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Schneider et al.

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(45) **Date of Patent: Apr. 3, 2012**

(54) **ROTATABLE SEAT ASSEMBLY**

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(73) Assignee: **The United States of America as represented by the Secretary of the Navy**, Washington, DC (US)

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(22) Filed: **Jul. 31, 2009**

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(51) **Int. Cl.**
A47C 1/00 (2006.01)

(52) **U.S. Cl.** **297/344.21**; 297/344.23; 297/273

(58) **Field of Classification Search** 297/344.21, 297/344.23, 273

See application file for complete search history.

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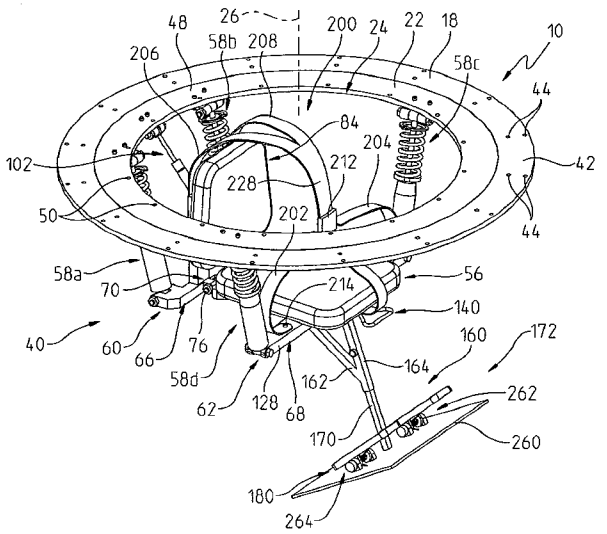
Primary Examiner — Sarah B McPartlin
(74) *Attorney, Agent, or Firm* — Christopher A. Monsey

(57) **ABSTRACT**

A seat assembly supported for rotation and including a foot control supported below a seat base for rotation with a rotatable support member. The foot control illustratively includes a right control pedal configured to cause the actuator to drive the rotatable member in a clockwise rotation, and a left control pedal configured to cause the actuator to drive the rotatable member in a counterclockwise direction.

11 Claims, 16 Drawing Sheets



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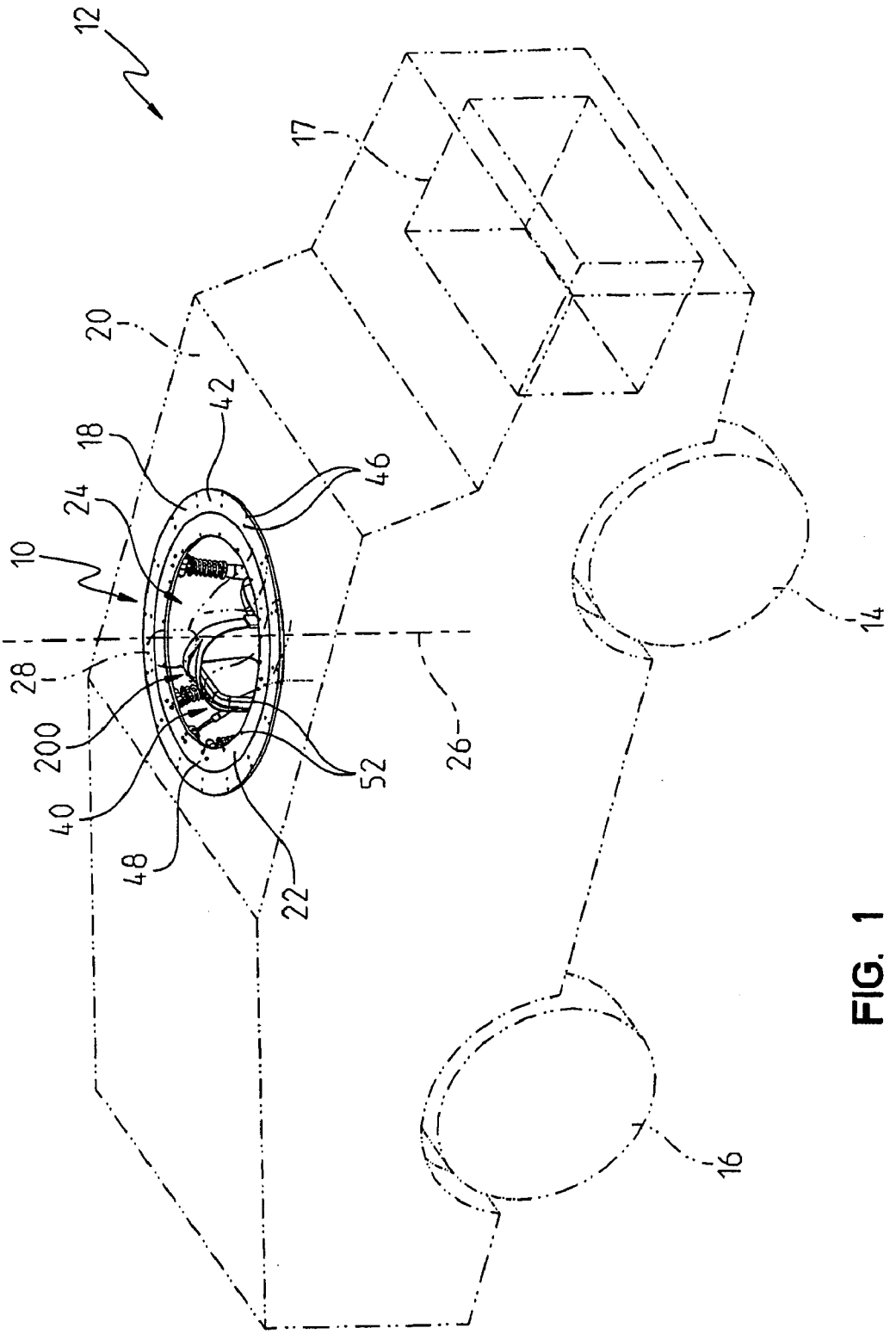
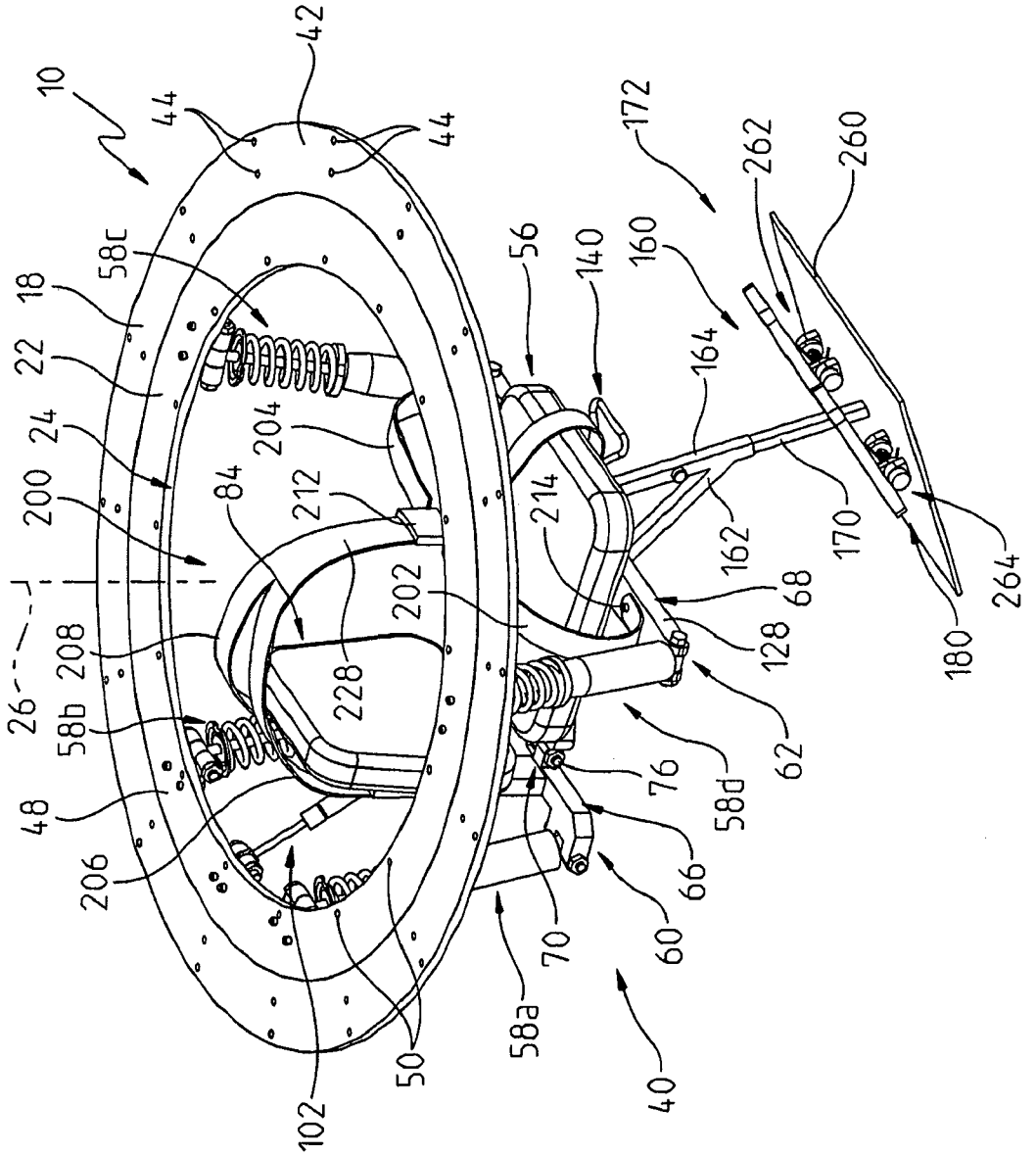


FIG. 1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170
264
180
68
128
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58d
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102
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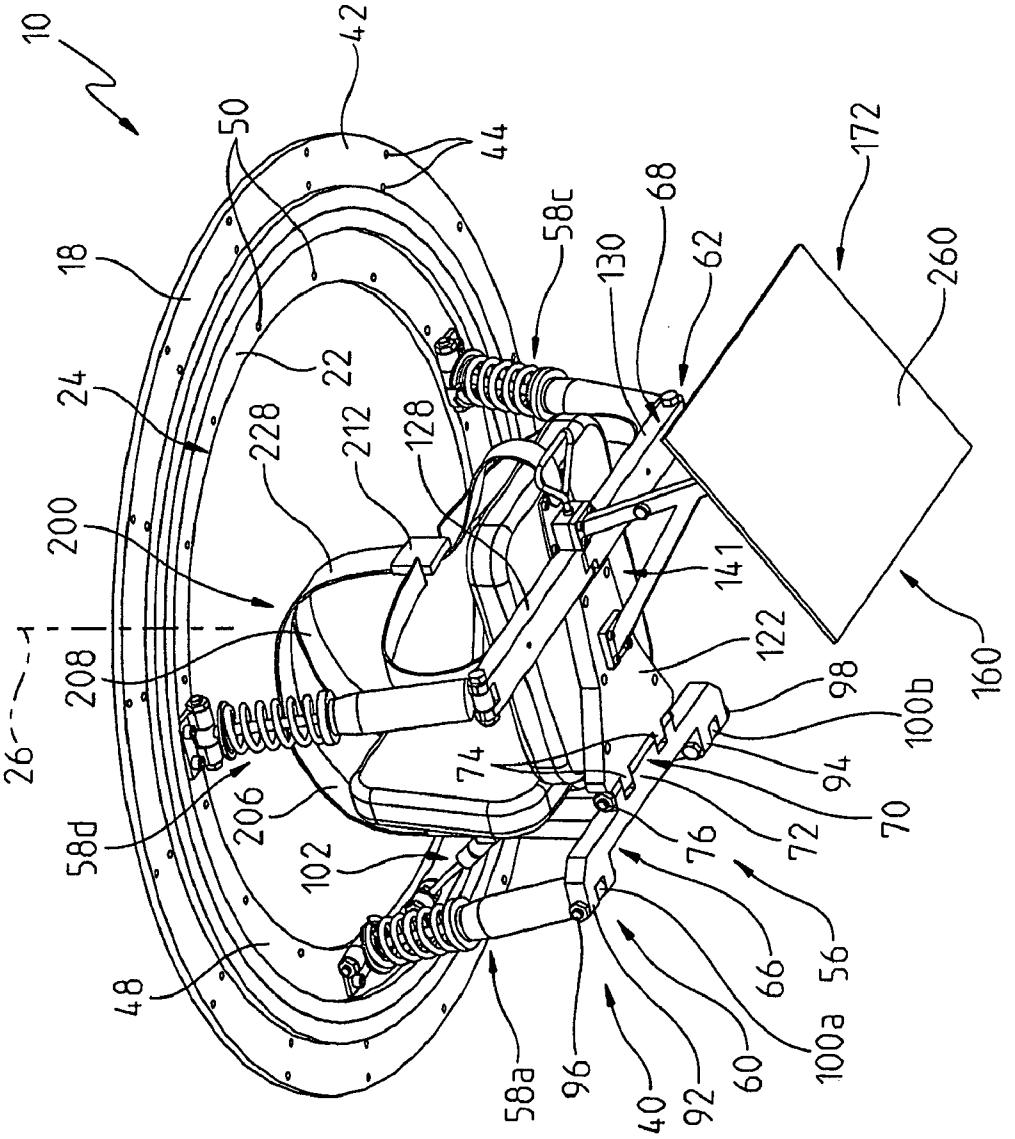
48
58b
208
26
228
202

FIG. 2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100b
160
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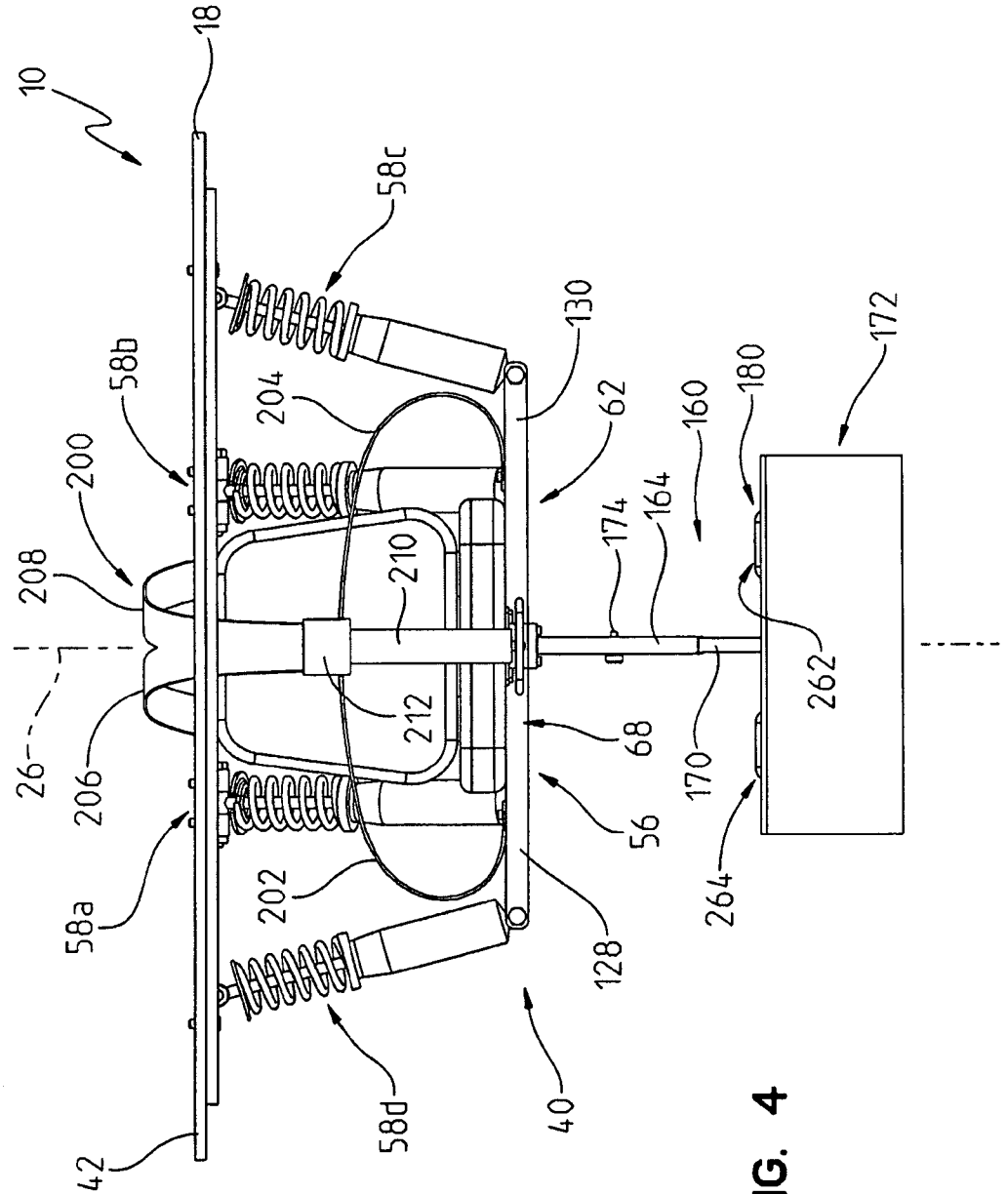
66
56
48
100a
60
58a
96
40
92

FIG. 3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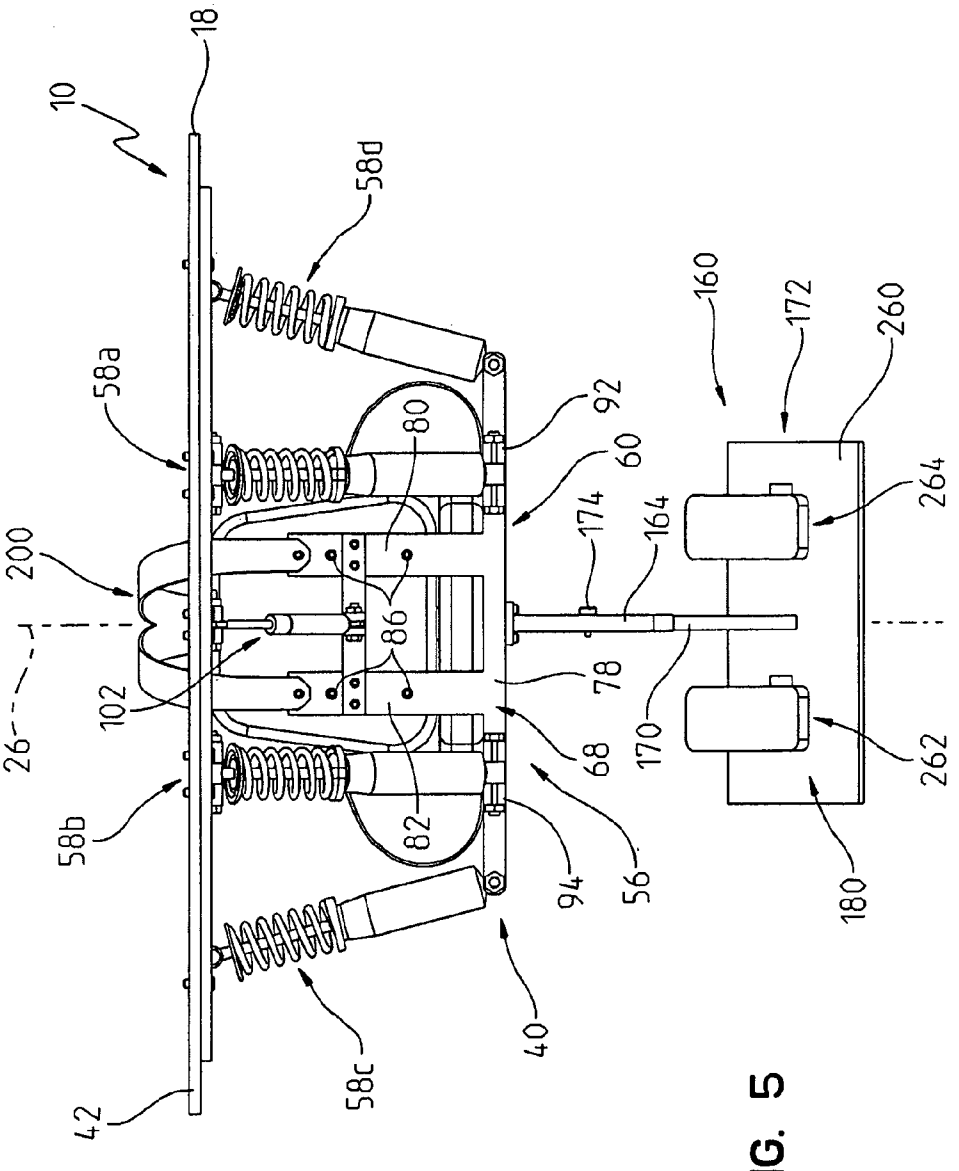
262
264

FIG. 4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58b
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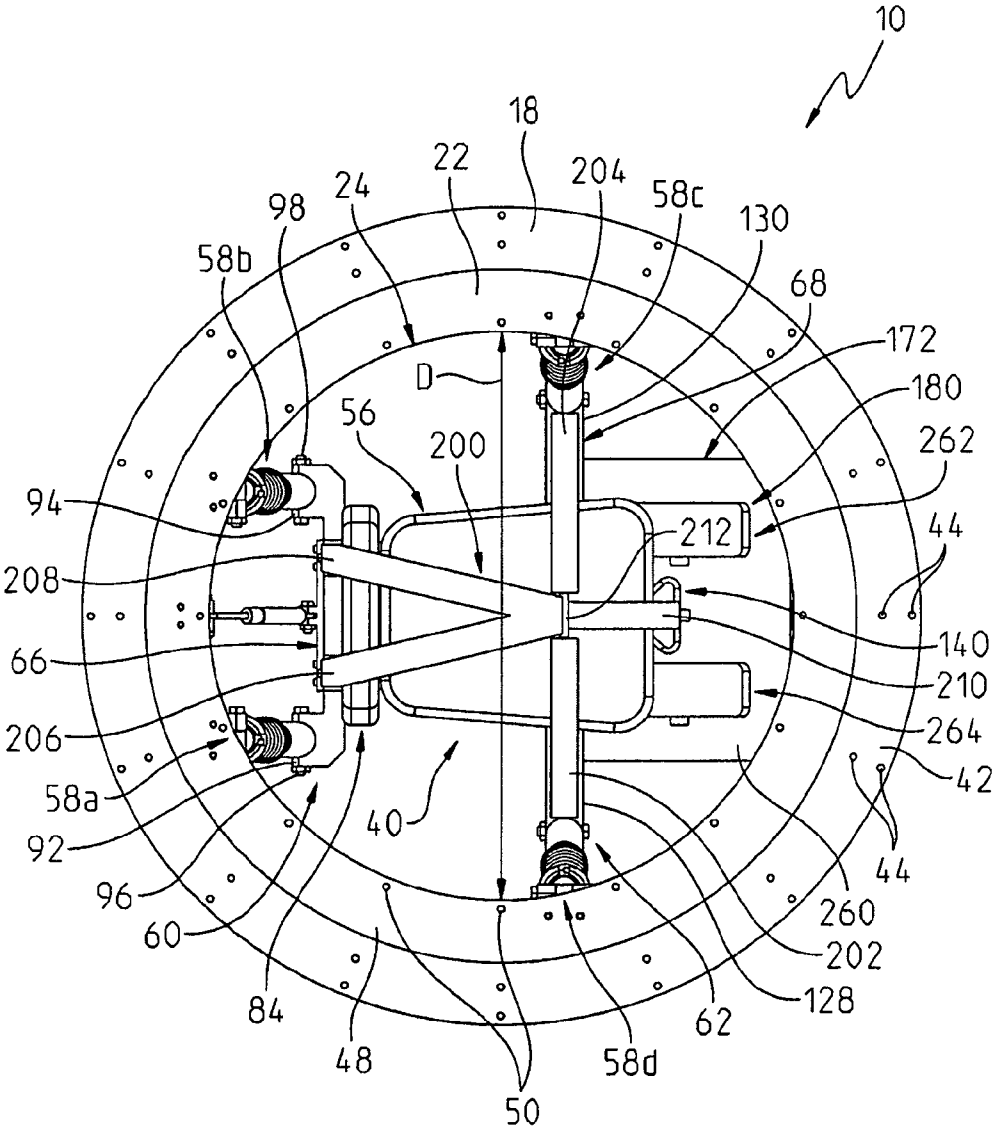
94
56
180
40
58c
42

FIG. 5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128
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48
58d
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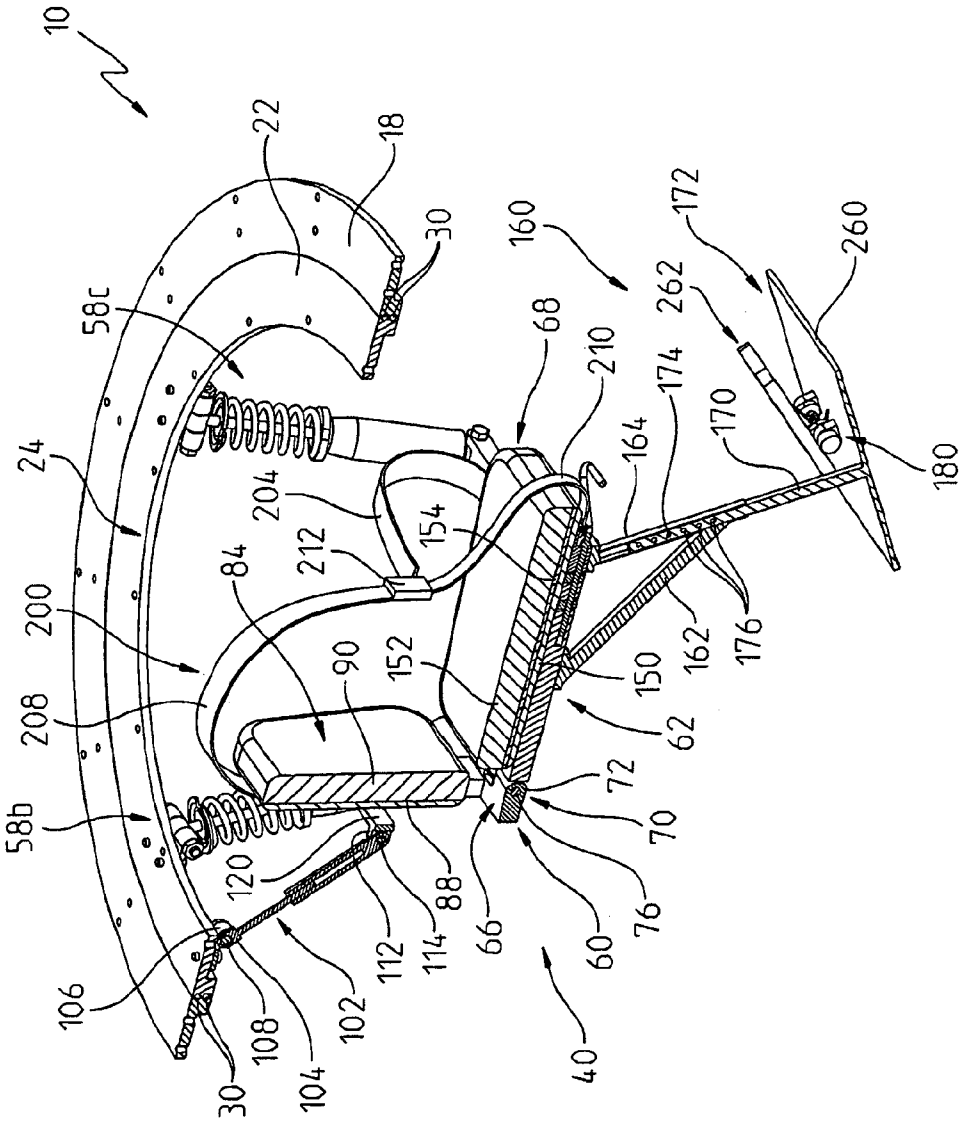
FIG. 6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162
176
208
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58b
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104
30
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FIG. 7

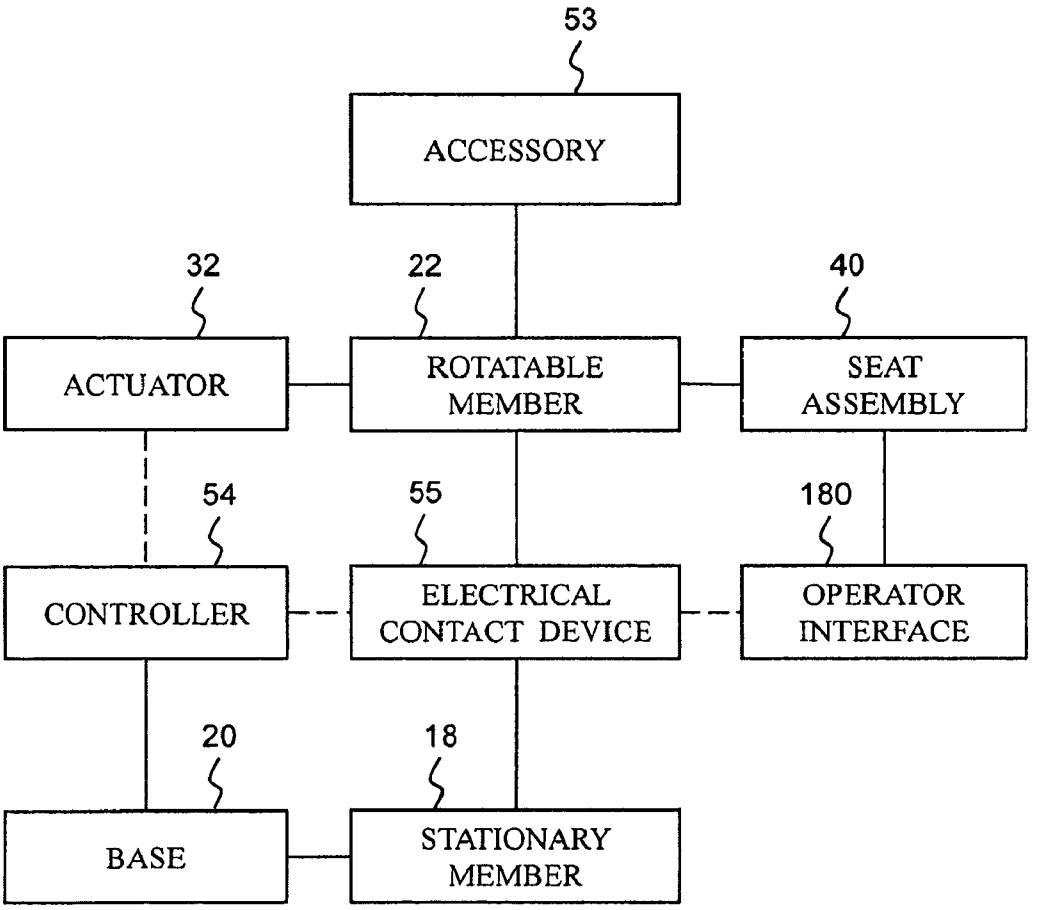
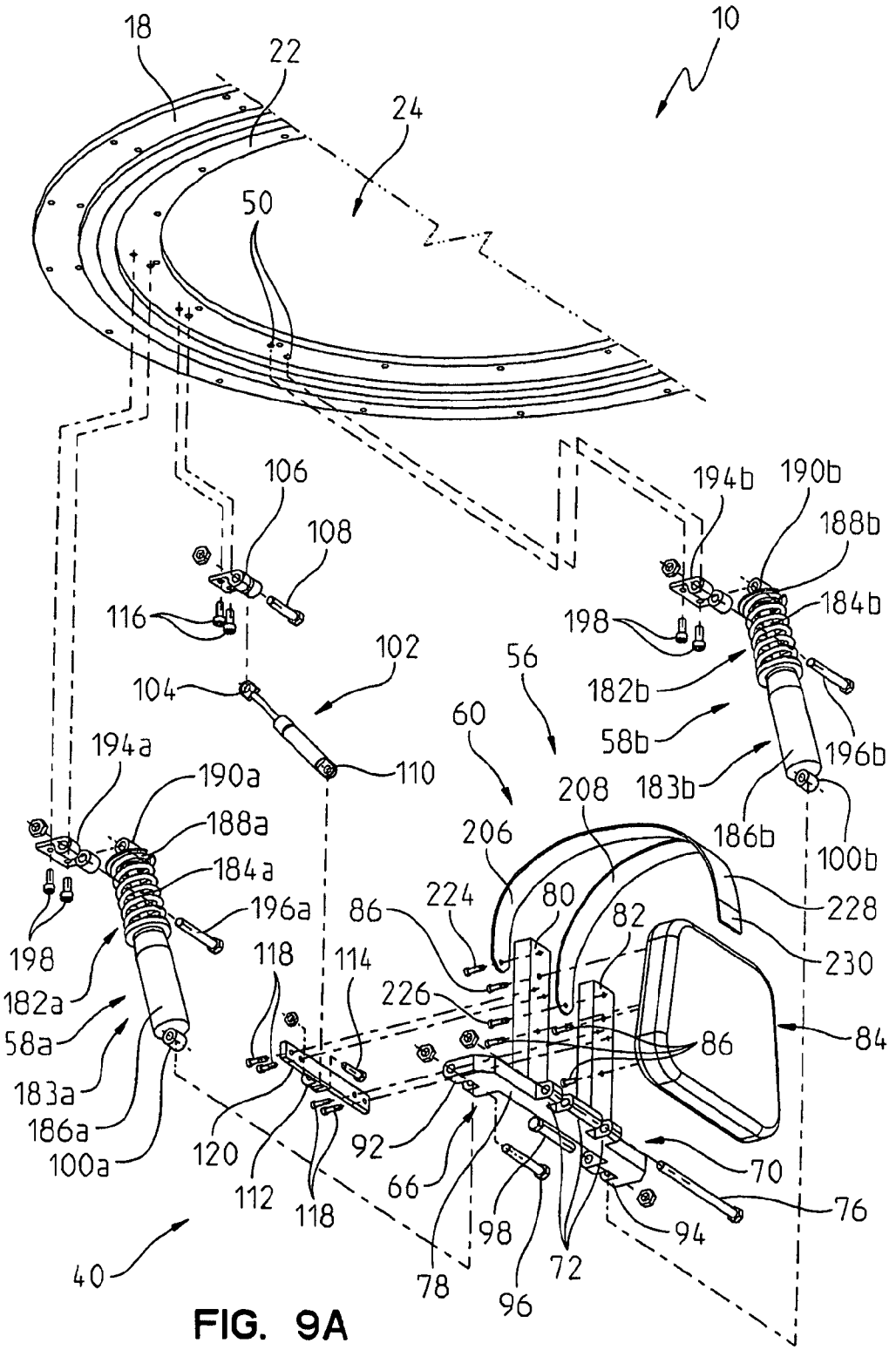

53
ACCESSORY
32
22
40
ACTUATOR
ROTATABLE MEMBER
SEAT ASSEMBLY
54
55
180
CONTROLLER
ELECTRICAL CONTACT DEVICE
OPERATOR INTERFACE
20
18
BASE
STATIONARY MEMBER

FIG. 8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196b
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194a
190a
188a
184a
196a
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182a
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183a
186a
100a
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120
112
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86
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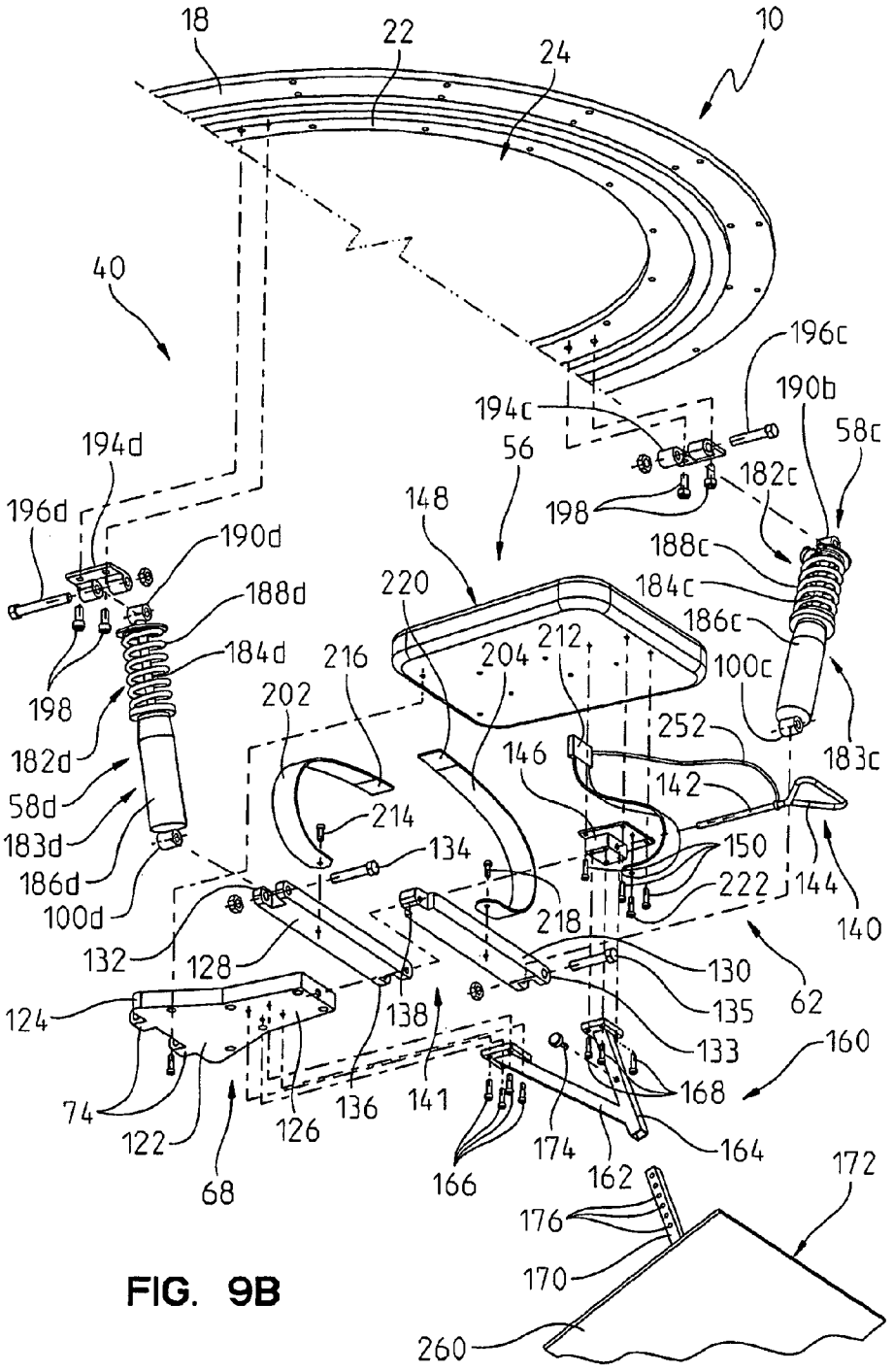
FIG. 9A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183c
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182d
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58d
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183d
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186d
218
140
100d
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128
130
62
124
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FIG. 9B

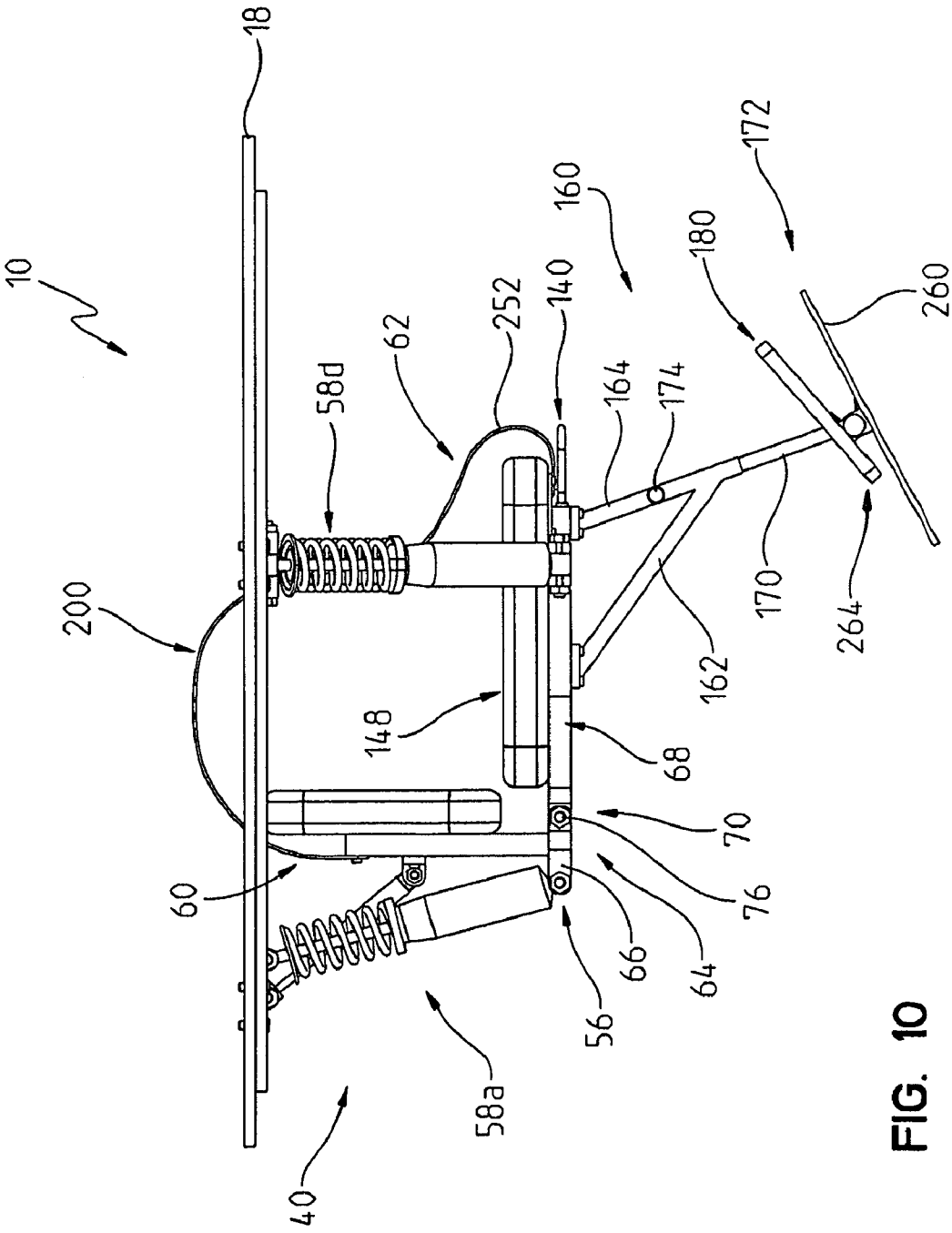
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FIG. 10

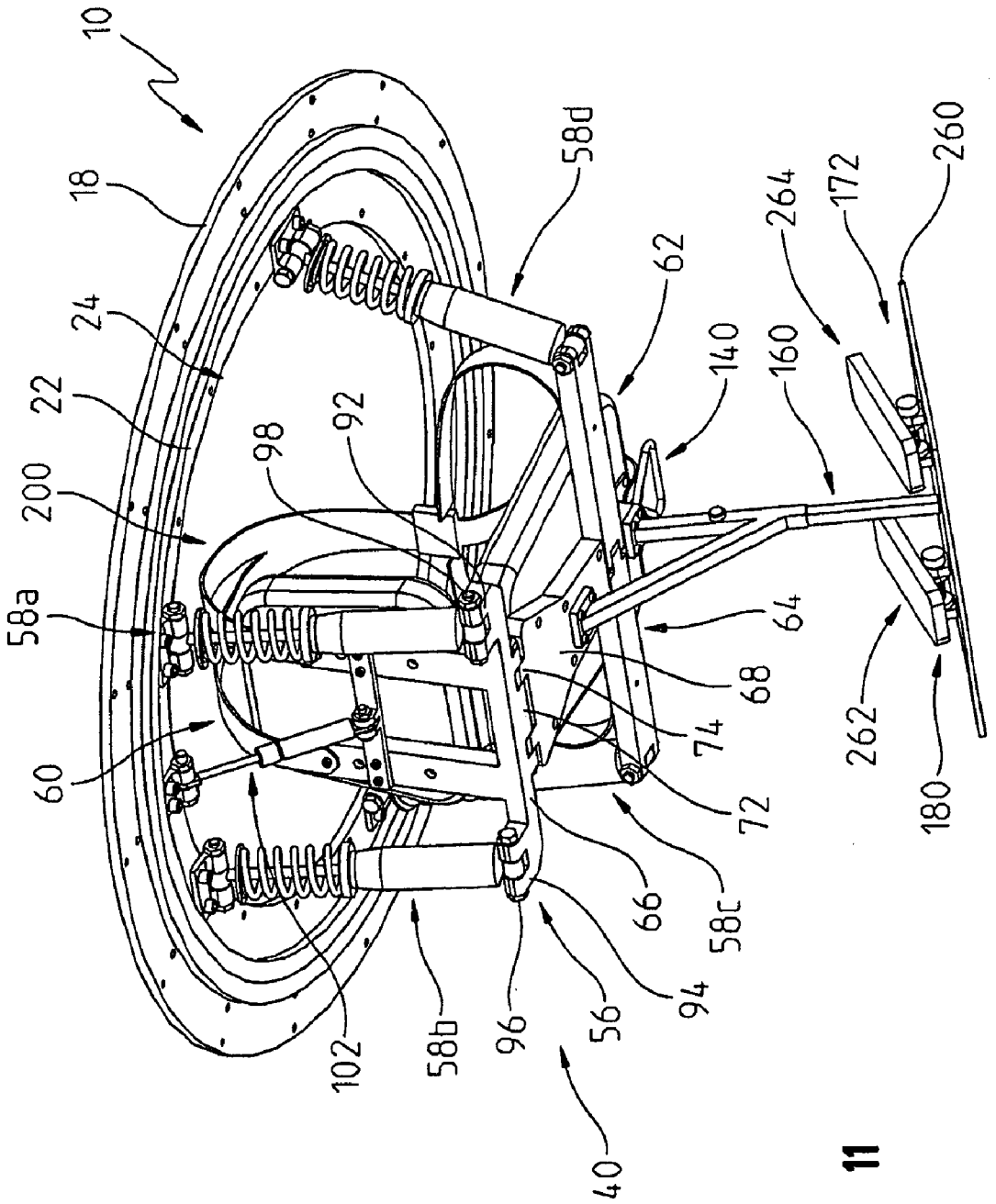
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FIG. 11

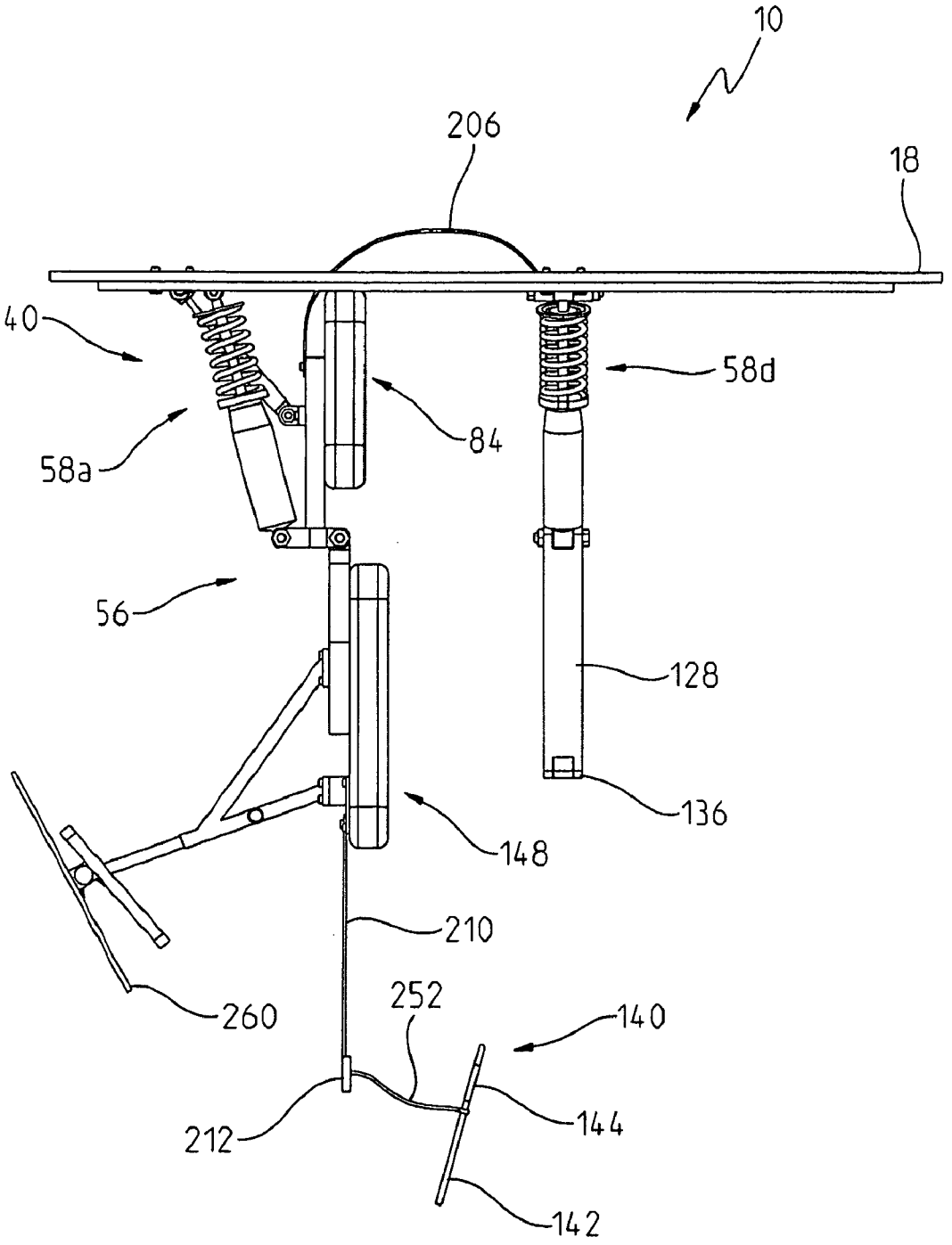

FIG. 12

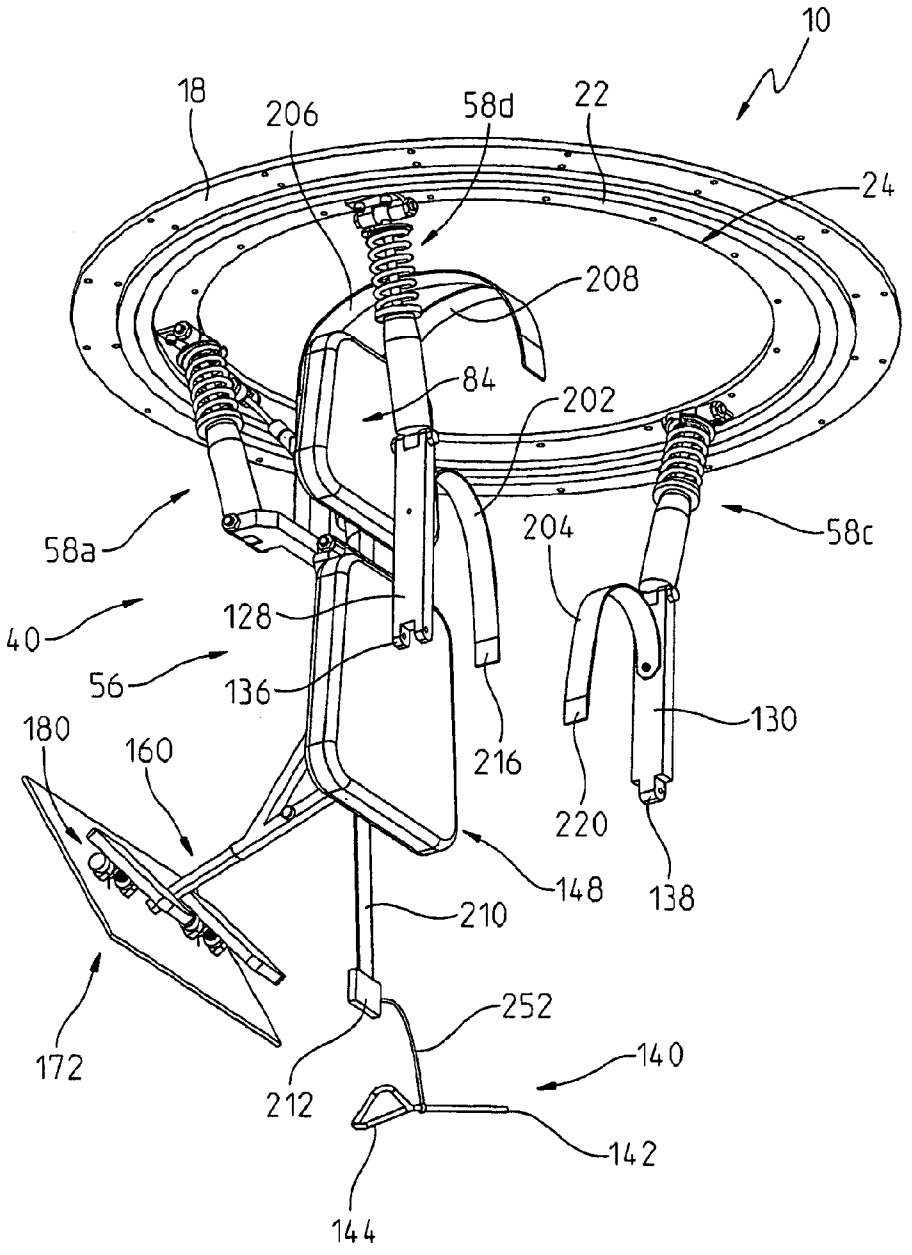
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FIG. 13

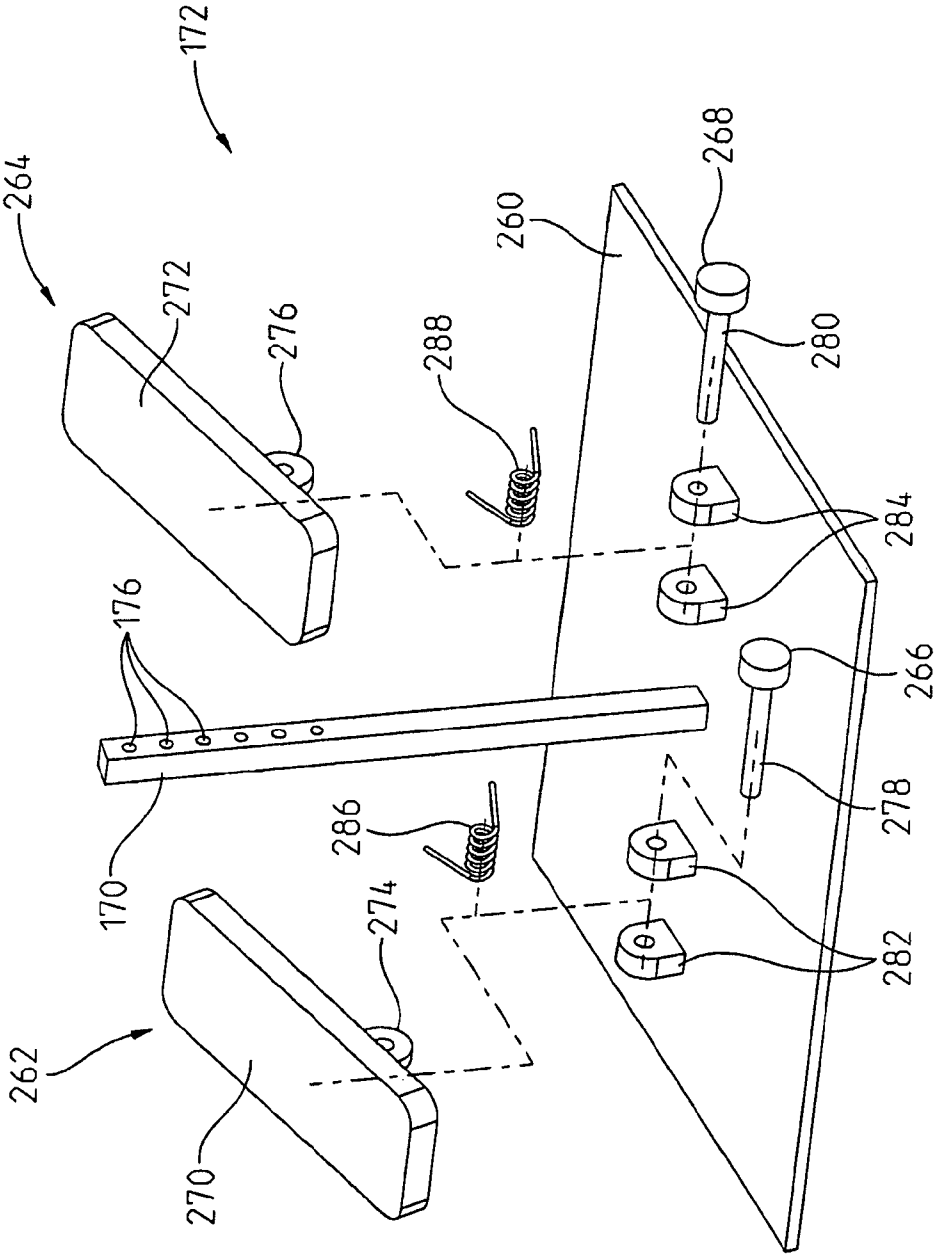
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FIG. 14

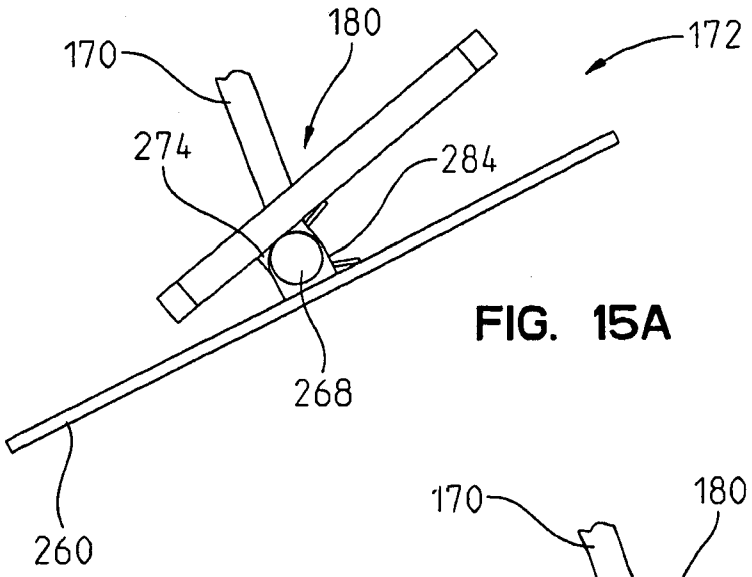

FIG. 15A

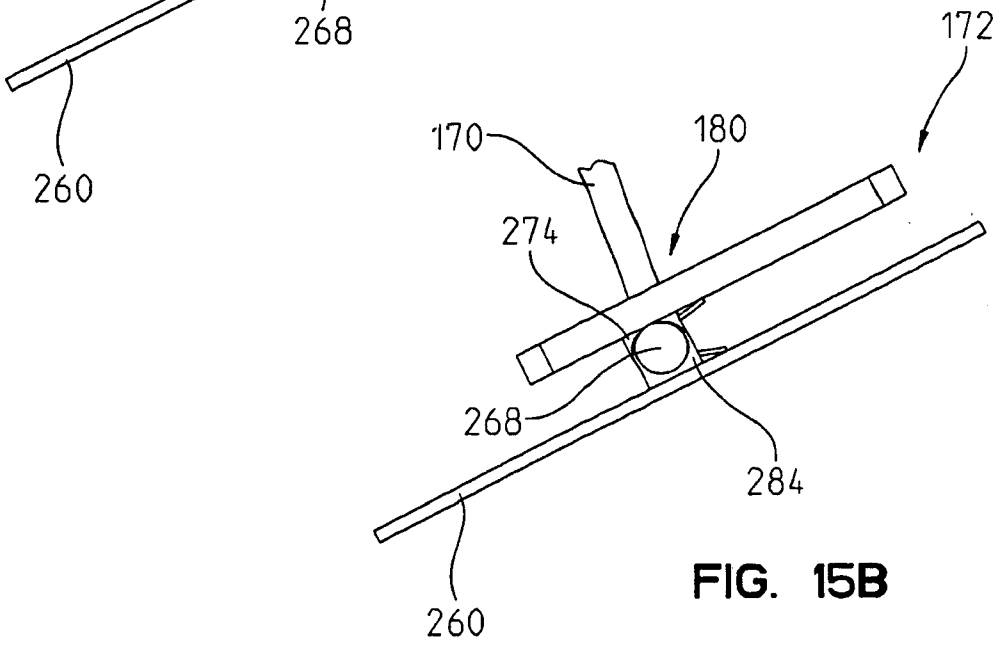

FIG. 15B

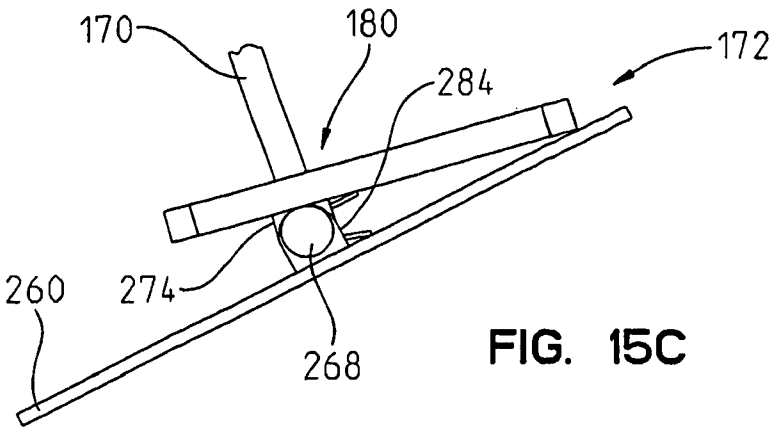

FIG. 15C

ROTATABLE SEAT ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation of U.S. patent application Ser. No. 12/510,221, filed Jul. 27, 2009, the disclosure of which is expressly incorporated by reference herein.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

The invention described herein was made in the performance of official duties by employees of the Department of the Navy and may be manufactured, used and licensed by or for the United States Government for any governmental purpose without payment of any royalties thereon.

BACKGROUND AND SUMMARY OF THE DISCLOSURE

The present invention relates generally to operator supports and, more particularly, to a seat assembly supported by a rotatable turret.

Structures are known for supporting an operator below a rotating support. For example, vehicles including turrets may include a flexible strap coupled below a rotatable ring at diametrically opposed support points. However, such straps often prove to be uncomfortable for the operator, particularly during extended periods of time. Additionally, such straps provide little protection to the operator in the event of an accident, or due to blast pressures or fragmentation due to blast events. Further, such straps provide little or no cushioning from vibrations and impacts during normal vehicle operations.

According to an illustrative embodiment of the present disclosure, an operator support assembly includes a first member, and a second member supported for rotation relative to the first member, the second member defining a center opening. A seat bottom is suspended below the second member. A support couples the seat bottom to the second member. The support includes a shock absorbing device to dampen shock impulse between the second member and the seat bottom.

In a further illustrative embodiment, the support includes a first support member and a second support member, a releasable coupling connecting the first support member to the seat bottom, and a pivotable coupling connecting the second support member to the seat bottom. A quick release mechanism includes a user interface operably coupled to the releasable coupling, wherein activation of the user interface causes the quick release mechanism to disconnect the releasable coupling from the seat bottom such that the seat bottom pivots downwardly about the pivotable coupling.

According to another illustrative embodiment of the present disclosure, a method of supporting an individual within a turret includes the steps of providing a rotatable member, and suspending a seat bottom from the rotatable member, the seat bottom including a rigid base member. The method further includes the steps of absorbing shock between the rotatable member and the seat bottom, and rotating simultaneously the rotatable member and the seat bottom.

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

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

FIG. **1** is a perspective view of an illustrative operator support assembly coupled to a vehicle;

FIG. **2** is a front, top perspective view of the operator support assembly of FIG. **1**;

FIG. **3** is a front, bottom perspective view of the operator support assembly of FIG. **2**;

FIG. **4** is a front view of the operator support assembly of FIG. **2**;

FIG. **5** is a rear view of the operator support assembly of FIG. **2**;

FIG. **6** is a top plan view of the operator support assembly of FIG. **2**;

FIG. **7** is a side perspective view, in cross-section, of the operator support assembly of FIG. **2**;

FIG. **8** is a block diagram illustrating the interaction between the operator interface and additional components of the operator support assembly of FIG. **2**;

FIG. **9**A is an exploded perspective view of an illustrative rear subassembly of the operator support assembly of FIG. **2**;

FIG. **9**B is an exploded perspective view of an illustrative front subassembly of the operator support assembly of FIG. **2**;

FIG. **10** is side elevational view of the operator support assembly of FIG. **2**, with the seat assembly in a locked support mode of operation;

FIG. **11** is a rear, bottom perspective view of the operator support assembly of FIG. **2**, with the seat assembly in the locked support mode of operation;

FIG. **12** is a side elevational view similar to FIG. **10**, with the seat assembly in a released mode of operation;

FIG. **13** is a front, bottom perspective view of the operator support assembly similar to FIG. **3**, showing the seat assembly in the released mode of operation;

FIG. **14** is an exploded perspective view of the foot control assembly of FIG. **2**;

FIG. **15**A is a side elevational view of the foot control assembly of FIG. **14**, showing the right foot pedal in a raised position;

FIG. **15**B is a side elevational view similar to FIG. **15**A, showing the right foot pedal in an intermediate depressed position; and

FIG. **15**C is a side elevational view similar to FIG. **15**A, showing the right foot pedal in a fully depressed position.

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 exemplification set out herein illustrates 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

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawings, which are described

below. The embodiments disclosed below are not intended to be exhaustive or limit the invention to the precise form disclosed in the following detailed description. Rather, the embodiments are chosen and described so that others skilled in the art may utilize their teachings. It will be understood that no limitation of the scope of the invention is thereby intended. The invention includes any alterations and further modifications in the illustrated devices and described methods and further applications of the principles of the invention which would normally occur to one skilled in the art to which the invention relates.

Referring initially to FIG. **1**, operator support assembly **10** according to an illustrative embodiment of the present disclosure is shown coupled to a vehicle **12**. Illustratively, the vehicle **12** includes a plurality of ground engaging members, such as a pair of front wheels **14** and a pair of rear wheels **16**. Some or all of the wheels **14** and **16** may be driven in motion by an actuator, such as an engine **17**. While the following description describes the operator support assembly **10** for use in connection with a vehicle **12**, it should be appreciated that the operator support assembly **10** may find use in other applications, including being mounted to a stationary support (not shown). Further, the illustrative vehicle **12** in the embodiment of FIG. **1** may be of any conventional type, such as military vehicles, law enforcement vehicles, rescue trucks, communications vehicles, material handling equipment, and construction equipment.

With reference to FIGS. **1-7**, the operator support assembly **10** illustratively includes a first member, such as an annular outer stationary member **18** configured to be coupled to a base **20**, such as a vehicle platform. A second member, such as an annular inner rotatable member **22**, is illustratively supported for rotation relative to the stationary member **18** and is concentrically received within the outer stationary member **18**. The inner rotatable member **22** defines a center opening **24** having a longitudinal axis **26** and configured to receive the torso of an individual **28**, typically an operator associated with the vehicle **12** (FIG. **1**). More particularly, the center opening **24** of the rotatable member **22** is configured to permit the traversing thereof by the torso of individual **28** (i.e., ingress and egress within the center opening **24**). Illustratively, the center opening **24** has an inner diameter D (FIG. **6**) of at least 26 inches based upon the shoulder width of an average adult male. In one illustrative embodiment, the inner diameter D of center opening **24** is approximately 42 inches in order to accommodate the clothing of individual **28** and to permit the manipulation of equipment within opening **24** by individual **28**.

With reference to FIG. **8**, an actuator **32**, such as an electric motor connected to a gear train, may be coupled in a conventional manner to drive the rotatable member **22** in rotation relative to the stationary member **18**. In another embodiment, a manual hand crank (not shown) may be coupled to the rotatable member **22**, wherein rotation of the hand crank drives the rotatable member **22** in rotation. Alternatively, the rotatable member **22** may be manually rotated by the individual **28** received within the center opening **24** by pushing his or her legs against the floor or other relatively stationary member. As further detailed herein, an operator seat assembly **40** is illustratively supported by the rotatable member **22**, such that the individual **28** supported by the seat assembly **40** rotates concurrently with the rotatable member **22**. Conventional bearing members, such as ball bearings **30** (FIG. **7**), are illustratively supported intermediate the stationary member **18** and the rotatable member **22** to facilitate relative rotation therebetween.

The stationary member **18** includes an annular outer mounting flange **42** having a plurality of mounting holes **44** for receiving fasteners **46** for coupling to the vehicle platform or base **20** (FIG. **1**). Similarly, the rotatable member **22** includes an annular inner mounting flange **48** having a plurality of mounting holes **50** for receiving fasteners **52** for securing thereto an accessory **53** (FIG. **8**), such as a turret in connection with a military vehicle, an antenna or camera in connection with a communications vehicle, a crane in connection with construction equipment, a ladder in connection with rescue or maintenance trucks, or a water cannon for use on fire fighting or crowd control vehicles.

With further reference to FIG. **8**, a controller **54** may be supported by the base **20** and is in electrical communication with an electrical contact device **55**. The electrical contact device **55** provides for electrical communication between components coupled to the stationary member **18** and components coupled to the rotatable member **22**. An illustrative electrical contact device **55** is disclosed in U.S. patent application Ser. No. 12/334,070, filed Dec. 12, 2008, the disclosure of which is expressly incorporated by reference herein.

Referring now to FIGS. **2** and **3**, the operator seat assembly **40** illustratively includes a seat **56** suspended below the rotatable member **22** for rotation therewith. More particularly, a support operably couples the seat **56** to the rotatable member **22** and, illustratively, includes a plurality of support members **58**. The seat **56** includes a rear seat portion or subassembly **60** coupled to a front seat portion or subassembly **62** (FIGS. **9**A and **9**B).

With further reference to FIGS. **2-7**, the seat **56** includes a frame assembly **64** including a rear frame **66** of the rear seat portion **60**, and a front frame **68** of the front seat portion **62**. The rear frame **66** is pivotally coupled to the front frame **68** at a pivot coupling or hinge **70**. The pivot coupling **70** is illustratively defined by a first or rear bracket member, illustratively a dual clevis **72**, of the rear frame **66** pivotally coupled to a second or front bracket member, illustratively a pair of tabs **74**, of the front frame **68** by way of a pin **76**.

The rear frame **66** illustratively includes a lateral base **78** supporting the rear bracket member **72** and a pair of uprights **80** and **82**. A seat back **84** is coupled to the uprights **80** and **82**, illustratively through fasteners **86**. In a further illustrative embodiment, the uprights **80** and **82** may include adjustable telescoping members (not shown) such that the relative position of the seat back **84** may be adjusted by the user. The seat back **84** may include a rigid support **88** secured to a cushion **90** (FIG. **7**). In certain illustrative embodiments, an adjustable headrest (not shown) may be supported above the seat back **84**.

With reference to FIGS. **3**, **5**, and **9**A, a pair of laterally spaced support brackets, illustratively first clevis **92** and second clevis **94**, are illustratively positioned at opposing ends of the base **78**. The brackets **92** and **94** are configured to receive pivot pins **96** and **98** to pivotally couple lower mounting members **100***a* and **100***b* of support members **58***a* and **58***b* to the rear frame **66**.

A back support or coupler **102** illustratively extends between the rotatable member **22** and the rear frame **66**. The back support **102** is illustratively flexible, and may comprise a gas shock having a tab **104** at an upper end coupled to a clevis **106** by a pivot pin **108**, and having a tab **110** at a lower end coupled to a clevis **112** by a pivot pin **114**. Clevis **106** is illustratively secured to the rotatable member **22** by fasteners **116** received within apertures **50**. Clevis **112** is illustratively secured to the uprights **80** and **82** by fasteners **118** extending through a cross-member **120**. The back support **102** is configured to maintain the seat back **84** in a generally vertical

position while permitting limited relative movement between the seat back **84** and the rotatable member **22**.

With reference to FIGS. **3**, **4**, and **9**B, the front frame **68** illustratively includes a longitudinal base **122** having a rear portion **124** with an extended width and a front portion **126** extending longitudinally forward from the rear portion **124**. The rear portion **124** supports the front bracket member **74**, while the front portion **126** is releasably coupled to a pair of lateral supports, illustratively cross-members **128** and **130**.

The lateral supports **108** and **130** each include a support bracket, illustratively clevis **132**, **133**, supported at a first or outer end and configured to receive pivot pins **134**, **135** to pivotally couple lower mounting members **100***d* and **100***c* of supports **58***d* and **58***c* to the front frame **68**. The second or inner end of the lateral support **128** includes a bracket or clevis **136**, while the second or inner end of the lateral support **130** includes a cooperating bracket or tab **138**. The tab **138** is received within the clevis **136**, and is releasably secured to the clevis **136** together by a coupler **140** to define a releasable coupling **141**. The coupler **140** illustratively includes a pin **142** secured to a handle **144**. The pin **142** is releasably received within coaxial openings formed within the clevis **136** and tab **138**. In certain illustrative embodiments, a receiver **146** is positioned forward of the supports **128** and **130** and includes an opening configured to receive the pin **142** of the coupler **140**. The receiver **146** may be secured to a seat bottom **148** by a plurality of fasteners **150**. Engagement between the pin **142** of coupler **140** and the receiver **146** is configured to prevent undesired relative pivoting or flexing between the supports **128** and **130**.

The seat bottom **148** is supported in a substantially horizontal position by the supports **128** and **130** when coupled together at the releasable coupling **141**. As further detailed herein, the supports **128** and **130** are connected to, but not fixed to the seat bottom **148**. Instead, the seat bottom **148** rests upon, and is at least partially supported by, the supports **128** and **130**.

With reference to FIG. **7**, the seat bottom **148** illustratively includes a rigid base member **150**, illustratively formed of aluminum plate, supporting a cushion **152**. A ballistic resistant member **154** may be supported by the base member **150** below the cushion **152**. Illustratively, the ballistic resistant member **154** may comprise a para-aramid synthetic fiber, such as Kevlar®, configured to protect individual **28** supported by the seat **56** against blast pressure and fragmentation.

The cushion **90** of seat back **84**, and the cushion **152** of seat bottom **148** are illustratively formed of a fire retardant foam. Alternatively, or in addition to the fire retardant foam, a protective cover or coating may encapsulate each respective cushion **90** and **152**. In one illustrative embodiment, the protective cover comprises a fire retardant material, such as Nomex®, a flame retardant meta-aramid material.

With reference to FIGS. **2**, **5**, **7**, and **9**B, a foot support assembly **160** is illustratively coupled to the seat bottom **148** through a pair of arms **162** and **164** oriented in a Y-shaped configuration. The foot support assembly **160** is illustratively configured to be ergonomically advantageous for the operator **28**. In one illustrative embodiment, arm **162** is secured to base **122** by fasteners **166**, and arm **164** is secured to receiver **146** by fasteners **168** (FIG. **9**B). A telescoping member or key **170** is illustratively received within the arm **164** and is coupled to a footrest **172**. A pin **174** may be received within any one of a plurality of apertures **176** (FIGS. **7** and **9**B) of telescoping member **170** such that the vertical position of the footrest **172** relative to the seat bottom **148** may be adjusted. In certain illustrative embodiments, the angular orientation of the foot rest **172** relative to the seat bottom **148** may also be adjusted by providing a pivoting arm **164** and a length adjustable arm **162**. As further detailed herein, an operator interface **180** may be supported by the footrest **172**.

With further reference to FIGS. **9**A and **9**B, the support members **58** each include a shock absorbing device **182** to dampen shock impulse between the rotatable member **22** and the seat **56**. The shock absorbing devices **182** may be of conventional design for absorbing or dissipating energy. For example, the devices **182** may comprise coil springs, leaf springs, pneumatic or gas shocks, hydraulic shocks, air bags, or various combinations thereof.

In the illustrative embodiment shown in FIGS. **9**A and **9**B, the shock absorbing devices **182** each comprise a gas shock **183** including a rod **184** supported by a body **186** and surrounded by a spring **188**. More particularly, the rod **184** is supported for sliding movement within the body **186**, illustratively a cylinder. As is known, the cylinder **186** is filled with a fluid, illustratively, a gas such as air. Illustratively, the springs **188** support the weight of the seat **56** and absorb shock by compressing and rebounding. The gas shocks **183** each dampen the oscillation of the respective spring **188** by pushing a piston (not shown) coupled to the rod **184** through a column of fluid received within the body **186**. In one illustrative embodiment, the shock absorbing device **182** is a Roco Marzocchi rear suspension shock absorber available from Marzocchi USA of Valencia, Calif.

The shock absorbing devices **182** are independently coupled between the rotatable member **22** and the seat **56**. Upper and lower mounting members **190** and **100** of each shock absorbing device **182** is pivotally coupled to the rotatable member **22** and the frame **64**, respectively. The upper mounting members **190** are each pivotally coupled to a clevis **194** by a pivot pin **196**. The clevis **194** is secured to the rotatable member **22** by fasteners **198**. As further detailed above, the lower mounting members **100** are each pivotally coupled to one of the brackets **92**, **94** of the rear frame **66** or to one of the support brackets **132**, **133** of the front frame **68**.

The shock absorbing devices **182** of the support members **58** are configured to collectively withstand a range of forces imported on the vehicle **12**. In one illustrative embodiment, the shock absorbing devices **182** are configured to withstand forces encountered by the operator support assembly **10** during normal vehicle operation over rough terrain (about 3 g loading) up to forces caused by blast over pressurization (about 80 g loading) that may be caused by an explosion in proximity to the vehicle **12**. The applied forces may be directed laterally, longitudinally, vertically, or in various combinations thereof. In the foregoing description of forces, g is recognized as the known unit of measure representing acceleration produced by gravity at the earth's surface (i.e., sea level) (for example, 3 g force or loading represents three times the force or loading at normal gravity or 1 g).

The shock absorbing devices **182** absorb vertical forces in the manner detailed above. Lateral and longitudinal forces may be similarly absorbed by the shock absorbing devices **182** as a result of the pivotable mounting thereof to the rotatable member **22** and to the frame **64** of seat **56**. More particularly, the shock absorbing devices **182** illustratively include three degrees of freedom relative to the rotatable member **22**, including rotation of the upper mounting member **190** about pivot pin **196**, rotation of the rod **184** about is longitudinal axis relative to cylinder **186**, and translational movement of the rod **184** relative to the cylinder **186**. The mounting of the shock absorbing devices **182** facilitates the translation of lateral and longitudinal forces, by pivoting or swinging move-

ment of the seat **56**, into components acting substantially along the longitudinal axes of the rods **184** similar to vertical forces.

An operator restraint, such as a harness **200**, is illustratively supported by the seat assembly **40**. More particularly, the harness **200** may comprise a five point restraint including first and second straps or side belts **202** and **204**, third and fourth shoulder straps **206** and **208**, and a fifth center strap **210** coupled together at a releasable coupler or buckle **212**. With reference to FIGS. **2**, **3**, and **9**B, side belt **202** includes a first end secured to lateral support **128** through a fastener **214**, and a second end having a tab **216** releasably coupled to buckle **212**. Similarly, side belt **204** includes a first end secured to lateral support **130** through a fastener **218**, and a second end having a tab **220** releasably coupled to buckle **212**. The center strap **210** includes a first end secured to the seat bottom **148** through a fastener **222** engaging the receiver **146**, and a second end fixed to the buckle **212**.

With reference to FIGS. **2**, **3**, and **9**A, shoulder strap **206** includes a first end secured to upright **80** of the rear frame **66** through a fastener **224**. Similarly, shoulder strap **208** includes a first end secured to upright **82** of the rear frame **66** through a fastener **226**. Second ends of the shoulder straps **206** and **208** are secured together, illustratively through stitching, at a combined portion **228** including a tab **230** which may be releasably coupled to buckle **212**.

In one illustrative embodiment, the harness **200** may comprise a five point Latch and Link Restraint available from Simpson Performance Products of New Braunfels, Tex. Other types of operator restraints may be substituted for the harness **200**, including four point and six point restraints.

A quick release mechanism **250** is operably coupled to the seat **56** and includes an operator interface, illustratively handle **144**, configured to release the seat **56** from the fixed support mode of operation shown in FIGS. **10** and **11** to the released drop down mode of operation of FIGS. **12** and **13**. As detailed above, the handle **144** is operably coupled to pin **142** which passes through brackets **136** and **138** of lateral supports **128** and **130** which support the seat bottom **148**. More particularly, the pin **142** releasably couples together the left and right lateral supports **128** and **130** and, illustratively, the receiver **146**. Pulling the pin **142** axially away from the seat bottom **148** causes the pin **142** to disengage from the left and right supports **128** and **130**. In response to gravity, the supports **128** and **130** then pivot downwardly about pivot pins **134***c* and **134***d* of the supports **58***c* and **58***d*. The seat bottom **148** then drops down by pivoting about hinge **70** of the rear frame **66**, allowing the operator **28** to quickly drop below the stationary member **18** and base **20**. The rear frame **66** and base **122** of front frame **68** of seat **56** remain supported by the rotatable member **22** through support members **58***a* and **58***b*. Similarly, the lateral supports **128** and **130** remain supported by support members **58***c* and **58***d*.

The handle **144** of the quick release mechanism **250** is operably coupled to the buckle **212** of the harness **200**, illustratively through a cable or tether **252**. As such, when the handle **144** is pulled axially away from the seat bottom **148**, the cable **252** likewise causes the buckle **212** to release the straps **202**, **204**, **206**, **208**, **210** of the harness **200** from each other, thereby releasing the user from the seat **56**. More particularly, when the seat bottom **148** drops downwardly, the harness **200** simultaneously releases such that the operator is free to drop down away from the seat **56**.

With reference to FIGS. **5**, **9**B, and **14**-**15**C, the footrest **172** illustratively includes a base **260** coupled to key **170** and supporting the operator interface **180**. The operator interface **180** may comprise a pair of foot pedals **262** and **264** operably coupled to electrical switches, such as rotary contacts or potentiometers **266** and **268**, wherein depressing the pedals **262** and **264** cause a signal to be transmitted to the controller **54** (FIG. **8**). It should be appreciated that other operator interfaces may be substituted for the pedals **262** and **264**, such as push buttons or pressure sensors.

Illustratively, each pedal **262**, **264** includes a lever **270**, **272** configured to be depressed by the foot of the operator **28** (clockwise in FIGS. **15**A-**15**C). Each lever **270**, **272** includes a downwardly extending tab **274**, **276** pivotally coupled by a pivot pin **278**, **280** to a bracket or clevis **282**, **284** supported by the base **260**. A spring **286**, **288** biases each lever **270**, **272** upwardly away from the base **260** (counterclockwise in FIGS. **15**A-**15**C).

In one illustrative embodiment, the operator interface **180** includes left pedal **262** and right pedal **264**. Depressing the left pedal **262** causes the controller **54** to drive actuator **32** for moving the rotatable member **22** in a counterclockwise direction, and depressing the right pedal **64** causes the controller **54** to drive the actuator **32** to rotate the rotatable member **22** in a clockwise direction. Illustratively, the degree of pivot of the respective lever **270**, **272** may vary the signal transmitted by the potentiometer **266**, **268** to the controller **54**. In response, the controller **54** may vary the rotational speed at which the actuator **32** drives the rotatable member **22**. For example, in the raised position of FIG. **15**A the actuator **32** may by inactive such that the rotatable member **22** is not driven in rotation, in the partially depressed position of FIG. **15**B the actuator **32** may drive the rotatable member **22** at a slow speed, while in the fully depressed position of FIG. **15**C the actuator **32** may drive the rotatable member **22** at a fast speed.

In a further illustrative embodiment of the operator support assembly **10**, the shock absorbing devices **182** may be part of an active system. More particularly, the shock absorbing devices **182** may comprise air bags which are inertially activated through sensors, such as through accelerometers which are set to trigger based on relatively high g movements (vertical, lateral, and/or longitudinal). The trigger may be based upon the force imparted on the base **20**, to which the seat **56** is operably coupled, by explosions in proximity thereto (typically between 40 to 80 g force). The shock absorbing devices **182** may be inflatable and/or retractable based on sensors and/or commands from a user interface. An override may be provided for instantly deflating the shock absorbing devices **182** based upon input from an emergency switch, which is accessible to the operator as well as rescue personnel. In some illustrative embodiments, activation of the emergency switch may also reposition the seat **56**, including head rest, and release the operator restraint **200** to facilitate positioning and subsequent exiting of the operator **28** from the vehicle **12**.

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.

The invention claimed is:

1. A seat assembly comprising:

a rotatable support member defining a longitudinal axis;

a seat base supported for rotation with the support member;

a plurality of first shock absorbing devices adapted to dampen a shock impulse between the rotatable support member and the seat base;

an actuator operably coupled to the support member for rotating the support about the longitudinal axis;

a controller operably coupled to the actuator;

a foot control supported below the seat base for rotation with the support member, the foot control operably coupled to the controller and configured to receive input from the foot of an operator for causing the actuator to drive the support member in rotation, wherein the foot control includes a right control pedal configured to cause the actuator to drive the rotatable member in clockwise rotation, and a left control pedal configured to cause the actuator to drive the rotatable member in a counter-clockwise direction;

a rotary electrical contact device operably coupled to the rotatable support member and configured to provide electrical communication between the foot control and the controller; and

a footrest supported below the seat base, wherein each of the right control pedal and the left control pedal includes a lever member, a pivot coupled to the lever member and the footrest, and a position sensor configured to detect the relative angular position of the lever member relative to the footrest, wherein the seat base is suspended below the support member;

further comprising a seat back coupled to said seat assembly in proximity to said seat base adapted to provide a back support for an operator seated on said seat base and a second shock absorbing device coupling said seat back with said rotatable support member, said seat assembly further comprising at least one operator restraint coupled to a structure coupled to at least one of said plurality of first shock absorbing devices adapted to maintain a torso section of said operator in substantially stationary position with respect to said seat base and seat back, said at least one operator restraint further comprising a quick release coupling system adapted to selectively couple and decouple said restraint such that the operator may be selectively restrained or released.

2. A seat assembly comprising:

a rotatable support member and a seat base suspended below the support member, the rotatable support member including a first support member and a second support member, a releasable coupling connecting the first support member to the seat base, and a pivotable coupling connecting the second support member to the seat base;

a quick release mechanism including a user interface operably coupled to the releasable coupling, wherein activation of the user interface causes the quick release mechanism to disconnect the releasable coupling from the seat base such that the seat base pivots downwardly about the pivotable coupling

a suspension coupling the seat base to the rotatable support member, the suspension including a shock absorbing device to dampen shock impulse between the rotatable support member and the seat base;

a footrest positioned below the seat base;

a foot control supported by the footrest and configured to generate a signal in response to activation thereof; and

a controller operably coupled to the foot control and configured to receive the signal from the foot control.

3. The seat assembly of claim **2**, further comprising an actuator operably coupled to the rotatable support member for driving the rotatable support member in rotation.

4. The seat assembly of claim **3**, wherein the foot control includes a right control pedal configured to cause the actuator to drive the rotatable support member in clockwise rotation, and a left control pedal configured to cause the actuator to drive the rotatable support member in a counter-clockwise direction.

5. The seat assembly of claim **4**, wherein each of the right control pedal and the left control pedal includes a lever member, a pivot coupled to the lever member and the footrest, and a position sensor configured to detect the relative angular position of the lever member relative to the footrest.

6. The seat assembly of claim **5**, where each of the right control pedal and the left control pedal includes a spring configured to bias the lever member away from the footrest.

7. The seat assembly of claim **5**, wherein the position sensor comprises a potentiometer configured to provide a variable resistance based upon the relative angular position of the lever member relative to the footrest.

8. The seat assembly of claim **3**, further comprising a rotary electrical contact device operably coupled to the rotatable support member and configured to provide electrical communication between the foot control and the controller.

9. The seat assembly of claim **2**, further comprising an adjustable leg coupling the footrest to the seat base, the footrest being movable relative to the seat base.

10. The seat assembly of claim **2**, wherein the support member defines a center opening to provide clearance for the torso of an individual supported on the seat base.

11. The seat assembly of claim **2**, further comprising a stationary member operably coupled to the support member and configured to be coupled to a vehicle platform.

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