧框架 104”、侧壁 108”以及后框架 106”。货物区域 100”在支承板 502 上还包括多个联接位置，其说明性地为系缚杆 508 和孔口 510。孔口 510 可以构造成接纳诸如螺钉、钩以及闩锁之类的传统紧固件，以便将货物保持在货物区域 500 内。此外，孔口 510 可以用于将纵梁 114（图 21）固接至支承板 502，如本文中详细所述，以允许操作者将纵梁 114 定位在支承板 502 上的期望的位置。在一个实施方式中，支承板 502 包括还含有孔口 510 的可移除的盖 470。可移除的盖 470 遮蔽动力传动系组件 16 并且可以移除以便允许接近动力传动系组件 16。

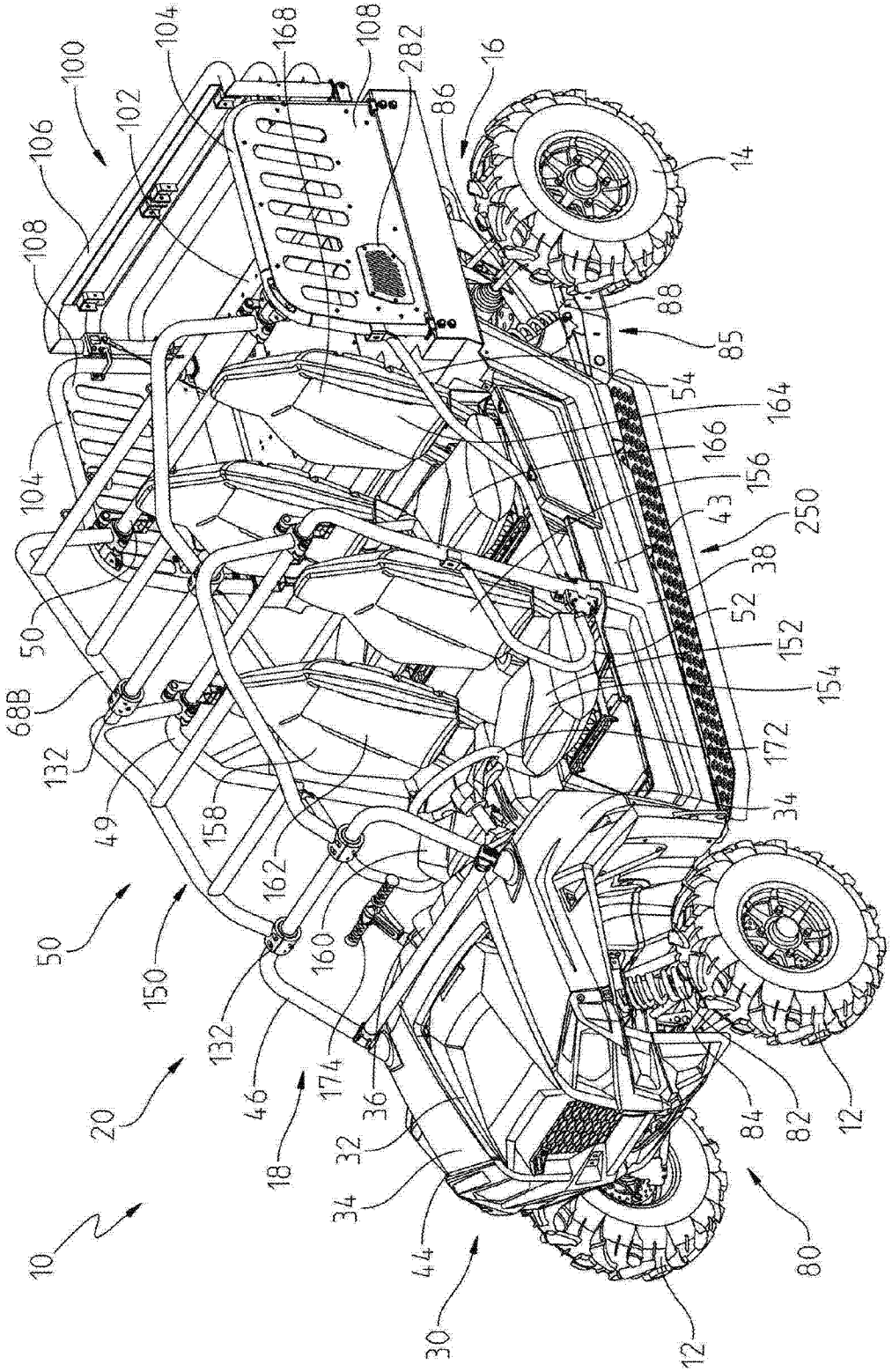
[0132] 在一个实施方式中，货物区域 100”的后框架 106”为构造成在闭合或闩锁位置与打开或解闩位置之间枢转的可移动的后挡板。如图 36 所示，后框架 106”包括基本彼此平行的横梁构件 472。横梁构件 472 包括多个孔口 474，从而允许另外的部件、附件、货物和 / 或运输装置联接至车辆 10”。另外，孔口 474 减小了后框架 106”的重量，因此减小了车辆 10”的重量。

[0133] 侧壁 108”基本定位在后框架 106”的前方并且联接至侧框架 104”和支架 476。支架 476 与侧壁 108”和侧框架 104”间隔开并且包括孔口 478。支架 476 可以焊接至侧框架 104”。孔口 478 允许另外的部件、附件、货物和 / 或运输装置联接至车辆 10”。更特别地，附件、货物和 / 或运输系缚构件可以通过闩锁、钩、线、绳、线缆或者其他的紧固件联接至侧框架 104”并且进一步固接至支架 476。另外，孔口 478 减小了货物区域 100”的重量，因此减小了车辆 10”的重量。

[0134] 侧框架 104”还可以联接至承架杆 480，如图 38 所示。承架杆 480 从货物区域 100”延伸至前框架部 22”，以便进一步支承车辆 10”内的乘客和操作者。说明性的承架杆 480 是通过侧框架 104”上的托架 490 和承架杆 480 上的突片 488 联接至侧框架 104”的单个部件。

承架杆 480 还通过紧固件 486 联接至中间框架构件 49 并且还可以通过中间框架构件 49 上的托架 484 和承架杆 480 上的突片 482 进一步固接至中间框架构件 49。

[0135] 尽管本发明已被描述为具有示例性设计，但是可以在本公开的精神和范围内对本发明作进一步改型。因此，本申请意在通过使用其一般原理覆盖本发明的任何变型、用途或适应性改型。另外，本申请意在包涵背离本公开内容的、落入在本发明所涉及的领域中已知或惯常实践的范围内的方案。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43
250
38
52
152
154
172
34
158
162
160
174
36
32
34
44
30
12
80
84
82
12
18
46
132
150
50
20
10
49
132
68B
50
104
108

图 1

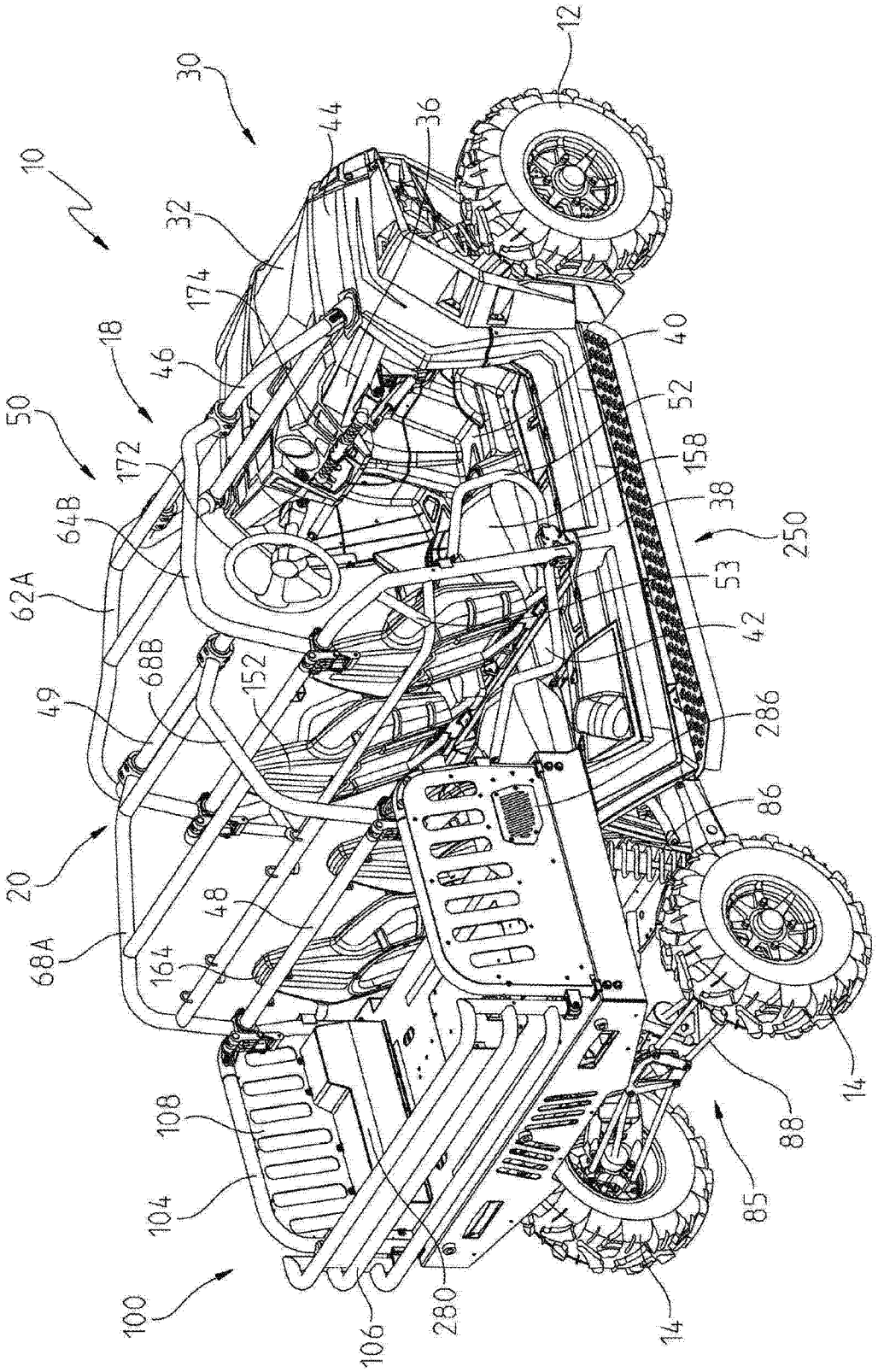

12
30
44
36
10
32
174
18
46
40
50
52
172
158
64B
38
250
62A
53
42
68B
152
49
286
86
20
48
68A
164
108
104
88
85
14
100
106
280
14

图 2

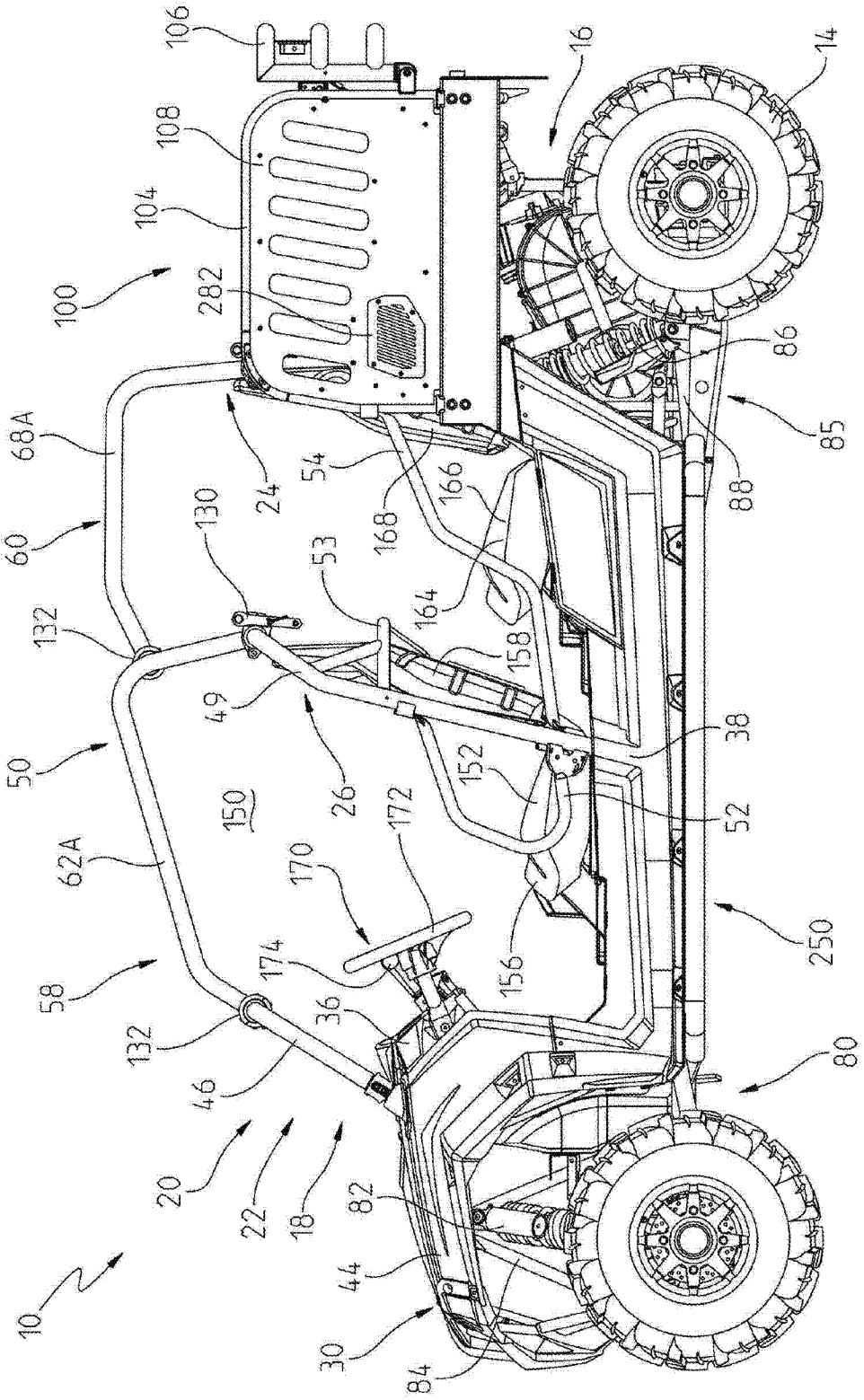

106
108
104
100
282
16
14
86
85
88
68A
60
24
54
166
168
130
53
164
132
158
49
38
50
26
152
150
172
52
62A
170
250
174
156
58
36
80
132
46
20
22
18
82
44
10
30
84

图 3

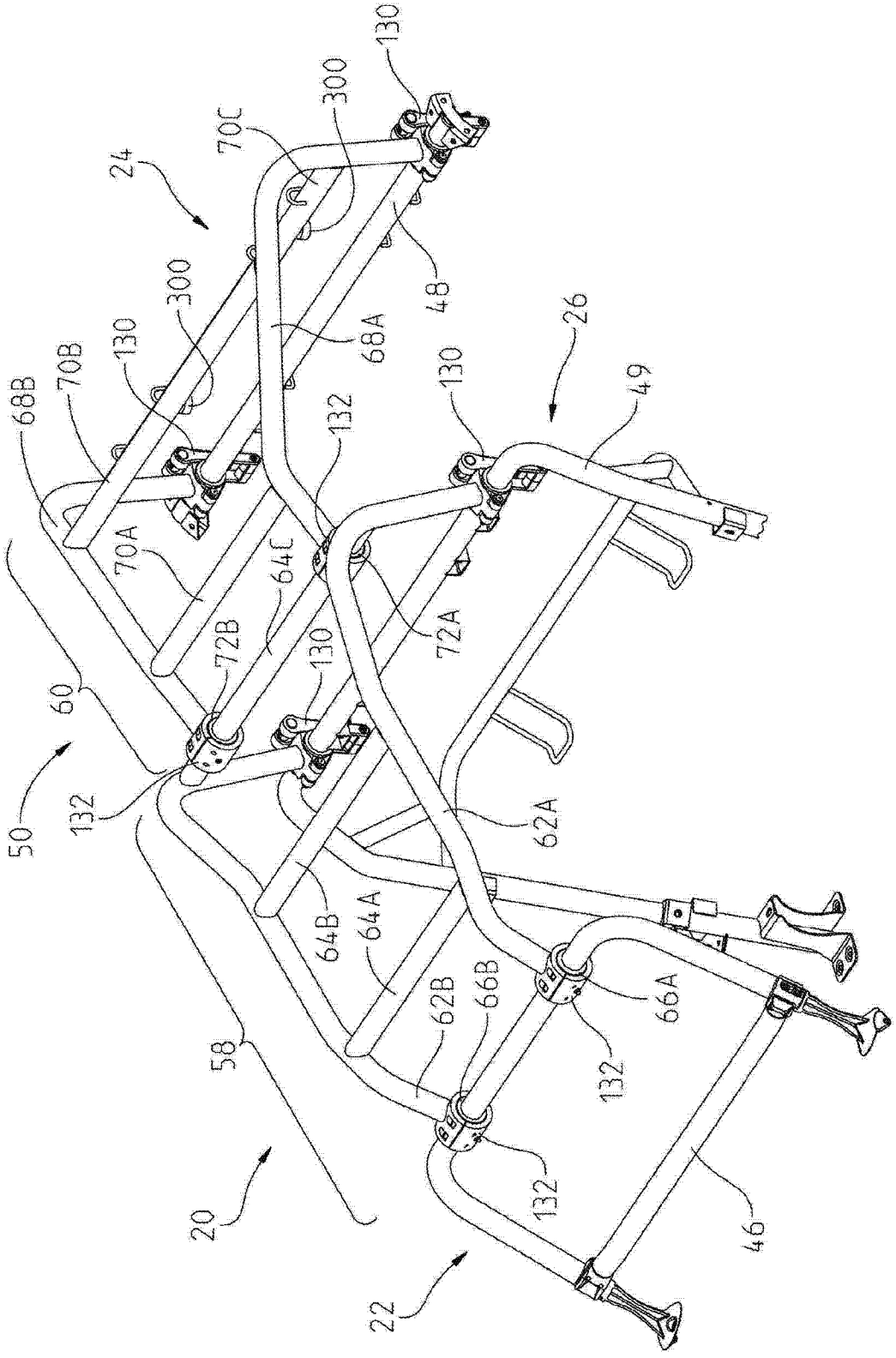

130
300
70C
24
48
68A
26
49
300
130
70B
68B
132
130
70A
64C
72A
72B
130
60
50
132
62A
64B
64A
62B
66B
66A
58
132
132
20
46
22

图 4

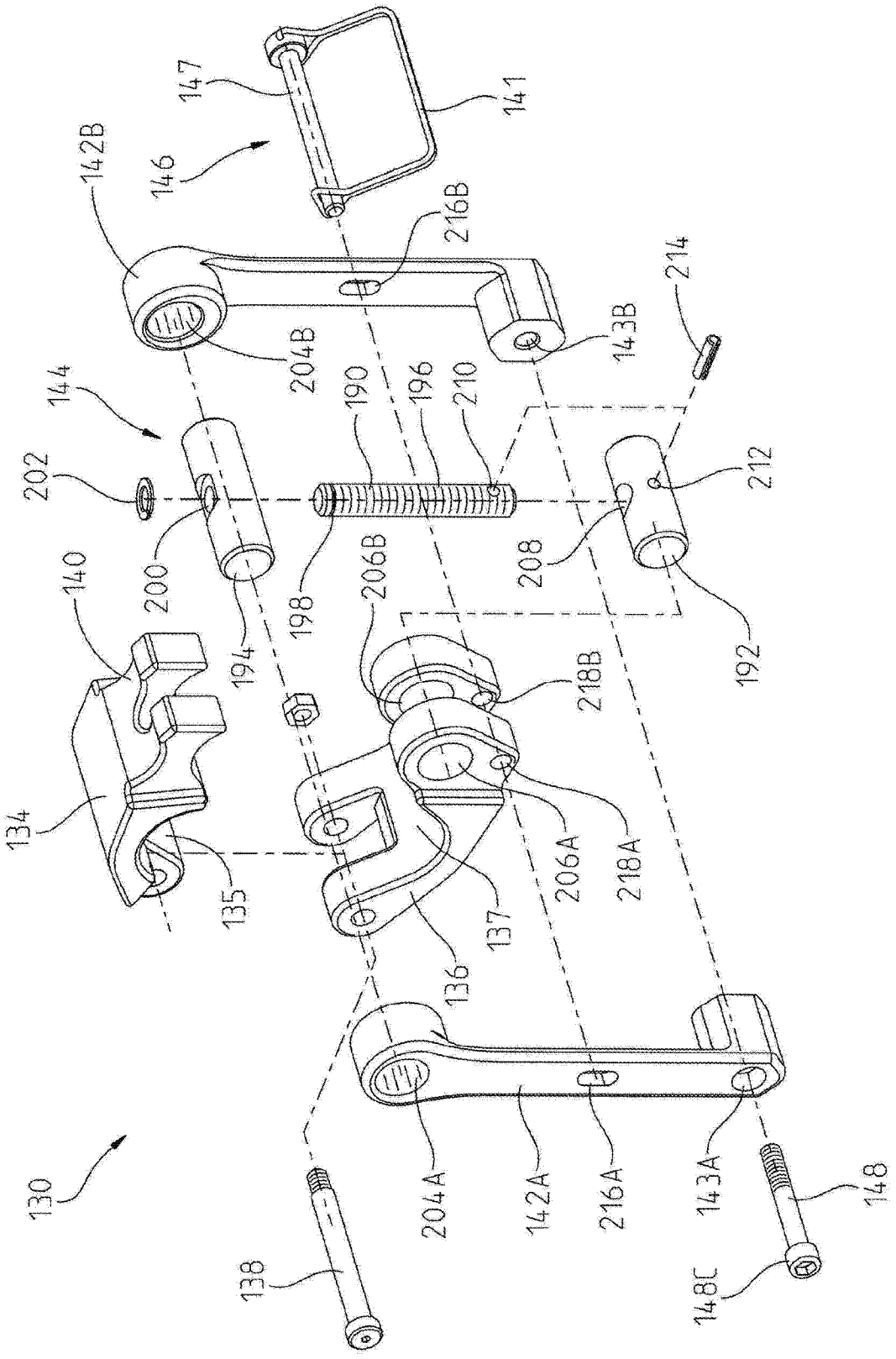
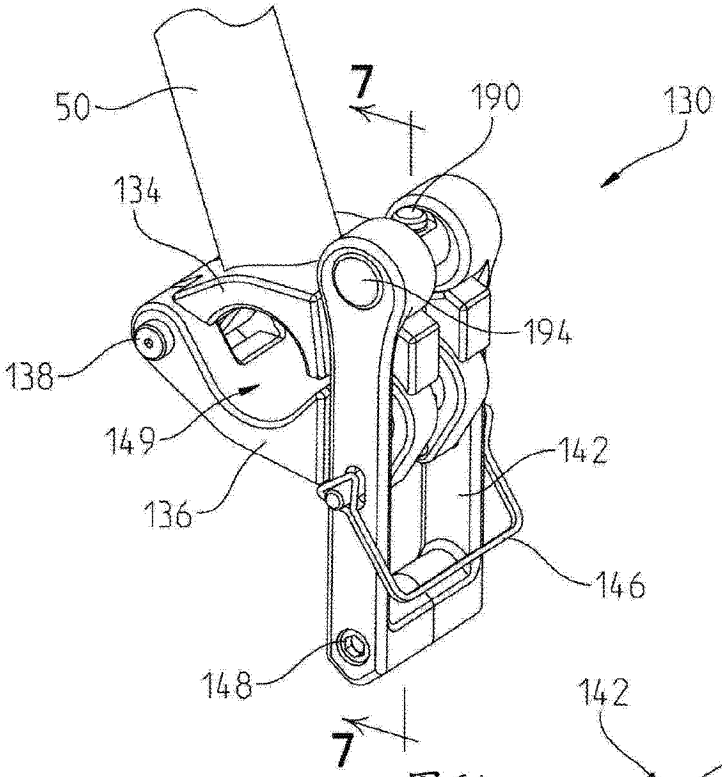

147
141
146
142B
216B
214
204B
143B
144
190
196
210
202
212
200
208
206B
140
198
194
192
218B
134
206A
218A
135
137
136
130
204A
142A
216A
143A
148
138
148C

图 5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7
190
130
134
194
138
149
142
136
146
148
7

图 6A

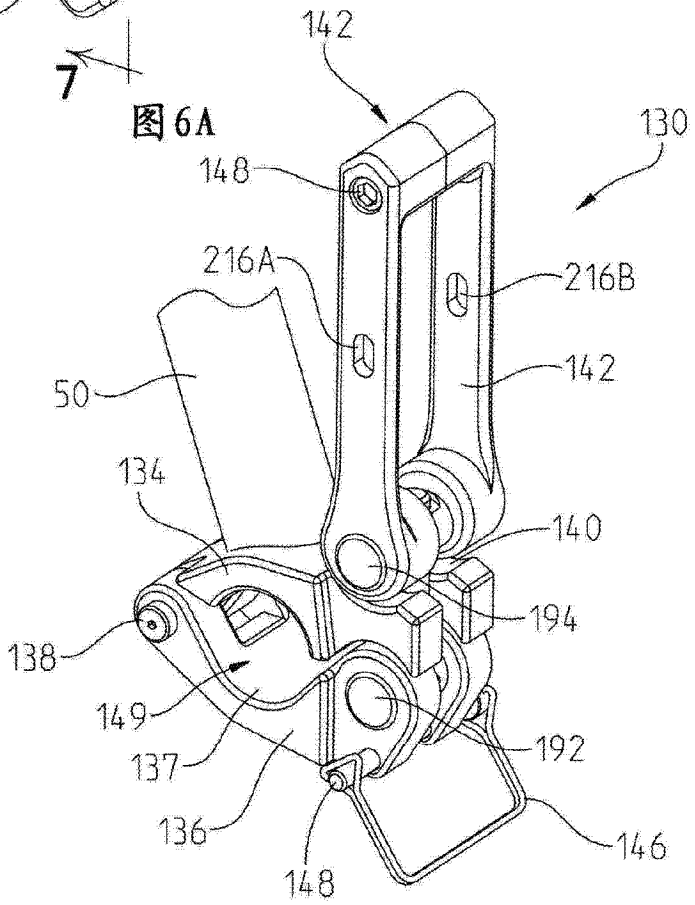

142
130
148
216A
216B
50
142
134
140
194
138
149
192
137
136
146
148

图 6B

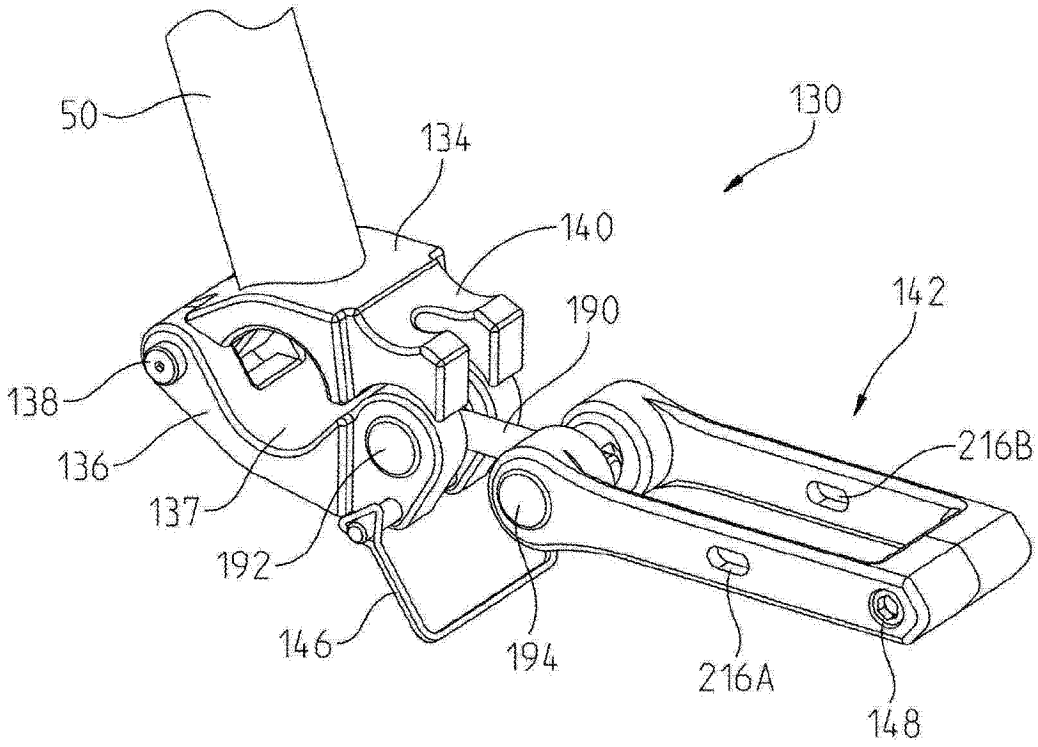


图 6C

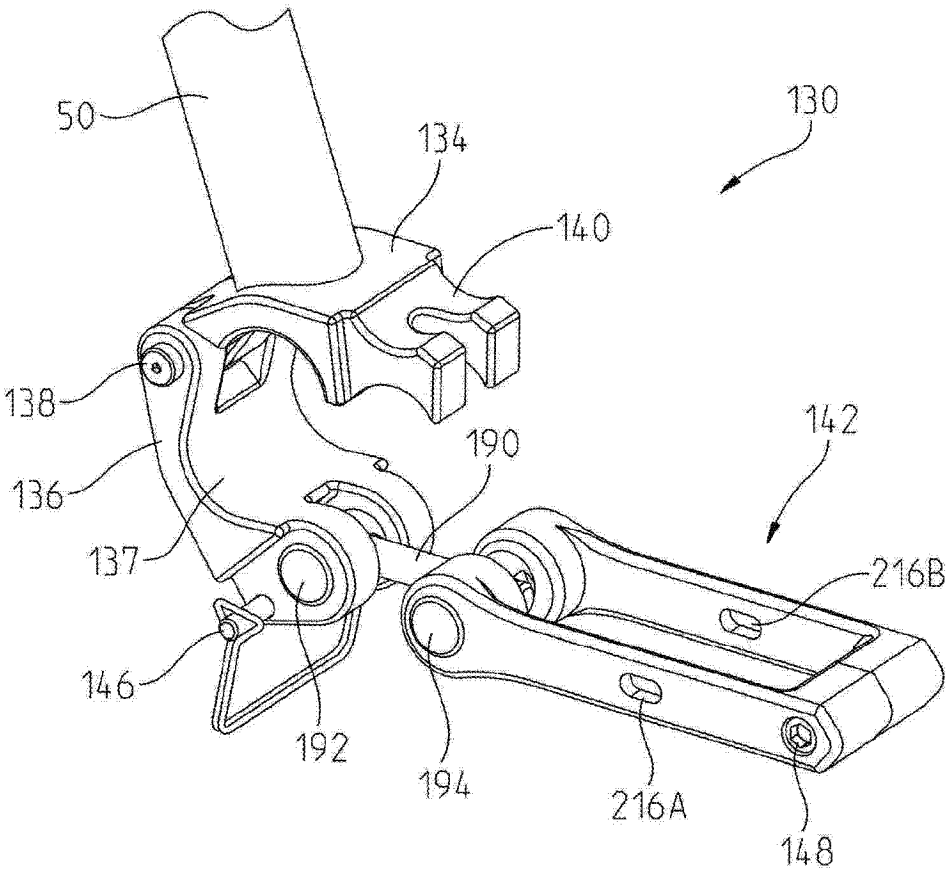


图 6D

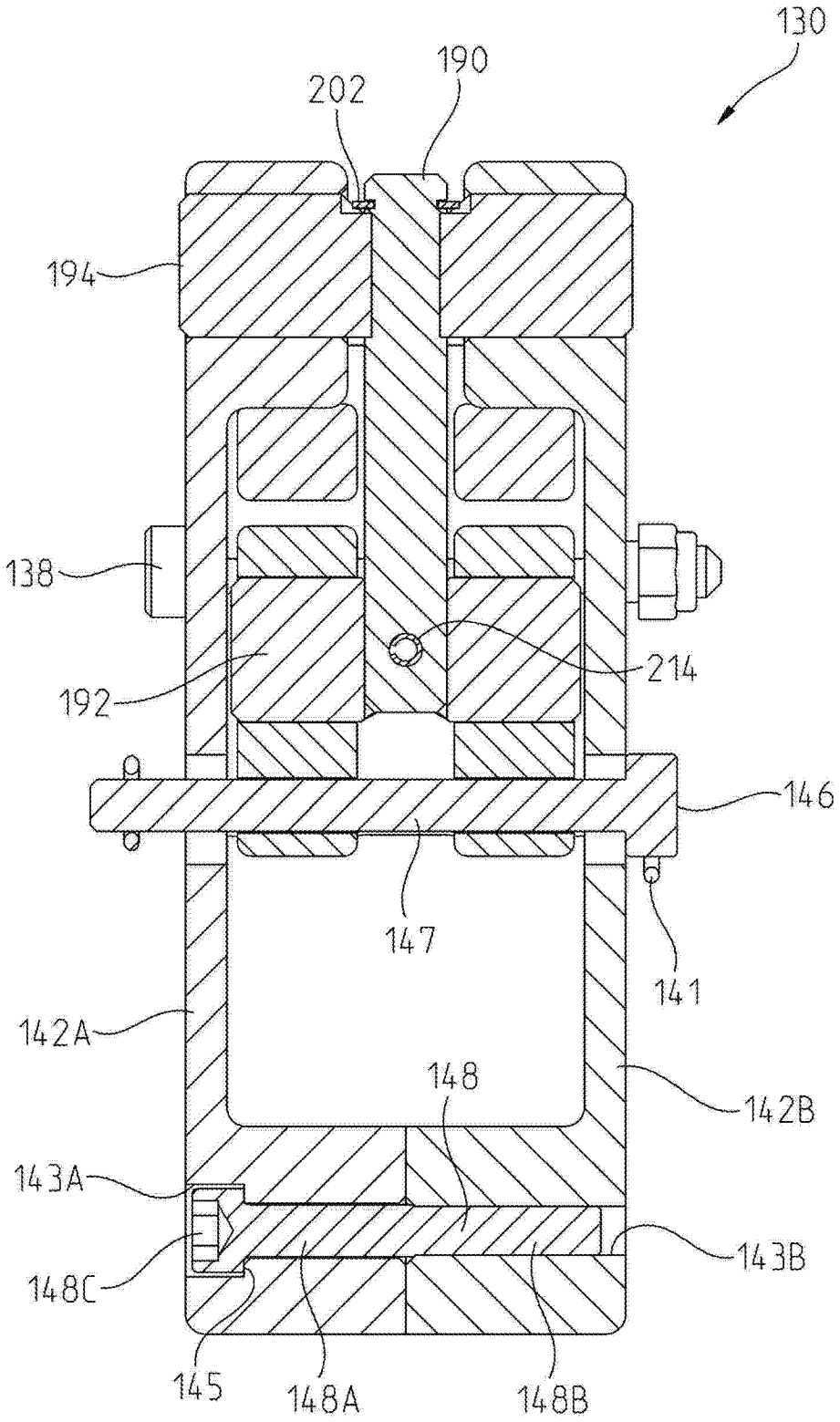

130
190
202
194
138
214
192
146
147
141
142A
148
142B
143A
143B
148C
145
148A
148B

图 7

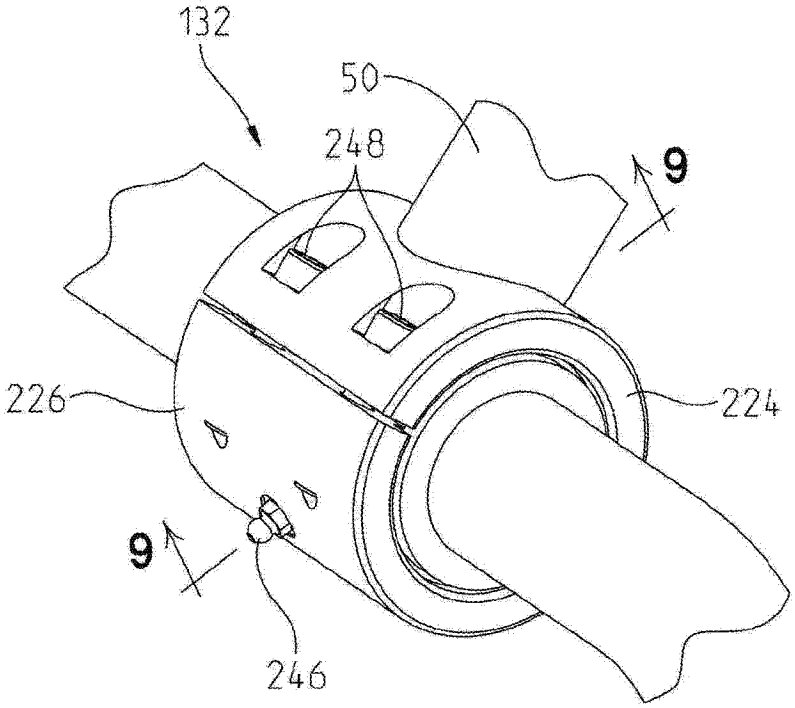
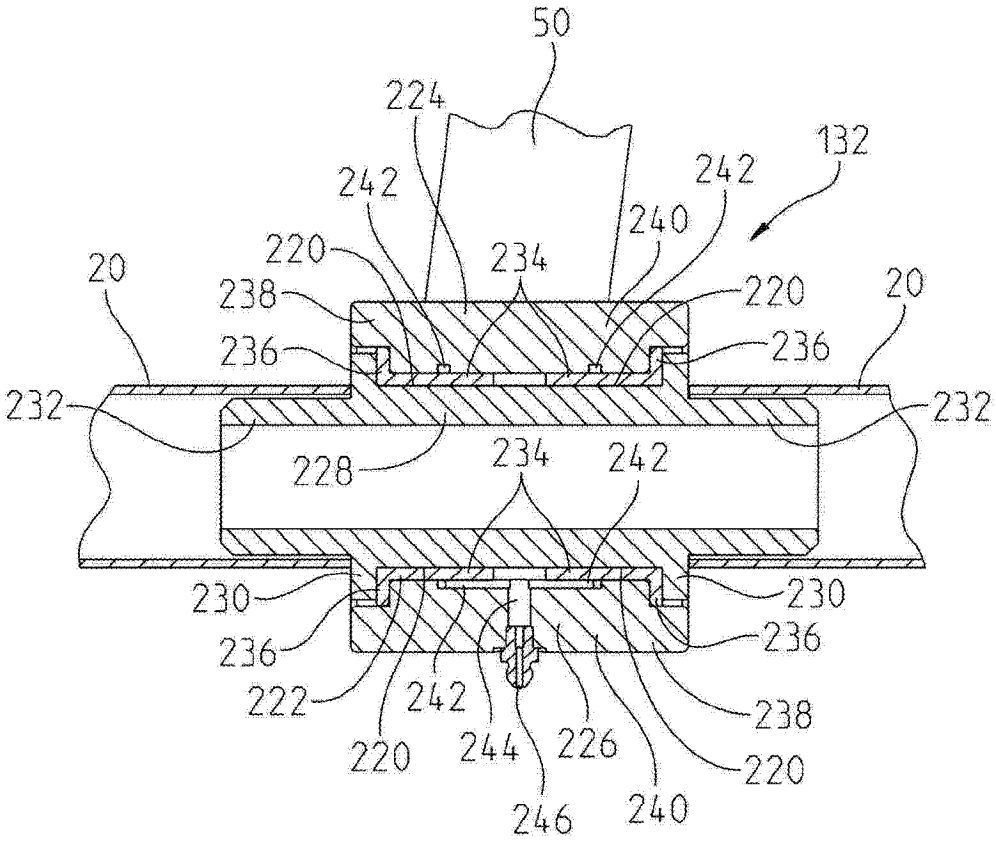

132
50
248
9
226
224
9
246

图 8A


50
224
132
242
242
240
220
234
20
238
220
20
236
236
232
232
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234
242
230
230
236
236
222
242
238
220
244
226
220
246
240

图 9

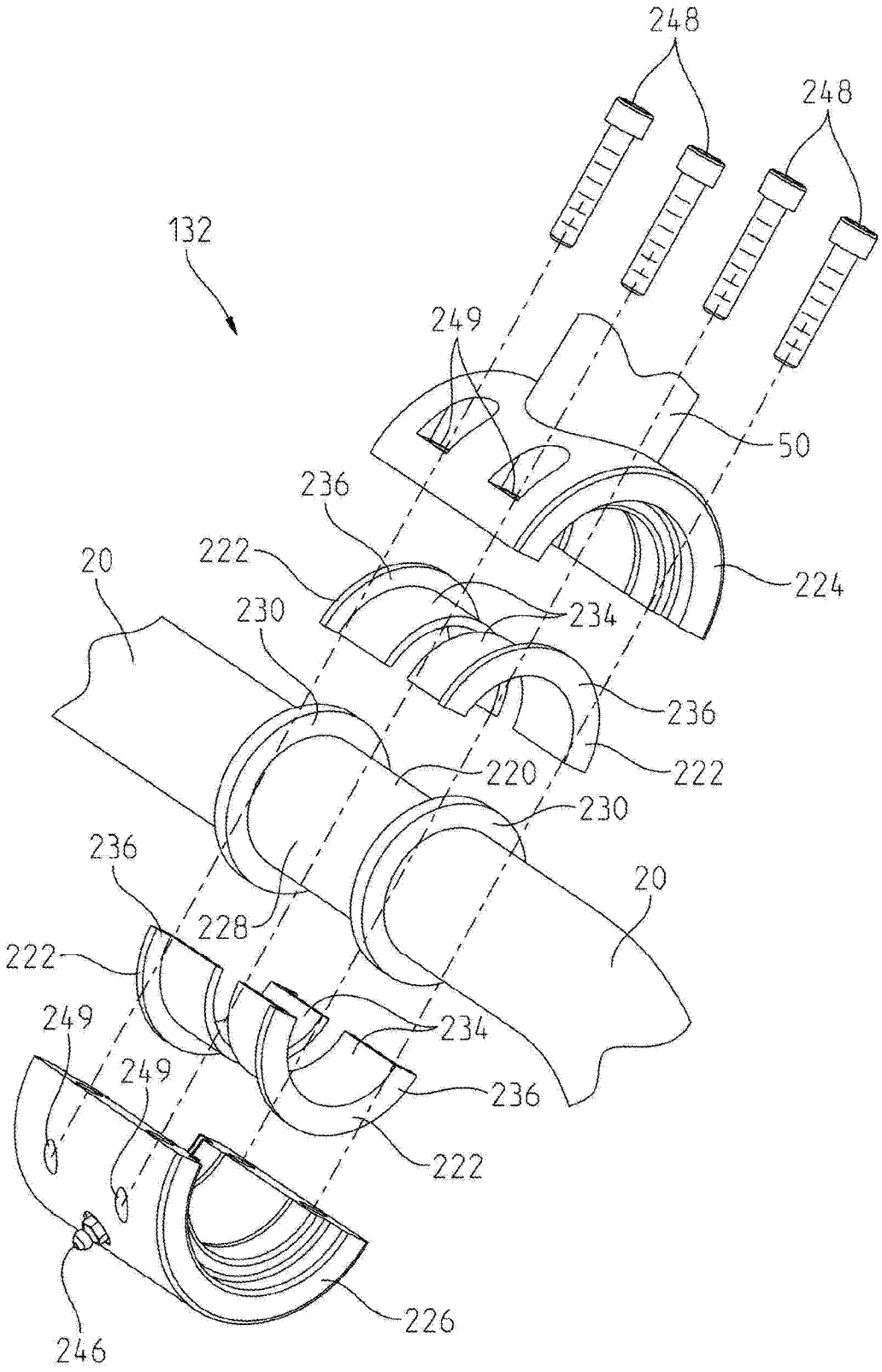

248
248
132
249
50
236
222
20
224
230
234
236
220
222
230
236
20
228
222
249
234
249
236
222
226
246

图 8B

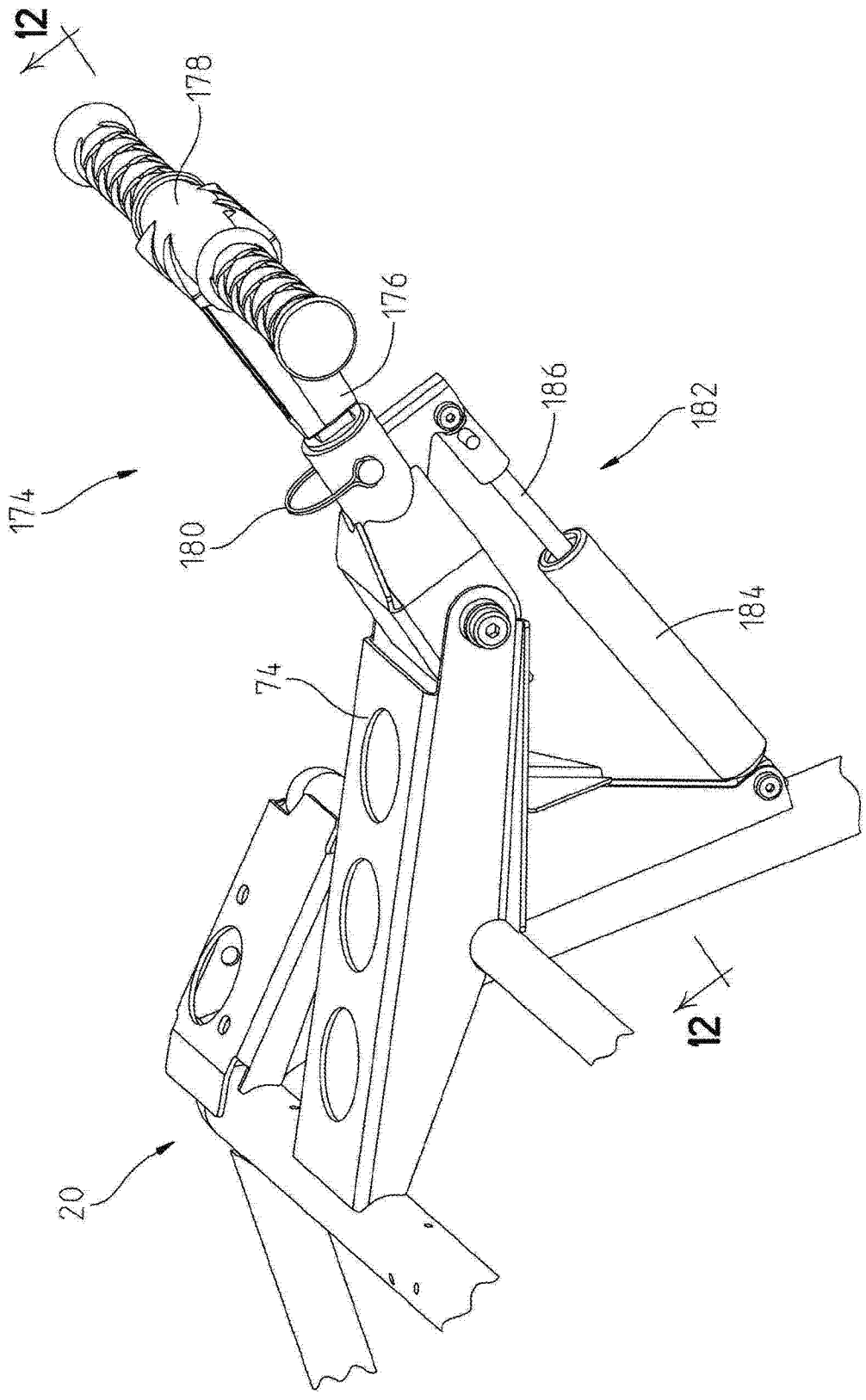
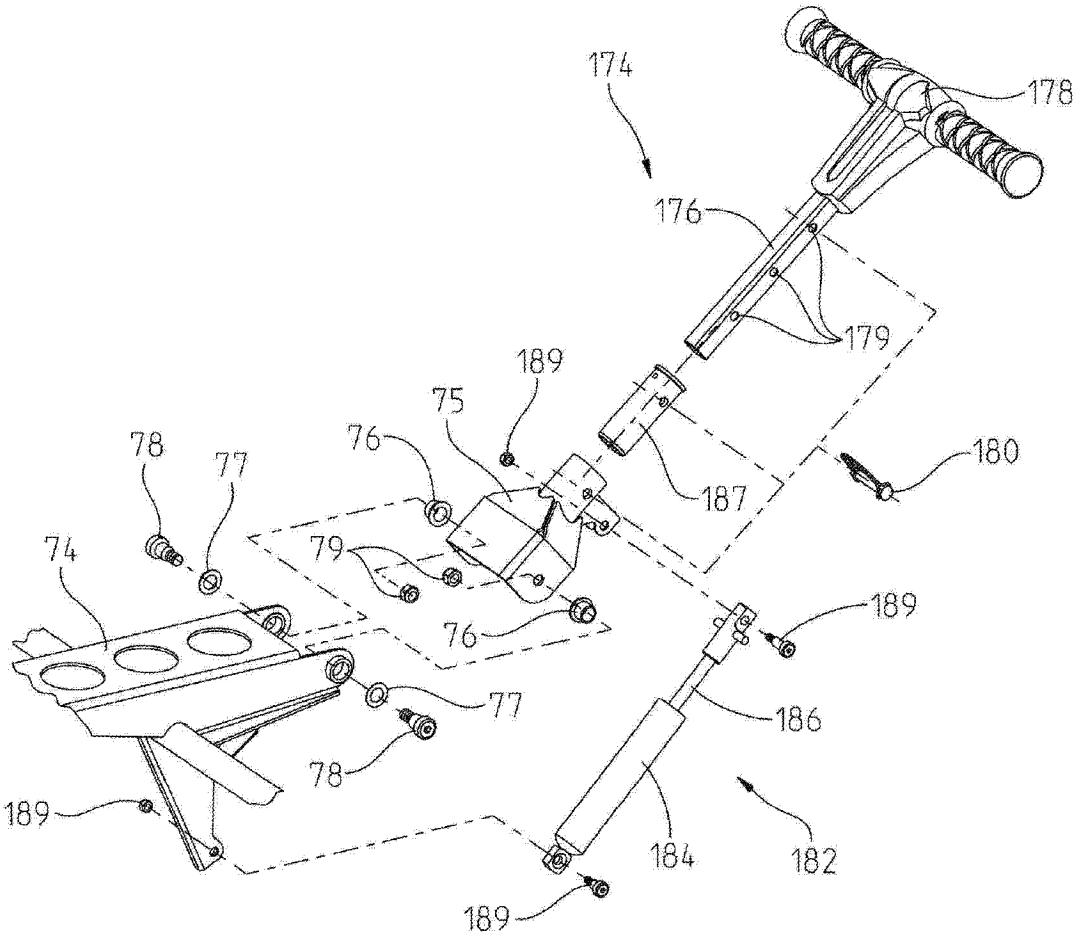


图 10


174
178
176
179
189
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76
78
77
180
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74
79
189
76
77
186
78
189
184
182
189

图 11

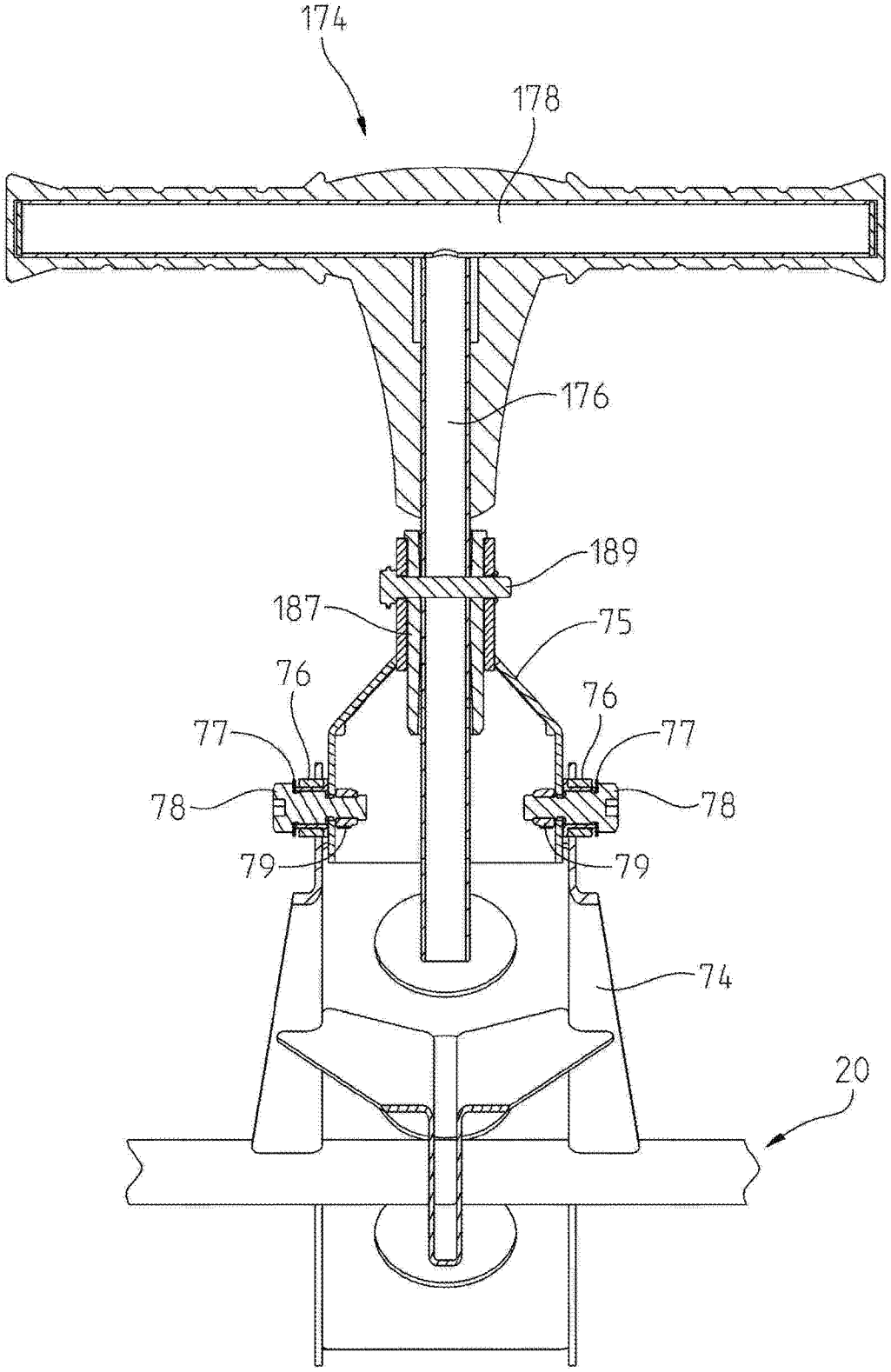

图 12

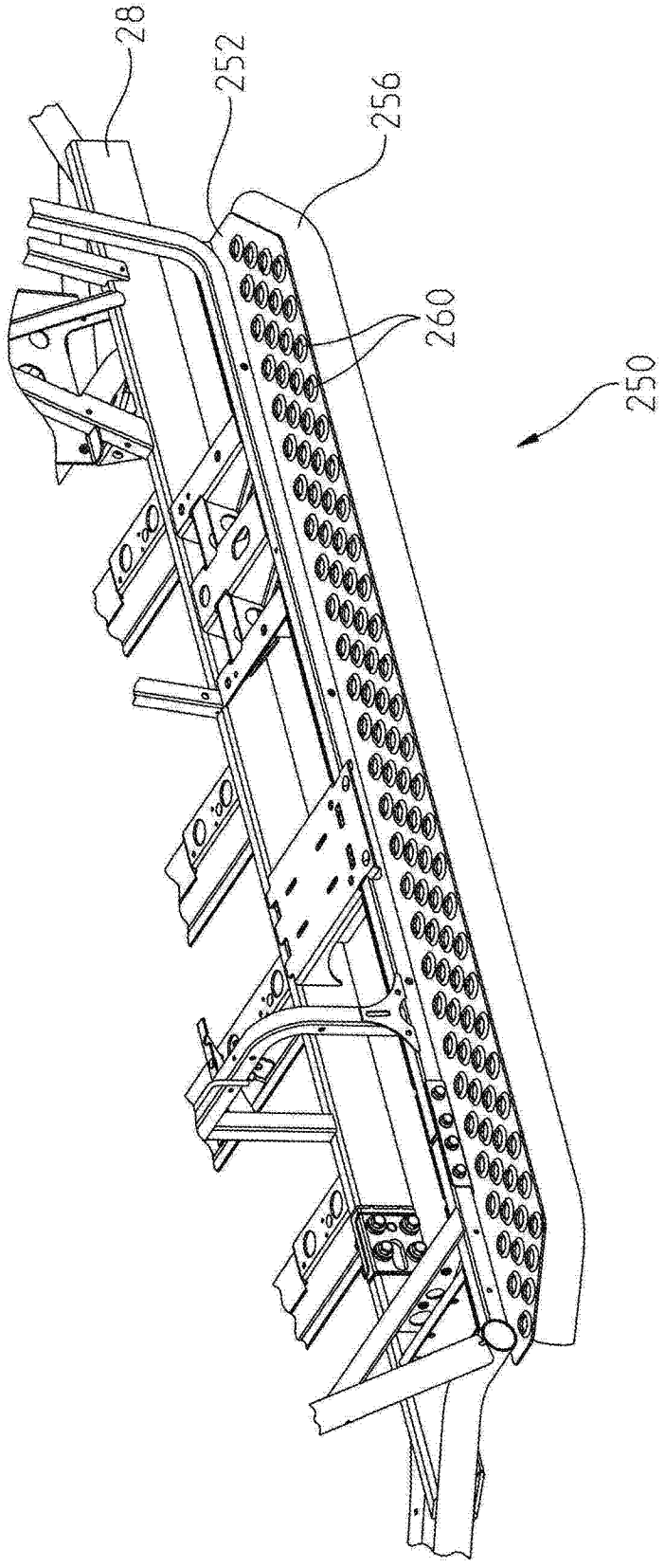

图 13

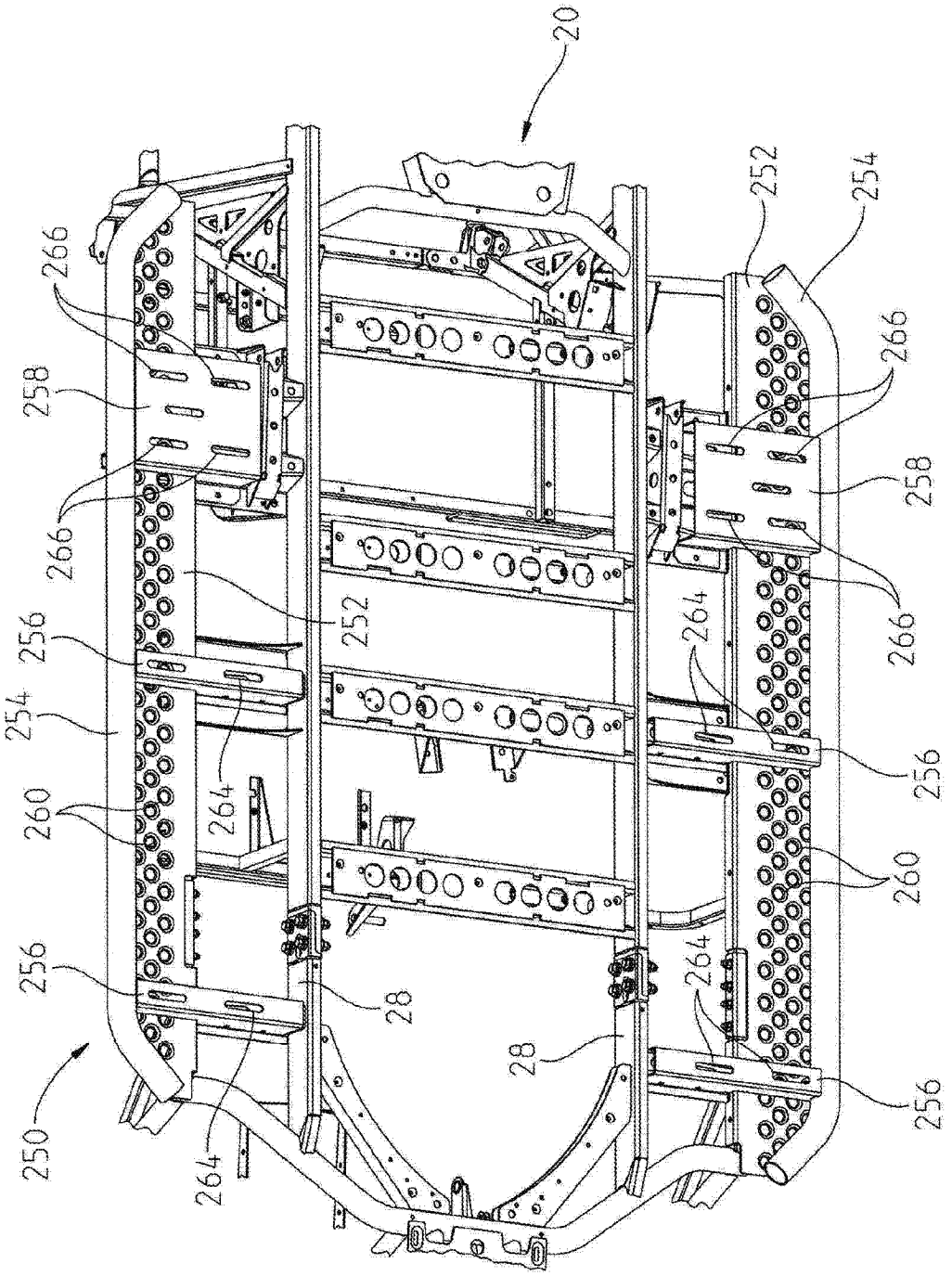
20
252
254
266
258
266
258
266
252
264
256
254
256
260
264
260
256
264
28
28
250
264
256

图 14

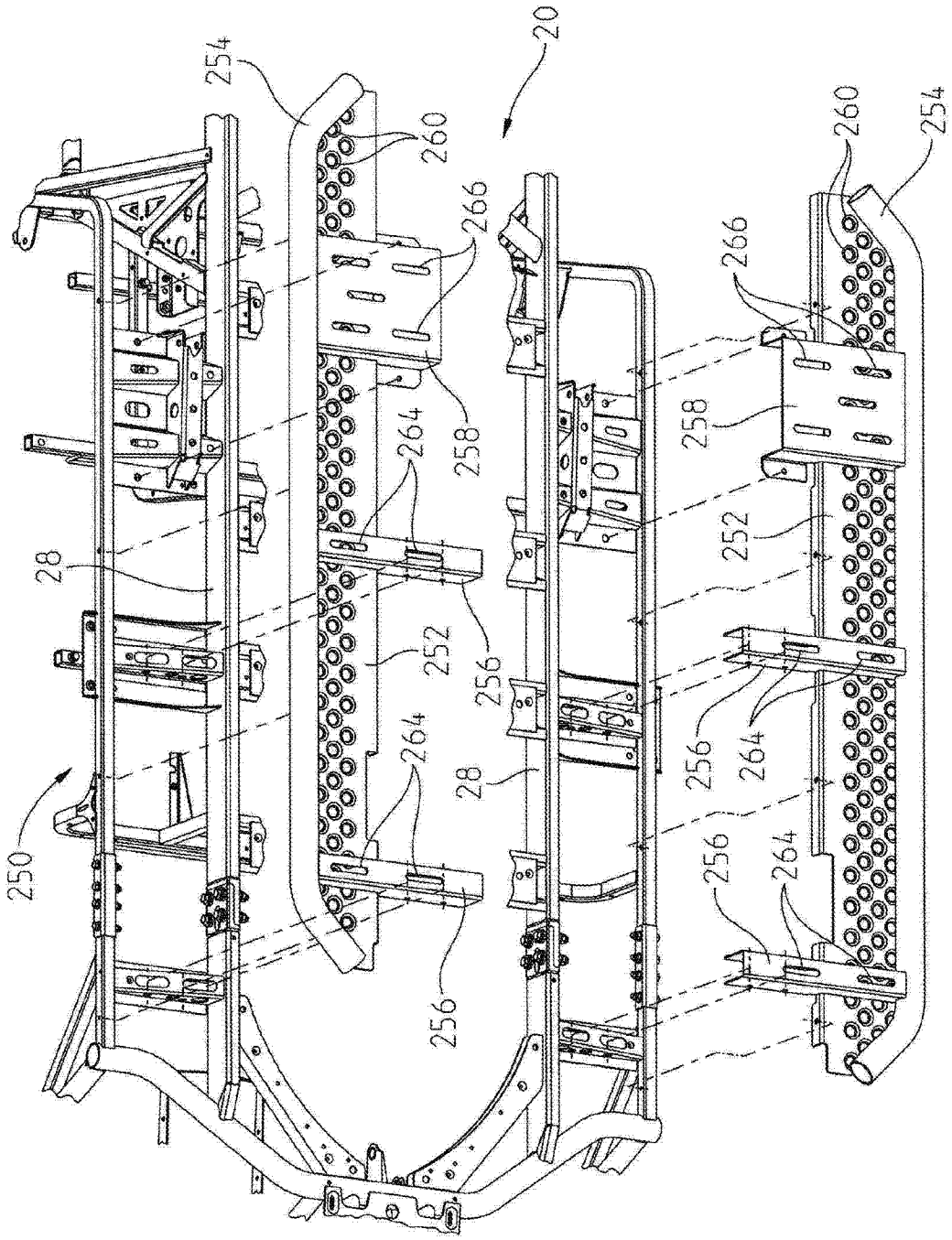
20
254
260
266
258
264
28
252
256
250
254
260
266
258
252
256
264
28
256
264
256
264

图 15

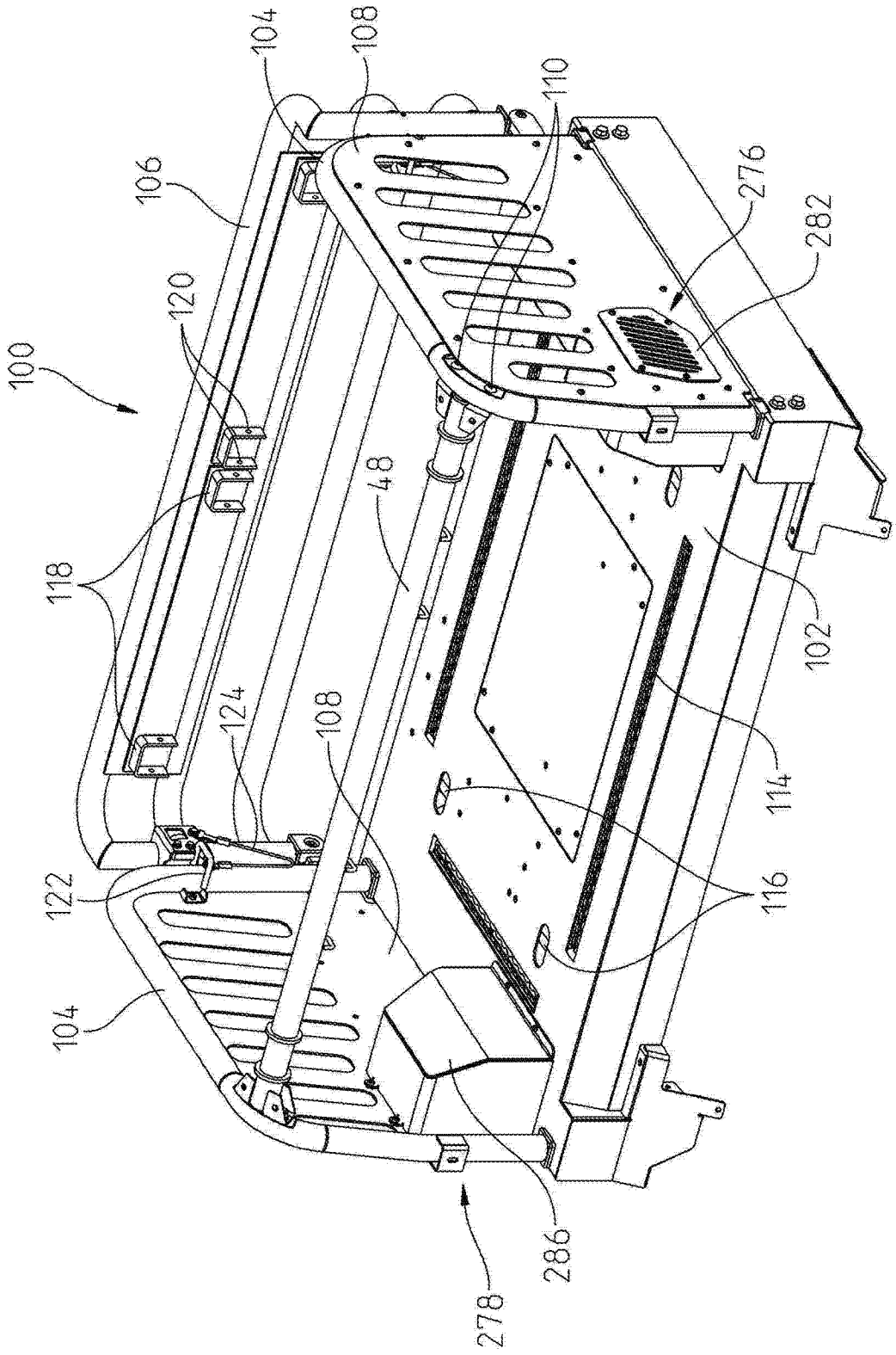
104
108
110
106
276
282
120
100
48
118
102
124
108
114
116
122
104
286
278

图 16

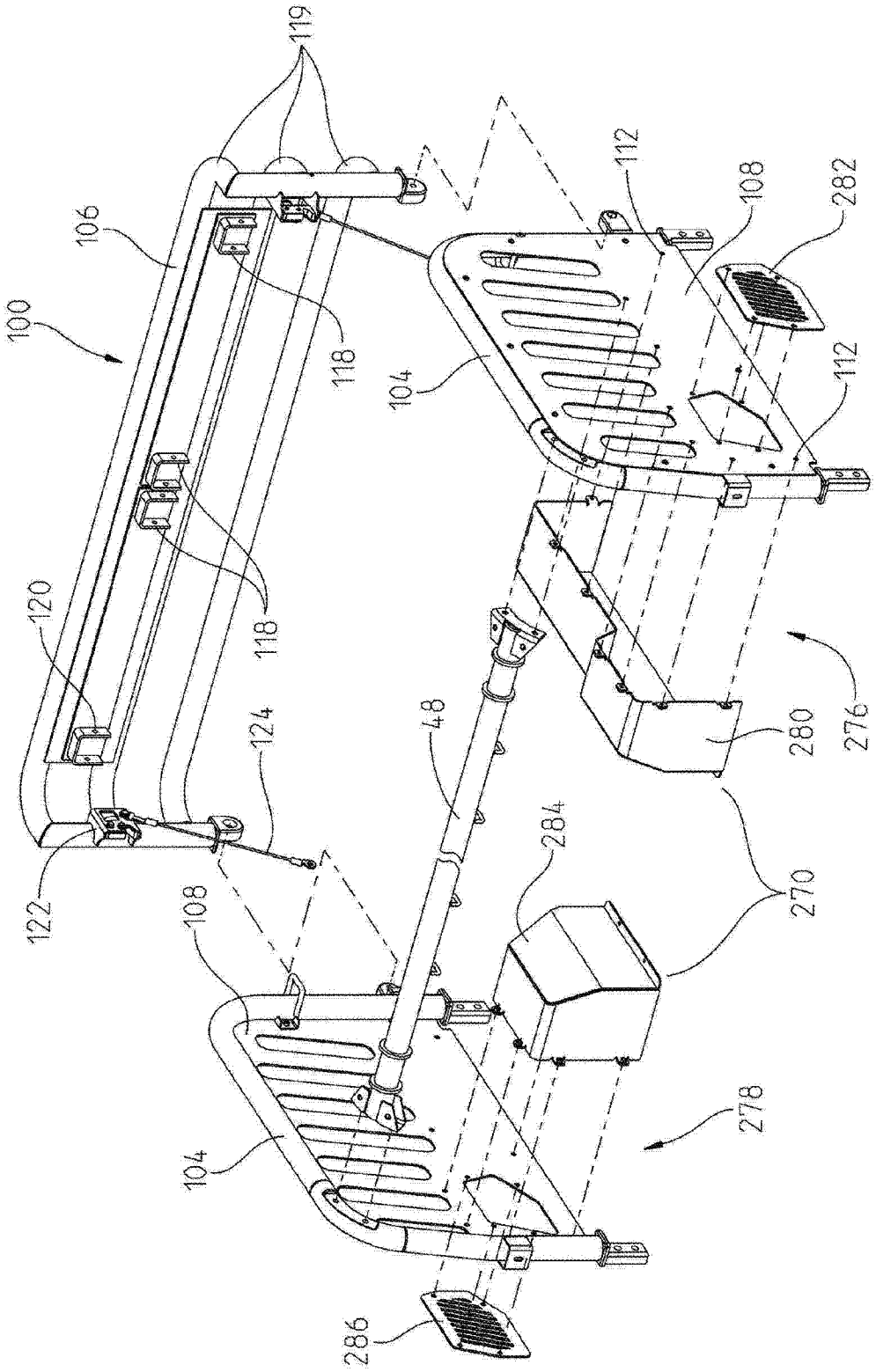
119
106
100
118
104
112
108
282
112
120
118
124
48
280
276
122
284
270
108
104
278
286

图 17

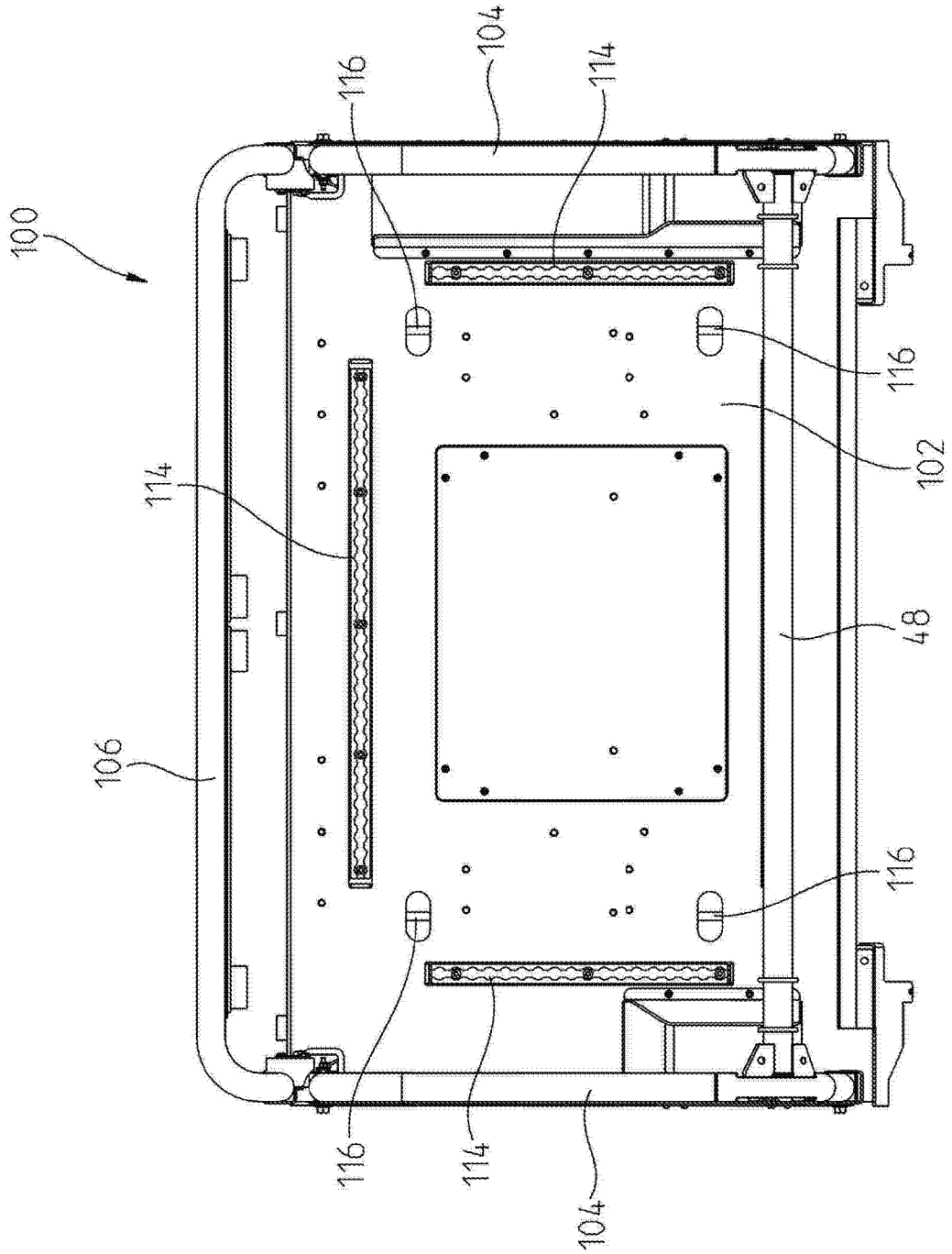

图 18

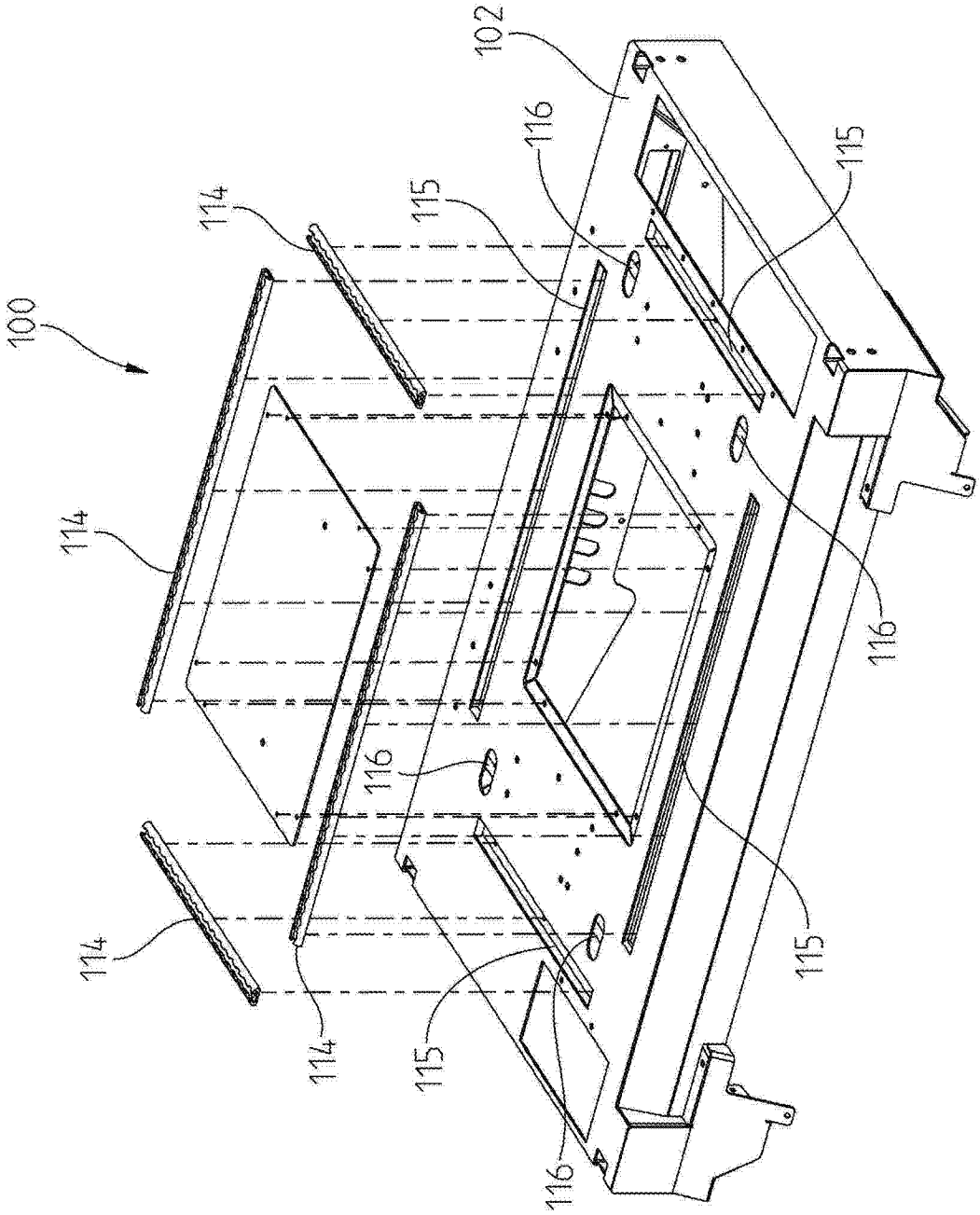

图 19

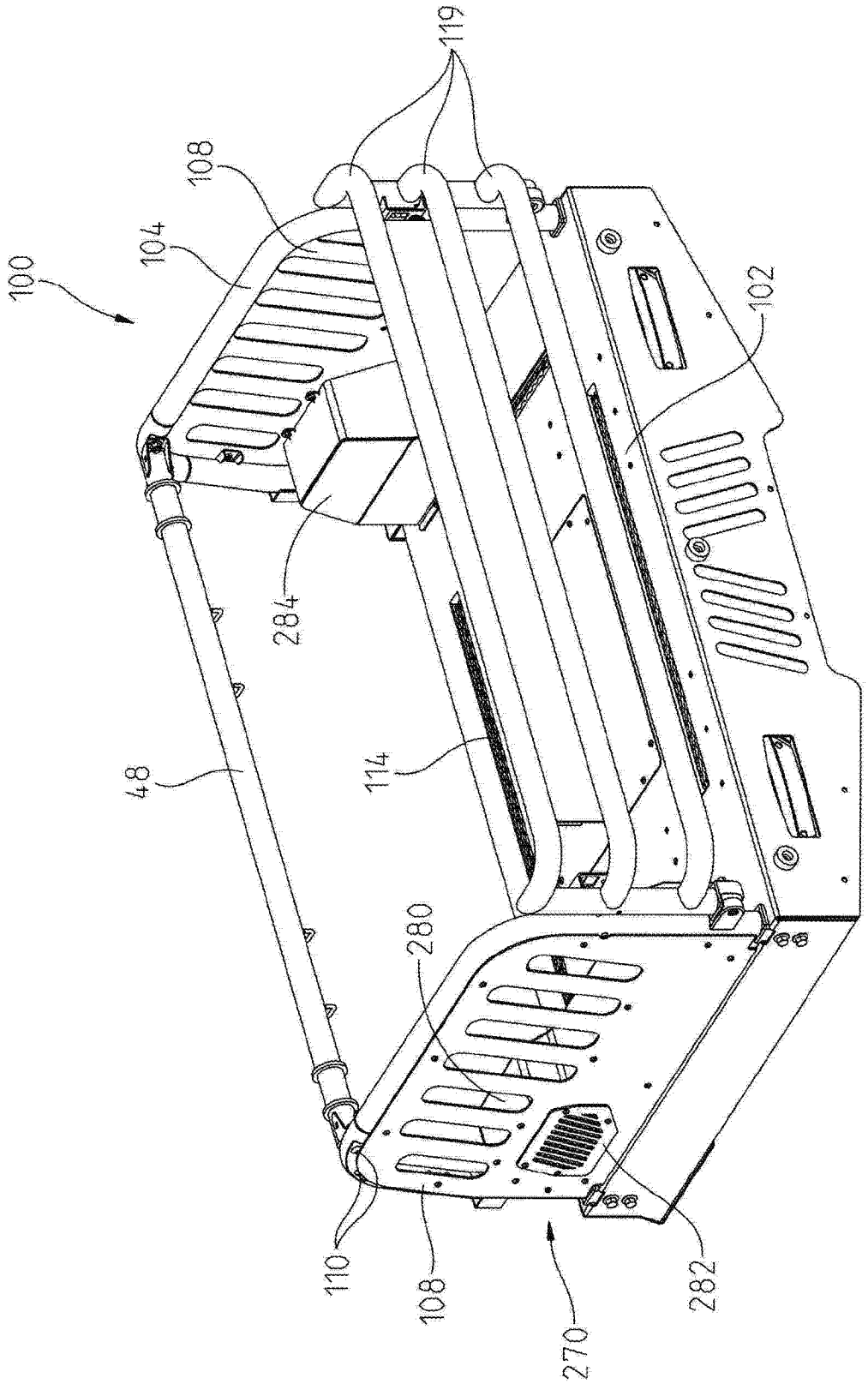

图 20

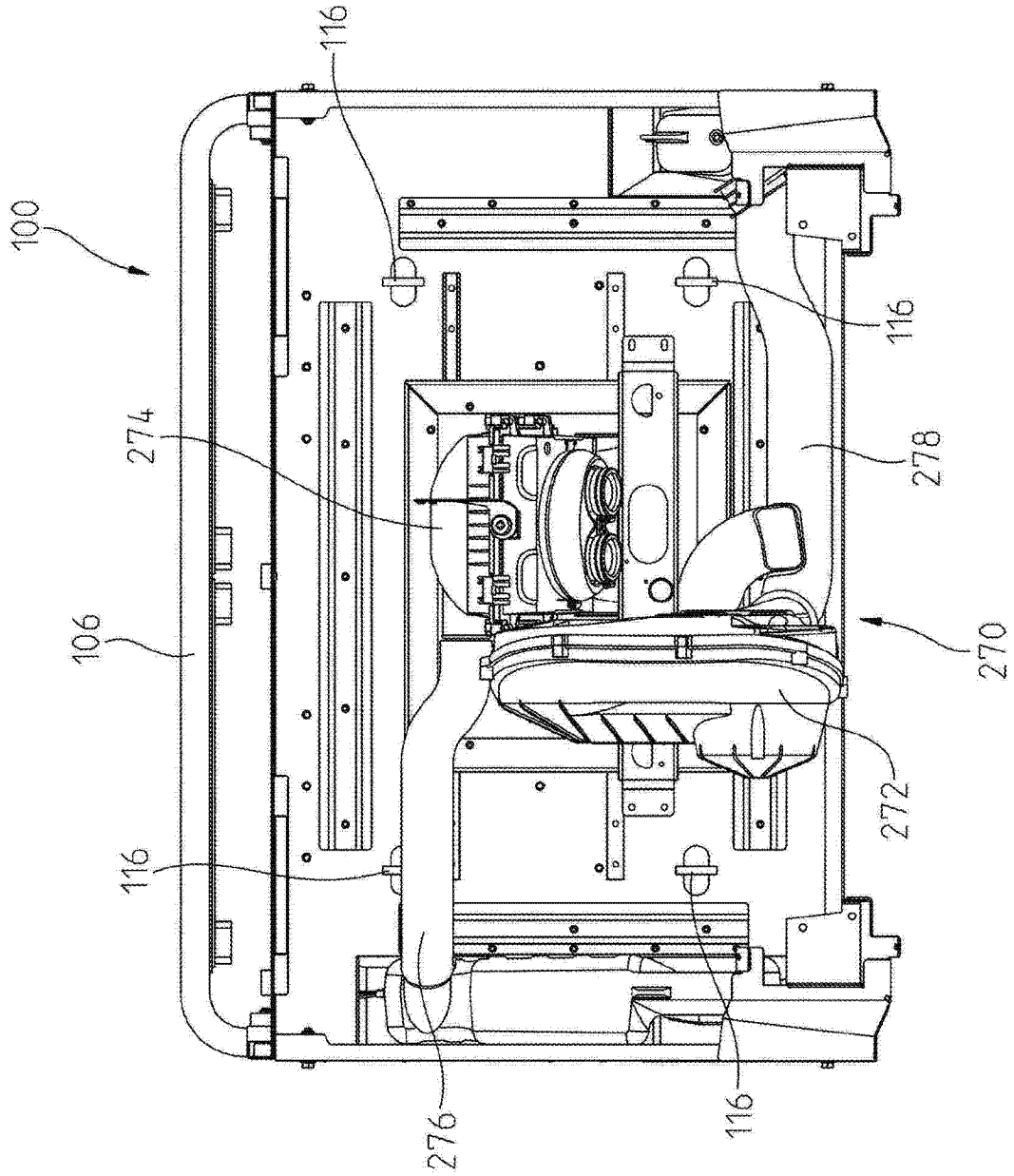

图 21

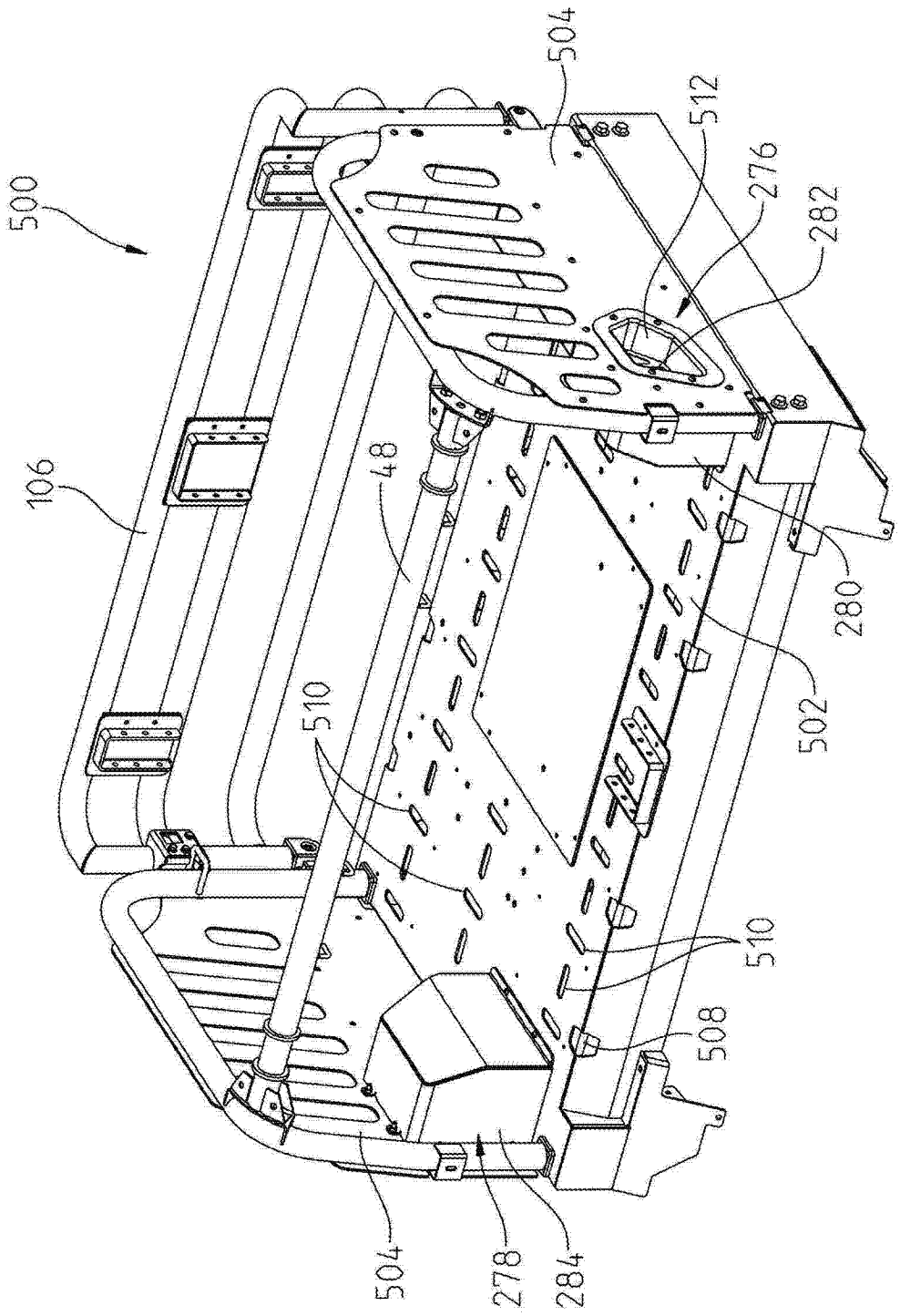

图 22A

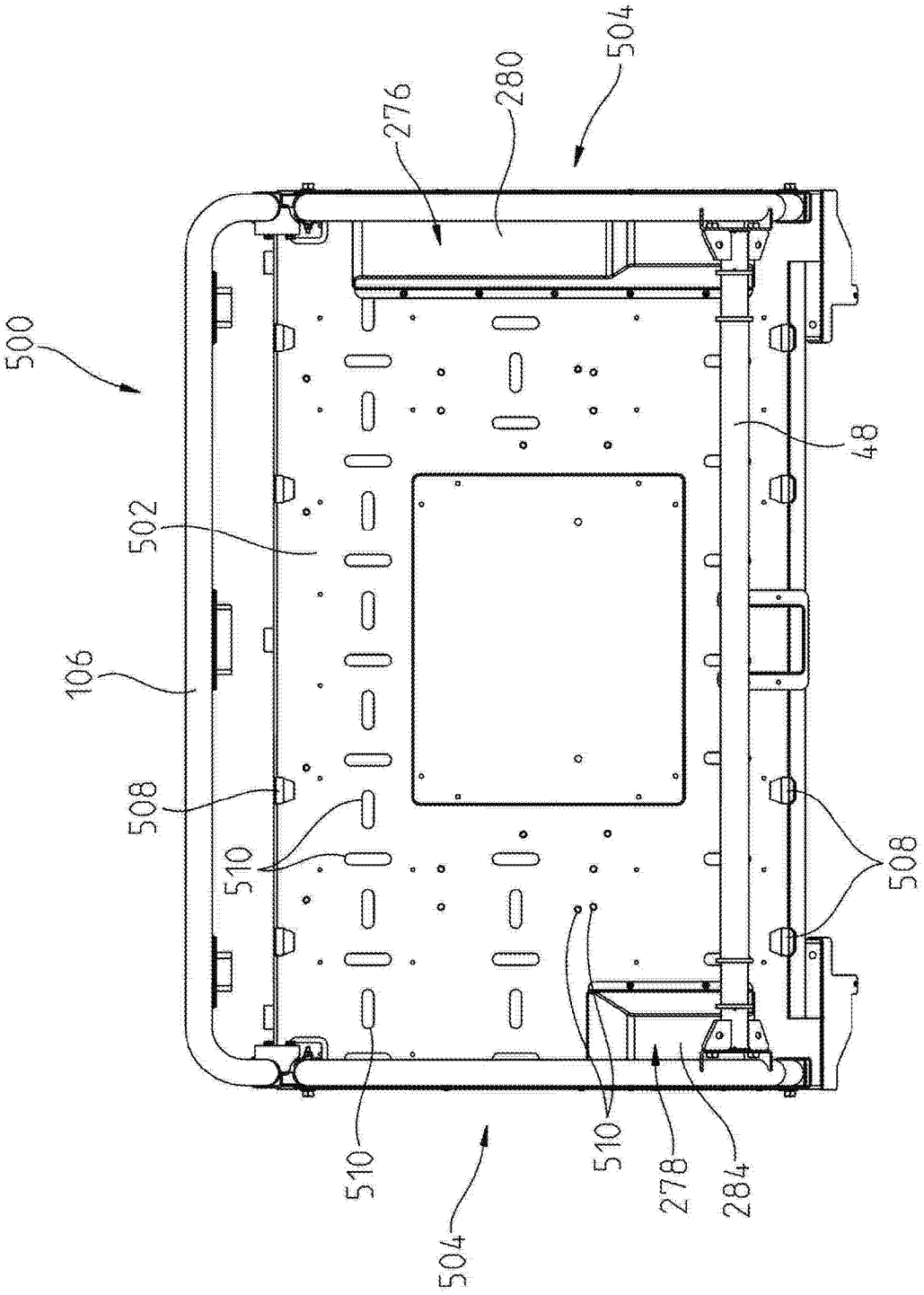

图 22B

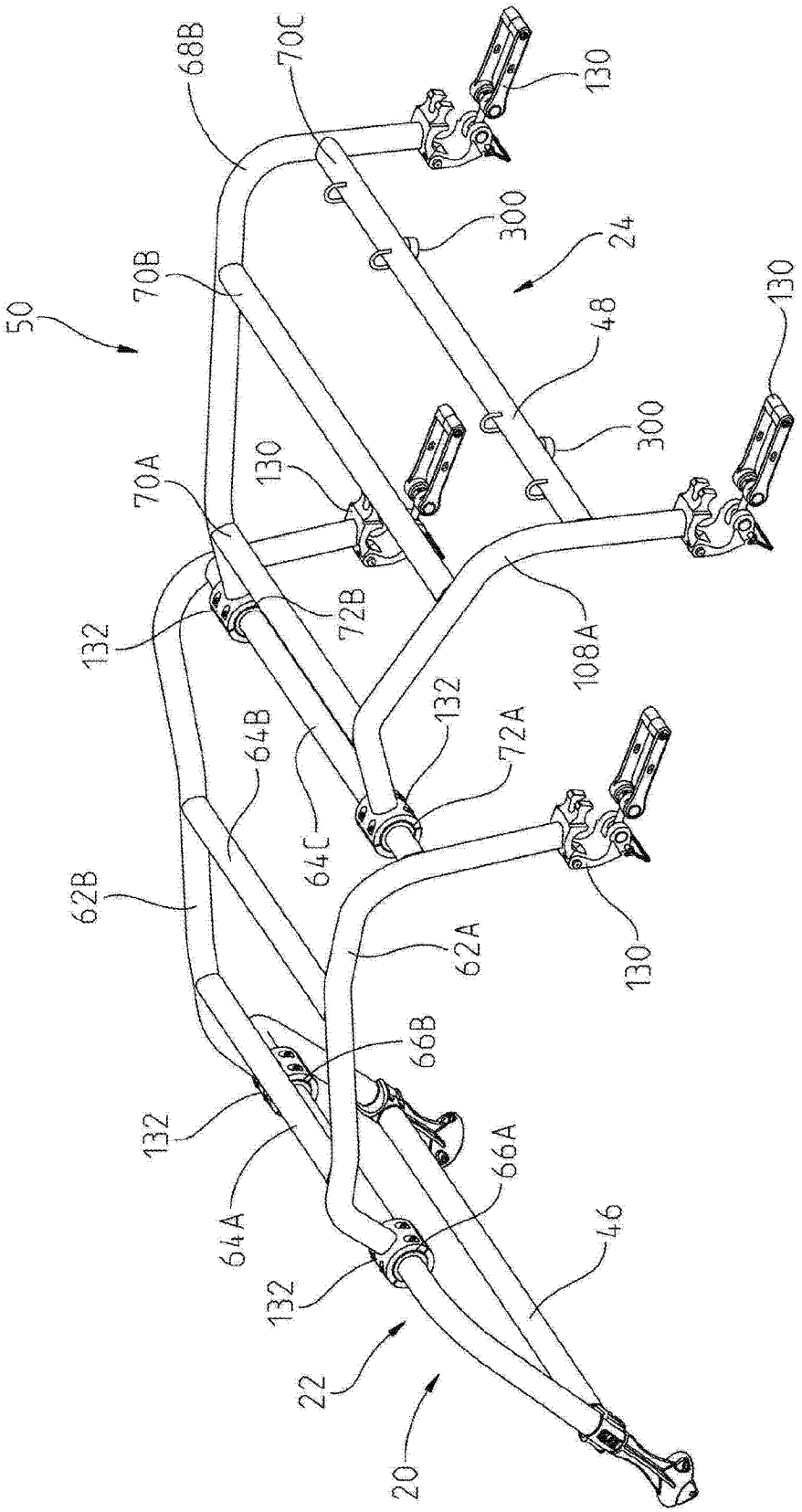
68B
70C
130
300
24
50
70B
48
130
300
70A
130
72B
132
108A
132
64B
72A
64C
62B
62A
130
66B
132
66A
64A
46
132
22
20

图 23

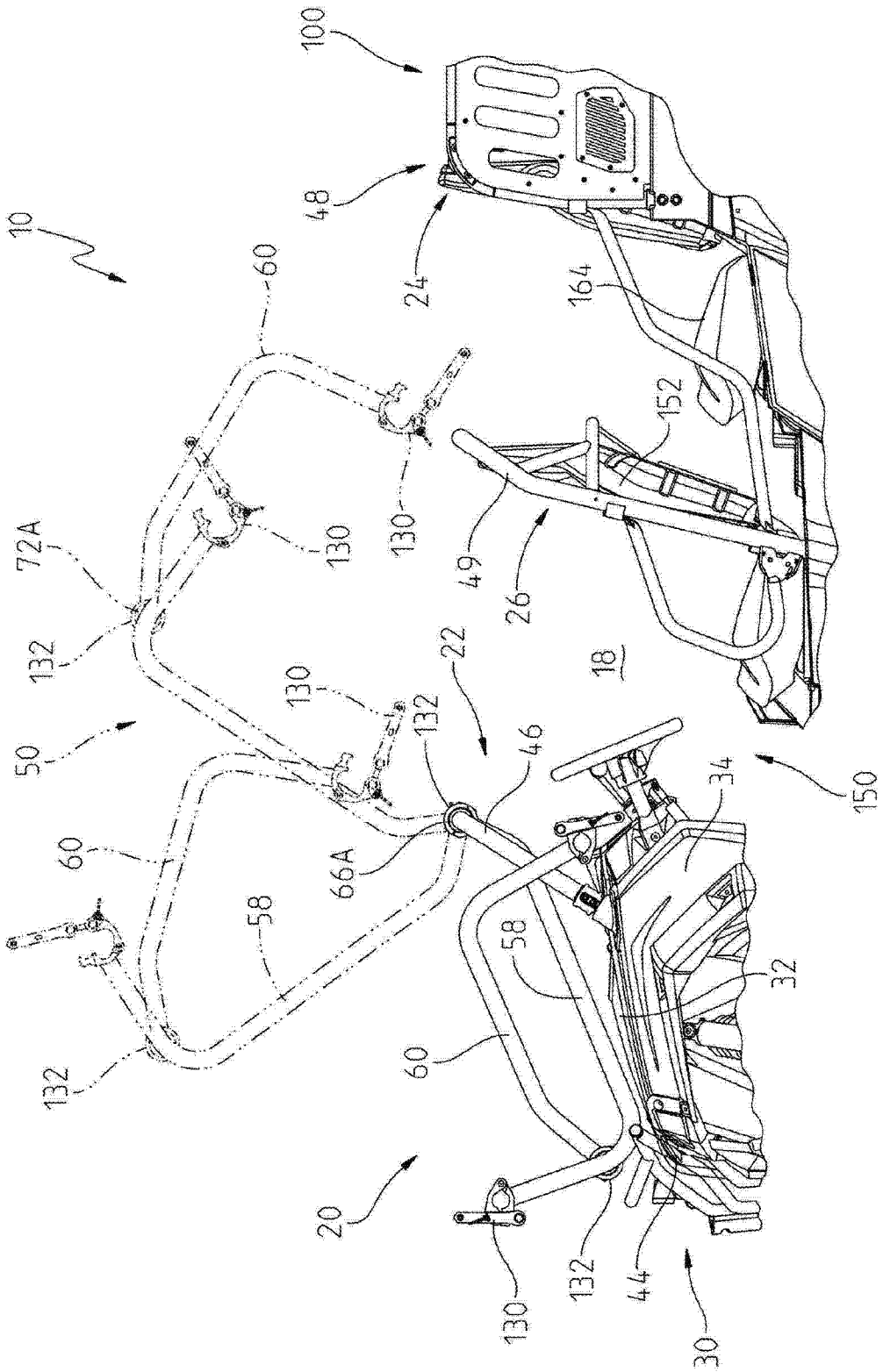
100
48
10
24
164
60
152
72A
130
130
49
26
132
22
18
130
132
46
50
34
150
60
66A
58
58
32
132
60
20
130
132
44
30

图 24

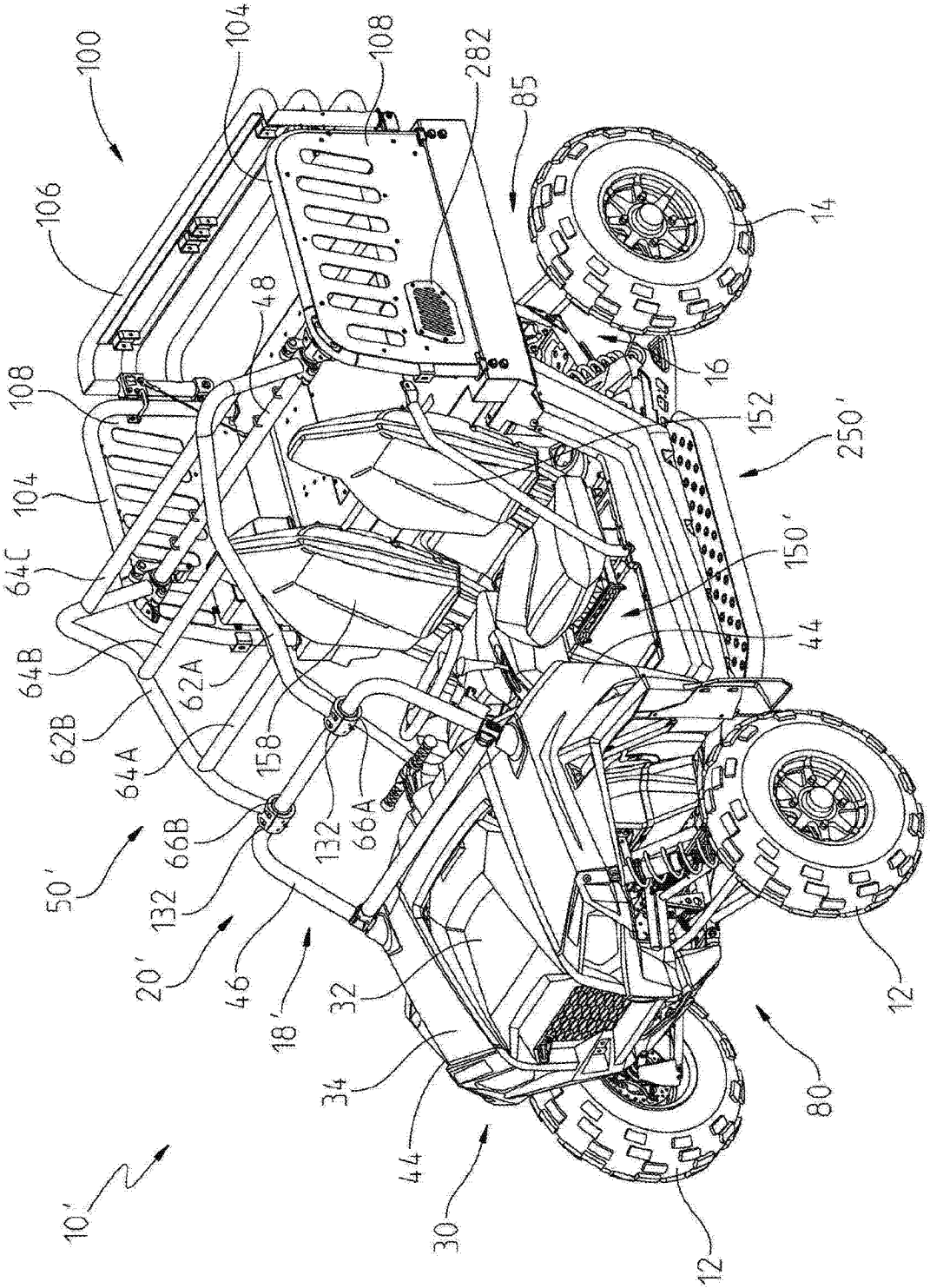
100
104
108
282
85
106
14
48
16
108
152
250'
104
150'
64C
44
64B
62A
62B
158
64A
66A
66B
132
50'
132
20'
46
18'
32
34
44
30
12
80
12
10'

图 25

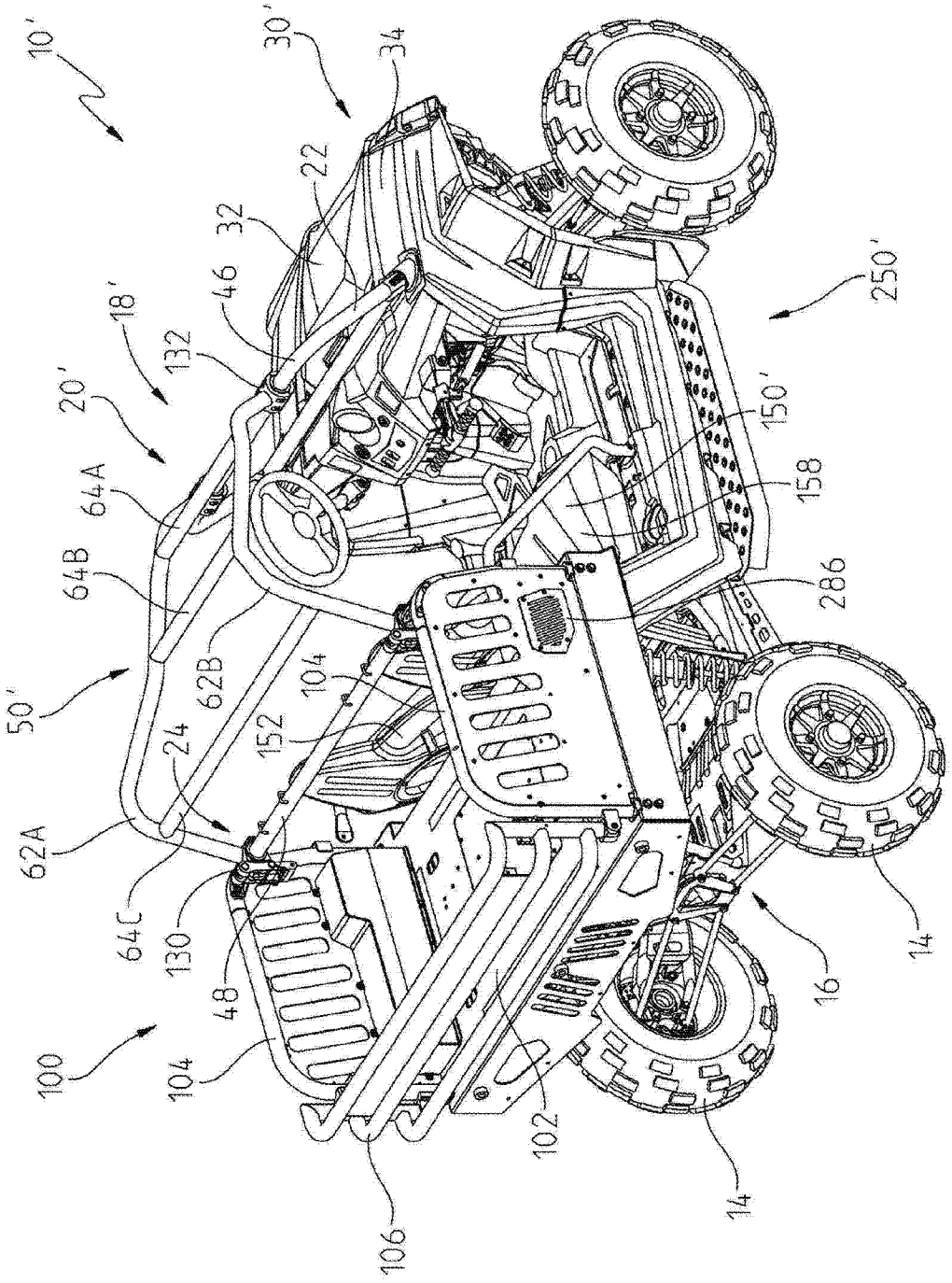
10'
30'
34
22
32
46
18'
132
20'
64A
64B
62B
50'
24
62A
64C
130
48
100
104
106
102
14
16
250'
150'
158
286
152
104

图 26

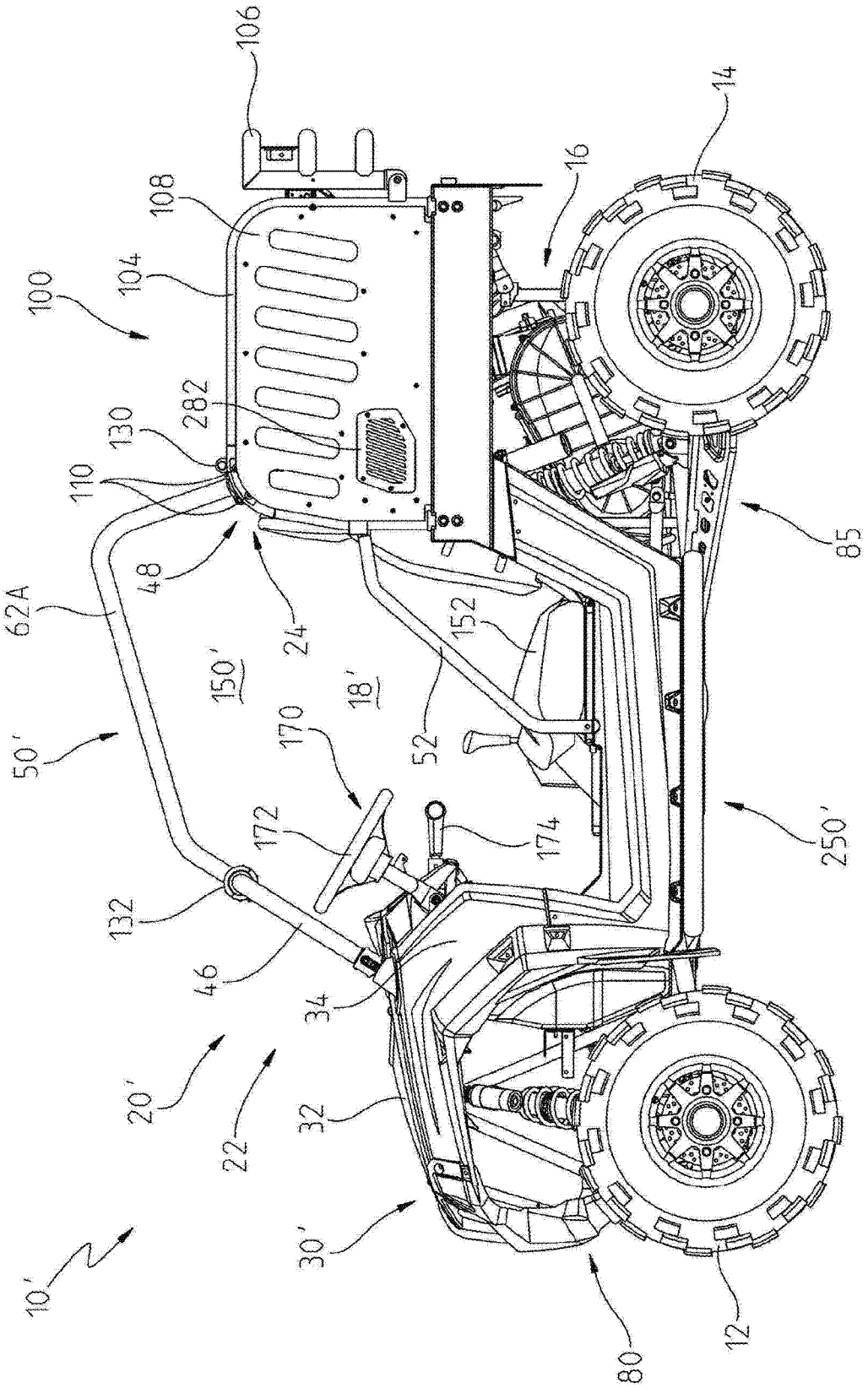
106
14
16
108
104
100
282
130
110
48
24
85
62A
150'
18'
152
52
50'
170
172
174
250'
132
46
34
20'
22
32
30'
10'
80
12

图 27

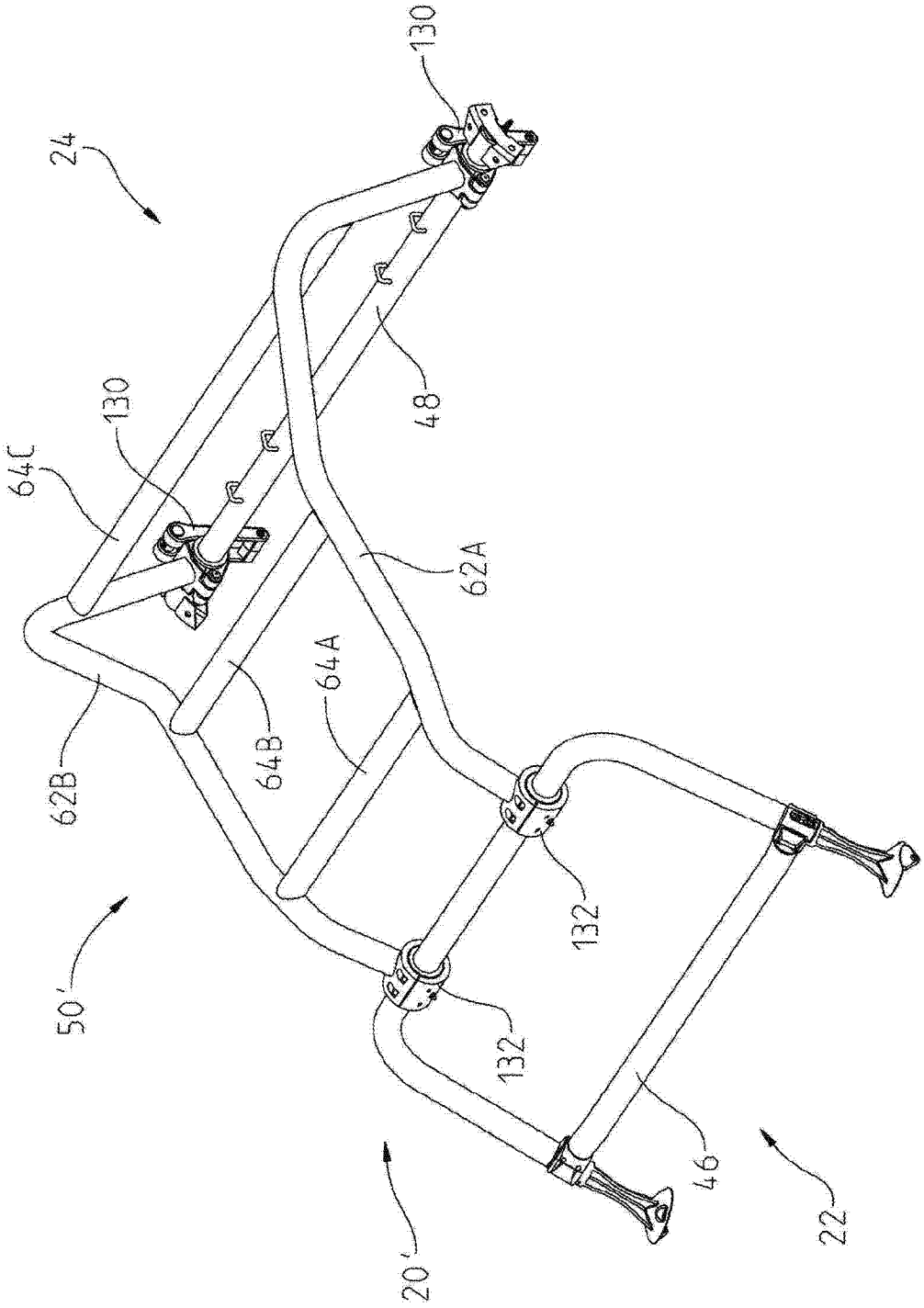

图 28

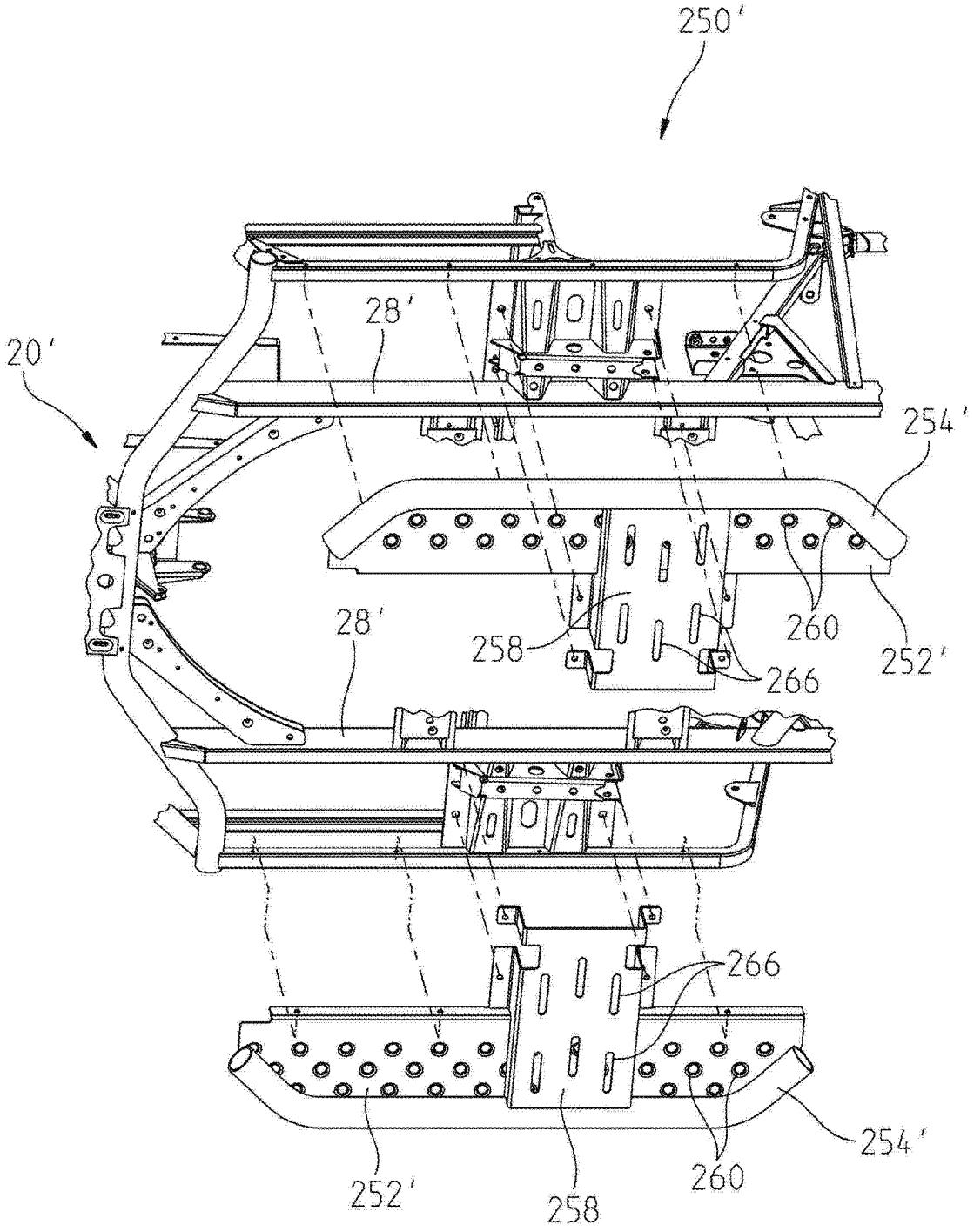

图 29

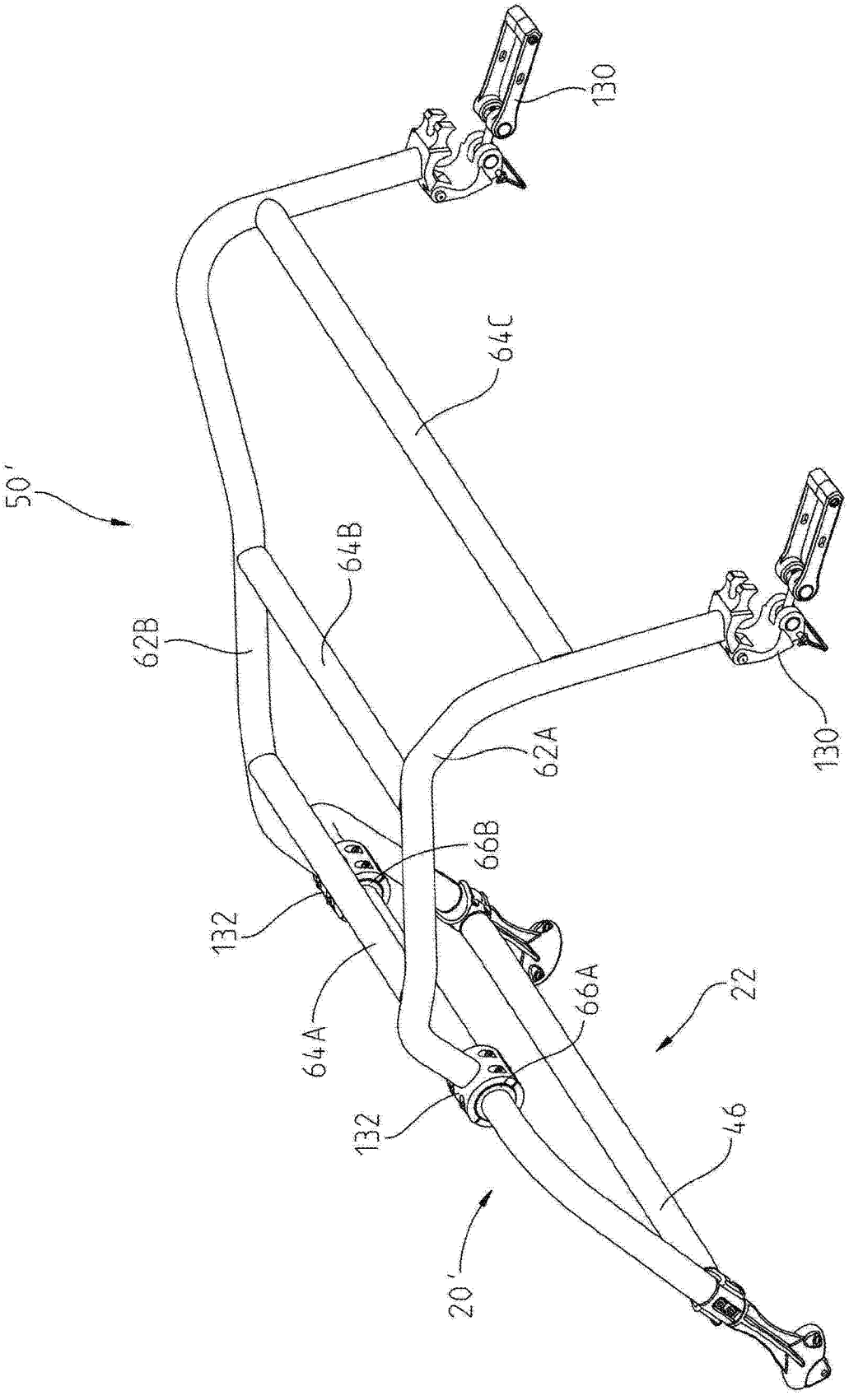

图 30

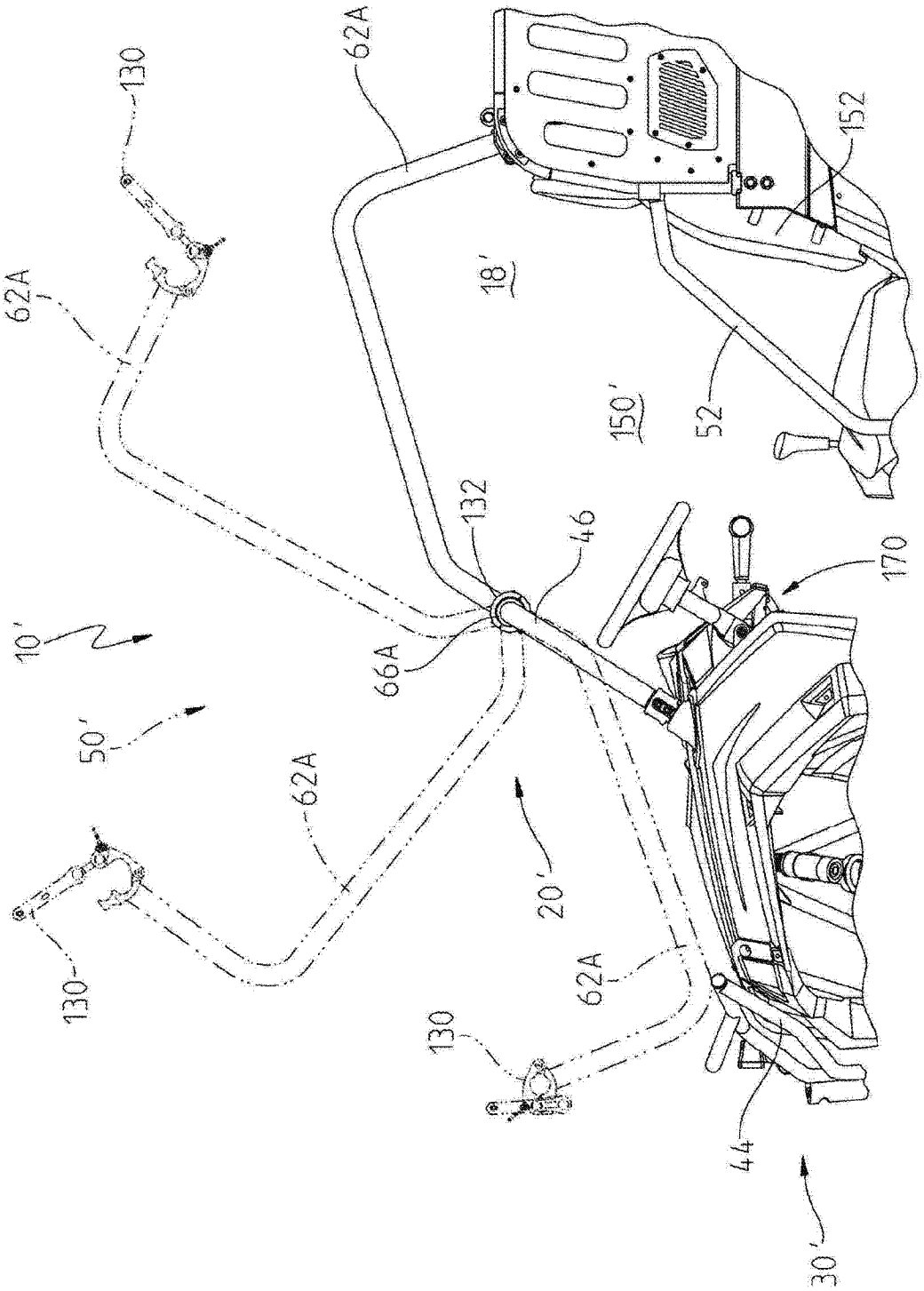
62A
130
62A
18'
152
150'
52
132
46
170
10'
66A
50'
62A
20'
130
62A
130
44
30'

图 31

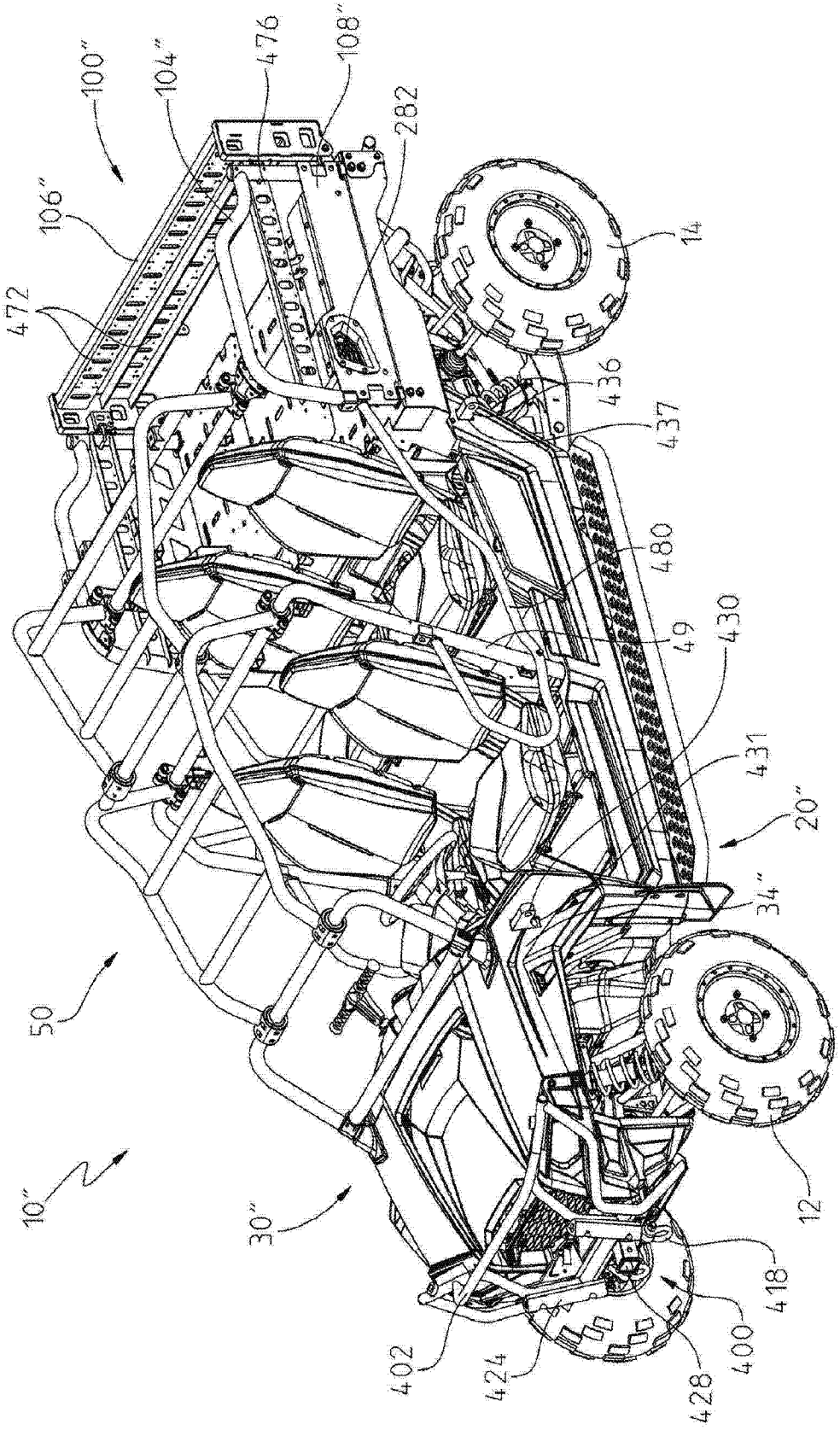
100″
104″
476
108″
282
106″
14
472
436
437
480
49
430
431
20″
34″
50
10″
30″
12
418
400
402
424
428

图 32

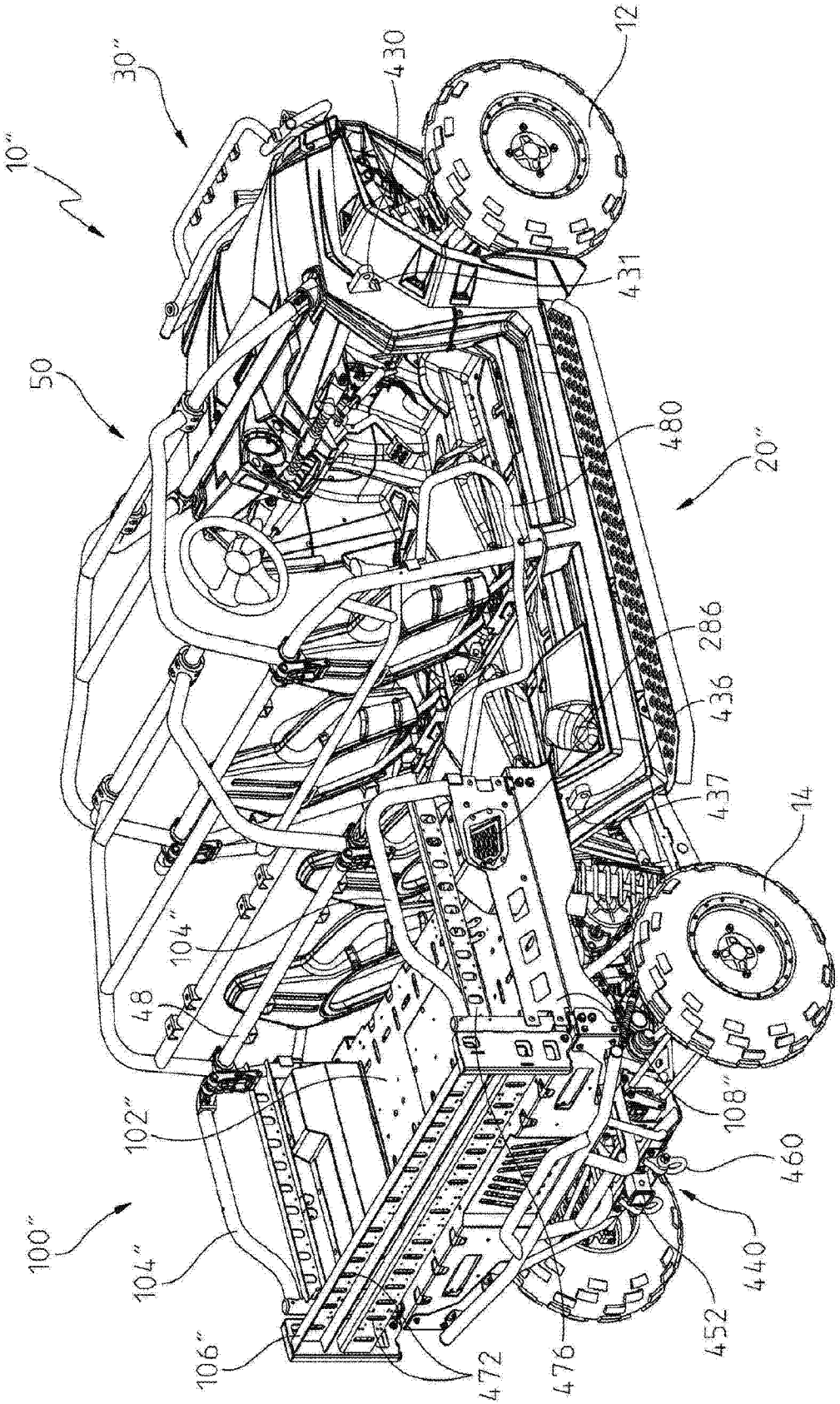
12
30″
430
10″
431
50
480
20″
286
436
437
14
104″
48
102″
108″
460
100″
104″
440
452
106″
472
476

图 33

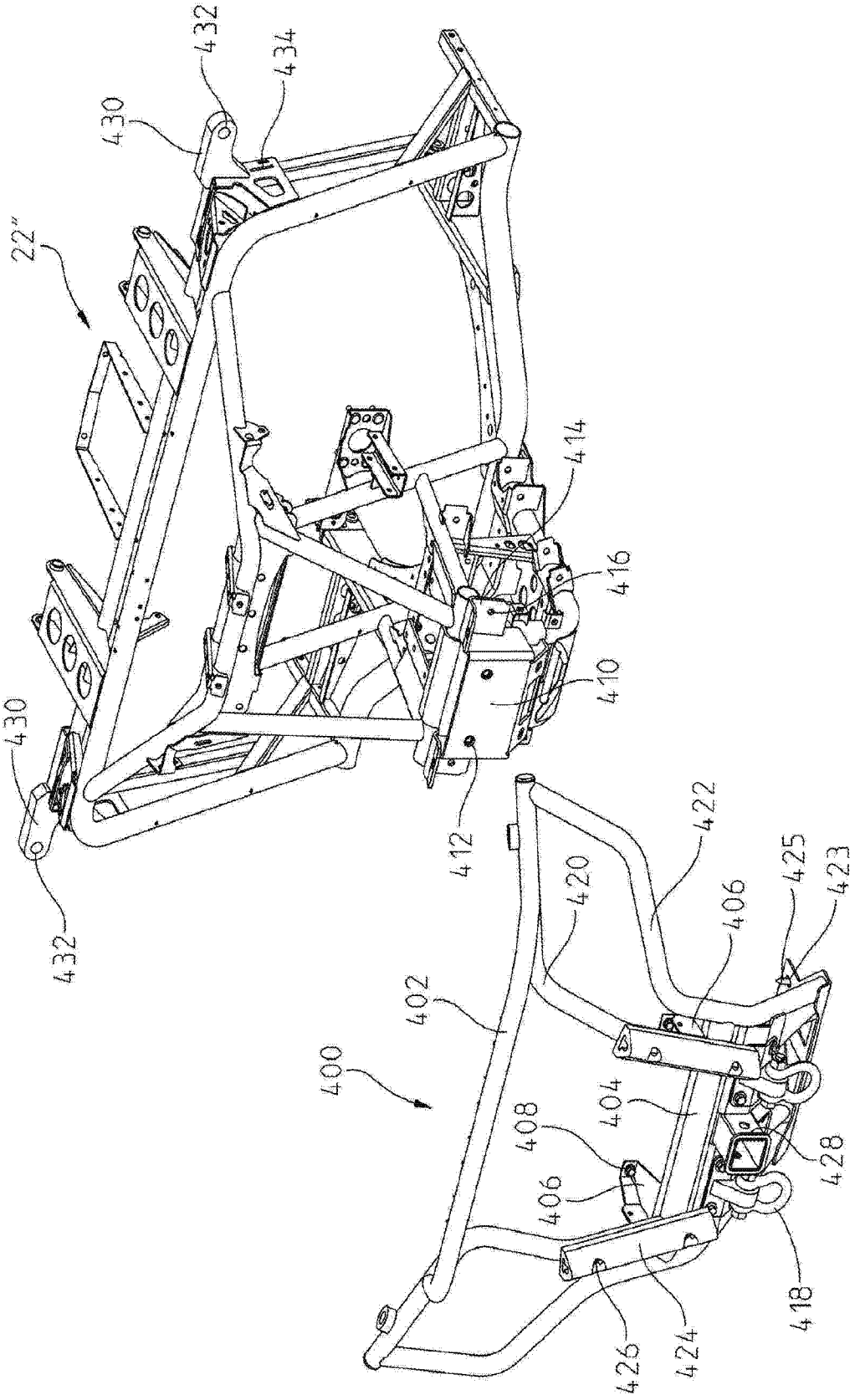
432
434
430
22"
414
416
410
430
412
422
420
425
423
406
402
400
404
408
406
428
418
426
424
432

图 34

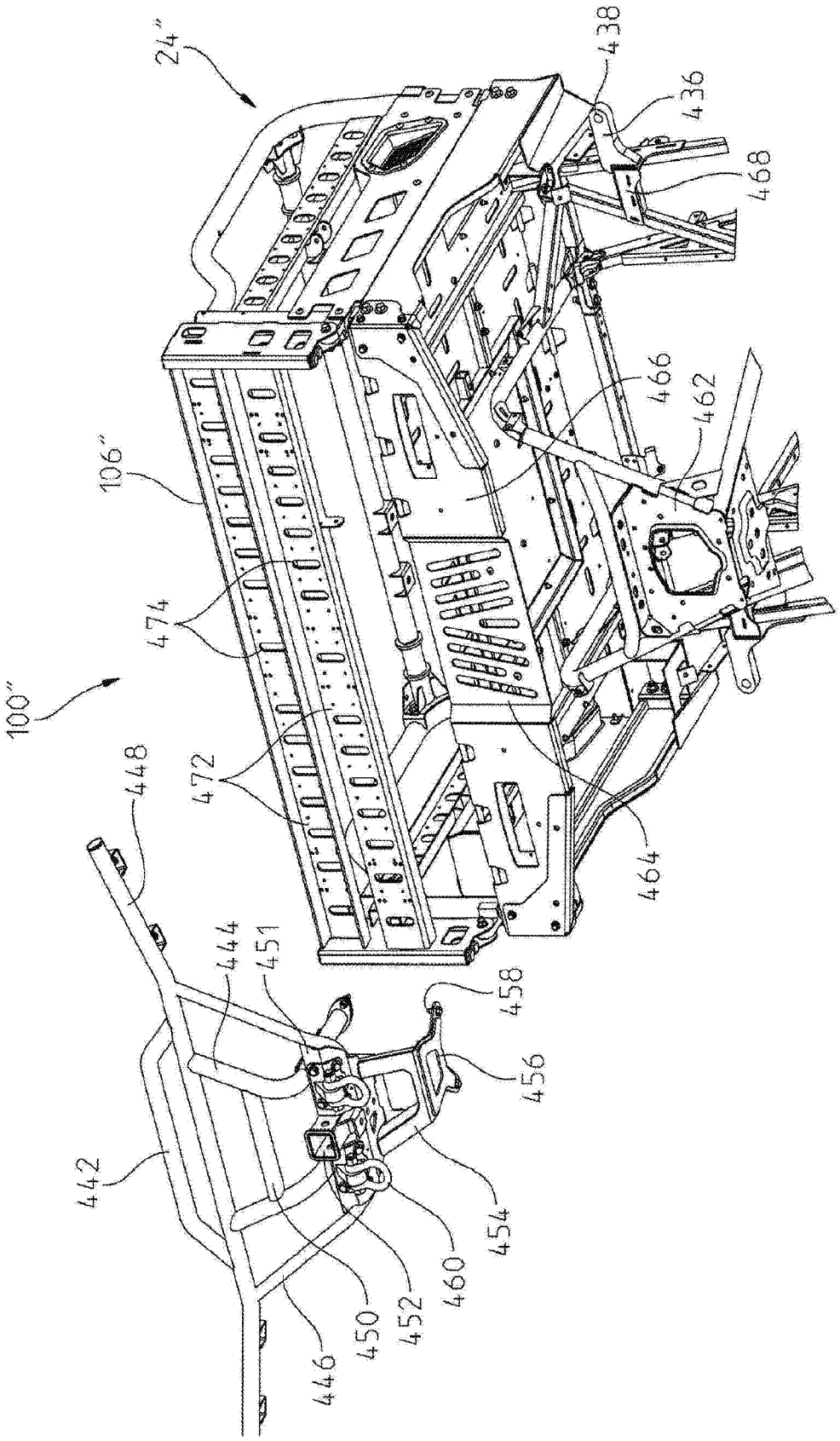
24"
438
436
468
466
462
106"
474
100"
448
472
464
444
451
458
456
442
454
460
450
452
446

图 35

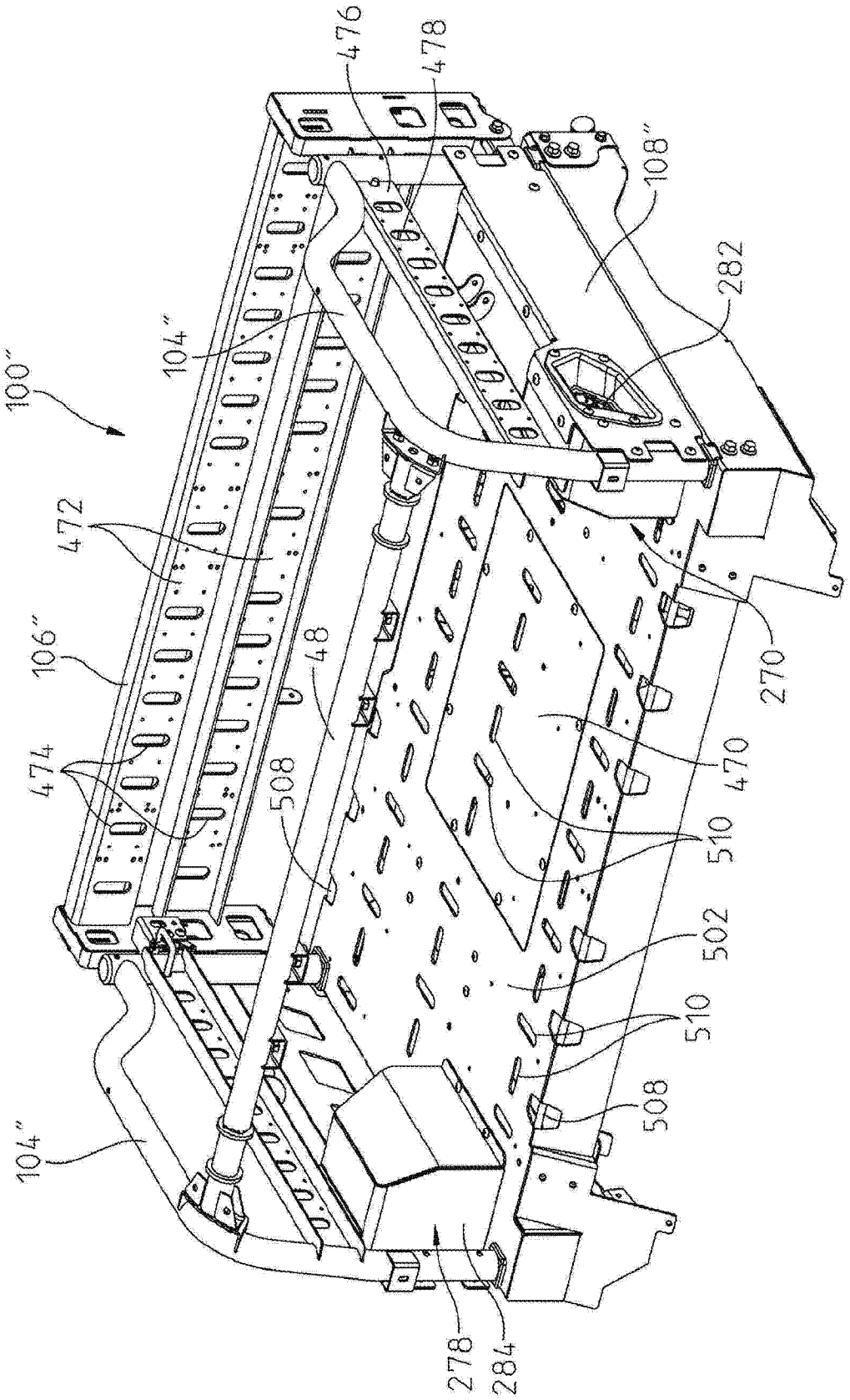
476
478
108″
282
104″
100″
472
106″
48
270
474
508
470
510
502
510
508
104″
278
284

图 36

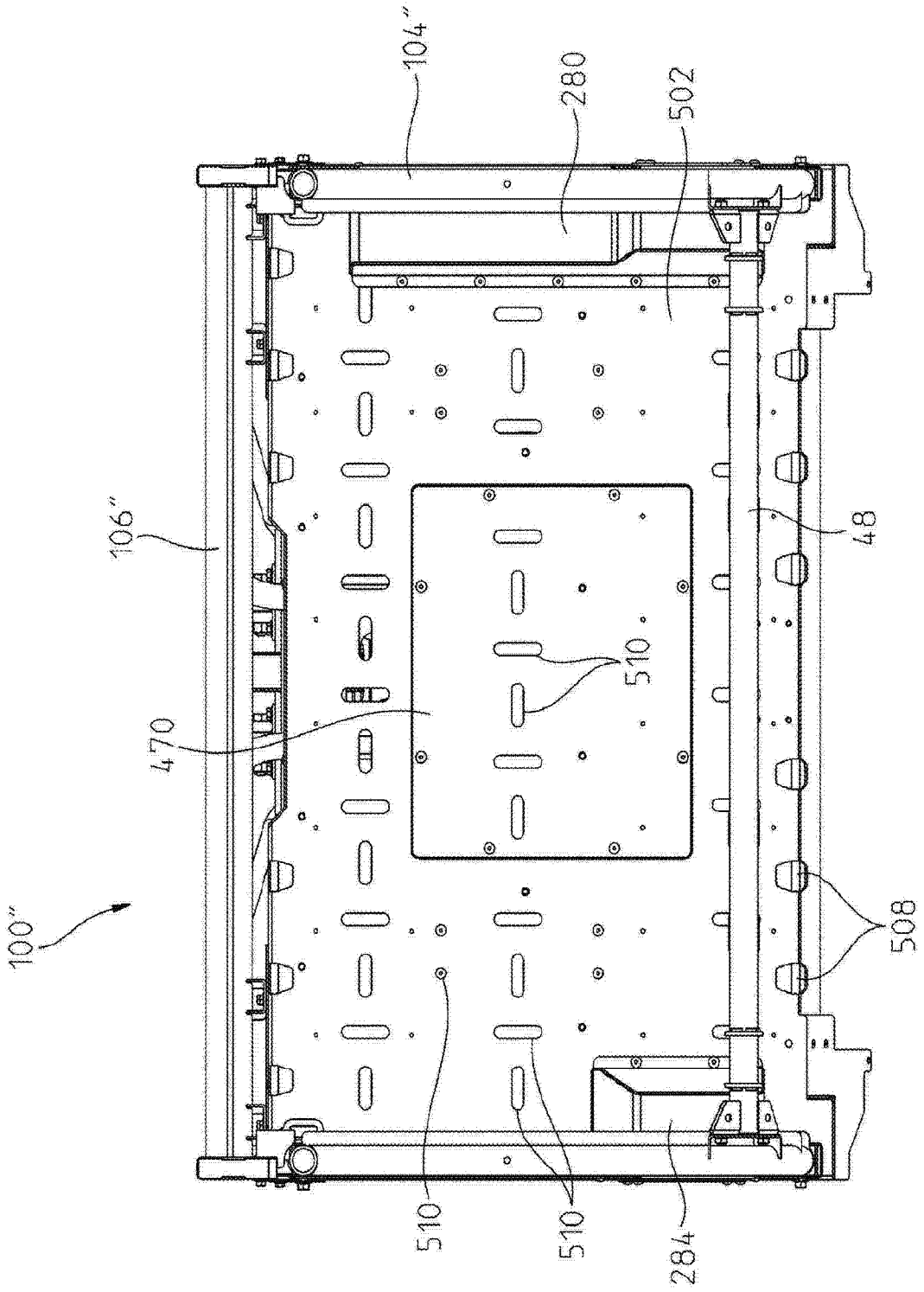

图 37

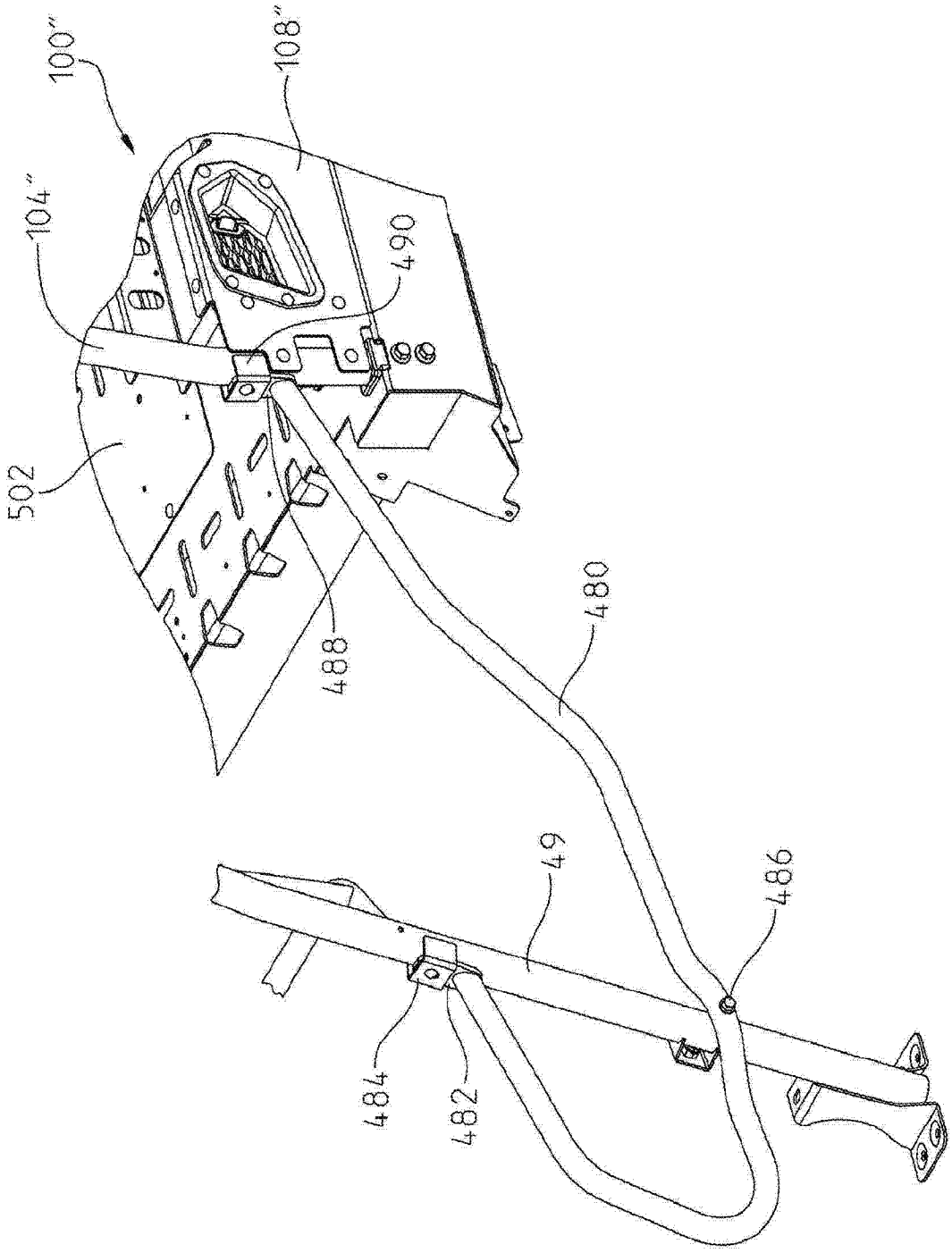

图 38

Abstract

An illustrative embodiment of the present disclosure includes a vehicle (10) comprising a plurality of ground engaging members (12, 14), a chassis (30) supported by the plurality of ground engaging members, and an engine (274) supported by the chassis. The engine is configured to provide power to at least one of the plurality of ground engaging members. The vehicle further comprises a seating area (150) supported by the chassis. The seating area includes at least an operator seat (152) and a passenger seat (158) in a side-by-side arrangement. The vehicle further comprises a plurality of longitudinal members (62) positionable above the seating area and a coupling device (130) coupled to at least one of the longitudinal members. The coupling device has an adjustment member (144) to vary a force of the coupling device.