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Bell et al.

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[54] **CONVERTIBLE AND REVERSIBLE SEAT STRUCTURE**

[75] Inventors: **Richard A. Bell; Earl C. Wallace; Ted W. Winters,** all of Andrew, Ind.

[73] Assignee: **General Engineering Manufacturing Corp.,** Andrews, Ind.

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[52] **U.S. Cl.** **297/92,** 5/47, 297/371

[51] **Int. Cl.** **B60n 1/02**

[58] **Field of Search** 297/92, 94, 103, 93, 379, 297/369, 370, 371; 5/37, 47, 48

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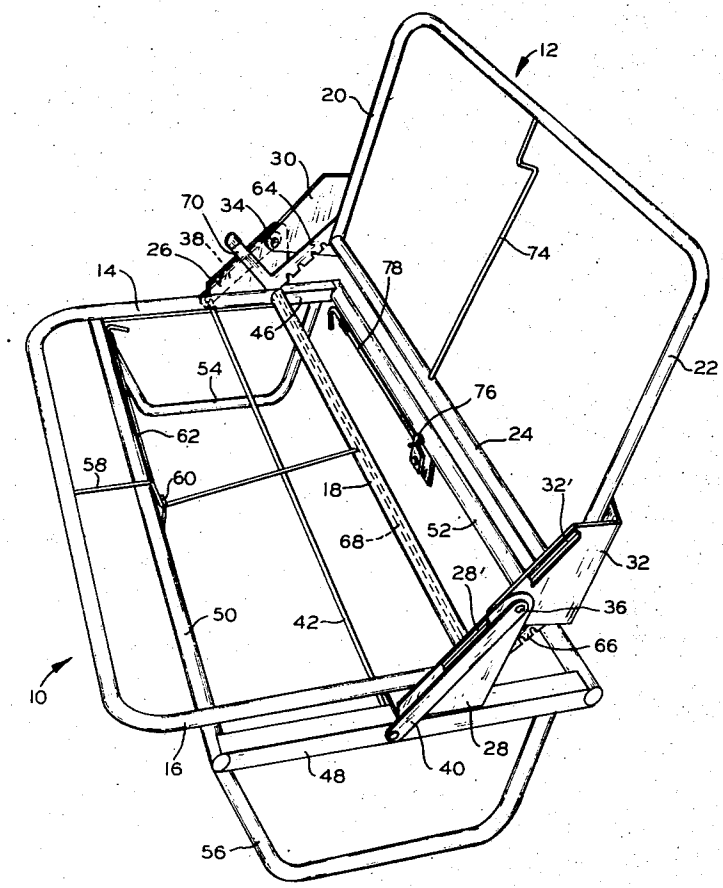
Primary Examiner—Francis K. Zugel

Attorney, Agent, or Firm—Donald R. Fraser

[57] **ABSTRACT**

A convertible and reversible seat structure such as the type used in recreational vehicles comprising a load supporting base with two pivotally attached frame members which may be alternated between a vertical position and a horizontal position such that the direction of seating is reversed and means to adjust the frame members relative to one another to vary their relative inclination.

10 Claims, 5 Drawing Figures



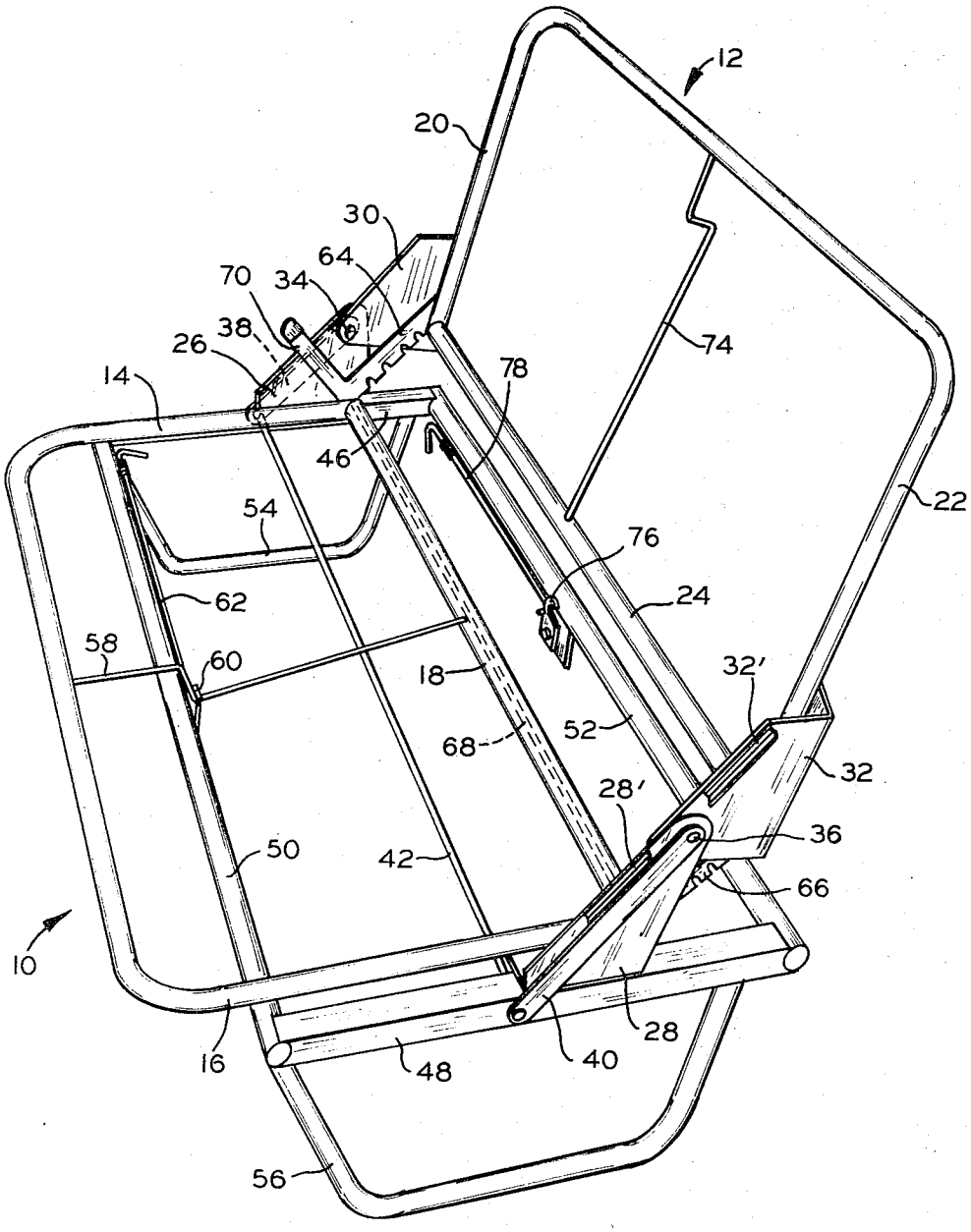

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FIG. 1

FIG. 2

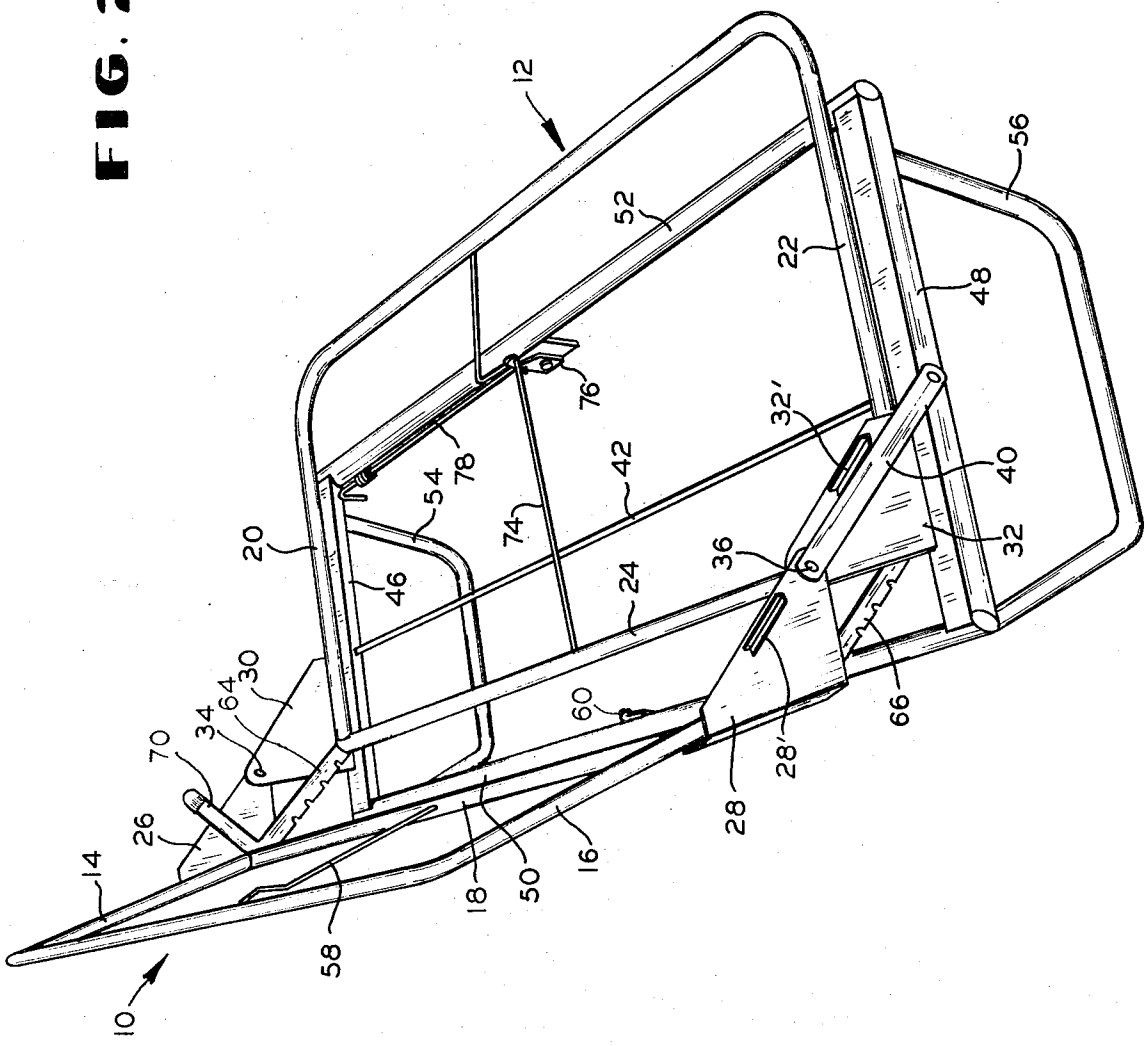
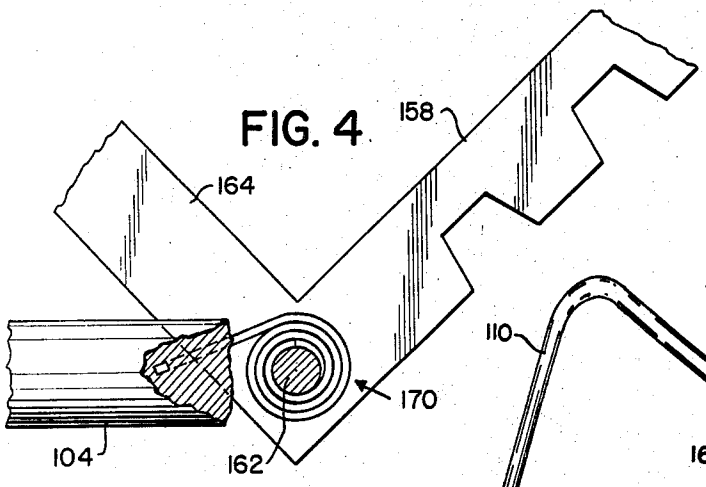

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FIG. 4


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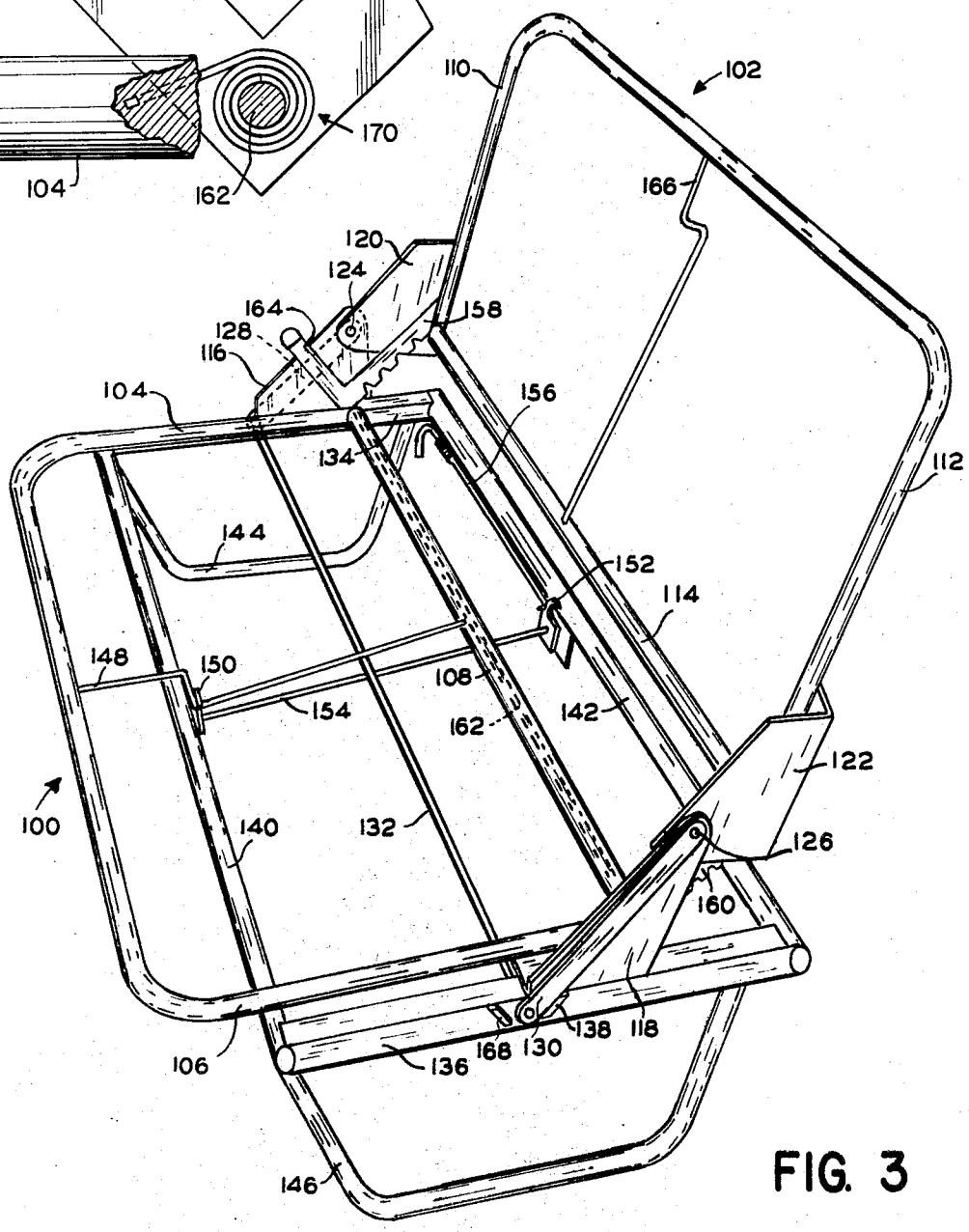

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FIG. 3

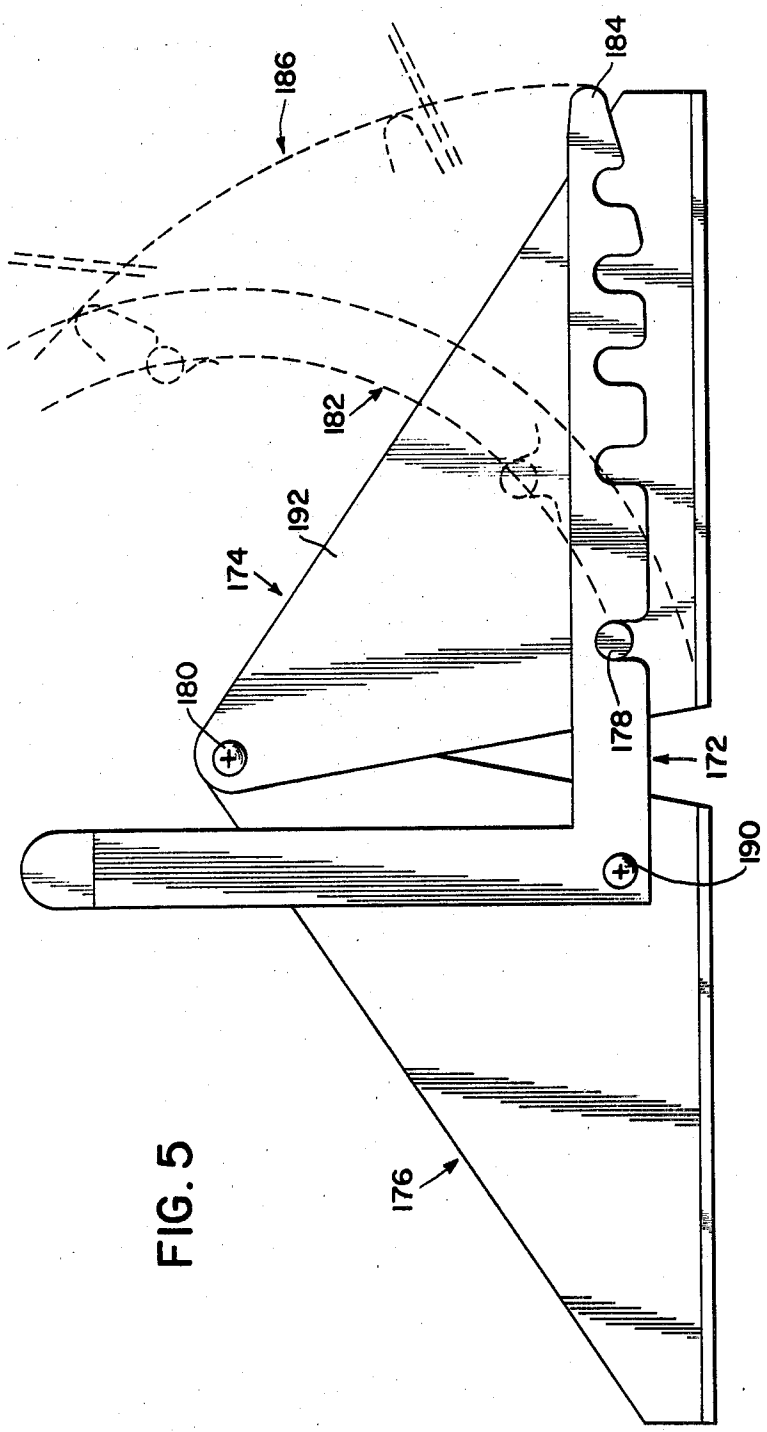


FIG. 5

CONVERTIBLE AND REVERSIBLE SEAT STRUCTURE

DESCRIPTION OF THE PRIOR ART

An increased interest in travel has, in recent years, created a demand for small vans and buses which include facilities for sleeping and eating. In general, this demand has required the installation of seats which by law are required to meet certain safety specifications. Therefore, once these seats are installed, the direction of seating can easily be changed, if for example, after facing a table for a meal, the travelers desire to face in the opposite direction for a view out a window upon resuming their trip.

SUMMARY OF THE INVENTION

Safety standards for vehicles require that the seats exhibit a certain strength, that the seat backs are securely fastened in place and that the seat base is securely fastened to the floor of the vehicle. The present invention provides a seat structure which fulfills the above-mentioned requirements and may be easily reversed to change the direction of seating. This is accomplished by pivotally connecting the seat frames and the seat base with a pair of connecting arms. These arms are then interconnected by a torque rod which maintains the relative angular position of the arms to each other as the seat frames are reversed. The arms and interconnecting rod form a reversing mechanism which is much more simple and easier to operate than the known reversing mechanisms.

It is an object of the present invention to provide a seat structure for a vehicle which can, with facility, be reversed in its seating direction.

A further object of the invention is to provide a reversible seat which may be selectively adjusted from a vertical to various positions toward the horizontal.

Still another object of the invention is to produce a convertible and reversible seat structure which can readily be varied only by the actuation of specific mechanisms.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will become readily apparent to those skilled in the art from reading the following detailed description of an embodiment of the invention when considered in the light of the accompanying drawings, in which:

FIG. 1 is a perspective view of a seat structure embodying the features of the invention with the associated cushions removed to more clearly illustrate the operating mechanism.

FIG. 2 is a perspective view of the seat structure illustrated in FIG. 1 showing the seating direction reversed from that in FIG. 1.

FIG. 3 is a perspective view of another embodiment of the seat structure of FIGS. 1 and 2.

FIG. 4 is a fragmentary plan view of a spring mechanism for the lever arms associated with the seat structure of FIG. 3.

FIG. 5 is a view in front elevation showing a pair of brackets and a slotted lever arm associated with the seat structure of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 and 2, the convertible and reversible seat structure in accordance with the invention includes a seat bottom frame, generally indicated by reference numeral **10**, and a seat back frame, generally indicated by reference numeral **12**. Advantageously, the frames **10** and **12** are typically substantially identical with one another in dimensions and construction, and are preferrably formed from a metal tubing which produces a seating assembly which is strong and rigid and light in weight. In forming the frame **10**, a single section of tubing is employed and is suitably bent so that the side portions **14** and **16** extend parallel to each other and are perpendicular to the axis of the main section of the tubing. The terminal ends of the side portions of the bottom frame **10** are connected to opposite ends of a tubular member **18** by any suitable fashion such as welding.

The seat back frame **12** is formed in a manner similar to that explained with respect to seat bottom frame **10** and includes parallel side portions **20** and **22**, the terminal ends of which are connected to a tubing member **24** which, in effect, completes the fourth side of the frame.

Each of the frames **10** and **12** has a pair of brackets **26, 28** and **30, 32**, respectively. The brackets are attached to the respective frames in the region of the terminal end portions of the sides of the frames. Brackets **26** and **30** are pivotally interconnected by a suitable pivot means **34**, while the brackets **28** and **32** are similarly pivotally interconnected by a pivot means **36**. Accordingly, the frames **10** and **12** are thereby pivotally interconnected to one another and may pivot relative to one another about the pivot points **34** and **36**. Also, pivotally connected to the pivot means **34** and **36** is the upper end of connecting arms **38** and **40**, respectively. The opposite ends of the connecting arms **38** and **40** are connected to opposite ends of a torque rod **42** which extends freely through suitable disposed apertures in horizontally disposed members **46** and **48** of a supporting base assembly. A stop member **28'** is securely fixed to bracket **28** in a position to contact the upper edge of the connecting arm **40** to ensure the desired stability and prevent the frame **10** from moving beyond a predetermined position.

The supporting base assembly is constructed of a pair of spaced apart parallelly arranged tubing members **50** and **52**, the end portions of which are suitably secured by welding to the ends of the members **46** and **48**. Attached to and depending from the framework comprised of the members **46, 48, 50**, and **52**, are leg assemblies **54** and **56**. Since the opposite ends of the torque rod **42** are secured to the lower ends of the connecting arms **38** and **40**, the arms **38** and **40** will move in unison.

Extending between the main section of the tubing of the seat frame **10** and the tube **18**, is a striker member **58** having a centrally contoured latch or detent engaging section. It will be noted in FIG. **1** that the latch engaging section of the striker member **58** is suitably engaged by a manually releasable latch assembly **60**. The latch assembly **60** is suitably secured to the tube **50** of the seat base supporting frame. The latch assembly **60** includes a horizontally extending arm **62** which is spring biased to the position illustrated in FIG. **1**. The seat back frame **12** is maintained in the position illustrated in FIG. **1** by means of a pair of slotted arms **64** and **66** maintained on respectively opposite sides of the assembly by means of a torque rod **68** which extends

internally of the tube **18.** The slotted arms **64** and **66** are caused to move in unison by actuation of a manually actuated arm **70** integral with the slotted arm **64.** By pushing downwardly on the lever handle **70,** the slotted arms **64** and **66** become disengaged from pins of the like, not shown, on the lower portion of the tubular sections **20** and **22.**

Thus, it will be appreciated that the striker member **58,** the latch assembly **60,** and the arm **62** are means for positively and selectively engaging the seat frame **10** into a horizontal position with respect to the supporting base assembly, and the slotted arms **64** and **66** are means for selectively maintaining the seat back frame **12** in a position relative to the seat frame **10** wherein the seat back frame **12** is adjustable to a number of varying positions from a substantially vertical position to a horizontal position determined primarily by the number of slots provided in the slotted arms **64** and **66.** It will be appreciated that only a single handle member **70** is illustrated; however, a similar handle structure could be provided and made integral with the slotted arm **66.** While not specifically illustrated in the FIGS. **1** and **2,** a suitable spring mechanism is advantageously employed to urge the slotted arms **64** and **66** into engaging position. Any of the conventional spring members, such as a spiral spring may be employed to urge the lever arms into an engaging position.

In order to reverse the direction of seating from the position illustrated in FIG. **1** to the position illustrated in FIG. **2,** the horizontally extending arm **62** of the latch assembly **60** is moved laterally to disengage the latch **60** from the latch engaging section of the striker member **58.** The entire assembly of the framework **10** and the framework **12** are pivoted about the pivot points **34** and **36** on the upper ends of the connecting arms **38** and **40,** respectively, and the entire assembly is moved to cause the connecting arms **38** and **40** to assume the position illustrated in FIG. **2** wherein the lower ends of the connecting arms **38** and **40** are pivoted about the torque rod **42.** Thereby, the seat frame assembly **10** becomes the seat back portion and the seat back frame **12** becomes the seat bottom. It will be observed that the framework **12** has a striker member **74** having a centrally contoured latch or detent engaging section to engage with the latch assembly **76** secured to the supporting base assembly tube **52.** The latch assembly **76** is further provided with a spring-biased arm **78** which functions to maintain the latch assembly **76** in a closed position. It will be observed that the contoured latch or detent engaging section of the striker **74** effectively cams the latch assembly **76** open upon downward movement thereof and then when the framework **12** is in a horizontal position the latch assembly **76** is urged to a closed or locked position. A stop member **32'** is securely fixed to bracket **32.** It will be noted that in the position of the structure illustrated in FIG. **2** the stop member **32'** contacts the upper edge of the connecting arm **40** to ensure the desired stability and prevent the frame **12** from moving beyond a predetermined position.

Another embodiment of the invention is illustrated in FIG. **3** which includes a seat bottom frame, generally indicated by reference numeral **100,** and a seat back frame, generally indicated by reference numeral **102.** Advantageously, the frames **100** and **102** are typically substantially identical with one another in dimensions and construction, and are preferrably formed from a metal tubing which produces a seating assembly which is strong and rigid and light in weight. In forming the frame **100,** a single section of tubing is employed and is suitably bent so that the side portions **104** and **106** extend parallel to each other and are perpendicular to the axis of the main section of the tubing. The terminal ends of the side portions of the bottom frame **100** are connected to opposite ends of a tubular member **108** by any suitable fashion such as welding.

The seat back frame **102** is formed in a manner similar to that explained with respect to seat bottom frame **100** and includes parallel side portions **110** and **112,** the terminal ends of which are connected to a tubing member **114** which, in effect, completes the fourth side of the frame.

Each of the frames **100** and **102** has a pair of brackets **116, 118** and **120, 122,** respectively. The brackets are attached to the respective frames in the region of the terminal end portions of the sides of the frames. Brackets **116** and **120** are pivotally interconnected by a suitable pivot means **124,** while the brackets **118** and **122** are similarly pivotally interconnected by a pivot means **126.** Accordingly, the frames **100** and **102** are thereby pivotally interconnected to one another and may pivot relative to one another about the pivot points **124** and **126.** Also, pivotally connected to the pivot means **124** and **126** is the upper end of connecting arms **128** and **130,** respectively. The opposite ends of the connecting arms **128** and **130** are connected to opposite ends of a torque rod **132** which extends freely through suitable disposed apertures in horizontally disposed members **134** and **136** of a supporting base assembly. A stop member **138** is securely fixed to member **136** in a position to contact the lower edge of connecting arm **130** to ensure the desired stability and prevent the frame **100** from moving beyond a predetermined position.

The supporting base assembly is constructed of a pair of spaced apart parallelly arranged tubing members **140** and **142,** the end portions of which are suitably secured by welding to the ends of the members **134** and **136.** Attached to and depending from the framework comprised of the members **134, 136, 140,** and **142** are leg assemblies **144** and **146.** Since the opposite ends of the torque rod **132** are secured to the lower ends of the connecting arms **128** and **130,** the arms **128** and **130** will move in unison.

Extending between the main section of the tubing of the seat frame **100** and the tube **108,** is a striker member **148** having a centrally contoured latch or detent engaging section. It will be noted that in FIG. **3** the latch engaging section of the striker member **148** is suitably engaged by a manually releasable latch assembly **150.** The latch assembly **150** is suitably secured to the tube **140** of the seat base supporting frame. The latch assembly **150** is interconnected with a similar latch assembly **152** by rod **154.** The latch assembly **152** includes a horizontally extending arm **156** which is spring biased to the position illustrated in FIG. **3.** The seat back frame **102** is maintained in the position illustrated in FIG. **3** by means of a pair of slotted arms **158** and **160** maintained on respectively opposite sides of the assembly by means of a torque rod **162** which extends internally of the tube **108.** The slotted arms **158** and **160** are caused to move in unison by actuation of a manually actuated arm **164** integral with the slotted arm **158.** By pushing downwardly on the lever handle **164,** the slotted arms **158** and **160** become disengaged

from pins of the like, not shown, on the lower portion of the tubular sections **110** and **112.**

Thus, it will be appreciated that the striker member **148,** the latch assemblies **150** and **152,** the rod **154,** and the arm **156** are means for positively and selectively engaging the seat frame **100** into a horizontal position with respect to the supporting base assembly and the slotted arms **158** and **160** are means for selectively maintaining the seat back frame **102** in a position relative to the seat frame **100** wherein the seat back frame **102** is adjustable to a number of varying positions from a substantially vertical position to a horizontal position determined primarily by the number of slots provided in the slotted arms **158** and **160.** It will be appreciated that only a single handle member **164** is illustrated; however, a similar handle structure could be provided and made integral with the slotted arm **160.** As illustrated in FIG. **4,** a suitable spring mechanism is advantageously employed to urge the slotted arms **158** and **160** into engaging position. Any of the conventional spring members, such as spiral spring **170** may be employed to urge the lever arms into engaging position. The inner end portion of spiral spring **170** may be attached to torque rod **162** while the outer end portion is attached to side portion **104** of seat bottom frame **100.** When handle member **164** is rotated in a counterclockwise direction to disengage slotted arms **158** and **160** (not shown), spiral spring **170** will unwind and then will apply force to rotate slotted arms **158** and **160** into the engaging position when handle member **164** is released.

Referring to the FIG. **5** there is shown a slotted arm **172,** similar to the slotted arm **64** of FIG. **1,** and brackets **174** and **176** for maintaining a seat back frame in a predetermined position. As was previously stated, a pin can be attached to the lower tubular section of the seat back frame, or a pin **178** can be attached to the bracket **174** which in turn is attached to the seat back frame, not shown. In the position illustrated, a first slot of the slotted arm **172** engages the pin **178** to maintain the brackets with the attached seat frames in a substantially horizontal position. As shown, the bracket **174** can be pivoted at the pivot point **180** relative to the bracket **176** so that the pin **178** moves along the dashed line **182** to be engaged by successive slots of the slotted arm **172.** The end **184** of the slotted arm **172** moves along the dashed line **186** to clear the portion **188** of the bracket **174** to which the seat frame is attached as the slotted arm pivots at the pivot point **190.** The portion **188** is formed at approximately a right angle to the portion **192** of the bracket **174** and extends beyond the slotted arm **172** so that the slotted arm is positioned between the portion **192** and the seat frame.

In order to reverse the direction of seating from the position illustrated in FIG. **3,** the horizontally extending arm **156** of the latch assembly **152** is moved laterally to disengage the latch **150** from the latch engaging section of the striker member **148.** The entire assembly of the framework **100** and the framework **102** are pivoted about the pivot points **124** and **126** on the upper ends of the connecting arms **128** and **130,** respectively, and the entire assembly is moved to cause the connecting arms **128** and **130** to assume the position wherein the lower ends of the connecting arms **128** and **130** are pivoted about the torque rod **132.** Thereby, the seat frame assembly **100** becomes the seat back portion and the seat back frame **102** becomes the seat bottom. It will be observed that the framework **102** has a striker member **166** having a centrally contoured latch or detent engaging section to engage with the latch assembly **152** secured to the supporting base assembly tube **142.** It will be observed that the contoured latch or detent engaging section of the striker **166** effectively cams the latch assembly **152** open upon downward movement thereof and then when the framework **102** is in a horizontal position the latch assembly **152** is urged to a closed or locked position. A stop member **168** is securely fixed to member **136.** It will be noted that when the position of the structure is reversed from that illustrated in FIG. **3,** the stop member **168** contacts the lower edge of the connecting arm **130** to ensure the desired stability and prevent the frame **102** from moving beyond a predetermined position.

In accordance with the provisions of the patent statutes, I have explained the principle and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, it must be understood that within the spirit and the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

What we claim is:

1. A convertible and reversible seat structure comprising:

a load supporting base;

two load supporting frames:

bracket means attached to opposite sides of said load supporting frames;

means pivotally interconnecting said frames and said base including a single pair of connecting arms attached at one end to said bracket means on opposite sides of said load supporting base;

a rod attached to the other ends of said connecting arms and pivotally attached to respective opposite sides of said base;

latching means for positively and selectively engaging one of said frames with said base;

means for selectively maintaining one of said frames in a position relative to the other of said frames; and

means preventing said frames from moving beyond a predetermined position.

2. The invention defined in claim **1** wherein said rod attached to said connecting arms is in a neutral position when said frames are maintained in a seating position.

3. The invention defined in claim **1** wherein said latching means for positively and selectively engaging one of said frames with said base includes a striker member attached to each of said frames having a contoured engaging section.

4. The invention defined in claim **3** wherein said latching means for positively and selectively engaging one of said frames with said base includes a spring biased latch member disposed on at least two opposing sides of said base.

5. The invention defined in claim **3** wherein said latching means for positively and selectively engaging one of said frames with said base includes a spring biased latch member disposed on one side of said base, a latch member disposed on the side of said base opposite said spring biased latch member and a rod attached to said latch members to maintain the relative angular position of said latch members to each other.

6. The invention defined in claim 1 wherein said means for selectively maintaining one of said frames in a position relative to the other of said frames includes slotted arm means pivotally connected to opposite sides of one of said frames and spring means normally biasing said arm means to a latching position.

7. The invention defined in claim 6 wherein said means for selectively maintaining one of said frames in a position relative to the other of said frames includes a rod attached to said arm means to maintain the relative angular position of said arm means to each other.

8. The invention defined in claim 7 wherein said means for selectively maintaining one of said frames in a position relative to the other of said frames includes a handle affixed to at least one of said slotted arm means.

9. The invention defined in claim 1 wherein said means preventing said frames from moving beyond a predetermined position includes stop members attached to said bracket means and alternately engaging each of said connecting arms as each of said frames is latched to said base.

10. The invention defined in claim 1 wherein said means preventing said frames from moving beyond a predetermined position includes stop members attached to said base and alternately engaging each of said connecting arms as each of said frames is latched to said base.

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